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Competent Person Report

Yancoal Australia Ltd

Job Number: ADV-BR-11019
Report Date: 26 November 2018
Effective Date: 30th June, 2018

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Executive Summary

Yancoal Australia Ltd
Level 18, Tower 2, 201 Sussex Street
Sydney NSW 2000
Phone: +61 2 8583 5300
26th November, 2018

RE: Competent Person Report

To Whom it May Concern,

RPM Advisory Services Limited ("RPM") has been engaged by Yancoal Australia Ltd. (ASX:YAL) referred to as ("Yancoal", the "Client" or the "Company") to undertake an Independent Technical Review ("ITR") and compile a Competent Person Report ("CPR" or the "Report") (as defined by Chapter 18 of the Rules Governing the Listing Rules of the Stock Exchange of Hong Kong (the "Listing Rules") on Multiple Coal Assets (the "Assets"). The Assets are located within the Hunter and Central Western Region of New South Wales (NSW) and Central Highlands Region of Queensland, Australia.

The Assets in NSW include Hunter Valley Operations ("HVO"), Mount Thorley Operation and Warkworth Mine (combined "MTW"), Moolarben, Ashton, Austar, Donaldson and Stratford and Duralie Operations, whilst the Queensland assets include Yarrabee and Middlemount Operations in Queensland. Collectively these assets are regarded as the "Projects" or the "Operations". The Ashton, Austar and Donaldson mines are managed by YAL on behalf of Watagan, YAL's unconsolidated, wholly-owned subsidiary. The remaining operations are owned (at various interests) and operated/managed by Yancoal with the exception of Middlemount which is a Joint Venture with Peabody and HVO with the recent formation of a Joint Venture with Glencore.

As at March, 2016 Yancoal lost accounting control of the Watagan Assets (Ashton, Austar and Donaldson), with all material decisions made by the Watagan Board, not Yancoal or its Directors. RPM understands Yancoal is the manager and operator of the mines, pursuant to mining and management services agreements and have day-to-day operational jurisdiction over the operations, however all mine plans for each year and annual capital expenditure and operational expenditure budgets are approved by the Watagan Board. The information contained within this report is based on data provided by the Company and the approved mine plans.

The process and conclusions of the ITR are presented in this Report and will be included in the HKEx prospectus prepared as part of the Initial Public Offering.

The statements of Coal Resources and Coal Reserves (as defined in ***Appendix B***) have been reported to be in accordance with the recommendations of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves JORC Code (2012 Edition) and the Australian Guidelines for the Estimation and Classification of Coal Resources (2014)

RPM's technical team ("the Team") consisted of International Competent Person's, International Senior Consultants, Executive Mining Engineers and Consultant Geologists as well as environmental/social specialists with significant coal mining experience. RPM's Hong Kong Competent Person was responsible for compiling or supervising the compilation of the Report and the JORC reported Statements of Coal Resources and Coal Reserves, stated within. The Team's qualifications and experience is detailed in ***Appendix A*** for reference.

A site visit was conducted by members of the Team to the Assets' operations to familiarise themselves with the Assets characteristics. The site visit to HVO/MTW was undertaken on the 16th February, 2017 by Ms. Trisha, Wilson Mr. Peter Ellis and Mr. Jolyon Peart while all other assets were visited during the weeks of the 23rd and 30th April, 2018. During the site visits the Team inspected the mining operations, the Coal processing plant, the tailings storage facility, the water supply system, the power distribution system and conducted general inspections of the Assets area. The visit was also used to gain a better understanding of the Assets status. The Team had open discussions with the Company's personnel on technical aspects relating to the relevant issues. The Company's personnel were cooperative and open in facilitating RPM's work.

In addition to work undertaken to generate independent JORC Coal Resources and Coal Reserves estimates, the CPR relies largely on information provided by the Company, either directly from the sites and other offices, or from reports by other organizations whose work is the property of the Company or its subsidiaries. The data relied upon for the JORC Coal Resources and Coal Reserves estimates independently completed by RPM have been compiled primarily by the Client and the Company and subsequently reviewed and verified as well as reasonably possible by RPM. The CPR is based on information made available to RPM as at 26 November, 2018. The Company has not advised RPM of any material change, or event likely to cause material change, to the underlying data, designs or forecasts since the date of Assets inspections.

Asset Summary

- The business consists of multiple open pit and underground operating mines which exploit and process market ready coal products for international demand (***Table 1***). In addition to eight operating mines, the Assets include a re-start project (Donaldson) which is currently on care and maintenance pending re-start at the Company's discretion and the potential MTW underground project. Of importance the Assets include the large world class, low risk open cut operations, HVO, MTW and Moolarben which collectively contribute 80% of all future coal products planned to be sold over the Life of Mine ("LOM") planning period.
- The eight operating mines are located in three areas, the Hunter and Central Western Regions of NSW and Central Highland region of Queensland. Both areas contain a number of medium to large scale coal deposits which are well known geologically and have been in operation for several decades in some instances.
- Run of Mine ("ROM") coal and overburden is mined via conventional truck, shovel/excavator and/or dragline at the open cut operations and via longwall mining methods at the underground operations. The majority of ROM coal is washed at coal handling processing plants ("CHPP") and loaded on trains via dedicated train loading points. All products are transported via rail links to the deep water Ports of Newcastle in NSW and one of three ports in Queensland. A variety of product coals are produced across the group including thermal coal products and metallurgical coal products including semi soft to semi hard coking coal products and pulverised coal injection ("PCI") product. These products can be customised and quantities can be varied based on market and customer demands within each operation and between all operations where rail and port synergies exist to optimise revenue based on short term market trends.
- In addition to the mining and the surface processing plants and office infrastructure, significant regional and local infrastructure provide support to the operations and the forecast production requirements. A review by RPM of the regional and local infrastructure indicates that the area has suitable transport logistics connecting the operating assets to local and international markets for both supply of consumables and transport of product to market. The Projects are located close to well established highways, water sources with power provided via a long-term agreement with electric utility company serving the regions.
- The Assets are operated directly by Yancoal or via various joint venture arrangements with ownership proportions differing between the operations (***Table 1***). Of particular note, a Joint Venture was recently formed between Yancoal and Glencore for HVO and an Operational Integration Agreement ("OIA") allows MTW to be managed as a single integrated operation by the Company. Under the terms of the OIA, export coal can be produced from either area and is allocated between the two joint ventures based on a tonnage commitment ratio. The Middlemount mine is managed by Middlemount Coal Pty Ltd which is an incorporated joint venture between Peabody and Yancoal. Further to this the Ashton, Austar and Donaldson assets are owned by Watagan (wholly owned subsidiary of Yancoal), controlled by Independent Directors however are managed directly by Yancoal pursuant to management agreements systems, plans and the operation of equipment.

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Table 1 Ownership Control of Assets.

Asset	Yancoal Ownership[3]	Operational Control	Type
Hunter Valley Operations ("HVO") - OC	51%	Joint Venture	Met/Thermal
Mount Thorley[1] - OC	80.0%	Yancoal	Met/Thermal
Warkworth[1] - OC	84.47%		Met/Thermal
Moolarben - OC & UG	81%	Yancoal	Thermal
Ashton[2] - OC & UG	100%	Yancoal	Met/Thermal
Yarrabee - OC	100%	Yancoal	PCI/Thermal
Stratford and Duralie - OC	100%	Yancoal	Met/Thermal
Austar[2] - UG	100%	Yancoal	Met
Donaldson[2] - UG	100%	Yancoal	Met/Thermal
Middlemount - OC	50%	Joint Venture	PCI/Met

Note: Supplied by the Company
[1] Mount Thorley and Warkworth mines are referred to in the Report as one operation know as "MTW"
OC = Open Cut, UG = Underground
2 Assets owned by Watagan (wholly owned subsidiary of Yancoal) and managed directly by Yancaol.
3 Based on the ownership at Latest Applicable Date

RPM highlights that the statements contained within this Report all Coal Resources and Coal Reserves within the Assets on a 100% equity basis unless otherwise stated.

Mineral Resource and Ore Reserves Estimates

- The review undertaken by RPM of the drilling and sampling procedures indicates that in general, good practices were used with no material issues noted. RPM also notes the majority of the data used for the Resource estimations were derived from drilling which has followed the Companies procedures and protocols typically considered to be industry standard, however this varies between operations. As such, RPM considers the data which supports the resource estimations to have no material sample bias and is representative of the samples taken. Further details of the data verification and types is provided in ***Section 6***.
- Results of the independent Coal Resources estimates for the Assets as at 30th June, 2018 are tabulated in the Statement of Coal Resources in ***Table 2*** below, which were developed in line with the 2014 Coal Guidelines and reported in line with the requirements of the 2012 JORC and the reporting standards of Chapter 18 of the HKEx Listing Rules. The Statement of Coal Resources is therefore suitable for public reporting. The Statement of Coal Resources shown in ***Table 2*** and graphically in ***Figure 1*** are inclusive and not additional to the Coal Reserves reported in ***Table 3***.
- In addition to the Coal Resources for the operating assets, 16.8Mt of Indicated and 80Mt of Inferred for a total of 96.8Mt of Coal Resources is contained with the Monash Deposit located 25km south of Singleton. The Monash deposit is considered an underground coal target with limited potential for open cut mining.
- The Assets are mature open cut/underground mining operations that have approvals and license to operate for an extended period of time. As part of the Coal Resource reporting, RPM has made a number of general assumptions to define the reasonable prospects for economic extraction, these assumptions are detailed in ***Section 7.6*** for each asset.

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Table 2 Statement of Coal Resources by Operation as at 30th June, 2018.

Operation	Classification				
	Measured (Mt)	Indicated (Mt)	M + I (Mt)	Inferred (Mt)	Total (Mt)
HVO (OC/UG)	704	1,430	2,134	1,654	3,788
Mount Thorley (OC/UG)	27	75	102	153	255
Warkworth (OC/UG)	197	713	910	527	1,437
Moolarben (OC)	438	105	543	69	612
Moolarben (UG)	287	131	418	129	547
Ashton (OC)	25	49	74	70	144
Ashton (UG)	52	18	70	15	85
Yarrabee (OC)	94	80	174	20	194
Stratford and Duralie (OC)	11	196	207	76	283
Stratford and Duralie (UG)	-	1	1	35	36
Austar (UG)	70	80	150	69	219
Donaldson (OC)	10	-	10	-	10
Donaldson (UG)	178	326	503	95	598
Middlemount (OC/UG)	73	47	120	1	121
Total (100% Basis)	**2,165**	**3249**	**5,414**	**2,913**	**8,327**
Yancoal Attributable Share[6]	**1,610**	**2,355**	**3,964**	**1,952**	**5,916**

Notes for Table 2:

1. *The Statement of JORC Coal Resources for HVO, Mount Thorley and and Warkworth have been compiled under the supervision of Mr. Peter Ellis who is a full-time employee of RPM and a Registered Member of the Australian Institute of Mining and Metallurgy. Mr. Ellis has sufficient experience that is relevant to the style of Coal and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code.*
2. *The Statement of JORC Coal Resources for Yarrabee and Middlemount have been compiled under the supervision of Mr. Michael Johnson who is a sub-consultant to RPM and a Registered Member of the Australian Institute of Mining and Metallurgy. Mr. Johnson has sufficient experience that is relevant to the style of Coal and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code.*
3. *The Statement of JORC Coal Resources for all others deposits have been compiled under the supervision of Mr. Brendan Stats who is a full-time employee of RPM and a Registered Member of the Australian Institute of Mining and Metallurgy. Mr. Stats has sufficient experience that is relevant to the style of Coal and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code.*
4. *All Coal Resources figures reported in the table above represent estimates at 30th June, 2018. Coal Resource estimates are not precise calculations, being dependent on the interpretation of limited information on the location, shape and continuity of the occurrence and on the available sampling results. The totals contained in the above table have been rounded to reflect the relative uncertainty of the estimate. Rounding may cause some computational discrepancies.*
5. *Coal Resources are reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The Joint Coal Reserves Committee Code – JORC 2012 Edition).*
6. *Based on the ownership at the latest applicable date*

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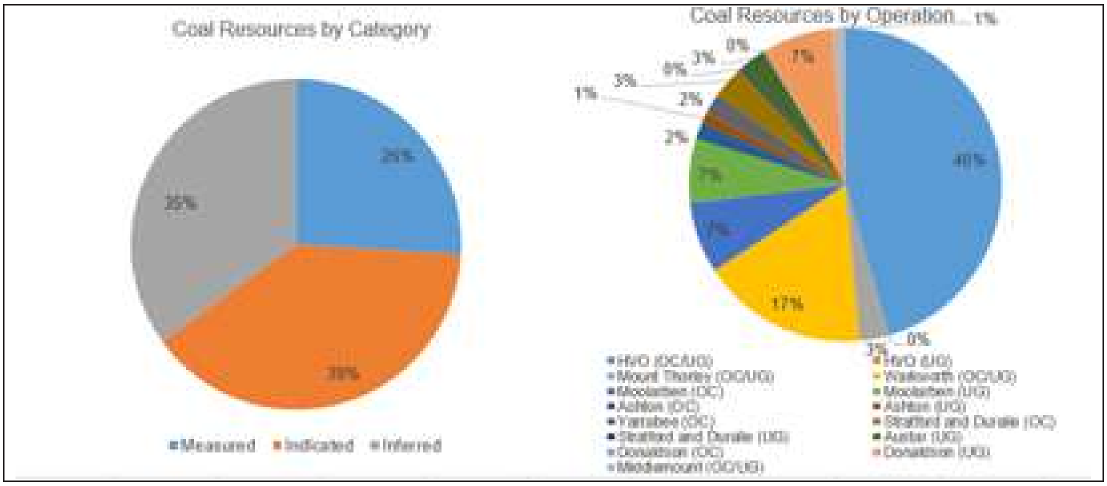
Figure 1 Graphical Representation Coal Resources (100% Basis)



- The Independent Statement of Ore Reserves for the Project is estimated as at the 30th June, 2018 by RPM and reported in accordance with the JORC Code. RPM has confirmed suitable Modifying Factors to apply in the Ore Reserve estimation process following review of site data and technical information contained with studies of at least a pre-feasibility level of confidence. Further information taken into consideration included the proposed life of mine plans, mining method, forecast processing plant recoveries, environmental management and license to operate in addition to the historical performance of each operations. Further details ae provided in ***Section 8, 9 and 10*** for each Asset.
- The Proved and Probable Coal Reserves estimate for each Asset is summarised in ***Table 3*** and shown graphically in ***Figure 2***. The Coal Reserves estimates reported below are included in the Measured and Indicated Coal Resources quantities reported in ***Table 2*** and are not additional to. RPM highlights that approximately 80% of the Coal Reserves are contained within the large world class Tier 1 assets of HVO, MTW and Moolarben.

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Table 3 Statement of JORC Coal Reserves Estimate within the Final Designs as at 30th June, 2018

Operation	Coal Reserves			Marketable Reserves		
	Proved (Mt)	Probable (Mt)	Total (Mt)	Proved (Mt)	Probable (Mt)	Total (Mt)
HVO (OC)	333	463	796	229	325	554
Mount Thorley (OC)	-	8	8	-	5	5
Warkworth (OC)	125	189	314	87	133	220
Moolarben (OC)	178	12	189	136	12	148
Moolarben (UG)	54	13	67	54	13	67
Ashton (OC)	-	14	14	-	7.8	7.8
Ashton (UG)	23	10	33	13	6	18
Yarrabee (OC)	36	19	55	28	14	42
Stratford and Duralie (OC)	-	44	44	-	26	26
Austar (UG)	-	41	41	-	31	31
Donaldson (UG)	-	62	62	-	32	32
Middlemount (OC)	50	37	87	40	27	67
Total (100% basis)	**799**	**912**	**1,710**	**587**	**632**	**1,218**
Yancoal Attributable Share[5]	**547**	**631**	**1,178**	**406**	**432**	**837**

Notes:
1) *The Statement of JORC Open Cut Coal Reserves has been compiled under the supervision of Mr. Doug Sillar who is a full time Senior Mining Engineer employed by RPM and is a Member of the Australian Institute of Mining and Metallurgy. Mr. Sillar has sufficient experience which is relevant to the style of Coal and type of deposit under consideration to qualify as a Competent Person as defined in the JORC Code.*
2) *The Statement of JORC Underground Coal Reserves has been compiled under the supervision of Mr. Graeme Rigg who is a full time Senior Mining Engineer employed by RPM and is a Member of the Australian Institute of Mining and Metallurgy. Mr. Rigg has sufficient experience which is relevant to the style of Coal and type of deposit under consideration to qualify as a Competent Person as defined in the JORC Code.*
3) *Tonnages are metric tonnes*
4) *Figures reported are rounded which may result in small tabulation errors. Coal Reserves have been estimated under the 2012 Edition of the JORC Code.*
5) *Based on ownership at the latest applicbale date.*

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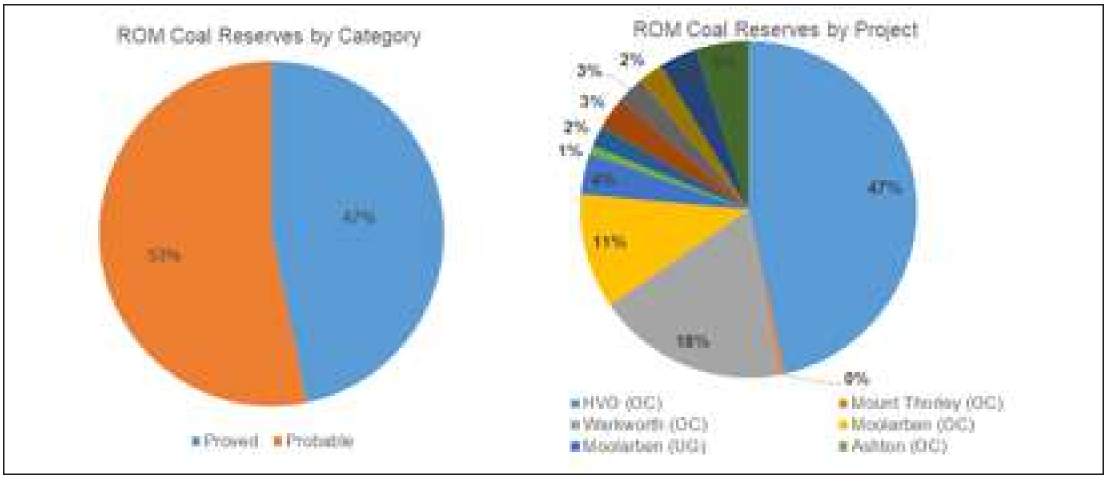
Figure 2 Graphical Representation JORC Coal Reserves Estimate within the Final Designs



- To determine the economic viability of the Coal Reserves, RPM undertook a variety of analyse including review of Company margin ranking/pit optimisation and independent break even strip ratio analysis to confirm appropriate pit designs as well as underground mine design reviews. Following confirmation of the design, the quantities and Life of Mine schedules were reviewed and/or updated and discounted cashflow models were constructed to confirm economic viability for each asset. RPM highlights that each asset was considered a separate standalone operation for the cashflow analysis with no blending or cross cost sharing assumed which typically occur on a short term basis. While RPM is aware blending may occur between operations, this was not included as it is difficult to quantify over the long mine lives and would present an upside case versus the assumed base case which should be utilised for the estimation of Coal Reserves.

Exploration Potential

- Exploration has been undertaken over numerous generations over the last decades with the main focus on the areas for which Coal Resources have been estimated. Although these areas have a long history of exploration, RPM considers there to be reasonable potential to define extensions to the coal seams within the Project areas both near planned mining infrastructure and within the broader exploration concession. In addition RPM considers the large concession holding of the Company within particular projects contains numerous targets which present opportunities to increase the resource base and potentially add feed sources to the plant in turn increasing the mine life. ***Section 7.5*** outlines the potential for each asset.

Mining and Production

- All mining operations at the assets are mined via conventional truck, shovel and/or dragline open cut or via underground Longwall mining methods. The majority of ROM coal is washed at coal handling processing plants ("CHPP") and loaded on trains via dedicated train loading points. All products are transported via rail links to the deep water Ports of Newcastle or one of three ports in Queensland.
- The Life of Mine schedules were developed by RPM in conjunction with the Company targeting a variety of ROM Coal production rates dependent on the operation. These vary between 2 Million Tonnes per Annum (Mtpa) at Stratford and Duralie up to 20.6Mtpa at HVO as outlined in ***Table 5***. Each open pit operation consists of numerous open pits which are mined at various times throughout the mine life, while the underground operations typically target specific seams which are mined in spatial areas (known as longwall panels) within the same seam.

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- The majority of the assets are at stable production with no significant expansions required to achieve the LOM production quantities planned. As such the groups ROM and Product coal annual production is relatively stable over the next 10 years ranging between 70 and 75Mt ROM before decreasing production with assets nearing the end of their current planned mine life, such as Ashton, Austar and Middlemount. RPM has estimated the total LOM Schedule (including inferred) to achieve a variety of mine life's which range from 11 up to 43 years (***Table 4*** and ***5***). RPM notes that the key low cost assets of HVO, MTW and Moolarben each have mine life's of at least 20 years (43 for HVO) with the highest production rates in the group ranging between 17 and 20.6Mtpa.

Table 4 Operations Mine Life's as at 30th June, 2018

Operation	Mine life (Years)
HVO	43
MTW	23
Moolarben	20
Yarrabee	38
Austar	17
Ashton	13
Stratford and Duralie	35
Donaldson	11
Middlemount	20

- The CHPP facilities are well-established and capable of processing the forecast ROM Coal, with the exception of Ashton and Yarrabee. The operations require upgrades to achieve planned rates for which CAPEX is included in the forecast. While the infrastructure is comparatively old in some operations, it appears to be reasonably well maintained which is required and forecast to continue. All operations utilised CHPP's which are owned and located onsite with the exception of Donaldson which is planned to utilise a third party CHPP located 3km from site. The LOM Coal yields vary between operations based on coal qualities for each seam, however the groups LOM forecast based on the expected bypass and throughputs varies between 71% and 76% with a LOM total average of 75%.

Table 5 LOM Consolidated Schedule

Operation	Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2040	Avg. 2041-2050	Avg. 2051-2060	Total LOM
HVO	ROM Coal	Mt	10.2	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.8	15.4	**814.9**
	Coal Processed	Mt	10.2	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.8	15.4	**814.9**
	Plant Yield	%	71.3	69.9	70.3	70.6	70.7	71.4	71.8	71.7	70.7	71.0	70.3	68.7	69.2	69.1	67.5	69.9	69.2	**69.6**
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Coal Product	Mt	7.3	14.4	14.5	14.6	14.6	14.7	14.8	14.8	14.6	14.6	14.5	14.2	14.3	14.2	13.9	13.8	10.7	**567.4**
	Effetive Yield	%	71.3	69.9	70.3	70.6	70.7	71.4	71.8	71.7	70.7	71.0	70.3	68.7	69.2	69.1	67.5	69.8	69.6	**69.6**
MTW	ROM Coal	Mt	8.5	17.0	17.0	17.0	17.0	17.0	16.9	16.9	16.9	16.7	16.7	16.6	16.6	16.7	14.8			**368.1**
	Coal Processed	Mt	8.5	17.0	17.0	17.0	17.0	17.0	16.9	16.9	16.9	16.7	16.7	16.6	16.6	16.7	14.8			**368.1**
	Plant Yield	%	69.4	67.8	69.4	69.8	69.7	70.0	69.8	69.6	69.5	69.3	69.5	69.1	69.4	69.8	70.6			**69.7**
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			**0.0**
	Coal Product	Mt	5.9	11.5	11.8	11.9	11.8	11.9	11.8	11.8	11.7	11.6	11.6	11.4	11.6	11.6	10.4			**256.5**
	Effetive Yield	%	69.4	67.8	69.4	69.8	69.7	70.0	69.8	69.6	69.5	69.3	69.5	69.1	69.4	69.8	70.4			**69.7**
Moolarben	ROM Coal	Mt	8.9	18.9	20.0	20.0	20.0	18.8	18.7	18.6	17.6	15.5	12.0	11.9	11.3	11.4	1.3			**270.6**
	Coal Processed	Mt	6.1	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	12.0	11.9	11.3	11.4	1.3			**212.7**
	Plant Yield	%	71.8	77.1	74.6	72.8	75.4	75.4	76.4	77.7	78.4	78.5	78.4	78.4	78.4	77.8	74.1			**76.9**
	Coal Bypassed	Mt	2.8	5.9	7.0	7.0	7.0	5.8	6.7	6.6	5.6	3.5								**57.9**
	Coal Product	Mt	8.1	15.9	16.7	16.5	16.8	15.6	15.9	15.9	15.1	13.0	9.4	9.3	8.8	8.9	0.9			**222.3**
	Effetive Yield	%	90.8	84.2	83.5	82.3	84.0	83.0	84.9	85.6	85.3	83.4	78.4	78.4	78.4	77.8	70.2			**82.1**
Yarabee	ROM Coal	Mt	2.1	4.0	4.3	4.8	4.6	5.2	5.1	4.9	5.2	4.2	4.2	4.2	4.0	4.2	4.0	4.0	3.5	**147.6**
	Coal Processed	Mt	1.1	2.3	3.2	3.6	3.4	3.6	4.1	4.1	4.1	3.5	3.4	3.5	3.4	3.5	3.4	3.4	2.7	**120.6**
	Plant Yield	%	78.8	85.5	75.9	78.6	76.5	77.4	74.0	74.7	80.4	75.8	75.5	74.1	74.1	73.8	73.4	74.1	75.8	**76.1**
	Coal Bypassed	Mt	0.9	1.7	1.1	1.2	1.2	1.6	1.0	0.8	1.1	0.7	0.8	0.7	0.6	0.7	0.6	0.5	0.8	**26.9**
	Coal Product	Mt	1.8	3.7	3.5	4.0	3.8	4.4	4.0	3.9	4.4	3.4	3.4	3.3	3.1	3.3	3.1	3.1	2.9	**117.5**
	Effetive Yield	%	88.2	91.5	82.0	83.8	82.9	84.4	79.2	78.7	84.4	79.9	79.9	78.2	77.9	77.9	77.1	77.5	82.0	**79.6**
Austar	ROM Coal	Mt	0.0	1.7	2.2	2.9	2.7	2.7	3.1	2.8	3.2	2.5	2.8	3.1	2.5	2.6				**42.6**
	Coal Processed	Mt	0.0	1.7	2.2	2.9	2.7	2.7	3.1	2.8	3.2	2.5	2.8	3.1	2.5	2.6				**42.6**
	Plant Yield	%	0.0	86.0	79.0	74.0	70.0	73.0	68.0	70.0	73.0	67.0	73.0	71.0	77.0	73.1				**72.9**
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				**0.0**
	Coal Product	Mt	0.0	1.4	1.7	2.1	1.9	2.0	2.1	2.0	2.4	1.7	2.0	2.2	1.9	1.9				**31.0**
	Effetive Yield	%	0.0	86.0	79.0	74.0	70.0	73.0	68.0	70.0	73.0	67.0	73.0	71.0	77.0	73.1				**72.9**
Ashton	ROM Coal	Mt	1.5	3.4	2.9	2.6	2.4	2.8	3.1	5.7	6.2	5.7	5.9	4.8	0.6					**47.6**
	Coal Processed	Mt	1.5	3.4	2.9	2.6	2.4	2.8	3.1	5.7	6.2	5.7	5.9	4.8	0.6					
	Plant Yield	%	49.1	52.6	54.9	53.5	52.7	59.9	58.8	54.6	57.9	58.4	59.3	60.0	47.1					**56.7**
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					**0.0**
	Coal Product	Mt	0.7	1.8	1.6	1.4	1.3	1.7	1.8	3.1	3.6	3.3	3.5	2.9	0.3					**27.0**
	Effetive Yield	%	49.1	52.6	54.9	53.5	52.7	59.9	58.8	54.6	57.9	58.4	59.3	60.0	47.1					**56.7**
Stratford Duralie	ROM Coal	Mt	0.5	1.1	1.7	1.9	1.8	1.3	1.6	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	**68.2**
	Coal Processed	Mt	0.5	1.1	1.7	1.9	1.8	1.3	1.6	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	**68.2**
	Plant Yield	%	49.9	56.9	59.4	57.8	58.3	62.4	67.6	64.8	60.1	60.5	60.8	61.4	61.3	61.2	55.3	54.4	36.2	**58.4**
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Coal Product	Mt	0.2	0.6	1.0	1.1	1.0	0.8	1.1	1.3	1.2	1.2	1.2	1.2	1.4	1.2	1.1	1.1	0.7	**38.2**
	Effetive Yield	%	49.9	56.9	59.4	57.8	58.3	62.4	67.6	64.8	60.1	60.5	60.8	61.4	61.3	61.2	55.3	54.4	36.2	**56.0**
Middlemount	ROM Coal	Mt	2.9	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4				**100.4**
	Coal Processed	Mt	2.9	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4				**100.4**
	Plant Yield	%	79.7	76.8	78.0	77.0	76.9	77.1	75.6	74.5	74.1	74.1	70.7	74.6	75.9	76.1				**75.7**
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				**0.0**
	Coal Product	Mt	2.1	4.1	4.2	4.2	4.2	4.2	4.1	4.0	4.0	4.0	3.8	4.0	4.1	4.1				**76.0**
	Effetive Yield	%	79.7	76.8	78.0	77.0	76.9	77.1	75.6	74.5	74.1	74.1	70.7	74.6	75.9	76.1				**75.7**
Total	ROM Coal	Mt	**34.6**	**71.9**	**74.1**	**75.1**	**74.4**	**73.8**	**74.6**	**77.0**	**77.1**	**72.7**	**69.6**	**68.6**	**63.3**	**62.9**	**42.6**	**25.7**	**20.9**	**1,859.9**
	Coal Product	Mt	**26.2**	**53.4**	**55.1**	**55.6**	**55.3**	**55.2**	**55.7**	**56.8**	**56.9**	**52.8**	**49.4**	**48.5**	**45.5**	**45.3**	**29.3**	**18.0**	**14.3**	**1,377.7**

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- An average of 228 Million AUD (ranging between 258 Million AUD in 2021 to 535 Million AUD in 2020 over the next 10 years) is required per year for Growth and Sustaining CAPEX. The majority of the CAPEX is required at HVO, MTW and Moolarben while Yarrabee, due to it mine life, also requires significant sustaining CAPEX. As outlined in ***Section 9***, the operations require continued replacement and sustained maintenance for both mobile and fixed plant to ensure the required production performance and processing yield. New and replacement production fleet (draglines, trucks, excavators) capital encompasses the majority of the sustaining capital for operations (approximately 60%). The remainder of the capital includes replacement and maintenance of the CHPP's and site infrastructure construction. RPM considers the forecast reasonable to support the LOM schedule.
- Forecast operating costs for the LOM Schedule (including inferred) vary between the operations as outlined in ***Table 6*** for Free of Rail (FOR) and Free on Board (FOB). Further breakdowns inclusive of annualised costs are provided in ***Section 14*** as well as ***Appendix G*** for reference. Review of the forecasts clearly highlights the differentiation between the HVO, MTW and Moolarben low cost operations versus the remainder. RPM considers the forecasts reasonable and achievable

Table 6 LOM Average Operating Costs

Operation	Centre	Unit	LOM Average Cost
HVO	**FOR**	**AUD/t prod**	45.8
	FOB	**AUD/t prod**	67.2
MTW	**FOR**	**AUD/t prod**	49.3
	FOB	**AUD/t prod**	67.1
Moolarben	**FOR**	**AUD/t prod**	25.9
	FOB	**AUD/t prod**	50.4
Yarrabee	**FOR**	**AUD/t prod**	85.2
	FOB	**AUD/t prod**	124.8
Ashton	**FOR**	**AUD/t prod**	67.1
	FOB	**AUD/t prod**	91.3
Austar	**FOR**	**AUD/t prod**	70.5
	FOB	**AUD/t prod**	95.6
Stratford and Duralie	**FOR**	**AUD/t prod**	80.4
	FOB	**AUD/t prod**	107.1
Donaldson	**FOR**	**AUD/t prod**	34.1
	FOB	**AUD/t prod**	93.8
Middlemount	**FOR**	**AUD/t prod**	87.5
	FOB	**AUD/t prod**	133.1

Source: Unit Costs were provided by the Company however were adjusted to reflect RPM independent Coal Reserve schedule. LOM Unit costs vary to the Company's due to unit costs changes and production schedule variations.

Environmental, Health, Social and Safety

- The Assets have exhibited a high degree of environmental compliance over recent years. Several independent audits have been completed over the past 3 years on the assets with no material issues noted. The Company have a developed Health, Safety and Environment (HSE) Management System with corresponding resources in terms of staffing and processes in place. One area in which regulatory compliance has been lagging has been the management of water on-site at HVO, including in respect to water pollution incidents. These however, are not expected to pose an ongoing regulatory risk with improved management systems implemented onsite and as such are not considered a risk to the forecast operation.
- Recent reviews of risks and exposure associated with Native Title and Aboriginal Land Claims was conducted in June 2016, the results of which are contained in the Hunter Valley Native Title and Aboriginal Land Claim Risk Register. The review states that while Native Title has not been extinguished for some areas (including land, water ways and access roads)., the majority of the Assets holdings are not subject

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to native title claims and that any outstanding areas and claims do not impact the current life of mine plan as presented in this Report.

- The MTW, Stratford and Moolarben mines have been the subject of a medium to high community complaint frequency, largely as a result of noise and dust emissions. As a result the Company has put in place several management strategies and increasingly efficient noise attenuation systems and noise and dust early warning monitoring systems. These trigger the temporary shut-down of mobile plant as noise levels in nearby communities approach regulatory limits. This implementation has resulted in a marked reduction in complaints in recent times and RPM highlights these shut downs are incorporated into the forecast utilisation. In addition, the Company has established a community management system to manage these issues as per good industry practice. Management measures in place support the assumption that the forecast plans will be ultimately accepted by communities. This includes the on-track progress in obtaining approval for the upcoming closing of a community road, which RPM is aware is nearing completion.
- In line with all operating coal mines in the regions, the Assets have accumulated heavy-metal contaminated waste rock in the disposal/storage facilities and these potential contamination factors have not been thoroughly quantified and assessed, however based on the prevailing geo-chemistry of tailings materials in the region, the risk of highly mobile and bio-available contamination is considered unlikely.
- Continuous and phased rehabilitation of mined out areas has been taking place, with an acceptable level of success measured against established criteria for the areas having had the longest regeneration time. Mine closure costs are budgeted beyond the operational expenditures associated with the continuous rehabilitation.
- Several Coal Bursts have occurred within the Austar mine which have resulted in loss of production and forced shutdowns. RPM is aware the company has introduced a number of measures to manage the issue. The longwall operation at Austar is currently not operating as the Company is seeking approval to recommence following development of revised management systems, plans and the operation of equipment.

<u>The Key Opportunities Identified during the ITR include.</u>

While various opportunities exist to increase the value of the Projects, including the exploration potential and the inferred material within the schedules, given the very long mine life, RPM for reference presents below what are considered to be the opportunities which could have a material effect on both the mine life presented in this report and/or the value of the Project.

- **HVO/MTW Underground** – As further outlined in ***Section 16*** this would include multiple working areas and could be undertaken in conjunction with the current open pit operations. If undertaken this would increase ROM production by up to 5 to 7Mtpa and have the added advantage of augmenting take or pay commitments of the groups operation in the short term which are included in the forecast OPEX. Further studies are required to confirm the optimised project ahead of corporate investment decision.
- **HVO Boundary Coal Pillar** – The current Coal Reserves and LOM plans excludes significant coal within the boundary pillar of the tenement holdings due to the inability of mining across the tenement boundary on the neighbouring tenement (***Figure 9-3***) without agreements in place. A high level study indicates that an additional ROM coal tonnage of between 100 and 120Mt could be exploited with extensions of the West, Carrington East, Riverview and Cheshunt Deep pits. Integrated mine planning is required to realise potential upside in LOM plans and Reserves for the site.
- **Blending** – The current LOM plan presented in this Report and the supporting cashflow analysis, assumes no blending occurs either within the operations or between the operations. The products generated by the operations are generally high value coal types and blending based on product qualities can realise additional value rather than selling single products from the operations. In addition, as the Company further incorporates HVO/MTW into its operations this blending strategy could be used to further optimise mining operations in both short and medium term planning through careful and meticulous mine plans focusing on:
  - Maximising the exploitation of the in situ resources by potentially increasing pit limits using improved revenue streams and
  - Incorporating the ability to react quickly to market condition by changing the short term mine plan to target seams with specific coal qualities.
- **Moolarben Expansion** –The expansion of the open cut involves optimisations of the approved Stage 1 and Stage 2 operations to increase site ROM coal production to 24Mtpa from the current circa 18Mtpa.

The Modification also involves a minor extension to the OC2 pit limit, minor extensions and reductions of the OC3 pit limits, rehabilitation, water management and relocated/additional surface infrastructure. The successful implementation of the Stage 2 expansion at Moolarben demonstrates the Company's ability to achieve organic growth targeting low cost/high margin coal.

The Key Risks Identified during the ITR include.

While various risks have been identified, given the very long mine life's, the risks RPM presents below are considered to be the risks that could potentially affect the Company's ability to achieve the mine life as presented in the Report and/or the value of the Project's current LOM schedule and do not include any risks associated with the upside. Further low risks as well as upside risk for the potential underground are presented in ***Section 17***.

- **Community Relations (MTW, Stratford and Moolarben):** Communities have voiced grievances against some mine operations, in particular regarding noise and dust emissions, leading to equipment downtime and subsequent investment in noise attenuation equipment for mobile and fixed plant.
- **Coal Bursts – Austar**: Several Coal Bursts have occurred within the Austar mine which have resulted in loss of production and forced shutdowns. RPM is aware the company has introduced a number of measures to manage the issue. The longwall operation at Austar is currently not operating as the Company is seeking approval to recommence following development of revised longwall management systems, plans and the operation of equipment systems, plans and the operation of equipment.
- **Austar Restart** - RPM is aware that the Austar permit for the operation of the longwall has recently been suspended following coal bursts in 2018 and now has approval for limited longwall activities under controlled conditions. Limited operations at Austar recommenced on 14 August 2018 subject to certain conditions which the mine can comply with however full scale operations are as yet to recommence.

Limitations and Exclusions

RPM's review was based on various reports, plans and tabulations provided by the Client or the Company either directly from the mine site and other offices, or from reports by other organizations whose work is the property of the Client or the Company. Neither Client nor the Company has not advised RPM of any material change, or event likely to cause material change, to the operations or forecasts since the date of Assets inspections.

The work undertaken for this Report is that required for a technical review of the information, coupled with such inspections as the Team considered appropriate to prepare this Report.

It specifically excludes all aspects of legal issues, commercial and financing matters, land titles and agreements, except such aspects as may directly influence technical, operational or cost issues and where applicable to the JORC Code guidelines.

RPM has specifically excluded making any comments on the competitive position of the Relevant Assets compared with other similar and competing producers around the world. RPM strongly advises that any potential investors make their own comprehensive assessment of both the competitive position of the Relevant Assets in the market and the fundamentals of the seaborne export coal at large.

Limited Liability

This Report has been prepared by RPM for the purposes of Client for inclusion in its Prospectus in respect of the proposed Listing of the Assets in accordance with the Listing Rules and is not to be used or relied upon for any other purpose. RPM will not be liable for any loss or damage suffered by a third party relying on this report or any references or extracts therefrom contrary to the purpose (regardless of the cause of action, whether breach of contract, tort (including negligence) or otherwise) unless and to the extent that RPM has consented to such reliance or use.

Responsibility and Context of this Report

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The contents of this Report have been based upon and created using data and information provided by or on behalf of Client or the Company. RPM accepts no liability for the accuracy or completeness of data and information provided to it by, or obtained by it from Client, the Company or any third parties, even if that data and information has been incorporated into or relied upon in creating this report. The report has been produced by RPM in good faith using information that was available to RPM as at the date stated on the cover page and is to be read in conjunction with the Prospectus which has been prepared and forms part of the referenced transaction.

This report contains forecasts, estimates and findings that may materially change in the event that any of the information supplied to RPM is inaccurate or is materially changed. RPM is under no obligation to update the information contained in the report.

Notwithstanding the above, in RPM's opinion, the data and information provided by or on behalf of Client or the Company was reasonable and nothing discovered during the preparation of this Report suggests that there was a significant error or misrepresentation of such data or information.

Indemnification

Client has indemnified and holds harmless RPM and its subcontractors, consultants, agents, officers, directors and employees from and against any and all claims, liabilities, damages, losses and expenses (including lawyers' fees and other costs of litigation, arbitration or mediation) arising out of or in any way related to:

- RPM's reliance on any information provided by Client and the Company; or
- RPM's services or materials; or
- Any use of or reliance on these services or material,

save and except in cases of death or personnel injury, property damage, claims by third parties for breach of intellectual property rights, gross negligence, wilful misconduct, fraud, fraudulent misrepresentation or the tort of deceit, or any other matter which be so limited or excluded as a matter of applicable law (including as a Competent Person under the Listing Rules) and regardless of any breach of contract or strict liability by RPM.

Mining Unknown Factors

The findings and opinions presented herein are not warranted in any manner, expressed or implied. The ability of the operator, or any other related business unit, to achieve forward looking production and economic targets is dependent upon numerous factors that are beyond RPM's control and which cannot be fully anticipated by RPM. These factors include site specific mining and geological conditions, the capabilities of management and employees, availability of funding to properly operate and capitalise the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, etc. Unforeseen changes in legislation and new industry developments could substantially alter the performance of any mining operation.

Capability and Independence

RPM provides advisory services to the mining and finance sectors. Within its core expertise it provides independent technical reviews, resource evaluation, mining engineering and mine valuation services to the resources and financial services industries.

RPM has independently assessed the Assets by reviewing pertinent data, including resources, reserves, manpower requirements and the life of mine plans relating to productivity, production, operating costs and capital expenditures. All opinions, findings and conclusions expressed in this Report are those of RPM and its specialist advisors.

Drafts of this Report were provided to Client, however only for the purpose of confirming the accuracy of factual material and the reasonableness of assumptions relied upon in this Report.

RPM has been paid and has agreed to be paid, professional fees based on a fixed fee estimate for its preparation of this Report. Its remuneration is not dependent upon the findings of this Report or on the outcome of the transaction.

None of RPM or its directors, staff or specialists who contributed to this Report have any economic or beneficial interest (present or contingent), in:

- the Assets, securities of the companies associated with the Assets or that of Client; or
- the right or options in the Relevant Assets; or
- the outcome of the proposed transaction.

This CPR was compiled on behalf of RPM by the signatories to this CPR, details of whose qualifications and experience are set out in ***Appendix A*** of this CPR. The specialists who contributed to the findings within this CPR have each consented to the matters based on their information in the form and context in which it appears.

RPM Qualifications and Experience

RPM's advisory division operates as independent technical consultants providing services across the entire mining life cycle including exploration and Assets feasibility, resource and reserve evaluation, mining engineering and mine valuation services to both the mining and financial services industries.

RPM is the market leader in the innovation of advisory and technology solutions that optimize the economic value of mining Assets and operations. RPM has serviced the industry with a full suite of advisory services for over 50 years and is the largest publicly traded independent group of mining technical experts in the world having completed over 14,000 studies across all major commodities and mining methods and worked in over 118 countries globally. This report was prepared on behalf of RPM by technical specialists, details of whose qualifications and experience are set out in **Appendix A**.

RPM has been paid and has agreed to be paid, professional fees for its preparation of this report; however, none of RPM or its directors, staff or sub-consultants who contributed to this report has any interest or entitlement, direct or indirect in:

- the Company, securities of the Company or companies associated with the Company; or
- The right or options in the relevant Assets.
- The work undertaken is an ITR of the information provided by or on behalf of the Company, as well as information collected during site inspections completed by RPM as part of the ITR process. It specifically excludes all aspects of legal issues, marketing, commercial and financing matters, insurance, land titles and usage agreements and any other agreements/contracts that Company may have entered into.

RPM does not warrant the completeness or accuracy of information provided by the Company which has been used in the preparation of this report.

The title of this report does not pass to the Client until all consideration has been paid in full.

Drafts of this report were provided to the Client, however only for the purpose of confirming the accuracy of factual material and the reasonableness of assumptions relied upon in the report.

Generally, the data available was sufficient for RPM to complete the scope of work. The quality and quantity of data available and the cooperative assistance, in RPM's view, clearly demonstrated the Company's assistance in the ITR process. All opinions, findings and conclusions expressed in the report are those of RPM and its specialist advisors.

Yours faithfully,

Doug Sillar
Senior Mining Engineer (Competent Person – Hong Kong Chapter 18)
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1. Introduction

RPM Advisory Services Pty Ltd ("RPM") has been engaged by Yancoal Australia Ltd. (ASX:YAL) referred to as ("Yancoal", the "Client" or the "Company") to undertake an Independent Technical Review ("ITR") and compile a Competent Person Report ("CPR" or the "Report") (as defined by Chapter 18 of the Rules Governing the Listing Rules of the Stock Exchange of Hong Kong (the "Listing Rules") on Multiple Coal Assets (the "Assets"). The Assets are located within the Hunter and Central Western regions of New South Wales and Central Highlands Region of Queensland, Australia (***Figure 1-1***).

The Assets include Hunter Valley Operations ("HVO"), Mount Thorley Warkworth ("MTW"), Moolarben, Ashton, Austar, Donaldson and Stratford and Duralie Operations in NSW and Yarrabee and Middlemount operations in Queensland. All operations are owned (at various interests) and operated/managed by Yancoal with the exception of Middlemount which is a Joint Venture with Peabody and HVO with the recent formation of a Joint Venture with Glencore.

As at March, 2016 Yancoal lost accounting control of the Watagan Assets (Ashton, Austar and Donaldson), with all material decisions made by the Watagan Board, not Yancoal or its Directors. RPM understands Yancoal is the manager and operator of the mines, pursuant to mining and management services agreements and have day-to-day operational jurisdiction over the operations, however all mine plans for each year and annual capital expenditure and operational expenditure budgets are approved by the Watagan Board. The information contained within this report is based on data provided by the Company and the approved mine plans.

1.1 RPM Scope of Work

RPM's scope of work included:

- Gathering of relevant information on the Assets including resources and reserves information, Life if Mine ("LOM") production schedules and operating and capital cost information;
- Reviewing of the Company's resources and reserves, including quantity and quality of drilling, reliability of data and adequacy of resource and reserve estimation methods;
- Estimation of independent Coal Resources and Coal Reserves (as defined in ***Appendix B***) reported in compliance with the recommended guidelines of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the "JORC Code"), prepared by the Joint Ore Reserves Committee ("JORC") and the Australian Guidelines for the Estimation and Classification of Coal Resources (2014);
- Reviewing and commenting on the exploration prospect of the Assets;
- Reviewing and commenting on forecast operating and capital expenditures in the relevant technical studies;
- Reviewing the Assets short term and long term development plans;
- High level review of the environmental, health and safety risks and management plans for the Assets; and
- Compilation of a CPR as defined under Chapter 18 of the Hong Kong Listing Rules.

1.2 Relevant Assets

The Assets are located in NSW and QLD Australia and include both open cut and underground operations with associated onsite coal processing and handling infrastructure. Coal products include a range of thermal coal products as well as semi soft coking coal products, semi hard coking products and Pulverised Coal Injection (PCI) coal products. All NSW products are currently exported through the Port of Newcastle which allows direct access to international markets via the Pacific Ocean (***Figure 1-1***), while the QLD products are exported through three ports in Queensland.

The relevant assets included in this Report are outlined in ***Table 1-1*** below.

RPM highlights that the statements contained within this Report all Coal Resources and Coal Reserves within the Assets on a 100% equity basis unless otherwise stated.

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Table 1-1 Operating Asset List

Asset	Yancoal Ownership[4]	Operational Control	Type
Hunter Valley Operations ("HVO") - OC	51%	Joint Venture	Met/Thermal
Mount Thorley[1] - OC	80%	Yancoal	Met/Thermal
Warkworth[1] - OC	84.47%	Yancoal	Met/Thermal
Moolarben - OC & UG	81%	Yancoal	Thermal
Ashton[2] - OC & UG	100%	Yancoal[2]	Met/Thermal
Yarrabee - OC	100%	Yancoal	PCI/Thermal
Stratford and Duralie[3] - OC	100%	Yancoal	Met/Thermal
Austar[2] - UG	100%	Yancoal[2]	Met
Donaldson[2] - UG	100%	Yancoal[2]	Thermal
Middlemount - OC	49.99%	Joint Venture	PCI/Met

Note: Supplied by the Company
[1] Mount Thorley and Warkworth mines are referred to in the Report as one operation know as "MTW"
OC = Open Cut, UG = Underground
2 Assets owned by Watagan (wholly owned subsidiary of Yancoal) and managed directly by Yancoal.
3 Stratford and Duralie are separate mine with a common CHPP and Management
4 Based on owenership at the latest applicable date

In addition to the operating assets listed above, an exploration asset Monash is located 16km south west of MTW. This asset has Coal Resources declared and is considered a greenfield project.

1.3 Review Methodology

RPM's ITR methodology was as follows:

- Review existing reports and data;
- Conduct a Competent Person's site visit;
- Discussions with Assets personnel of the Company prior to and following the site visit;
- Independent Estimation and Reporting of Coal Resources and Coal Reserves in accordance with the JORC Code (2012) and Australian Coal Guidelines (2014); and
- Preparation of a CPR and provision of drafts of the CPR to Client's personnel to ensure factual accuracy and reasonableness of assumptions.

The comments and forecasts in this CPR are based on information compiled by enquiry and verbal comment from the Client and Assets personnel from the Company. Where possible, this information has been checked with hard copy data or by comment from more than one source. Where there was conflicting information on issues, RPM used its professional judgment to assess the issues.

1.4 Site Visits and Inspections

RPM visited HVO/MTW operations on the date of 16th February, 2017 and the remainder between the dates of April 16th and April 28th 2018 to perform technical due diligence on the Assets. RPM's site visit team consisted of:

- Trisha Wilson, Senior Mining Engineer visited HVO/MTW in 2017 and Stratford and Duralie in 2018;
- Peter Ellis, Principal Geologist, visited MTW and HVO in 2017;
- Chris Turvey, Associate Geologist, reviewed and completed the site visit for Stratford and Duralie;
- Greg Eisenmenger, Executive Consultant, Mining; visited Yarrabee and Middlemount;
- Michael Johnson, Associate Geologist visited Middlemount and Yarrabee;
- Graeme Rigg, Principal Mining Engineer visited Ashton, Austar, Donaldson;
- David McMillian, Principal Mining Engineer, visited Moolarben and

- Brendan Stats, Senior Geologist, visited Moolarben.

RPM notes that Hong Kong Competent Person (Mr. Doug Sillar) has not visited all sites, however the JORC Competent Persons (Peter Ellis, Michael Johnson and Brendan Stats) for Coal Resource have. As part of the Hong Kong Competent Person responsibilities Mr. Sillar has relied on the relevant experts who completed the site visit as part of his confirmation of the works completed.


DARWIN
NORTHERN TERRITORY
QUEENSLAND
CORAL SEA
Bowen
Mackay
MIDDLEMOUNT
YARRABEE
Gladstone
BRISBANE
SOUTH AUSTRALIA
NEW SOUTH WALES
STRATFORD / DURALIE
ASHTON
MOOLARBEN
HVO
DONALDSON
Newcastle
MTW
AUSTAR
SYDNEY
ADELAIDE
SOUTHERN OCEAN
CANBERRA
A.C.T.
TASMAN SEA
VICTORIA
MELBOURNE
Bass Strait
TASMANIA
HOBART
RPMGLOBAL
Operating Mine
Care and Maintenance
Port
N
0
1000 km
DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
GENERAL LOCATION PLAN
FIGURE No.
1-1
PROJECT No.
ADV-BR-11019
Date
November 2018

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1.5 Information Sources

Several geology studies, feasibility studies, design reports, life of mine budgets and schedules were provided for the Assets as well as recent operational data. This information was either supplied via an online data room or in a bulk information download for large packages of data.

1.6 Competent Person and Responsibilities

The Statements of Coal Resources and Coal Reserves have been reported in accordance with the recommended guidelines of the JORC Code and are suitable for inclusion in a CPR as defined by Chapter 18 of the Listing Rules.

HKEx Competent Person

Mr. Doug Sillar meets the requirements of a Competent Person, as defined by Chapter 18 of the Listing Rules. These requirements include:

- Greater than five years' experience relevant to the type of deposit;
- Member of the Australian Institute of Mines and Metallurgy ("AUSIMM"), which is a Recognised Professional Organisation as per the HKEx and JORC Code;
- Does not have economic or beneficial interest (present or contingent) in any of the reported Relevant Assets;
- Has not received a fee dependent on the findings outlined in the Competent Person's Report;
- Is not an officer, employee or proposed officer for the Client or any group, holding or associated company of the issuer; and
- Assumes overall responsibility for the Competent Person's Report.

Doug Sillar (Hong Kong Competent Person) (MAUSIMM)

Team Responsibility

Additional members of the team who have worked to compile this report include the following:

- Ms. Amanda Antcliff - Amanda was responsibility for the review of the environmental and social aspects of the Assets.
- Mr. Jeremy Clark - Jeremy was responsible for internal peer review of the Report.
- Mr. Philippe Baudry- Philippe was responsible for the final internal peer review and approval of the Report.

JORC Competent Persons

The Competent Persons for JORC Coal Resources were responsible for review of the borehole database and estimation of the Coal Resources stated within this Report. The Competent Person for JORC Reserves was responsible for review of the mining parameters, mine scheduling and estimation of the Open Cut Coal Reserves stated within this Report. The persons responsible for each Asset is listed in ***Table 1-2.***

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Table 1-2 JORC Competent Person Responsibility

	Coal Resources	Coal Reserves – Open Cut	Coal Reserves – Underground
HVO	Mr Peter Ellis	Mr Doug Sillar	-
MTW	Mr Peter Ellis	Mr Doug Sillar	-
Moolarben	Mr Brendan Stats	Mr Doug Sillar	Mr Graeme Rigg
Ashton	Mr Brendan Stats	Mr Doug Sillar	Mr Graeme Rigg
Yarrabee	Mr Michael Johnson	Mr Doug Sillar	-
Stratford and Duralie	Mr Brendan Stats	Mr Doug Sillar	-
Austar	Mr Brendan Stats	-	Mr Graeme Rigg
Donaldson	Mr Brendan Stats	-	Mr Graeme Rigg
Middlemount	Mr Michael Johnson	Mr Doug Sillar	-
Monash	Mr Brendan Stats	-	-

Coal Resources

The information in this report that relates to the Coal Resources of the Relevant Assets listed in ***Table 1-2*** is based on information compiled and reviewed by **Mr. Peter Ellis**, who is a member of the Australasian Institute of Mining and Metallurgy and is a full time employee of RPM.

Mr Ellis has sufficient experience that is relevant to the style of mineralisation and types of coal deposits under consideration and to the activity he is undertaking, to qualify him as a Competent Person (as defined in the 2012 Edition of the JORC Code). He has more than fifteen years of experience in the mining industry and has visited the mine sites.

Mr Ellis has no interest whatsoever in the mining Assets reviewed and will gain no reward for the provision of this Coal Resource Statement. RPM will receive a professional fee for the preparation of this statement.

Peter Ellis BSc (Geology) (Hons) MAusIMM

The information in this report that relates to the Coal Resources of the relevant Assets listed in ***Table 1-2*** is based on information compiled and reviewed by **Mr. Brendan Stats**, who is a member of the Australasian Institute of Mining and Metallurgy and is a full time employee of RPM.

Mr Stats has sufficient experience that is relevant to the style of mineralisation and types of coal deposits under consideration and to the activity he is undertaking, to qualify him as a Competent Person (as defined in the 2012 Edition of the JORC Code). He has more than thirteen years of experience in the mining industry and has visited the mine sites or worked closely with the person who conducted the site visit.

Mr Stats has no interest whatsoever in the mining Assets reviewed and will gain no reward for the provision of this Coal Resource Statement. RPM will receive a professional fee for the preparation of this statement.

Brendan Stats BSc (Geology) (Hons) MAusIMM

The information in this report that relates to the Coal Resources of the Relevant Assets listed in ***Table 1-2*** is based on information compiled and reviewed by **Mr. Michael Johnson**, who is a member of the Australasian Institute of Mining and Metallurgy and a member of the Australian Institute of Geoscientists and is a sub-consultant of RPM.

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Mr Johnson has sufficient experience that is relevant to the style of mineralisation and types of coal deposits under consideration and to the activity he is undertaking, to qualify him as a Competent Person (as defined in the 2012 Edition of the JORC Code). He has more than nineteen years of experience in the mining industry and has visited the mine sites or worked closely with the person who conducted the site visit.

Mr Johnson has no interest whatsoever in the mining Assets reviewed and will gain no reward for the provision of this Coal Resource Statement. RPM will receive a professional fee for the preparation of this statement.

Michael Johnson BAppSci (Geology) MAusIMM, Member AIG

Open Cut Coal Reserves

The information in this report that relates to the Coal Reserves of the relevant Assets listed in ***Table 1-2*** is based on information compiled and reviewed by **Mr. Doug Sillar,** who is a member of the Australasian Institute of Mining and Metallurgy and is a full time employee of RPM.

Mr Sillar has sufficient experience that is relevant to the style of mineralisation and types of coal deposits under consideration and to the activity he is undertaking, to qualify him as a Competent Person (as defined in the 2012 Edition of the JORC Code). He has more than fifteen years of experience in the mining industry.

Mr Sillar has no interest whatsoever in the mining Assets reviewed and will gain no reward for the provision of this Coal Reserve Statement. RPM will receive a professional fee for the preparation of this statement.

Doug Sillar BE (Min)(Hons) MAusIMM

Underground Coal Reserves

The information in this report that relates to the Coal Reserves of the relevant Assets listed in **Table 1.2** is based on information compiled and reviewed by **Mr. Graeme Rigg**, who is a member of the Australasian Institute of Mining and Metallurgy and is a full time employee of RPM.

Mr Rigg has sufficient experience that is relevant to the style of mineralisation and types of coal deposits under consideration and to the activity he is undertaking, to qualify him as a Competent Person (as defined in the 2012 Edition of the JORC Code). He has more than twenty years of experience in the mining industry.

Mr Rigg has no interest whatsoever in the mining Assets reviewed and will gain no reward for the provision of this Coal Reserve Statement. RPM will receive a professional fee for the preparation of this statement.

Graeme Rigg BE (Min)(Hons) MAusIMM

1.7 Limitations and Exclusions

RPM's review was based on various reports, plans and tabulations provided by Client or the Company either directly from the mine site and other offices, or from reports by other organizations whose work is the property of the Client or the Company. Neither Client nor the Company has advised RPM of any material change, or event likely to cause material change, to the operations or forecasts since the date of Assets inspections.

The work undertaken for this Report is that required for a technical review of the information, coupled with such inspections as the Team considered appropriate to prepare this Report.

It specifically excludes all aspects of legal issues, commercial and financing matters, land titles and agreements, except such aspects as may directly influence technical, operational or cost issues and where applicable to the JORC Code guidelines.

RPM has specifically excluded making any comments on the competitive position of the relevant Assets compared with other similar and competing producers around the world. RPM strongly advises that any potential investors make their own comprehensive assessment of both the competitive position of the relevant Assets in the market and the fundamentals of the coal markets at large.

Limited Liability

This Report has been prepared by RPM for the purposes of Client for inclusion in its Prospectus in respect of the proposed Listing of the Assets in accordance with the Listing Rules and is not to be used or relied upon for any other purpose. RPM will not be liable for any loss or damage suffered by a third party relying on this report or any references or extracts therefrom contrary to the purpose (regardless of the cause of action, whether breach of contract, tort (including negligence) or otherwise) unless and to the extent that RPM has consented to such reliance or use.

Responsibility and Context of this Report

The contents of this Report have been based upon and created using data and information provided by or on behalf of Client or the Company. RPM accepts no liability for the accuracy or completeness of data and information provided to it by, or obtained by it from Client, the Company or any third parties, even if that data and information has been incorporated into or relied upon in creating this report. The report has been produced by RPM in good faith using information that was available to RPM as at the date stated on the cover page and is to be read in conjunction with the Prospectus which has been prepared and forms part of the referenced transaction.

This report contains forecasts, estimates and findings that may materially change in the event that any of the information supplied to RPM is inaccurate or is materially changed. RPM is under no obligation to update the information contained in the report.

Notwithstanding the above, in RPM's opinion, the data and information provided by or on behalf of Client or the Company was reasonable and nothing discovered during the preparation of this Report suggests that there was a significant error or misrepresentation of such data or information.

Indemnification

The Client has indemnified and held harmless RPM and its subcontractors, consultants, agents, officers, directors and employees from and against any and all claims, liabilities, damages, losses and expenses (including lawyers' fees and other costs of litigation, arbitration or mediation) arising out of or in any way related to:

- RPM's reliance on any information provided by Client and the Company; or
- RPM's services or materials; or
- Any use of or reliance on these services or material,

save and except in cases of death or personnel injury, property damage, claims by third parties for breach of intellectual property rights, gross negligence, wilful misconduct, fraud, fraudulent misrepresentation or the tort of deceit, or any other matter which be so limited or excluded as a matter of applicable law (including as a Competent Person under the Listing Rules) and regardless of any breach of contract or strict liability by RPM.

Mining Unknown Factors

The findings and opinions presented herein are not warranted in any manner, expressed or implied. The ability of the operator, or any other related business unit, to achieve forward looking production and economic targets is dependent upon numerous factors that are beyond RPM's control and which cannot be fully anticipated by RPM. These factors include site specific mining and geological conditions, the capabilities of management and employees, availability of funding to properly operate and capitalise the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, etc. Unforeseen changes in legislation and new industry developments could substantially alter the performance of any mining operation.

Capability and Independence

RPM provides advisory services to the mining and finance sectors. Within its core expertise it provides independent technical reviews, resource evaluation, mining engineering and mine valuation services to the resources and financial services industries.

RPM has independently assessed the Relevant Assets of the Assets by reviewing pertinent data, including resources, reserves, manpower requirements and the life of mine plans relating to productivity, production, operating costs and capital expenditures. All opinions, findings and conclusions expressed in this Report are those of RPM and its specialist advisors.

Drafts of this Report were provided to Client, however only for the purpose of confirming the accuracy of factual material and the reasonableness of assumptions relied upon in this Report.

RPM has been paid and has agreed to be paid, professional fees based on a fixed fee estimate for its preparation of this Report. Its remuneration is not dependent upon the findings of this Report or on the outcome of the transaction.

None of RPM or its directors, staff or specialists who contributed to this Report have any economic or beneficial interest (present or contingent), in:

- the Assets, securities of the companies associated with the Assets or that of Client; or
- the right or options in the Relevant Assets; or
- the outcome of the proposed transaction.

This CPR was compiled on behalf of RPM by the signatories to this CPR, details of whose qualifications and experience are set out in ***Appendix A*** of this CPR. The specialists who contributed to the findings within this CPR have each consented to the matters based on their information in the form and context in which it appears.

2. Project Overview

The Assets are contained within a number of exploration and mining tenements that are located in three areas, the Hunter and Central Western regions of NSW and the Central Highland region of Queensland (***Figure 1-1***). These three areas contain a number of medium to large scale coal deposits which are geologically well known and have been in operation for several decades in some instances.

The business consists of multiple open pit and underground operating mines which process and manufacture market ready coal products to meet international demand (***Table 2-1***). In addition to the eight operating mines, the assets include a re-start project (Donaldson) which is currently on care and maintenance pending re-start at the Company's discretion and the potential MTW underground project. The Assets include the large world class, low risk open cut operations, HVO, MTW and Moolarben open cut and underground complex which collectively contribute 80% of all future coal products of the life of mine (LOM) schedules presented in this report.

Table 2-1 Overview of Projects

Area	Operation	Curent Mining Methods		LOM Mining Methods		Product type	Minelife (year)	Comments
		Open Cut	Underground	Open Cut	Underground			
NSW	HVO	✓		✓		SSCC/Thermal	43	
	MTW	✓		✓		SSCC/Thermal	23	
	Moolarben	✓	✓	✓	✓	Thermal	20	UG completed in 2026
	Austar		✓		✓	SHCC/Thermal	16	
	Ashton		✓	✓	✓	SSCC	13	OC commences in 2024
	Stratford and Duralie	✓		✓		SHCC/Thermal	35	
	Donaldson		✓		✓	Thermal	11	Not in operation
QLD	Yarrabee	✓		✓		PCI/Thermal	38	
	Middlemount	✓		✓		PCI/Coking	19	

Note Donaldson has Coal Reserves and as such can recommence production at the Company's discretion. See Section 9.1 for further details.*

Run of Mine ("ROM") coal and overburden is mined via conventional truck, excavator or shovel and/or dragline at the open cuts or via underground Longwall mining methods. The majority of ROM coal is washed at coal handling processing plants ("CHPP") and loaded on trains via dedicated train loading points. All products are transported via rail links to the deep water Port of Newcastle or one of three ports that are located in Queensland. A variety of product coals are produced across the Assets including thermal, semi soft/hard coking coal products, as well as a pulverized coal injection ("PCI") product. These products can be customised and quantities can be varied based on market and customer demands not just within each operation, however importantly between all operations that have port and product synergies to optimise revenue based on short term market trends. Further information is provided in ***Section 11.1***. All operations follow a similar work flow as described above, with an example flowsheet shown in in ***Figure 2-1***.

2.1 Assets Location and Access

The Assets are all located in regions which are readily accessible via a series of National Highways and regional excellent quality paved roads from capital cities of Sydney and Brisbane and locally from Newcastle, Gladstone and Mackay. Both the regional and capital cities connect further abroad to most eastern seaboard cities and internationally. Good quality paved highways connect the cities in the various regions to the Assets as well as providing access to further regional centres for workers and support services. Good quality gravel roads allow access throughout and across each of the mines where required.

New South Wales Group

The Assets within NSW are all located in the Hunter or Central Western region between 30 to 120km to the west of regional city of Newcastle and 160 to 200km North West of Sydney (***Figure 2-1***). All NSW operations are adjacent to (and utilise) the extensive world class Hunter Valley / NSW railway network. This network transports all coal to three deep water coal terminals located in the Port of Newcastle (***Figure 2-1***). Further information on the rail network can be found in ***Section 12***.

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HVO/MTW

The HVO/MTW operations are located in adjacent landholdings in the Hunter Valley region of NSW, Australia (***Figure 2-2*** and ***Figure C-1*** and ***Figure C-2***), approximately 150 km north of Sydney and 90 km west from Newcastle. HVO is centred 24 km northwest of the regional town of Singleton, while MTW is centred approximately 14 km south east of Singleton. Both operations can be accessed by a network of excellent quality regional roads from Singleton.

Current Operations

Mining at HVO/MTW commenced in the 1960's and has continued to the present via conventional large scale dragline and truck and shovel methods. Multiple pits are currently active enabling the operations flexibility to optimise the product blends and mining fleets to de-risk mining activities. The Company is a major regional landholder and employer. The HVO and MTW mines are considered amongst the premier high quality thermal coal providers globally.

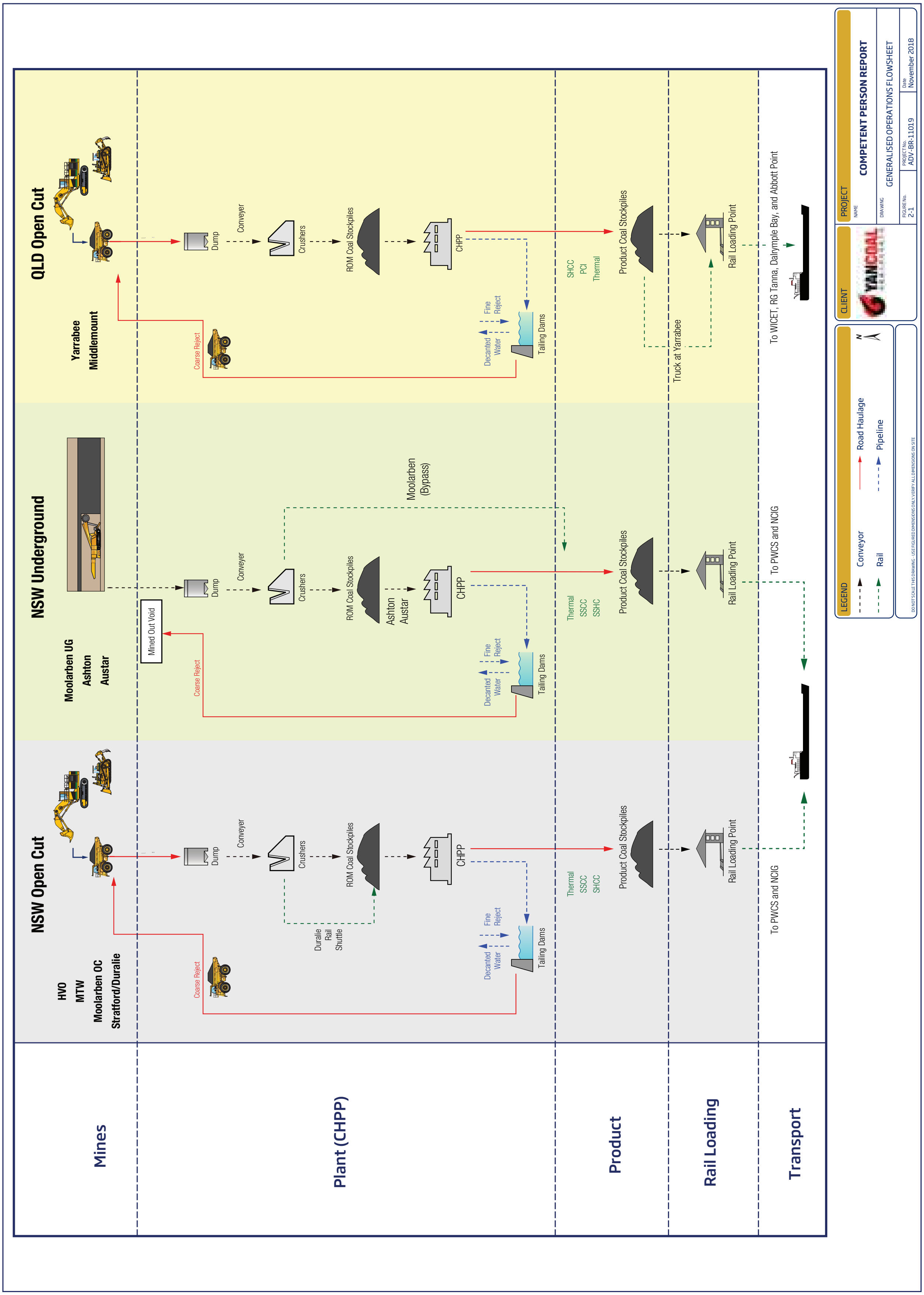
HVO currently produces thermal and semi-soft coking coal ("SSCC") from five active pits. Mining activities are geographically divided by the Hunter River into the HVO North and the HVO South areas and product coal is optimised as part of the overall blending strategy. Current mining focuses on the West and the Carrington pits in the North and the Cheshunt and Riverview pits in the South (Figure ***C-1***). ROM Coal from the pits is hauled to either of two CHPP's which have a combined nameplate throughput capacity of 20 million tonnes per annum ("Mtpa"). These include the Hunter Valley Coal Processing Plant ("HV-CHPP") at 17Mtpa and the Howick Coal Processing Plant (Howick-CHPP") at 3.2Mtpa. Currently the majority of ROM coal is hauled to the HV-CHPP, however some coal is processed at Howick-CHPP.

Product coal is transferred by haul truck from the Howick-CHPP to the Newdell Rail Loading Point and by conveyor to the Hunter Valley Rail Loading Point ("HV-Rail Loading) from the HV-CHPP. RPM notes that further blending occurs at the rail heads via conveyors to further optimise and add value to the products to meet specific customer specifications. This blending is not included the LOM Schedule or Coal Reserve estimate. Product coal is railed 99 km to the port facilities in Newcastle for export. In 2017 HVO produced approximately 19.5 million tonnes ("Mt") of ROM coal for 14.8Mt of product coal versus the planned 20.6Mt ROM Coal for 2018.

MTW produces thermal coal and SSCC from three active pits, North, West and Loders. MTW is geographically separated by the Putty Road, which separates the operation into the southern Mount Thorley and the northern Warkworth areas (***Figure C-2***). There are two coal handling and preparation plants (CHPP) at MTW which have a combined throughput capacity of 18.6Mtpa ROM Coal. The two MTW plants are the Mount Thorley CHPP ("MT-CHPP) at 8.4Mtpa and the Warkworth CHPP (WW-CHPP) at 10.2Mtpa. Thermal ROM coal is directly fed into the WW-CHPP, whilst SSCC ROM coal is trucked to the MT-CHPP as it consists of a two product washing facility enabling SSCC and thermal coal to be produced from a single seam.

Following washing the coal products are conveyed from each plant to the Mount Thorley Rail Loading Point. Blending occurs at the railhead prior to loading on rail wagons for transport 80 km to the Newcastle port. RPM notes this is the same rail line used by HVO. 11.8Mt of product coal (17.7Mt ROM Coal) was produced in 2017 versus the planned 17.0Mt ROM in 2018.

Figure 2-1 shows a generalised operational flowsheet for both the NSW and Queensland operations.


Mines
Plant (CHPP)
Product
Rail Loading
Transport
NSW Open Cut
HVO
MTW
Moolarben OC
Stratford/Duralie
NSW Underground
Moolarben UG
Ashton
Austar
QLD Open Cut
Yarrabee
Middlemount
Coarse Reject
Mined Out Void
Dump
Conveyer
Crushers
ROM Coal Stockpiles
Duralie Rail Shuttle
Ashton Austar
Moolarben (Bypass)
CHPP
Fine Reject
Decanted Water
Tailing Dams
Thermal SSCC SHCC
Thermal SSCC SSHC
SHCC PCI Thermal
Product Coal Stockpiles
Rail Loading Point
Truck at Yarrabee
To PWCS and NCIG
To WICET, RG Tanna, Dalrymple Bay, and Abbott Point
LEGEND
Conveyor
Rail
Road Haulage
Pipeline
CLIENT
PROJECT
NAME COMPETENT PERSON REPORT
DRAWING GENERALISED OPERATIONS FLOWSHEET
FIGURE No. 2-1
PROJECT No. ADV-BR-11019
Date November 2018

Moolarben

The Moolarben Complex is located 40 km north of the regional town of Mudgee in the Central West Region of NSW and can be accessed by regional paved roads. (***Figure 2-2*** and ***Figure C-3***) The operation is connected to the port of Newcastle by a 270 km rail line and National and regional paved roads. Mudgee, a major regional town in the Central-West of NSW located 270km North West of Sydney, is readily accessed via national highways and regional paved roads.

Current Operations

The Moolarben Operation consists of both underground longwall and open cut truck and shovel operations. The operation commenced in 2010 and produces up to four thermal coal products. Moolarben currently has three active open pits and a single longwall underground operation however it is forecast to complete four open cut pits over the mine life with the vast majority of production being from Open Cut 4 and two underground mining areas, Underground 1 and Underground 4. Additional potential underground mining area, Underground 3, which doesn't form part of the current LOM Plan is being considered by the Company for inclusion in future LOM Plans pending further technical studies.

All Open Cut ROM coal is washed in a single wash plant which produces three thermal coal products, while all Underground ROM coal is crushed and screened and sent directly to the market (bypass) as a low ash thermal coal product. During 2017 the operation produced 12.4Mt product coal from 13.8Mt processed and 1.1Mt bypass. In 2018 the Project is planned to increase ROM coal production to 17.8Mtpa with 9.8Mtpa produced in H1 2018 (open cut and underground combined). This increase is the result of further ramp of the underground operations as discussed in ***Section 10***.

Ashton

Ashton is located 14km north of the regional town of Singleton (***Figure 2-2*** and ***Figure C-5***) and is connected to the port of Newcastle (specifically PWCS) via a 94 km rail line and National and regional paved roads.

Current Operations

The current Ashton Operation consists of a single underground longwall operation producing between 1.5 to 2Mtpa SSCC from 3Mtpa ROM tonnes. The underground operation will be supplemented by an open cut truck and excavator operation in 2024 to produce up to 3.6Mtpa ROM coal with similar products but higher yields compared to the underground operation.

All ROM Cut ROM coal is washed in a single wash plant which is optimised to produce a single semi soft coking coal product. During 2017 the operation produced 1.2Mt product coal from 2.8Mt ROM Coal versus the planned 3.0Mt ROM Coal in 2018, with 963kt produced in H1 2018 which is planned to ramp up to 1.5Mt in H2 2018.

Stratford and Duralie

The Stratford and Duralie Operation is located approximately 2.5km north-east from the Stratford village in the Stratford and Duralie Basin, which is located about 110km north of Newcastle in NSW (***Figure 2-2***). The operation consists of the Stratford and Duralie open cut mines and is readily accessible via national and regional paved roads (***Figure C-6***).

Current Operations

The current mining activities at the Stratford and Duralie operations consist of a series of open pits mined via truck and excavator methods. Split between the Stratford and Duralie areas, four pits are currently active to produce 0.8mt ROM coal which will increase to 2Mt in 2020 for the remainder of the mine life. Duralie ROM coal is transported to Stratford CHPP by a Shuttle Train. All coal is washed at the Stratford CHPP to produce a high quality Semi Hard coking coal as well as a thermal coal.

Some blending of ROM coal from each of the mining areas may occur prior to washing to produce the required export coking and thermal product coal specifications. Blended coal products are transported by rail to the Port of Newcastle for direct export loading and/or blending with other Yancoal group coals at the port.

Open cut mining at the Duralie Pit is currently undertaken 5 days per week for 18.5 hours per day. The Stratford Pits operate for 6 days per week, 21 hours per day, with the exception of Roseville West which is approved to operate on day shift only.

The handling and processing of ROM coal at the CHPP is approved to operate 24 hours per day, seven days per week. The unloading of ROM coal from the Duralie Shuttle Train is currently conducted between 7 am and 10pm.

During 2017 the operation produced 0.7Mt product coal from 0.9Mt ROM Coal versus the planned 0.8Mt ROM Coal in 2018.

Austar

Austar Coal Mine (Austar) is located in the Newcastle Coalfield in the Lower Hunter Valley of New South Wales, Australia. The mine is located 8 kilometres southwest of Cessnock and approximately 65km by rail west of Newcastle. Austar is a wholly owned subsidiary of Yancoal Australia Ltd and in 2005 introduced Longwall Top Coal Caving technology to maximise extraction of coal from the Greta Seam.

Current Operations

Austar is not currently operating due to management of ongoing coal burst issues. Prior to this mining was undertaken in the domain known as "Bellbird South" which lies between Area 2 (Mined by Austar Coal Mine between 2008 and 2012) and Ellalong (Longwall Panel 9A last mined in 1996) (***Figure C-7***). Conventional longwall mining recommenced in Bellbird South in July 2016 with the Longwall Top Coal Caving method planned to be used again in the next mining domain, Area 3. The longwall performance is currently being impacted by coal burst issues which the Company is managing through the development of additional operating management systems, plans and procedures including the operation of equipment.

Austar Coal Mine was previously called Southland and before that was called Ellalong Pelton and Southland Colliery's which date back to 1916. The first longwall mining operation in the Greta Seam commenced at Ellalong Colliery in the early 1980's. All coal is washed onsite with product coal transported by ail 65km to the port of Newcastle. During 2017 the operation produced 1.9Mt product coal from 2.0Mt ROM Coal versus the planned 2.2Mt ROM Coal in 2018. As discussed in ***Section 10***, the 2018 production has been impacted by the recent limitation on longwall production due to management of the coal burst issues.

Donaldson

The Donaldson Project is located in the Newcastle Coalfield, 25km northwest of the port of Newcastle, NSW. It comprises the now closed (April 2013) and rehabilitated Donaldson open cut mine which extracted coal from Upper Donaldson, Lower Donaldson and Big Ben Seams where interburden thickness between those three seams was minimal. The Abel underground mine which was commissioned in 2008, has its portal entry coming off the Donaldson open cut final highwall and mined the Upper and Lower Donaldson Seams by bord and pillar extraction methods (***Figure C-8***). The Abel underground mine was placed on care and maintenance in June 2016.

The vast majority of past mining has been completed by Stockrington No 2 mine (1952-1988), extracting the West Borehole Seam by bord and pillar method for over 35 years. Historical tracings of this mine's workings are extensive and cover an area approximately 8km by 8km.

The Abel Underground ROM coal has been washed at the third party Bloomfield CHPP located to the north of Donaldson open cut mine. ROM coal was hauled from the Abel underground mine to the CHPP by truck. Washed coal (coking and thermal) was transported by rail from the Bloomfield CHPP to the port of Newcastle for export. The operation is currently under care and maintenance with no production in 2017 pending re-start at the Company's discretion.

Monash

The Monash greenfield project is locates 17km north of Cessnock and 25km south of Singleton in the south hunter region of NSW. The project is considered a greenfield project with no mining taking place previously and only limited drilling.

The Monash site layout is shown in ***Figure C-10***.


COAL MEASURES
Sydney Basin
Gunnedah Basin
Gloucester Basin
Clarence Moreton Basin
Ashford Basin
QUEENSLAND
Tenterfield
Lismore
Clarence Moreton Basin
Ashford Basin
Grafton
Glen Innes
Gwydir River
Macintyre River
Clarence River
Coffs Harbour
Narrabri
Armidale
Namoi River
Macleay River
GUNNEDAH COALFIELD
Gunnedah
Tamworth
Coonabarabran
Gunnedah Basin
Port Macquarie
NEW SOUTH WALES
Taree
Scone
Stratford / Duralie
Forster
Gloucester Basin
Moolarben
Muswellbrook
LIDDEL PS
Ashton
BAYSWATER PS
HVO
Singleton
Wellington
Mudgee
MTW
WESTERN COALFIELD
REDBANK PS
Donaldson
Austar
HUNTER COALFIELD
Newcastle
PWCS and NCIG
NEWCASTLE COALFIELD
ERARING PS
VALES POINT PS
Macquarie River
Orange
Sydney Basin
Wyong
MUNMORAH PS
Bathurst
Woy Woy
MT PIPER PS
WALLERAWANG PS
CENTRAL COALFIELD
Penrith
Sydney
Liverpool
Camden
Campbelltown
Lachlan River
Wollongong
PORT KEMBLA Steelworks & Coal Loader
Kiama
Goulburn
SOUTHERN COALFIELD
Nowra
Yass
Shoalhaven River
Canberra
ACT
Queanbeyan
Ulladulla
Moruya
Darwin
NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
SOUTH AUSTRALIA
Brisbane
Perth
NEW SOUTH WALES
MAP AREA
Sydney
Canberra
A.C.T.
Adelaide
VICTORIA
Melbourne
TASMANIA
Hobart
LEGEND
Roads
Rail
Rivers / Creeks
State Boundary
Power Stations
Coal Export Terminals
N
0 50 100 200 km
DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
NSW LOCATION PLAN
Figure No. 2-2
PROJECT No. ADV-BR-11019
Date November 2018

Queensland Group

The Queensland Group of projects consists of the operating Yarrabee and Middlemount Mines both of which are located in the Bowen Basin in Central Queensland (***Figure 2-3***). The Central region of Queensland is accessible through a series of national highways from the state capital of Brisbane as well as the local regional hubs of Blackwater and Emerald (***Figure 2-3***).

Yarrabee

The Yarrabee Coal Mine is located 40km northeast of Blackwater in the eastern Bowen Basin of Central Queensland. The mine is located 150km west of major regional town of Rockhampton and 280km northwest of the Port of Gladstone.

Current Operations

The Yarrabee resource is characterised by an overarching south easterly syncline structure that plunges to the south and has been further folded and faulted. It contains seven coal seams that contain low volatile and low to moderate ash content coal. With steep seam dips, of up to 60º and commonly containing a large number of thrust faults, the geology can be described as moderate to complex. Five pits across Yarrabee are planned to be mined during the mine life.

Since 2009 Yarrabee has been producing low volatile PCI and thermal coal products via open cut mining methods. Coal is either washed in the Yarrabee CHPP to produce PCI coal, or crushed and sold as bypass thermal coal. CHPP reject is separated into coarse and fine streams, with the coarse reject being disposed of in the open pit voids and the fine reject being stored in tailings dam facilities. Product coal is hauled 37km by road truck to the Boonal Loadout Facility which is located adjacent to the Capricorn Highway 10km east of Blackwater and then railed up to 280km to either the Wiggins Island Coal Terminal or the RG Tanna Coal Terminal at the Port of Gladstone.

During 2017 the operation produced 2.9Mt product coal (including 1.2Mt bypass) from 3.4Mt ROM Coal versus the planned 3.4Mt ROM Coal in 2018. The H1 2018 ROM coal production for Yarrabee is reported to be 1.3Mt. The Yarrabee site layout is shown in ***Figure C-4***.

Middlemount

The Middlemount mine is located 10 km southwest of the town of Middlemount and 90 km north-east of Emerald in central Queensland. Roper Creek flows west to east in the southern part of the tenement holding.

Current Operations

Full scale operations at the open-cut mine commenced in November 2011, with mining activities using conventional truck and excavator techniques with ROM coal washed at an onsite CHPP with a capacity of 5.3Mtpa. The Middlemount site layout is shown in ***Figure C-5***.

The Middlemount mine produces low volatile pulverised coal injection coal and semi hard to hard coking coal, with contracted rail and port capacity through Dalrymple Bay Coal Terminal and Abbot Point Coal Terminal in Bowen (***Figure 2-3***). Product coal is railed 306km to the port for export.

During 2017 the operation produced 3.6Mt product coal from 5.3Mt ROM Coal versus the planned 5.4Mt ROM Coal in 2018. The H1 2018 ROM coal production for Middlemount is reported to be 2.5Mt.

LEGEND

Main Highways

Other Highways

Railways

Township

Coal Export Port

N

0 100 200 400 km

DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE

CLIENT

YANCOAL

PROJECT

NAME

COMPETENT PERSON REPORT

DRAWING

QLD LOCATION PLAN

Figure No.	PROJECT No.	Date
2-3	ADV-BR-11019	November 2018

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2.2 Product Types

A range of product coal types are produced from the operations, these include a range of thermal products, semi soft coking coal, semi hard coking coal and PCI products. RPM presents this for information and refers the reader to the business section of the Prospectus for further information.

Thermal Coal

The Hunter Valley region has been the source of large volumes of high quality bituminous thermal coal which, for several decades, has been used as the basis for the design of power plants in the major developed economies of Japan, Korea, China and Taiwan and the developing economies in south-east Asia. The thermal coal produced and importantly planned to continue as part of the Yancoal LOM plans, is consistent with the historical high quality thermal coals and customers expected requirements. The coals are characterised by low ash, low sulphur, favourable fuel ratio, high energy and benign ash chemistry, as shown in **Table 2-2** which shows the company product specifications. The operations typically produce three thermal product coal types based on ash content, low ash, medium ash and high ash. As would be expected these three product types attract different customers and prices with specifications varying between customers. Marketing specifications are shown in the table below.

Table 2-2 Assets Average Thermal Coal Quality

Quality	Unit	MTW/HVO	Moolarben (low ash)	Moolarben (high ash)
Calorific Value	kcal/kg, gar	6,322	5,994	5,328
Ash (ad)	%	13.5	18	27
Total Moisture (ar)	%	10.0	10.5	10.5
Fixed Carbon (ad)	%	53.0	50	40.5
Sulphur (ad)	%	0.55	0.75	0.5
Volatile matter (ad)	%	31.0	29.5	30
HGI		50	47	47

Source: Provided by the Company

Semi-soft coking coal characteristics

Semi soft coking coal (SSCC) can be produced from a limited number of seams in the lower Hunter Coalfield within which the Company has a large footprint. This product coal type is highly regarded by steel mills throughout Asia, including China, for various reasons, most particularly the low ash, and impurities in the coal. Typical semi soft and semi hard coking coal specifications are shown in **Table 2-3** for reference.

The Austar and Stratford and Duralie coal products have particularly high fluidity which is a sought after property in a coking coal blend. RPM is aware the Company markets these coals as a blend for semi hard coking coal.

Table 2-3 Typical Semi Soft and Semi Hard Coking Coal Quality

Quality	Unit	MTW/HVO	Ashton	Austar	Strat/Duralie	Middlemount
Ash (ad)	%	10.0	9.5	6.5	10.5	10
Total Moisture (ar)	%	10	10	6.5	7	10
Fixed Carbon (ad)	%	55	52	49	51	69.5
Volatile Matter (ad)	%	33.5	36	42	36	19
Phosphorous (ad)	%	0.015	0.023	0.046	0.004	0.039
Free swelling index		6	7	7	7	6
Fluidity	(ddpm)	150	800	60,000	15,000	20

Source: Provided by the Company

PCI Coal and Uses

Coal deposits in the Bowen Basin of central Queensland (such as the Client's Yarrabee and Middlemount mines) include extensive resources of low and medium volatile coals that are well-suited to the PCI market.

These coals give high coke replacement ratios that assist in maintaining blast furnace productivity and exhibit good grinding characteristics.

Usage

Pulverised coal injection has become a standard practice in many of the world's major steelworks, particularly Asia which is the preferred customer of the Company. Finely ground coal is injected with the hot blast directly into the raceway of the furnace to provide energy and reductant in addition to that from the coke bed, thus replacing some of the coke with cheaper non-coking or weakly coking coal. Hence the PCI process increases the economic efficiency of steel-making by using lower cost coals to reduce consumption of higher cost prime coking coals. In addition, the PCI coal is not subject to a coke-making or other process stage, other than grinding, prior to its introduction to the blast furnace. PCI rates must be such that stable blast furnace operation is maintained while the permeability of the coke bed is not affected. The typical PCI Coal specification is presented in ***Table 2-4***.

Table 2-4 Typical PCI Coal Quality

Quality	Unit	Yarrabee YP1	Yarrabee YP4	Middlemount
Ash (ad)	%	9.5	11.5	10.5
Total Moisture (ar)	%	10.5	9	10
Fixed Carbon (ad)	%	80.3	77.8	69.5
Volatile Matter (ad)	%	8.7	9.2	18.5
Phosphorous (ad)	%	0.095	0.096	0.05

Source: Provided by the Company

2.3 Market Overview

The major traditional thermal coal markets of Japan, Korea, China, Taiwan and South East Asia are the primary customers of the Company. Japanese power utilities and some customers in Taiwan and Korea seek high energy, low ash coal to enhance boiler efficiency and/or reduce ash disposal costs. RPM is aware that the Company's coking coals are sought in significant and increasing proportions by North Asian steel mills for their coking coal blends.

The Company updates long term pricing forecasts on a 6 monthly basis using research from third party analysis. RPM is not a commodity forecasting specialist and has relied on third parties for price assumptions. As per the JORC Code (2012) reporting requirements, RPM has completed independent reviews of the Company's coal price forecasts based on public and internal pricing information and considers the price assumptions used by the Company to be reasonable.

2.4 Regional Environment

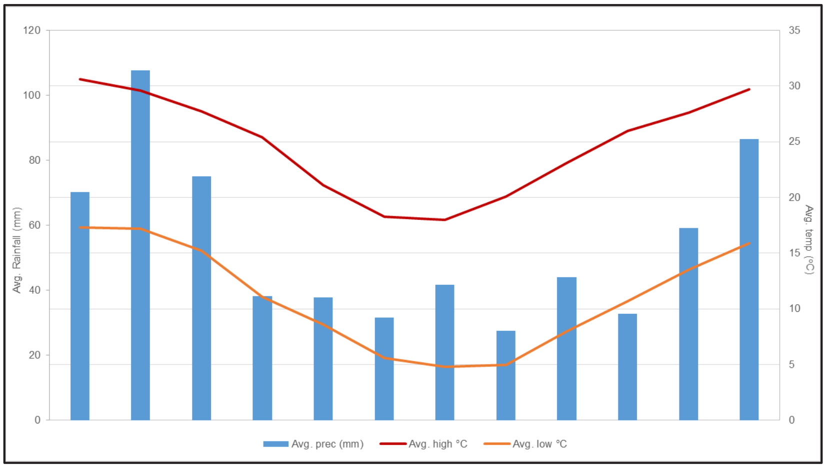
NSW Group

Geography and Climate

The Hunter region of New South Wales (***Figure 1-1***) extends approximately 120 km to 310 km north of Sydney with the land form is dominated by the major regional Hunter River and its tributaries with highland escarpments to the north and south. The Hunter Valley is one of the largest river valleys on the NSW coast and is characterised by rolling hills incised by river and creek systems.

The region has a humid sub-tropical to temperate climate with hot wet summers and cool drier winters. The rainfall observed and moderate temperature ranges result in little to no impact on mining activities and plentiful water supply. The average annual temperature is 17.6^{o}C and has an average rainfall of 692 mm per annum with the driest month being July and the highest rainfalls occur between December and February as outlined in ***Figure 2-4***.

Figure 2-4 Hunter Valley Group Regional Average Rainfall and Temperature



Industry

Apart from mining, the other major industries in the region include Defence, tourism, light industry, vineyards, horse breeding and cattle production. The largest employment industry is coal mining, which employs 24% of the region's workforce.

Regional and Local Infrastructure

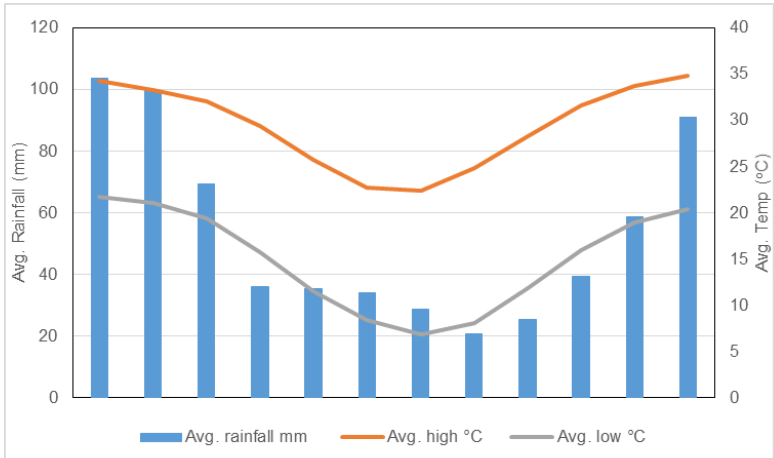
In addition to the minesite open pit mining, maintenance, surface processing plant, office infrastructure, there is significant additional offsite regional and local infrastructure that provides support to the operations and the forecast production. A review by RPM of the regional and local supporting infrastructure indicates that the area has suitable power, water and transport logistics connecting the operating Assets to international markets to support the life of mine ("LOM") production presented in this Report. The Assets are located close to well established excellent quality highways and rail infrastructure (***Figure 2-2 and Figure 2-3***), water sources and regional towns which provide accommodation and support services for the mining operation and its personnel. Further details of the supporting infrastructure are provided in ***Section 12*** and ***Section 13***.

Queensland Group

The Central Highlands region of Queensland is approximately 300km inland (west) from the coastal town of Gladstone (***Figure 1-1***), which is the location of a deep water port for export. The region hosts a large number of large scale coal mines and is the main source of employment along with farming.

The region has a humid subtropical climate with warm to hot summers and mild, dry winters. Maximum temperatures range from 34 °C in January to 22 °C in July, while minimums range from 22 °C to 7 °C with an average annual rainfall of 641.2 mm. The rainfall observed and moderate temperature ranges result in little to no impact on mining activities and plentiful water supply. ***Figure 2-5*** shows the yearly ranges of average high and low temperatures along with monthly rainfall.

Figure 2-5 QLD Group Regional Average Rainfall and temperature



Industry

Apart from coal mining, other major industries include agricultural which includes cotton farming, as well as grapes, citrus and grain growing.

Regional and Local Infrastructure

In addition to the minesite open pit mining, maintenance, surface processing plant and office infrastructure. Significant regional and local infrastructure provides support to the operations and the forecast production. A review by RPM of the regional and local supporting infrastructure indicates that the area has suitable power, water and transport logistics connecting the operating Assets to international markets to support the Life of Mine ("LOM") production presented in this Report. The Assets are located close to well established excellent quality highways and rail infrastructure **(*Figure 2-3*),** water sources and regional towns which provide accommodation and support services for the mining operation and its personnel. Further details of the supporting infrastructure are provided in ***Section 12*** and ***Section 13***.

3. Licences and Permits

The Company holds numerous current mining tenements including mining and exploration licences (permits), business, environmental and safety permits. These enable the Company's operations including mining, major surface facilities and coal handling, management, electrical infrastructure, waste and tailings emplacement and exploration. Below is a summary of the key permits.

RPM provides this information for reference only and recommends that land titles and ownership rights be reviewed by legal experts.

RPM notes that the approved Yarrabee production rate is 4Mtpa, which is forecast to be exceeded in 2020 and an additional permit is required to expand the Middlemount pit to the North West. These approvals are ongoing and is in-line with typical approval processing in Queensland. RPM assumes as part of the reporting of the LOM plans and costs that this will be granted ahead of required timing, however notes that no material issues will occur if delays occur other than delaying the expanded production. Furthermore, as noted in the Business Section of the prospectus, RPM is aware the designed capacity at HVO is 20Mtpa ROM tonnes versus the forecast 20.6Mtpa, however the approved maximum production is 38Mtpa, as such no further permits are required. The increased designed capacity is to be achieved through CHPP efficiencies rather than material changes to the initial design plans.

3.1 Coal Concessions and Surface Rights

All key mining tenements are currently valid for the continued operation of the Assets to support the planned production rates forecast in this Report. All relevant mining and exploration licenses and authorisations held by the Company are listed in ***Appendix E*** and are shown graphically in ***Figure C-1*** through ***Figure C-10.***

3.2 Water Rights

Water required for the operations is sourced by various methods, including wells and surface water storage dams and the various local rivers. As such numerous water rights permits are required for the Assets. All permits are currently in good standing and support current production. Further information is provided in ***Section 15***.

3.3 Environmental and Operating Permits

The Company currently holds numerous environmental, construction and operating permits that are described in ***Section 15***. The permits include the waste and tailings dam facilities construction and operating permits, water bore drilling and extraction permits and various operating and environmental permits. RPM has completed an overview of these permits and considers them in good standing to support the continued operation of the Assets for the foreseeable future. RPM does note that as per typical Australian standards, various permits and licenses need to be periodically renewed as per any long standing and operating mining and processing operations. RPM is not aware of any reason for these permits to not be renewed pending the correct and suitable application procedure.

Further details on tenements, approvals and licenses held by the Company are provided in ***Section 15***.

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4. Assets History

4.1 Exploration History

The Assets have a long history of systematic exploration which has included geological mapping, geophysical and geochemical surveys as well as a large amount of surface diamond and open hole drilling as outlined below.

HVO/MTW

Prior to the acquisition of the operations by the Company, several companies and government agencies completed exploration works which include the following:

- Exploration in MTW commenced in 1949 by the Joint Coal Board (JCB) which completed a series of shallow percussion boreholes. It was not until 1976 that development of the Warkworth Mining Limited (WML) and Mount Thorley Operations (MTO) areas was considered in earnest.
- 1960's: Clutha Bargo explored the Whybrow Seam for coking coal potential.
- 1970-1975: Department of Mines conducts fully cored hole drilling program (DM Warkworth and DM Doyles Creek series).
- 1976: Warkworth Consortium formed (later established as WML) and awarded mining bid for Warkworth area. Commenced exploration program with 12 rigs drilling fully cored, HQ-size holes and large diameter (LD) core drilling in selected seams.
- 1976: Drilling program started at the Mt Thorley site – similar to Warkworth drilling program. Main concentration of drilling was in the shallower, eastern parts of the lease.
- 1980s & 1990s: The main focus at Warkworth was open-hole drilling. Mt Thorley increased open hole drilling in advance of production and made a concerted effort at core drilling during the 1990s.

HVO is an amalgamation of three previously independent mining operations, namely: Howick, Hunter Valley and Lemington. Each mine was developed at different times and was subject to different exploration philosophies and exploration work. Some of the initial exploration work is summarised below:

- Howick open-cut (west pit) – exploration initiated in the 1940s and 1950s completed by the Joint Coal Board and the Bureau of Mineral Resources. Drilling to 200m–300m spacing for cored holes and 50m–150m spacing for open holes.
- Hunter Valley No.1 & 2 mines – exploration initiated in the 1960s and early 1970s by the New South Wales (NSW) Department of Mines. Drilling to 212m spacing for cored holes and 100m spacing for open holes.
- Lemington South open-cut and underground mines – exploration initiated in the 1970s by the Joint Coal Board. Drilling to 200m– 800m spacing for cored holes.

Moolarben

- Exploration in the area commenced in 1950 but historical mining at the Ulan Mine (immediately west of Moolarben) has occurred since 1920's. A summary of key exploration periods completed by other parties is provided below:
- The New South Wales Mines Department carried out initial exploration in 1950 with 6 core holes.
- In 1977 the Joint Coal Board drilled 21 core holes.
- In the late 1970's the Energy Recycling Corporation drilled 33 core holes inside Moolarben leases and 41 core holes in the surrounding areas.
- White Industries in early 1980's drilled 25 core holes.
- In late 1980's Ulan Coal Mine drilled 38 holes (core and non-core).
- Between 1999 and 2003 the Department of Mineral Resources drilled 47 holes (core and non-core) to define potential open cut areas.

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- Intensive exploration activity over recent years at Moolarben has focused on improving the classification of Ulan Seam coal resources, defining interpreted igneous and erosive (palaeochannel) features and Ulan Seam sub- crop/limit of oxidation in advance of mine operations.
- RPM notes that an additional 32 holes were drilled after the 2017 Resource model was completed and these have not been included in the model. RPM reviewed the results to ensure any potential impact on resource classification and estimation was identified and addressed prior to the completion of this resource report.

Yarrabee

Exploration in the Yarrabee area commenced in the mid-1960s with Mines Administration (Minad) and the Bellambi Coal Company (Bellambi), both holding tenure and exploring for metallurgical coal. The significant historic tenure held in the Yarrabee area is listed below with a brief description;

- EPC 16 Mines Administration Pty Ltd. (Minad) 24/02/1966 to 21/07/1967
- EPC28 Bellambi Coal Co Ltd.6/12/1965 to 24/03/1966: results of exploration describe intersections in the Burngrove Formation (Fort Cooper Coal Measures equivalent),
- EPC 34 Mines Administration Pty Ltd. 30/11 1966 to 25/03/1969: Minad identified shallow coal in the area that later became ML 1770, the initial mining area at Yarrabee.
- EPC123 Yarrabee Coal Company (YCC) 26/08/972 to 1/05/1996: The title was originally granted to Brigalow Mines Pty Limited a jointly owned company of Mount Isa Mines Limited (MIM) and Thiess Bros. Pty Limited on 26 august 1972. MIM retained the holding in Brigalow when it acquired 100% of the company in January 1990. Assignment of the EPC from Brigalow to YCC was approved by the Department of Mines and Energy (DME) on 19 August 1993. The Company was granted MDL 160 on 1 April 1996 which covered eight of the twelve sub blocks.
- EPC 190 Yarrabee Coal Company Pty Ltd 16/09/1975 to 19/04/1996: The title was originally granted to Mines Administration Pty Limited (Minad) on 16 September 1975, at which time it covered an area of 770 sq.km. Relinquishments progressively reduced the area to 125 sub blocks in 1976, 70 sub blocks in 1977, 40 sub blocks in 1978, 13 sub blocks in 1979 and 11 sub blocks in 1982. The title was transferred to CSR subsidiary Thiess Bros Pty Limited in October 1986 and later approved for sale to Yarrabee Coal Company Pty Limited in November 1989. On 1 April 1996, The YCC was granted MDL 160, which covered four of the eleven sub blocks.
- ML 1770 Yarrabee Coal Company Pty Ltd From 25/03/1976: ML 1770 was granted on 25/03/1976 and has been held by The Company and its antecedents since that date. The subsequent nine MLs were granted during the period 1998 to 2014 within the area held as MDL 160. The initial stages of exploration commenced with aerial photographic interpretation supported by geological field mapping to delineate the location(s) of the coal measures and to interpret the structural geology of the area. Exploration drilling targeted the Rangal Coal Measures (RCM) outcrop, which resulted in the delineation of the initial mining area of the Yarrabee resource that was located in ML1770.

Ashton

Ashton and previous owners have drilled over 300 surface slim holes (open and cored) for exploration, geotechnical, hydrological and seam gas purposes since 2000. Commencing in August 2013, a number of inter-seam bores (IS-series), gas drainage (GW-series) holes and piezometer bores (YAP-series) were drilled. In addition, measured section strip logs were also undertaken during gate road and longwall face mapping.

In addition to the surface holes a number of phases of underground drilling have been undertaken to optimise the underground operations, these include:

- Prior to 2016 a number of cored (NMLC-size) inter-seam holes were drilled vertically into the floor of the underground workings. These drill holes were drilled for coal quality and geotechnical purposes however were not geophysically logged due to logistical issues associated with the underground mine environment. An additional gas hole WMLC335 was available for 2015 JORC classification onward. Interseam hole ISLL54, which cored ULLD in July 2016 facilitated reclassification of Indicated ULLD resources inside the LOM in ML1533 to Measured status in 2016.
- In late 2016 core drill hole YAC-019 was drilled to test geotechnical, coal quality and interburden thickness between Upper Liddell Seam and Upper Lower Liddell Seam to facilitate decisions on the

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position of the LW201 installation roadway. Non-core drill holes YAO-020 and YAO-021 were also drilled to facilitate decisions on the position of the LW201 installation roadway as the interseam between Upper Liddell Seam and Upper Lower Liddell Seam was thinning inbye. A single large diameter drill hole YAC-023 was also drilled (200mm core hole). Target seams were Lemington 12 Seam, Lemington 15 Seam, Upper Liddell Seam, Upper Lower Liddell Seam and Lower Barrett Seam for clean coal quality analysis.

- An extensive program of interseam drilling from Upper Liddell Seam northwest mains to Upper Lower Liddell Seam 200 mains, for seam level and geotechnical testing of belt chamber areas was completed in 2017. In addition interseam drilling from MG201 and TG201 will allow more confident resource classification in Lower Barrett Seam, the next underground target below the current mining operation. A series of Upper Lower Liddell Seam strip samples in MG201 and TG201 were taken for quality testing. RPM is aware this drilling will be utilised in the 2018 updated model.

Stratford and Duralie

The following provides an overview of the historical exploration at the Stratford and Duralie project including the Stratford mine are, Duralie mine area and the Grant and Chainey resource area.

- Noranda (1970s): Initial exploration drilling in the Gloucester Basin was completed by Noranda.
- BMI Mining/Noranda (1977-1981): Undertook extensive exploration drilling programs in the Gloucester Basin concentrating on drilling Stratford (Stratford Main Pit area) and Duralie.
- BMI Mining/ESSO 1981-1993): Commenced exploration drilling in Stratford North (including BRN). Completed a number of east-west and north-south 2-D seismic lines in 1982/83.
- During the 1980s extensive surface mapping was undertaken by Malcom Lenox.
- Excon: RPM is unsure if any exploration was undertaken.
- AGIP: Undertook no exploration.
- Excel Mining (1993-1995): Drilled coal quality holes. Float/sink data in the Stratford Main Deposit was later considered unreliable.
- CIM Resources (1995-2003): Mining commenced and the wash plant was upgraded. Exploration drilling was completed on target areas (such as BRN proposed pit area), but was minimal due to tight economic conditions.
- Pacific Power (1990s): Drilled nine deep stratigraphic holes to obtain data for their gas leases.
- Gloucester Coal Ltd (2003-2015): Exploration drilling increased during the time of Gloucester Coal Ltd, targeting future areas in Stratford (Roseville West, Wenham Cox Road, Stratford South, Avon North/Stratford North, Clareval seam) Duralie (Weismantel seam coal quality and Clareval seam) and Grant & Chainey. 2D seismic data from the 1980s was reprocessed over Duralie - further defining the structure of the area and leading to the discovery of the Clareval seam. During 2009-2010, intense exploration drilling was undertaken with the quality of data sometimes compromised for quantity of drilling. 2D seismic undertaken in EL6904 in 2011.
- AGL: completed 2D and 3D seismic surveys and airborne surveys (magnetic and radiometric) thought the Gloucester Basin. 2D survey undertaken in 2009 and 2012 and 3D survey over Stratford in 2010. Several deep stratigraphic drill holes were also undertaken by AGL throughout the basin.

Donaldson

Exploration at Donaldson has been carried out by various parties, commencing in 1951as outlined below:

- 1951- 1952 - 54 shallow cored holes drilled by the Bureau of Mineral Resources (BMR) targeting West Borehole Seam. A further 22 cored holes were drilled by BMR in the Buchanan area to assess open cut potential of the Donaldson, Big Ben, Tomago Thin and Rathluba Seams.
- 1952 - 10 core holes drilled by the Joint Coal Board (JCB), targeting West Borehole Seam.
- 1959-1960 - 11 core holes drilled by the JCB, on behalf of the Electricity Commission of NSW (ELCOM), to investigate thermal coal potential of Tomago Coal Measures.
- 1961-1984 - 145 core holes and 151 oxidation chip holes drilled by RW Miller (RWM) in the Ironbark area.

- 1962-1986 - 21 core holes drilled by the JCB and J&A Brown and Seaham Collieries (JABAS) in the Stockrington No 2 lease area, targeting Newcastle Coal Measures and to assess down dip potential of the Tomago Coal Measures.
- 1969 - Two core holes drilled by the JCB in the Black Hill area.
- 1980 - Five fully cored holes drilled by Gollin Wallsend Company in the Buttai area to investigate West Borehole and Sandgate Seams.
- 1996-1997 - Nine non-core holes and four core holes drilled by Donaldson Projects Pty Ltd primarily for groundwater studies. A comprehensive suite of geophysical logs run in all 13 holes.
- 1997- 2000 - 12 holes drilled in Tasman, in four phases, to improve understanding of stratigraphy, structure and coal quality. Geophysical logs run in all holes.
- 1998-1999 - 32 holes drilled by Callaghans Creek Holdings in the Surveyors Creek area to investigate open cut potential of the West Borehole Seam. Geophysical logs run in most holes.
- 2001 - 10 non-core holes and two core holes drilled by Bloomfield Collieries to evaluate open cut potential of EL5497. Geophysical logs available for 10 of the 12 holes.
- 2002 - Nine core holes drilled by Excel Coal in EL5497 down dip of Donaldson to assess open cut potential of the Donaldson and Big Ben Seams. Geophysical logs run in all holes.
- 2003 - Four non-core and 12 core holes drilled at Donaldson to improve understanding of stratigraphy, structure and coal quality in the North, Central and EW Pits.
- 2005 - 17 holes drilled at Donaldson for structural and quality control purposes.
- 2005- 2007 - 170 holes drilled to target the full Tomago Coal Measures and Newcastle Coal Measures down to the Ashtonfield Seam.
- 2014 - 18 holes drilled by Donaldson Coal targeting West Borehole, Lower Donaldson and Ashtonfield Seams.
- 2016 - Four 100mm diameter (C316-C318, C323) and two 200mm diameter core holes (C319, C322) had been completed. These holes targeted the Lower Donaldson Seam within the proposed mine plan. In addition five non-core holes (R324-R328) were drilled to investigate the parting thickness between B and C plies within the Lower Donaldson

Middlemount

The Roper Creek area was first explored by Central Queensland Coal Associates, a consortium of Utah Development Co. and Mitsubishi Development Pty. Ltd. (Utah) under Authority to Prospect (ATP) 6C. The results of exploration suggested that the coal in the Roper Creek area contained significant tonnages of thermal coal. Utah relinquished large tracts of ATP 6C in 1966 which included the Roper Creek area.

The Department of Mines carried out reconnaissance exploration in late 1972 and 1973 in the Roper Creek area to investigate the extent of the potential coal resources. Three stratigraphic holes were drilled within the current project area.

Further drilling was completed in the 1970's and 1980's by Capricorn Coal Pty Ltd (CapCoal; now Anglo). CapCoal determined that the Middlemount resource area contained low to mid volatile, low sulphur bituminous thermal coal and relinquished part of their tenure which included the Middlemount resource area on 22 February 1992. RPM notes that the PCI coal market did not exist at that time and it was extremely difficult to market low volatile (less than 22%) thermal coal at that time.

No further exploration was completed until 2006-2007 when Peabody (Custom Mining) drilled 54 holes. The Middlemount Coal joint venture have explored the deposit since 2008 and have added a further 705 holes to the resource area.

Drilling includes open holes, partially cored slim (HQ-3 and HMLC) and 4-inch diameter core holes (4C) and large diameter holes. ***Table 4-1*** summarises the drilling statistics for holes stored in the Middlemount database.

Table 4-1 Source of Borehole Data at Middlemount

Source	Period	TOTAL	Modelled	Not Used	LAS	Cored
Department of Mines	1970's	3	0	3	0	3
CapCoal (Middlemount)	1980's	238	93	145	135	238
Anglo	1970's-1980's	52	40	12	31	37
Peabody Custom Mining	2006-07	54	39	15	37	24
Middlemount Coal	2008-17	689	547	142	609	175
Middlemount Coal Water Bore	2008-10	16	3	13	2	0
Other		24	10	14	0	4
TOTAL		**1076**	**732**	**344**	**814**	**481**

NOTE: *"Modelled" refers to Quantity Data Points used in the 2018 resource model; "Not Used" refers to holes not used in the 2018 resource model; "LAS" refer to holes that have been geophysically logged and LAS data exist.*

Two 2D seismic surveys have also been completed at Middlemount. In 2008, 7.50km of data was acquired for assistance to delineate and characterise the Jellinbah Fault. An additional 2.93km of 2D seismic data was acquired in 2017 to investigate the underground extension in the south of the deposit.

Monash

A total of 23 holes have been completed within the Monash deposit, all of which were completed prior to 2014, as such all holes were completed by the previous owners.

4.2 Mining History

As outlined above mining activities are being undertaken at all but one of the operations, with recent production shown in ***Table 4-2***. RPM highlights that during 2017 58Mt ROM were produced for 44Mt product of which approximately 80% was produced from the large world class low risk open cut operations at HVO, MTW and Moolarben. Below is an outline of the mining history of each operation.

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Table 4-2 2015 through 2017 Operations Historical Coal Production by Type and Operation

Operation	Method	Centre	Unit	2015	2016	2017	H1 2018
HVO	OC	ROM Coal	Kt	na		19,531	9,113
		Strip Ratio	bcm:t			5.4	5.9
		CHPP	Kt			19,437	8,610
		Yield	%			75	74.4
		Bypass	Kt			213	-
		Total Product	Kt			14,784	6,409
		Product type	Kt	SSCC/thermal			
MTW	OC	ROM Coal	Kt	na		17,691	8,497
		Strip Ratio	bcm:t			5.7	5.6
		CHPP	Kt			17,646	8,314
		Yield	%			67	70
		Bypass	Kt			46	214
		Total Product	Kt			11,817	6,033
		Product type	Kt	SSCC/thermal			
Moolarben	OC/UG	OC ROM Coal	Kt	9,001	11,815	12,998	6,862
		Strip Ratio	bcm:t	-	3.6	3.7	3.8
		UG ROM Coal	Kt	-	422	1,712	2,952
		CHPP	Kt	9,005	12,156	13,499	7,110
		Yield	%	77	77	84	84
		Bypass	Kt	-	-	1,085	2,814
		Total Product	Kt	6,899	9,349	12,380	8,757
		Product type	-	Thermal			
Ashton	UG	ROM Coal	Kt	3,001	2,379	2,791	962
		CHPP	Kt	2,975	2,394	2,797	937
		Yield	%	46	45	42	44.5
		Bypass	Kt	-	-	-	-
		Total Product	Kt	1,375	1,074	1,164	417
		Product type	-	SSCC			
Yarrabee	OC	ROM Coal	Kt	3,360	3,625	3,394	1,341
		Strip Ratio	bcm:t	-	10.9	12.5	15.4
		CHPP	Kt	1,930	2,088	2,192	1,020
		Yield	%	78	74	75	74.2
		Bypass	Kt	1,304	1,548	1,205	373
		Total Product	Kt	2,814	3,098	2,850	1,130
		Product type	Kt	PCI/Thermal			
Stratford and Duralie	OC	ROM Coal	Kt	1,854	1,218	873	290
		Strip Ratio	bcm:t	-	5.6	3.8	4.3
		CHPP	Kt	1,904	1,223	639	312
		Yield	%	75	71	71	69.1
		Bypass	Kt	-	-	223	-
		Total Product	Kt	1,433	864	677	215.7
		Product type	-	SHCC/Thermal			

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Operation	Method	Centre	Unit	2015	2016	2017	H1 2018
Austar	**UG**	**ROM Coal**	Kt	823	1,236	2,039	371
		CHPP	Kt	829	1,214	1,866	391
		Yield	%	87	94	91	95
		Bypass	Kt	-	-	177	-
		Total Product	Kt	721	1,138	1,870	371
		Product type	-	SHCC/Thermal			
Middlemount	**OC**	**ROM Coal**	kt	5,533	5,275	5,293	2,495
		Strip Ratio	bcm:t	7.5	8.5	10.6	11.0
		CHPP	kt	5,534	5,294	5,069	2,495
		Yield	%	79	77	76	82.6
		Bypass	kt	-	-	-	-
		Total Product	kt	4,367	4,089	3,857	2,061
		Product Type		SHCC/PCI			
Donaldson	**UG**	**ROM Coal**	Kt	1,808	265	-	-
		CHPP	Kt	1,742	237	-	-
		Yield	%	77	68	-	-
		Bypass	Kt	-	34	-	-
		Total Product	Kt	1,335	193	-	-
		Product type	-	Thermal		-	-

Source: Provided by the Company

Note: HVO and MTW were not part of the Groups production in 2015 and 2016. Donaldson has no production in 2017

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HVO/MTW

The Assets are an amalgamation of five coal mining operations which combined have been in production for over 45 years via various large scale open pits and small bord and pillar underground operations at Lemington.

HVO comprises three separate previous mines namely Howick, Hunter Valley and Lemington Assets which included the following:

- The Lemington Mine, which began production in 1971, was acquired and merged into HVO in 2001.
- Coal production began at the Howick Coal Mine in 1968 in what is known as the West Pit at HVO. In 2000 the Howick Coal Mine became part of Rio Tinto's Hunter Valley Operations as a result of the merger with Hunter Valley Mine.
- The Hunter Valley No. 1 Mine began production in 1979.

In 2000 the Howick and Hunter Valley mines merged to create the Hunter Valley Operations. The Lemington mine was acquired and merged into Hunter Valley Operations in 2001. Yancoal acquired HVO and MTW as part of the acquisition of Coal and Allied in 2017.

MTW comprises the Mt Thorley and Warkworth Assets and includes the following:

- Mount Thorley has been in operation since 1981 and after a business restructuring of mining company R.W. Miller, Coal & Allied became managers of the mine in 1989.
- Warkworth Mining began operations in the same year as Mount Thorley in 1981 and in 2001 Coal & Allied purchased an interest in the mine. In January 2004, the two mines were integrated to improve efficiency by operating as one business.

Mining is ongoing at MTW and HVO with recent production outlined in **Table 4-2**.

Moolarben

Moolarben leases overlie an area of approximately 105 km2 and have been explored since the 1950's by several private companies, the New South Wales Mines Department and the Joint Coal Board.

Yancoal acquired Moolarben mine through the purchase of Felix Resources in December 2009.

The Moolarben Coal Project Stage 1 was assessed in the Moolarben Coal Project Environmental Assessment Report (MCM, 2006) and was approved by the NSW Minister for Planning on 6 September 2007 (Project Approval [05_0117]). The Moolarben Coal Project Stage 2 was approved by the Planning Assessment Commission (PAC) (as a delegate of the NSW Minister for Planning) on 30 January 2015 (Project Approval [08_0135]). The Stage 2 included the addition of the open cut mine OC4 and two underground mines UG 1 and UG 2 plus supporting infrastructure. The now completed and integrated Stage 1 and Stage 2 projects have approval to mine up to 21Mt per annum ROM coal.

Coal mining operations commenced on the site in 2010 and currently include both underground and open cut operations. Production ramped up to 8.3Mt ROM by 2013 as part of the Stage 1 approval and maintained this level of production until 2015. Following the Stage 2 approval the project has developed OC4 and ramped up ROM coal production to a total of 14.7Mt by 2017 which will be further ramped up to 20Mtpa by 2020. Underground development commenced in 2016 and the longwall commenced operation in 2017 in-line with forecasts.

Yarrabee

The construction of the Yarrabee Coal Mine started in 1981 and commercial production commenced in 1982 in ML 196. Ownership of Yarrabee at that time was by CSR Limited. Initial production from Yarrabee was a range of raw coal products having different ash and phosphorus content. A premium brand coal was produced by toll washing at a nearby coal handling and preparation plant (CHPP).

The Yarrabee Coal Company became the owners of the Yarrabee asset in November 1989. Production rates of PCI and thermal coal ranged from 0.35Mtpa to 1Mtpa. Felix Resources operated the Yarrabee Mine from July 2003 to December 2009 when Yancoal acquired Yarrabee mine through the purchase of Felix Resources. Production at Yarrabee during that period was 1.7Mtpa.

From December 2009 ownership of Yarrabee passed to Yancoal. The CHPP was completed and commissioned in June 2009. The mining areas at Yarrabee are shown in ***Figure C-4***. RPM notes that the term DOM refers to DOMAIN, which refers to an area that is structurally separated from other areas due to faulting and folding.

Ashton

Yancoal acquired Ashton mine through the purchase of Felix Resources in December 2009.

The only previous open cut mining operation within the Ashton leases is the North East Open Cut (NEOC) where open cut mining was conducted by Ashton from 2002-2010. The remnant NEOC void is utilised as the course reject emplacement area for the current operation.

Ashton underground operations commenced in 2005 with development entries driven from the remnant highwall of the NEOC. Extraction using longwall commenced in 2007 with an approved mine plan to extract four seams: Pikes Gully, Upper Liddell, (ULD), Upper Lower Liddell (ULLD and Barrett. The longwall is currently operating in the ULLD seam with the Pikes Gully Seam having been fully extracted and the ULD seam having been partially extracted.

Approval for the South East Open Cut (SEOC) was gained in 2015.

Ashton ownership was transferred to Watagan in 2016. Watagan is a wholly owned unconsolidated subsidiary of YAL.

Stratford and Duralie

Open cut mining first commenced in the Stratford and Duralie basin in June 1995. In 2012, Yancoal acquired both the Stratford and Duralie mines through the merger with Gloucester Coal.

The Stratford and Duralie coal project is an open cut coal operation located approximately 100 km north of Newcastle, New South Wales in the Gloucester Basin. Stratford Coal Pty Ltd is the owner and operator of the Stratford Mine and is a wholly owned subsidiary of Yancoal.

The nearby Duralie Coal Mine is also owned by Yancoal and is located approximately 20 km south of the Stratford Mine. Stratford and Duralie mines collectively comprise the Stratford and Duralie Basin operations which are jointly operated and managed.

Austar

Austar is an aggregate of the former Pelton, Ellalong, Cessnock No1 (Kalingo) and Bellbird South Collieries with the current operations dating back to 2005. Austar Coal Mine was previously called Southland and before that was called Ellalong Colliery which date back to 1916. Yancoal acquired the Southland mine (renamed Austar) in December 2004. The first longwall mining operation in the Greta Seam commenced at Ellalong Colliery in the early 1980's. RPM notes the area to the north of Austar has been mined.

Austar is currently mining the domain known as "Bellbird South" which lies between Area 2 (mined by Austar Coal Mine between 2008 and 2012) and Ellalong. Conventional longwall mining commenced in Bellbird South in July 2016. The next mining Domain is Stage 3 where operations will recommence with the Longwall Top Coal Caving mining method.

Austar has introduced the Longwall Top Coal Caving (LTCC) mining method with development by continuous miner. The longwall top coal caving technology is used to maximise recovery of the thick Greta seam. Longwall Top Coal Caving is the extractive method of which has been utilised successfully since 2006. Longwall Top Coal Caving has been included in the estimated Coal Reserves for Stage 3 mining area.

Austar ownership was transferred to Watagan in 2016. Watagan is a wholly owned unconsolidated subsidiary of YAL.

Donaldson

Mining at Donaldson began in 2001 with the Donaldson open cut mine which was closed and rehabilitated in 2013. Donaldson lodged the EIS for the Abel underground mine in 2006, with approval granted in June 2007 and development commencing in March 2008. It was planned as a bord and pillar mine for greater flexibility, particularly around creek and cliff lines. The amount of coal extracted would be varied to control subsidence to protect a range of surface features.

Yancoal acquired Donaldson mine through the merger with Gloucester coal in 2012.

Abel Mine operated as a bord and pillar mine from 2008 to 2016 (when it was placed on care and maintenance), producing up to 2.5Mtpa of ROM coal to wash thermal and SSCC products for export. Production was predominantly from the Upper Donaldson Seam. A combination of total extraction and partial extraction was incorporated across the target area, with partial extraction used below sensitive surface areas and infrastructure.

A modification to the Abel Project Approval (MOD3) was approved by the Department of Planning in December 2013 that allows for a change in mining method to longwall mining and an increase in annual ROM output of 6Mtpa.

Donaldson ownership was transferred to Watagan in 2016. Watagan is a wholly owned unconsolidated subsidiary of YAL.

Middlemount

The Middlemount Mine is managed by Middlemount Coal Pty Ltd which is an incorporated Joint Venture between Peabody and Yancoal. Yancoal acquired its interest in Middlemount Mine with the merger of Gloucester Coal in 2012.

A trial pit was completed during 2008-09 in the centre of ML70379 to extract coal from the Pisces Upper seam for bulk sample testing. Open cut mining commenced at Middlemount in 2011 and by the end of 2012, approximately 2.8Mt of coal had been mined, mostly from the Pisces Upper seam. Saleable production currently amounts to approximately 4.1Mtpa from some 5.4Mtpa of ROM output. The location of the mined out and planned open cut areas are shown in ***Figure C-9.*** The mining method at Middlemount open cut is conventional truck and excavator mining. The operating method is well proven and suitable for the deposit.

All ROM coal at Middlemount is washed to produce two product types: a semi-hard coking product at 10.5% ash with CSN of 6 and CSR of 58 to 63 and a low-volatile PCI coal at 10.0% ash. The CHPP is a 700tph single stage plant with two product coal handling systems and uses industry standard technology, operating at high availability.

Monash

No mining has occurred.

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5. Geology

RPM has reviewed the geology of the operations, on both a regional and deposit scale and considers the geology to be well understood and developed through the generations of geological mapping, data acquisition from drilling, geophysical surveys, interpretation and development of three-dimensional models. Below is a summary of the key geological features of the Assets.

RPM notes that the below summary has largely been derived from information provided by the Company from various reports and sources, however it has been reviewed and edited based on RPM's opinion and site visit observations.

5.1 HVO / MTW / Ashton/ Monash

Regional Geology

The HVO/MTW and Ashton assets are located in the Hunter Coalfield, which is located in the northern part of the Sydney Basin as shown in ***Figure 1-1***. The Sydney Basin forms part of the composite Permian-Triassic age Sydney-Gunnedah-Bowen Basin (SGBB) system, which extends for approximately 1,700 km from southern NSW into central Queensland. The SGBB represents a 1,700 km long foreland basin of Early Permian to Late Triassic age. The Sydney Basin is bounded by the New England Fold Belt to the north and this boundary is marked by the structurally complex, Hunter-Mooki Thrust. To the west and south, the basin strata lap onto older rocks of the Lachlan Fold Belt and to the east, the basin's limit is marked by the edge of the continental shelf.

The Sydney Basin is one of the world's premier coal provinces containing multiple stacked sequences of thick bituminous-rank Permian age coal measures. The Permian coal measures in the Sydney Basin are only weakly to moderately folded and faulted and as such are generally amenable to high productivity surface and underground mining methods.

The SGBB system evolved during the Late Carboniferous to the Middle Triassic (approximately 310 to 230 million years ago (Ma)) as a series of contiguous basins which formed along the eastern part of the Gondwana continental margin. The SGBB has been subject to a complex, multiphase geological history including early rifting in a back-arc environment and thermal subsidence evolving into a retro-arc foreland basin.

Coal measure sedimentation in the Sydney Basin began in the early Permian and was terminated towards the end of the Permian by major uplift and basin tilting. The earliest Permian units were deposited in fluvial, coastal plain and marine environments on older Palaeozoic basement rocks. This deposition was followed by rapid subsidence in the middle Permian, providing more space for sediment accumulation, with the main period of coal deposition occurring in the late Permian.

The sedimentary pile in the Sydney Basin has asymmetrical thickness distribution. The thickest accumulations are along the easterly-dipping Hunter-Mooki Thrust Fault System suggesting that subsidence was greatest along that fault. The sedimentary sequence thins to the west due to the sediments onlapping into the basement rocks in the west. The Hunter Coalfield is a district-scale north-eastern subdivision of the Sydney Basin (***Figure 2-2***). The Permian coal bearing stratigraphic section occurs within the Whittingham Coal Measures.

Regional Stratigraphy

The Late Permian Whittingham coal measures are the main focus of operations and its stratigraphy is outlined in ***Figure 5-1***. The existing operations exploit more than 100 individual seams (or seam plies) contained in more than 20 seam groups (or members) across the Vane and Jerrys Plains Subgroups of the Whittingham Coal Measures. Coal seams split and coalesce in various combinations at all stratigraphic intervals.

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Whittingham Coal Measures

The Whittingham Coal measures are subdivided in to two Subgroups, namely Jerrys Plains and Vane as outlined below and shown in in ***Figure 5-1***.

The Whittingham Coal Measures were deposited in a retroact foreland basin during the Late Permian at a time when the Sydney-Bowen Basin complex was undergoing east–west compressional tectonics. The sediments were largely derived from the north (Hunter-Mooki Thrust) and the east, shedding off a contemporaneous high associated with the New England Fold Belt and the already developed Hunter-Mooki Thrust System.

Palaeocontemporaneous highs such as the Loder Dome found in the Lower Hunter area probably influential the coal seam deposition at that time by acting as a basement high resulting in thinner Permian sediment deposition. Subsequent burial, rifting and recent compressional tectonics has all influenced the structural character of the area. The coal seams generally dip to the south and west at less than 4 to 6º.

The Whittingham Coal Measures are typically 100 to 300m thick and where they crop out around the Lochinvar Anticline are 60m to 75m thick. Igneous activity occurred at various stages of geological history, particularly during the Jurassic, Late Cretaceous and Tertiary, after deposition of the coal seams and as such cross cut the coal measures and influence continuity and coal qualities in the local vicinity.

Jerrys Plains Subgroup

The Jerry's Plains Subgroup represents a complete cycle of terrestrial coal measure sedimentation that is up to 800m thick. Interseam lithologies are typically lithic sandstones, shale and conglomerate, with siltstone, carbonaceous claystone and tuff also occurring throughout the sequence. This Subgroup is the major source of coal mined in the Hunter Coalfield and due to extensive work has been subdivided in various formations and further into seam members as outlined in ***Figure 5-1***.

The Bayswater Coal Member is the lowest coal seam in the Jerry's Plains sequence and was formed in a back-barrier coal swamp environment. The Archerfield sandstone which occurs below the Bayswater seam represents a phase of prograding beach complex. Deposition of alternating interdistributary bay laminites and upwards coarsening crevasse-splay sandstones occurred in a lower delta plain environment, with the thin and banded Broonie Coal Member and Vaux Coal Member forming part of this sequence. Upper delta plain conditions then resulted in thicker and laterally continuous seams such as the Piercefield Coal Member and Mount Arthur Coal Member, after which lower delta plain conditions were re-established with the deposition of the Glen Munro through to the Whybrow Coal Member. Deposition of the Jerrys Plains Subgroup ended with a marine transgression, forming the base of the Denman Formation. Coal distribution in the Jerrys Plains Subgroup of the Whittingham Coal Measures is more variable compared to that of the Vane Subgroup stratigraphically below. Although the majority of the upper delta plain seams are laterally extensive, some of the largest variations occur in the Blakefield, Mount Arthur and Piercefield coal members. The lowest seam, the Bayswater Coal Member seam, varies in thickness from about 1 to 14 m and has a dull character with high inertinite content. The brighter coals such as the Broonie through to the Warkworth coal members are subject to extensive splitting.

Vane Subgroup

The Jerrys Plains Subgroup and the Vane Subgroup are separated by a marine incursion, which is represented by the Archerfield Sandstone. The Jerrys Plains Subgroup has been subdivided into two formations, namely the Bulga and Foybrook Formations and various seam members as outlined in ***Figure 5-1***.

The lower seams of the Vane Subgroup generally have similar thicknesses and are characteristic of the facies change from lower to upper delta plain deposits, with the Liddell Coal Member being the thickest coal-bearing unit, up to 14m in the Foybrook area. The majority of the seams are characterised by multiple splitting, thus, individual coal seams tend to be thin and of inferior quality to the upper Jerrys Plains Seams.

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Figure 5-1 Generalised Stratigraphic Column for the Whittingham Coal Measures

	Subgroup	Formation	Member
Whittingham Coal Measures	Denman Formation		
	Jerrys Plains Subgroup	Mt Leonard Formation	Whybrow Seam
		Malabar Formation	Redbank Creek Seam
			Wambo Seam
			Whynot Seam
			Blakefield Seam
		Mount Ogilvie Formation	Saxonvale Member
			Glen Munro Seam
			Woodlands Hill Seam
		Milbrodale Formation	
		Mount Thorley Formation	Arrowfield Seam
			Bowfield Seam
			Warkworth Seam
		Fairford Formation	
		Burnamwood Formation	Mt Arthur Seam
			Piercefield Seam
			Vaux Seam
			Broonie Seam
			Bayswater Seam
	Archerfield Sandstone		
	Vane Subgroup	Bulga Formation	Lemington Seam
		Foybrook Formation	Pikes Gully Seam
			Arties Seam
			Liddell Seam
			Barrett Seam
			Hebden Seam
	Saltwater Creek Formation		

Coal Mineralogy and Rank

Vitrinite

Vitrinite is the dominant maceral group in coals of the Jerrys Plains Subgroup (generally greater than 50%) with the content of the coal at MTW and HVO typically ranging between 70 and 80%. Inertinite is most abundant in seams from the Bowfield Coal Member to the Bayswater Coal Member, which could indicate greater extent of oxidation during deposition of coals in that part of the Jerrys Plains Subgroup

Coal Rank

Coals in the south of the Hunter Coalfield are generally of higher rank in comparison to those in the north for the same depth, all generally increasing linearly with increasing depth. Vitrinite Reflectance (Rv max) is used as a measure of coal rank. In the south of the coalfield RV max varies within a broad range between 0.56 and 1.15%, although most are greater than 0.75%. Rv max of 1% or more occurs at depths of greater than 700m with the central regions, Rv max is about 0.72 to 1.00%, whereas in the west Rv max is between 0.65 and 0.95% Rv max in the HVO area does not show any consistent trends and any potential down dip trend of increasing Rv max is within the repeatability range of the vitrinite reflectance measurement and cannot be interpreted as a trend.

A number of seams demonstrate that CSN increases to the south east in HVO rather than down dip. The CSN at MTW appears to follow the south-easterly increasing trend with CSN values that are generally greater than those values at HVO down to the Mount Arthur Seam. The CSN for the Piercefield to Broonie seams appear to have similar values at both MTW and HVO. The CSN values in MTW appear to increase down dip.

The MTO CHPP splits coal at plus and minus 16mm, with the minus 16mm size fraction producing SSCC from certain coal seams. Splitting the coal by size fraction is a way of concentrating vitrinite into the minus 16mm fraction, which enables the coal product to be marketed as SSCC.

RPM considers that increased CSN at MTW and HVO is related to the increased vitrinite content of the coal. Coal rank in the range Rv max 0.75 to 0.8% at MTW and HVO is not a significant driver for caking properties. Additionally RPM concludes that Rv max should not be used as an indicator for determining increased potential for semi soft coking coal down dip, however the relationship between vitrinite content and CSN should be investigated in detail to develop an understanding of how increased value can be obtained from the MTW and HVO resources.

Deposit Geology

The surface geology of the HVO, MTW and Ashton coal leases is dominated by outcrops of the Jerry's Plains and Vane Subgroups which form the Whittingham Coal Measures. The main rock types of this sub-group include sandstone, siltstone and conglomerate, which occur with subordinate coal and tuffaceous claystone

Hunter Valley Operations

HVO is located on the asymmetric southerly plunging Bayswater Syncline. The Auckland area is located on the western flank of the Camberwell Anticline and dips more steeply than the western limb of the Bayswater Syncline. The West Pit is located on the eastern flank of the Muswellbrook Anticline.

The Barrett seam outcrops in the east of the Auckland area on the Camberwell Anticline. A cross section through the HVO resource is shown as ***Figure 5-2***.

Mount Thorley and Warkworth

The Wollombi Coal Measures overlie the Whittingham Coal Measures and outcrop in the far southwestern corner of CCL753. Alluvial deposits associated with the Hunter River and Wollombi Brook cover the coal bearing strata over the northern and eastern parts of CCL753.

The strata within the MTW area dip to the west and southwest between 4 and 6^{o} with increased dips in excess of 60 degrees in the south-eastern corner of the MTO area, known as the Mount Thorley Monocline, which is located on the western flank of the Loder Anticline.

A cross section through the MTW resource is shown as ***Figure 5-3***.

Ashton

The Ashton area is located on the Camberwell Anticline which has a north north-west to north-west orientation and plunges to the north-west. The Camberwell Anticline is asymmetric with a moderately dipping (9° to 18° degrees) eastern limb which is situated in ML1529 and a gently dipping (6° to 9°) western limb which is situated in the remainder of the area as shown in ***Figure 5-4***. The western limb at Ashton contains the seams that are equivalent to those in the Auckland area at HVO.

The Ashton area contains all coal seams from the Bayswater Seam to the Hebden seam which in stratigraphic descending order are:

- Bayswater;
- Lemington;
- Pikes Gully;
- Arties;
- Liddell;
- Barrett; and,

- Hebden.

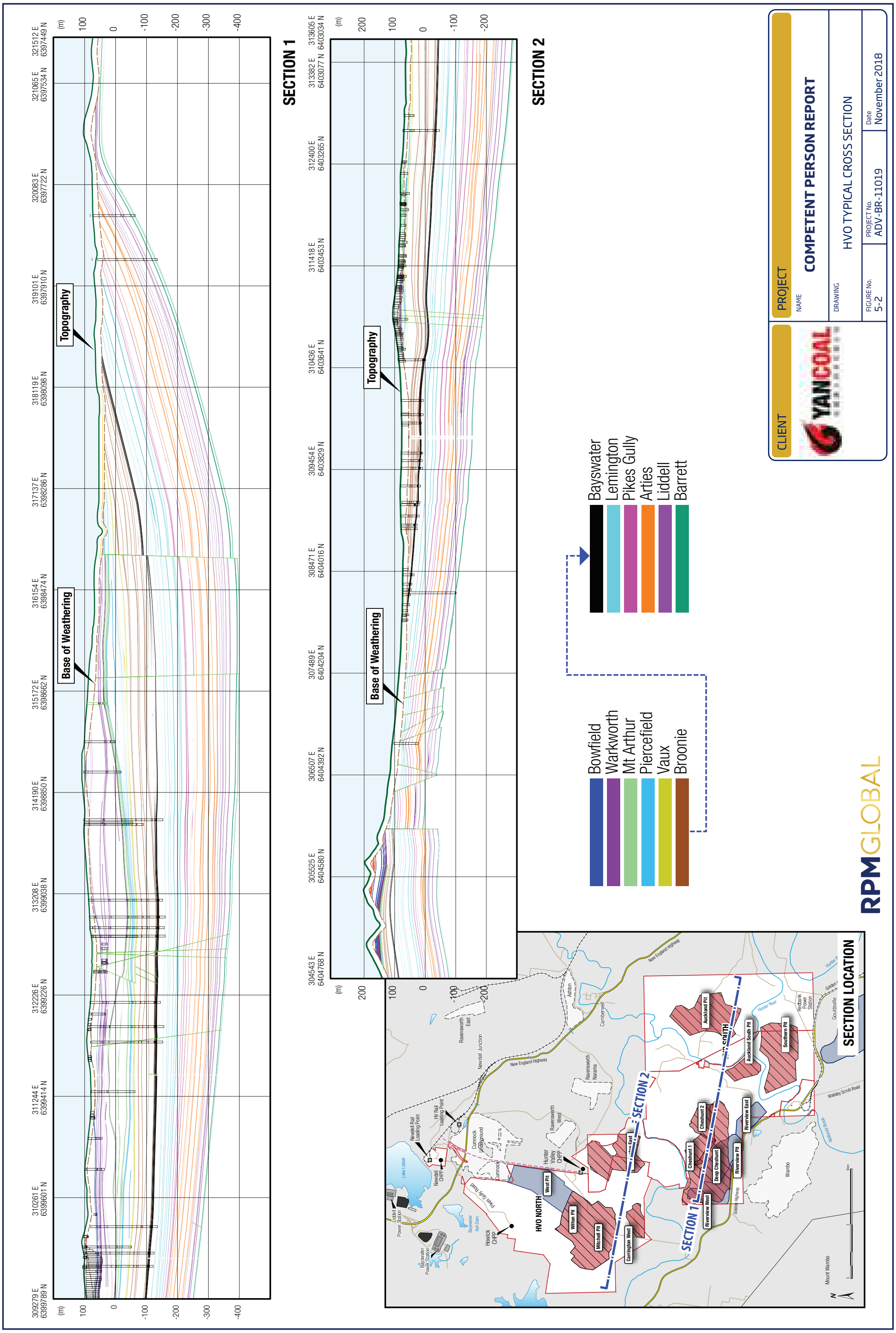
The coal seams at Ashton exhibit the same degree of seam splitting, seam thickness and have similar raw coal ash ranges to the equivalent coal seams at MTW and HVO.

The Barrett Seam outcrops on the Camberwell Anticline south of the New England Highway and joins with the outcrop of that seam to the south in HVO. The stratigraphically higher coal seams above the Barrett Seam crop out sequentially from east to west throughout the Ashton area. The coal seams in the Ashton area are equivalent to the coal seams present in the Auckland area at HVO.

Monash

The Monash area contains stratigraphy from the Newcastle Coal Measures and Jerrys Plains Subgroup of the Whittingham Coal Measures. Regional dip of strata is shallow (<5 degrees) generally towards the southwest. Triassic Narrabeen Group sediments up to 400m thick overlie the Newcastle Coal Measures and form prominent escarpments. Coal seams in this remote portion of the Lower Hunter Valley exhibit a high degree of splitting and so thickness and ash content varies considerably throughout the deposit. The stratigraphy is similar to that outlined in ***Figure 5-1*** and the coal seams contained in the Monash resource in stratigraphic descending order include:

- Fassifern;
- Borehole;
- Whybrow;
- Whynot;
- Woodlands Hill;
- Arrowfield; and,
- Bowfield.


SECTION 1
SECTION 2
Topography
Base of Weathering
Bayswater
Lemington
Pikes Gully
Arties
Liddell
Barrett
Bowfield
Warkworth
Mt Arthur
Piercefield
Vaux
Broonie
SECTION LOCATION
CLIENT
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
HVO TYPICAL CROSS SECTION
FIGURE No.
5-2
PROJECT No.
ADV-BR-11019
Date
November 2018
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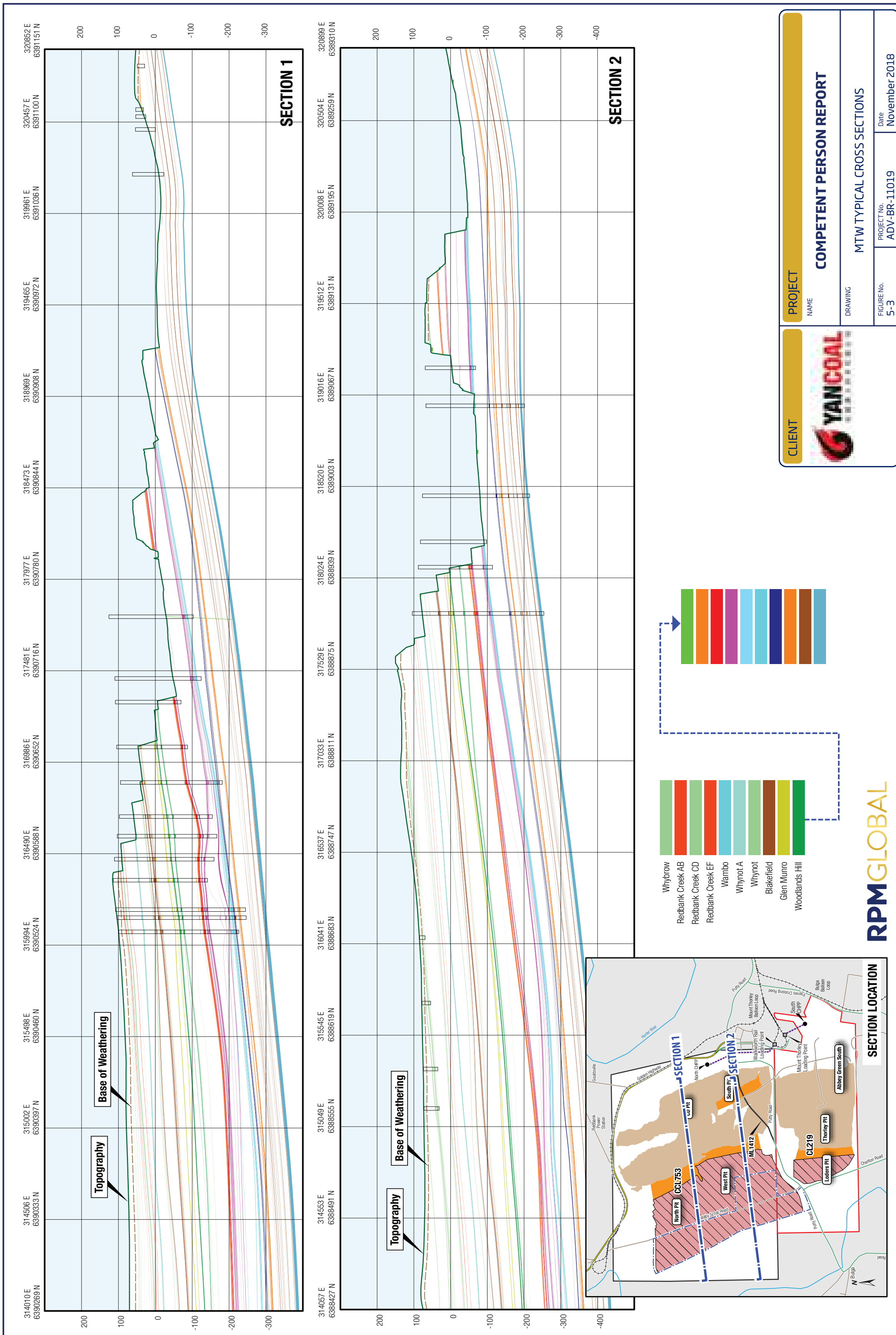
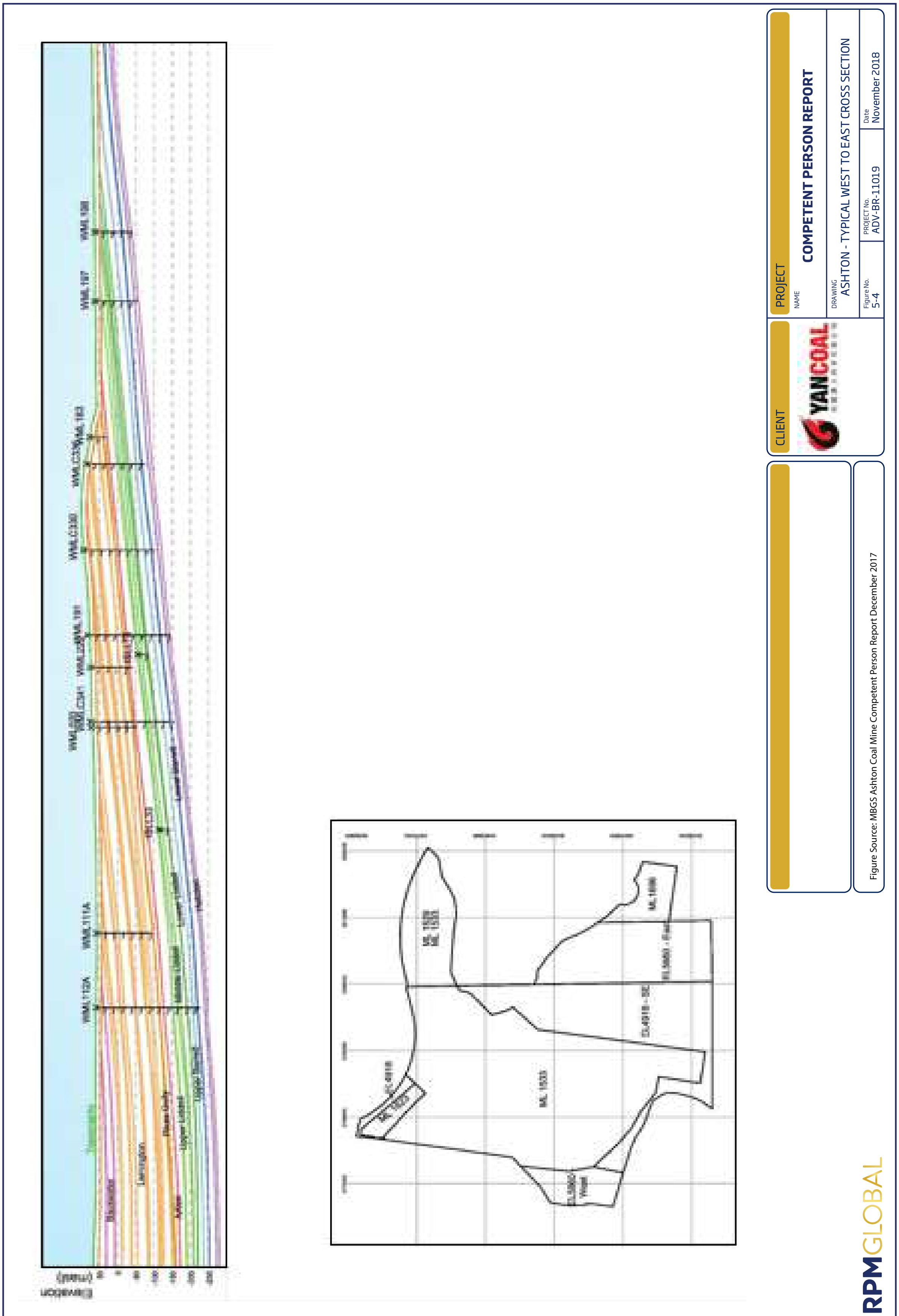

SECTION 1
SECTION 2
Topography
Base of Weathering
Whybrow
Redbank Creek AB
Redbank Creek CD
Redbank Creek EF
Wambo
Whynot A
Whynot
Blakefield
Glen Munro
Woodlands Hill
SECTION LOCATION
RPMGLOBAL
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
MTW TYPICAL CROSS SECTIONS
FIGURE No.
5-3
PROJECT No.
ADV-BR-11019
Date
November 2018


CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
ASHTON - TYPICAL WEST TO EAST CROSS SECTION
Figure No.
5-4
PROJECT No.
ADV-BR-11019
Date
November 2018
Figure Source: MBGS Ashton Coal Mine Competent Person Report December 2017
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5.2 Moolarben

Regional Geology

The Moolarben deposit is located on the western margin of the Western Coalfield within the Sydney Basin where sedimentary strata of Permian, Triassic and Jurassic age dip towards the northeast at 1° - 3° and overlie Carboniferous granite and folded metamorphic basement. The Permian strata comprise the coal-bearing Illawarra Coal Measures and the underlying Shoalhaven Group, which in turn uncomformably overlies the Lachlan Fold Belt basement rocks (***Figure 5-5***). Surface Quaternary alluvial deposits and remnant Tertiary basalt flows are common in the area.

The Illawarra Coal Measures are equivalent to the basal section of the Newcastle Coal Measures and the Wittingham Coal Measures in the Hunter Coalfield. Extrusive basaltic lavas and intrusive igneous activity was common during the Tertiary era (< 65 million years ago). These igneous features are usually not significant for open cut mining but for underground operations the impact of unidentified igneous intrusions can be serious from a safety as well as a cost perspective. RPM is aware the Company and its operators are well aware of this issue and continue to monitor and explore to minimise their impact.

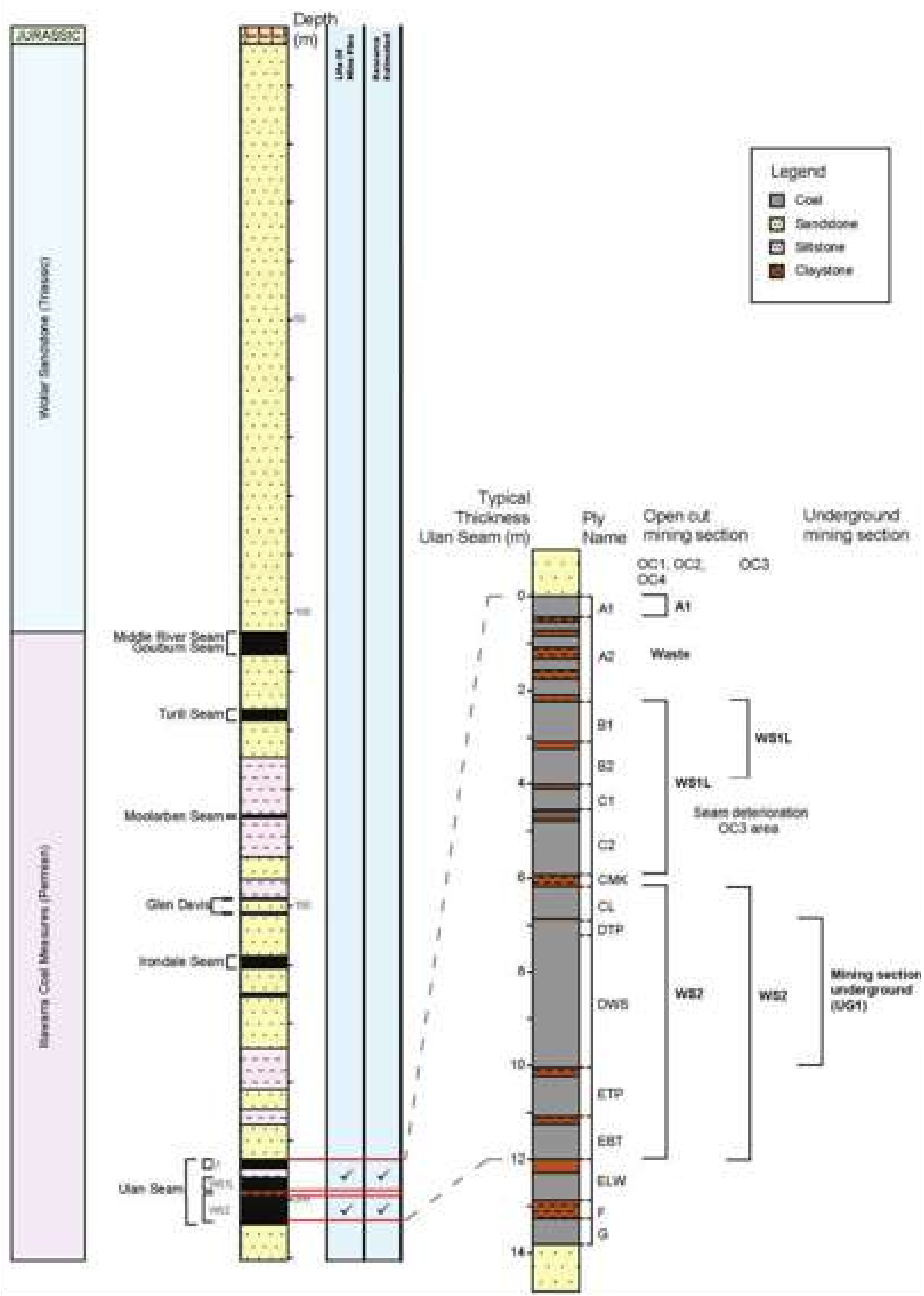
Regional Stratigraphy

The Illawarra Coal Measures are typically 80 to 100m thick within the Moolarben resource area and comprise a sequence of interbedded siltstone, sandstone, minor claystone with up to eight coal intervals, of which the Ulan Seam is the only seam mined (***Figure 5-5)***. Regionally, the Wollar Sandstone which is a 120m thick sandstone sequence within the Narrabeen Group, overlies the coal measures forming cliffs and escarpments. The Pilliga Sandstone and Purlawaugh Siltstone, both of Jurassic age, overlie the Narrabeen Group to the north and east of Moolarben, with a combined thickness of up to 120 m. The Pilliga Sandstone is an aquifer of regional significance.

The Ulan Seam includes several partings and on a regional basis is up to 12m thick. A tuffaceous parting (C Marker – CMK) approximately 0.3m thick occurs in the middle of the seam and separates the upper (WS1L) and lower (WS2) open cut working sections. East of Moolarben the CMK interval increases to 15m thick. The Lithgow Seam, which is up to 15m below the Ulan Seam is the basal seam within the Illawarra Coal Measures throughout the Western Coalfield.

The seam depth increases towards the northeast due to regional dip (***Figure 5-6***). Overburden thickness north of the railway in the north of EL6288 reaches 300m and in the south of EL6288 severe topographic relief caused by remnant Triassic escarpments, limit the extent of open cut development even though overburden thickness tends to be less than 150 m.

The Ulan Seam is typically 11m thick throughout much of tenure although in the south of EL6288 and within EL7073, deterioration of some upper coal plies in the WS1 results in a decrease in overall seam thickness to less than 6 m.



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CLIENT	PROJECT		
YANCOAL	NAME: COMPETENT PERSON REPORT		
	DRAWING: MOOLARBEN STRATIGRAPHIC COLUMN		
	Figure No. 5-5	PROJECT No. ADV-BR-11019	Date November 2018

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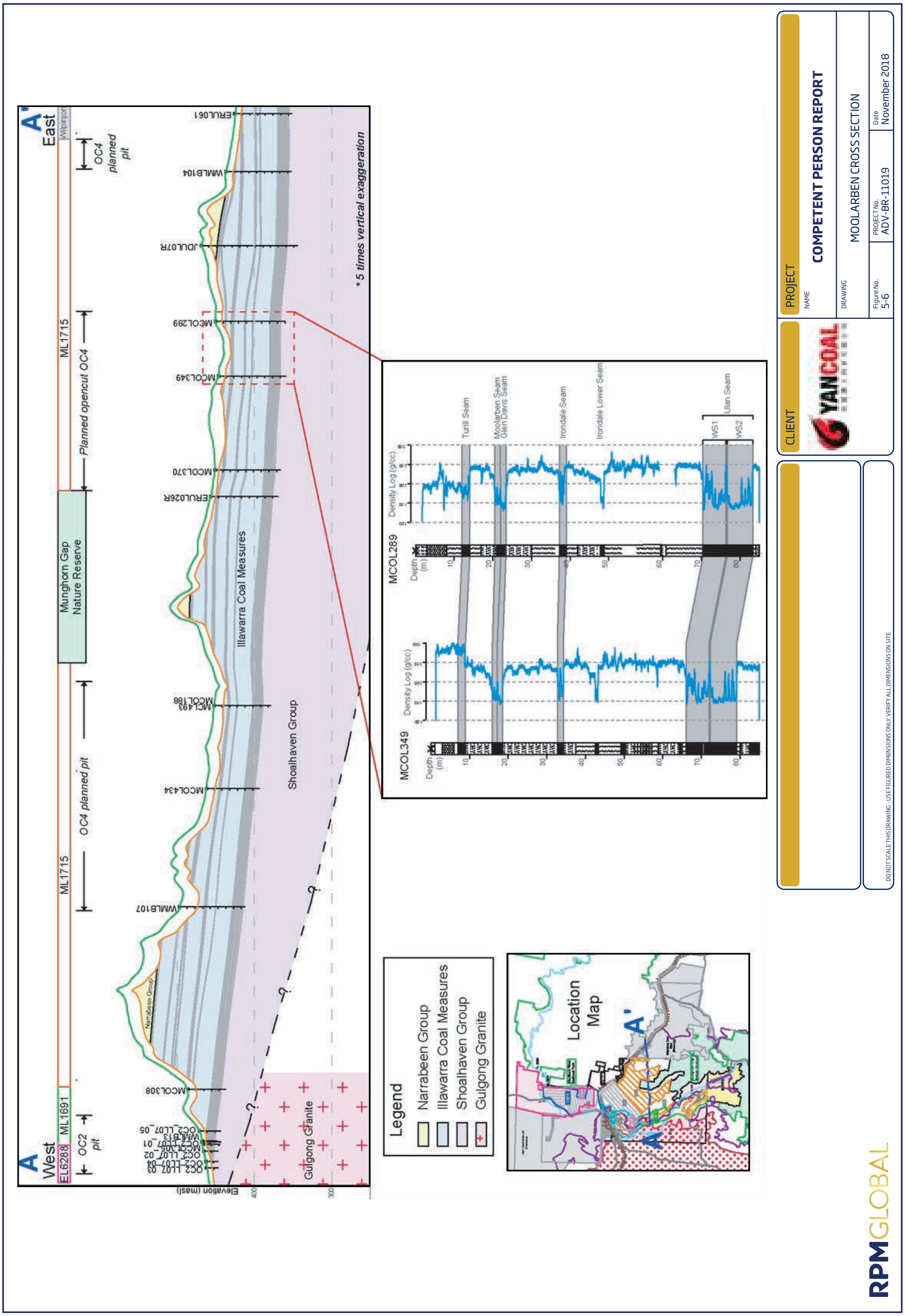
A
West
A'
East
EL6288
ML1691
ML1715
OC2 pit
OC4 planned pit
Munghorn Gap Nature Reserve
Planned opencut OC4
OC4 planned pit
Elevation (masl)
400
300
MCOL308
WMLB107
MCOL434
MCOL188
MCOL370
ERUL026R
MCOL349
MCOL289
JDUL07R
WMLB104
ERUL061
Narrabeen Group
Illawarra Coal Measures
Shoalhaven Group
Gulgong Granite
* 5 times vertical exaggeration
MCOL349
MCOL289
Depth (m)
Density Log (g/cc)
Turill Seam
Moolarben Seam
Glen Davis Seam
Irondale Seam
Irondale Lower Seam
Ulan Seam
WS1
WS2
Legend
Narrabeen Group
Illawarra Coal Measures
Shoalhaven Group
Gulgong Granite
Location Map
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
MOOLARBEN CROSS SECTION
Figure No.
5-6
PROJECT No.
ADV-BR-11019
Date
November 2018
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5.3 Yarrabee

Regional Geology

The Yarrabee deposit is situated in the eastern portion of the Central Bowen Basin in central Queensland adjacent to the Dawson Tectonic zone. The stratigraphic sequence is made up of thin Quaternary soils, Tertiary sands and gravels, the Triassic Rewan Formation and the Upper Permian Rangal Coal Measures. The coal measures consist of interbedded siltstones and sandstones with some mudstones and shales. The Rangal Coal Measures are separated from the lower Burngrove Formation by the Yarrabee Tuff, which, when present, can be used for correlation purposes.

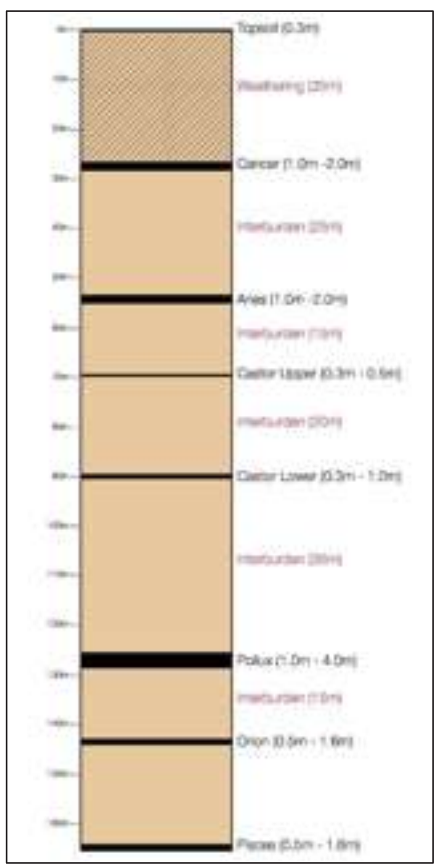
The Tertiary material is dominated by sand and gravel, the thickness of which increases with proximity to the Mackenzie River. Thicknesses of the Tertiary range from 40 meters depth in the north to zero meters in the south. The base of weathering is typically between 5 and 15 meters below the Base of Tertiary surface.

The seams at Yarrabee in stratigraphic order (as shown in ***Figure 5-7***) are: Cancer, Aries, Castor Upper, Castor Lower, Pollux, Orion and Pisces Lower) have been modelled and resourced where supported by adequate data. The lower Orion and Pisces seams are generally thin and of poor quality and thus are not resourced, with the exception of the Yarrabee East South (YES) and Domain 2 South pit areas. In these zones the seams thicken and improve in quality sufficiently to be resourced. ***Figure 5-7*** shows a schematic of the Yarrabee seams.

Deposit Geology

The Yarrabee deposit is located within a fault slice of the Rangal Coal Measures of the Blackwater Group, between the Yarrabee fault on the east and another fault on the west, both faults being thrusts and upthrown to the east, ***Figure 5-8***.

Figure 5-7 Yarrabee Resource Stratigraphic/Seam Sequence



The overarching structure of the Yarrabee area is an asymmetric south easterly plunging syncline, the Yarrabee Syncline, with the greatest amount of compressional deformation located on the western limb and the northern nodal part of the syncline. The Yarrabee Syncline is shown by the dark blue line in ***Figure 5-8***. The Yarrabee Mine is located between two significant fault structures (most likely faulted zones, rather than single faults) on the east and to the west. Faults strike in a NNE-SSE direction and are upthrown to the east.

The Yarrabee Syncline is itself folded and faulted by smaller fold structures and faults, shown in ***Figures 5-8***. The anticline structures are typically faulted in the more compressed parts of the Yarrabee area and coal is only present in the synclines. ***Figure 5-9*** shows two cross sections which are located in the vicinity of the Yarrabee East North (YEN) pit. Six thrust faults have been interpreted with the lowest angle faults being located in the east and subsequent faults located to the west steepening to the west. In addition fault plane angles are lowest in the north and steepen to the south, which can be observed by comparison between cross section 1 and cross section 2 in ***Figure 5-9***.

Figure 5-8 Yarrabee East Mine Area and Location of Cross Sections

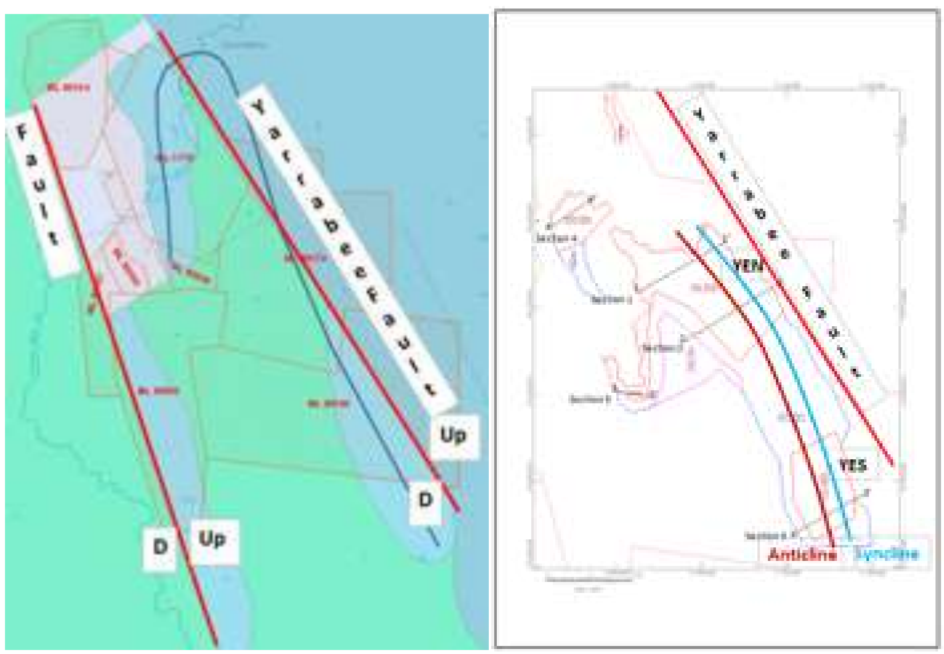
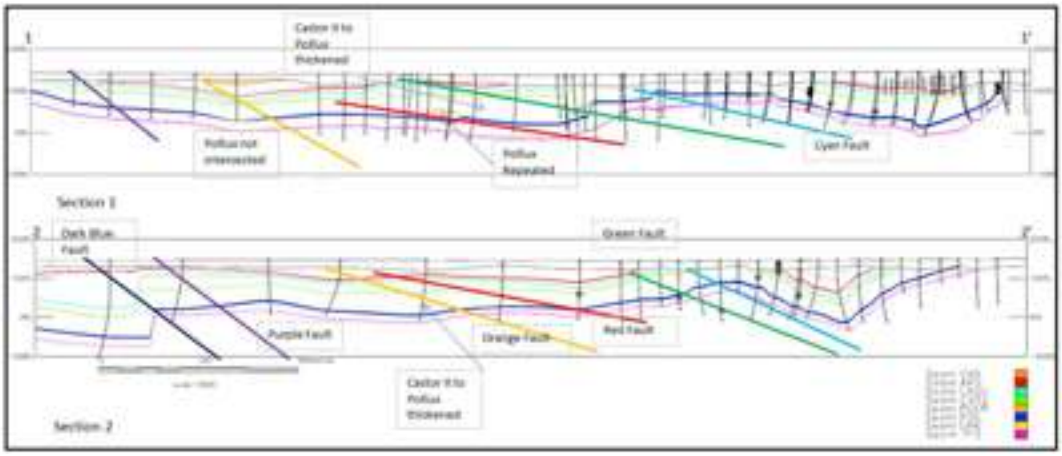


Figure 5-9 Yarrabee Typical Cross Section



The Pollux seam is the only seam that is subsampled with multiple ply samples taken. The other seams are typically sampled as a single sample unless the geologist determines that the seam intersection has been structurally thickened by faulting and in those cases additional samples are taken to ensure correct representation of the seams coal quality attributes.

The Pollux seam is stratigraphically equivalent to the Leichardt or Elphinstone of the Northern Bowen Basin and the DU and D seam of the south-eastern Bowen Basin at Moura. The RPM Competent Person is familiar with the characteristics of the Pollux seam throughout the Bowen Basin.

The Pollux seam is subdivided into four coal intervals which are listed below. The upper and lower sections of the Pollux seam are subdivided at the medial stone band which is a Bowen Basin wide marker in the Leichardt / Elphinstone seam. Typical sampling for each of the four intervals is described below and shown in ***Figure 5-10***:

1) Wash Top - The Wash top ply is sampled as a single interval, because it is typically less than 30cm thick,

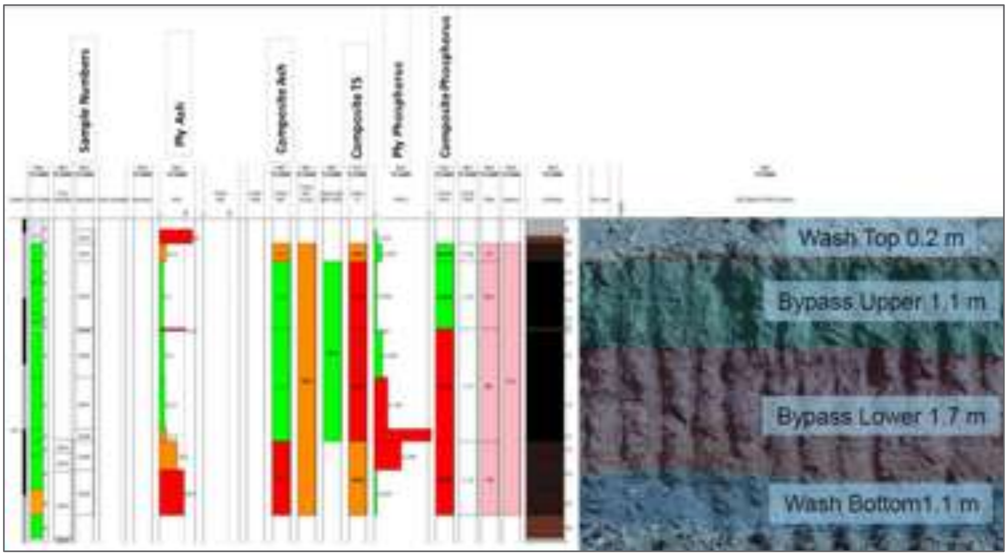
2) Bypass Upper - The Bypass Upper is typically sampled as a single interval because it has uniformly consistent coal quality,

   Medial Stone Band

3) Bypass Lower - The Bypass Lower is sampled as a number of intervals to characterise the raw coal ash and phosphorus. In general a minimum of three samples is required.

4) Wash Bottom - The wash Bottoms is also sampled as a number of intervals to characterise the raw coal ash and phosphorus and a minimum of three samples is required.

Figure 5-10 Pollux Seam Sample and Mining Sections



5.4 Stratford and Duralie

Regional Geology

The Stratford and Duralie Operations comprises the Stratford mine in the north and the Duralie Mine in the south. The Operations are located in the Gloucester Basin in NSW and is approximately 55km long and 15km at it's widest. The coal bearing strata package is over 1km thick and contains 10-15 significant seams. The stratigraphic sequence of the Gloucester Basin is shown in ***Figure 5-11***

The Basin primarily contains in stratigraphically descending order the Late Permian strata of the Gloucester Coal Measures and Dewrang Group. The Stratford and Duralie Basin is a relatively small Permian basin which has undergone significant east-west tectonic compression that has resulted in a tight north trending synclinal structure that is disrupted by considerable normal faulting that strikes east-west and reverse faulting that strikes north-south.

The, Roseville, Marker 3, Marker 8, Marker 1, Bowens Road, Glen View, Marker operation is located on the eastern limb of the Stroud Gloucester syncline, where the strata dip to the west, ranging from 10 to 50°, however is steeper in localised areas resulting in a relatively complex deposit compared to its regional peers in the Hunter Valley. The deposit comprises multiple seams with extensive splitting and coalescing both down dip and along strike. The coal seams that are exposed on the eastern side of the Stroud Gloucester Syncline include: Linden, Marker 7, Marker 6, Bindaboo, Deards, Cloverdale2, Avon, Triple, Weismantel, Cheerup and Clareval Seams. It is expected that all coal mined at Stratford and Duralie will be washed and if required blended with other seams to produce both coking and thermal coal products as is currently site practice.

The Gloucester Coal Measures are considered to be equivalent to the Late Permian Wittingham Coal Measures of the Hunter Coalfield, northern Sydney Basin. The coals in the Gloucester Coal Measures are generally vitrain rich and intensely cleated

Stratford Deposit Geology

The western portion of the operation strata from the Woods Road, Bucketts Way and Wenham Formations dip to the west at 10-50° and contain ten coal seam packages (Marker 7 to Bowens Road) over a stratigraphic thickness of approximately 600m**.** A stratigraphic column of the seam sequence at Stratford West is shown in ***Figure 5-11***.

East-west/northeast-southwest normal faulting is present with the most prominent feature a growth fault at the boundary of the BRN Pit (***Figure 5-12***), with displacement up to 40m are present in the Stratford West area and can be traced for a distance of up to 3km. A number of smaller displacement reverse faults have been interpreted from borehole data to have vertical displacements of up to several metres.

Further complexity occurs with sedimentary changes prevalent in these seams resulting in seam splitting and thinning of plies to the northern areas of the tenement holdings. Changes in interburden and ply thickness can occur over reasonably short distances making correlation of borehole data difficult. Rare igneous intrusions have been intersected in boreholes, due to the location of these intersections a possible dyke has been interpreted trending parallel to the east-west faults. Coal seams in Stratford West from Marker 7 to Marker 1 are generally reasonably coalesced in the south and start to split apart northwards.

The majority of seams in the Gloucester Coal Measures have raw ash content of 25-35% and total sulphur values average 0.5-0.8%. Washability data shows coal seams are able to produce coking and thermal coal products with low to moderate sulphur content after beneficiation.

Avon North is an area northeast of the Stratford Main Pit and the strata present are from the Avon Sub- group. Seams dip steeply toward the west at 35-50° and sub-crop to the east (***Figure 5-12***). North-south trending reverse faults have been identified from borehole intersections, two of which are steeply dipping (in the order of 70° to the west). Additional reverse faults have been identified however there is insufficient data to refine the interpretation.

The Avon seam is the main economic target in this area. It contains up to 13 coal plies, and is disrupted by 5 or 7 thrust faults. The upper part of the Avon seam has an overall product yield of 80% with coking coal yield of 65% (ash 10% and CSN 8-9) and thermal middlings yield 10-15% (ash 25-30%). Raw coal analyses show the Avon Seam contains low sulphur (generally <0.5%).

The Stratford East area is a narrow elongated resource area located east of Stratford. Strata dip steeply to the west and contain the Weismantel, Cheerup and Clareval Seams. These coal seams are from the stratigraphically lower Dewrang Group which is approximately 500m deeper (stratigraphically) than the Avon Seam at Avon North. The Weismantel seam is located some 150m stratigraphically above the Clareval.

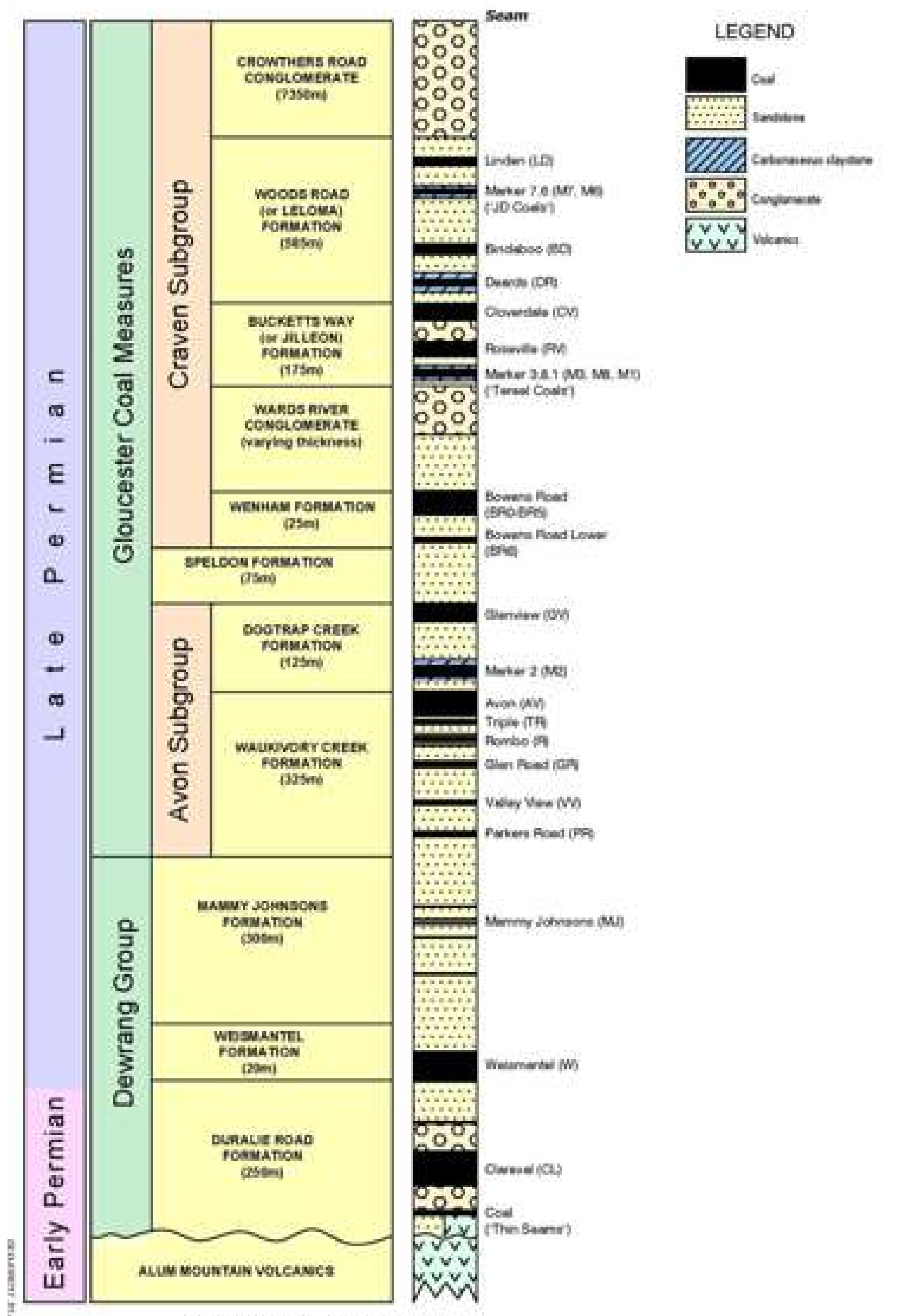
The Weismantel seam at Stratford is considerably deteriorated compared to the Weismantel Seam at Duralie (See below). There is very limited quality data for this seam however the data available indicates a high ash (40-50%), moderate sulphur (1.5-1.6%) thermal coal. Limited raw data on the Cheerup Seam indicates a variable sulphur (0.5-9%), high ash (30-45%) coal. Raw quality on the Clareval Main Seam plies indicates low to moderate sulphur (0.5-1.6%) and medium to high ash (24-45% including thin stone partings). The Clareval Seam at Stratford East would provide product coal with similar quality to the Duralie Northwest area, however with reduced overall yield due to thin stone partings within the seam.

Duralie Deposit Geology

Mining at Duralie focuses on two seams, the Weismantel and Clareval Seams. The Weismantel Seam comprises four plies (W1-W4) and has raw ash content of 20-35% (ad). Total Sulphur in the upper portion of the seam is high (4-5%) while the remainder of the seam reports 1-3% Total Sulphur. Multiple ROM coal types are beneficiated at the Stratford CHPP to produce high sulphur and moderate sulphur thermal coal and moderate sulphur coking coal.

Open cut extraction of the thick (4-20m) Clareval Seam which underlies the Weismantel Seam (by approximately 200m), commenced in the Clareval Pits. These Pits are also located on the western limb of the syncline (up to 3km north from the original Duralie Pit). The Bowl area Pit is a highly structured area with numerous reverse faults and tight folds (including the Holmes Syncline and Cheerup Anticline). This seam has been divided into Clareval Upper, Clareval Middle and Clareval Lower Seams. Raw ash content is in the order of 15-30% and Total Sulphur is similar to Weismantel Seam with high sulphur of 4-5% (ad) in the Clareval Upper and 1-2% (ad) in Clareval Middle and Lower Seams. Clareval Seam is washed to produce both thermal and coking coal products.

Structural complexity has been identified from drilling and is observed in the open cut operation. Thrust faulting can generate seam repeats and thicken seams considerably. In current mining areas seam dips are steep (generally 30-60°, however locally can be steeper) and typically dip to the east (except in zones of structural complexity).



Source: Gloucester Coal Ltd, modified MBGS

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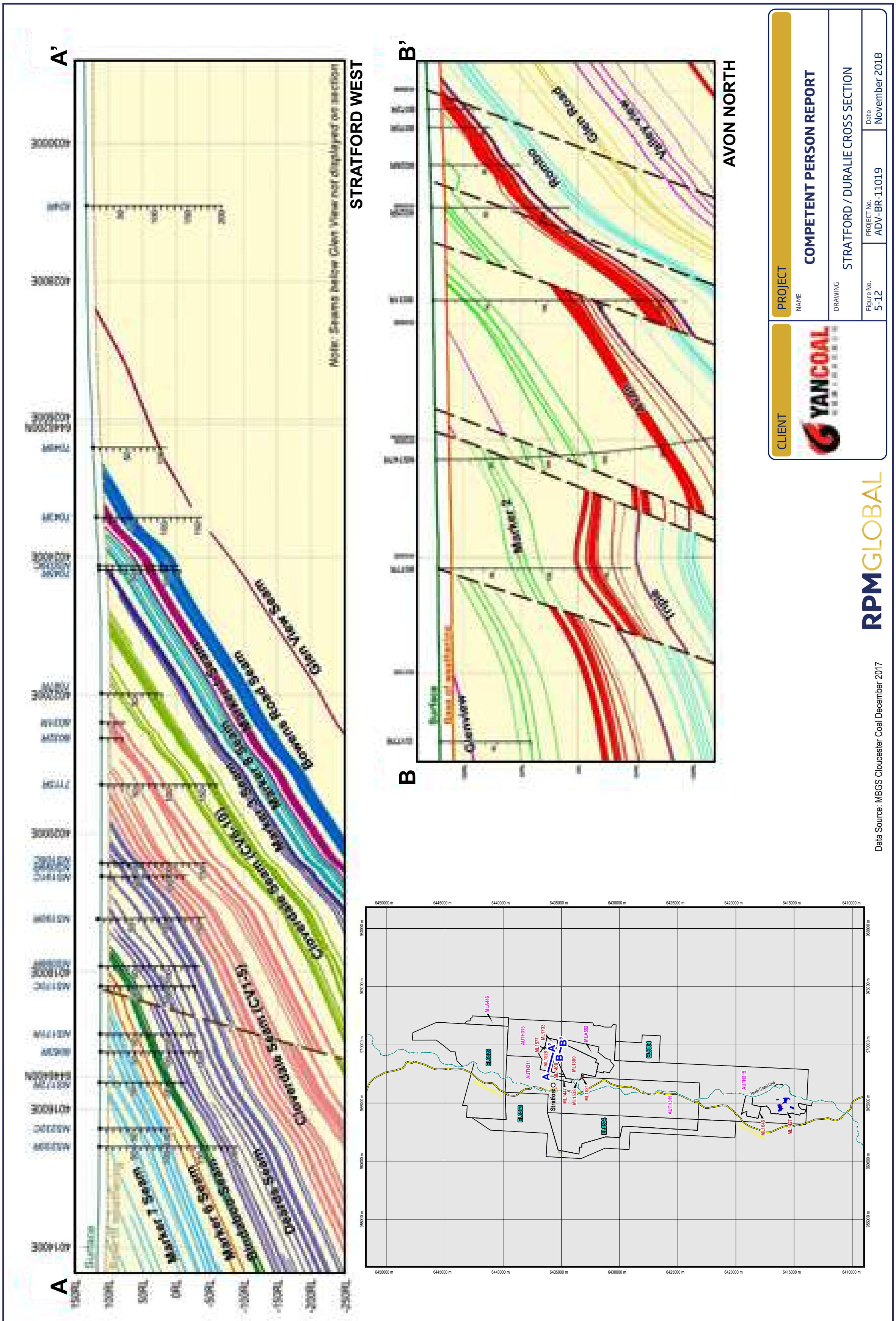
CLIENT	PROJECT		
YANCOAL	NAME: COMPETENT PERSON REPORT		
	DRAWING: STRATFORD DURALIE STRATIGRAPHIC COLUMN		
	Figure No. 5-11	PROJECT No. ADV-BR-11019	Date November 2018


A
A'
B
B'
STRATFORD WEST
AVON NORTH
Note: Seams below Glen View not displayed on section
Glen View Seam
Bowens Road Seam
Cloverdale Seam
Marker 2
Triple
CLIENT
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
STRATFORD / DURALIE CROSS SECTION
Figure No.
5-12
PROJECT No.
ADV-BR-11019
Date
November 2018
RPMGLOBAL
Data Source: MBGS Cloucester Coal December 2017

5.5 Austar

Regional Geology

The Austar Operation exploits the Greta Coal Measures in the South Maitland Coalfield, on the western side of the Newcastle Coalfield. As shown in the stratigraphic Column in ***Figure 5-13***. The Greta Coal Measures overlie volcanic sediments of the Dalwood Group at the base of the Permian succession. The thick (up to 2,000m) barren Maitland Group sediments (Branxton Formation, Muree Sandstone, Mulbring Siltstone) overlie the Greta Coal Measures and separate the Greta Coal Measures from the next coal measure sequence – the Tomago Coal Measures. These Coal Measures are the distal equivalent to the Whittingham Coal Measures located further to the northwest (approximately 50km) in the Hunter Coalfield. Overlying Tomago Coal Measures are the Newcastle Coal Measures which are in turn overlain by Early Triassic Narrabeen Group quartz rich sediments.

Greta Coal Measures are of Early Permian age (approximately 270 Ma) and in the Cessnock area comprise the following Formations:

- Paxton Formation (youngest)
- Kitchener Formation – Greta Seam
- Kurri Kurri Conglomerate – Homeville Seam
- Neath Sandstone (oldest)

Igneous dykes are present in the South Maitland Coalfield and although infrequent, were intersected at Ellalong and in old workings to the north. Dykes usually occur as a pair of dykes rather than a single dyke. The south trending Central Dyke (1-2 dykes) defined the eastern limit to longwall mining in the Stage 2 mining area. Recent exploration drilling, a review of mapping from past workings to the north (at Kitchener) and two ground magnetometer surveys has confirmed another southeast trending narrow zone of intrusive activity comprising two dykes (Kitchener Dyke) extending south into the Stage 3 mine area. From historical mapping and Austar's experience when intersecting dykes, there has been no evidence of intrusive sill bodies migrating horizontally from the dyke into the seam.

Deposit Geology

The major regional Lochinvar Anticline has a significant impact on the Greta Seam dip and strike, as well as the style of faulting which is observed within the South Maitland Coalfield. The deposit is located on the eastern flank of the south westerly plunging Lochinvar Anticline, with seam dip of approximately 4^{o} and strike ranging from east to northeast. Knowledge of the local geology from surface and subsurface mapping and an extensive array of 2D seismic and borehole data has defined a number of significant faults that will impact on, or limit mining:

- The Quorrobolong Fault Zone (Stage 3 area);
- The Abernethy Fault Zone (Stage 3 area);
- The Swamp Fault Zone (Bellbird area),and
- The Barraba Fault Zone (Bellbird area).

These zones are well mapped and defined and have been included in the structure model. Two cross sections of the Austar resource are shown as **Figure 5-14**.

The Greta Seam

The Greta seam has a well-defined trend in thickness and quality from west to east within the tenement holdings. In the western portion, past mining extracted the Greta Seam where it was typically 3m-3.5m thick.

The Greta Seam thickness increases from 6 to7m in the central areas (Bellbird and eastern part of Stage 3) and comprises dull and bright to bright banded coal. The basal 4m of coal is generally devoid of claystone bands, while the upper 2m - 2.5m contains several thin claystone bands. When seam thickness is 6 to 7m Austar attempts to use LTCC methods to mine the coal.

Towards the east additional thin claystone bands gradually emerge in the basal half of the seam and eventually the seam splits into an upper 4m thick section and lower 1.5m thick section, along a broadly north south trending split line. The Upper Greta Seam has been intersected in old boreholes further to the east, in the eastern portion where it gradually thins over several kilometre distance to a minimal thickness of 2m. The Lower Greta Seam thins and deteriorates to the east and east of the split line is not considered a resource.

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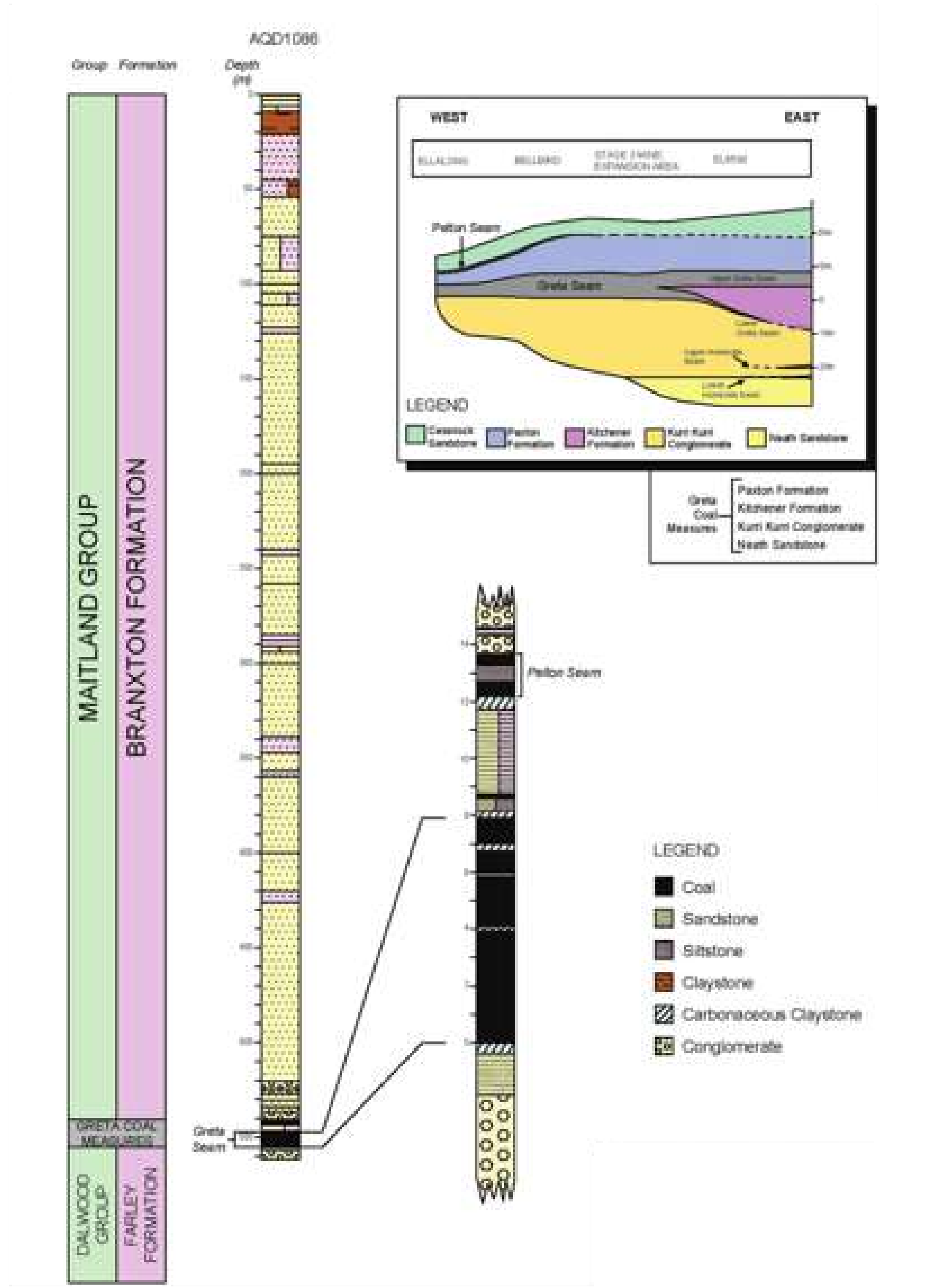
Coal Qualities

The Greta Seam is a low ash bituminous coal with high specific energy and importantly very good coking properties (Crucible Swell Number "CSN") – 6.5, Maximum fluidity – 20,000, Maximum dilatation – 450). The seam, however also has high sulphur content which is interpreted to be influenced by environmental conditions at the time of deposition. High sulphur concentration towards the top of the seam is thought to be related to increasing marine influence during peat deposition.

Total Sulphur content in the basal half to two thirds of the seam typically ranges from 0.8%-1.2%. This Total Sulphur content increases to greater than 3% in the upper portion, close to the top of the seam. Analytical tests indicate Organic Sulphur is the major component of the Total Sulphur content, as such by the marine influence on deposition. Organic sulphur is more difficult to remove by beneficiation by a CHPP.

Raw ash for full Greta Seam is generally less than 12%, however in the eastern portion, ash increases to greater than 20% with the gradual increase in claystone bands, as noted above. RPM notes that in general coal seams at the proposed depths of mining at Austar normally contain significant quantities of methane or carbon dioxide seam gas, however the Greta Seam at Austar surprisingly has very low seam gas content.



Data Source: MBGS Competent Persons Report Austar Mine Coal December 2017

CLIENT	PROJECT		
YANCOAL	NAME: COMPETENT PERSON REPORT		
	DRAWING: AUSTAR STRATIGRAPHIC COLUMN		
	Figure No. 5-13	PROJECT No. ADV-BR-11019	Date November 2018

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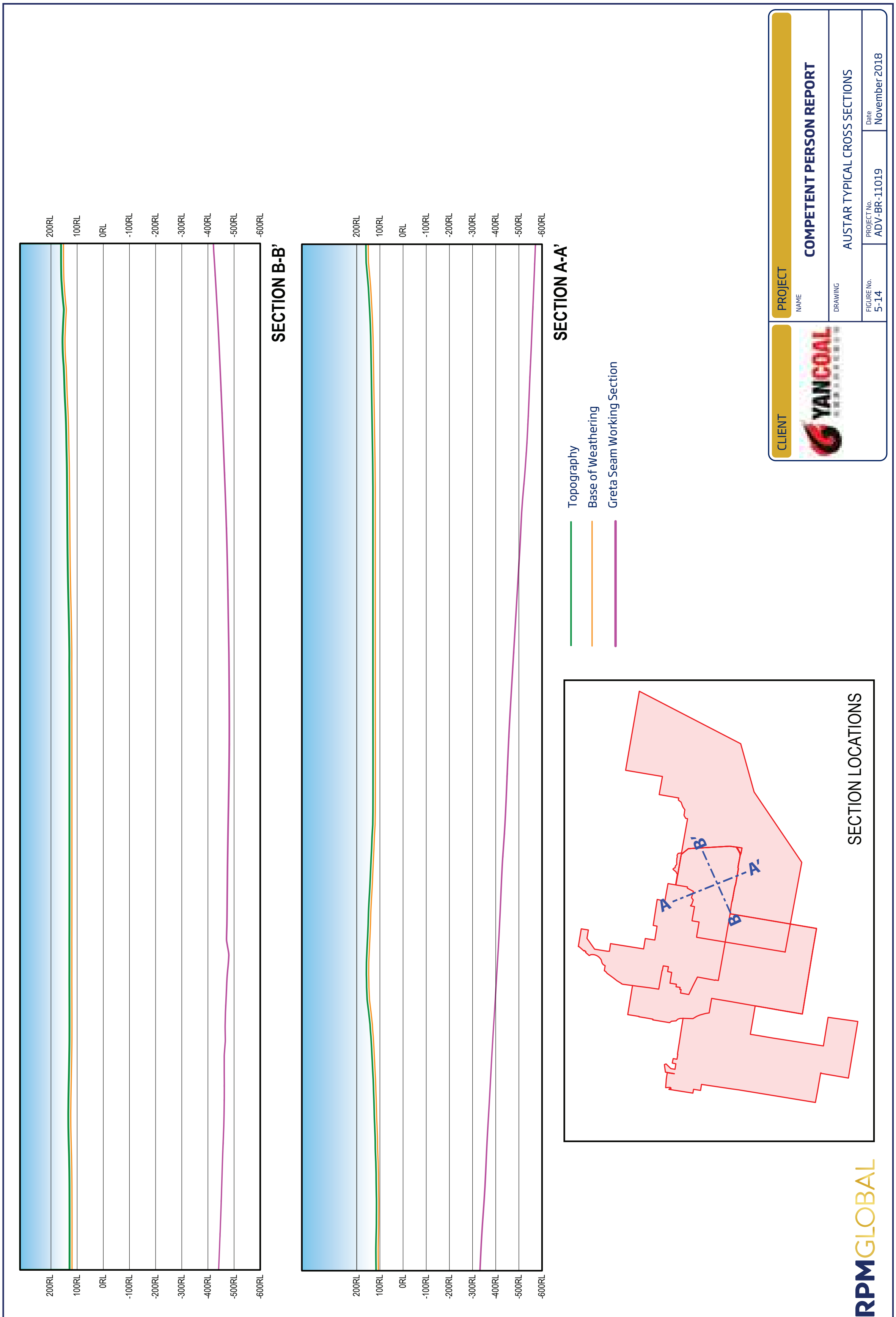
SECTION B-B'
SECTION A-A'
200RL
100RL
0RL
-100RL
-200RL
-300RL
-400RL
-500RL
-600RL
Topography
Base of Weathering
Greta Seam Working Section
SECTION LOCATIONS
A
A'
B
B'
RPMGLOBAL
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
AUSTAR TYPICAL CROSS SECTIONS
FIGURE No.
5-14
PROJECT No.
ADV-BR-11019
Date
November 2018

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5.6 Donaldson

Regional Geology

The Donaldson Mine is located in the northern-central portion of the Newcastle Coalfield, which forms the northern portion of the Permian/Triassic Sydney Basin. The stratigraphy comprises Late Permian Tomago Coal Measures overlain by the Newcastle Coal Measures (***Figure 5-15***). These Coal Measures overlie the Greta Coal Measures which host the Austar deposit as discussed in ***Section 5.5***. The non-coal bearing Triassic Narrabeen Group overlies the Newcastle Coal Measures and forms steep topographic relief which includes Mt Sugarloaf and Mt Vincent.

The north east trending Lochinvar Anticline fold axis is located west of the Donaldson leases, while the Macquarie Syncline fold axis trends in a north of north westerly direction through the central portion of the Donaldson leases. The overall structural fabric of the Donaldson area is north of north westerly The seams dip gently both to the east and west due to the Macquarie Syncline, which plunges to the south.

A zone of steeply dipping strata, known as the Buchanan Monocline, is located between these regional features, along the western boundary of Donaldson leases with stratigraphy dips steeply (up to 50°) toward the east. Immediately north of Donaldson are two north trending parasitic folds associated with the Macquarie Syncline, namely the East Maitland Syncline and the Four Mile Anticline. These two structures affect the Tomago Coal Measures however not in the tenement holding of the Company.

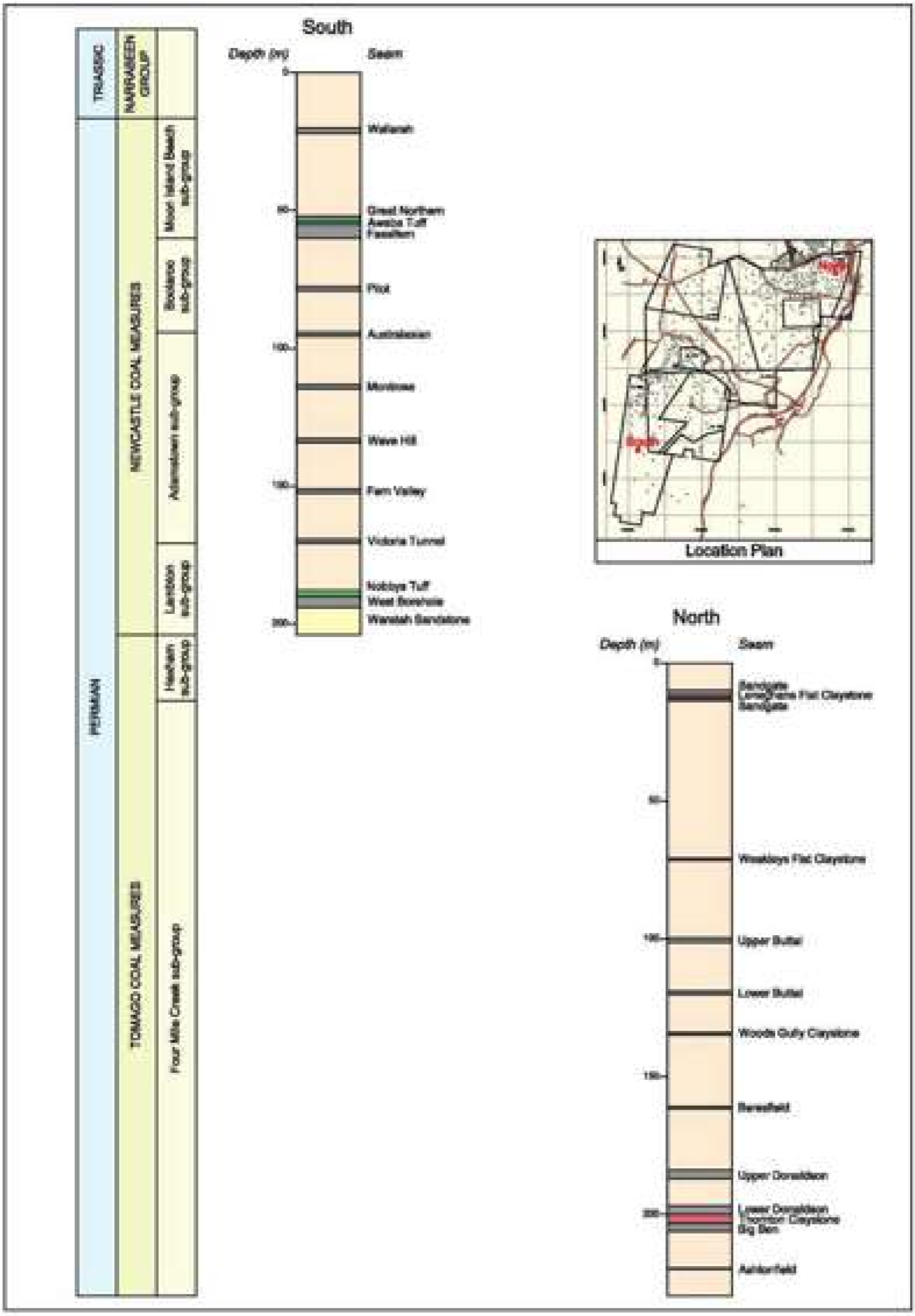
Local Geology

The long production history at Donaldson has highlighted the presence of faults and dykes which have impacted mining. Information provided to RPM indicates that the northwest trending dykes are generally 1 to 5m wide and produce limited cindered zones within surrounding coal. No sills have been identified, however drilling has identified minor intrusions within coal seams and associated cindered coal closely associated with the dyke activity. Small scale faulting with displacement less than 1m has been observed in Abel, Tasman and Stockrington No 2 mine workings, however a number of faults have been observed with throws between 2.5 and 6m. Faults and dykes in general have north of north westerly orientations that conform to the local geologic structural fabric.

Stratigraphy

The Tomago Coal Measures comprising up to 12 coal seams occur only on the eastern side of the Lochinvar Anticline and sub-crop toward the west between Hexham and Maitland. Beyond Hexham, the Coal Measures are covered by large deposits of unconsolidated Quaternary sediments. Near Maitland the Tomago Coal Measures stratigraphic pile is approximately 600m thick, which increase to over 1,000m toward the east. These Coal Measures exhibit variable characteristics such as splitting, coalescing and deterioration.

The Newcastle Coal Measures also occur on the eastern side of the Lochinvar Anticline. These Coal Measures occur over a large area from south of Maitland, to the middle reaches of Lake Macquarie and east to the coastal fringes. On the eastern flank of the Macquarie Syncline the Coal Measures are approximately 350m in thickness and contain up to 16 individual coal seams. (***Figures 5-15 and 5-16***) On the western flank of the Macquarie Syncline the Coal Measures decrease in thickness to approximately 250m and contain no more than 12 individual coal seams. The Coal Measures exhibit variable characteristics such as splitting, coalescing and seam deterioration.



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CLIENT

YANCOAL

PROJECT

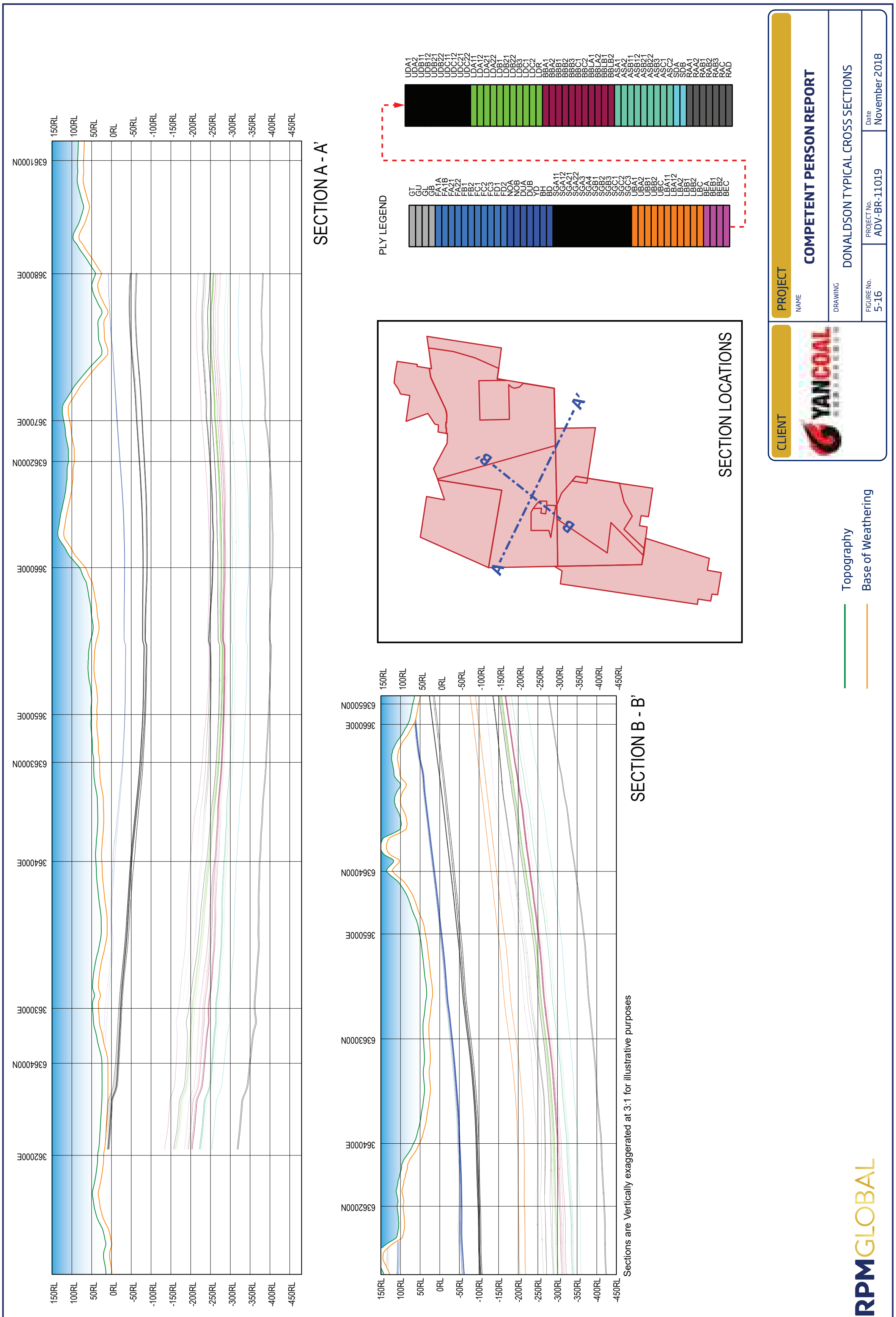
NAME

COMPETENT PERSON REPORT

DRAWING

DONALDSON STRATIGRAPHIC COLUMN

Figure No.	PROJECT No.	Date
5-15	ADV-BR-11019	November 2018


SECTION A - A'
SECTION B - B'
SECTION LOCATIONS
PLY LEGEND
Sections are Vertically exaggerated at 3:1 for illustrative purposes
Topography
Base of Weathering
CLIENT
YANCOAL
PROJECT
COMPETENT PERSON REPORT
DONALDSON TYPICAL CROSS SECTIONS
FIGURE No. 5-16
PROJECT No. ADV-BR-11019
Date November 2018
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5.7 Middlemount

Regional Geology

The Middlemount deposit is located in the central region of the Bowen Basin which covers an area of approximately 200,000 sq.km, Figure 2.3. The Basin consists of a sedimentary sequence of Permo-Triassic clastic sediments with a maximum thickness of 9,000m which are divided into number of tectonic units comprising north north-west to south south-east trending platforms or shelves that are, separated by sedimentary troughs.

Regionally, the stratigraphic sequence consists of the Permo-Triassic sediments, overlain by a thin covering of unconsolidated Quaternary alluvium and colluvium, poorly consolidated Tertiary. The Permian Blackwater Group coal measures and associated over- and interburden are located below the Triassic strata and overly the Back Creek Group, the basement.

Local Geology

The Middlemount resource contains the coal seams of the Rangal Coal Measures and Burngrove Formation of the Blackwater Group. The target seams within the resource consist of the Roper, Middlemount, Tralee and Pisces Upper seams (in descending order) which belong to the Rangal Coal Measures, while the Pisces Lower and Girrah seams belong to the Burngrove Formation and are not considered to have economic potential based on current studies.

Overlying the Rangal Coal Measures are alluvial sediments, inferred to be Tertiary in age, with a thickness of up to 30m. The depth of weathering averages 45m, ranging from 20m in the southeast to over 60m in the central and northern areas of ML70379.

The Middlemount and Pisces seams have been subjected to the majority of the exploration mining works. The Middlemount seam averages 4.0m thick in the area west of the Jellinbah Fault, ranging from less than 2 to over 7 m. The Middlemount Upper working section is a high ash section that is present over most of the Middlemount area – the exception is in the north, where it is less than 0.3m thick. The top section of the Middlemount Lower Section is predominantly dull with some bright banded coal with an average raw coal CSN average of 1 to 1.5. The base section of the Middlemount seam has more bright coal than the top section and the average raw coal CSN is 4 to 5.

The Tralee seam underlies the Middlemount seam. At Middlemount, it ranges in thickness from 0.5 to 1.0m when it occurs just below the Middlemount seam (within 10m). The Tralee seam is divided into three working sections (TL1, TL2T and TL2B, top down) and similar to the Middlemount Lower seam the working section division is predominantly based on coal brightness. Where the seam splits further from the Middlemount seam, the Tralee seam thins to usually less than 0.3m.

The Pisces Upper seam averages 4.8m thick in the area west of the Jellinbah fault, ranging from 2 to over 6 m. Thickening and thinning of the seams is interpreted to be the result due to the same structural effects as noted for the Middlemount seam, while intersections outside this range were similarly excluded from the coal thickness model. The Pisces Upper seam is divided into three working sections (PUT, PUM and PUB, top down) and similar to the Middlemount Lower seam the working section division is predominantly based on coal brightness.

The Middlemount Seam is stratigraphically equivalent to the Leichhardt seam or Elphinstone seam of the Northern Bowen Basin, or the Pollux Seam of the Central and Southern Bowen Basin and the DU and D seam of the south-eastern Bowen Basin at Moura. The Pisces Seam is the stratigraphically equivalent to the Vermont or Hynds Seam of the Northern Bowen Basin and the E seam of the south-eastern Bowen Basin at Moura. The RPM Competent Person is familiar with the characteristics of the Middlemount and Pisces seams throughout the Bowen Basin.

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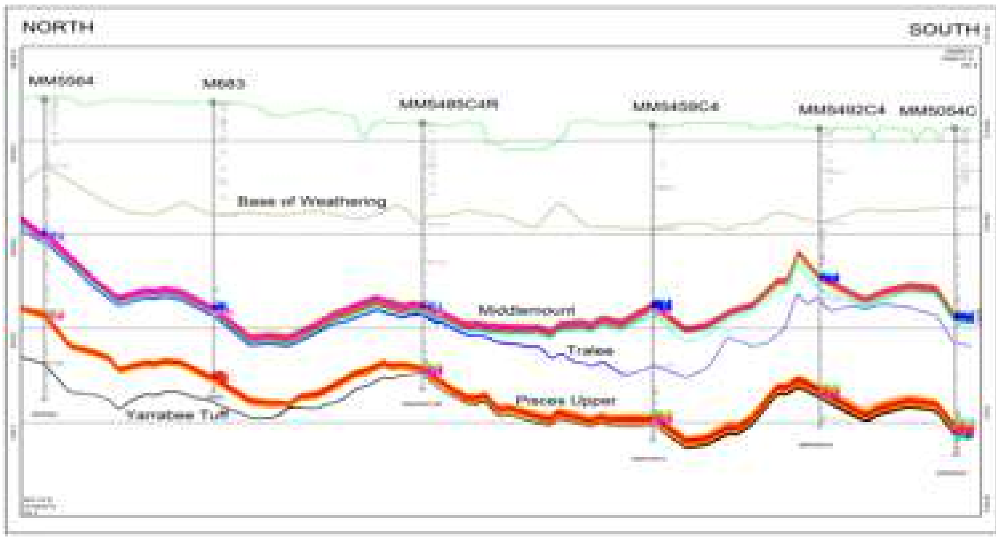
Figure 5-17 Middlemount Section showing coal seam stratigraphy



The potential open cut coal area strikes north-northwest and dips to the east at between 3- and 7-degrees; the deposit is approximately 7km long and 2km wide. The resource is limited to the east by the Jellinbah Fault; a major regional thrust fault which is oriented north-northwest and has displacement greater than 300m. This fault is located close to the boundary of ML70379 and ML 70417. The coal seams of the Rangal Coal Measures crop out to the west of the Jellinbah Fault, where the majority of the coal exploration has been completed. The strata present on the eastern or upthrown side of the Jellinbah Fault are from the Burngrove Formation, which are becoming visible in the highwall of the mining excavation. ***Figure 5.17*** shows a typical long section through the Middlemount resource area.

Exploration drilling and mining has identified that the deposit is complicated by localised thickening of seams in the vicinity of faults. Other than the Jellinbah fault, the deposit contains small-scale (<10m) normal and thrust faults, which is evidenced by the thickened and thinned Middlemount and Pisces seam intersections and by the changes in structural elevations between boreholes.

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6. Data Verification

RPM completed a review of the geological and digital data supplied by the Client to ensure that no material data issues could be identified and that there was no cause to consider the data inaccurate or not representative of the underlying exploration results. RPM visited the Assets at HVO/MTW assets in March, 2017 and the reminder of the assets in April 2018 and reviewed the Assets operations. RPM concluded that the geological data was adequately acquired, validated and managed in databases according to a range of good to industry best practices as outlined below.

6.1 HVO / MTW

Bore Hole Data

Geological data acquisition has been ongoing in the MTW and HVO areas since 1949 when the Joint Coal Board commenced exploration in the MTW area. Exploration activity increased in the late 1960s and 1970s in response to increasing world energy consumption and demand for both thermal and metallurgical coal, with the Howick Mine commencing operations in 1968, closely followed by the Lemington Mine in 1971 and the Hunter Valley No. 1 operation in 1979. Mt Thorley and Warkworth Mines commenced operations in 1981.

The long history of HVO has led to the utilisation of a number of different data and planning practices and in particular seam correlations between the Howick, Hunter Valley and Lemington mine sites. During 2007, Minescape software was introduced to HVO as the preferred tool for technical mine planning functions, including geological database and geological modelling. A GDB borehole database called HVO was created from Minex seam interval data, with "stone" used to designate non-coal units within boreholes. Geological data acquired since 2007 was loaded with all detail into the HVO GDB database.

It became apparent to the Company's antecedent (previous owner) that significant proportions of pre 2007 geological data had not been uploaded into GDB and / or was unsuitable for geological model development and could not be easily validated compared to the original primary data. As a result, the Company's antecedent referred to all exploration data acquired prior to 2007 as legacy data. The Company's antecedent undertook a project referred to as the 'Hunter Valley Legacy Data Project' between mid-2013 and October 2015 whereby all legacy data for HVO was converted from non-digital to digital format, validated and added to the HVO geological database.

The MTW operation transitioned to Minescape software in 2006, with all legacy data being validated and uploaded to the GDB database by the end of 2006. RPM considers that the 'Legacy Data Project' has achieved a significantly complete geological data set which now can be used with a high level of confidence for geological modelling and Resource estimation.

RPM is aware that the Company's antecedent completed a significant tranche of work in 2015 whereby seam nomenclature and correlation was standardized for the Jerrys Plains and in particular the Vane Subgroup across the Howick, Hunter Valley and Lemington areas. This tranche of work enabled a single HVO geological model to be developed.

While RPM has not reviewed primary data sources such as geological logs, geophysical logs and laboratory coal quality reports as part of its data verification however has relied upon review of the following:

- Standards and Procedures (QA and QC) followed by the Company's antecedent for data acquisition, interpretation and database and model development and
- Data contained in the database and the geological models has been reviewed by several authors previously including third party competent persons and
- The laboratories which undertook the majority testing are ISO certified.

RPM conclude that the digital geological data for MTW and HVO has been adequately reviewed and validated using industry best practices as outlined below.

In addition, RPM is aware that the Company is performing a review of the geological data it acquired from its antecedent so that it meets the internal Company Standards.

Digital Data Base

The Company's antecedent utilised ABB's Minescape suite of geological database, modelling and mine design software which includes the system's Oracle-based geological database (GDB) and stratigraphic modelling package (Stratmodel). GDB is a relational database comprising a number of indexed tables linked by key variables including borehole collar, lithology, geophysics, coal quality (raw, wash and composite data) and geotechnical data.

As a result of the long exploration history and amalgamation of operations the HVO database includes data from multiple data sources and formats (Howick Mincom Geodas database, the Lemington Minex borehole database and Vulcan format database files from Hunter Valley No's 1 and 2 and Prolog files generated by field geologists). The majority of the data, with the exception of the Howick data, was a set of seam pick files consisting of from and to depths which could not be easily validated. During 2009 the original data was sourced, reformatted and in many cases encoded from English logs to populate the ABB GDB based borehole database. However, that work completed in 2009 was only an interim step and it was not until the completion of the Hunter Valley Legacy Data Project in 2015 that all geological data was transformed into a digital format and could be loaded to the GDB database.

The MTW database was subject to an extensive upgrade and validation process by 'Measured Resources' in 2012 where data quality, accuracy and completeness was improved significantly. As part of this validation a number of underlying "business rules" where built into the GDB database to ensure consistency and integrity of data including, however not limited to:-

- Relational link between geological, down hole geophysical and coal quality data
- Exclusion of overlapping geological intervals
- Restriction of data entry to the interval of the defined hole depth
- Use of defined rock type and stratigraphic codes
- Coal quality upper and lower limit bounds
- Basic coal quality integrity checks such ensuring data is within normal range limits, which proximate analyses add to 100 percent etc.

Drilling Types and Core Recoveries

Geological data generated since 2002 has followed the antecedent's data acquisition standards, documentation, systems and protocols for drilling, logging and sampling of bore core and chip samples, in pit mapping of rock exposures and geophysical data acquisition, interpretation and database management.

Data acquired prior to 2007 has been subject to the protocols of the Legacy Data Project and conforms to the standards followed by the Company's antecedent..

Both core and open holes have been completed at MTW with coring predominantly undertaken via HQ3-sized bit (63 mm) and open hole to an equivalent hole diameter size. RPM notes that seven holes at 150 mm and 49 holes at 200 mm diameter sizes were completed for evaluation of coal preparation properties. A total of 503 open holes and 230 cored holes were completed at MTW during the period 2004 to 2015 as shown graphically in Figure 6-1 while a summary of the holes completed since 2004 are provided in ***Table 6-1***.

Commencing with the 2008 drilling program a borehole grid design based on an equilateral triangular grid with cored boreholes spaced 250m apart and open holes spaced 125m apart was used at MTW. The MTW mined out area is largely supported by cored borehole data at 250m to 500m centres and open hole data at variable spacing but generally 125m apart. The intensity of core drilling is greater at Mount Thorley than it is at Warkworth, where there is a need to continue closing in core drill spacing to improve the status of Coal Resources. Borehole spacing of cored holes that intersect large parts of the sequence located west of Wallaby Scrub Road is relatively sparse and the spacing is 500 to 1,500m.

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Table 6-1 Summary of Holes Completed since 2004

Type	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Totals
Open Holes	35	11	71	75	23	62	103	39	45	6	28	5	**503**
Cored Holes	7	1	6	19	18	17	24	47	44	31	13	3	**230**
Totals	**42**	**12**	**77**	**94**	**41**	**79**	**127**	**86**	**89**	**37**	**41**	**8**	**733**

Source: Provided by the Company

HVO

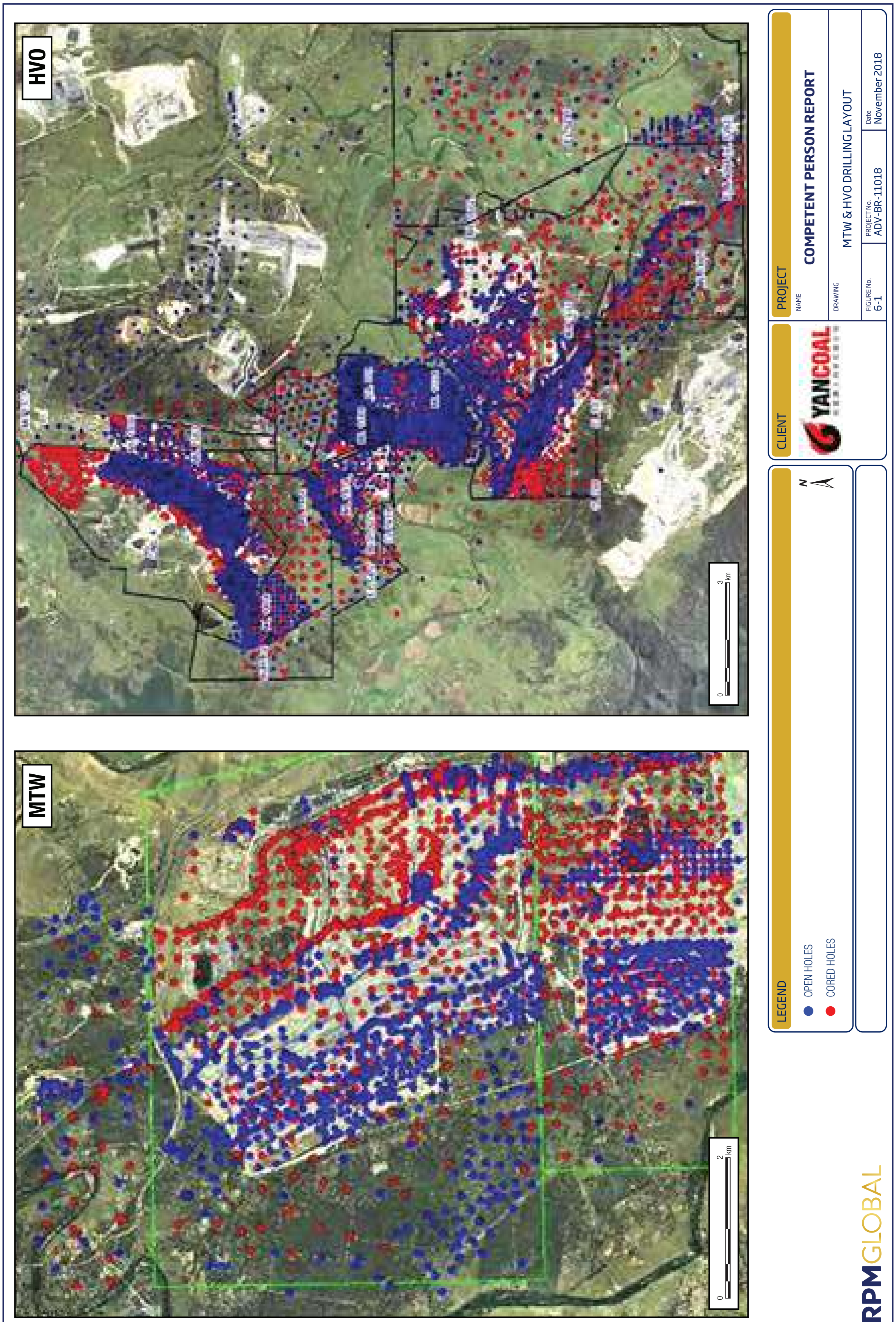
A combination of open holes (predominantly for structural definition) and cored (for coal quality, geotechnical and gas sampling) have been used for delineation of the HVO resource with the location of exploration boreholes at HVO is shown in ***Figure 6-1***. Borehole spacing for core holes is on an equilateral triangle grid of 500m or less, while open holes spacing is on a 250m or less equilateral triangle grid. Coring has predominantly been completed using a HQ3-sized (63mm) bit and open hole drilling to an equivalent hole diameter size. In addition a number of large diameter (LD) holes have been drilled with 103 holes at 101mm (4") and six holes at 200mm (8") diameter sizes.

A total of 1,010 open holes and 253 cored holes were completed at HVO during the period 2002 to 2015 as summarised in ***Table 6-2***.

Table 6-2 Summary of Drill Type for HVO Since 2002

	Area/Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Open Holes	Carrington	43	20	31							11	102				**207**
	Cheshunt	23	7	2	6	16	43		3	19	51		2	15		**187**
	West	37			25		9	134	38			6	5	4		**258**
	Mitchell	13										43				**56**
	Riverview	84			8		29		26	14	47		24	33		**265**
	Southern										12	25				**37**
	Totals	**200**	**27**	**33**	**39**	**16**	**81**	**134**	**67**	**33**	**121**	**176**	**31**	**52**		**1,010**
Cored Holes	Carrington		1	7				17	4		5	40				**74**
	Cheshunt	10	1		5	5	8		4	8	8	4		2		**55**
	West	4	7		8		3	7	4	4	3	9		2		**51**
	Mitchell										5	1				**6**
	Riverview				1	1			1	15	8	2				**28**
	Auckland											18			6	**24**
	Southern										15					**15**
	Totals	**14**	**9**	**7**	**14**	**6**	**11**	**24**	**13**	**27**	**44**	**74**	**0**	**4**	**6**	**253**

Source: Provided by the Company.


HVO
MTW
0
3 km
0
2 km
N
LEGEND
OPEN HOLES
CORED HOLES
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
MTW & HVO DRILLING LAYOUT
FIGURE No.
6-1
PROJECT No.
ADV-BR-11018
Date
November 2018
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Topography and Collar Locations

The topographic surface at MTW is derived from a combination of 2m and 5m contour data digitised from topographic maps and 10m digitised data from the Bulga 1st edition topographic map covering the mined areas. This data was combined with surveyed borehole collars and mine survey data to form the final topographic map of the mined area. The topographic surface at HVO was developed from combinations of Lands and Property Management Authority ("LPMA") 10m contours which originated from the early 1980s and recent (September 2008) 2m contours derived from an AAM Hatch flyover. RPM notes that the historical mine out surfaces were on a coarse grid size, which doesn't allow suitable level of accuracy for the bench and batter definition. As such the depletion is potentially inaccurate however any potential change is not material and does not impact the forecast Ore Reserves.

Since 2007, borehole collars at MTW and HVO were surveyed post drilling by licensed surveyors using differential global positioning system with an accuracy of ±10 mm. RPM is aware that the Legacy data borehole collars have been converted to the MGA coordinate system and reviewed by the HVO survey team, while boreholes surveyed to local coordinate grids have not been converted to MGA where insufficient survey information was available and have not been used for model development.

Borehole collars have been compared with the natural topographic surface with reports nothing that the majority of borehole collars are located between 0 and 2m above the natural topographic surface. Some 1,100 boreholes have differences of greater than +/- 10m above or below the natural topographic surface, however all of these boreholes are located on in pit benches or on spoil and as such are considered suitable for geological model development that is used for Resource estimation.

RPM notes that all surveyed coordinates are within Map Grid of Australia 1994 MGA ("MGA94") Zone 56 projection using datum GDA94.

RPM considers that the topographic surfaces and borehole collar locations at both MTW and HVO have been developed with sufficient rigor to enable reliable Resource model development and Coal Resource estimation.

Down the Hole Survey

Geophysical logging at both MTW and HVO only became a common occurrence in the 1980's and 1990's respectively, while down hole borehole deviation data has only been acquired since the mid 2000's, however only deviation from 239 boreholes is loaded to the GDB database.

RPM considers that the historical lack of down the hole surveying is not material as the strata at both MTW and HVO are relatively shallow dipping and that borehole deviation particularly for HQ-3 cored holes will be negligible.

Geophysical Logging

Geophysical logging of boreholes has been carried out since the 1980's at Mt Thorley Warkworth and in general from the 1990s at HVO. Hard copy geophysical logs of boreholes are stored at each site. The suite of geophysical logs acquired generally includes natural gamma, short and long spaced density, compensated density, calliper, neutron, sonic and resistivity. Verticality surveys and acoustic and optical televiewer data has only been acquired since the mid 2000's. In 2006, LAS files were organised and stored on a server dedicated to mine planning. Not all geophysically logged boreholes have LAS data due to the borehole pre dating the time when geophysical data was acquired digitally.

RPM notes that down hole geophysical data is acquired by the geophysical service provider according to Company Standards and protocols.

Geological, Geotechnical and Geomechanical Logging

MTW and HVO are mature mining operations with the local and regional geology and geotechnical characteristics of the two areas well understood from open cut and underground mining operations and geotechnical logging and testing of bore core that have occurred over the past forty years.

Geological logging and sampling is performed by qualified geologists at the drill rigs in accordance with the Company Standards and procedures with all core logged for geology and geotechnical characteristics. Open hole chip samples are taken every 1m and logged for lithology. Quantitative logging for lithology, stratigraphy, texture and hardness is conducted using standard dictionary definitions, while colour and any additional qualitative descriptions are also recorded. Geological interpretation occurs by the following series of steps:

- Preliminary seam correlations are carried out with reference to geophysical logs and known marker intervals.
  - The primary marker intervals such as the Milbrodale Claystone, Fairford Claystone and Archerfield Sandstone are identified to provide the overarching stratigraphic framework for the Jerrys Plains Subgroup. The Archerfield sandstone is located below the Bayswater seam and has a distinctive bronze colour. The Fairford Claystone is located between the basal Warkworth ply and the uppermost Mt Arthur ply and the Milbrodale Claystone is located between the Arrowfield Zero and One seams;
  - Broad brush seam correlations are completed by use of 1:200 scale geophysical logs; and
  - The broad brush correlations are checked by referencing existing boreholes in the GDB database to ensure consistency with existing data and interpretations.
- LogCheck software which has similar business rules as the GDB database is used to encode lithology data.
- The lithology and seam data loaded into GDB are validated using GDB's business rules and validation tools.
- The LogCheck and GDB software business rules include but are not limited to:
  - relational link between geological, down hole geophysical and coal quality data;
  - exclusion of overlapping geological intervals;
  - restriction of data entry to the interval of the defined hole depth;
  - use only of defined rock type and stratigraphic codes;
  - basic coal quality integrity checks such as ensuring data is within normal range limits, that proximate analyses add to 100 percent etc;
  - Other checks are performed either periodically or before export of the data for loading into GDB include:-
    - missing or unlogged geological intervals highlighted;
    - stratigraphic picks out of correct stratigraphic sequence;
    - missing stratigraphic codes;
    - missing, anomalous, non-zero thickness, multiple or inappropriate (e.g. within overlying stratigraphy rather than host stratigraphy); and
    - Base of Weathering.
- A structural geology model is developed from which borehole postings, sections and contours are created and used by the geologists to validate seam correlations.
- Anomalous or incorrect seam correlations are corrected and the checking process repeated until the geological practitioner is satisfied with the integrity of the correlations.
- Fault locations and displacement are determined from surveyed seam roof or floor data, in pit mapping, from direct evidence in bore core and interpretation of missing or repeated sequences in boreholes.
- Fault displacements are calibrated by review of supporting seam roof or floor survey data in addition to ensuring that borehole seam data is honoured.
- Base of weathering data is interpreted from visual data from the original exploration boreholes.
- Geotechnical logging is completed by qualified geotechnical personnel and follows the Company Guidelines and Standards and is completed for all core boreholes at MTW and HVO. RPM also notes the following.
  - Geotechnical logging is completed by qualified geotechnical personnel and followed the previous owners Guidelines and Standards and is completed for all core boreholes at MTW and HVO.
  - The 'synthetic' formation strength is estimated from a regression equation developed from cross plots of Uniaxial Compressive Strength ("UCS") of bore core samples and sonic velocity correlations.

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- Data acquired from acoustic or optical televiewer images provide more detailed information about defect orientation, spacing and intensity and the direction of horizontal stress.
- Additional geotechnical and structural data is acquired by field measurement by hand held compass and Maptek I-Site three dimensional laser scans of the excavation.

RPM considers that the recorded information is sufficient for reliable geological Resource and geotechnical models for development of reliable and safe LOM plans.

Bulk Density Determination

The density of coal and the immediate seam roof and floor have been determined from analysis of bore core samples while the density of interseam formations density is estimated from density logs. A range of relative density testing has been performed at MTW and HVO, with some samples having been tested for

- True RD analysis;
- Both ARD and true RD; and
- The majority of samples that have had ARD determined.

The relationships between ARD and true RD were determined from the paired sets of ARD and true RD analyses.

The relationships between ARD and true RD were determined from the paired sets of ARD and true RD analyses include:

- MTW - The relationships used at MTW to populate the ply by ply data that has missing ARDs or true RD value are:
  - RD = 1.0003 x ARD 1.0645
  - ARD = 1.0045 x RD 0.9316
- HVO - The relationships used at MTW to populate the ply by ply data that has missing ARDs or true RD value are:
  - RD(ad) = 1.042 x ARD (ad) – 0.018
- The in situ relative density; i.e. the density of materials at an in situ moisture basis, was calculated using the Preston and Sanders equation:
  - RD2= [RD1*(100-M1)]/ [100+RD1*(M2-M1)-M2].

In situ moisture has been estimated by the equation moisture air dried + 4% for both HVO and MTW. Air dried moisture is typically 2% to 4% thereby in situ moisture will range between 6 and 8%. RPM considers this appropriate for the coal rank at HVO and MTW. In general the stratigraphically higher coal seams, such as Arrowfield, have total moisture closer to 8% and the Bayswater seam will have total moisture closer to 6%.

RPM considers that the work performed by previous owners to populate the ply by ply density data in the GDB database at MTW has resulted in a poor to average relative density data set. The cross plot of ply by ply un-composited relative density and ash values show that relative density is overestimated, as shown in ***Figure 6-2.*** This plot shows that the raw ash and relative density cross plots contain a large percentage of outlier relative density data values, both overestimated (red polygon) and underestimated (blue polygon). RPM is unaware of any coal measure sediment samples for coal where the rank as measured by vitrinite reflectance (Rv max) is less than 1% Rv max:

- Having ash content of less than 40% and relative density values greater than 1.8 and
- For coal seams to have relative density greater than 2.2 (and up to greater than 3) when ash values range from 60% to 80%.

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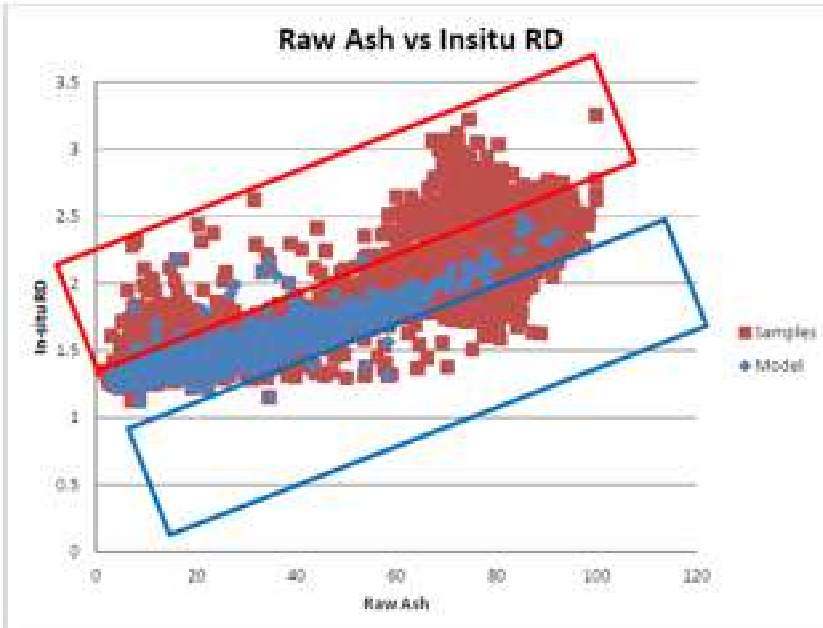
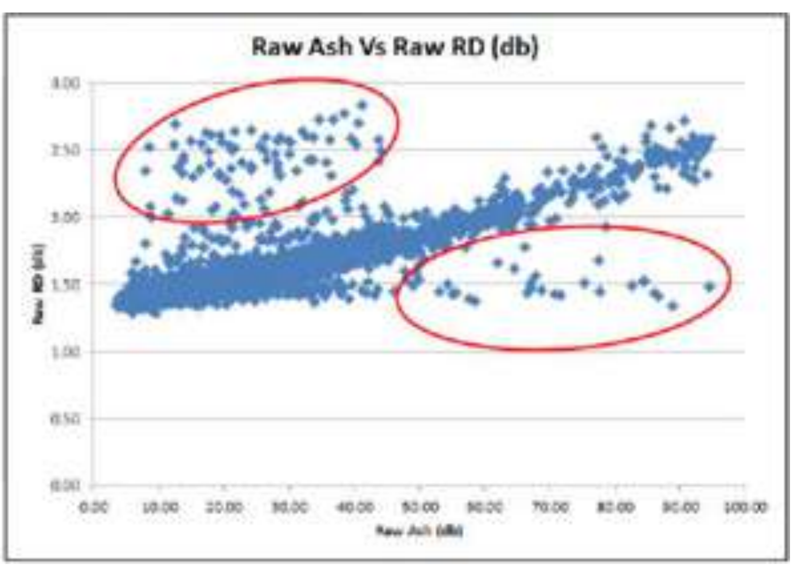
Figure 6-2 Cross Plots of Raw Ash and In situ RD for All Samples and Modelled Seams at MTW



The HVO database contains similar relative density outliers to MTW, as shown in ***Figure 6-3***, where 141 composited raw coal sample outliers have been identified.

Figure 6-3 Cross Plots of Raw Ash and In situ RD for All Samples and Modelled Seams at HVO



RPM considers that the MTW and HVO database contains a large number of outlier relative density values that are causing both under and overestimation of relative density. RPM consider that potential estimation errors of relative density will not have a material impact on the Resources and Reserves estimate, because the number of overestimated and underestimated values will have a negating effect.

Good practice has been followed at HVO to develop relative density models for estimation of Coal Resources and Reserves. Outlier relative density values (those values above or below 1.5 times the interquartile range) were excluded from coal quality model development.

Sampling and Sample Preparation

The Company's antecedent followed the procedures outlined in the document 'Coal and Allied's Hunter Valley Borecore Testing Programme' documentation for coal sampling, preparation and testing which was introduced in March 2011. RPM is unaware of any documentation describing coal sampling, preparation and testing prior to 2011 but understands that relatively consistent informal practices were followed at both MTW and HVO prior to 2011.

Washability testing at MTW has historically been carried out at a range of different densities. In 2007, washability data was loaded into spreadsheet based LIMN simulation software to standardize the washability data into a consistent format.

All HQ-3 (63 mm diameter) core samples are weighed, air-dried and then re-weighed before being crushed to an 11.2 mm top size. Subsequently coal quality testing was completed over a three stage process consisting of:

- Raw coal quality testing;
- Washability; and
- Clean coal composite testing of washed coal fractions to simulate product quality.

Table 6-3 and ***Table 6-4*** summaries the analytical testing procedure followed by Company's antecedent for raw coal, float and sink and clean Product Coal composites. As noted previously a limited number of large diameter ("LD") holes have been drilled at MTW for evaluation of coal preparation properties. Testing of the LD holes was for eleven size fractions with a top size of 50mm.

Prior to May 2013 samples were analysed by ALS (previously named ACIRL) at their Steel River, Newcastle laboratory. Post-May 2013, samples have been sent to the Bureau Veritas laboratory in Brendale, Queensland. All sample treatment and analysis is conducted according to procedures which adhere to Australian (or International equivalent) standards in a National Association of Testing Authorities certified laboratory.

Table 6-3 Analytical Tests for Raw Coal and Stone Ply Samples

Raw Samples	Raw Coal Analysis	
	COAL	STONE
Relative Density ad (AS 1038.21.1.1 - 2002)	√	√
Moisture (ad)	√	√
Ash (ad)	√	√
Volatile Matter (ad)	√	
Fixed Carbon (ad)	√	
Calorific Value (gad)	√	
Total Sulphur (ad)	√	√

Source: Provided by the Company

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Table 6-4 Analytical Tests for Float Sink Testing

Sample Type	Fractional Separation Density	Standard	Detailed
COAL	F1.3		√
	F1.4	√	√
	F1.5		√
	F1.6	√	√
	F1.7		√
	F1.8	√	√
	S1.8*	√	√
STONE	F1.6	√	√
	F1.8	√	√
	S1.8*	√	√

Source: Provided by the Company
(*) Denotes testing for total Sulphur on selected samples for acid rock drainage.

Table 6-5 Analytical Tests for Clean Coal Composite Testing

Borehole Analysis type	STANDARD		DETAILED		
Composite Type	**CF1.40**	**CF1.60**	**BYPASS**	**CF1.40**	**CF1.60**
Moisture (ad)	√	√	√	√	√
Ash (ad)	√	√	√	√	√
Volatile Matter (ad)	√	√	√	√	√
Fixed Carbon (ad)	√	√	√	√	√
Calorific Value (gad)	√	√	√	√	√
Total Sulphur (ad)	√	√	√	√	√
CSN	√	√	√	√	√
Moisture Holding Capacity			√		
Carbonate carbon (ad)		√	√	√	√
Ultimate Analysis		√	√	√	√
Ash Analysis		√	√		√
Ash Fusion (reducing)		√	√		√
Trace element analysis			√		√
Chlorine			√		
HGI			√		o
Abrasion Index					o
Petrography - macerals/reflectance				√	o
Giesler				√	o
Gray-King Coal Type				√	o
A-A Dilatometer				√	o
Forms of sulphur			√	√	o

Source: Provided by the Company
o = Optional

Core Recovery

Core recovery is recorded by the drill rig geologist while logging the bore core. Overall, linear core recovery of greater than 95 per cent was required by the Company's antecedent. Linear core recovery less than 95% in coal requires that section of the borehole to be re-drilled. Ply samples masses are also checked for representativeness against a theoretical mass after raw coal quality analysis and prior to composite definition. Open hole chip recovery is assessed qualitatively by the rig geologist.

Quality Assurance Quality Control

RPM is aware that non-formalised quality assurance/quality control (QA/QC) checks involving duplicate samples are regularly undertaken as per standard coal industry practices. In addition, RPM understands that check laboratory round robin and basic reproducibility tests are flowed both by ALS or Bureau Veritas. All coal quality results were assessed by the Company's antecedent using a range of validation methods that included:

- The sum of all percentages reported for proximate analysis, ultimate analysis and petrographic analysis should total 100%. The exception is ash analysis, for which the sum of the oxides has an allowable range between 98% and 102%.
- Ash Fusion Temperatures: Check deformation flow temperatures to ensure they are always increasing for the one sample.
- Review of classical statistics for the significant seams of each raw analytical element and produce relevant histograms from the quality samples used in model development.
- Review cross-plots of related parameters such as relative density and ash, energy and ash.
- Check that yields add up to 100%.
- Check sizing and relative density fractions to ensure they are reported in the correct order.

Data transfer from site is covered by the agreed protocol Company's antecedent.

Sample Security

All drilling activities prior to the Company's management were managed by its antecedent's on-site geological teams at each of the individual sites. Subsequent to the Company's management all drilling activities have been completed by contractors under the Company's supervision by Company staff geologists.

Due to the style of drilling undertaken within the Assets the personnel of the Company's antecedent completed core sample handling rather than the contractors. These activities include the drilling crews being responsible for delivering the core to the core logging facility where geologists log and sample the coal core and box the non-coal core. The geologist transports the coal core samples and core boxes to the core shed, where the coal samples are stored in a locked secure core shed until the cored hole has been completed. Samples from an entire cored hole were transported by a dedicated courier to the laboratory. Core samples from MTW are stored in a refrigerated unit in the MTW core shed prior to dispatch to the laboratory.

RPM considers these procedures to be industry standard and regards the sample security and the custody chain to be adequate, however notes that no details were provided for sample security prior to 2007.

Data Verification Statement

The review undertaken by RPM of the drilling and sampling procedures indicates that in general, good practices were used with no material issues noted.

RPM also notes the majority of the data within and used for the resource estimation were derived from drilling from post 2007 and have followed the relevant Company procedures and protocols. Data acquired prior to 2007 has been subject to the relevant Company procedures and protocols that were implemented as part of the HVLDP and as such all data is considers to be of good standard.

RPM considers that the data which supports the resource estimation has no material errors.

6.2 Moolarben

Bore Hole Data

Exploration in the resource area commenced in 1950 and is currently ongoing. A total of 1,025 drill holes have been completed..

Drill hole spacing varies from <250m to >1 km towards the edges of the lease. Drill hole data intersecting the Ulan Seam exist outside the MCC tenements and two coal mines mining the Ulan Seam (Ulan and Wilpinjong) are located adjacent to MCC, which is further confirmation of coal seam continuity.

Digital Data Base

Drill hole data is stored and validated in Geobank database. Geobank is a drill hole database software package that provides an environment for capturing, validating, storing and managing geological data.

Drilling Types

The Moolarben area includes contains 1,025 boreholes:

- 517 core holes, most of these holes were pre-collared to within 20m of the target Ulan Seam and then diamond cored using HQ size triple tube (HQTT) core barrels to core below the seam floor. Several holes have been fully cored to gather geological and geotechnical information on the full stratigraphic package and at least five large diameter holes (6") for full washability analysis.
- 285 rotary holes.
- 223 rotary air blast for limit of oxidation definition.

Topography and Collar Locations

Borehole collars and mined surfaces have been surveyed by registered surveyors using GPS equipment. The current grid system is GDA94 in Zone 55.

A LiDAR topography survey was acquired in 2010 to an accuracy of +/- 0.1m which is considered very accurate for the resource estimation process and mined out areas are surveyed by registered site surveyors.

Down the Hole Survey

All holes were drilled vertically which is considered the most appropriate given the flat lying nature of the deposit. As such no down hole surveys were completed which RPM considers suitable

Geophysical Logging

Most recent MC, MCOL and WMLB series holes (except redrills, some pilot holes and piezometer holes) have been geophysically logged to total depth and core has been photographed.

Groundsearch Australia Pty Ltd geophysically logged most of the holes. Groundsearch follows their calibration protocols for all the tools before using them on site.

An airborne magnetic survey was carried out over the planned underground longwalls (UG1 and UG2) to identify magnetic features. This survey identified a number of potential igneous bodies which may affect underground mining. Drilling targeted two main features and confirmed two diatremes. RIM borehole to borehole survey has been undertaken to define the size and shape of the diatremes at seam level however one of these features requires further investigation.

Geological, Geotechnical and Geomechanical Logging

All holes have detailed lithological logging through the whole length of the hole (100%), which have been used for seam correlation supported by geophysical logs where available. Core holes include geotechnical logging, point loading tests and selected samples are sent to geotechnical labs to support mining studies.

The amount, type and detail of information collected from logging of the boreholes is considered by RPM to be appropriate to support the Resource Estimate.

Bulk Density Determination

Relative density (RD) has been determined for most analysed samples on an air dry basis using Australian Standards. RD is then adjusted to in situ moisture basis using the Preston & Sanders equation at an estimated in situ moisture of 6%.

Sampling and Sample Preparation

The entire cored section of each coal ply sampled is placed in the sample bag. No splitting, subsampling or sawing of coal samples takes place outside of the laboratory. Coal quality analysis is completed by NATA approved laboratories which comply with Australian Standards for coal sample preparation.

Bureau Veritas and SGS Australia (for the latest samples) analysed the core samples from the MC, MCOL and some WMLB series holes. CCI Australia analysed earlier samples from WMLB holes. All laboratories followed similar treatment procedures. Coal samples undergo Proximate analysis, relative density, total sulphur and specific energy; and selected plies (DTP and DWS) were tested for hardgrove grindability (HGI). The remaining sample undergoes float/sink testing and each density fraction is analysed for ash. Clean coal analysis has been undertaken for each ply at 1.50 g/cc or 1.60 g/cc density, including Proximate Analysis, sulphur, calorific value, HGI, phosphorous and ash analysis.

Based on ply thickness and HQ core size the amount of sample available for testing is reasonable for the tests completed.

Core Recovery

Chip sample recoveries are not relevant as these samples are only used to define limit of oxidation not to assign quality parameters to the coal seam.

Core recovery is recorded by the drill rig geologist while logging the bore core and checked using geophysical logs and measured core lengths recorded in the lithology logs.

Core recovery for the coal seams is very good and core loss is infrequent in this deposit. Samples with core loss greater than 5% were excluded from the geological model and resource estimation.

Quality Assurance Quality Control

Borehole data is entered into Geobank and then depth corrected to downhole geophysical logs. Once the data is corrected it is flagged as completed and then requires special permissions to edit. Digital drill data is loaded into Minex for modelling and reporting. Seam thickness and ply correlations for each seam are checked in the Minex model via cross sectional analysis and contour plots.

Prior to modelling, statistical reports are generated to check anomalies have not been introduced to the dataset. Any anomaly is reviewed against original logs and reports.

Sample Security

All samples are sealed and marked appropriately with a tag inside and outside the plastic bag. Information is recorded on a third tag which is kept on site and on borehole sampling schedule forms. Copies of the sampling schedule are despatched with the samples. Coal samples are sent by secured courier to the laboratory

Data Verification Statement

RPM considers that the data which supports the resource estimation has been acquired and managed by following good to best practices and has no material errors.

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6.3 Ashton

Bore Hole Data

The tenement area includes 297 holes of which 12 were drilled by YAL (10 non-core holes and 2 core holes). Of the 285 historical boreholes drilled prior to YAL ownership, 142 were cored for coal quality, geotechnical and gas studies and 143 were non-core structure holes.

There are an additional 4 drill holes located outside of the Ashton resource area that are included in the drill hole database to assist in modelling of the deposit with the Project boundaries.

Digital Data Base

Drill hole data is stored in a Geovia Minex drill hole database. Geovia Minex is a geological modelling and mine design software. The geological data including collar, lithological, seam pick, downhole geophysics, sampling and coal quality data is stored in a series of data files.

Geovia is not a true database, however RPM is aware that YAL is transforming all data to follow internal YAL Standards which is best practice.

Drilling Types and Core Recoveries

Both wireline coring (HQTT – 61mm diameter and NMLC – 51.8mm diameter) and non-core slim hole drilling have been conducted across the deposit. Historically, Ashton primarily used rotary air blast with percussion hammer bits to drill the non-core holes and the pre-collar sections of core holes, with some mud rotary drilling near areas containing shallow alluvial cover.

All surface and intra-mine IS series exploration holes have been drilled and cored vertically with no HQTT or NMLC core oriented. However, deviation data has been acquired by geophysical logging but is only available for surface exploration holes. Maximum horizontal deviation in the YAO series holes was up to 8.6m over 250m depth (in YAO-009). On this basis it was decided that the drill dataset did not require correction for verticality and all holes have been modelled vertically, because the correction for seam reduced level is not material, and there were no critical operational reasons that required more precise location of drill holes.

Topography and Collar Locations

All surveyed borehole collar data provided by Ashton Coal was supplied in GDA 1994 co-ordinates, MGA Zone 56. Collar data for some historical holes were excluded from the data due to lack of confidence in their collar locations.

The current topography DTM surface was supplied to Ashton Coal in September 2013 based on an aerial survey flown in January 2013. It appears satisfactory for resource modelling and estimation.

The current underground surveyed face positions of the Upper Liddell (ULD) and Upper Lower Liddell (ULLD) seams at 30th June 2018 and the LOM plans were used to excise mined coal from the geological resource model. The LOM plans have been used to determine the coal resources within and outside the current LOM.

A check of collar heights against the topography model grid derived from the DTM (TOPO_50 - 50m mesh) showed several anomalies up to +/-30m between collars and the surface topography. These large anomalies were identified as being the result of spoil emplacement above original topography, with the borehole collar located on the original surface R.L. A check of a regional original topography grid, which included the Ashton deposit, against collar showed differences of up to 4m in the areas with spoil dumps, this is reasonable as the original topography was most likely based on historic 1:25,000 Lands Department topographic maps. Elsewhere differences between collars and the DTM were modest, generally <+/-1.5m.

Down Hole Survey

All drill holes have been drilled vertically. There are only a very limited number of drill holes which have verticality logs however these are not incorporated into the geological model. Based on the limited number of verticality logs and the regional experience, RPM considers that not using drill hole verticality will not be a material issue operationally and for Resource and Reserve estimation.

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Geophysical Logging

A standard suite of downhole geophysical logs including calliper, natural gamma and density, were acquired in all holes used in the model. Some holes were also logged with resistivity, sonic, neutron, borehole televiewer and verticality.

Geophysical logs were acquired to supplement the geological description of the cores and to ensure that the core recoveries were satisfactory (>/= 95%) and to assist with correlation of the various seams present. All surface core holes and open holes used in the model have been geophysically logged. Historically, (prior to 2007) geophysical logs were acquired either by Wootmac or Rutherford. Since 2008, most boreholes have been geophysically logged by Groundsearch Australia. Regular calibration of geophysical logging tools is standard practice for logging companies.

All intra-mine (IS series) core holes were not geophysically logged however core recovery is recorded in logging and core photos taken.

Geological, Geotechnical and Geomechanical Logging

All drill cuttings and core from the Ashton historical boreholes were qualitatively lithologically described on hand written geological record sheets and then later encoded into the computer using Prolog software initially by Ashton's geologists, then later by Earthdata personnel. The computer files were uploaded into computer geological databases for modelling. YAL have adopted a similar methodology.

Logging of chip and core samples is detailed and includes a record of the recovery of the total length and the drilled core length, lithology type, lithology descriptions to describe the sample in terms of colour, grainsize, bedding and bedding spacing, bedding dip, mechanical state, weathering, bedding relationship, structure, dip of structures, mineral forms and there associations, primary bedding forms, sedimentary contacts, defects and spacing, all of which is entirely sufficient to describe the various lithologies and coal samples to support the coal resource estimation from a geological, geotechnical and coal quality consideration. All YAL core was photographed. Geos Mining determined that 40 historical WML and WMLC core holes contain core photos and 30 do not. All of the WMLC300-series holes contain core photography. The lack of core photos for the earlier WMLC holes is not considered to have a material impact upon the resource estimation.

Assessment of the geological and geotechnical logs indicate they have been logged to a level of detail to support appropriate Mineral Resource estimation and mining studies.

Bulk Density Determination

Relative Density (RD) which measures the coal density without the void space and ash measurements have been conducted systematically on many coal and stone core samples. The Moisture Holding Capacity (MHC) has also been tested on selected samples across the Ashton deposit which has enabled an assessment by Geos Mining using ACARP 10041C to determine the in situ moisture. An estimate of 6.5% for the coal was determined. In situ densities were calculated by use of the Preston & Sanders formula.

In situ density grids were generated from adjusted density values derived using in situ moisture of 6.5%.

Sampling and Sample Preparation

The entire core thickness was used in sampling (sawing, quarter or half sampling of core is not a standard sampling technique in coal exploration). No non-core samples were used in the database/model/resource estimate.

The core sampling protocol followed by Ashton was to sample the "cleanest" coal intervals based on visual examination and sample stone partings separately using a 0.30m minimum parting thickness limit. Roof and floor sub-samples were also taken. The nature, quality and appropriateness of these core sampling procedures was not documented but are expected to have been to an industry standard sampling the entire core section/ply/sub ply into plastic bags with some form of identification. No sample preparation takes place outside the laboratory.

No coal core duplicates are taken as the analysis methods for coal require the whole cylindrical seam section for analysis. Sub-sampling of the sampled core is part of the treatment procedure at the laboratory where a

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portion of the sample is reserved for the purpose of sample analysis checks and or additional testing. The laboratories (SGS Australia, Carbon Consulting International Pty Ltd and currently Bureau Veritas) follow Australian Standards methods and are all NATA accredited.

The core size of 61mm for surface holes and 51.8mm for intra-mine (IS series) provide sufficient sample to conduct the typical proposed testing program. Significantly the coal industry standard for core diameters suitable for the analysis of coal core has increased to typically 83mm (PQTT) and 4" core (100mm) where possible which tends to improve the recovery of the coal and the quality of the core recovered. Limitations exist for the underground drilling operations and the core size although not typically ideal is satisfactory where good core recoveries are achieved.

Core Recovery

The documentation and reporting does not describe the methods of recording and assessing core recoveries, nor does it describe the measures taken to ensure sample respresentivity. Best practice in the coal industry requires that the coal core is matched to the geophysical logs and depth corrected prior to sampling ensuring that there are no depth misalignments and to establish core losses prior to sampling to determine if the core recovery is satisfactory (preferably >95% recovery) to sample and conduct coal quality testing.

In selecting boreholes suitable for use in developing the 2014 geological model, Geos Mining conducted a review of the historical core data on a seam by seam basis and some seam quality data was excluded where the sample did not meet minimum acceptable core recovery criteria of 80% volumetric or 95% linear recovery where sample mass information data was not available.

For the IS series holes (which have no geophysics) spot checks of core photographs to determine whether the mass recovery determined by the laboratory are acceptable were conducted by the geological consultant Geos Mining. Geos Mining commented that the mass recovery may have generally overstated the core loss sample intervals and that these values become unacceptable in cases where the laboratory reported values of less than 80% volumetric recovery. RPM recommends that comparison of the seam section graphic section with surrounding geophysical logged holes is completed to assess likely recovery of core relative to the stone partings to determine whether the present core recovery calculation is valid.

It is not expected that there is a sample bias due to preferential loss/gain of material. Coal seams range from bright banded to dull so preferential loss of bright coal could occur although drilling methods would try to minimise losses in these zones.

Quality Assurance Quality Control

Previous consultants including both Palaris and Geos Mining have conducted extensive validation exercises prior to completing their resource estimations in 2012, 2013 and 2014.

Geos Mining consolidated the data supplied by Ashton with the Palaris Minex resource estimation model 2013 database exports. Data was compiled into custom-designed tables within a Microsoft SQL Server 2008 database and served as the primary data source. Lithological logs, wireline geophysical logs, coal quality results (checked against NATA laboratory reports where available) and coal intersection depths were reconciled by Geos Mining before modelling and resource estimation in 2014.

In 2017, McElroy, Brian Geological Services (MBGS) directly used the collar survey and the coal quality databases provided by Geos Mining and incorporated updated geological and geophysical data provided by Ashton Mine.

RPM completed a selective audit of borehole data. Issues were identified with respect to where sample intervals and seam intervals were mismatched, and where relevant were updated.

The quality control procedures are inherent with NATA approved laboratories which undertake the testing of core samples to Australian Standard testing procedures and are subjected to regular round robin testing to ensure consistency of methods and results. The testing program procedures have sufficient reserve sampling in-built in the program to allow for checks of the analytical testing to be undertaken as required if the result is anomalous. External testing will be undertaken when required.

Sample Security

Measures to ensure sample security were not documented and reported historically. It was not possible to validate sample security.

The sample number, seam and ply number, depth interval and lithology type, were recorded in the digital sampling sheets. No documentation was available summarizing the "chain of custody" of the sample and the security systems established to ensure coal seam sample anonymity at the laboratory.

Data Verification Statement

RPM considers that the data which supports the resource estimation has no material errors.

6.4 Yarrabee

Bore Hole Data

Geological data acquisition has been ongoing at Yarrabee since the mid-1960s, when exploration was commenced by Minad and Bellambi coal.

The Yarrabee Mine area contains some 10,388 boreholes, of which 1,118 are cored holes of various diameters, ***Figure 6-4*** and forms the basis of the Yarrabee deposit knowledge. Open hole drilling was used for structural control, while core drilling was used for coal quality and gas desorption sampling and testing. ***Figure 6-4*** also shows the anticlinal area delineated by the Minad field mapping and exploration drilling completed during the mid-1960s. The yellow areas which represent the anticline area that contains the Burngrove Formation are relatively similar in both the Minad and the Company figures. The Minad plan has been rotated, because the plan was based on a local grid system.

A total of 4,575 boreholes are located in the mined out areas at Yarrabee. DOM 6 and DOM2S (The term DOM refers to Domain) contain a high percentage of historic data, however it appears to match the post 2008 data closely and has been retained. The Yarrabee East South (YES) area contains approximately 200 historic boreholes that also match the post 2008 data closely and has been retained.

The distribution of boreholes in the Yarrabee area is concentrated in the northern and western areas of the resource areas because these areas are geologically the most complex. The southern part of the YEN and the YES resource areas have the least number of boreholes in the Yarrabee resource because these two areas are less structurally disrupted than the other areas.

The previous Competent Person opines that approximately 90% of the cored holes in the database meet the requirements of the Standard YAL core logging procedures. The majority of boreholes in the Resource area at Yarrabee is modern data that was acquired post 2008.

Geological data generated since 2008 has followed the Company data acquisition standards, documentation, systems and protocols for drilling, logging and sampling of bore core and chip samples, in pit mapping of rock exposures and geophysical data acquisition, interpretation and database management. All geological data acquisition since 2008 has been managed by Mr Stuart Whyte, the previous Competent Person.

Data acquired prior to 2008 has been subject to review by the previous Competent Person, according to the protocols he developed and made standard practice at the Company and is now implementing throughout the Yancoal organisation.

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Figure 6-4 Location of Exploration at Yarrabee

Digital Data Base

Since 2008, all field geological data logging was entered directly into GeoBank which is an electronic geological data management system. The coal quality laboratories provide the results of coal quality testing to Yarrabee in a template which is directly uploaded into Geobank which eliminates transcription and key in errors arising from data transfer. The Geobank database contains the following data types:

- collar survey;
- lithology;
- geophysics; and
- coal quality data.

Core and chip sample photographs are stored separately on a server.

GeoBank software is used by the geologists to encode lithology data at the drill site using tablet computers. Geobank contains validation and other business rules to ensure only acceptable codes that describe the rock types intersected can be entered by the geologists and that depth intervals and the like meet the business rule requirements of the database.

Drilling Types and Core Recoveries

Industry standard drilling techniques are used, with conventional rotary table drill rigs using air and water circulation. All drilling has been completed drilled vertical drill with no core orientation performed. RPM notes the following comments relating to drilling methods at the site:

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- Blade/Hammer/PCD bits were used to drill open (chip) holes.
- Partially cored 4C (100 mm) core holes were drilled to obtain coal quality information. It is estimated by Yarrabee that 90% of core holes are 4C type holes.
- Due to the extreme geological complexity at Yarrabee, 4C (100 mm) core barrels were used to maximise core recovery. Minimum core recovery for core holes used in the model was 90%. It is observed that the brightest, lowest ash, friable/brittle coal is more susceptible to core loss, especially in faulted areas. Core loss usually occurs between core runs and thus the maximum 4C core barrel length of 4.5m was used to minimise the number of core runs and maximise core recovery
- In addition to minimising the number of core runs, the seam coring procedure used at Yarrabee for coring the Pollux seam is to stop the first core run in the middle of the Pollux Bypass Upper ply, (approximately 1m into the Pollux seam). The second core run is used to core the remainder of the Pollux seam. If any core loss occurs between the two core runs, it is entirely confined within the Pollux Bypass Upper ply which has the most consistent raw coal quality with less than 9% ash, less than 0.6% sulphur and less than 0.06% phosphorous
- Gas desorption testing was performed on HQ-3 core samples.
- All drilling has been completed using vertical drill orientation.
- No core orientation has been performed.

The Company coring instruction procedure, which is based on standard industry methods for obtaining bore core samples is followed by all the rig geologists.

Topography and Collar Locations

The topographic surface at Yarrabee is essentially flat lying. The topographic surface for the YES area has been developed from the borehole collars.

The initial borehole coordinates are obtained using handheld Garmin GPS by the site geologist using Aus Geoid 84 Zone 55. Final borehole collar survey is completed by the Yarrabee Coal Company personnel trained in surveying, using the Yarrabee Mine base station calibrated to AMG84_55.

Geological models are developed from topographic data from AAM Hatch airborne LiDAR, using control points to correct to the local grid. LiDAR data is acquired annually and is therefore up to date.

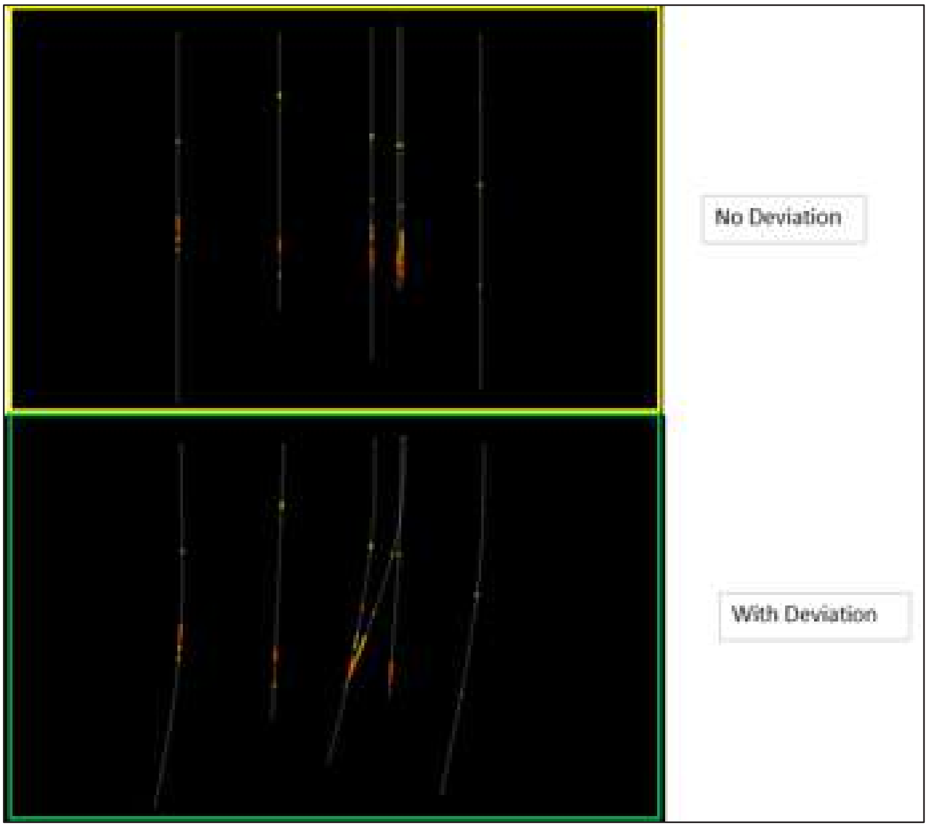
Down the Hole Survey

Boreholes were oriented and drilled vertically. Steep seam dips and the regional horizontal stress magnitude and direction cause boreholes drilled at Yarrabee to deviate significantly (updip) at greater than 60m depth, ***Figure 6.5,*** which shows the location of the seams intersected in six boreholes with no downhole deviation and the same boreholes with downhole deviation. The difference in the location of the coal seams in un-deviated and the deviated boreholes is 20 to 30m which is significant, when a geologist is interpreting the geology in areas of complex faulting.

Verticality data was acquired during geophysical logging and has been used for unambiguous location of the coal seams for 90% of boreholes used for development of geological models.

Core orientation has not been measured, because it is not a common industry method used for coal exploration and in general is less reliable and reproducible than use of deviation tools with dip meter.

Figure 6-5 Seam Location in Vertical Holes Compared with Deviated Holes



Geophysical Logging

An estimated 90% of the Resource uses holes with digital geophysical logs. Some older holes only have paper copy geophysics. The holes without geophysics appear to have been corrected to geophysics and reliability has been verified from newer drilling and mining. Holes confirmed to be unreliable have been flagged in the Geobank database to avoid accidental use during modelling. In some areas these holes have been redrilled. The geophysical tools used were: short and long spaced density, natural gamma, calliper and verticality. A sonic sonde is run on cored holes.

RPM notes that down hole geophysical data is acquired by the geophysical service provider according to the Company Standards and protocols. The Company routinely acquires the following down hole geophysical data;

- Density,
- Gamma,
- Calliper,
- Downhole deviation and
- Acoustic Scanner.

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Geological, Geotechnical and Geomechanical Logging

The Yarrabee coal mine is a mature mining operation with the local and regional geology and geotechnical characteristics being well understood from open cut mining operations that have occurred over the past forty years.

Standardised Yancoal logging systems and protocols are utilised for all drilling logging and sampling. Core is geologically logged and open hole chip samples are taken every 1m and logged for lithology changes. Geological logging and sampling is performed by qualified geologists at the drill rigs in accordance with the Company Standards and procedures.

All holes have been lithologically logged, with cored coal sections brightness logged. The logging of the chip and core samples is detailed and includes a record of the recovery of the total length and the cored length, rock type, stratigraphic unit and numerous adjectives to describe the sample in terms of colour, grainsize, bedding etc. all of which is sufficient to describe the various lithologies and coal samples to support the coal Resource estimation from a geological and coal quality consideration.

Limited geotechnical drilling has been completed at Yarrabee, due to the structural complexity of the area. RPM considers that interpretation of the faults on a 3D basis will enable most geotechnical hazards that may be present due to faulting to be interpreted. In general geotechnical assessment is not performed based on bore core data because the structural deformation at Yarrabee can be classified between complex and severe for some of the mining areas. Geotechnical drilling has been completed in the Yarrabee East South (YES) and Wilpeena areas. Geotechnical boreholes have been drilled vertically and as a result, do not intersect a significant number of defect structures, because joints and other structural features typically have subvertical orientation.

Open hole chip samples are taken every 1m and logged for lithology. Chip samples are photographed as they are sampled and laid out in 1m intervals. Quantitative logging for lithology, stratigraphy, texture and hardness is conducted using standard dictionary definitions, while colour and any additional qualitative descriptions are also recorded.

RPM considers that the recorded information is sufficient to define a reliable geological Resource model and geotechnical models for development of reliable and safe LOM plans.

Bulk Density Determination

The Yarrabee Mine has been in operation since 1982 with the density of the coal and its distribution within the seams well known. Most borehole samples have only true relative density (RD) analysis as such the relationships used to populate the ply by ply data with missing air dried relative density ("ARDs") or RDs are estimated by an ash RD regression.

The in situ density is estimated using laboratory ARD and adjusted to in situ density using the Preston Sanders method using the assumed in situ moisture of 5.5%. RPM considers that the insitu moisture estimate is suitable for coal of anthracite rank.

Sampling and Sample Preparation

Core sampling is completed at the drill site and is based on a set of standard criteria (determined by lithology and structure) that follows the Yarrabee sampling procedure which includes:

- All samples were photographed, double bagged and provided with a unique sample identifier prior to sending to the laboratory.
- Whole samples were used for quality analysis.
- All samples within the seam extents were analysed.
- Carbonaceous material and all stone bands were sampled to ensure that full coverage of each seam was obtained.

Seam extents were corrected to geophysics prior to coal quality analysis and then corrected to quality after the analysis was completed (if necessary).

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Core Recovery

Core recovery is recorded by the rig geologist at the time of logging the bore hole based on measurements taken of stick up at the start and finish of core runs and the cored interval and the core recovered and visual inspection of the core. Actual recovered core lengths are measured with a tape measure and any core loss is recorded in geological logs, coal quality sample intervals and in the run by run drilling record field sheets.

Core loss is confirmed by the rig geologist after comparing the recovered core to the geophysical logs to determine which parts if any of the seam are missing due to core loss. Core loss is recorded and core samples are taken either side of the core loss interval in accordance with the Yarrabee Core Logging procedure. The Company estimates that 90% of the core holes in the database are compliant with the Standard procedure.

Historic boreholes (those boreholes completed prior to 2008) do not comply with the Yarrabee core logging procedure, however they have been reviewed by the Company geology team according to the Yarrabee procedures to select or exclude the borehole(s) from model development.

The database contains 1,316 parent seams with sample and coal quality data. Ninety two seams intercepts (7%) have less than 90% core recovery and that coal quality data is excluded from the coal quality model. Seventy three seams (5%) have between 90% and 95% core recovery and have been used in the model. 1,151 seams (87%) have greater than 95% core recovery.

If core recovery for a coal ply is less than 95%, then that section of the hole is redrilled to ensure a representative sample is taken, provided that the cored hole is not located in an area of high structural complexity, in which case lower core recovery is accepted.

Open hole chip recovery is assessed qualitatively by the rig geologist. The Company uses the accepted typical industry procedures for data acquisition.

Quality Assurance Quality Control

RPM is aware that non-formalised quality assurance/quality control (QA/QC) checks involving duplicate samples are regularly completed according standard coal industry practices. In addition, RPM understands that check laboratory round robin and basic reproducibility tests are followed by the NATA certified laboratories. All coal quality results were assessed by the Company geologist using a range of validation methods that includes but is not limited to the following examples of checks:

- The sum of all percentages reported for proximate analysis, ultimate analysis and petrographic analysis should total 100%. The exception is ash analysis, for which the sum of the oxides has an allowable range between 98% and 102%,
- Ash Fusion Temperatures: Check deformation flow temperatures to ensure they are always increasing for the one sample.
- Review of classical statistics for the significant seams of each raw analytical element and produce relevant histograms from the quality samples used in model development,
- Review cross-plots of related parameters such as relative density and ash, energy and ash,
- Check that yields add up to 100%,
- Check sizing and relative density fractions to ensure they are reported in the correct order.

Data transfer between the Company and the laboratories (as requests for analysis) and the laboratories and the Company is covered by an agreed Company protocol.

Since 2008, data has been stored in Geobank software. All required modifications are made in Geobank prior to being uploaded via ODBC to Minex for modelling. Some of the business rules contained in Geobank for validation of data include:

- planned borehole coordinates are within 20m of the actual as drilled collar coordinates;
- the borehole total depth matches the lithology depth and the drilled depth;
- the lithology data uses the correct codes;

- there are no negative thicknesses; and
- plies are constrained by the parent seam roof and floor constraints.

Sample Security

Core samples are bagged by the geologist and sent through the Yarrabee Mine Stores for dispatch. Samples are transported to the laboratory by dedicated courier service. Sample instructions are provided to the laboratory and Yancoal advise that no samples have gone missing to date.

In light of the bulk commodity nature of coal and the long mining history at Yarrabee, no higher level security measures are deemed necessary since it is very unlikely to be subject to material impact from sample tampering theft or loss. RPM considers these procedures to be industry standard and regards the sample security and the custody chain to be adequate, however notes that no details were provided for sample security prior to 2008.

Data Verification Statement

The review undertaken by RPM of the drilling and sampling procedures indicates that in general, good practices were followed by the Company and no material issues noted.

RPM also notes the majority of the data used for the resource estimation were acquired from drilling post 2008 that has followed the Company procedures and protocols. Data acquired prior to 2008 has been subject to The Company procedures and protocols to ensure the reliability of that data so that it could be used to develop the geological models.

RPM considers that the data which supports the resource estimation has no material errors.

6.5 Stratford and Duralie

There are approximately 2,500 boreholes contained within the databases for each of the deposit areas. Approximately 10% of the boreholes contain coal quality data used in the geological models. All holes used in the resource model and resources estimation were geophysically logged with downhole geophysical tools.

Digital Data Base

Borehole data is stored in Minex databases for each of the deposits for the Project. Data stored includes borehole survey, seam data, coal quality and, where loaded, downhole geophysics. Lease, fault, trend line and resource limit polygons are stored in Minex geometry files. Borehole seam structural, thickness and raw coal quality data are modelled in Minex grids

Drilling Types and Core Recoveries

Duralie

Non-core structural and core drilling initially targeted the Weismantel Seam with subsequent exploration targeting the more recently identified Cheerup and Clareval seams. Partially cored HMLC holes for Weismantel Seam were drilled during a 1995 drilling program. Large diameter boreholes (8" core) were drilled in 2002 to obtain a bulk sample from the Weismantel Seam. Approximately 20 LOX holes were drilled to define the seam sub-crop prior to mining. From 2005 onwards HQ and PQ partially cored holes were drilled to Weismantel, Cheerup and Clareval seams.

Exploration holes were drilled vertically. In the Early-mid 2010's several holes were drilled inclined to provide pit/geotechnical wall information ahead of mining. In 2017, 12 blast holes were geophysically logged to assist with structural interpretation in the Clareval bowl pit.

Stratford and Grant & Chainey

Non-core structural boreholes have been drilled to depths generally ranging from 50-250 m. Shallow limit of oxidation drilling (LOX) was completed to define pit low walls on now completed pit areas. Core hole drilling encompassed a number of diameter sizes: pre 2001 were 100 mm and 150 mm partially cored HMLC holes, post 2001 were HQ and PQ core size. Larger core sizes achieved better core recovery. In recent years (post 2009) core drilling has focused on PQ core size.

Holes were largely drilled vertically, however the exception to this is drilling in 2014-2015 in the northeast of Stratford where exploration drilling in steeply dipping areas was inclined, targeting multiple intersections of seams.

The Co-disposal resource is being mined and reprocessed. This resource is not supported by drill hole data. A surveyed volume is known and yields and product quality are estimated from CHPP actual performance.

Topography and Collar Locations

The original data was in the ISG coordinate system (Zone 56/1) and was converted to GDA94 (Zone 56) in early 2004. Since then models were created in GDA94.

Duralie

Good topographic control from digital terrain models (DTM), obtained pre 2000 and 2006. Borehole collars were surveyed and are generally within 1m of the DTMs (of approximately 900 holes approximately 100 holes are 1-2m from the DTM, 20 are 2-5m from the DTM and boreholes 1017R and 1165R are 23m and 35m respectively from the DTM). These two holes are located towards the centre of the syncline where Inferred Resources are estimated; the collar has not been altered as resurvey should be undertaken. Approximately 20 holes were drilled in 2015-2016 and 12 blast holes in 2017 in the mined Clareval Bowl area. These holes will show a discrepancy to the original topography and are acceptable.

Mine seam pick up data (up to April 2014) and pit survey (up to September 2017) is supplied by site surveyors and is of a good standard.

Stratford and Grant & Chainey

Although mining has occurred at Stratford, the 'original' topographic surface supplied by Gloucester Coal was used as the topographic surface for the models at Stratford and Grant & Chainey. This surface provides good original topographic control.

For Resource and Reserve studies the current mined surface was utilised. In Stratford West the mined surface for all pits (Roseville and Roseville Extension/West pits, Bowens Road West, Stratford Main pit and BRN pit) to the end of June 2014 was provided by mine site surveyors which RPM considers good quality data. This mined out pit data was blended with the base of weathering grid and the resultant surface was used to limit seam resources at Stratford.

No mining has occurred at Avon North, Stratford East or Grant & Chainey. For Stratford East the original topographic surface was merged with the 2014 DTM where the original topographic surface did not extend far enough east.. Original topographic surface is a combination of DTMs produced from aerial photography flown pre-2001, 2004, 2006 and 2014 (the majority of the area is covered by the 2006 DTM).

Borehole collars were surveyed and generally agree with the DTM. Borehole survey data are generally within 1-2m of the original DTM.

In some cases collar elevations differed by 2-5m and in rare cases 20m from the DTM (two holes were adjusted to comply with the DTM as this better fitted the surrounding structure). There are discrepancies between old borehole collars and the original surface in the Co-disposal area where reject material was emplaced and in the north of Grant & Chainey due to mine rehabilitation. There are also discrepancies where holes were drilled in partly mined out areas (including some 8000 series boreholes drilled in BRN Pit). These differences are acceptable.

Co-disposal area

The original topographic DTM is of good quality. The end of June 2012 surface was created from end June 2012 aerial photography with historical pits and voids to end September 2012 cut in (the end September survey of pits did not cover Cells 1-3). I.e. the upper surface for the Co-disposal area is dated end June 2012.

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Down the Hole Survey

Borehole verticality has been collected for some however not all boreholes. Where available, borehole verticality has been used in the geological model. Some variation in seam thickness- is observed in the structural models as seam "kinking" due to the presence of or lack of down hole deviation. YAL consider that incorporation of verticality data produces more reliable models.

Geophysical Logging

As a standard procedure all holes were geophysically logged with downhole geophysical tools. Holes not successfully logged with downhole geophysics generally had poor hole wall stability. Poor ground conditions can occur in this highly structured syncline/basin with steeply dipping coal seams. Holes without geophysical logs could were not be used in the model as the drill hole data could not be validated.

Holes have at least density/gamma/calliper logs run, a number of holes have sonic, verticality and/or acoustic scanner. The quality of some logs was poor, often related to the age or the company used. Weatherford, Ground Search and Coal Seam Wireline Services have provided the geophysical logging services. Presentation of the data varied between these logging companies and was at times poor, which has made it difficult to consistently pick thin plies. During recent drilling at Duralie in 2015-2016, Weatherford undertook geophysical logging of approximately 20 boreholes (logging suite included density/gamma/calliper, vertically, sonic, neutron, dipmeter, acoustic scanner).

Geological, Geotechnical and Geomechanical Logging

Core holes were lithologically logged, coal core brightness logged and some post 2001 holes were also logged geotechnically. Generally logging was undertaken in sufficient detail (measurement and description); however there were a number of holes drilled during approximately 2009-2010, of which some were very basically/poorly logged. These holes heavily relied on geophysical logs to confirm thickness and depth of geological intervals.

Core and non-core holes were depth corrected and correlated using downhole geophysical logs and are considered reliable points of observation.

Generally logging is qualitative (core logging to centimetre accuracy and non-core logging chip samples to metre accuracy). All core sections of boreholes were lithological logged. Most if not all non-core sections were also lithologically logged. Core photography is generally available for cored sections (largely for new holes not always available for pre 2001 holes). There are a number of holes drilled during approximately 2009-2010 some of which were very basically/poorly logged with coal core sections that were logged on a broad lithological basis rather than in detail.

No boreholes relate to the Co-disposal area this material is a waste emplacement area.

Bulk Density Determination

A mixture of Relative density and Apparent Relative density data was available from laboratory analyses. Only Relative density data was used in the database/gridding/resource estimate. Relative density data was converted to an in situ moisture basis (estimated at 6% moisture) to account for loss of void spaces during testing (Preston Sanders equation). An ash versus density regression was determined to enable estimation of in situ density for all plies with raw ash data.

Where sufficient data was available in situ density grids were generated. Default in situ density values were determined for each ply from the available data to use where gridded data was not available. Default density values range from 1.35-1.60 g/cc. For stone parting plies of the Weismantel Seam default density values used (when gridded data was not available) ranged from 1.80-2.1 g/cc.

For the Co-disposal area a default density of 1.10 g/cc was used as a reasonable density estimate for emplaced wash plant reject material.

Sampling and Sample Preparation

No splitting or sawing of coal core took place (quarter or half sampling core is not standard in sampling of coal).

Non-core coal samples were analysed from a small number of early chip holes intersecting the Clareval Seam to gain an initial understanding of basic coal quality parameters before a core rig was available to obtain standard core samples. No non-core samples were used in the database/model/resource estimate.

For holes completed prior to 2001, specific sampling techniques are unknown but were sampled generally to plies, however some were on a sub-ply or combined ply basis. For post 2001 holes core of coal seams were generally sampled on a correlatable ply basis but with some combined ply samples taken on thin plies and sub-plies on very thick plies (e.g. W2, CLM). A small number of core holes were correlated at the time of sampling and some holes were re-correlated post sampling. The entire cored section of each sample was placed in the sample bag with identification tags for subsequent quality analysis. Some samples include stone partings and this would affect raw quality results. Parting plies of the Weismantel Seam (P1, P2 and P3) were sampled and analysed.

No sample preparation took place outside the laboratory. Coal quality testing was undertaken at laboratories which comply with Australian Standards for sample preparation (including the ALS laboratory at Maitland).

HQ, PQ and 100 mm core sizes are appropriate for raw coal quality testing and float/sink testing. Large diameter holes drilled prior to mining commencing at Duralie were suitable for the drop shatter/float/sink testing undertaken. The ply thickness of samples at Duralie provided adequate sample mass for testing. At Stratford and Grant & Chainey there can be thin coal intersections and there is a potential that detailed float/sink analyses was undertaken in 2009-2010 holes on samples that were too thin.

RPM is unsure how sampling was undertaken at the Co-disposal area. Bulk samples from ongoing operations would provide an appropriate sample size for the material being sampled.

Core Recovery

Core recovery was recorded by the field geologist at the drill rig (drilled length and core recovered) and drill depths were subsequently corrected using down hole geophysical logs to accurately determine the location and magnitude of core loss. Varying core diameters have been used (largely HQ, PQ and 100 mm). Pre 2001 holes appear to have better core recoveries due to >100 mm core diameters used. Post 2001 - HQ holes often suffered poor recoveries. PQ holes were used post 2009 and generally achieved 90-95% core recoveries.

Coal seams in the Gloucester Basin have been subjected to considerable tectonic compression which can result in poor ground conditions when drilling. Some holes with high core loss were sampled. Only those holes with coal core recovery of greater than 80% were used in reporting and gridding qualities. 80% recovery was used to maximise the data due to the large number of plies in the deposit. Core loss intervals were inserted into the quality database to ensure correct selection of data in Minex software for reporting, gridding and tonnage estimation/reporting.

The effect of core loss at Gloucester is that analyses may underestimate the better qualities of the coal due to loss of the brighter parts of the sample (e.g. core losses generally result in higher ash, higher density, lower CSN), which results in underestimation of the quality of the insitu resource. However, a material bias in the quality values related to core recovery has not been identified.

Quality Assurance Quality Control

Significant intersections and/or anomalous geological or coal quality values are checked as part of the data compilation process (e.g. thick or thin intersections checked to geophysical logs/logged core sections, high or low quality values checked to original reports).

Raw coal quality data were compiled from original laboratory reports into a single spread sheet. Relevant data was standardised to a constant moisture basis of 2.5% (Stratford West, Avon North, Grant & Chainey) or 1.5% (Duralie and Stratford East). An ash versus density regression was developed (using RD at an estimated 6% in situ moisture) to enable generation of in situ density from raw ash data. An ash versus energy regression was also developed to generate energy data from all samples with raw ash data.

For Stratford and Grant & Chainey it was difficult to obtain original reports for pre-2001 holes and only a few are used in the data set. Sampling strategies pre-2001 often combined plies and inclusion of this data was difficult. For Weismantel Seam core holes prior to 2001, raw coal and float/sink data were compiled and validated by Quality Coal Consulting (QCC).

There are coal quality data for the co-disposal material available in laboratory reports. No adjustments have been made to the quality results of the co-disposal material.

Sample Security

Security measures of samples prior to 1999 are unknown, however are expected to reasonably follow standard industry practices.

Core trays are generally taken to the core shed as soon as possible (usually at the end of the day) after measurement and lithological logging of the core at the drill rig. The core shed is a secure location at the mine site. Core is sampled (after geophysical logging/correction/ correlation/core photography), bagged and tagged. Usually a site geologist transports the samples to the laboratory.

There have been occasions when the time frame between coring and sampling was over a few months and the core was not refrigerated. The coal seams at Duralie, Grant & Chainey and Stratford appear to hold fluidity very well and may not be adversely affected by a lag in time between coring and sampling of a few months.

Security measures for the Co-disposal area samples are not known.

Data Verification Statement

Borehole data reviewed by RPM were contained within Minex borehole databases and structural and coal quality grids. A number of downhole geophysical logs were loaded into the Stratford West and Avon North databases and checked against seam picks and coal quality intersections.

Given the steep seam intersections in Avon North and Stratford West, coal seam picks generally correlated well with downhole geophysical logs. Coal quality samples generally correlated well with geophysical logs and seam/ply picks. Some discrepancies occur in a few instances, possible due, in part, to differences between geophysical log picks and core intercept picks of steeply dipping seams.

RPM considers that the data which supports the resource estimation has no material errors.

6.6 Austar

The Austar resource is supported by a large range of data types in addition to borehole data. This additional support data includes;

- 103km 2D seismic that has been reprocessed a number of times as data processing capabilities have increased,
- 30.5km of ground magnetic surveys, and
- Mapping data from surrounding abandoned mine workings.

Bore Hole Data

Thera are approximately 180 drill holes in the Austar Project area. Almost all drill holes were cored using HQ Triple Tube core systems, (HQTT- 61.3 mm diameter core) to recover core samples from the seam plus roof and floor strata. In addition some boreholes were drilled for structural investigation of faults that were interpreted from 2D seismic data and were fully cored (HQTT) from surface to acquire geological and geotechnical information for the full stratigraphic sequence.

All boreholes were spudded with vertical orientation. The Greta coal seam has almost horizontal (4° dip) to the southeast as a result all boreholes intersect the Greta seam almost orthogonally (85°). Borehole spacing varies throughout the Austar leases and is summarised by three spacing categories;

- The northern portion of CML2, core hole spacing ranges from approximately 250m to 600m while in the southern portion of CML2 core hole spacing ranges from 600m - 1,200m;
- CCL728 core hole spacing is approximately 1,000m, and

- EL6598 core hole spacing ranges from 1.0 km to 3.6 km. In addition to borehole data, an extensive array of seismic survey lines (>100 km) over CML2 and CCL728.provides support for seam continuity.

Digital Data Base

Austar has not described a true geological database. Data is stored in the Geovia Minex software, which does not have a true database. The Austar area contains a large volume of data which consists of approximately 180 boreholes most of which are geophysically logged, 103km of 2D seismic data, 30.5km of ground magnetic survey data and underground mapping data from the surrounding abandoned underground mine workings that are located predominantly to the north of Austar resource area.

Drilling Types and Core Recoveries

Due to the depth of the Greta Seam almost all holes were cored (HQTT- 61.3mm diameter core) to recover Greta Seam plus roof and floor strata. Some non-core holes were drilled for structural investigation of faults interpreted from seismic data. Some holes were fully cored (HQTT) from surface to gather geological and geotechnical information on the full stratigraphic package.

Topography and Collar Locations

Borehole collars over the last 17 years were surveyed by a registered surveyor using GPS equipment. Previously borehole collar surveys were carried out by registered surveyor using theodolite survey instruments. All collar data is considered by RPM to be adequate. Topography is from Department of Lands (supplied 2007) and is considered by RPM to be adequate.

Down the Hole Survey

All boreholes were vertical and the coal seam is almost horizontal (40^{o} dip). All sampling from vertical boreholes is almost orthogonal (85^{o}) to the target Greta Seam. No sampling bias has taken place.

Borehole verticality surveys have been incorporated into the structural model where available.

Geophysical Logging

Wireline logging companies that ran down hole geophysical tools for past and present exploration have, as standard operating procedures a calibration process which takes place on a regular (monthly) basis.

Surface seismic survey data acquired in the past at Austar is of high quality and has proved reliable in identifying faults in advance of mining and defining seam continuity between boreholes. The extensive network of seismic coverage has significantly improved confidence in the overall structural interpretation and continuity of the Greta Seam. Seismic survey data was all reprocessed by geophysicist J Saunders who specialises in seismic interpretation. The favourable nature of overburden strata above the Greta Seam allows for capture of very high quality seismic data. More recently geophysicist Mr. Gary Fallon has also reprocessed seismic data.

Geological, Geotechnical and Geomechanical Logging

Lithological logs are available for almost all boreholes. Some early NER prefixed non-core structure holes did not have lithological logs but down hole geophysical logs were available.

Coal seam depths are corrected to geophysical logs for both open and cored boreholes by the Austar geologist.

Logging of Maitland Group overburden strata may be of lesser detail as it is mostly non-core drilled. Core logging of roof and floor strata as well as the Greta seam has been detailed. Geotechnical logs are available from 1999. Core photography from pre 1999 holes is not available however since that time core photography has been standard procedure.

Bulk Density Determination

Relative Density (RD) and Apparent Relative Density (ARD) values have been reported on coal core samples in past and present drilling programs. Differing eras of exploration reported either RD or ARD on each ply sample.

For this resource estimate, coal quality data was separated into those reporting RD or ARD as per information from original coal quality reports. RD and raw ash data were then converted to an in situ moisture basis of 5% (using the Preston/Sanders change of base equation) and a regression was developed to allow estimation of in situ density (ID) for all data, from raw ash values. This included coal quality data which reported ARD only.

Sampling and Sample Preparation

Coal samples were taken from cored borehole intersections. Core sample size is generally HQTT (61 mm). HQTT coring is a coal industry standard technique to maximise core recovery and ensure sample is representative.

The Greta seam has been sampled on a ply by ply basis using the density geophysical log responses to determine sample intervals.

Coal core of Greta Seam is divided into plies using down hole geophysics and then sampled. The entire cored section of each ply is placed in sample bags. No splitting or sawing of coal core takes place. No sample preparation takes places outside the laboratory. Coal quality analytical laboratories used to analyse Greta Seam coal comply with Australian Standards for sample preparation.

Sample sizes are considered appropriate for the material being sampled and the coal testing regime.

Sampling of the Greta seam may not be consistent due to a number of differing eras of drilling plus gradational changes within the Greta seam that occur from west to east, with the seam splitting into an upper and basal section in the eastern part of the resource area. The correlation of individual plies may not be fully consistent across the Austar leases.

Austar has developed a number of composite intervals based on the ply samples to accommodate the variability of the older sample intervals.

Austar has merged all previous borehole ply correlations into one standard system comprising three basal plies each 1m thick each and up to eight consecutive 0.5m thick plies to the seam roof, which gives them the capability to assess standard longwall operations and longwall top coal caving (LTCC) options. However, given the cessation of TLCC in the Bellbird area due to high sulphur product coal and thinner seam section, it is likely that this methodology cannot be used successfully to predict product quality.

The more recent exploration data have been sampled with three basal plies each 1m thick each and up to eight consecutive 0.5m thick plies to the seam roof.

Core Recovery

Core recovery for the Greta Seam in most holes has been greater than 95%. Core recovery is measured at the drill rig when comparing drill run length to core recovered. This calculation is audited and confirmed by down hole geophysics (density log). Where core recovery has been less than 90% the hole has been redrilled. Using HQTT as the standard method of drilling is considered optimal to maximise coal seam recovery with minimal disturbance.

No bias in coal quality due to recovery has been identified and due to the high core recovery, any bias is considered unlikely or immaterial.

Quality Assurance Quality Control

Laboratories used to analyse Greta Seam cores have complied with Australian Standards for coal quality testing and are certified by the National Association of Testing Authorities Australia (NATA). Repeat sampling on a regular basis to validate results is standard procedure for proximate analysis testing.

Digital geological data for Austar resides in a Minex borehole database. This includes borehole survey data, seam picks, raw coal quality data and verticality data for more recent holes. Data in the database includes boreholes up to AQD1123. Recent holes drilled in 2017 will be loaded into the next geological model.

Sample Security

Coal core sample bags are sent to the laboratory via courier. In the past they have also been delivered to the laboratory by the field geologist or picked up from site by laboratory personnel. RPM considers this is appropriate for coal core samples.

Data Verification Statement

The borehole information was reviewed as part of the process of developing the geological and coal quality models used for this Resources estimate. No external audits or reviews are known to have been completed, however the data and model is considered by RPM to be suitable for inclusion in a Coal Resource estimate.

6.7 Donaldson

Bore Hole Data

In total there are 793 drill holes in the database for the Donaldson Project. Of the 793 drill holes:

- 361 have graphic logs and geophysical logs.
- 402 have graphic logs only.
- 30 have no graphic or geophysical logs.

Drill hole data at Donaldson has been acquired by many different parties, commencing in 1951 as outlined in **Section 4.1**.

Digital Data Base

In 2015, a third party collated and reviewed all the available drill hole data for Donaldson and re correlated all coal seams within the entire deposit. Subsequently, a third party obtained all available laboratory reports from site and upgraded the coal quality database. Drill hole information is stored on the Donaldson mine geology drive. The compiled information used in the geological model is stored in a Maptek Vulcan Isis Database.

Drilling Types and Core Recoveries

Seventeen different phases of exploration have occurred at the Donaldson Project since the early 1950s. Hence, a variety of drilling techniques have been followed. All boreholes are vertical and are fully cored, partially cored or non-cored open holes. The majority of the holes are either non-core or partially cored HQ3 diameter holes.

Contractual arrangements requiring greater than 95% recovery on a seam basis have been in place for drill holes that have recently been drilled. The recovery is recorded in the geological database for a large portion of holes and it is generally at an acceptable level (>80%). Where the recovery is recorded and it is less than 80% then the sample is rejected from the geological modelling process. Where sample recovery has not been recorded it has been accepted as adequate if the results are considered consistent with surrounding data values.

Topography and Collar Locations

A topographic surface was created in the geological model built in July 2015 using LiDAR data acquired by Donaldson Coal in 2014/2015. The quality and adequacy of the topographic surface is considered good.

Boreholes recently completed have been surveyed by a registered surveyor using an RTK GPS system with a base station control. These collars have been captured and stored in the Map Grid of Australia (MGA) 1994 Zone 56 system. Locations of historical holes are recorded in either the old Integrated Survey Grid (ISG) or in Chains from referenced cadastral locations. Historical borehole surveys have been converted to the MGA 94 Zone 56 system; however, the accuracy of the conversion is not known by the Competent Person.

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Down the Hole Survey

All drill holes at the Donaldson Project have been drilled vertical and are generally perpendicular to the coal seams. More recent drill holes have downhole verticality data recorded and show little deviation of the drill holes through the strata.

Geophysical Logging

Where downhole wireline geophysical data has been obtained it generally includes natural gamma, calliper and dual density. On occasions other tools have been acquired, including resistivity and sonic. Wireline logging tools are calibrated by the geophysical logging contractors in accordance with their company standards.

Geological, Geotechnical and Geomechanical Logging

Lithological and geotechnical logging has been undertaken on core and chip samples for the majority of boreholes. For a small collection of older boreholes these data have been lost and these holes are not used in the geological model. In most cases the logging is of a detailed enough nature to provide an accurate reflection of the geology. In most cases lithological logging encompasses the full length of the borehole.

Bulk Density Determination

In situ density was calculated for all samples using two regression equations developed by coal quality specialist Bob Leach. Bob Leach provided one regression equation for samples under 50% ash (adb) and another for samples over 50% ash (adb). In situ density was calculated at an in situ moisture of 4% using the Preston Sanders equation.

Sampling and Sample Preparation

Samples taken at Donaldson are generally only sub-sampled by the laboratory as a part of their coal quality analysis procedures. Sub-sampling by the laboratory involves either riffle or rotary splitting in order to receive a representative sub-sample to undertake each step of the analysis procedure.

Historically coal quality samples taken from boreholes have not undergone any pre-treatment, rather they have been crushed to pass 11.2 mm and then analysis performed. It is understood that coal quality samples received through channel sampling are subject to a pre-treatment process that involves drop shatter, sizing, wet tumbling and hand knapping.

The more modern coal quality analysis has involved analysing ply samples on an individual basis and the re-combining into working/seam sections on an RD x length basis.

Core Recovery

Contractual arrangements requiring greater than 95% recovery on a seam basis have been in place for boreholes that have recently been drilled. The recovery is recorded in the geological database for a large portion of holes and it is generally at an acceptable level (>80%). Where the recovery is recorded and it is less than 80% then the sample is rejected from the geological modelling process. Where sample recovery has not been recorded it has been accepted as adequate. No relationship between sample recovery and a quality bias has been identified.

Quality Assurance Quality Control

The Competent Person does not know of any audits or reviews of the sampling techniques.

In 2015 a third party undertook a large review of the seam and ply correlation as well as a comparison of the coal quality data against the original lab results. This extensive exercise resulted in a completely new geological model, which removed numerous small and several large errors.

Sample Security

Any sample security measures applied to historical samples is unknown by the Competent Person. Holes recently drilled (those holes completed in 2014) were double bagged with sample tickets included between the bags. A copy of the sample ticket was retained on site at Donaldson Coal.

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Data Verification Statement

RPM considers that the data which supports the resource estimation has no material errors.

6.8 Middlemount

Bore Hole Data

Exploration data collection for Middlemount Coal has been managed by Peabody Energy Australia since 2008; all borehole data is completed using industry standard practices outlined in the CoalLog Manual for Geology & Geotechnical Data Collection ("CoalLog"). Data acquired prior to the release of the CoalLog industry standard in 2012, including holes obtained in tenement acquisitions and in open file Government reports, have been assessed by Peabody geologists and deemed to provide an adequate representation of the deposit.

The Middlemount Mine area contains some 1076 boreholes which forms the basis of its orebody knowledge; 732 of which were used in the 2018 geological model. Data is managed through multiple systems due to limitations on data capture abilities; however, paper copies are kept on site and network locations are used for data repositories. Three separate databases are used to perform different functions on the data: Task Manager, GeoCore and Isis. Their uses are explained in the following data flow process, as confirmed by Peabody's Geology Team:

1. The Field Geologist logs lithology data on paper. The paper log is kept in a borehole file on site and also scanned to network.
2. The Field Geologist data enters lithology into Task Manager and files are saved as <Hole>_FIELD for raw data.
3. Contract Geophysical logger logs the hole and provides hard copy and digital files to Geologist. Geophysics printouts for boreholes are kept at the Middlemount Mine Site and Peabody Field Exploration Office. LAS and PDF files are acquired from the geophysical contractor and saved to Task Manager. All digital LAS is uploaded to the GeoCore database.
4. Mine surveyor surveys the hole and provides coordinates to the Exploration Manager for upload to the GeoCore Database. CSV files are kept on network.
5. Core photos are stored on the network and can be viewed with the lithological data via Task Manager
6. Task Manager is setup to validate data and flag data entry errors which do not conform with CoalLog 1.2.
7. Field Geologist validates all primary data and completed geophysical adjustments, based on gamma, calliper and density traces.
8. Once the hole correction is complete, it is saved as <Hole>_CRX on the network. The CRX file is then checked and edited as required by the Exploration Manager resaved as Hole.xls and uploaded to the Peabody GeoCore Database via Task Manager.
9. GeoCore does not store all fields, therefore, Excel records are kept on the network.
10. Sample advice summaries are exported from Task Manager to provide coal quality instructions to the laboratory.
11. All coal quality results are saved on the network and uploaded directly to GeoCore by the Coal Quality Department at Peabody.
12. When a model update is required, the headers, lithology, geophysics and raw quality data is exported from GeoCore and provided to the Resource Geologist as a CSV file.
13. The Resource Geologist creates an Isis database from the exported CSV files for Vulcan modelling.
14. The Resource Geologist models structure and raw coal quality from the created Isis database.
15. Any changes made during resource modelling are provide back to Peabody as CSV files. The relevant data is amended directly in GeoCore, however, this could take longer than 6 months for the data to be updated.
16. The updated model and Isis database are provided to site personnel at Middlemount Mine. There is no Mine Geologist at Middlemount and the responsibility falls on the Technical Service Manager.

17. In-house coal quality experts simulate washability and product coal quality upon the reporting of results by the lab.
18. Washability and product quality data is not accounted for in the resource model, however provided to mining engineers for reserving.

RPM is concerned that the data management practices could lead to divergence of data sets due to loss of version control, and data misuse. There are risks associated with data entry from field notes; using multiple versions of CSV files through importing and exporting into different systems which have different data storage abilities; and personnel accessing different systems for geological data. The lack of integration of the coal quality and structural data, and use of that data by the resource geologists is also of concern because it does not appear that product coal quality data has been considered in the Resource estimation process.

Drilling Types and Core Recoveries

RPM Global understand that industry-standard drilling techniques are used at Middlemount, with conventional rotary table drill rigs using air and water circulation.

Both open hole and coring techniques have been applied to the Middlemount deposit (Core drilling is typically by both HQ (nominal 60mm diameter) and 100mm diameter tungsten carbide drill bits and triple tube barrels (**Table 6-6**). Open hole drilling is used for structural control and to confirm seam continuity and the occurrence of coal is confirmed through downhole geophysical techniques. Blade/Hammer/PCD bits were used to drill open (chip) holes. Core holes have been drilled to understand the seam quality. Core drilling is typically by both HQ (nominal 60mm diameter) and 100mm diameter tungsten carbide drill bits and triple tube barrels.

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Table 6-6 Modelled hole types for 2018 Middlemount resource estimations

Total Model Holes	Open Holes	4-inch Core Holes	HQ Core Holes	Large Diameter Core Holes
732	429	69	231	3

Contractually, a redrill is required if less than 95% core recovery is obtained. Recovery less than 95% is occasionally accepted if the drilling environment is difficult, or when the loss is deemed acceptable by comparing against geophysics density logs and the position of the loss in the seam.

Topography and Collar Locations

Geological models are developed from topographic data from Middlemount Coal supplied Digital Terrain Model (DTM) data for the Middlemount area, as at the end of June, 2018. The topography of the Middlemount project area is gently undulating, with surface elevations generally ranging from 160-170m (AHD). Roper Creek flows west to east in the south of the project area.

Drill sites are located using handheld GPS by the Site Geologist and final borehole collar survey is completed by the Middlemount Coal personnel trained in surveying, using the Middlemount Mine base station calibrated to Aus Geoid heights and GDA94 Zone 55 datum and projection system.

RPM considers that the topographic surface and borehole collar locations at Middlemount have been developed with sufficient rigor to enable reliable Resource model development and Coal Resource estimation.

Down the Hole Survey

All drilling has been completed using vertical drill orientation. Downhole deviation data has only been collected on selected holes drilled in 2017, which accounts for only 7% of modelled holes. Deviations <5% was observed at depths greater than 100m and no adjustment for drill hole verticality has been applied to drill hole data used to develop the geological structural model.

RPM has reviewed a selection of verticality analyses and suggests that the Resource model would provide a more reliable estimate of coal seam depth and thickness with deviation data applied and could assist with identifying unmapped geological structures.

Geophysical Logging

RPM notes that down hole geophysical data is acquired by the geophysical service provider according to Company Standards and protocols.

An estimated 75% of the resource uses holes with digital geophysical logs. Some older holes only have paper copy geophysics. The holes without geophysics appear to have been corrected to geophysics and reliability has been verified from newer drilling and mining. Holes confirmed to be unreliable have been flagged in the Isis database to avoid accidental use during modelling. In some areas these holes have been redrilled.

The standard geophysical tools used were: density, gamma and calliper. Selected historic holes have verticality, sonic, resistivity, temperature and spontaneous

Geophysical logs are used to confirm the reliability of the Geologist's observation, provide a more accurate assessment of coal seam depth and discriminate coal seams and plies across the Middlemount deposit.

Geological, Geotechnical and Geomechanical Logging

Geological logging and sampling is performed by qualified Geologists at the drill rigs in accordance with the CoalLog Manual for Geology & Geotechnical Data Collection; however, only basic geotechnical characteristics are recorded such as defect type and surface roughness, with rare recording of defect infill type. Quantitative logging for lithology, stratigraphy, texture and hardness is conducted using standard dictionary definitions, while colour and any additional qualitative descriptions are also recorded. Geological interpretation occurs by the following series of steps:

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- Preliminary seam correlations are carried out with reference to geophysical signatures and known marker intervals:
  - The medial stone band present in the Middlemount Seam (which is the same as the medial stone band in the Pollux Seam at Yarrabee Mine in the central Bowen Basin);
  - The ~0.30m deteriorated material of the Tralee Upper ply at the base of the Middlemount Seam;
  - A thick interburden (~60m) between the Middlemount Seam and the Pisces Seam, both of which contain approximately 4-5m accumulated coal thickness;
  - The Yarrabee Tuff marker band at the base of the Pisces Upper ply.
  - Interbanded coal and tuffaceous material of the Girrah seam (Fort Cooper Coal Measures)
- Insertion of horizons such as Base of Weathering and recognition of Tertiary material interpreted from visual data from the original exploration boreholes
- A structural geology model is developed from which borehole postings, sections and contours are created to validate seam correlations
- Anomalous or incorrect seam correlations are corrected and the checking process repeated until the geological practitioner is satisfied with the integrity of the correlations.
- Faults locations and displacement are determined from surveyed seam roof or floor data, in pit mapping, from direct evidence in bore core and interpretation of missing or repeated sequences in boreholes. 2D seismic data has also contributed to the positioning of the Jellinbah Fault.
- Fault displacements are calibrated by review of supporting seam roof or floor survey data in addition to ensuring that borehole seam data is honoured.

With only basic geotechnical parameters noted in exploration drilling, it is the opinion of RPM that the level of geotechnical investigation at Middlemount is not sufficient for understanding highwall and low wall stability, pit and dump slope designs and failure mechanisms encountered by the interaction of water, Tertiary material, regional faulting, upthrown strata on the east of the Jellinbah Fault and the Yarrabee Tuff as pit floor material. Further geotechnical investigation should also be carried out to understand roof and floor characteristics and vertical and horizontal stress regimes to assess the viability and suitability of underground mining methods.

Bulk Density Determination

The density of the coal and its distribution within the seams has been well established as the Middlemount Mine has been in operation since 2011. Most borehole samples have true relative density (RD) analysis.

The insitu density is estimated using laboratory air dried Relative Density (RD) and adjusted to insitu density using the Preston Sanders equation using the assumed insitu moisture of 5%.

Sampling and Sample Preparation

Core sampling is completed at the drill site and is based on a set of standard criteria (determined by lithology and structure) that follows the Middlemount sampling procedure. Both HQ and 4-inch core have been used across Middlemount's exploration campaigns for coal quality analysis.

Coal quality samples are based on the coal brightness in an attempt to maximise coking potential (typically associated with brighter coals). Carbonaceous material and all stone bands are sampled to ensure that full coverage of each seam intersection is obtained. Roof and floor strata (approximately 20-30cm of material) is also sampled and tested so that dilution qualities can be applied in the conversion of insitu quality to ROM quality. All samples are photographed and provided with a unique sample number before being placed into double plastic bags and sealed.

Samples are air dried and weighed prior to analysis. Raw analysis samples were crushed to -12.5mm and split into portions using a rotary splitter prior to coal quality analysis. One quarter of the sample is analysed for raw coal parameters (***Table 6-7***), which the remaining three-quarters of the sample make up the reserve mass and washability samples (***Table 6-8***).

RPM opine that coal quality testing at 12.5mm top size does not enable the evaluation of plus and minus 16mm fractions for optimisation of the metallurgical coal products and thermal products.

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Table 6-7 Analytical Tests for Raw Coal and Stone Ply Samples

Raw Samples	Raw Coal Analysis	
	COAL	STONE
Relative Density (ad)	✓	✓
Moisture (ad)	✓	✓
Ash (ad)	✓	✓
Volatile Matter (ad)	✓	
Fixed Carbon (ad)	✓	
CSN	✓	
Total Sulphur (ad)		✓

Table 6-8 Analytical Tests for Float Sink Testing

Sample Type	Fractional Separation Density	Ash (ad)	Cumulative CSN
COAL	F1.3	✓	✓
	F1.4	✓	✓
	F1.5	✓	✓
	F1.6	✓	✓
	F1.7	✓	✓
	F1.8	✓	✓
	F2.0	✓	✓

Although washability and product analysis are reported to be conducted across the resource area (following Middlemount's washability and product coal procedures), this data is not used for resource modelling. Raw coal ash and CSN are used to determine the coal mining sections for washed coal products.

Core Recovery

Core recovery is recorded by the rig geologist at the time during logging the bore hole, based on measurements taken of the cored interval and the core recovered and visual inspection of the core. Actual recovered core lengths are measured with a tape measure and any core loss is recorded in geological logs and core reconciliation sheets. Core run recovery differences are also noted on the core board and photographed.

A full assessment of core loss is confirmed by the rig geologist after comparing the recovered core to the geophysical logs to determine which parts if any of the seam are missing due to core loss.

Quality Assurance Quality Control

Sample instructions are issued by Middlemount Coal personnel, who are currently using ALS Global Coal Quality laboratory at Richlands, QLD for coal testing. RPM understands that the lab conducts round robin validation checks to ensure a high standard of reporting is maintained and follow appropriate Australian Standards for analysis.

Laboratory Project Managers collate and validate the data, looking for abnormalities in the results. The primary means of validation include looking for known trends in the data, by creating cross plots of the results on a seam by seam basis. Typical industry practices include the comparison of the following (for example):

- Ash vs. Relative Density
- Volatile Matter vs. Ash
- Specific Energy vs. Volatile Matter
- Ash vs. Total Sulphur

Validation is conducted before and after data is loaded into Task Manager. The coal quality department at Peabody are responsible for the management and integrity of coal quality results.

RPM were provided with clean coal (product) quality composites by Peabody. In the absence of coking indices, the basicity index has been calculated (which can be used as an indicator of coking potential). A basicity index below 0.10 indicates reasonable coking potential. Of the 431 product coal composites, only 25% (108 samples) have coking potential based on the basicity index of the complete sample. The seams with the highest coking potential on a complete seam basis (where >50% of samples have basicity index <0.10) are the MU and TL2B seams).

Sample Security

All geology and exploration activities at Middlemount are managed by Peabody's Geology department. Core samples are bagged by the geologist and kept in refrigerated storage until they are dispatched to the laboratory by dedicated courier service. In light of the bulk commodity nature of coal, no higher level security measures are deemed necessary since it is very unlikely to be subject to material impact from sample tampering theft or loss. RPM considers these procedures to be industry standard.

Data Verification Statement

RPM completed review of the geological and digital data supplied by the Client to ensure that no material data issues could be identified and that there was no cause to consider the data inaccurate and not representative of the underlying samples. RPM visited the Middlemount Mine in April 2018 and reviewed the Asset's operation. RPM concluded that the data was adequately acquired and validated following industry best practices as outlined

7. JORC Coal Resources

Coal Resources have been independently developed in line with the Australian Guidelines for the Estimation and Classification of Coal Resources (2014) and reported in line with the requirements of the JORC Code 2012.

7.1 Coal Resource Classification System under the JORC Code

A "Mineral Resource" is defined in the JORC Code as 'a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality) that there are reasonable prospects for eventual economic extraction. The location, quantity, grade (or quality), continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories (JORC Code – Clause 20).'

Mineral Resource estimates are not precise calculations, being dependent on the interpretation of limited information on the location, shape and continuity of the occurrence and on the available sampling results.

For a Mineral Resource to be reported, it must be considered by the Competent Person to meet the following criteria under the recommended guidelines of the JORC Code:

- There are reasonable prospects for eventual economic extraction.
- Data collection methodology and record keeping for geology, assay, bulk density and other sampling information is relevant to the style of Mineral and quality checks have been carried out to ensure confidence in the data.
- Geological interpretation of the resource and its continuity has been well defined.
- Estimation methodology that is appropriate to the deposit and reflects internal grade variability, sample spacing and selective mining units.
- Classification of the Mineral Resource has taken into account varying confidence levels and assessment and whether appropriate account has been taken for all relevant factors i.e. relative confidence in tonnage/grade, computations, confidence in continuity of geology and grade, quantity and distribution of the data and the results reflect the view of the Competent Person.

The terms 'Mineral Resource(s)' and the subdivisions of these as defined above, apply also to coal reporting, however if preferred by the reporting company, the terms 'Coal Resource(s)'' and the appropriate subdivisions may be substituted. (JORC Code - Clause 43). As such in this report RPM will refer to Mineral Resource, as Coal Resources.

7.2 Area of the Resource Estimation

The Assets consists of several exploration and mining rights under the NSW and QLD mining codes. RPM notes that the reported Coal Resources include the following areas:

- **HVO Open Cut** – The resource area is contained within HVON and HVOS areas. The Resource in the HVON area is located in the Vane Subgroup and the Resource in the HVOS area consists of all seam groups within the Jerrys Plains and Vane Subgroups.
- **HVOS Underground** – The resource area is contained within the Arties and Barrett seams of the Vane Subgroup.
- **Mt Thorley Open Cut** - The resource area is contained within MTW (south of the Putty Road) and consists of a number coal seams within the Whittingham Coal Measures which occur within 320m of surface and exploitable by Open Cut methods.
- **Warkworth Open Cut** – The resource area is contained within MTW (south of the Golden Highway and north of Putty Road) and consists of a number of coal seams within the Whittingham Coal Measures and which occur within 320m of surface and exploitable by Open Cut methods.

- **Mt Thorley Underground** - The resource area is contained within MTW (south of Putty Road) and consists of the coal seams which are potentially exploitable via Longwall Underground methods.
- **Warkworth Underground** - The resource area is contained within MTW (South of the Golden Highway and north of Putty Road) and consists of the coal seam which is potentially exploitable via Longwall Underground methods.
- **Moolarben Open Cut** – The combined Resource area at Moolarben covers an area stretching 20km north to south and up to 8km east to west. The open cut resource targets the shallow coal of the Ulan Seam and some minor quantities of the Moolarben and Glen Davis Seams to the south of Ulan Road and Ulan-Wollar Road.
- **Moolarben Underground** – The underground Resource area includes the deeper areas of the resource, generally located beneath natural ridgelines that are unfavourable to mine via open cut methods and is restricted to the Ulan Seam (excluding the top A1 ply), of which the lower portion (DWS) is currently being mined via Longwall mining methods.
- **Ashton Open Cut** – The resource is typically covers a large portion of the licence holding, including the Bayswater and Lemington Seams above the current underground in the western portion of the Project and the Hebden through to Arties Seam in eastern portion of the Project including the South East Open Cut area.
- **Ashton Underground** – The Resource area covers ML1533, ML1623, EL4918 and EL5860 which includes the current underground operations and includes the Pikes Gully Seam, Upper Liddell Seam, Upper Lower Liddell Seam, Upper Barrett Seam and Lower Barrett Seam.
- **Yarrabee Open Cut** – The Resources are contained within the Yarrabee licence holding (approximately 12km by 8km) and are limited by drilling and an overall strip ratio of 25:1 (bcm:t).
- **Stratford and Duralie Open Cut** – The Resources are contained within three areas including the Stratford area in the north, the Grant and Chainey area in the central region and Duralie in the South. The Resources are limited in the Stratford west to a depth of 150m, in Stratford Avon North and Stratford East to 200m. At Duralie the Resource boundary is limited to the north by drilling and to the east by the Mammy Johnson River.
- **Stratford and Duralie Underground** – The Resource is contained predominately in the Duralie area below the open pit resource, to a depth of 500m for the Weismantel Seam.
- **Austar Underground** – Resources are estimated to a depth of 800m (mining is planned up to 720m) for the Greta Seam.
- **Donaldson Open Cut/Underground** – Coal Resources north of John Renshaw Drive and east of the closed Donaldson open cut mine are considered open cut Resources due to their shallow depth. All other resources at Donaldson are considered underground Resources either due to depth, or surface constraints that prohibit open cut mining.
- **Middlemount Open Cut** – The Middlemount deposit is approximately 7km in strike length (north-northwest) and 2km wide (east-west). Coal resources commences at the subcrop line in the west of the deposit and extends towards the Jellinbah fault, which bounds the east of the deposit. The Resource area includes ML70379, ML70417 and MDL282.

7.3 JORC Statement of Coal Resources

Results of the independent Coal Resources estimate for the Assets are tabulated in the Statement of Coal Resources in ***Table 7-1*** and shown graphically in ***Figure 7-1*** below, which are reported in line with both the requirements of the 2012 JORC Code and the reporting standards of Chapter 18 of the HKEx Listing Rules. The Statement of Coal Resources is therefore suitable for public reporting. The Statement of Coal Resources are inclusive of the Coal Reserves reported in ***Section 8***.

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Table 7-1 Statement of Coal Resources by Operation as at 30th June, 2018.

Operation	Classification				
	Measured (Mt)	Indicated (Mt)	M + I (Mt)	Inferred (Mt)	Total (Mt)
HVO (OC/UG)	704	1,430	2,134	1,654	3,788
Mount Thorley (OC/UG)	27	75	102	153	255
Warkworth (OC/UG)	197	713	910	527	1,437
Moolarben (OC)	438	105	543	69	612
Moolarben (UG)	287	131	418	129	547
Ashton (OC)	25	49	74	70	144
Ashton (UG)	52	18	70	15	85
Yarrabee (OC)	94	80	174	20	194
Stratford and Duralie (OC)	11	196	207	76	283
Stratford and Duralie (UG)	-	1	1	35	36
Austar (UG)	70	80	150	69	219
Donaldson (OC)	10	-	10	-	10
Donaldson (UG)	178	326	503	95	598
Middlemount (OC/UG)	73	47	120	1	121
Total (100% Basis)	**2,165**	**3249**	**5,414**	**2,913**	**8,327**
Yancoal Attributable Share[6]	**1,610**	**2,355**	**3,964**	**1,952**	**5,916**

Note:

1. *The Statement of JORC Coal Resources for HVO and MTW have been compiled under the supervision of Mr. Peter Ellis who is a full-time employee of RPM and a Registered Member of the Australian Institute of Mining and Metallurgy. Mr. Ellis has sufficient experience that is relevant to the style of Coal and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code.*
2. *The Statement of JORC Coal Resources for Yarrabee and Middlemount have been compiled under the supervision of Mr. Michael Johnson who is a a sub-consultant of RPM and a Registered Member of the Australian Institute of Mining and Metallurgy. Mr. Johnson has sufficient experience that is relevant to the style of Coal and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code.*
3. *The Statement of JORC Coal Resources for all others deposits have been compiled under the supervision of Mr. Brendan Stats who is a full-time employee of RPM and a Registered Member of the Australian Institute of Mining and Metallurgy. Mr. Stats has sufficient experience that is relevant to the style of Coal and type of deposit under consideration and to the activity that he has undertaken to qualify as a Competent Person as defined in the JORC Code.*
4. *All Coal Resources figures reported in the table above represent estimates at 30th June, 2018. Coal Resource estimates are not precise calculations, being dependent on the interpretation of limited information on the location, shape and continuity of the occurrence and on the available sampling results. The totals contained in the above table have been rounded to reflect the relative uncertainty of the estimate. Rounding may cause some computational discrepancies.*
5. *Coal Resources are reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The Joint Coal Reserves Committee Code – JORC 2012 Edition).*
6. *Based on owner at the latest applicable date.*

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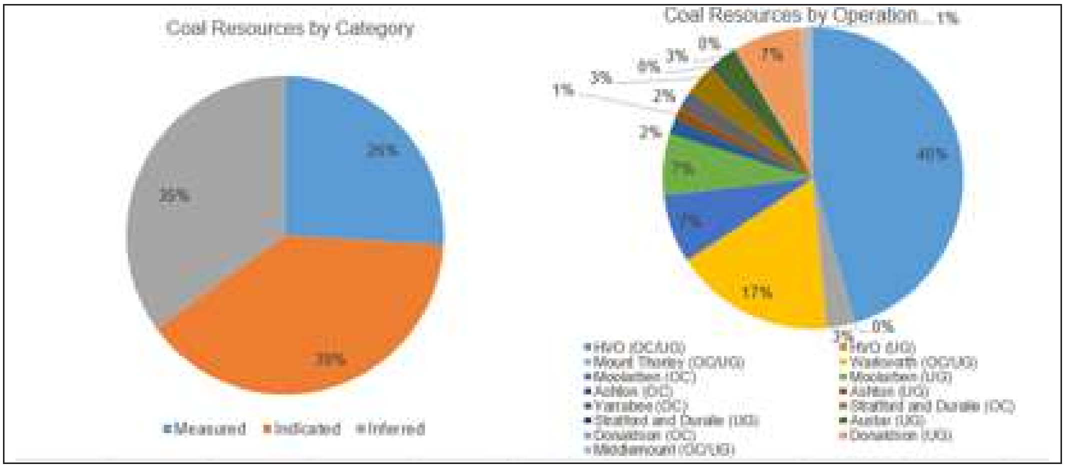
Figure 7-1 Graphical Representation Coal Resources (100% basis)



In addition to the Coal Resources for the operating assets, a total of 16.8Mt of Indicated and 80Mt of Inferred for a total of 96.8Mt is contained with the Monash Deposit located 25km south of Singleton.

7.4 Classification

While Table 1 as required by the JORC Code 2012 edition is presented in ***Appendix C*** for reference, a summary of the resource estimate classification approach is provided below. The RPM Resource classification system is based on industry best practices and generally included the following process:

- Review the regional geology to understand seam continuity and other characteristics beyond the Company's mining tenure boundaries that may impact the geology within the Client's tenure.
- Review or develop a geological model to represent the geological data and understanding of the deposit.
- Define the Points of Observation (PoO's) for quantity and quality.
- Define supportive data types – is the stage at which a determination is made as which data will be in the classification of the resources.
- Determine Resource and Reserve entities – is the stage at which seam groups and which ply will be separated and PoO determined for each seam.
- Determine PoO spacing.
- Stage 1 is a mechanical stage that produces two maps for the Resource entity, one for quantity and the second for quality, which shows the polygons of influence surrounding the PoO's. Stage 1 assigns areas of high, moderate and low levels of confidence.
- Stage 2 is the stage at which the judgement of the Competent Person is applied. The two Stage 1 maps are reviewed and modified by the Competent Person to:
  - Reflect the importance of supporting PoO's for structure and quality as distinct from primary data.
  - Take into account regional and other geological knowledge and the like, which cannot be distilled down into PoO's
  - Remove outliers, fill in between inliers where appropriate, reduce excessive extrapolation and smooth polygon boundaries
- Stage 3 is the final stage in which the categories are assigned based upon both physical continuity/existence and coal quality. To achieve this position the minimum area of each category for each map is taken as being the final area for that category. For example, if an area of 100 ha is considered to be Measured based on physical existence/continuity, however only 65 ha of this is considered to be

Measured based on knowledge of coal quality, then the final area of Measured coal is the 65 ha intersection of the two polygons.

Below is a brief description of each of the steps and the parameters assumed.

Review of Regional Geology

HVO / MTW

RPM has performed a high level review of the geology surrounding the Assets and concludes that the Whittingham Coal Measures are continuously developed within and surrounding the MTW and HVO areas. However, there are differences in how the stratigraphic sequence of the Whittingham Coal Measures has been interpreted between the Assets sites and with the surrounding sites as outlined in ***Section 5***.

Moolarben

The Moolarben coal deposit is located on the western margin of the Sydney Basin's Western Coalfield where sedimentary strata of Permian, Triassic and Jurassic age dip towards the northeast at 1° - 3° and overlie Carboniferous granite and folded metamorphic basement. The Permian strata comprise the coal-bearing Illawarra Coal Measures and the underlying Shoalhaven Group, which in turn unconformably overlies the Lachlan Fold Belt basement rocks. Surface Quaternary alluvial deposits and remnant Tertiary basalt flows are common in the area.

The regional geology is well defined and understood from a long history of exploration and mining in the area and a relatively simple geological setting.

Ashton

Ashton is located in the Hunter Coalfield in the North East of the Sydney Basin. The basal seams of the Burnamwood Formation in the Jerrys Plains Subgroup and all seams of the Foybrook Formation in the underlying Vane Subgroup exist within the Project. These subgroups exist within the Late Permian age Wittingham Coal Measures. The strata and coal seams outcropping in the Ashton area are from the Late Permian Wittingham Coal Measures. The Wittingham Coal Measures maximum thickness of about 250m occurs at its deepest development at the boundary with Ravensworth Underground Mine to the west. Towards the east seams subcrop on the western limb of the Camberwell Anticline with progressive erosion of overlying seams from west to east resulting in subcrop of the Bayswater Seam to Hebden Seam sequence

The regional geology of Ashton is well defined by the extensive exploration and mining from not only Ashton but also the surrounding operations in the Hunter Coalfield.

Yarrabee

RPM has performed a high level review of the geology of surrounding the Yarrabee area and concludes that the Rangal Coal Measures are present within thrust slices and that coal seams have been established to be continuous within each of the structural domains.

The Yarrabee resource is contained in a thrust slice bounded by the Yarrabee Fault that is located contiguously with the western boundary of the Dawson Tectonic Zone and another thrust fault located immediately to the west of the coal zone that has been defined between DOM 6 and DOM 2S.

Stratford and Duralie

The resource areas within the Stratford and Duralie deposits are located in the Permian aged Gloucester Basin of New South Wales, Australia. The Duralie deposit is contained within the southern extent of the basin where that portion of the syncline plunges to the north. There are two main seams at Duralie; the Weismantel and Clareval and two minor seams; Duralie and Cheerup. The interburden between the topmost Weismantel and bottom-most Clareval seam is approximately 200m. The Clareval seam is located near the base of the basin stratigraphy.

The Stratford area is comprised of three regions referred to as Stratford West, Avon North and Stratford East, where:

- Coal seams in Stratford West are from the Gloucester Coal Measures and include a ten coal seam packages from the Marker 7 to the Bowens Road seam groups. Strata at Stratford West dip to the west at 10-50 degrees and can be steeper when associated with faulting.
- Avon North is a small area (0.6 x 1.25 km) approximately 100m northeast of Stratford Main Pit. Strata at Avon North are from the Avon Sub-group, which forms the lower part of the Gloucester Coal Measures. The Avon North area is north of a major east-west trending fault which was intersected at the northern end of the Stratford main pit. The Avon North area steeply dipping to the west at 25 to 50 degrees, which is intersected by five reverse faults.
- At Stratford East the strata dip steeply to the west. Drill holes at Stratford East intersect Weismantel, Cheerup and Clareval Seams contained within the Weismantel and Duralie Road Formations of the Dewrang group.

The geology while complex, is well understood. Further information is provided in ***Section 5***.

Austar

The Greta Seam occurs within the Greta Coal Measures in the South Maitland Coalfield, on the western side of the Newcastle Coalfield. The Greta Coal Measures are of Early Permian age (approximately 270 Ma) and in the Cessnock area comprise the following Formations:

- Paxton Formation (youngest)
- Kitchener Formation – Greta Seam
- Kurri Kurri Conglomerate – Homeville Seam
- Neath Sandstone (oldest)

In the western portion of CCL728 and CML2, past mining (Ellalong Colliery) extracted Greta Seam where it was typically 3m-3.5m thick. In the central and eastern portions of CML2 where longwall top coal cave mining has been taking place, Greta Seam increases to 6m-7m thick and comprises dull and bright to bright banded coal. The basal 4m of coal is generally devoid of claystone bands while the upper 2m-2.5m contains several thin claystone bands. Towards the east in CML2 additional thin claystone bands gradually emerge in the basal half of the seam.

Close to the eastern boundary of CML2, the Greta Seam splits into an upper 4m thick section and lower 1.5m thick section, along a broadly north south trending split line. The Upper Greta Seam has been intersected in old drill holes further to the east, in the eastern portion of EL6598 where it gradually thins over several kilometres distance to a minimal thickness of 2m. The Lower Greta Seam thins and deteriorates to the east and east of the split line is not considered a resource.

The Lochinvar Anticline is a major regional feature which has a significant impact on Greta Seam dip and strike, as well as the style of faulting in the South Maitland Coalfield. Austar mining and exploration leases are located on the eastern flank of the south plunging Lochinvar Anticline, with gentle seam dip of approximately 4° and seam strike rotating between east to north-east. The presence of extensive old workings (and mapping data) within the Greta Seam to the north of Austar leases has been beneficial in interpreting regional fault structures extending south from old workings into CML2 and EL6598. This, along with an extensive array of seismic and drill hole data has defined a number of significant faults that will impact on, or limit mining:

- The Quorrobolong Fault Zone (Stage 3 area)
- The Abernethy Fault Zone (Stage 3 area)
- The Swamp Fault Zone (Bellbird area)
- The Barraba Fault Zone (Bellbird area)

To the north of Austar, extensive past workings (last 100 years) have extracted Greta Seam from surface down to a depth of approximately 350m. Austar leases CCL728, CML2 and EL6598 are located further down dip, south of past workings and so depth to Greta Seam ranges from 400m to in excess of 700m.

Igneous dykes are present in the South Maitland Coalfield and although infrequent, were intersected at Ellalong and in old workings to the north. When dykes have been intersected they usually occur as a pair of dykes rather than a single dyke. The south trending Central Dyke (1-2 dykes) defined the eastern limit to longwall mining in the Stage 2 mining area. Recent exploration drilling, a review of mapping from past workings to the north (at Kitchener) and two ground magnetometer surveys has confirmed another southeast trending narrow zone of intrusive activity comprising two dykes (Kitchener Dyke) extending south into the Stage 3 mine area. From historical mapping and Austar's experience when intersecting dykes, there has been no evidence of intrusive sill bodies migrating horizontally from the dyke into the seam. Igneous activity within the Greta Seam, to date presents as dykes.

The geological understanding of the Project is considered by RPM to be consistent with the regional geology.

Donaldson

Donaldson Coal and its associated mining/exploration titles are located in the northern-central portion of the Newcastle Coalfield, which forms the northern portion of the Permian/Triassic Sydney Basin. Stratigraphy comprises Late Permian Tomago Coal Measures overlain by Newcastle Coal Measures. The non-coal bearing Triassic Narrabeen Group overlies the Newcastle Coal Measures and form steep topographic relief which includes Mt Sugarloaf and Mt Vincent.

The regional geology is well defined from extensive exploration and mining activities in the Newcastle Coalfield and more specifically from the Abel, Tasman and Stockrington No 2 underground mine workings and Donaldson open cut. The geological model and Resources estimate is consistent with the Regional geological understanding.

Middlemount

Stratigraphically, the first seam intersected in the Rangal Coal Measures in the Middlemount area is the thin Roper seam; which is rarely present, because it subcrops closer to the Jellinbah Fault than the other coal seams as outlined in ***Section 5***.

The Middlemount seam is typically a single seam, however in places splits into a high ash upper split, (MU) and the upper (MLT) and lower (MLB) seam section. The MLT and MLB are contiguous. The split into MLT and MLB sections is for coal quality reasons, with the upper section being a low ash dull coal that has PCI / thermal coal properties and the lower section being a low ash bright coal section with metallurgical coal properties.

The Middlemount seam thickens from 3m in the south to up to 5m in the north. Seam thickness generally follows sedimentary trends, however it is obvious that some of the seam thickness variability in the north is due to structural rather than sedimentary reasons. RPM considers that there is likely to be at least three north east striking fault structures located north of the current northern end wall that have not been interpreted.

RPM considers that the Tralee seams are in fact the lower plies of the Middlemount seams based on our knowledge of the Elphinstone and Leichhardt seams elsewhere in the Bowen Basin. Furthermore RPM considers that the non-sedimentary thickness variations observable in the Middlemount and Pisces seams will not have a material impact on the Resource estimate.

RPM has interpreted a number of subsidiary thrust faults which are upthrown to the east. The structural changes noted down dip of the current highwall have been interpreted to be due to a subsidiary thrust fault to the Jellinbah Fault because there is no sign of north-easterly structures in the current highwall. In RPM's opinion if the faults causing the structural disruption east of the current highwall have an easterly orientation the faults should be visible in the highwall. As a result, it is RPM's opinion that the structure requires more careful consideration in future mine design and resource classification work, because the remainder of the Middlemount resource potentially has greater structural disturbance than the area that has been mined to date. These structures could impact on plans to employ highwall mining and underground mining methods at Middlemount.

For a review of the deposit's coal quality and verification of the deposit's potential to continue to product coking coal, RPM have been provided with a subset of laboratory data from selected exploration campaigns and a full dataset of clean coal quality composites. In the absence of coking indices, the basicity index has been calculated (which can be used as an indicator of coking coal). A basicity index below 0.10 is sought for coking potential. Of the 431 product coal composites, 25% (108 samples) have coking potential based on the basicity index on the sample mass as a whole. Plies with the highest coking potential on a whole ply basis (where >50% samples with basicity index <0.10) are MU and TL2B.

Ash analysis was also reviewed for anomalies in calcium (CaO) and iron (Fe2O3), which are known to affect the coking potential of the Rangal Coal Measures in Queensland. The spatial distribution of high values of CaO (>8%) and Fe2O3 (>10%) were examined and it was identified that these correlated with a decrease in vitrinite content, suggesting a change in coal type, potentially caused by changes in water level in the peat swamp at the time of deposition. In addition, phosphorus levels at these locations were also high (>0.07%). While only a subset of this data was provided for core holes drilled in 2015, there is enough information to cast doubt on the coking potential, as is currently assumed in the north, particularly in the Middlemount Seam. As such RPM recommends further studies be completed to confirm the assumptions made based on historical production and current knowledge.

Geological Models

All geology models were created by third parties and review by RPM to ensue no material issues were noted. Below is a summary of the outcomes of these reviews.

MTW

The MTW_1208_LOM model was developed and validated by Measured Resources, utilising the standard ABB FEM interpolator for structural modelling and the standard ABB model settings used. The inverse distance squared interpolator was used for coal quality model development on grids with 20m by 20m node spacing.

The model consists of the coal seams only with waste modelled by default and not assigned any grade. Resource estimates are therefore of the coal seams only.

RPM considers that the coal quality model is developed to an acceptable standard however notes the following:

- The database and the model do not contain clean coal composite values when raw coal ash of a coal ply is greater than 50%. In these cases the coal quality model will underestimate ash and overestimate yield.
- Coal quality data has not been acquired when coal seams are less than 0.1m thick. Due the seam characteristics there are a large number of thin seams modelled that do not have coal quality data. The coal quality grids will interpolate missing coal quality values between boreholes and extrapolate values beyond boreholes. The interpolations and extrapolations could either under or overestimate values. There is no definitive conclusion to be made about the impacts of coal quality data being missing for thin seams less than 10cm thick.
- The coal quality model was developed by using all borehole data with a number of coal quality data points that do not have supporting structural data. It appears that the final quality models were developed prior to the final structural models which have excluded some of the coal quality boreholes from those that were used in the coal quality model.

Having noted the above, RPM is of the opinion that the misalignment of the raw coal and clean coal quality models with the structural model is unlikely to make a material difference to the Resources and Reserves estimate.

HVO

The HVO_1508_LOM model was developed and validated by HVO personnel using Minescape Version 5.9. software and subsequently externally reviewed by Encompass Mining. The ABB FEM interpolator was used for structural modelling with Standard ABB settings used.

The inverse distance squared interpolator was used for coal quality model development. Subsequent to structural modelling the inverse distance squared interpolator was used for surface and both the structural and coal quality model development on grids are based on a 50m by 50 me node spacing. A single structural model and single coal quality model cover the entire HVO area. The model consists of the coal seams only with waste modelled by default and not assigned any grade. Resource estimates are therefore of the coal seams only.

RPM considers that the coal quality model is developed to an acceptable standard however notes the following:

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- RPM consider that the coal quality models contain many inconsistent data input values, with numerous coal seams being modelled with ash values between 50% and 90%. A large percentage of the boreholes with anomalously high ash values are located in areas of low coal quality data density. These boreholes will be over represented in the coal quality model by having a disproportionate area of influence and as a result coal tonnage will be excluded from the Reserves estimate.
- The coal quality model was developed by using all borehole data. There are number of coal quality data points that do not have supporting structural data. It appears that the final quality models were developed prior to the final structural models which have excluded a larger number of boreholes that were used in the final coal quality model

Having noted the above issues, RPM considers that the above are unlikely to make a material difference to the global Coal Resources estimate, however will potentially impact short term models and schedules. RPM further comments that these high raw ash anomalies are likely to be ignored during mining, given the long history of mining these seams in the region.

Moolarben

The geological computer model 'Moolarben_0217' was built using Minex software (version 6.5.2) in 2017. The geological model is based primarily on the borehole database and incorporates exploration data completed up to mid-January 2017. The model was generated using Minex proprietary growth algorithms. Structural and quality grids were generated using 20m mesh size mesh size.

The geological model includes structure grids for all relevant geological surfaces, including the major stratigraphic boundaries, base of weathering and all coal seams identified in the Illawarra Coal Measures on a ply basis.

The geological model includes a raw ply coal quality model which provides grid surfaces for density, ash, volatile matter, fixed carbon, energy and sulphur on a ply basis as well as raw coal quality, washability and clean coal quality data.

Ashton

The geological model was developed in 2014 using Micromine software. This model was subsequently updated in 2015 and 2017 using Minex software. The 2017 Minex geological model supplied included structure and raw coal quality grids on a ply basis (for Open Cut Resources) and on a working section basis (for Underground Resources). RPM completed a model update for the Open Cut Resources for the South East Open Cut area. The updated RPM model is named 'Ashton_1805'.

Yarrabee

The geological (structural and coal quality) models for Yarrabee were developed using the Geovia Minex software version 6.3. Five geological models were developed by Company personnel. The model names are shown in ***Table 7-2***. The model for Domain 6 was finalised after the LOM plan was completed and as a result the Domain 6 Resource did not transfer to Reserve.

Table 7-2 Graphical Representation Coal Resources

Mine Area	Structural Model Name	Quality Model Name	Date of Release
Yarrabee East (YEN Pit)	EAST_PLY_CUT_DEC15	EAST_PLY_QUAL _FEB17	23/12/2015
Yarrabee East (YES Pit)	EAST_PLY_CUT_DEC15	QUALITY _FEB17	18/12/2015
Domain 2 North	EAST_PLY_CUT_DEC15	QUALITY _FEB17	18/12/2015
Domain 2 South	DOM 2STH_CUT_2017	QUALITY _FEB17	23/03/2017
Domain 6			After LOM finalised

Coal seams are initially correlated in GeoBank using geophysical logs and cross sections, to ensure consistency of the seams.

Borehole data is transferred to Minex and where the data is visually inspected to detect any seam pick anomalies by using the borehole display and from solid triangulation. Errors are edited in GeoBank.

Exclude core holes and create structure models. Fault thickened core hole seams are not edited so that seam thickness matches the average surrounding seam thickness, because the cored seam intervals cannot be changes otherwise they will not match the coal quality data.

Missing seams are interpolated in boreholes by Minex for those seams that are;

- Interpreted to exist at a reduced level above the borehole collar,
- Are interpreted to exist below the total depth of a borehole when that borehole has been terminated before the full seam sequence had bene intersected,
- Missing between named seams due to faulting or sedimentary reasons.

Missing seams that are present between named seams are set to zero which ensures that coal tonnage is not overestimated.

Missing seam interpolation is a modelling process that takes place in most geological modelling software packages such and Stratmodel and Vulcan.

Check seam thickness and set over thickened seams in structure holes (open holes) to the average surrounding seam thickness.

Fault thickened cored hole seam thicknesses have not been trimmed to the average seam thickness to ensure that the entire seam quality result can be composited and used in the coal quality model. Fault thickened cored hole seam are excluded from generating structure and thickness grids. YAL estimates that less than 5% of cored hole seam intersections are fault affected.

Geological models are developed such that grids are not extrapolated infinitely beyond the last borehole intersection for a seam or surface. The extrapolation distances are shown in ***Table 7-8***. The maximum extrapolation distance is 1,000m which is the extrapolation distance used for Inferred resource classification.

Structure models were created at 10x10 mesh size and coal quality models were created with a 50x50 mesh size. The mesh sizes were selected to achieve the most representative grid node spacing for both the quantity (structure) and coal quality models.

Faults were modelled as vertical structures. The Company considers that vertical faults are acceptable due to high coal losses occurring during the mining process in the vicinity of faults and any repeat seams have relatively low coal recovery. Seam repeats have been modelled for large displacement faults where the repeated seam is continuous between multiple holes.

RPM considers that The Company has identified the fault slices in the Yarrabee area with sufficient accuracy and detail that angled thrust structures could be modelled by ABB Stratmodel software using standard modelling techniques, or by use of wireframes using the Geovia Minex software. The angled faults would provide a greater degree of certainty to the models and also provide a better understanding of the geotechnical hazards that may be expected in the vicinity of the faults.

Trend strings were used to control the model in complex areas of tight folding, vertical seam dip and fault displacement. Trend lines are used to manipulate the grid where necessary. This technique is used to maintain seam trends beyond the limits of the borehole data, in areas of steep seam dip such as the north-eastern part of the YEN pit and to maintain seam dip past the coal subcrop limits.

Limit masks have been applied to coal quality and seam thickness grids to limit the minimum and maximum modelled thickness and coal quality attribute ranges to the maximum and minimum values within the data set. RPM expects that a different interpolator setting would achieve a similar result.

Stratford and Duralie

Duralie

The geological model for Duralie (DUR_0614) was produced in 2014, using Minex software. The model was created using borehole intersections, seismic data reprocessed in 2004 and pit survey data for the Weismantel Seam (to April 2014). Largely reverse faults were not specifically modelled but reasonably closely spaced borehole data allowed control of gridding. This model was used for most of the Duralie resource area. In 2016 an updated model was produced over the LOM area to incorporate new drilling and update the structural interpretation. This model (DURmicro16) was used for Resources for areas within the LOM.

Seam thickness grids were gridded on a 5m (DURmicro16) or 10m mesh (DUR_0614) using Minex growth technique. Raw quality grids were gridded on a 50m mesh using inverse distance squared gridding methods.

Stratford

The computer models for Stratford West (WCR0811), Avon North (STRAT0315) and Stratford East (SE0512) were generated using Minex software. The computer models were created using borehole intersections, fault interpretations (not all if minimal throw or extent) and trend lines to correct the synclinal structure. Not all faults in resource areas were modelled but the borehole data controlled the seam elevations. Faults in WCR0811 model were modelled as vertical faults. STRAT0315 (Avon North) reverse faults were modelled using Minex 3D faulting software and modelled as steeply inclined reverse faults or vertical normal faults. For Stratford East, no faulting was incorporated into the model, however faults are expected (probably minor in extent and offset and/or insufficient data to interpret laterally).

Seam thickness grids were gridded on mesh sizes of 10m (WCR0811) or 15m (STRA0315 and SE0512) depending on average borehole spacing or structure, using Minex growth techniques. Raw coal quality grids were modelled on 50m (SE0512) or 100m (WCR0811) mesh sizes, extrapolated 250m from borehole data. No raw coal quality grids have been developed for the STRAT0315 model at this time (default values are used for the Avon North resource estimate).

Grant & Chainey

The Minex computer model generated in August 2012 (GC_0812), incorporating all current borehole data in the resource area, was used for resource estimation. No mining has occurred in the area (in the northern limit of the area there is a portion covered by mine rehabilitation) and the original topographic surface has been used. The base of weathering was developed from visual base of weathering in boreholes.

The model was produced using borehole seam intersections, the current fault interpretation and trend lines to assist modelling the syncline structure. Not all faults were specifically modelled but the borehole data allowed to control the seam elevations. Any faults modelled were modelled as vertical faults. Confidence is highest in the Bowens Road and Avon Seams due to the number of borehole intersections. Structural grids were gridded on a 20m mesh and quality on a 100m mesh.

Austar

The Resource Estimate for Austar is based on the Austar Minex Geological Model called 'Austar_1015', released on the 9th of April 2018. The geological model was developed by a third party in early 2018 using Minex software. The geological model contains structural and coal quality grids of the working section of the Greta Seam which represent the geological model The Structural and coal quality grids use a 50m grid mesh and cover the extents of the Project. The drill hole database is also provided in the geological model.

The Austar deposit contains the Greta Seam (GR). This seam splits towards the east into upper (UG) and lower (LG) plies. The working section of the Greta Seam (WGR) was generated from the full GR Seam where the seam is coalesced or the UG ply where the seam splits. The split line is defined where the interburden between UG and LG is <0.2m.

Several normal faults were interpreted and incorporated into the model.

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Donaldson

The Resource estimate is based on the geological model 'DON_0815' developed in 2015 by a third party. The geological model was generated in version 9.1 of Maptek's Vulcan software. This model, DON_0615, was built after a major re-correlation exercise that incorporated all boreholes within the existing Donaldson mining/exploration tenure.

The geological model contains structure grids and raw quality grids using a grid spacing of 25m. The Raw quality values modelled on a ply basis where ash, fixed carbon, volatile matter, specific energy, total sulphur and density. All quality grids where generated at a standardised air dried moisture basis of 2.5%.

Middlemount

The geological model for Middlemount was constructed using Maptek Pty Ltd geological modelling software, Vulcan, version 10.1.4. One all-encompassing model (mar18) was completed in March 2018.

The structural model was created at 20x20 mesh size, using inverse distance modelling interpolation, to the power of two (2) with no trending. It combines information from 732 boreholes, interpreted seam roof data from selected locations along 2D seismic lines and in-pit survey of coal seam roof, floor and fault strings.

Stratigraphic files in Vulcan were used to interpolate horizons in every hole to control the development of the structure and thickness grids. Where holes were not drilled deep enough to intersect seams lower in the sequence (e.g. in LOX holes), the interpolation of the seams into these holes was ignored and only true intersections were recognised so that the structural integrity of the model was kept intact.

Seams were split into their plies and modelled as contiguous elements. Coal thickness and seam midburden thickness was modelled over the area. The seam roof and floor models were "stacked" up from the Pisces Upper (PUB) floor and Middlemount Lower (MLB) floor surfaces, which were generated with a 1st order linear interpolator to obtain initial floor grids. A base of weathering grid was developed from borehole intersections and all final structure grids used for resource estimations were clipped to the base of weathering to ensure oxidized coal was excluded from the calculations

Thrust faults at Middlemount are modelled with a dip of 25-30^{o} and normal faults are modelled with an average dip of 60^{o}. To constrain the seams against the Jellinbah Fault, the location where the fault plane intersects the roof and floor of each seam has been estimated. In the case of the Jellinbah Fault, a 50m buffer to the west of this point has been applied as the fault line, due to uncertainty of the faults' location and its characteristics.

Raw coal quality modelling created with a 100x100 mesh size, using inverse distance modelling interpolation, to the power of two (2) with no trending. Washability and product coal results were not modelled for Middlemount. 3312 raw quality samples were composited across all seams to generate the coal quality model. The seam intervals were determined from the structural model and samples required a minimum of 90% linear recovery for each respective interval to be modelled.

Company/RPM Validation of Geological Models

RPM is aware that the Company undertook validation of the geological models to support their use in Coal Resource reporting. For reference and transparency RPM presents the following summary and outcomes which are sourced from the YAL Competent Person statements.

MTW

The following reviews were undertaken by the previous owners Competent Persons prior to acquisition and confirm by RPM:

- Comparison of modelled seam reduced levels with input borehole seam reduced level was performed by comparison of structure contours and data postings. No material issues are reported. RPM agrees with this finding.
- Visual inspection of sampled and modelled intervals for raw coal ash to determine if the sampled intervals match the seam picks. No material issues are reported. RPM considers that there is mismatch between coal quality data due to the high raw ash issue previously discussed.

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- Comparison of input ash and relative density values with modelled ash and relative density values. No material issues reported. RPM considers that the comparison is not particularly valid because it compares un-composited ply by ply input data with composited seam data.

HVO

Prior to acquisitions the previous owners completed most of what RPM considers to be a normal suite of model validation procedures which has included:

- Comparison of modelled seam thickness with input seam thickness values. No material issues are reported.
- Comparison of modelled seam reduced levels with input seam reduced level. No material issues are reported.
- A comparison of waste volumes and tonnage for the previous HVO_1408_ model with the HVO_1508_LOM model showed increased waste volume and coal tonnage of 1%, which RPM considers is not material.
- Review of coal quality cross plots of ash and relative density, ash and energy, specific energy and relative density and volatile matter and energy was completed for all seams. In general the cross plots showed that coal quality data was reliable, although coal quality data outliers are present in the database.
- The Company has not completed a comparison of input coal quality values compared to the output gridded coal quality values.
- The HVO_1508_LOM model was reviewed by a third party which identified issues which were partially corrected by the Company before release of the final model (which formed the basis for RPM's review). A number of these issues were not corrected for the final model release and currently remain uncorrected, these include the two main issues identified and discussed by RPM:
  - There are a total of 701 composited raw coal samples with a raw coal ash value greater than 50%.
  - A total of 141 composited raw coal density sample outliers are present in the database (as discussed in ***Section 6***)

RPM considers that the above issues are not material however recommends further analysis and reviews be undertaken as part of the next update to the geological models.

Moolarben

RPM reviewed the 'Moolarben_0217' geological model by comparing the borehole data with the geological grids and ensuring the grids honoured the data. RPM also interrogated the geological model using cross sections and contour plots to ensure the geological model was consistent with the geological understanding. Unusual values identified in the geological model grids were reviewed to ensure that the features were supported by borehole data. The geological model 'Moolarben_0217' is considered robust and well developed based on the review and suitable to support Resources estimation and detailed mine planning.

Ashton

The geological grids were cross referenced against the borehole data and geological understanding of the project to ensure the grids honour the underlying data. RPM also developed a geological model in 2018 using Minescape software and made comparisons in order to validate the geological model supplied.

Yarrabee

RPM is aware that the Company completed significant validation of the geological models to support their use in Coal Resource estimation and reporting. The general model validation process followed by the Company is predominantly by visual inspection of input borehole data and output model data and is summarised below:

- Check for structural anomalies visual inspection of the model grid surface values compared to the input borehole data values. Determine validity of data and edit data as required,
- Check for coal quality anomalies, particularly for raw coal ash and phosphorus. Determine validity of model grid quality surfaces compared to the input borehole data values and edit data as required,

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- Check the correlation of seams using cross sections through adjacent boreholes throughout the resource area,
- Create and check the topography and base of weathering grids,
- Create model grid and check structure and thickness compared to input borehole data,
- Reconcile new model against prior model (structural and tonnage).
- Create Strip ratio grid using all seams to the Pisces seam, regardless of their resource status (It is assumed that all upper seams will be mined during pit progression to the basal seam).
- Create strip ratio grids for each seam increment

A review completed by RPM of the geological models indicates that the interpretations appear to honour input borehole and seam thickness and reduced level values and are considered appropriate for reporting of Coal Resources.

RPM considers that the Company followed good practices for development of their database and geological models. The Company model validation process is a basic process, however appears to have been completed to a high standard. The Company has identified five similar structural domains of borehole data and has modelled that data as five model areas. RPM considers that good practice has been followed using this methodology.

RPM considers that use of basic statistical methods for comparison of gridded model data and input data could also have been used for model validation by the Company, as such in future model should be considered as an alternative method.

Stratford and Duralie

Data supplied included a Minex borehole database and associated seam/ply structural, thickness and raw coal quality grids, except in Avon North where coal quality grids were not computed and resources were estimated using default quality values (see below).

The borehole database comprised seam pick data and raw coal quality data, excepting Avon North, which was supplied on request. The structure grids contained faults. The Avon North model grids contained detailed 3D faults showing good detail of reverse faulting and seam repeats. Borehole data checked for resources, coal quality variation, seam thickness variation and number of borehole seam intersections appears consistent.

Validation of the models included checks of topography versus borehole collar, seam correlation, coal quality and where available geophysical data. Resources were re-estimated using the geological and were consistent with previously reported Resources.

At Avon North default coal quality values were used to estimate coal resources and raw coal quality. RPM modelled the coal quality and estimated resources for the Avon Seam (Indicated) with coal quality using Minex software. Grids were computed where four or more boreholes contained data for each seam/ply. For seams/plies with less than four data points, weight averaged coal quality values were used to estimate resources. Approximately 92% of the resource estimated for the Avon Seam contained borehole coal quality data. This data appears consistent for seam ash with In-situ data for Stratford Main Deposit Mine in the September 2001 quarter and previous 12 months data as detailed in the Runge Pty Ltd Reconciliation (Stratford Coal – Stratford Main Deposit Reconciliation January 2001 – September 2001 Runge Pty Ltd).

Austar

The Geological Model 'Austar_1015' was reviewed by RPM to assess if the geological model was suitable to support the Resources Estimate and detailed mine planning. RPM reviewed the modelling method, drill hole data and resultant geological model grids. Based on review, RPM considers that that the resultant geological model honours the drill hole data and is consistent with the geological understanding of the Project.

RPM completed a shadow estimate of Resources from the geological model and considers the Resource Estimate is consistent with the Geological Model.

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Donaldson

RPM reviewed the geological model 'DON_0815' to asses if the modelling method was appropriate, geological model honours the borehole data, and the geological model is consistent with the geological understanding of the Project. RPM reviewed the modelling parameters and a number of reports and graphical outputs including contours and cross sections from the geological model. RPM completed a shadow estimate of Resources from the geological model. Based on the review RPM considers the geological model to be suitable for the Resource estimation and mine design.

Middlemount

A review completed by RPM of the geological models indicates that the interpretations appear to honour input borehole and seam thickness and reduced level values and are considered appropriate for reporting of Coal Resources. A brief outline if provided below:

- Comparison of modelled seam thickness with input seam thickness values. No material issues are reported.
- Comparison of modelled seam elevations with input seam elevation values. While there are no material issues associated with the seam intersections being honoured at the drilled elevation, there are significant implications for resource categorisation surrounding the lack of faults modelled in the deposit, which can be identified through the rapid changes in seam elevation presented in structural floor contours produced from the geological model. These faults are also likely to preclude the proposed underground and highwall mining methods and cast significant doubt over the classification of resources in these area.
- Review of coal quality cross plots of ash and relative density and coal quality spot checks between laboratory data and modelled qualities. In general these verified that raw coal quality data was reliable, although data outliers are present in the database.
- Holes composited in the coal quality model are also used in the structural model.
- However, the geological model does not include washability or product coal parameters.

While considered not material given the current information, RPM recommends further analysis and reviews be undertaken, particularly in regards to the structural interpretation, as part of the next update of the geological model.

Points of Observation Definition and Supportive Data

RPM defined the following for reference:

- **Quantity Point of Observation**: A Quantity or Structure Point of Observation ("PoO") requires a reliable collar location and downhole geophysical log data acquired for the full seam interval that is to be classified.
- **Quality Point of Observation**: A Quality PoO requires a reliable collar location and raw ash data. Down hole geophysical log data acquired for the seam interval in a cored hole is optional, because the cored holes are predominantly fully cored.

HVO / MTW

As part of the above definitions, RPM considers that all bore core has been acquired and logged to a high standard so that the amount and location of any core loss has been managed by the geologist logging the core. RPM review of cored hole data suggests that the requirement for greater than 95% core recovery for a Quality PoO has been met because significant core loss was not found in bore core log descriptions.

In addition, RPM considers that downhole geophysical logs will have a depth accuracy of+/- 20 to 30cm, depending on the source to detector spacing of the sonde and that it is unlikely that bore core would be logged with error of greater than 20 to 30cm. RPM consider that potential depth error of 20 to 30cm is not material due to the depth of the large scale mining methods employed at the Assets being greater than 100m.

As part of its initial review RPM utilised a PoO definition that used clean coal product ash which identified to correspond well with the number of raw coal ash PoO's at HVO. However, at MTW it was noted that samples

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with raw ash content of greater than 50% were not submitted for washability and determination of clean product quality parameters. As a result within MTW Raw coal ash was used by RPM for the PoO definition.

RPM considers that raw coal ash can be used as proxy for relative density and specific energy and considers that reliable relationships have been established that relate raw ash to washed product yield and ash given the long production historical data and product generation.

The RPM PoO definitions are shown in ***Table 7-3***.

Supportive Data

The following data has been used as supportive data for the PoO:

- Surveyed in pit seam observations and inspection of open pit highwalls as supportive data to assist with determining PoO spacing.
- Borehole data not used for model development was reviewed to provide additional data to support seam continuity.

Table 7-3 Points of Observation Definitions

PoO Attribute	PoO Type			
	Quality		Quantity (Structure)	Support Data
	Type 1	Type 2	Type 3	
Non Cored Borehole				
Reliable Collar Location	✓	✓	✓	
Geophysical log for seam interval (Requires density and gamma)	✓	✓	✓	
No Geophysical Log				✓
Cored Borehole				
Reliable Collar Location	✓	✓		
Geophysical log for seam interval (Requires density and gamma)	✓			
No Geophysical Log		✓		
Greater then 95% linear core recovery	✓	✓		
Raw Ash (MTW)	✓	✓		
Clean coal product Ash (HVO)	✓	✓		
Other				
Surveyed in pit seam observation				✓

Moolarben

PoO's are based on the borehole intersection of coal seams which includes lithological and downhole geophysical log. For quality PoO, a sample is required to have raw proximate analysis from a coal seam/ply where the sample has a linear core recovery greater than 95%.

The PoO from borehole data are supported be an airborne magnetic survey was carried out over the planned underground longwalls (UG1 and UG2) to identify magnetic features. This survey identified a number of potential igneous bodies which may affect underground mining. RIM borehole to borehole survey has been undertaken to define the size and shape of the igneous diatremes at seam levels.

The consistency and continuity of the Ulan seam is supported by surrounding mining operations (Ulan and Wilpinjong) where the Ulan Seam is also mined and geology is defined by extensive exploration and mining.

Ashton

PoO's are based on the borehole intersection of coal seams. For quality PoO, a sample is required to have raw proximate analysis from a coal seam/ply where the sample has a:

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- minimum core recovery 80% volumetric or 95% linear (where volumetric data unavailable), and
- minimum 80% overlap between sample and ply interval.

Borehole data is supported by proximal underground workings and surrounding coal mine information adjacent to Ashton. High frequency RIM surveys are also completed routinely in advance of mining areas to identify geological variations. The continuity and properties of the coal seams is also supported by the extensive exploration and mining experience in the surrounding tenements.

Yarrabee

The RPM Points of Observation definitions are shown in ***Table 7-4***.

Table 7-4 Points of Observation Definitions

PoO Attribute	PoO Type			
	Quality		Quantity (Structure)	Blastholes
	Type 1	Type 2		
Non Cored Borehole				
Reliable collar location			✓	✓
Down hole deviation survey			✓	
Geophysical log for seam interval			✓	✓
Cored Borehole				
Down hole deviation survey	✓	✓		
Geophysical log for seam interval	✓			
No geophysical log		✓		
Greater than 90% linear core recovery	✓	✓		
Raw coal ash	✓	✓		
Raw coal phosphorus	✓	✓		

Stratford and Duralie

Core and non-core boreholes with downhole geophysical logs were considered PoO for confidence in the deposit in conjunction with information from mined areas and supporting information from seismic data. Classification of the Coal Resources into Measured, Indicated, and Inferred was based on the Competent Persons confidence in the estimate.

The Resource classification is based on the confidence to identify coal plies between holes, understanding the changes/variability of the coal seams, the interpreted structure and how the computer model manages to 'model' the structure. In some structurally complex areas the model has not defined the faulted structure specifically (such as the Clareval Bowl or structurally complex area in Stratford West or Rombo/Parkers Road seams in the north of Grant & Chainey, where borehole seam intersections were allowed to control seam elevation/thickness); however the borehole spacing was sufficient to show coal seam continuity and reasonable confidence in tonnages to support the classification category. An example of this is the Clareval Bowl area at Duralie. This is an extremely complex small synclinal structured area with numerous reverse faults and folds. In the early years of mining none of the faults had been modelled specifically; allowing the closely spaced boreholes to control the geology. Mining found on a day to day basis there were differences between the model and the actual structure encountered, however overall mined tonnes reconciled with modelled tonnes. From discussions with the Duralie site geologist at the time, the model underestimated the tonnage slightly as a result of repetition of coal seams because of thrust faulting. This area is covered by approximately 100m spaced drill lines with holes averaging 50m along these lines (supported by coal quality data). The confidence in this estimate is Measured.

Often the availability of coal quality data on a ply basis is variable per seam due to core recovery or the ply not existing in the hole (minor upper and lower plies have rare quality data due to fewer borehole intersections due to variability of these plies). In the absence of borehole coal quality data, a history of nearby mining or geophysical log trends were used to support the classification. Sometimes the estimate of particular plies depended on default quality values. This was more common for Inferred Resources, however also used for Measured and Indicated Resources. Core holes often do not provide data on all plies in an intersected/sampled seam, due to either core recovery or variability in a seam.

Austar

Core holes with geophysics and non-core holes with geophysics have both been used as PoO. To support drill hole data, there exists an extensive array of seismic survey lines (>100km) over CML2 and CCL728. There is also extensive historical workings within the Project area that are used to support the geological understanding and Resource classification. The PoO for quantity and quality and support information used for resource classification are shown in ***Table 7-5***. It is noted that quality PoO's can be used for quantity, however quantity PoO's cannot be used for quality classification.

Table 7-5 Austar PoO

PoO Attribute	PoO Type			
	Quality		Quantity (Structure)	Other Data
	Type 1	Type 2		
Non Cored Borehole				
Reliable collar location			✓	
Down hole deviation survey				
Geophysical log for seam interval			✓	
Cored Borehole				
Down hole deviation survey				
Geophysical log for seam interval	✓			
No geophysical log		✓		
Greater than 90% linear core recovery	✓	✓		
Raw coal ash	✓	✓		
Raw coal total sulphur	✓	✓		
Support Information				
2D Seismic Data				
Faults				✓
Magnetic Data				
Dykes				✓
Existing Underground Workings				
Faults				✓
Dykes				✓
Seam Levels and Continuity				✓

Donaldson

Core holes with geophysics and non-core holes with geophysics have both been used as PoO.

Historical workings in the Fassifern seam (Tasman mine) and the West Borehole Seam (Stockrington No 2 mine, Buchanan Mine) and current Abel workings in the Upper Donaldson Seam have been used as PoO in the classification of surrounding coal resources.

Coal quality data has not be used as a criteria to define a PoO however the distribution and spatial variation in coal quality has been assessed and taken into account in determining Resource categorisation. Borehole core recovery (volumetric) for coal seams at Donaldson typically ranged between 85%-100% and so an 80% cut-off was applied to the coal quality data used in the geological model.

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Middlemount

The classification of the Mineral Resources into varying confidence categories is based on a standardised process of utilising PoO according to their reliability. The PoO are used to categorise quantity and quality continuity (or both) or support continuity.

The resource classification at Middlemount has been completed by JB Mining and is based on the Competent Person's confidence of the seam continuity and coal quality variability within boreholes.

A **Quantity** PoO has the following attributes:

- Open or cored hole;
- Seam interval geophysically logged, or where geophysical data is missing for a seam(s), it is up to the Competent Persons discretion to determine if the seam level and thickness is consistent with nearest neighbour boreholes; and
- Reliable collar survey.

Quality PoO has the following attributes:

- Cored hole;
- Linear core recovery greater than 90%;
- Reliable collar survey;
- Cored hole in which 100% of the seam interval has been cored;
- Seam interval geophysically logged, or if no geophysics log data is available it is up to the Competent Persons discretion to determine if the seam level and thickness is consistent with nearest neighbour boreholes; and,
- Raw coal ash.

Support Data for PoO include:

- In pit mapping data for faults;
- Seam floor or roof survey data; and,
- Elevations from interpreted 2D seismic surveys.

Resource and Reserve Entities

HVO / MTW

The Company's Resource and Reserve entities are interpreted to be the seam groups mined, which at MTW number 15 and number 17 at HVO. As part of the classification of the Coal Resource, RPM applied further analysis to seam groups and separated individual ply's to 34 entities at MTW and 25 entities at HVO.

RPM reviewed the borehole intersections on a seam basis and identified that in many cases the number of seam intersections and coal quality data were not the same for each seam element in a seam group. As outlined in Table 7-3, the Vaux seam at MTW which includes the VAA, VAB, VAC, VAD, VAE, VAF, VAG, VAH, VAJ elemental intervals and the various compound seams, the VAA and VAB elements have 230 borehole intersections. The VAC to VAH elements have 300 to 350 borehole intersections and the VAJ element has 125 borehole intersections. As a result RPM created 3 Resource entities, VAAB, VACH and VAJ for the Vaux seam at MTW. The Resource entities used by RPM are shown in ***Table 7-6.***

RPM applied a similar approach to that described for the Vaux seam, to all of the seams at MTW and HVO based on the number of structural and coal quality borehole intersections. As a result, RPM applied entities varies from that of the Company which impacts the classification applied to the seam groups as outlined below.

Limits

RPM notes that the below limits have been applied as part of the entities applied to the resource estimate:

- No minimum seam thickness limit has been applied to the RPM Resource; and
- No upper ash limit has been applied to the RPM Resource estimate.

RPM considers the above appropriate for resources considering the further applied entities and aggregation applied to the mining planning to form the recoverable ROM working sections.

Table 7-6 Vaux Seam Number of Borehole Intersections by Seam Element and Compound

Compound Intervals	Element	Number of Intersections
	VAA	231
VAAB		
	VAB	234
VA		
	VAC	326
VACD		259
	VAD	341
VACE		249
	VAE	340
VACH		
	VAF	357
VAFG		360
	VAG	360
VAFH		
	VAH	305
VACJ		
	VAJ	125

Moolarben

Moolarben leases cover a length of approximately 20 km (north-south) and up to 8 km wide (east-west). The Ulan seam is present over most of the area covered by the leases with exception towards the west boundary where the seam subcrops at the edge of the basin. The full Ulan Seam (except A2 ply) is included in the Resource estimate.

No coal quality cut-offs were used as the Ulan Seam is currently mined in its entirety in the open cut pits with the exception that the A2 ply is treated as a waste unit on account of high ash and is therefore excluded.

Where the Moolarben and Glen Davis seams are coalesced to a thickness of approximately 3m and are located above Open Cut Resources of the Ulan Seam, they are considered a Resources. This is a very small percentage of the overall Resource.

Ashton

Resources have been estimated for open cut and underground domains with a number of resource polygons.

Open cut resources extend from below the base of weathering (nominally 14m below surface) to a maximum depth of approximately 200m. The open cut resource estimate included all individual or coalesced plies available in the sequence with a 50% maximum raw ash content (adb).

Open Cut Resources sequences in the west include Bayswater to Lemington 19 located in EL5860 West, ML1533, ML1623 and EL4918N with Lemington 9 the uppermost resource interval in ML1623 and Lemington

14 uppermost resource interval within ML1533 North. Open Cut Resources are excluded in EL4918 West due to surface constraints associated with the Hunter River alluvium.

The open cut resource sequence in the east include Upper Liddell to Hebden which progressively subcrop across EL4918 East and EL5680 East and are life of mine open cut targets for the proposed South East Open Cut. Resources are excluded from Glennies Creek and Hunter River alluvium areas.

Underground resource extend to a maximum depth of less than 350m.

Underground resources occur in ML1533, ML1623, the northern and southern portions of EL4918 as well as EL5860 west of ML1533 adjacent to Ravensworth Underground Mine. Underground Resources are restricted to the Pikes Gully (remnant resources following completion of longwall operations), Upper Liddell, Upper Lower Liddell, Upper Barrett and Lower Barrett seams. Of these Upper Liddell, Upper Lower Liddell and Barrett are life of mine underground targets.

The Pikes Gully Seam, Upper Liddell Seam and Upper Lower Liddell Seam Underground Resources exclude all coal mined up to 30th June, 2018.

Yarrabee

The Resource entities at Yarrabee are the seven seams present at Yarrabee, namely, Cancer, Aries, Caster Upper, Caster Lower, Pollux, Orion and Pisces.

Resources have been limited to a 45% raw ash cut-off (determined through washability analysis), for seam extents in core holes. The equivalent geophysical signature was adopted and applied as an estimate to equivalent seams in the chip holes for interpretation of the 45% raw ash extents.

Resources are limited to the 25:1 strip ratio which was the economic limit during the 2010 resource boom. The limit is determined by doubling the economic strip ratio, which is approximately 12.5:1. The assumption by The Company is that metallurgical coal prices could once again increase to high levels based on decreasing volumes of economic metallurgical coal.

Minimum seam thicknesses are determined by the structural complexity of each resource domain and in conjunction with practical mining limitations, as well as consultation with mine planning engineers. In areas of low structural complexity, seam thickness limit are as thin as 40cm. No seam thickness limit is applied where seams coalesce other seams (ie are contiguous).

Open cut is considered as the only suitable method of operation. The structural complexity of the deposit currently excludes underground extraction methods. Truck and excavator with dozer push assist methodology is considered the most appropriate method of open cut mining at Yarrabee.

Stratford and Duralie

Duralie

Resources were estimated using thickness grids and in situ density grids (or default density values where gridded data was not available) from the uncut model (DUR_0614 or DURmicro16). Coal seams were limited to below base of weathering grid combined with the end of September 2017 mined surface within vertical sided polygons. To update resources to December 2017, forecast tonnes from October 2017 to December 2017 were subtracted from the resource estimate.

Clareval Seam resources were limited to a maximum depth of 300m (<300m west limb and <200m east limb, largely controlled by borehole data). Weismantel Seam resources were limited to 500m depth of cover. Resources are not extrapolated beyond borehole data. No minimum seam thickness was applied to the Weismantel Seam as the seam is generally 10-12m across the deposit. A minimum seam thickness was applied to the Cheerup and Clareval Seams of 0.1m (this would only exclude minimal tonnes). No quality limits were applied to the resource as current mine practices wash all coal from Duralie and blend if required at the Stratford CHPP.

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Stratford

Resources were estimated using thickness grids and in situ density grids (or default density values where gridded data was not available) from the current models (WCR0811, STRAT0315 and SE0512). Coal seams were limited to below the base of weathering grid combined with the end of June 2014 mined surface, within vertical sided polygons. Essentially no mining has occurred in Roseville West and Bowens Road North pits since July 2014. Resources were limited to a maximum depth of 150m (Stratford West) or 200m (Avon North, Stratford East) (largely controlled by borehole data). Resources were not extrapolated beyond borehole data.

No minimum seam thickness was applied to the estimate to allow maximisation of the reserve estimate (due to the numerous plies in the deposit/splitting and coalescing, applying a minimum ply thickness in previous works limited reserve studies from accessing all potential coal). No quality limits were applied to the resource as current mining practices mine coal thick enough for the equipment being used and the coal is washed and potentially blended.

Grant & Chainey

Resources were estimated in Minex software using thickness grids from the uncut model (GC_0812) limited to below the base of weathering and in situ density grids or default density values where gridded data was not available. Resources were estimated within vertical sided polygons to a maximum depth of 200m below topography. Resources are not extrapolated beyond borehole data. No minimum seam thickness was applied to the estimate to allow for maximisation of the Reserve estimate (as requested by the Reserves Competent Person). No quality limits were applied to the resource as current mining practices mine coal thick enough for the equipment being used and all coal is washed and, if required, blended.

Austar

The following list details the limits used;

- Limit of Mining as at 30 June 2018,
- 50m barrier pillar exclusion zone around underground mined areas,
- 5m offset either side of dykes,

The following assumptions have been made regarding the Austar Resource estimate:

- The proposed extraction methods are LTCC and conventional longwall operation for the remaining Bellbird, Stage 3 and the Inferred resource stated in EL6598.
- Longwall mining in the Austar area has been at depths of 420 to 540m depth of cover. The current LOM plan shows extraction plans for the Greta seam to a depth of approximately 720m. The assumption is that mining at up to 800m depth of cover could be achieved.
- A minimum seam thickness has not been applied because the Greta seam and Greta upper seam maintain seam thickness greater than 3m throughout the Austar tenure.
- That the coal in the resource area will have similar washability characteristics to the coal that is currently being mined and processed.
- Ash and total sulphur cut off limits have not been applied. It is assumed that the coal can be washed to achieve a 5.5 to 6.5% ash product coal with total sulphur content in the range of 1 to 2.5% based on the results of coal quality testing of core.
- Bord and pillar and potentially longwall extraction of remnant coal blocks as a scavenging operation is proposed.
- That access can be gained to the remnant coal blocks surrounding the proposed longwall panels.

The resource entity is the Greta Seam working section which consists of the Greta Upper and Lower seams west of the split line and the Greta Upper seam east of the split line. Resources have been categorised on a resource block basis according to tenure as the first discriminator for simplicity, rather than spacing of PoO's.

The Measures resource in the Austar resource is well known from information seam elevation, thickness and quality and the location of faults and dykes from the mined out areas, in conjunction with borehole and 2D seismic data. Indicated Resource is estimated in the majority of the Stage 3 area, southeast of the drift to the Stage 3 area and southwest of the Bellbird area. Boreholes are typically spaced at less than 1000m in these three areas of Indicated coal. Historical workings located to the north and borehole data confirm the presence of the Greta seam in the areas of Indicated resource.

Significant numbers of 2D seismic lines have been completed, processed and interpreted in the area of Indicated resource. The location of faults is well understood from drilling and 2D seismic data. The location of the Kitchener Dyke is also well known from magnetic survey data.

Consistent seam thickness that follows the expected gradual thickness changes associated with sedimentary trends, except for a number of thinned Greta seam occurrences that align with the Kitchener Dyke and the Quorrobolong Fault zone in the mined out area of Stage 3. The areas of seam thinning are also associated with increased raw ash content.

Inferred Resource is estimated in ML1661 and EL6598 for resource blocks ML1661F1 and EL6598IN. The Inferred resource is dependent upon the following information for classification;

- Historical workings located to the north and borehole data confirm the presence of the Greta seam in EL6598.
- Boreholes are spaced at 1 to 4km. Some of the boreholes do not have geophysics and have highly variable raw ash of less than 8% and 26% ash in adjacent boreholes. It is likely that there are differences in the sampling methodology and sample compositing philosophy of older and more recent data.
- The inferred resource reported for ML1661 (block ML1661F1) is located in the Abernathy Fault Zone. Raw coal ash in this area is anomalously high and seam thickness is highly variable in this area. It is suggested that the borehole data used in the model is not representative of the resource in this area due to faulting affecting the thickness and ash of the core samples.

Donaldson

Coal resources have been estimated for the Fassifern Seam, West Borehole Seam, Upper Donaldson Seam, Lower Donaldson Seam and Big Ben Seam

Coal resources north of John Renshaw Drive and east of the closed Donaldson open cut mine are considered open cut resources due to their shallow depth. All other resources at Donaldson are considered underground resources either due to depth, or surface constraints that prohibit open cut mining.

The limits and assumptions used to define resource areas are:

- Limited to lease boundaries
- Limited to seam subcrops
- Limit of mining as at 30 September 2016
- Abel mine ROM tonnes from 1 October 2015 to 31 December 2015 were 228,704t. ROM tonnes from 1 January 2016 to 30 September 2016 were 266,365t. Forecast tonnes from 1 October to December 31 2016 are 0 tonnes. These tonnage figures are included in the Abel Mine production figures in the Reconciliation Table.
- A 50m exclusion zone around historical workings
- A minimum seam thickness of 1.2m has been applied
- A maximum raw ash cut-off of 50% has been applied to most target seams (except Lower Donaldson Seam)
- For Lower Donaldson Seam a maximum ash cut-off of 55% has been used as mine planning and financial analysis studies completed by Donaldson mine and Yancoal Corporate indicate this mine plan has a positive NPV.
- Seams without reasonable prospects for eventual economic extraction excluded from estimate.
- No surface constraints have been applied

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Middlemount

The Company's Resource and Reserve entities are interpreted to be the seam groups mined; that is,

- Middlemount Seam plies of MU, MLT, MLB;
- Tralee Seam plies of TL1, TL2T, TL2B; and
- Pisces Upper Seam plies of PUT, PUM, PUB

The minimum seam thickness for resource estimation is 0.30m; a limit that has been applied due to practical mining limitations, as well as consultation with mine planning engineers. This effectively excludes the TL1 ply from resource estimations across most of the deposit. No seam thickness limit is applied where seams adjoin (coalesce) with other seams; however, there is a minimum separable interburden thickness is 0.30m also.

Based on the effects of dilution observed in coal quality data reviews by RPM, the limit of 37%ad raw ash applied to the resource categorisation by JB Mining appears reasonable. Other limits applied to the resource exclude all coal within a 50m buffer of the Jellinbah Fault and all coal to the east of the fault; all weathered coal; and all fault-repeated coal from resource estimations.

Points of Observation Spacing

RPM has completed a detailed review of the PoO spacing from a first principles to determine an independent view of classification applied to the resource.

HVO / MTW

RPM has reviewed the following attributes for 100 seam elements and 65 compound seam intervals for MTW and 104 seam elements and 55 compound seam intervals for HVO to assess the variability of the Resources to determine PoO spacing:

- Seam thickness,
- Interburden thickness,
- Seam splitting and coalescing patterns to determine whether they are sedimentary or due to seam correlation inconsistency between stages of exploration.
- Structural elevation,
- Coal quality,
- The relationship between raw coal quality and washed Product Coal quality,
- The relationship between overburden / interburden thickness variation and coal quality variability,
- Histograms, statistics and cross plots of coal quality attributes of seam groups.
- Review of the as mined seam roof or floor survey data in conjunction with modelled roof and floor contours and borehole intersections to assess reliability of input data and model output.

RPM acknowledges that some of the variability present in the MTW and HVO geological data is in part due to the inconsistency of the work that was performed by a large range of geologists over a time period in excess of 30 years. It is likely that the geology of the MTW and HVO areas may be less variable than that exhibited by the MTW and HVO databases, however, the Resource estimate must be made by making an assessment based on the variability of the data that is available.

The largest variability of the MTW and HVO data is caused by the seam correlations. In general the seam splits do not show any trend which is counter to geological processes. Groups of certain seam correlations appear to be clustered into groups that are aligned in strips parallel to the highwall suggesting that seam correlations are dependent upon the geologist completing the work rather than the geology. RPM has ignored this aspect of variation and has assessed seam thickness and coal quality variation within each of the different seam name domains and considers this not a material issue given the large scale mining practices.

RPM has determined the PoO spacing for both the MTW and HVO resource areas by review of variation between nearest neighbour boreholes for the attributes listed above. The PoO spacing was determined when

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less than 10% and 20% variability of between adjacent boreholes was established. In general coal quality data showed low variability between adjacent boreholes, except in the following circumstances:

- Incorrect data has been loaded to the database, or data has been incorrectly composited. There are a large number of coal seams in HVO with coal seam ash ranging between 50 and 90%.
- Interburden thickness above a coal seam thickens. It is common for interburden thickness to increase from 0.2m to greater than 20m over a horizontal distance between 100 and 150m. In general the underlying coal seam shows increased raw ash and product ash in the zone where the interburden thickens.

The coal quality PoO spacing was assessed by RPM to usually be double the spacing of the quantity or structural PoO as shown in ***Table 7-7*** and ***Table 7-8***.

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Table 7-7 PoO Spacing MTW

Seam Group / Seams	PoO Radius Quantity			PoO Radius Quality		
	Measured	Indicated	Inferred	Measured	Indicated	Inferred
Whybrow						
WYAB	100	200	400	200	400	800
WYC	100	200	400	200	400	800
WYD	100	200	400	200	400	800
WYE	100	200	400	200	400	800
WYF	100	200	400	200	400	800
WYG	100	200	400	200	400	800
Redbank Creek						
RCA	125	250	500	250	500	1,000
RCB	125	250	500	250	500	1,000
RCC	125	250	500	250	500	1,000
RCD, RCE, RCF	125	250	500	250	500	1,000
Wambo						
WBAC	125	250	500	250	500	1,000
WBD	125	250	500	250	500	1,000
Whynot						
WNA	125	250	500	250	500	1,000
WNB, WND	125	250	500	250	500	1,000
WNC	125	250	500	250	500	1,000
Blakefield						
BLAB, BLC, BLE, BLF, BLG, BLH	160	320	900	250	500	1,000
BLD	125	250	500	250	500	1,000
BLJ	125	250	500	250	500	1,000
Glen Munro	125	250	500	250	500	1,000
Woodlands	125	250	500	250	500	1,000
Arrowfield						
AFA	125	250	500	250	500	1,000
AFB	125	250	500	200	400	600
Bowfield	170	300	1,000	250	500	1000
Warkworth	150	300	600	300	600	1,200
Mount Arthur	150	300	600	300	600	1,200
Piercefield						
PFAB	200	400	800	400	1,000	1,200
PFCE	200	400	800	400	1,000	1,200
Vaux						
VAAB	225	450	900	400	1,000	1,200
VACH	225	450	900	400	1,000	1,200
VAJ	225	450	900	400	1,000	1,200
Broonie						
BNAF	200	400	800	400	1,000	1,200
BNGH	200	400	800	400	1,000	1,200
BNJQ	200	400	800	400	1,000	1,200
Bayswater	250	500	1,000	400	1,000	1,200

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Table 7-8 PoO Spacing HVO

Seam Group	PoO Radius					
	PoO 1 to 3			PoO 1 and 2		
	Quantity			Quality		
	Measured	Indicated	Inferred	Measured	Indicated	Inferred
Wambo	75	150	400	150	300	800
Whynot	75	150	400	150	300	800
Blakefield	75	200	400	150	300	800
Glen Munro	75	200	400	150	300	800
Woodlands	75	150	400	150	300	800
Arrowfield	75	150	400	150	300	800
Bowfield	100	200	500	200	400	1,000
Warkworth, WK2, WK3, WK4, WK5, WK6, WK9, WK10	125	250	600	250	500	1,000
WK1	125	250	600	250	500	1,000
WK7, 8A, 8C	125	250	600	250	500	1,000
Mount Arthur	125	250	600	250	500	1,000
Piercefield	175	350	700	350	700	1,000
Vaux	200	400	800	300	600	1,200
Broonie	175	400	800	300	600	1,200
Bayswater	200	400	800	300	600	1,200
Lemington	100	200	400	200	400	1,000
Pikes Gully	125	250	600	300	600	1,200
Arties	125	250	600	250	500	1,000
Liddell	125	250	600	250	500	1,000
Barrett	125	250	600	250	500	1,000
BAR	150	300	600	300	600	1,000
BAR1	125	250	600	250	500	1,000
BAR2	125	250	600	250	500	1,000
LBA	125	250	600	250	500	1,000
LBA1	125	250	600	250	500	1,000
LBA2	125	250	600	250	500	1,000

Moolarben

Resource classification and estimates are limited and based entirely on borehole data and supported by exiting data outside Moolarben. Resources were mostly extended to lease boundaries as boreholes and existing mine operations intersected and target the Ulan Seam within and outside the Moolarben boundaries.

Measured Resources are supported by boreholes approximately 500m apart but up to 900m apart (south and north areas). The consistent nature and predictability of the Ulan Seam and utilizing public information and knowledge of neighbouring operations provides confidence in Measured status resources.

Indicated Resource are mainly towards the edge of the lease where there is supporting data outside the Moolarben tenements. Classification supported by boreholes up to 1.2 km.

Inferred Resources are supported by boreholes up to 2 km apart. Inferred Resources exist on the edges of the lease, classified using data outside the Moolarben tenements to extend resources to the lease boundaries.

Ashton

Coal resources were classified Measured Resources - where geological data points based on detailed and reliable close spaced borehole data where sampling and testing information supports a reasonable level of confidence in seam thickness, continuity and coal quality of the seam. Adjacent past workings both

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underground and open cut provide additional supporting information confirming seam presence and continuity. Distance between boreholes can be up to 500m depending on the consistency of seam character.

Indicated status done last year has locally required borehole spacing in excess of 1,100m. Justification for this is based on regional lateral persistence extending through to adjoining tenements and mine operations. Coal resources were classified Indicated Resources - where geological data points contribute to a reasonable level of confidence in seam thickness and continuity and coal quality. Distance between boreholes can be up to 1100m depending on the consistency of seam character.

Coal resources were classified Inferred Resources - where there is a paucity of coal quality data and borehole spacing is only sufficient to delineate seam thickness to a low level of confidence. Distance between boreholes is generally greater than 1100m or in areas of extrapolation beyond PoO.

Yarrabee

The Yarrabee Resource is well understood based on exploration and open cut mining operations that have occurred over the past forty years or so, sale of predominantly raw coal up until 2009 and sale of washed coal from 2009. The major turning point in understanding of the geology at Yarrabee occurred over the past ten years or so under Yancoal ownership and the work by the previous Competent Person during that time.

The PoO used to classify the Yarrabee Resource are shown in ***Table 7-9***. The PoO spacing are intended as a guideline only for quantity and have been used as shown in ***Table 7-9*** for coal quality. The coal quality at Yarrabee has a greater level of certainty between PoO's than quantity due to the highly structured nature of the Yarrabee resource.

Seam thicknesses for the Resource entities follow sedimentary trends, which is expected in a coal deposit and means that the coal quantity estimate will predominantly have moderate to high confidence.

Coal seams can be correlated with a high level of confidence across the Yarrabee resource using geophysical logs. However, RPM highlights that the structure is critical and structural domains DOM6, DOM3, DOM2, DOM2S, YEN and YES is based on the nature of the geology, such as seam dip direction and magnitude, faulting and the likely modifying factors that impact conversion of Resource to Reserve.

Borehole spacing in parts of DOM6, DOM3, DOM2, and DOM2S may be as close as 20 to 50m in order for the structure to be understood. Therefore, the spacing for the quantity PoO's is really a guideline only. The ability to interpret, describe and model the geology is the key driver to assigning a Resource status to a coal resource in a structurally complex area such as Yarrabee.

Table 7-9 Points of Observation Spacing

General Resource Classification Parameters				
Category	Quantity PoO		Quality PoO	
	Spacing	Radius	Spacing	Radius
Measured	200	150	400	250
Indicated	400	250	800	500
Inferred	800	500	1000	1000

Stratford and Duralie

Duralie

Measured Resources – typical drilling density involved 100m spaced east-west drill lines (range from 50-150 m) with boreholes along these drill lines averaging 50m spacing. Some fault delineation drilling down to 15m spacing may be present. Cored holes are spaced approximately 200-500m apart. Indicated Resources – 200-500m spaced east-west drill lines, with boreholes along the drill lines up to 300 m. Core holes are located generally 400-1,000m apart. Inferred Resources – for Weismantel Seam borehole data is generally located at the edges of Inferred areas, rare data within these areas (up to 1.5 km apart). Core holes are rare in Inferred Resource areas however are generally adjacent/nearby to areas with core data.

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Stratford

Measured Resources: there is a small Measured Resource at Stratford in the Bowens Road Seam (this is a consistent seam, which was mined extensively immediately north of the measured area). Holes are located on approximately 100m spaced drill lines with holes along these lines 75-100m apart and with coal quality data available from holes or previous mining within 500 m. Indicated Resources: holes were located on 200-300m spaced east-west drill lines with holes along the lines 20-200m apart. For Avon North the holes were spaced on 100m drill lines but were classified Indicated due to seam complexity and quality data limitations. Core holes were 150m to approximately 1,000m apart or near mined areas of those seams. Inferred Resources: boreholes up to 800m apart with rare coal quality data. Some areas had far more closely spaced holes but quality data rare/absent.

Co-disposal area

These resources were classified as Indicated Resources due to the good quality of survey and mapping data, continuous emplacement of wash plant reject material into these cells from 1995-1999, a history and continued use of this material as feed to the Stratford Mine wash plant and coal quality results indicating usable products.

Grant & Chainey

Measured Resources: Boreholes are located on 100-150m spaced east west drill lines. Holes along drill lines are spaced 20-150 m. Core holes are located up to 400m apart along strike due to the steeply dipping nature of seams. Indicated Resources: Boreholes are located generally on 200m spaced east west drill lines. Holes along these drill lines are 40-150m apart. Core holes are located generally 400-800m apart, however can be up to 1.5 km apart (often along strike due to the steeply dipping seams). At the nose of the seam sub-crops in the south, there is no coal quality data, however the spacing and grid of boreholes, coal quality data available in nearby areas on certain seams (including Bowens Road and Avon seams) and consistency of coal seam character determined from downhole geophysical logs, has enabled these resources to be classified as Indicated Resources. Inferred Resources: For some minor seams, boreholes are located as close as 200m spaced east-west drill lines, however there may be little up-dip/down-dip data on the seam or inconsistency of the plies. For major seams, holes are spaced on drill lines up to 2 km apart. Core data is 500m apart to rare on some minor seams and sparse to rare for major seams (including Bowens Road and Avon Seams).

Austar

In the northern portion of CML2, core hole spacing ranges from approximately 250m-600m while in the southern portion of CML2 core hole spacing ranges from 600m-1200m. In CCL728 core hole spacing is approximately 1000m. In EL6598 core hole spacing ranges from 1km -3.6km.

As part of the resource estimation process, the total resource area was divided based on various geological, structural, PoO, past mining or lease boundary considerations, into discrete polygons. Once resource polygons were defined, the status of coal resources within each polygon was classified either as:

• Measured Resources - where geological data points based on detailed and reliable exploration, sampling and testing information support a reasonable level of confidence in Greta Seam thickness, continuity, coal quality and structure of the Greta Seam. Supporting geological information in the form of reprocessed seismic data was also used to interpret continuity of Greta Seam along seismic lines. Adjacent past workings provide additional supporting information confirming presence and continuity of Greta Seam.

Indicated Resources - where geological data points contributed to a reasonable level of confidence in seam thickness and continuity and some coal quality. Supporting geological information in the form of reprocessed seismic data was also used to interpret continuity of Greta Seam along seismic lines.

Inferred Resources - where there was a paucity of coal quality data and drill hole spacing was only sufficient to delineate Greta Seam thickness to a low level of confidence. Past mining to the north provides supporting information confirming the presence and continuity of Greta Seam.

RPMGLOBAL

Donaldson

Measured Resources were categorised where geological data points based on detailed and reliable borehole data, sampling and testing information support a reasonable level of confidence in seam thickness, continuity and coal quality of the seam. Adjacent past workings (if present) provide additional supporting information confirming seam presence and continuity. Distance between boreholes can be up to 700m depending on the consistency of seam character.

Indicated Resources were categorised where geological data points contribute to a reasonable level of confidence in seam thickness and continuity and coal quality. Distance between boreholes can be up to 1300m depending on the consistency of seam character.

Inferred Resources were categorised where there is a paucity of coal quality data and borehole spacing is only sufficient to delineate seam thickness to a low level of confidence. Distance between boreholes is generally greater than 1500m.

Middlemount

The radii of influence for PoO were determined by consideration of the following for all coal plies:

- Seam continuity;
- Variability of seam thickness;
- Variability of interburden thickness;
- Structural variability;
- Variability of coal quality (particularly raw ash); and
- Review of the variability of the geology between boreholes and the reliability of borehole data.

Rudimentary geostatistical analysis was completed by previous authors on modelled seam thickness and raw ash across the deposit, based on previous studies by Noppe & de Klerk (2013). This study noted that the "range" on the variogram – which is the zone where mineralisation is correlatable, i.e. the values which fall between the nugget and the sill – is the maximum radii for PoO. On average, the range for modelled coal thickness was 2100-2500m and for raw ash (%ad), it was 1000-1500m.

Noppe & de Klerk (2013) noted that the range provided a guide to estimating the maximum extrapolation distance for the Inferred resource category, with two-thirds of the range being the maximum radii for Indicated resources and one-third of the range being the maximum radii for Measured resources.

Raw ash was selected as the basis for confidence categories for all seams resulting in the following:

- 1000m was confirmed as the radius for Inferred resources;
- 500m was confirmed as the radius for Indicated resources; and,
- 250m was confirmed as the radius for Measured resources.

7.5 Exploration Potential

HVO / MTW

Exploration has been undertaken over numerous generations over the last decades with the main focus on the two operation main pits for which Coal Resources have been estimated. Although the area has a long history of exploration, RPM considers there to be good potential to define further coal seams bodies within the Project area both near planned mining infrastructure and within the broader exploration concession. RPM considers the large concession holding of the Company contains a number of key targets which present opportunities to increase the resource base and add feed sources to the plant thereby in turn increasing the mine life, these include:

- **Inferred material**: Within the current final pit designs for the Projects a combined total of approximately 46Mt of "inferred" material has been reported. Targeted drilling to improve the geological confidence is required in these areas.
- **Downdip Targets**: The Company has undertaken exploration in the areas surrounding the defined near surface resource, however in addition further down dip targets have been identified predominately to the west of the current Inferred material. RPM notes this target is limited by the license boundary is underground potential only.
- **Underground**: While resources are currently defined further drilling is required to fully define the extent on potential underground mining. As detailed in ***Section 16*** as conceptual study has been completed on the currently define resources which highlights the economic potential on this area.

Moolarben

There is very limited potential for additional Resources based on future exploration. This is due to the coal seams being very consistent and well defined by the current extensive exploration data over the extents of the Project area.

Any future exploration is expected to not have a material impact on the total Resources although would be expected to increase resource classification from Inferred and Indicated to Measured status.

Ashton

There is very limited potential to increase the total Resources for the Ashton Project through further Exploration. All recognised coal seams are defined as Resources throughout the Project area. Further exploration would be expected to upgrade the Resource Categorisation, therefore increasing the percentage of Measured Resources.

Yarrabee

RPM considers that there is limited resource upside located within the current Mining Lease areas, because exploration drilling has been completed on a regular pattern over the most prospective parts of the Mining Leases.

RPM considers that underground or highwall extraction in the deeper parts of the Yarrabee resource should not be ruled out without additional exploration such as 2D seismic data acquisition and targeted exploration drilling in the eastern part of the resource.

It is likely that additional resource tonnage from the Rangal Coal Measures and more certainly from the Burngrove Formation, could be located in the EPC tenure located to the north of Yarrabee in what is referred to as the Wilpeena area.

Stratford and Duralie

Duralie

For potential underground resources drilling is required to evaluate the Weismantel Seam in the deeper central portion of the Gloucester Syncline. Much of these resources are currently classified as Inferred.

Stratford

Potential works include update of the coal quality database/model over Stratford. Also further exploration to improve definition of resource/reserve (Avon North and Stratford East), including additional coal quality data, further definition of structure.

Grant & Chainey

Further work planned includes reviewing the geophysical data recently obtained. Other works could include defining the Weismantel and Clareval Seams through the Grant & Chainey area, on the eastern limb of the syncline

RPMGLOBAL

Austar

Exploration potential exists for shallower underground coal in the eastern part of EL6598. The characteristics of the Greta seam from the east of EL6598 are:

- Depth of cover increases from 280m in the east to greater than 700m in the west,
- Seam thickness increases from 2 to 4m from east to west,
- Raw coal ash shows an overall trend of decreases from east to west, however data is sparse and variability in EL6598 is very high, with adjacent boreholes showing values of less than 8% raw ash and 26% ash.
- Raw coal total sulphur increases from less than 1% in the east to 3% in the west
- The Resource block EL6598I1 is located in EL6598 to the east of the Stage 3 area. The primary attributes of the Greta Seam in this area include the following;
  - Seam thickness; 2.7m
  - Average depth of cover; 513m
  - Raw coal ash; 17.9%
  - Raw coal total sulphur; 1.35%
  - The raw total sulphur in this area is the lowest of the Austar resource area.

Donaldson

The exploration potential of the Project is considered limited due to the extensive borehole database and mining history already defining any potential Resources.

Middlemount

RPM notes that sufficient work has been completed to establish seam continuity in the planned life of mine LOM area, however, further fault delineation drilling or 2D seismic surveys should be considered for the delineation of the Jellinbah Fault; the north east striking faults and the subsidiary thrust faults to the Jellinbah Fault; and the potential offsets of the Jellinbah Fault that RPM has interpreted.

Additional drilling is required to delineate the limits of oxidation of the Middlemount and Pisces seams in the future mining areas located north and south of the mined out area.

Additional core drilling and coal quality analysis will be required to increase confidence in the resource in the north and south of the deposit which is currently only at Indicated or Inferred status. Re-drilling sites where ply data is not available should also be considered to increase the understanding of coal quality trends.

To identify areas of the deposit where coking properties are likely to be impacted, ash analysis and maceral analysis should continue if no other coking tests are going to be conducted.

In 2017 Middlemount purchased a portion of an adjacent lease to the north-west of ML70370. This area has been explored by the previous owners and has been incorporated into the Resource estimate as at 30 June 2018.

7.6 Reasonable Economic Prospects

HVO / MTW

The Assets are mature open cut mining operations that have approvals and license to operate in place for an extended period of time. Coal products are semi soft coking and thermal coal products that have strong market acceptance. Given the active mining both Assets have sufficient infrastructure including rail and port capacity and a well-trained and competent work force that should enable the life of mine plans to be followed (See various sections for further commentary).

RPM has made the following general assumptions to define the reasonable prospects for economic extraction:

RPMGLOBAL

- The HVO open cut operations are economic to 17 to 1 for in situ prime strip ratio which is considered to approximate the break-even strip ratio and an approximate depth of cover between 300 and 350m (See Section 9 for further details).
- The MTW open cut operations are economic to the 16 to 1 for in situ prime strip ratio.
- Benchmarking with other open cut operations and future proposed operations in the Hunter Valley suggests that a 350m depth of cover cut off is appropriate,.
- RPM considers underground longwall operations below open cut excavation floor typically requires 80 to 120m of cover above the seam being mined by longwall methods. A minimum of 60m has been assumed for this Resource estimate based on RPM's assumptions used for other underground mining studies where the underground working sections are separated by 60m.
- Future demand for thermal and semi soft coking coal will remain strong and
- License to operate will not change to adversely affect the duration of the current LOM plan with mining consents are in place for HVO North to 2025, HVO South to 2030 and MTW to 2036. RPM assumes these will be updated in due course of standard applications in NSW.

In addition RPM has made the following assumptions specific to MTW:

- The Company has stated open cut Resources down to the Mt Arthur seam in the West Pit and Warkworth D seam in the North Pit.
- RPM considers that the Piercefield and Vaux seams are potentially economic open cut seams based on sufficient spoil room being available as such are included.
- That the slope and dump management plan will successfully manage the geotechnical aspects of mining below the current Mt Arthur and Warkworth seam floor to recover the Piercefield and Vaux seams.
- The Broonie and Bayswater seams are not potentially economic seams due to a lack of spoil room.
- The Company does not have title to the Bayswater seam by virtue of the title conditions and as such the Bayswater seam cannot form part of the current Coal Resource.
- MTO open cut Coal Resources are stated to the Woodlands Hill seam.
- The Bayswater seam has been reported as the Underground Resource in the WML area as it has been assumed that open cut mining will continue to the Vaux seam from the highwall location as of December 31 2016. The Company depicts plans for longwall panels in the Vaux seam in both WML and MTO. RPM has reviewed the separation thickness between the Mount Arthur seam floor and the Vaux seam and determined that the separation thickness is insufficient (less than 60m) to support a practical longwall in the Vaux seam, should open cut mining progress to the Mount Arthur seam.
- RPM reviewed the open cut potential in the MTO area and concluded that it was likely that only a single longwall operation was possible due to requirement of having at least 60m separation between mined intervals below the Woodlands Hill seam floor in the open cut. RPM selected the Vaux seam as a reasonable longwall target seam because it appeared to have consistent seam thickness and separation between the VAF, VAG and VAH plies. The Mt Arthur MAC to MAJ plies are also a possible longwall resource but were rejected on the grounds of closer proximity to the floor of the Mt Arthur seam open cut and inferior roof conditions due to the Mount Arthur MAA and MAB plies, Fairford Claystone and Warkworth WKE to WKK plies being present in the primary and secondary roof.

RPM has made the following assumptions specific to HVO:

- All seams within the Jerrys Plains and the Vane Subgroups in the HVON area have open cut economic potential because depth of cover is less than 320m and the prime strip ratio 5.8 as outlined in Section 8.
- The coal seams of the Vane Subgroup only have open cut economic potential to the proposed limit of the Auckland Pit highwall. All seams of the Vane Subgroup down dip of the proposed Auckland Pit highwall and located in the axial plane area of the Bayswater Syncline can only have underground potential due to having depth greater than 320m and in situ strip ratio greater than 9:1. The Wollombi Brook and its associated river flats is also considered to be the western limit of the Auckland open cut resource area.
- A 100m offset has been applied to the bord and pillar underground operations in the MA3, PF1 and PF2 seams. The area of underground working has been excluded from the Resource estimate.

- The HVO underground Resource is located in the HVO South area in the Arties and Barrett seams of the Vane Subgroup. The Resource area has been subject to a mining study by the Company in 2010.
- All Resource from the Jerrys Plains and Vane Subgroups in HVO North has been classified and reported as an open cut Resource and as such no underground Resources are reported.
- The HVO underground Resource is located in the HVO South area in the Arties and Barrett seams of the Vane Subgroup. The underground Resource area has been subject to an Order of Magnitude Study by the Company in 2010.
- RPM has assumed that tenure below the Vaux seam in CCL 755 and below the Bayswater seam in ML 1324 would be granted to the tenure holder of the HVO leases upon application. The Resource in these areas is estimated to be 453Mt to a depth of 350m.
- RPM has not reduced the Coal Resource footprint in areas of waterways and alluvial land. RPM considers that extraction of coal by methods other than open cut could be possible in such areas however notes that coal does not extend under the hunter river. Offsets from waterways and alluvial land are considered to be modifying factors when classifying Reserves.

Appendix D provides graphical representation of the classification applied to the Coal Resource for various seams.

Moolarben

Moolarben mine plan considers open cut potential mostly where depth of cover is less than 100 m. Coal resources for the uppermost ply of the Ulan seam (A1) is only reported at less than 100m depth because it is considered that this ply only has economic potential if mined by open cut methods. The rest of the Ulan Seam can be mined by either open cut or underground methods as it is currently mined at Moolarben and adjacent operations.

No coal quality or thickness cut-off parameters are applied as adopting reasonable cut-off parameters will not impact on the Resources.

Other seams above the Ulan Seam are present within the deposit but only Moolarben and Glen Davis seams are considered a resource in some areas of the open cut pit OC4 where these two seams coalesced to a thickness of approximately 3 m. This report considers these two seams as an Inferred Resource at this stage due to lack of quality data to better define economic mining potential.

Moolarben contains an active open cut operation mining the full Ulan Seam and an active underground longwall operation on the lower section of the Ulan Seam which provides the basis for the 'Reasonable Economic Prosects' test.

Ashton

Both Open Cut and Underground Resources are estimated for the Ashton Project based on what is considered the most likely method of extractions. The 'Reasonable Prospects Test' was applied based on the most likely mining method identified.

Relevant mining parameters depending on the mining method were considered to determine 'Reasonable Economic Prospects'.

For Underground Resources this included consideration of depth of cover, seam dip limit, working section thickness and interburden thickness between working sections.

For Open Cut Resources these included in situ cumulative strip ratio, depth of cover, minimum seam thickness and surfaces constraints including rivers and associated floodplain alluvial material.

Constraints associated with rivers and creeks, floodplain alluvial material and surface infrastructure were not applied to the Underground Resources. These were considered but as coal can technically be recovered from under these surface constraints no limits were applied. To determine if coal can be economical recovered requires detailed consideration during the development of mine plans associated with preparing Reserves.

In general, due to the nature of the deposit, the Resources are not sensitive to the consideration applied. Ashton has mined coal from both open cut and underground mining methods which supports the criteria used to determine the 'Reasonable Economic Prospects'.

Yarrabee

The Yarrabee Mine is a mature open cut mining operation that has an approved Environmental Authority and license to operate in place for an extended period of time (the current LOM is up to 2031). All Resources are located within current Mining Leases. Coal products are PCI and thermal coal products that have strong market acceptance. Given the active mining The Company has sufficient infrastructure including rail and port capacity and a well-trained and competent work force that should enable the life of mine plans to be followed.

RPM has made the following general assumptions to define the reasonable prospects for economic extraction:

- The Yarrabee open cut operations are economic to the 21 to 1 insitu prime strip ratio which is considered to approximate the break-even strip ratio.
- The Yarrabee Resource has been stated to the 25:1 in situ prime strip ratio, which is based on coal prices achieved during the previous boom in 2010, as such the maximum depth of mining.
- The Company has excluded the underground potential of the Yarrabee resource due to structural complexity. RPM is of the view that extraction methods other than open cut should be considered and has not ruled out underground extraction for the eastern part of the Yarrabee resource. RPM considers that Concept or Order of Magnitude Studies should be completed to assess the deeper resources at Yarrabee,
- Future demand for thermal and PCI coal will remain strong, with commensurate reasonable coal prices and
- License to operate will not change to adversely affect the duration of the current LOM plan.

Appendix D provides graphical representation of the classification applied to the Coal Resource for various seams.

Stratford and Duralie

Duralie

Currently open cut mining methods are used at Duralie in the Weismantel, Cheerup and Clareval seams. Current mining depths are 115m below original topography in the Weismantel Seam pit and 150m in the Clareval Bowl area. It is expected this method will continue for 'shallow' coal resources. The actual limit of open cut mining is a Reserve issue, depending on coal price and geotechnical issues. For resources in the deeper parts of Weismantel Seam, it is assumed mining will be by underground mining methods, including bord and pillar, hydraulic mining, etc. taking into account the relative steep dip of the seam.

Clareval Seam resources at Duralie are limited to depths of 200-300m below original topographic surface (largely controlled by borehole data). With in situ strip ratios in the order of 8:1, to depths of 200 m, it is possible that in the future (<50 years) these resources will be viable.

Stratford

Mining at Stratford has been by open cut mining methods. It is assumed remaining coal resources at Stratford will be extracted by open cut methods. Resources at Stratford are limited to depths of 150m (Stratford West) or 200m (Avon North and Stratford East) below original topographic surface (largely controlled by borehole data). Mining depths reached in the Stratford Main Pit and Bowens Road Pit were 125m and 120m from topography respectively. Approximate in situ strip ratios in the order of 6:1-10:1 indicate it may be possible that resources to depths of 200m may be economic in the future (<50 years).

In Roseville Extension and Roseville West pits, thin seam mining was used to extract the coal plies (coal bands down to 0.15m thick were mined). Small mining equipment was used to achieve this. In BRN Pit the Marker plies were mined at thicknesses down to 0.2-0.3 m. Due to the nature and coking quality of the coal a lot of care was taken in recovering the coal. Mining in the Roseville West Pit ceased during the downturn in prices however with the recent upswing in coal prices this pit will be viable again.

Resources are estimated for in situ coal seams that occur beneath the co-disposal material. It is assumed the co-disposal material will be completely extracted before mining the underlying seams. The geological model for Stratford West used the base of weathering below the original topographic surface in this area for resource estimation.

Coal resources have been limited by the mined surface as at the end of June 2014. In areas around some of the completed pits (e.g. Roseville Pit, Bowens Road West Pit) resources have been estimated below/adjacent to the pits. No buffer zone was applied to allow mining studies to determine reserve limitations and future mining opportunities.

Mine infrastructure, such as the Stratford East Dam over some of Stratford East, was not used to limit resources to allow mining studies to determine viability. The exception to this was coal under the main Stratford mine infrastructure (the wash plant, stock piles, ROM pad and coal handling facilities). This exclusion zone has removed approximately 1.5Mt of potential Indicated and 0.8Mt of potential Inferred Resources from the Marker 3-Bowens Road seams.

Co-Disposal Area

The material in the Co-disposal area has been mined by open cut methods and incorporated into the plant feed at Stratford CHPP for more than 15 years. Due to the depths of the material (<20m from surface) it is expected this mining method will continue with the remaining resource.

Grant & Chainey

The same coal seams and similar geology occur at Grant & Chainey as Stratford Mine and it is assumed coal resources at Grant & Chainey will be extracted by open cut mining methods, as at Stratford Mine. Resources at Grant & Chainey are limited to depths of 200m below original topographic surface (largely controlled by borehole data). Approximate in situ strip ratios in the order of 10:1 indicate that resources to depths of 200m may be viable in the future (<50 years).

Austar

The Austar resource has reasonable prospects of eventual economic extraction for the following reasons:

- Austar was an operating mine with sufficient onsite infrastructure to extract proposed tonnages, existing markets for high sulphur metallurgical coal and sufficient offsite infrastructure to rail and ship the proposed products
- Approximately 80% of the Austar Measured and Indicated Resource is located at less than 500m depth of cover. Mining is planned to 720m depth. Modifying factors which may affect the conversion of Resource to Reserve have not been discussed.
- Other assumptions made by the Competent Person for assessing reasonable prospects include;
  - Demand for high sulphur metallurgical coal remains high,
  - The price achieved for high sulphur metallurgical coal remains high,
  - Geotechnical issues (such as depth of cover) do not constrain mining, or cause mining closure prior to completion of the LOM plan,
  - Regulatory controls enable mining to continue for the duration of the LOM plan,
  - License to operate is not challenged in the future, such that the LOM plan cannot be completed,
  - The washability characteristics of the resource coal do not change significantly from the current washability characteristics,
  - There are remnant coal around areas of historical coal extraction and outside of the current LOM which would be difficult to extract with the current mining method and equipment. It is assumed that these blocks could potentially be recovered during 'scavenging' operations using Bord and Pillar mining

method. This may be reasonable as would add flexibility to the operation and supplement tonnes coming from the longwall as required.

Donaldson

Both open cut and underground Resources are estimated for the Donaldson Project based on what is considered the most likely method of extractions. The 'Reasonable Prospects Test' was applied based on the most likely mining method identified.

The Reasonable Economic Prospects for the Resources was determined by applying a general mining criteria based on the most likely mining method.

For open cut Resources the depth and cumulative strip ratio were used to determined 'reasonable prospects'.

For underground Resources, a minimum working section thickness of 1.2m and maximum raw ash cut off of 50% (55% for Lower Donaldson) were used to determine 'reasonable prospects'. Also, underground Resources were assessed to determine if under assumed and justifiable technical, economic and development conditions, might, in whole or part, become economically extractable. On this basis, the Sandgate and Ashtonfield Seams were excluded from the Resources.

Middlemount

The Middlemount asset is a mature open cut mining operations that has approvals and license to operate in place for an extended period of time. Coal products are semi hard coking and PCI metallurgical coal products that have strong market acceptance. The asset has sufficient infrastructure including rail and port capacity and a well-trained and competent work force that should enable the life of mine plans to be followed.

RPM has made the following general assumptions to define the reasonable prospects for economic extraction:

- The break-even strip ratio is estimated to be 17 and an approximate depth of cover between 60 and 200 m,
- Benchmarking with other open cut operations and future proposed operations in the Bowen Basin suggests that a 350m depth of cover cut off is appropriate,
- 37% Ash content and 5% IS moisture cut off,
- 50m barrier pillar to the underground resource,
- Minimum seam thickness of 0.3m,
- Basement unit Yarrabee tuff unit,
- Future demand for metallurgical coal, in particular semi hard coking and PCI coal, will remain strong,
- License to operate will not change to adversely affect the duration of the current LOM plan,
- RPM notes that Middlemount Coal has negotiated and achieved successful outcomes to relocate the Bingegang pipeline and to mine through other easements. RPM assumes that the relevant approvals will be granted for any required diversions of Roper Creek, and
- All coal seams from the Roper to Pisces Upper have open cut economic potential because depth of cover is less than 200 m and the average life of mine insitu prime strip ratio is 12:1.

RPM makes the following specific assumptions about the open cut resources;

- RPM has identified that slope stability will potentially be an issue at Middlemount based on our observations made during the site visit. The issues of concern are the failures that are present in the current highwall in both the Tertiary and Permian strata.
- The Permian strata are faulted by the Jellinbah Fault and its subsidiary faults in the upper parts of the Permian highwall, however these faults will be located closer to the pit floor with future highwall advance to the east. RPM considers that there is high potential for strata on the upthrown side of the Jellinbah Fault to have westward dips (into the open cut excavation), thereby creating geotechnical, operational and safety hazards.

- RPM has interpreted northeast striking faults with significant displacement at both the planned northern and southern end walls in the current LOM. Both faults intersect offset the Jellinbah Fault. The location of the intersection of the northern and southern faults with the Jellinbah Fault is close to the proposed intersection of the endwalls and highwall, thereby creating potential geotechnical hazards.
- That the final southern highwall will not be required to be moved to the north to avoid the southernmost northeast striking fault interpreted by RPM. The fault is downthrown to the south by 50-100m. Should additional data acquisition result in no change to its current location the final southern highwall may be moved to the north of its current location, thereby reducing the open cut Resource and Reserve.
- The Tertiary strata appear to be highly reactive and contain significant volumes of ground water. Groundwater seepage is occurring at the Tertiary/Permian interface in the current highwall. RPM assumes that the relevant structural and geotechnical data will be acquired by Middlemount Coal to understand and manage geotechnical risk associated with their LOM plan.
- RPM assumes that the potential groundwater issues associated with the Tertiary will be studied and understood prior to mine advance into the deeper parts of the resource.
- RPM assumes that Middlemount Coal will follow a suitable slope and dump management safety standard to ensure that the LOM Plan can be achieved.

RPM makes the following specific assumptions about the underground Resources;

- The Middlemount underground Resource is located in the southern part of the Middlemount ML70417 and ML70379. The proposed mining method is bord and pillar. The underground Resource area has not been subject to a mining study by Middlemount and no conceptual underground layout plan has been provided to RPM for review.
- The results of a mining study will return a positive rate of return and NPV.
- Sufficient cognisance in the proposed underground layout will be given to minimum thickness of fresh Permian strata in the goaf to avoid connectivity with the Tertiary strata which are approximately 40m thick.
- The required approvals will be granted to Middlemount for underground mining to proceed below Roper Creek and the Dysart Middlemount Road.
- Suitable access can be made to the underground Resource from the open cut southern end wall across the 50-100m displacement southern-most fault.
- 50m boundary pillar from above open cut resources
- 50m Barrier pillar from Mining Lease to the south.
- 37% ash and 5% IS Moisture content cut off.

RPM makes the following specific assumptions about the highwall mining Resources;

- Further and more rigorous delineation of structure and increased knowledge of the highwall geotechnical issues/assessments need to be conducted in order to assume the results of a future mining study would return a positive rate of return and NPV. Thus no Coal Resources have been estimated for this area.

7.7 Variation from 2017 Company Reporting

All resources have been depleted to the 30th June, 2018 compared to the 31st December, 2017. The mined material for each operation is outlined in ***Table 4-1***.

HVO / MTW

None

Moolarben

None

RPMGLOBAL

Ashton

Resources for Ashton have decreased by approximately 30Mt from previously reported Resources. This is principally due to the exclusion of Open Cut Resources from within the extents of the Hunter River and Glennies Creek and associated alluvium.

Yarrabee

Depletion to 30 June 2018.

Stratford and Duralie

None.

Austar

None.

Donaldson

Resources for Donaldson have decreased by approximately 93Mt due to the exclusion of the Sandgate and Ashtonfield Seams from the Resources Estimate. These seams were excluded based on RPM's opinion that they did not have 'Reasonable Prospects for Economic Extraction' based on the current information.

The Sandgate Seam consists of three major plies SGA, SGB and SGC that deteriorate and split into many sub plies towards the south and west. The uppermost ply and sub-plies (SGA) have a maximum cumulative thickness of 2m through portions of ML1618 and EL5497, however distinctive claystone markers exist within SGA which have a large impact on ash content of the seam and potential working sections. The SGB and SGC rarely combine and reside between 1m – 15m below the SGA ply. As only a relatively thin and high ash working sections can be determined from the Sandgate seam, it is considered by RPM unlikely to support the development of a mining operation in this seam and it is therefore excluded from the Resources estimate.

The Ashtonfield Seam occurs throughout the deposit but rarely forms a consistent minable seam package due to its splitting nature. A working section within the seam is only greater than 1.2m over a relatively small area which would be unlikely to support the development of a mining operation in this seam and therefore it is excluded from the Resource Estimate.

Middlemount

Highwall resource area excluded as further study required to confirm potential for economic extraction.

Monash

None.

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8. JORC Coal Reserves

The JORC Code defines a 'Coal Reserve' as the economically mineable part of a Measured and/or Indicated Coal Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined. Appropriate assessments and studies have been carried out and include consideration of and modification by realistically assumed mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified. Coal Reserves are sub-divided in order of increasing confidence into Probable Coal Reserves and Proved Coal Reserves. (JORC Code - Clause 28). Marketable Reserves allow for practical yields in a beneficiation plant, the result of processing commonly being known in the industry by the term "product coal".

The terms 'Mineral Resource(s)' and 'Ore Reserve(s)' and the subdivisions of these as defined above, apply also to coal reporting, however if preferred by the reporting company, the terms 'Coal Resource(s)' and 'Coal Reserve(s)' and the appropriate subdivisions may be substituted. (JORC Code - Clause 43). As such RPM will refer to Ore Reserves as Coal Reserves in this Report.

8.1 Areas of Coal Reserves

The estimation of Coal Reserves is based on the following areas which are planned to be exploited through open cut mining methods:

- **Hunter Valley Operations** – this mine is currently being exploited via open pit methods and contains total Coal Reserves of **796Mt** made up of 333Mt Proved and 463Mt Probable. The Reserve at HVO includes existing pits and additional pits that will be developed when required to maintain production. The total Marketable Reserves at HVO are **554Mt**.
- **Mount Thorley Warkworth** – this mine is currently being exploited via open pit methods and contains total Coal Reserves of **322Mt** made up of 125Mt Proved and 197Mt Probable. The Reserve at MTW is made up from pits that are currently operated at the site. The total Marketable Reserves at MTW are **225Mt**.
- **Moolarben Coal Mine** – this mine is currently being exploited via open pit and underground methods and contains total Coal Reserves of **256Mt** made up of 232Mt Proved and 25Mt Probable. The Coal Reserves can be further divided into 196Mt Open Cut Reserves and 71Mt Underground Reserves. The total Marketable Reserves at Moolarben are **215Mt**.
- **Ashton** - this mine is currently being exploited via underground methods. In addition to this there is a planned open cut project. The total Coal Reserves at Ashton is **47Mt** made up of 23Mt Proved and 24Mt Probable. The underground Reserve at Ashton mine includes layouts in the Upper Liddell, Upper Lower Liddell and Lower Barrett Seams and contains 33Mt of Coal Reserves. The total Marketable Reserves at Ashton are **26Mt**.
- **Yarrabee -** this mine is currently being exploited via open pit methods and contains total Coal Reserves of **55Mt** made up of 36Mt Proved and 19Mt Probable. The Reserve at Yarrabee includes existing pits and expansion pits that will be developed when required to maintain production. The total Marketable Reserves at Yarrabee are **42Mt**.
- **Stratford and Duralie -** this mine is currently being exploited via open pit methods and contains total Coal Reserves of **44Mt** which is all classified as Probable. The reserves at Stratford and Duralie include existing pits and expansion pits. The total Marketable Reserves at Stratford and Duralie are **26Mt**.
- **Austar**– this mine is currently being exploited via underground methods and contains total Coal Reserves of **41Mt** which is all classified as Probable. The Reserve at Austar is contained in the Bellbird South and Stage 3 areas. The total Marketable Reserves at Austar are **31Mt**.
- **Donaldson –** this project is currently on care and maintenance. It is proposed to be exploited via underground methods and contains total Coal Reserves of **62Mt** which is all classified as Probable. The reserves at Donaldson are based on proposed longwall mining operations in the Lower Donaldson Seam. The total Marketable Reserves at Donaldson are **32Mt**.
- **Middlemount -** this mine is currently being exploited via open pit methods and contains total Coal Reserves of **87Mt** made up of 50Mt Proved and 37Mt Probable. The Reserve at Middlemount includes the existing pit. The total Marketable Reserves at Middlemount are **67Mt**.

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8.2 JORC Statement of Coal Reserves

The Proved and Probable JORC Coal Reserves estimate for the Assets is summarised in ***Table 8-1*** and shown graphically in ***Figure 8-1***. The JORC Coal Reserves estimates reported below are included in the Measured and Indicated Coal Resources quantities reported in ***Section 7*** and are not additional to.

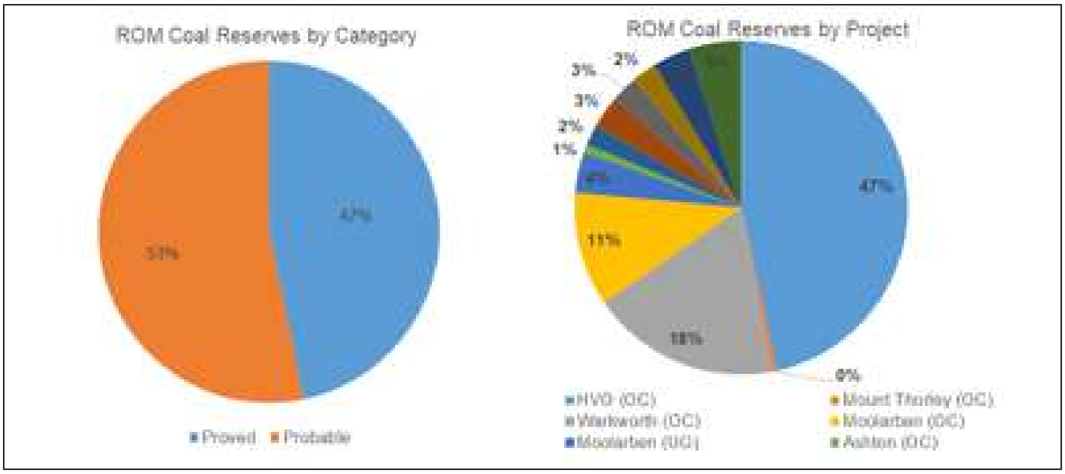
Table 8-1 Statement of JORC Coal Reserves Estimate as at 30th June, 2018

Operation	Coal Reserves			Marketable Reserves		
	Proved (Mt)	Probable (Mt)	Total (Mt)	Proved (Mt)	Probable (Mt)	Total (Mt)
HVO (OC)	333	463	796	229	325	554
Mount Thorley (OC)	-	8	8	-	5	5
Warkworth (OC)	125	189	314	87	133	220
Moolarben (OC)	178	12	189	136	12	148
Moolarben (UG)	54	13	67	54	13	67
Ashton (OC)	-	14	14	-	7.8	7.8
Ashton (UG)	23	10	33	13	6	18
Yarrabee (OC)	36	19	55	28	14	42
Stratford and Duralie (OC)	-	44	44	-	26	26
Austar (UG)	-	41	41	-	31	31
Donaldson (UG)	-	62	62	-	32	32
Middlemount (OC)	50	37	87	40	27	67
Total (100% basis)	**799**	**912**	**1,710**	**587**	**632**	**1,218**
Yancoal Attributable Share[5]	**547**	**631**	**1,178**	**406**	**432**	**837**

Notes:

1) *The Statement of JORC Open Cut Coal Reserves has been compiled under the supervision of Mr. Doug Sillar who is a full time Senior Mining Engineer employed by RPM and is a Member of the Australian Institute of Mining and Metallurgy. Mr. Sillar has sufficient experience which is relevant to the style of Coal and type of deposit under consideration to qualify as a Competent Person as defined in the JORC Code.*
2) *The Statement of JORC Underground Coal Reserves has been compiled under the supervision of Mr. Graeme Rigg who is a full time Senior Mining Engineer employed by RPM and is a Member of the Australian Institute of Mining and Metallurgy. Mr. Rigg has sufficient experience which is relevant to the style of Coal and type of deposit under consideration to qualify as a Competent Person as defined in the JORC Code.*
3) *Tonnages are metric tonnes*
4) *Figures reported are rounded which may result in small tabulation errors. Coal Reserves have been estimated under the 2012 Edition of the JORC Code.*
5) *Based on owner at the latest applicable date*

Figure 8-1 Graphical Representation JORC Coal Reserves Estimate within the Final Designs



8.3 Reserves Estimation Procedure

Open Cut Projects

Open Cut Coal Reserves were estimated using a suite of specialised geological and mine planning software. The approach typically includes a pit limit optimisation or margin ranking and supported by life of mine production scheduling which has been completed by the Company. The input parameters selected are based on the review of the mining studies completed by the Company, discussions with site personnel and site visit observations. To enable the estimation of JORC Coal Reserves, RPM has:

- Reviewed approach, assumptions and outcomes from the Company mine planning studies, including the operating and capital cost forecasts.
- Reviewed information on current mine performance including operating costs and processing recoveries.
- Reserves are based on the end of June 2018 surfaces. As a result, all Coal Reserves and production schedules presented in this report reflect the Reserves as at the 30th June, 2018.
- Reviewed the results of the pit limit optimisation or margin rank and independent break even strip ratio analysis and selection of appropriate pit shells.
- Reviewed the mining method and current life of mine pit designs.
- Reviewed methodology used to estimate coal recovery parameters in the model.
- Reviewed production schedules generated by the Client.
- The Coal Resource geological confidence limits of Measured, Indicated and Inferred polygons were overlaid on the mine plan and any Inferred or unclassified Resources excluded from the estimate.
- The Coal Reserve was then categorised as Proved or Probable based on the Coal Resource confidence, application of modifying factors and the level of detail in the mine planning.
- Generated a discounted cash flow model for the LOM schedule incorporating operating and capital costs and revenue as detailed in ***Section 14*** and outlined below. RPM reviewed the operating and capital cost estimates prior to applying them in the economic model.

Underground Projects

Coal Reserves were estimated using predominantly XPAC mine planning software, however also Minex software. The input parameters selected by RPM are based on the review of the mining studies completed by the Company, discussions with site personnel and site visit observations. To enable the estimation of JORC Coal Reserves, RPM has:

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- Reviewed the approach, assumptions and outcomes from the Company's mine planning studies, including the operating and capital cost forecasts.
- As part of the initial studies prior to the development of the underground mine layouts, costs and revenue factors were used to determine one or more "target areas". Mine layouts were subsequently generated and have since been refined. The various factors, combined with other criteria such as location of faults and dykes, lease boundaries, etc were cross checked by RPM to confirm the current mine layouts. The Company mine layouts have subsequently been used for the estimation of Reserves.
- Reviewed information on current mine performance including operating costs and processing recoveries.
- RPM used the end of June 2018 face positions as the basis for production schedule forecasts at the various underground Assets. As a result, all Coal Reserves and production schedules presented in this report reflect the tonnes as at the 30th June, 2018.
- Independently estimated operating costs to confirm economic viability across the mine life.
- Reviewed the mining method and current life of mine designs.
- Reviewed methodology used to estimate coal recovery parameters in the model.
- The tonnes within the mine layout were then estimated through the application of modifying factors, the potential Reserves in the mine layout checked.
- Review of detailed production scheduling was carried out in XPAC software.
- Review of equipment and other resources were selected to enable delivery of the production schedule which allowed a capital cost schedule and an operating cost schedule to be derived for the production schedule.
- Review of the financial model outcomes confirmed the economic viability of the mine.
- The Coal Resource geological confidence limits of Measured, Indicated and Inferred polygons were overlaid on the mine plan and any Inferred or unclassified Resources excluded from the estimate.
- The Coal Reserve was then categorised as Proved or Probable based on the Coal Resource confidence, application of modifying factors an, the level of detail in the mine planning and the level of risk.

RPM generated a discounted cashflow model for the LOM schedule incorporating operating and capital costs and revenue as detailed in Section 14 and outlined below. RPM reviewed the operating and capital cost estimates prior to applying them in the economic model.

8.4 Coal Reserve Economic Viability

As part of RPM's process to justify the economic viability of the reported Coal Reserves separate revenue cash flow analyses were completed for each operation, based on the following:

- All variable unit costs for the mine life, including mining, coal processing and handling, transportation costs, overheads and royalty costs;
- The forecast production schedules as shown in ***Section 9*** and ***Section 10***;
- Capital expenditure ("CAPEX") costs including sustaining and closure costs as outlined in ***Section 14***;
- Applied the forecast prices as agreed with the Company. Both the metalliferous and thermal coal markets are susceptible to both up and downswings over the medium and long term with various market forces impacting demand and supply. Given the market forces and the increased complexities in forecasting prices, in the DCF model RPM considered the use of long term average price suitable; RPM has sourced these prices from the Company. RPM is not a price forecast expert and has relied on third party and expert opinions however considers them reasonable;
- Discount rate of 10%, which was selected based on the quantity, long history of mining and well established community relations;
- For the purposes of confirming project economics a simple 30% company tax rate was applied; and
- State levies and royalties.

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Based on the above parameters the outcomes of all models showed positive cashflow when all costs, CAPEX and pricing assumptions were applied. Further to the construction of the DCF model, sensitivities were tested. The key elements found to be sensitive to the Assets economics are coal price as well as process operating costs. The Donaldson underground project and the SEOC at Ashton returned negative NPV's with reductions to revenue drivers or increased costs of 5%. This suggests these projects are marginal based on current inputs. Middlemount returns a negative NPV under a 15% reduction in Revenue and Stratford and Duralie returns negative NPV's for 15% decrease in revenue scenario and a 15% increase in operating cost scenario. For all other projects the Coal Reserves were found to be resilient to +/-15% variation in key parameters employed for sensitivity test over the life of the mine.

As such RPM considers that the quantities and grades reported are economically robust and suitable for reporting as Coal Reserves.

The averaged aggregated annualised costs which resulted from the cashflow model are presented in ***Section 14*** for each operation.

8.5 Reserves Comments

RPM notes the following in relation to the Coal Reserves:

HVO/MTW

- A number of years require peak waste movement to achieve the required throughput. The approach to modelling by RPM has been to assume that hire equipment is utilised to meet short term peaks in waste stripping requirements over and above the base annual capacity of the owner's fleet. This is consistent with operations.
- As part of the LOM plan the MTW operation requires the closure of the Wallaby Scrub road. RPM is aware the Company has an environmental permit as well as the required mining permits for mining in this area however required local council approval to close the road. RPM is aware of recent meetings with the Council and a visit was undertaken in February, 2017 which commenced the close out procedure and final approval is now with the NSW State Government. RPM highlights that this road closure is not required for 3-4 years, after which operations will be materially affected, as such considers this a low risk which can be managed as per normal community discussions of this type.
- Underground operations have not been considered for this statement of Coal Reserves. There are significant resources with underground potential at both MTW and HVO and preliminary studies have been completed. Further detailed study is required to confirm the feasibility of underground extensions prior to inclusion as a Reserve however RPM outlines the study shown in **Section 16**.

Moolarben

- Mining commenced at Moolarben in late 2010 when the open cut operation was opened up. Moolarben has subsequently operated exclusively as an open cut operation until 2016 when the underground workings were established and longwall operations commenced in the UG1 underground mine. Upon completion of mining in this area, operations will shift to the UG4 underground mine, followed by the UG2 underground mine.
- The target underground mining areas are the deeper areas of the resource, generally located beneath natural ridgelines that are unfavourable to mine via open cut methods. The underground mining strategy is to continue with a single longwall operation, sequentially working through the underground resource areas.
- As per the reporting requirements of the JORC Code, the Inferred material within the final open cut pits is considered waste and not included in the Reserve estimate. RPM notes that within the final open cut pits at Moolarben there is an additional 20Mt of Inferred Coal Resources, which is less than 5% of the Coal Reserves. If additional exploration successfully delineates this Coal and it is upgraded to Indicated and/or Measured this material can be included in an updated Coal Reserve estimate.
- The ELW ply has been included as a Reserve for the first time in the 2017 Reserves statement. The inclusion of this seam has added 11Mt of additional Coal Reserves and is supported by recovery of the seam during operations 2017.

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- Optimisation of working section horizons and the associated impact on project costs and CHPP yields is ongoing at the site and may have a minor impact on the stated reserves.
- Open Coal Reserves that are supported by Measured Resources are classified as Proved Reserves and Coal Reserves supported by Indicated Resources are classified as Probable Reserves. The one exception is at the southern end of OC3 where all Coal Reserves are classified as Probable for both Measured and Indicated Resources, primarily due to limited sub-crop drilling.
- RPM is not aware of any other environmental, legal, marketing, social or government issues which may hinder the economic realisation of the Reserves.

Ashton

- Coal Reserves that are supported by Measured Resources are generally classified as Proved Reserves and Coal Reserves supported by Indicated Resources are classified as Probable Reserves. Approximately 10Mt of Probable Reserves have been derived from Measured Resources, this being the lower seam panels around the Bowmans Creek alluvials. The detailed level of mine planning and ongoing operating experience in these areas provide sufficient confidence in the Modifying Factors to at least pre-feasibility study level of accuracy as defined by the JORC Code.
- The multi-seam nature of the deposit complicates the mining process. The mine layouts adopt an offset strategy, such that gateroads in underlying seams are below the goaf of the immediate seam above. The offset layout strategy is consistent with contemporary practice for extracting from multiple seams. This practice generally allows greater resource recovery than the alternative of stacking longwalls and having the gateroad panel below an overlying goaf results in improved development conditions. The trade-off however is the potential for additional face crush resulting from stress concentration on the longwall face of lower seams. This may negatively impact longwall productivity, increase out-of-seam dilution and increase operating costs.
- Current impacts to alluvial groundwater resources are within the approved predictions and impacts. The previous extraction of LW6b in the Pikes Gully Seam resulted in higher peak inflows than what was estimated in the groundwater modelling. The groundwater model was revised in 2016 and further updated in 2017 and the new model indicated that there are potential compliance risks with extracting the lower seam longwall panels around the Bowmans Creek alluvials. Assessment is ongoing and, in the interim, the longwall panel extraction sequence has been modified such that the first 5 longwall panels in the Upper Lower Liddell Seam will be extracted prior to the final 3 longwall panels in the Upper Liddell Seam being extracted. This permits further time to assess the potential groundwater issue but there remains the risk that some or all of the lower seam longwall panels around the Bowmans Creek alluvials will not be extracted. At a worst case scenario, this could reduce Reserves by 10Mt and Marketable Reserves by 5Mt however RPM considers this a low risk
- The Ashton open cut Reserves are subject to the Company reaching an agreement to purchase land in the SEOC area. The open cut is not scheduled to commence until 2024
- RPM is not aware of any other environmental, legal, marketing, social or government issues which may hinder the economic realisation of the Reserves

Yarrabee

- Coal Reserves that are supported by Measured Resources are classified as Proved Reserves and Coal Reserves supported by Indicated Resources are classified as Probable Reserves. The detailed level of mine planning and ongoing operating experience in these areas provide sufficient confidence in the Modifying Factors to at least pre-feasibility study level of accuracy as defined by the JORC Code.
- Reserves have not been reported in the DOM 6 Pit at Yarrabee due to the structural complexity in this area. This area represents potential Reserves upside.
- Reserves have not been reported for the YES pit as additional planning is required. This area represents potential Reserves upside.

Middlemount

- Coal Reserves that are supported by Measured Resources are classified as Proved Reserves and Coal Reserves supported by Indicated Resources are classified as Probable Reserves. The detailed level of

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mine planning and ongoing operating experience in these areas provide sufficient confidence in the Modifying Factors to at least pre-feasibility study level of accuracy as defined by the JORC Code.

- As per the reporting requirements of the JORC Code, the Inferred material within the final pit shells is excluded from the Reserve estimate. RPM notes that within the final pit shell at Middlemount there are minor quantities of Inferred Coal Resources and that the inclusion of this coal would not have an impact on the economic pit limits.
- A re-alignment of a small section of Roper Creek is required to extract the full extent of Reserves at Middlemount.
- Middlemount Coal recently acquired a portion of an adjacent lease which has been incorporated into the mine plan in 2018 and has been included in this estimate. Approvals to enable operation in this area are ongoing, however are expected within the timeframe these areas are planned to be mined.

Austar

- The reporting of Coal Reserves for Austar is based on the assumption that the operations permit will be reinstated following discussions with the regulators. If this permit is not reinstated the currently reported Coal Reserves will need to be revised and an alternative mine design, based on the geotechnical conditions will need to be undertaken. This revised mine plan may impact the economics of the project and as such the ability the mine profitably and the quantities of Coal Reserves reported.
- All coal Reserves that are supported by Measured Resources and Indicated Resources are classified as Probable Reserves. The detailed level of mine planning and ongoing operating experience in these areas provide sufficient confidence in the Modifying Factors to at least pre-feasibility study level of accuracy as defined by the JORC Code.
- From a geotechnical perspective, the most significant issues relate to coal bursts, rib control and periodic weighting. Of these, the coal burst issue is easily the most significant and ongoing investigations are being undertaken to improve the ability of the mine to deal with the issue.
- The depth of cover for the future workings ranges from 450 – 700 m. These depths are high by Australian standards.
- RPM is not aware of any other environmental, legal, marketing, social or government issues which may hinder the economic realisation of the Reserves.

Donaldson

- The mine is sufficiently viable to provide a positive NPV under current cost and revenue assumptions but the NPV magnitude is not significant. As such the economic viability of the mine will be particularly sensitive to changes in costs and coal prices.
- The Hunter Expressway traverses the target area and has formed a subsidence protection zone that will necessitate longwall equipment being relocated from one side of the expressway to the other in each longwall panel, leaving a subsidence protection pillar in between.
- Depth of cover for the Lower Donaldson Seam in the target area varies from 120m to a maximum 520m, with an average of 340m. These values are within the range of depths for Australian underground coal mines and are not considered likely to create any major impediments to mining.
- Measured and Indicated Resources have been classified as Probable Reserves. No Inferred Resources have been converted to Reserves. Approximately 1Mt of Probable Reserves have been derived from Measured Resources.
- Donaldson currently pays significant rail and port Take or Pay penalties. Once the mine becomes operational (assuming favourable economic conditions) it will be necessary for the rail and port contracts to mesh better with the actual mine output, otherwise Take or Pay penalties could impact significantly on project value.
- RPM is not aware of any other environmental, legal, marketing, social or government issues which may hinder the economic realisation of the Reserves.

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Stratford and Duralie

- Coal Reserves are primarily supported by Indicated Resources with only minimal Measured Resources estimated in the deposit. These have been classified as Probable Reserves due to the Measure Resources lying outside currently approved operations and an absence of modelled yield data. The ongoing operating experience in these areas provide sufficient confidence in the Modifying Factors to at least pre-feasibility study level of accuracy as defined by the JORC Code.
- As per the reporting requirements of the JORC Code, the Inferred material within the final pit shells is excluded from the Reserve estimate. RPM notes that within the final pit shells there is a large amount of Inferred coal at the Roseville West Pit that predominantly is sitting below the target seams for Reserves. RPM is of the opinion that the exclusion of this coal will not impact on the Reserves.
- Yields at Stratford and Duralie are based on actual washplant data collected at site on a seam by seam basis.

Overall permitting, approval and native title

See ***Section 15***.

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9. Consolidated Operations Plan

9.1 Current Life of Mine Plans

The production plans for the current Assets prepared by RPM, as shown in ***Table 9-2*** *and* ***Figure 9-1,*** are based on the total mineable economic coal. Specifically, this includes Coal Reserves and Inferred Resource contained within the economic pit and underground limits. Based on the total mineable economic coal, the development sequence, pit and/or underground designs, the forecast mine lives for the operations are shown in ***Table 9-1*** as at 30th June, 2018. RPM considers the proposed Life of Mine Development Sequence and Production Forecast to be reasonable and achievable based on the current mining equipment forecasts and designs. RPM does however recommend that further optimisation and long term planning be completed to confirm and optimise the LOM plan outcomes on an ongoing basis as per normal industry practices. This optimisation should focus of the sequence of development in conjunction with capital and operating cost analysis to maximise the profitability of the each operation in particular the fleet management.

RPM highlights that the production schedules in this report includes Inferred Resources which is excluded from the RPM Coal Reserves presented in ***Section 8*** as required by JORC Code.

Based on the Ore Reserve estimate, Mineable Quantities, the project Development Sequence and the Designs, the forecast mine life's for each operation is shown in ***Table 9-1*** as at 30th June, 2018. RPM considers that the proposed Life of Mine Development Sequence and Production Forecast to be reasonable and achievable based on the current mining equipment and designs. RPM does however recommend further optimisation and short term planning. This optimisation should focus on the sequence of development in conjunction with capital expenditure and short term grade variability to maximise the profitability of the Projects.

Table 9-1 Operations Mine Life Estimates as at 30th June, 2018

Operation	Mine life (Years)
HVO	43
MTW	23
Moolarben	20
Yarrabee	38
Austar	17
Ashton	13
Stratford and Duralie	35
Donaldson	11
Middlemount	20

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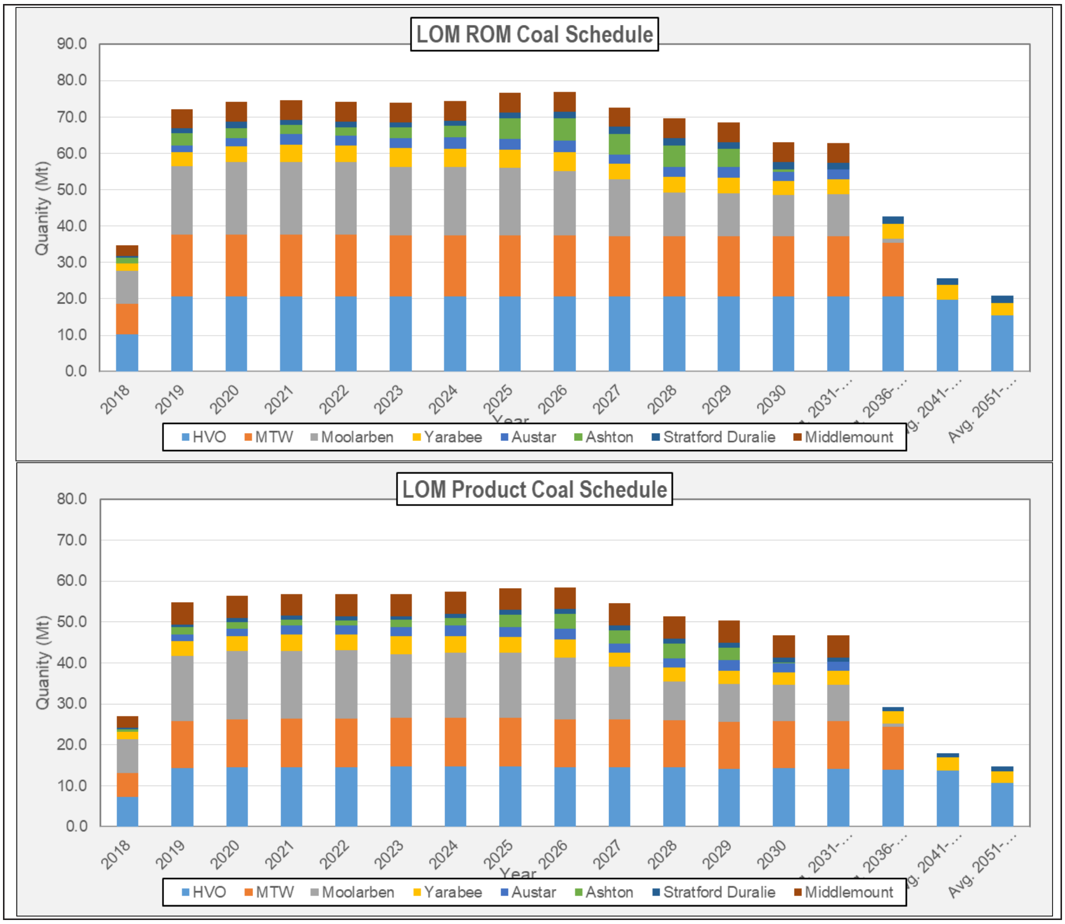
Table 9-2 Operations LOM Plan as at 30th June, 2018

Operation	Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2040	Avg. 2041-2050	Avg. 2051-2060	Total LOM
HVO	ROM Coal	Mt	10.2	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.8	15.4	814.9
	Coal Processed	Mt	10.2	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.8	15.4	814.9
	Plant Yield	%	71.3	69.9	70.3	70.6	70.7	71.4	71.8	71.7	70.7	71.0	70.3	68.7	69.2	69.1	67.5	69.9	69.2	69.6
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Coal Product	Mt	7.3	14.4	14.5	14.6	14.6	14.7	14.8	14.8	14.6	14.6	14.5	14.2	14.3	14.2	13.9	13.8	10.7	567.4
	Effetive Yield	%	71.3	69.9	70.3	70.6	70.7	71.4	71.8	71.7	70.7	71.0	70.3	68.7	69.2	69.1	67.5	69.8	69.6	69.6
MTW	ROM Coal	Mt	8.5	17.0	17.0	17.0	17.0	17.0	16.9	16.9	16.9	16.7	16.7	16.6	16.6	16.7	14.8			368.1
	Coal Processed	Mt	8.5	17.0	17.0	17.0	17.0	17.0	16.9	16.9	16.9	16.7	16.7	16.6	16.6	16.7	14.8			368.1
	Plant Yield	%	69.4	67.8	69.4	69.8	69.7	70.0	69.8	69.6	69.5	69.3	69.5	69.1	69.4	69.8	70.6			69.7
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
	Coal Product	Mt	5.9	11.5	11.8	11.9	11.8	11.9	11.8	11.8	11.7	11.6	11.6	11.4	11.6	11.6	10.4			256.5
	Effetive Yield	%	69.4	67.8	69.4	69.8	69.7	70.0	69.8	69.6	69.5	69.3	69.5	69.1	69.4	69.8	70.4			69.7
Moolarben	ROM Coal	Mt	8.9	18.9	20.0	20.0	20.0	18.8	18.7	18.6	17.6	15.5	12.0	11.9	11.3	11.4	1.3			270.6
	Coal Processed	Mt	6.1	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	12.0	11.9	11.3	11.4	1.3			212.7
	Plant Yield	%	71.8	77.1	74.6	72.8	75.4	75.4	76.4	77.7	78.4	78.5	78.4	78.4	78.4	77.8	74.1			76.9
	Coal Bypassed	Mt	2.8	5.9	7.0	7.0	7.0	5.8	6.7	6.6	5.6	3.5								57.9
	Coal Product	Mt	8.1	15.9	16.7	16.5	16.8	15.6	15.9	15.9	15.1	13.0	9.4	9.3	8.8	8.9	0.9			222.3
	Effetive Yield	%	90.8	84.2	83.5	82.3	84.0	83.0	84.9	85.6	85.3	83.4	78.4	78.4	78.4	77.8	70.2			82.1
Yarabee	ROM Coal	Mt	2.1	4.0	4.3	4.8	4.6	5.2	5.1	4.9	5.2	4.2	4.2	4.2	4.0	4.2	4.0	4.0	3.5	147.6
	Coal Processed	Mt	1.1	2.3	3.2	3.6	3.4	3.6	4.1	4.1	4.1	3.5	3.4	3.5	3.4	3.5	3.4	3.4	2.7	120.6
	Plant Yield	%	78.8	85.5	75.9	78.6	76.5	77.4	74.0	74.7	80.4	75.8	75.5	74.1	74.1	73.8	73.4	74.1	75.8	76.1
	Coal Bypassed	Mt	0.9	1.7	1.1	1.2	1.2	1.6	1.0	0.8	1.1	0.7	0.8	0.7	0.6	0.7	0.6	0.5	0.8	26.9
	Coal Product	Mt	1.8	3.7	3.5	4.0	3.8	4.4	4.0	3.9	4.4	3.4	3.4	3.3	3.1	3.3	3.1	3.1	2.9	117.5
	Effetive Yield	%	88.2	91.5	82.0	83.8	82.9	84.4	79.2	78.7	84.4	79.9	79.9	78.2	77.9	77.9	77.1	77.5	82.0	79.6
Austar	ROM Coal	Mt	0.0	1.7	2.2	2.9	2.7	2.7	3.1	2.8	3.2	2.5	2.8	3.1	2.5	2.6				42.6
	Coal Processed	Mt	0.0	1.7	2.2	2.9	2.7	2.7	3.1	2.8	3.2	2.5	2.8	3.1	2.5	2.6				42.6
	Plant Yield	%	0.0	86.0	79.0	74.0	70.0	73.0	68.0	70.0	73.0	67.0	73.0	71.0	77.0	73.1				72.9
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
	Coal Product	Mt	0.0	1.4	1.7	2.1	1.9	2.0	2.1	2.0	2.4	1.7	2.0	2.2	1.9	1.9				31.0
	Effetive Yield	%	0.0	86.0	79.0	74.0	70.0	73.0	68.0	70.0	73.0	67.0	73.0	71.0	77.0	73.1				72.9
Ashton	ROM Coal	Mt	1.5	3.4	2.9	2.6	2.4	2.8	3.1	5.7	6.2	5.7	5.9	4.8	0.6					47.6
	Coal Processed	Mt	1.5	3.4	2.9	2.6	2.4	2.8	3.1	5.7	6.2	5.7	5.9	4.8	0.6					
	Plant Yield	%	49.1	52.6	54.9	53.5	52.7	59.9	58.8	54.6	57.9	58.4	59.3	60.0	47.1					56.7
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					0.0
	Coal Product	Mt	0.7	1.8	1.6	1.4	1.3	1.7	1.8	3.1	3.6	3.3	3.5	2.9	0.3					27.0
	Effetive Yield	%	49.1	52.6	54.9	53.5	52.7	59.9	58.8	54.6	57.9	58.4	59.3	60.0	47.1					56.7
Stratford Duralie	ROM Coal	Mt	0.5	1.1	1.7	1.9	1.8	1.3	1.6	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	68.2
	Coal Processed	Mt	0.5	1.1	1.7	1.9	1.8	1.3	1.6	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	68.2
	Plant Yield	%	49.9	56.9	59.4	57.8	58.3	62.4	67.6	64.8	60.1	60.5	60.8	61.4	61.3	61.2	55.3	54.4	36.2	58.4
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Coal Product	Mt	0.2	0.6	1.0	1.1	1.0	0.8	1.1	1.3	1.2	1.2	1.2	1.2	1.4	1.2	1.1	1.1	0.7	38.2
	Effetive Yield	%	49.9	56.9	59.4	57.8	58.3	62.4	67.6	64.8	60.1	60.5	60.8	61.4	61.3	61.2	55.3	54.4	36.2	56.0
Middlemount	ROM Coal	Mt	2.9	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4				100.4
	Coal Processed	Mt	2.9	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4				100.4
	Plant Yield	%	79.7	76.8	78.0	77.0	76.9	77.1	75.6	74.5	74.1	74.1	70.7	74.6	75.9	76.1				75.7
	Coal Bypassed	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
	Coal Product	Mt	2.1	4.1	4.2	4.2	4.2	4.2	4.1	4.0	4.0	4.0	3.8	4.0	4.1	4.1				76.0
	Effetive Yield	%	79.7	76.8	78.0	77.0	76.9	77.1	75.6	74.5	74.1	74.1	70.7	74.6	75.9	76.1				75.7
Total	ROM Coal	Mt	34.6	71.9	74.1	75.1	74.4	73.8	74.6	77.0	77.1	72.7	69.6	68.6	63.3	62.9	42.6	25.7	20.9	1,859.9
	Coal Product	Mt	26.2	53.4	55.1	55.6	55.3	55.2	55.7	56.8	56.9	52.8	49.4	48.5	45.5	45.3	29.3	18.0	14.3	1,377.7

Figure 9-1 Graphical Representation of Operations LOM Schedule



RPM highlights that Donaldson is not included in the Operations LOM Schedule as it is currently on care and maintenance pending re-start at the Company's discretion. As outlined in ***Section 8 and 10***, Coal Reserves have been estimated and are included in this Report with detailed studies confirming the economic viability. RPM understands the re-start of Donaldson is dependent on optimal market conditions and performance of the Company's other operations to best fit the asset portfolio and is not dependent on capital or any other technical requirement and demonstrates "Commercial Path to Production". RPM agrees with this approach.

9.2 Upside Opportunities

While the current LOM plans display significant mine lives for each operation, there is potential to further optimise the operation to increase the mine life, bring forward production or realise value through detailed planning. The key opportunities include:

- **HVO/MTW Underground** – High level studies have highlighted the significant potential for an economically viable underground operation. As further outlined in ***Section 16*** this would include multiple areas and could be undertaken in conjunction with the current open pit operations. If undertaken this would increase ROM production by up to 5 to 7Mtpa for each asset and have the added advantage of augmenting take or pay commitments of the groups operation. RPM is aware advanced studies are underway to further evaluate the potential and synergies across the operation.

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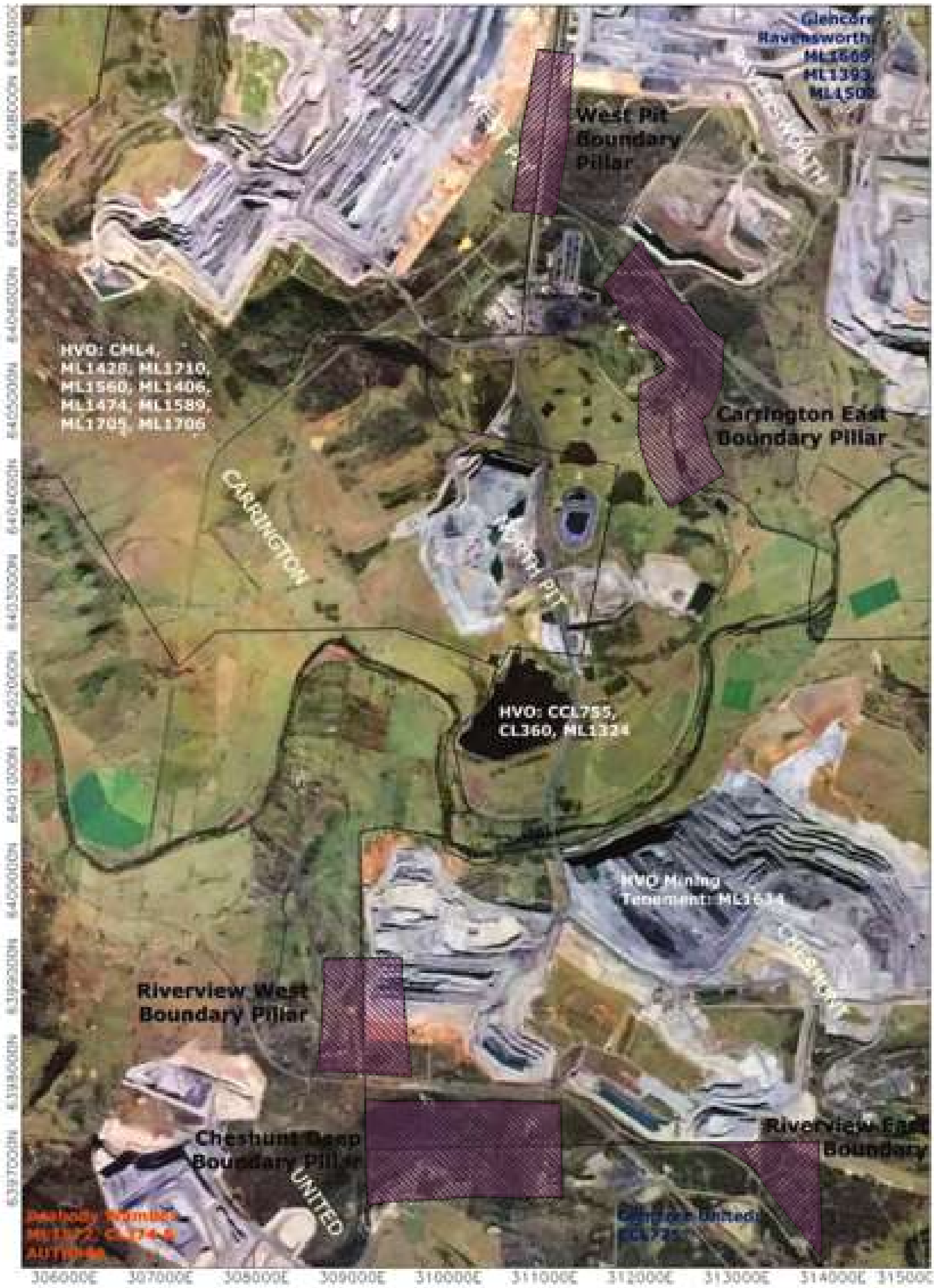
- **HVO Boundary Coal Pillar**- The current Coal Reserves and LOM plan excludes significant coal within the boundary pillars of the tenement holdings due to the inability of mining across the tenement boundary on the neighbouring tenement (***Figure 9-3***). With the recent Joint Venture Company formed between the Company and Glencore for HVO, this presents the potential for this coal to be exploited via agreement with Glencore. RPM notes that the majority of this coal is within the breakeven strip ratio and would become economic if mining were to occur across the tenement, as such presents significant upside to the current LOM plan. The Company has engaged a third party consultant to estimate the potential boundary coal at HVO. The study indicates that an additional coal tonnage of between 100 and 120Mt could be exploited with extensions of the West, Carrington East, Riverview East and West and Cheshunt Deep pits as shown in ***Figure 9-2***. Detailed integrated planning is required to confirm these tonnages.
- **Blending** – The current LOM plan presented in this Report and the supporting cashflow analysis, assumes no blending occurs either within the operations or between the operations. RPM is aware that the Company has a dedicated marketing department which analyse both short and medium term market conditions to strategically blend the various coal products from each operation to maximise revenue generated. The products generated by the operations are generally high value coal types and blending based on product qualities can realise additional value rather than selling single products from the operations. In addition, as the Company further incorporates HVO/MTW into its operations this blending strategy could be used to further optimise mining operations in both short and medium term planning through careful and meticulous mine plans focusing on:
  - Maximise the exploitation of the in situ resources by potentially increasing pit limits using improved revenue streams and
  - Incorporate the ability to react quickly to market condition by changing the short term mine plan to target seams with specific coal qualities.
- **Moolarben Expansion** –The expansion of the open cut involves optimisations of the approved Stage 1 and Stage 2 operations to increase site ROM coal production to 24Mtpa from the current circa 18Mtpa. The Modification also involves a minor extension to the OC2 pit limit, minor extensions and reductions of the OC3 pit limits, rehabilitation, water management and relocated/additional surface infrastructure. The successful implementation of the Stage 2 expansion plans from 8Mtpa to the forecast at Moolarben demonstrates the Company's ability to achieve organic growth targeting low cost/high margin coal.



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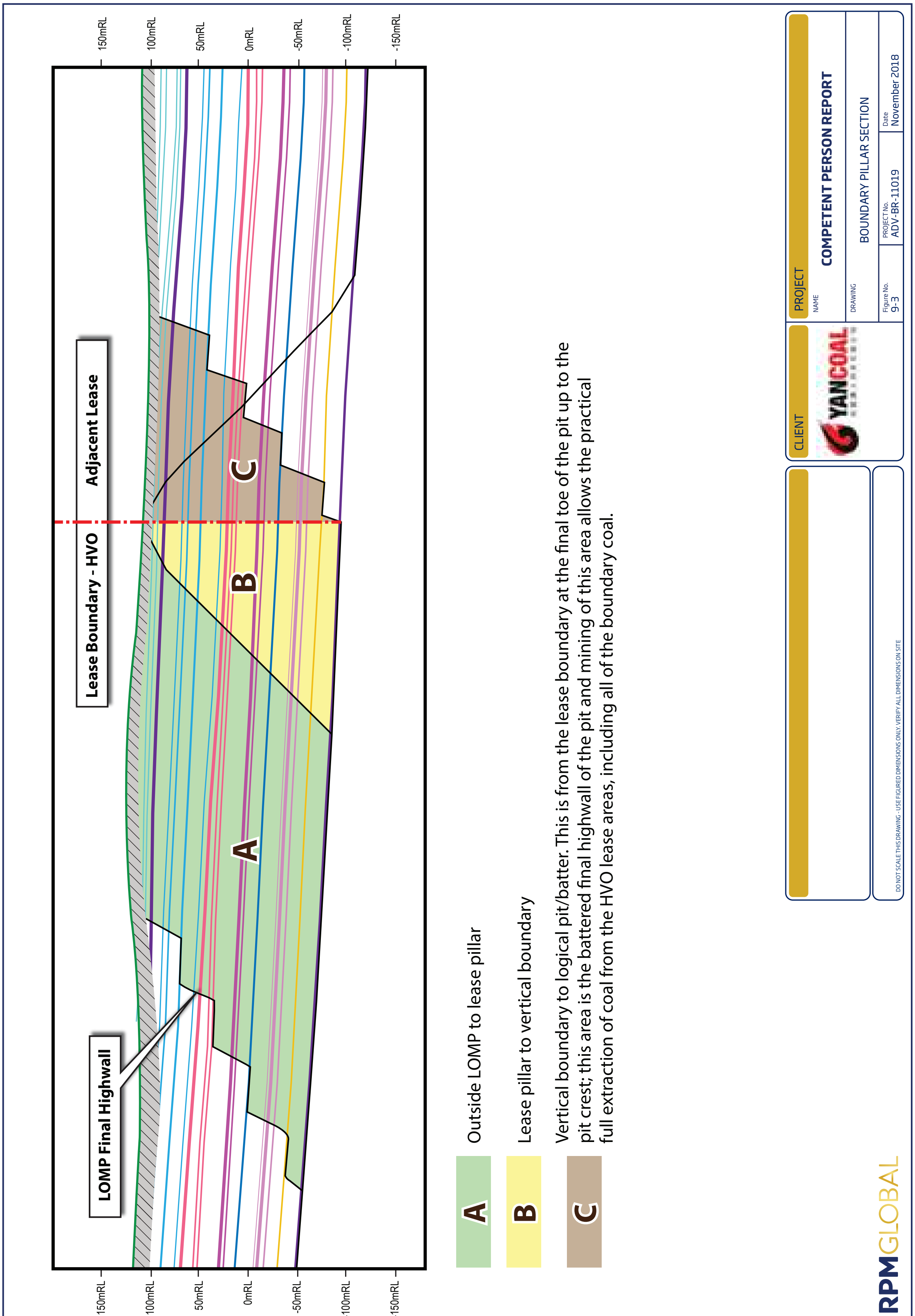
LEGEND	CLIENT	PROJECT
Boundary Pillar Locations	YANCOAL	NAME: COMPETENT PERSON REPORT
		DRAWING: HVO BOUNDARY PILLAR LOCATIONS
0 — 5 km		Figure No. 9-2 / PROJECT No. ADV-BR-11018 / Date November 2018

DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE



150mRL
100mRL
50mRL
0mRL
-50mRL
-100mRL
-150mRL
LOMP Final Highwall
Lease Boundary - HVO
Adjacent Lease
A
B
C
A Outside LOMP to lease pillar
B Lease pillar to vertical boundary
C Vertical boundary to logical pit/batter. This is from the lease boundary at the final toe of the pit up to the pit crest; this area is the battered final highwall of the pit and mining of this area allows the practical full extraction of coal from the HVO lease areas, including all of the boundary coal.
RPMGLOBAL
DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE
CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
BOUNDARY PILLAR SECTION
Figure No.
9-3
PROJECT No.
ADV-BR-11019
Date
November 2018

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10. Mining

All mining operations at the Assets are undertaken via conventional truck, shovel, excavator and/or dragline open cut or via underground Longwall mining methods. ROM coal is hauled to Coal Handling Preparation Plants which produce marketable product coal. Subsequent to blending and stockpiling, product coal is loaded onto trains and transported to the Port for sale on the international market.

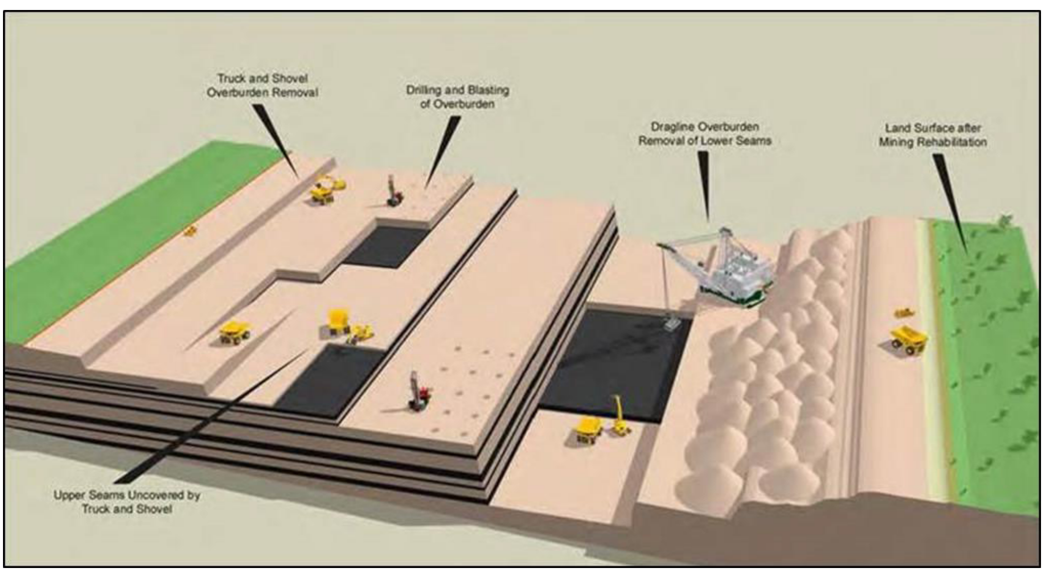
10.1 Mining Method

Open Cut Methods

Coal within the majority of operations occurs as large sub-horizontal bodies which are laterally very extensive. The exception to this is the Stratford and Duralie operation which has steeply dipping coal due to geological structures. The operations utilise large scale open cut mining methods which is summarised below and shown graphically in ***Figure 10-1***.

- Removal and storage of topsoil material via truck and front end loader methods.
- Drilling of a blast pattern.
- Blasting to fragment rock.
- Excavation of waste material with truck and shovel/excavator in the upper benches to uncover coal.
- Excavation of waste material in lower benches by draglines (in certain pits) and
- Digging, loading and hauling of coal via truck and excavator/front end loader methods.

Figure 10-1 Graphical Representation of Open Cut Coal Mining



Some operations utilise additional equipment, when the geological structure permits, that is typically lower in unit operating costs. These include:

- Draglines – usually sit in the lower strata and expose the bottom one or two seams with waste is dumped directly adjacent to the strip of coal being exposed. Draglines are currently operating at HVO and MTW.
- Dozer Push – a single or set of dozers are used to push waste adjacent to the strip being exposed. These can be used with truck and shovel operations and/or a dragline. Moolarben and Middlemount operations currently use dozer push as a primary production method.

The mining direction can also define the mining method. Draglines and dozer push require a strip mining operation where coal is typically mined in long strips, down dip with waste placed in the adjacent strip, usually with large vertical haulage for waste. Haulback, or Terrace Mining, typically mines perpendicular to seam dip with mining progressing along strike. This method may mine deeper coal early in the schedule but also moderates waste haulage which can be placed in the void with minimal vertical haulage.

RPM notes that the open cut mines in this report use the following methods:

Table 10-1 Primary Open Cut Mining Methods

Open Cut Mine	Mining Method	Pre-strip Removal	Additional Waste Removal
HVO	Haulback and Strip mining	Truck and shovel/excavator	Dragline
MTW	Strip mining	Truck and shovel/excavator	Dragline
Moolarben	Haulback mining	Truck and excavator	Dozer Push
Ashton	Haulback and Strip mining	Truck and excavator	
Yarrabee	Strip mining	Truck and excavator	
Stratford and Duralie	Haulback	Truck and excavator	
Middlemount		Truck and excavator	Dozer Push

Underground Methods

As outlined in **Table 10-2**, two underground mining methods are employed within the operation, conventional Longwall and Longwall Top-Coal Caving methods. Both method are well known and understood methods in Australia and are considered conventional mining methods.

Table 10-2 Primary Underground Mining Methods

Underground Mine	Mining Method
Moolarben	Longwall
Ashton	Longwall
Austar	Longwall and Longwall Top Coal Caving
Donaldson	Longwall

Longwall

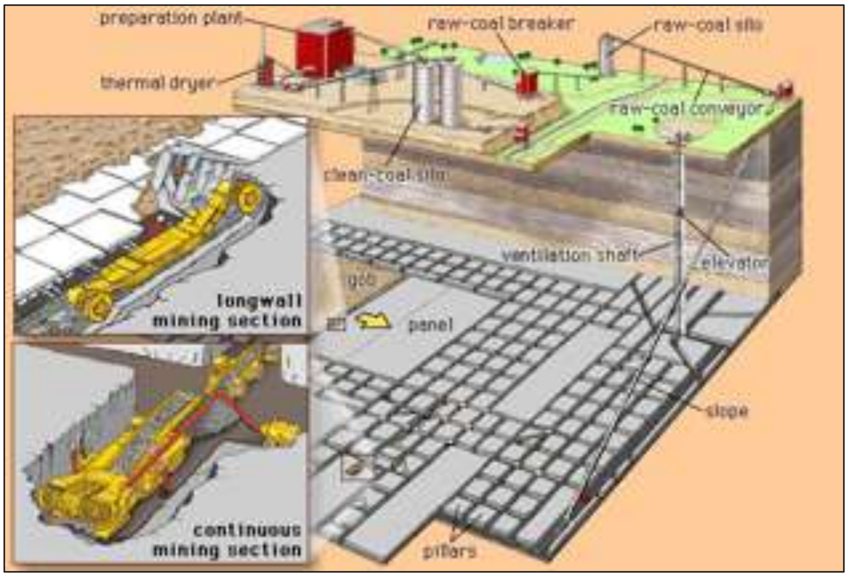
Longwall mining roadways are cut by continuous miners around the perimeter of a rectangular block of coal to form ventilation and access passageways. A longwall shearer is set up at one end of the panel and travels back and forth across the width of the panel, cutting a slice of coal with each pass.

Typically, panels are between 150 metres and 400 metres wide and 1,500 and 5,000 metres long. They are between 2 metres and 5 metres high, dependent on the thickness of the coal seam. The coal is transferred to the surface by conveyors.

The area at the coal face is supported by a series of large hydraulic roof supports. These provide a protective cocoon within which the workers can operate with safety. As each slice of coal is taken, the longwall equipment is advanced. The roof that had been supported by the hydraulic supports subsequently collapses into the void that is created by the removal of the coal seam. The void is referred to as the goaf.

Longwall mining is generally considered to be the safest underground extraction method for coal. It is also superior to other underground mining methods in terms of resource recovery, as well as being more productive and therefore more cost effective. It is however less favourable where the coal seam is affected by geological structures such as faults, rolls, dykes, sills and plugs, or where there are strong inconsistencies in coal quality, seam gradients or seam thickness.

Figure 10-2 Graphical Representation of Longwall Underground Mining



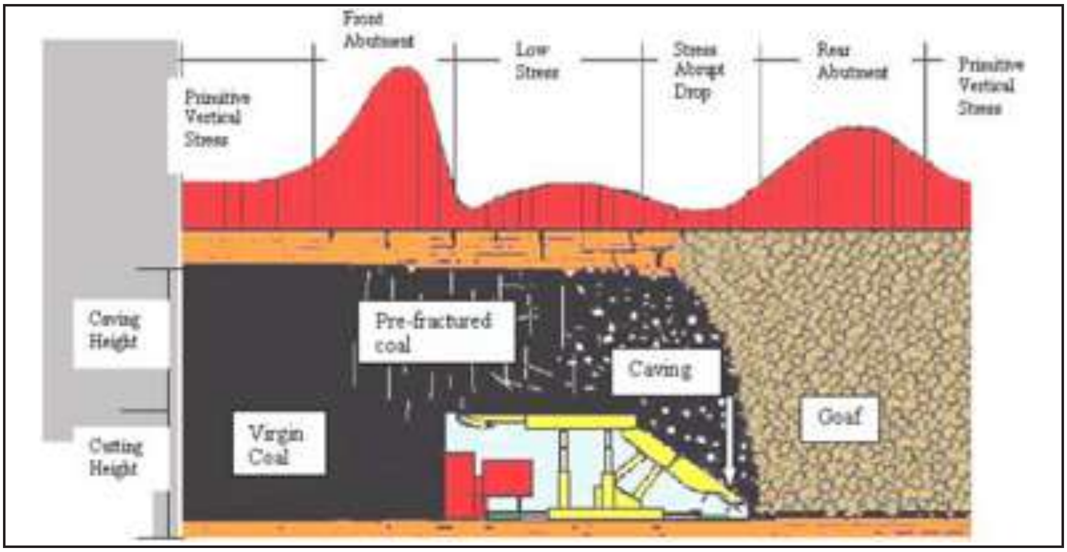
Longwall Top Coal Caving

Longwall Top Coal Caving ("LTCC") is a type of longwall mining applicable to very thick seams (greater than 4.5m) where coal is being left because "conventional" longwall equipment typically cannot mine beyond around 5m mining height. As a result, it generally enables an increased recovery for only an incremental additional cost. The method originated in Europe but has been developed in China in more recent years before being implemented in Australian coal operations.

As shown in ***Figure 10-2***, the lower section of the seam is cut by a conventional longwall set-up except that the longwall supports have a longer rear canopy extending past the base into the goaf. The extended canopies have a sliding door fitted into them. An additional armoured face conveyor ("AFC") is attached to the rear of the chocks and runs directly below the canopy openings.

As the face moves forward, the coal left above the section cut by the shearer falls onto the extended canopies, providing the goaf is caving normally. The sliding doors in the canopies are sequentially opened and the coal falls through onto the rear mounted AFC. The main gate stage loader is extended beyond the face conveyor to enable the rear mounted AFC to discharge coal directly onto it and carry coal to the main gate conveyor system.

Figure 10-3 Graphical Representation of Longwall Top Coal Caving Underground Mining



10.2 HVO

The HVO site area is approximately 20 km long (North to south) and 10 km wide (Figure 2-2). HVO is divided into HVO North (HVON) and HVO South (HVOS) which are separated by the Hunter River which flows through the HVO leases. There are a number of current active pits and potential future developments at HVO, with the existing operation producing approximately 20Mtpa of run-of-mine coal which results in approximately 14 to 15Mtpa of coal products.

Pit Limits

YAL completed a margin ranking process using XPAC mine planning software which is a process which attributes revenue and costs factors to a set of discreet block data to estimate the incremental and cumulative margin for each coal horizon. The margin ranking results provide an indication of the economic pit limits and also may assist in strategic planning as it allows the relative ranking of pits from high to low margin. The margin ranking was limited to the extents of the pit shells for HVO. The cost assumptions for the margin ranking include:

- Waste removal costs based on budget forecasts with operational improvements to productivity based on YAL benchmarks.
- Drill and blast costs based on YAL cost data.
- All other onsite costs as per the sites budget.
- Offsite costs updated as per YAL expectations.

The outcomes from the margin ranking were analysed and, allowing for cost of capital, a cut off margin of AUD 10.00 per product tonne was selected. Although the margin ranking process is indicative, it provides a good guide for targeting economical reserves for mine planning and scheduling.

The potential basal seams resulting from the margin ranking are outlined in ***Table 10.3***. The basal seam applied in the LOM plan and Reserves reporting is also shown. In some cases the potential economic basal seam may be below the pit design and presents upside for further expansion of the pits.

RPM has reviewed YAL's margin ranking exercise and considers it suitable and has applied these basal seams to the LOM Schedule presented in this Report.

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Table 10-3 Margin Rank and Design Seam Floor

Pit	Margin Rank Basal Seam	LOM / Reserve Basal Seam	Comments
West Pit	Barrett	Barrett / Liddell	South of bridge, the pit steps up to Liddell
Wilton Pit	Barrett	Barrett	
Mitchell Pit	Barrett	Barrett	
Carrington West Pit	Bayswater	Bayswater	
Riverview Pits	Warkworth	Warkworth	
Cheshunt Pits	Lower Liddell	Bayswater	Pit limited to Bayswater seam for practical purposes
Southern Pit	Hebden (Lower Barrett)	Lemington	Pit limited to Lemington seam for practical purposes
Auckland Pit	Hebden (Lower Barrett)	Lower Barrett	

In addition to the margin rank, RPM generated a break-even strip ratio to confirm the pit limits. A break-even strip ratio is the ratio of burden (waste) to ROM coal tonnes at which there is AUD0 margin. The cost inputs in the estimation of the break-even stripping ratio were as per those used in the above described margin rank process. The estimated break-even strip ratio for HVO is 17:1. Cumulative strip ratio plots were generated in Geovia Minex software to the appropriate seam floors for each pit area and compared against the break-even strip ratio estimate.

The break-even strip ratio analysis confirmed the results of the margin rank study completed by YAL. RPM also used the break-even strip ratio method to confirm the pit limits at Auckland South and Carrington East which were not included in the margin ranking as they were not included in the previous works completed by the YAL.

The pit limits are shown in ***Appendix C***.

Mine Design

Seismic hazard studies were not included in the documents available. However, the region is classified as a low seismicity area and seismic hazard is not a critical design consideration. RPM considers the geotechnical parameters applied to Assets pit designs are suitable and reasonable for the rock types identified.

The slope criteria adopted in the LOM plan for HVO are shown in the ***Table 10-4***. RPM notes that in some sections of wall the overall slope design may vary depending on the depth and the number of berms in the wall design.

Table 10-4 HVO Pit Design Slopes

Pit	North	East	South	West
West	30	38	30	N/A
Riverview	N/A	N/A	50	37
Cheshunt 1&2	40	N/A	45	45
Cheshunt Deep	40	40	40	40
Carrington West	40	45	44	38
Wilton/Mitchell	40	39	30	17-27
Southern	37-40	22	37-40	37
Auckland	35	35	35	35
Auckland South	37	31-37	37	37
Carrington East	47	45	55	45

Coal is planned to be mined from up to 10 separate pits over the life of the mine. Mine designs are generally based on those generated by the Company however have been reviewed by RPM and considered reasonable. RPM notes the following with regards to mine design:

- Some geotechnical issues have had an impact on design such as mining through alluvial land or in proximity to underground workings, however these have not had a significant impact on the operation,
- In the current pits, bedding is inclined in the direction of the highwall and major faulting generally trends perpendicular to the highwall.
- The weakest strata on site is the alluvial material, which requires significant geotechnical and hydrogeological study to confirm impact on pit design and stability.
- The ongoing design criteria used at the site includes input from:
- Regular geotechnical inspections, reviews and design advice from external geotechnical consultants throughout the entire period of mining operations; and
- Inspections and back analysis of any wall failures to demonstrate causes of failure with preventative measures being incorporated back into wall design.

At HVON the current active mining area is the West pit, however there has been recent mining in the Wilton and Carrington pits. West pit is a dragline pit whereas the Wilton and Carrington pits are planned to be mined via truck and shovel methods only. The West pit targets a Barrett seam floor. Coal seams from the Barrett seam at the bottom of the pit up to the Lemington seam are found in the West pit area with the upper seams more developed as the pit progresses down dip to the southeast.

A centre bridge system is used by the dragline at West pit to gain access into each successive cut. The coal beneath the centre bridge is not recovered with a low-wall ramp system used to gain access to the Liddell and Barrett coal seams at West pit. The pre-strip operations are undertaken by electric rope shovels and large hydraulic excavators loading rear dump trucks. Pre-strip waste is placed into the inpit dumps with coal mined by front end loaders and hydraulic excavators hauled to either of the CHPP's.

Within HVOS, there are two currently operating pit areas; Cheshunt 1 and 2 and Riverview. Riverview pit is located to the west of the Cheshunt pits on the western limit of the HVO lease boundary and has planned to pit limits of approximately 1.2 km wide (west to east) and 1 km north to south. Riverview is a dragline operation with truck and shovel pre-strip with the pit advancing to the south. In the north, the basal seam of the pit was the Warkworth seam (area mined out), with the central area of the pit the Warkworth seam splits away from the Bowfield seam and the floor of the pit is stepped up to a Bowfield floor.

Coal from the Riverview pit is mined by front end loaders and hauled to either CHPP. The in-pit spoil from the Riverview pit will ultimately be rehandled as part of the Cheshunt Deep pit which will target the Bayswater seam beneath the current Riverview pit.

Cheshunt 1 and 2 pits are adjoining mining areas located at the northern end of the HVOS area. The pits are mined by truck and shovel methods with waste being hauled to out of pit / inpit dumps to the north east of the pits either via the eastern endwall or cross pit access between the Cheshunt 1 and Cheshunt 2 pits. A ramp system up the advancing waste dump has been developed which provides access to a number of active dump tip heads. The combined length of operating face at the two pits is approximately 3 km. The pits are developed to the south and southwest and are a subset of the Cheshunt Deep pit extension which is planned in later years of the mine life. Coal seams from the Warkworth seam down to the Barrett seam are identified in the area, however the Cheshunt 1 and 2 pits mine down to the Bayswater seam floor only.

A third party dump study carried out on the 2017 LOM plan identified the following point:

- At the Auckland pit there was a significant shortfall in dump capacity when using the HVO's dump shell limit of 140 mRL. Accordingly, the planned dump height has been increased to 180 mRL to allow a spoil balance to be achieved. RPM highlights there is sufficient time to review and improve the mine plan at Auckland as the pit is not scheduled to commence until 2052.

RPM considers the HVO waste dump designs and strategy to be adequate to support the Life of Mine Production Schedules. Opportunities may exist to optimise waste handling and storage through detailed reviews of mine designs and scheduling.

Mine Schedule

The HVO LOM schedule was developed targeting a ROM coal production rate of 20.6Mtpa from a number of active mining areas at the site. West Pit, due for completion in 2034, is currently mined using a combination of truck and shovel for pre-strip operations and a dragline uncovering the lower coal seams, has a target of 4.5Mt ROM Coal per annum. At the completion of this pit the dragline will be retired from use at the mine. Riverview Pit is currently being mined by truck/excavator and dragline method. The Riverview Pit is mined to the Warkworth Seam with spoil placed into the mined out void. Following completion of the Riverview Pit in 2024 the dragline will be retired. The in-pit spoil at Riverview will also be re-handled as part of the larger Cheshunt Deep it which targets the deeper seams. The Cheshunt 1 & 2 Pits are adjacent active truck and shovel pits and are a subset of the larger Cheshunt Deep Pit. The Cheshunt 1 & 2 Pits are forecast to mine up to 14.7Mtpa and will be completed in 2023 following transition into the Cheshunt Deep Pit.

The future pits at HVO are the Cheshunt Deep Pit, Southern, Auckland, Carrington East and Auckland South Pits. The Cheshunt Deep Pit is scheduled to be completed in 2041 at which time the Southern, Carrington East and Auckland South Pits will be developed to maintain the total site production rate of approximately 20Mtpa. As these pits are depleted, the Auckland pit will be developed in 2052 with the operation transitioning to a lower production rate of 10Mtpa before completion in 2060.

The HVO schedule results, which RPM consider to be practical and achievable, are presented in ***Table 10-5.***

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Table 10-5 HVO/MTW LOM Production Schedule

Operation	Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2040	Avg. 2041-2050	Avg. 2051-2060	Total LOM
HVO	**Mining**																			
	ROM Coal	Mt	10.2	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.8	15.4	814.9
	Prime Waste Mined	Mbcm	50.1	87.6	97.4	113.5	121.5	99.5	131.2	140.6	114.2	118.0	120.4	122.7	102.1	114.7	108.5	118.0	88.9	4,604.1
	Rehandle Waste	Mbcm	6.1	10.0	11.2	11.7	11.3	11.3	11.1	8.7	8.2	8.0	7.9	7.8	7.2	5.7	2.2	2.4	1.8	201.2
	Total Waste mined	Mbcm	56.3	97.6	108.6	125.2	132.7	110.8	142.3	149.3	122.5	126.0	128.3	130.5	109.3	120.4	110.7	120.4	90.7	4,805.3
	Prime Strip Ratio	bcm/ROM t	4.9	4.3	4.7	5.5	5.9	4.8	6.4	6.8	5.5	5.7	5.8	6.0	5.0	5.6	5.3	6.0	5.8	5.6
	Total Strip Ratio	bcm/ROM t	5.5	4.7	5.3	6.1	6.4	5.4	6.9	7.2	5.9	6.1	6.2	6.3	5.3	5.8	5.4	6.1	5.9	5.9
	CHPP																			
	Coal Processed	Mt	10.2	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.8	15.4	814.9
	Plant Yield	%	71.3	69.9	70.3	70.6	70.7	71.4	71.8	71.7	70.7	71.0	70.3	68.7	69.2	69.1	67.5	69.9	69.2	69.6
	Bypass Coal	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Coal Product	Mt	7.3	14.4	14.5	14.6	14.6	14.7	14.8	14.8	14.6	14.6	14.5	14.2	14.3	14.2	13.9	13.8	10.7	567.4
	Effective Yield	%	71.3	69.9	70.3	70.6	70.7	71.4	71.8	71.7	70.7	71.0	70.3	68.7	69.2	69.1	67.5	69.8	69.6	69.6
	Product Type																			
	Semi Soft Coking	Mt	1.2	4.5	4.6	4.9	4.2	4.1	4.0	4.2	3.7	3.4	2.7	2.7	3.2	3.0	2.6	3.2	2.0	127.3
	Thermal (low ash)	Mt	2.7	4.4	4.4	4.3	4.7	4.9	5.0	4.9	5.1	5.3	5.6	5.5	5.3	5.6	5.8	5.7	4.7	222.2
	Thermal (Mid ash)	Mt	3.1	5.0	4.9	4.7	5.0	5.1	5.1	4.9	5.0	5.1	5.2	5.0	4.8	4.6	4.3	3.6	2.9	173.4
	Thermal (high ash)	Mt	0.3	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.3	1.1	44.4
MTW	**Mining**																			
	ROM Coal	Mt	8.5	17.0	17.0	17.0	17.0	17.0	16.9	16.9	16.9	16.7	16.7	16.6	16.6	16.7	14.8			368.1
	Prime Waste Mined	Mbcm	51.1	88.5	101.8	105.1	105.8	101.7	102.2	104.4	104.2	102.7	103.1	99.1	95.7	97.2	90.3			2,203.3
	Rehandle Waste	Mbcm	8.0	13.0	16.0	15.4	14.0	13.8	13.8	14.3	14.9	15.0	15.0	15.1	13.9	15.8	13.0			326.3
	Total Waste mined	Mbcm	59.1	101.6	117.7	120.5	119.8	115.5	116.1	118.7	119.1	117.7	118.1	114.2	109.6	113.0	103.4			2,529.6
	Prime Strip Ratio	bcm/ROM t	6.0	5.2	6.0	6.2	6.2	6.0	6.0	6.2	6.2	6.1	6.2	6.0	5.8	5.8	6.1			6.0
	Total Strip Ratio	bcm/ROM t	6.9	6.0	6.9	7.1	7.1	6.8	6.9	7.0	7.1	7.0	7.1	6.9	6.6	6.8	7.0			6.9
	CHPP																			
	Coal Processed	Mt	8.5	17.0	17.0	17.0	17.0	17.0	16.9	16.9	16.9	16.7	16.7	16.6	16.6	16.7	14.8			368.1
	Plant Yield	%	69.4	67.8	69.4	69.8	69.7	70.0	69.8	69.6	69.5	69.3	69.5	69.1	69.4	69.8	70.6			69.7
	Bypass Coal																			
	Coal Product	Mt	5.9	11.5	11.8	11.9	11.8	11.9	11.8	11.8	11.7	11.6	11.6	11.4	11.6	11.6	10.4			256.5
	Effective Yield	%	69.4	67.8	69.4	69.8	69.7	70.0	69.8	69.6	69.5	69.3	69.5	69.1	69.4	69.8	70.4			69.7
	Product Type																			
	Semi Soft Coking	Mt	1.0	2.2	3.0	2.3	2.5	2.7	2.2	2.1	2.3	2.4	2.4	2.4	2.3	3.0	2.7			58.2
	Thermal (low ash)	Mt	2.7	5.2	4.9	5.4	5.3	5.2	5.4	5.5	5.4	5.3	5.3	5.2	5.4	5.1	4.6			114.4
	Thermal (Mid ash)	Mt	1.4	2.7	2.5	2.7	2.6	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.4	2.2	1.8			51.9
	Thermal (high ash)	Mt	0.7	1.4	1.4	1.5	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.3			32.1

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10.3 MTW

Pit Limits

The MTW pit had a margin ranking process carried out by the YAL. RPM has reviewed YAL's margin ranking exercise and considers it suitable for the estimation of pit limits and has applied basal seams as per **Table 10-6** to the LOM Schedule presented in this Report.

Table 10-6 MTW Margin Rank and Design Seam Floor

Pit	Margin Rank Basal Seam	LOM / Reserve Basal Seam	Comments
Loders Pit	Woodland Hill	Woodland Hill	
West Pit	Mount Arthur	Mount Arthur	
North Pit	Mount Arthur	Warkworth	the Company currently mine to Warkworth Seam

RPM generated a break-even strip ratio to confirm the pit limits. The estimated break even strip ratio for MTW is 16:1 bcm:t.

The Pit limits are shown in ***Appendix C***.

Mine Design

There are currently three operational pits at MTW:

- Loders pit,
- West pit and
- North pit.

Coal is planned to be mined from up to three different pits of which Loders will be completed in 2019. The Company advised RPM that the final highwall overall design slope for the North, West and Loders pit is 55º and the end walls (northern and southern walls) vary between 25° and 35º for operational reasons. In all pits the overall slopes may vary depending on the depth of the pits, the number of benches and the number of required access roads.

RPM has reviewed the current mine plans for the pits that are scheduled to be mined over the life of the project and considers that the pit limits were designed with suitable level of detail taking into account the recommended geotechnical and mining operation parameters.

The strategy used for waste haulage and dumping at MTW can be described by the following rules:

- Loders Pit (Mt Thorley) waste is hauled in pit to Mt Thorley dumps (2018 only),
- Loders pit void will be primarily used as a tailings dam. Some waste will also be placed in the void late in the LOM Plan'
- West Pit waste is hauled to the following dumps in order of preference:
- West Pit in-pit dumps,
- South out of pit Dumps (2018 to 2028 after which South out of pit Dump is full)
- West out of pit dump (2028 to 2038 after which West out of pit dump is full) and
- Loders Pit final void (2038 to 2040),
- North Pit waste is hauled to the following dumps in order of preference:
- North Pit in-pit dumps,
- North Pit out of pit dump (2018 to 2022 after which North out of pit dump is full),
- West Pit final out of pit dump (2022 to 2038 after which West out of pit dump is full) and

- Loders Pit final void (2038 to 2040).

At MTW, waste generally fits within the approved dump limits with the one exception being where the dump over the Loders pit area will need to increase by 5m above the approved dump height of 155 mRL. The additional volume is estimated to be 2.5 Mbcm and is not considered by RPM to be a material issue.

Mine Schedule

In the MTW LOM schedule, the Loders Pit is planned to cease in 2019 leaving the West and North Pits to support production. YAL plans to retire the dragline that was operational at Mt Thorley and modify the dragline operating method in the West and North Pits to a tandem offset dragline method which will commence in 2019. The reduction from three operating dragline pits to two will require a change in the dragline operating method to maintain the required production rates, as a result YAL have completed detailed investigation of the revised dragline operating method. The features of the dragline offset method include:

- Operating two draglines in the same pit;
- Increasing the strip width from 55m to 80 m;
- Allows two coal seam horizons to be exposed at the same time;
- Two pass operation in the West Pit, one pass operation in North Pit;
- Spoil pullback pass in West Pit to achieve a spoil balance and
- 30 day delay for both draglines at the end of each strip to allow for de-coaling operations to take place and preparation of the next strip for dragline operation.

The West and North Pits will continue to develop down dip towards the west of the licence area and have a combined production target of approximately 17Mtpa. The ROM coal production from each pit is variable as it depends on the proportion of time the draglines are operating in each pit for any given year. North Pit ceases production in 2040 and West Pit is completed in 2036.

As the North and West Pits near their western limits the proportion of Inferred coal increases. This presents significant upside for future Reserves if successful drilling results in upgrade of the resource classification. The LOM plan schedule results are presented in ***Table 10-5***.

10.4 Moolarben

Mining operations at Moolarben are undertaken via underground longwall mining and conventional large scale open cut methods using owner operator equipment. Open cut ROM coal is hauled to a Coal Handling Preparation Plant and the underground coal is bypassed, all of which produces a marketable thermal product coal. Product coal is loaded onto trains and transported to the Port of Newcastle for sale on the international market.

Pit Limits

Open Cut

The open cut mine targets the Ulan seam with plies mined together as working sections. Some plies, such as the A2 and the top 200mm of the CL ply are wasted to improve product quality. These adjustments to mining have improved yield outputs which have been included in this estimation.

RPM has determined suitable technical parameters including costs, recoveries to apply in the Coal Reserve estimation process following; discussions with site personnel, review of pre-feasibility level documents, proposed life of mine plans, mining method, tailings dam capacity and the forecast processing plant recoveries for the areas of the Assets where Measured and Indicated Resources have been estimated. RPM notes that the sites are currently operating and that at least pre-feasibly study level documents were available for expansion areas, which formed the basis for the selected parameters.

The following parameters (***Table 10.7***) have been used for the Coal Reserve estimate and reporting at Moolarben:

- Variable metallurgical recoveries (yield) dependent on the ROM coal quality were utilised in the study and are based on the laboratory testing of slim core data. Adjustments are made to allow for inefficiencies of a coal preparation plant when compared to laboratory test work. The factors applied are 93% yield factor and a 1.4% increase in the product ash (reported product ash = laboratory Ash + 1.4%).
- Thermal products are based on the resultant thermal ash which typically ranges from 14.5% to 28% ash products.
- Mining and processing operating costs utilised in the margin ranking and break-even were based on actual operating cost data and forecast performance of the operations as per YAL's life of mine planning process. These costs are based on various expected volumes, plant maintenance and cost estimates over the life of the project. All mining is undertaken by the owner, as such the input costs reflect this with separate operating costs and capital costs for mobile equipment.
- In situ coal estimates have been converted to Run of Mine estimates through the application of Modifying Factors which are outlined in **Table 10-7**. In addition a minimum thickness cut off of 0.3m is applied to the A1 ply and ELW which also has a 55% raw ash cut off. The recoveries are based on reconciliation of site data.

Table 10-7 Moolarben OC Yields

	OC1	OC2	OC3	OC4
A1 Recovery	55%	55%		55%
A1 Ash Addition	13%	13%		13%
ELW Recovery				90%
WS1L Recovery	98%	98%	93%	97%
WS2L Recovery	98%	98%	95%	98%
WS1L Total Moisture	6.1	6.5	6.5	6.1
WS2L Total Moisture	7.5	8.3	8.3	7.5
WS1L Dilution	-0.90%	-0.90%	-0.90%	-0.90%
WS2L Dilution	1.40%	1.40%	1.40%	1.40%

Long term forecast prices were utilised for the economic modelling to underpin reporting of Coal Reserves. The prices for margin ranking and reporting of Coal Reserves are at the point of sale of the products (free of board). The long term forecasts were sourced from third party reports completed by marketing experts provided to the YAL along with discussions with YAL personnel. YAL updates long term pricing forecasts on a 6 monthly basis. RPM is not a commodity forecasting specialist and has relied on third parties for price assumption. As per the JORC Code reporting requirements, RPM has completed independent reviews based on public and internal pricing information and considers the price assumption to be reasonable.

Table 10-8 Moolarben Open Cut Break Even Strip Ratio Input Parameters

Description	Units	Moolarben
Prices		
SSCC	USD /tonne	-
Thermal	USD /tonne	66 – 88
Exchange Rate	AUD/USD	0.75
Average Mining Costs		
Coal Mining	AUD /tonne	1.70
Waste Mining	AUD /bcm	2.70
Site Overheads		
Processing	AUD /t ROM	5.30
Administration	AUD /t Prod	4.09
Offsite Costs		
Rail	AUD/t Prod	8.45
Port	AUD/t Prod	5.14
Other Offsite Costs	AUD/t Prod	1.68
Average Yield		
CHPP	%	77
Bypass[4]	%	UG Only

Notes:

1. *Coal Prices in USD*
2. *Thermal coal price varies for Mid and High ash products*
3. *All costs in Australian Dollars*
4. *Currently no bypass assumed for the open cut at Moolarben*

The pit limits are shown in ***Appendix C***.

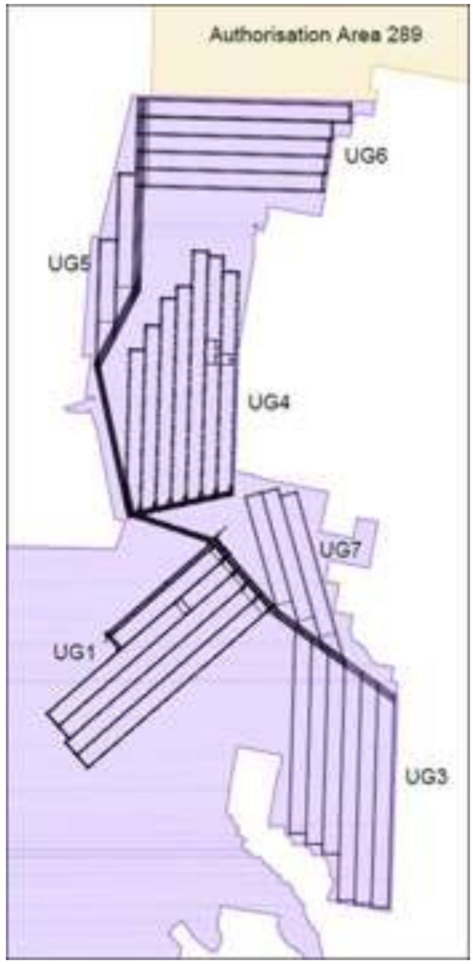
Underground

The target underground mining areas are the deeper areas of the resource, generally located beneath natural ridgelines that are unfavourable to mine via open cut methods. The underground mining strategy is to continue a single longwall operation, sequentially working through the underground resource areas. As per standard practice, the longwall is supported by development activity which currently utilises continuous miners. Development activity proceeds ahead of the longwall and as such there will be points in the mining schedule when two mining areas are operating simultaneously, as development progresses into UG4 while the longwall completes UG1.

There are currently three approved underground mining areas (UG1, UG2 and UG4) although as shown on ***Figure 10-4***, only UG1 and UG4 are included in the LOM plan. UG2, which lies between OC2 and OC4, is relatively small and considered a less attractive target than the other two underground targets. Additional resource areas (UG3, UG5, UG6 and UG7) as shown on ***Figure 10-5***, are considered for underground extraction but exploration and study for these areas have yet to reach a sufficient level of maturity to be included in the plan.

Figure 10-4 Moolarben underground mining areas

Figure 10-5 UG pipeline projects



Mine Design

Open Cut

The open cut operations consist of five pits labelled OC1, OC2, OC3, OC3E and OC4. Mine designs are based on the 2017 LOM plan generated by Yancoal however have been reviewed by RPM and considered reasonable. RPM note that Reserves are reported for all pits with the exception of OC3E Pit. Pit designs are based on a 75° pre-split wall or 70° trimmed wall with a 45° batter through weathered material. A 12m – 15m berm is placed at the base of the weathering and at required intervals to avoid batters greater than 45m in height. Strip widths vary from 50m to 100m to suit dozer push and excavators respectively.

Information provided by YAL notes the following with regards to pit design:

- An in situ barrier of coal has been left between OC1 and UG1 pits,
- Factors such as 1 in 100 year flood extents, economic limits, adjacent mining operations, geological features, approval limits, coal crops, watercourses and infrastructure define the pit boundaries and
- Extensions to OC3 to the south are under investigation, as such are not included in Coal Reserves.

Waste will be placed as per the approved final rehabilitation surface. RPM have not reviewed this surface but due to the very low stripping ratio in the LOM plan, spoil fit is not seen as a potential issue in the Moolarben mine plan. Dump planning needs to be carried out to ensure the site maintains a minimal noise and dust pollution output.

Both waste and coal mining will be completed using hydraulic excavators in both backhoe and shovel configuration dumping into rear dump trucks. OC4 will have the assistance of a dozer push fleet that has recently been introduced. RPM view this equipment as appropriate for the operations at Moolarben.

Underground

Underground development is undertaken using conventional development equipment. Single-pass bolter-miners (continuous miners) are used in development sections, with shuttle cars used to transport coal to the coal clearance system. The coal extraction methodology has been based on the use of standard Australian continuous miner practices for development and retreat longwall practices for production.

Development in UG1 and UG4 is performed by a combination of conventional development and super unit configurations. Conventional development units consist of one continuous miner and up to two shuttle cars in a panel alternately advancing each roadway and completing a pillar cycle. Super units consist of two continuous miners and two shuttlecars in a panel, with a continuous miner in each roadway to increase the rate of advance of the panel.

Longwall extraction is undertaken using a CAT longwall system applying the Bi-Di method of cutting through use of a twin ranging arm shearer cutting a conventional mining section with a 1m web. Automation technology is being used on the face to ensure face alignment and correct horizons are mined, to support efficient and productive operations.

Long / wide panels with modern longwall equipment, incorporating automation technology provides the potential for highly productive and reliable operations. Although these dimensions are in line with other highly productive longwall operations, they are within current experience levels with the longest panels up to 6 km in length and the widest, up to 400 m. The dimensions are largely constrained by the geometry of the resource and are unlikely to be increased.

UG1 and UG4 are at low to moderate depths of cover, as such stress conditions will be more favourable than experienced at deeper operations. RPM understands that there are no major issues with the strength or competence of the roof and floor.

Exploration has determined that seam gas content is low to negligible across the planned mining domains. Practical ventilation rates are expected to be sufficient for seam gas management by dilution of the atmosphere.

UG1

In UG1 longwall mining will extract the combined D working section (DWS) and DTOP plies of the Ulan Seam with up to 3.4m (3.0m to 3.4m) of the seam to be recovered. Longwall panels will range from 2.4 km to 4.6 km in length and will be 300m wide. The panels have been laid out in a southwest to northeast orientation with an extraction sequence of sequentially mining panels from north to south (towards OC4). Within each panel the longwall will retreat from the southwest (inbye) end to the main headings along the north-eastern boundary. The longwall is currently operating in the first panel (short) panel on the northern side. Both development and longwall operations are currently operating to plan and underground conditions have been favourable as are expected.

Igneous plugs (diatremes) which are expected to impact on production and quality have been identified in UG1 in panel 2 and panel 3. The longwall has been planned to "step around" i.e. not mine, the diatreme in panel 2 but schedules still show full mining through the igneous feature on the inbye end of panel 3. It is expected that the decision on how to mine the inbye end of Panel 3 will be made when more information has been made available as per typical grade control practices.

Although the face width reduces from 300m in UG1 to 250m in UG4, it is relatively straight forward to modify the face equipment for the shorter panel length and there would be no requirement for a major additional capital purchase to affect the transition.

UG4

Expansion into the UG4 mining area will occur once development of UG1 is completed. Due to changes in coal quality, longwall mining in UG4 will extract the DWS seam only with up to 3.0m (2.8m to 3.0m) mining height. Longwall panels will range from 2.4 km to 4.7 km in length and will be 250m wide. The subsidence criteria set out in the Stage 1 approval for UG4 has resulted in retaining a narrower panel width. The panels in UG4 based on YAL's plan will be oriented generally north to south.

Panel layout is impacted by the location of "The Drip" on the Goulburn River (a surface featured waterfall sourced from groundwater). The mine is further bounded by Ulan Road, Goulburn River National Park and the old Goulburn River Valley palaeochannel. In particular the significance of "The Drip" has resulted in a 500m standoff being required from the Goulburn River so that there are no subsidence impacts.

Additionally, several archaeological sites are located above the workings. The approved design accounts for their locations, including the use of a mini-wall to negotiate a cliff line.

Access

The underground access is via portals in the OC1 highwall which has been left open for this purpose. By using an existing highwall the project was able to avoid the significant capital cost of driving inclined drifts from the surface down to the seam. Travelling roads and coal conveying routes have been established between the portal area and the CHPP to provide mine access for personnel, equipment and materials and to clear coal from the mine.

The portals enter the underground at the western corner of the first underground panel in UG1. Access to the main headings is via a double-entry drive running in a north-easterly direction parallel to the first panel. The access roads connect with the UG1 main headings at the northern tip of the layout, which is also the point from which an underground connection to UG4 will be driven. This will be a key junction for the underground operations for both UG1 and UG4 and depending on mine design may remain the central point for all underground operations going forward.

Mine Schedule

Margin ranking has been used to direct the mining sequence and specifically cash rate. The key drivers to this are coal quality, stripping ratio and haulage distance to the CHPP. The strategy takes the low ratio coal from OC2 and OC3 first. OC3E contains a low ratio coal that is used to balance the strip ratio early in the schedule. The high ratio coal in OC 4 is the last to be mined with progression on two faces simultaneously.

The production schedule as per the 2017 LOM plan are shown in **Table 10-9**.

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Table 10-9 Moolarben Quantity Schedule Summary

Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	2036	Total LOM
Total ROM Coal	**Mt**	**8.9**	**18.9**	**20.0**	**20.0**	**20.0**	**18.8**	**18.7**	**18.6**	**17.6**	**15.5**	**12.0**	**11.9**	**11.3**	**11.4**	**1.3**	**270.6**
OC Mining																	
ROM Coal	Mt	6.1	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	12.0	11.9	11.3	11.4	1.3	**212.7**
Prime Waste Mined	Mbcm	20.2	43.2	42.5	48.7	48.1	37.1	51.6	52.9	49.6	47.8	50.4	49.3	49.5	52.6	1.1	**854.8**
Rehandle Waste	Mbcm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Waste mined	Mbcm	20.2	43.2	42.5	48.7	48.1	37.1	51.6	52.9	49.6	47.8	50.4	49.3	49.5	52.6	1.1	**854.8**
Prime Strip Ratio	bcm/ROM t	3.3	3.3	3.3	3.7	3.7	2.9	4.3	4.4	4.1	4.0	4.2	4.1	4.4	4.6	0.9	**4.0**
Total Strip Ratio	bcm/ROM t	3.3	3.3	3.3	3.7	3.7	2.9	4.3	4.4	4.1	4.0	4.2	4.1	4.4	4.6	0.9	**4.0**
UG Mining																	
UG ROM Coal	Mt	2.8	5.9	7.0	7.0	7.0	5.8	6.7	6.6	5.6	3.5						**57.9**
UG Development	Mt	0.3	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.1							**3.8**
UG Longwall	Mt	2.5	5.3	6.5	6.5	6.4	5.3	6.3	6.2	5.6	3.5						**54.1**
Development	km	11.6	21.0	19.7	19.9	20.8	19.4	16.4	13.3	3.1							**145.2**
CHPP																	
Coal Processed	Mt	6.1	13.0	13.0	13.0	13.0	13.0	12.0	12.0	12.0	12.0	12.0	11.9	11.3	11.4	1.3	**212.7**
Plant Yield	%	71.8	77.1	74.6	72.8	75.4	75.4	76.4	77.7	78.4	78.5	78.4	78.4	78.4	77.8	74.1	**76.9**
Plant Product	Mt	4.4	10.0	9.7	9.5	9.8	9.8	9.2	9.3	9.4	9.4	9.4	9.3	8.8	8.9	0.9	**163.5**
Bypass (UG only)	Mt	2.8	5.9	7.0	7.0	7.0	5.8	6.7	6.6	5.6	3.5						**57.9**
Coal Product		7.2	15.9	16.7	16.5	16.8	15.6	15.9	15.9	15.1	13.0	9.4	9.3	8.8	8.9	0.9	**221.4**
Effective Yield	%	80.6	84.2	83.5	82.3	84.0	83.0	84.9	85.6	85.3	83.4	78.4	78.4	78.4	77.8	74.1	**81.8**
Product Type																	
14.5% Ash @ 6,040 NAR	Mt	2.8	5.9	7.0	7.0	7.0	5.8	6.7	6.6	5.6	3.5						**57.9**
17.0% Ash @ 5,850 NAR	Mt	3.1	5.7	5.1	5.2	5.0	5.2	5.0	5.2	5.2	5.2	5.2	5.0	4.8	4.9	0.4	**89.5**
28.0% Ash @ 5,200 NAR	Mt	1.9	4.0	4.2	3.8	4.3	4.1	3.6	3.6	3.7	3.6	3.6	3.7	3.4	3.5	0.5	**65.8**
23.0% Ash @ 5,450 NAR	Mt	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5		**9.0**
Total Product	**Mt**	**8.1**	**15.9**	**16.7**	**16.5**	**16.8**	**15.6**	**15.9**	**15.9**	**15.1**	**13.0**	**9.4**	**9.3**	**8.8**	**8.9**	**0.9**	**222.3**

Figure 10-6 Moolarben ROM Coal Schedule

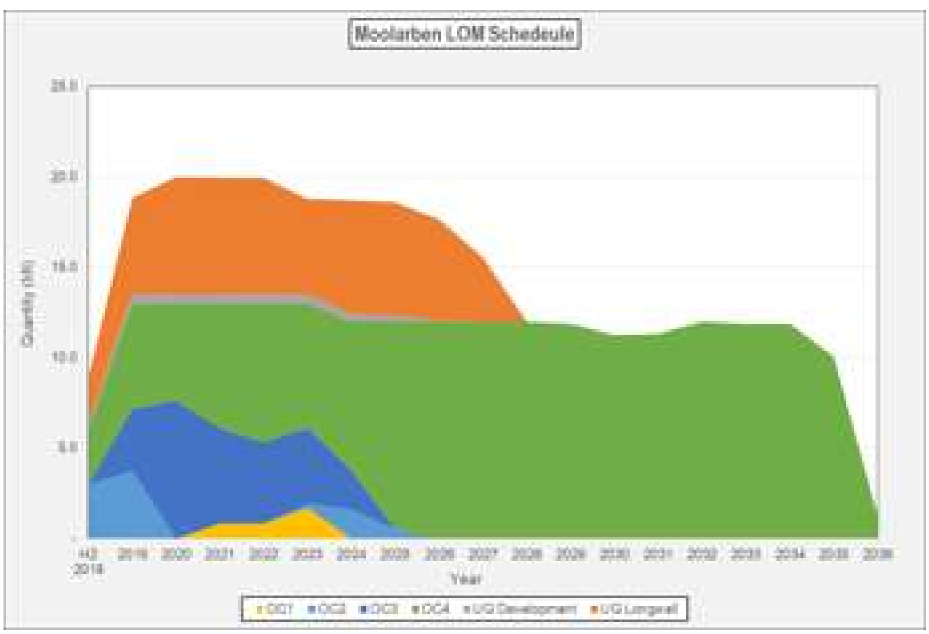
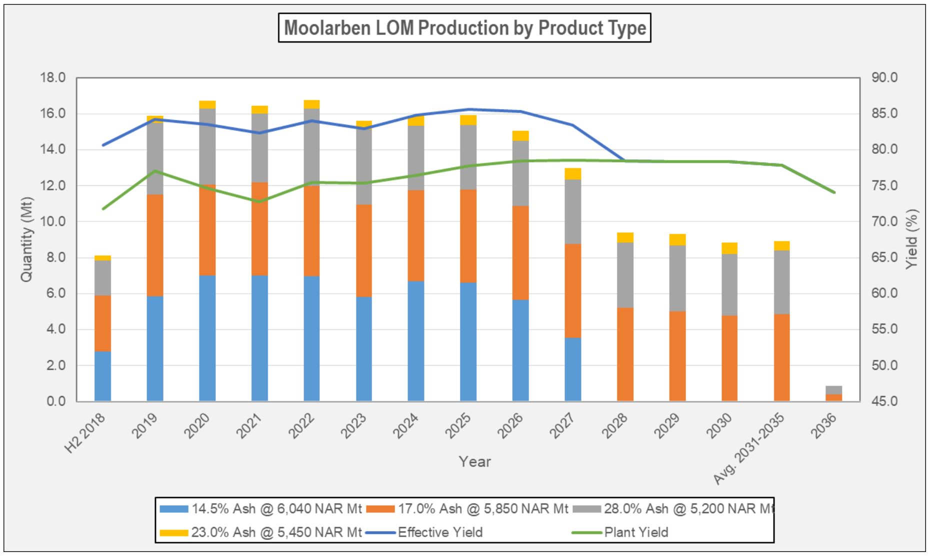


Figure 10-7 Moolarben Product Coal Schedule



10.5 Ashton

Pit Limits

Open Cut

The pit limits at Ashton were defined in the South East Open Cut (SEOC) PFS study. The SEOC pit is constrained by a combination of surface features, lease boundaries and seam subcrop. The western and northern limit is based on an offset from Glennies Creek which flows across the Ashton leases and into the Hunter River in the south. Seam dip to the west and sub crop to the east. The Lower Barrett Seam subcrop form the basis for the low wall of the pit in the east. The southern limit is determined by the lease boundary.

RPM reviewed the pit limits through the estimation of a break even stripping ratio and comparison to the ROM model. The key inputs to the estimate of the break-even strip ratio are shown in **Table 10-10**. Based on the inputs the estimated break even strip ratio is 12:1 (bcm/t ROM) which is significantly higher than the LOM strip ratio.

Table 10-10 Ashton SEOC Break Even Strip Ratio Input Parameters

Description	Units	Ashton
Prices		
SSCC	USD /tonne	110
Thermal	USD /tonne	-
Exchange Rate	AUD/USD	0.75
Average Mining Costs		
Coal Mining	AUD /tonne	6.02
Waste Mining	AUD /bcm	4.68
Site Overheads		
Processing	AUD /t ROM	5.79
Administration	AUD /t Prod	4.71
Offsite Costs		
Rail	AUD/t Prod	5.45
Port	AUD/t Prod	3.07
Other Offsite Costs	AUD/t Prod	7.15
Average Yield		
CHPP	%	61
Bypass[4]	%	N/A

Notes:
1. *Coal Prices in USD*
2. *All costs in Australian Dollars*
3. *No Bypass assumed for Ashton SEOC*

The pit limits are shown in ***Appendix C***.

Underground

The Ashton underground mine covers an area approximately 4 km long (N-S) and 2 km wide (E-W). The physical mining constraints used to determine the underground target area are the lease boundary to the east, south and west, whilst the New England Highway traverses the lease and has formed a boundary between the open cut operations to the north and the underground mine on the southern side.

Depth of cover for the four seams in the target area varies from 40m to a maximum 290m. These depths are not considered likely to create any major impediments to mining.

Mine Design

Open Cut

A geotechnical study of the SEOC area was completed in the 2010 by a third party. The outcomes of the study was the recommendation of pit design criteria which included overall slopes of 60 to 62 degrees. The pit design includes bench slopes of 75 degrees and up to two 15m wide berms. The low wall design is a 45 degree slope from the base of weathering to topography.

A flood protection levee is required to be constructed along the western and northern limits of the pit. Incorporated into the levee structure is the ROM pad for the SEOC. Materials to construct the levee will be sourced from within the SEOC mine footprint. Ashton plan to develop a low permeability barrier along the western side of the pit to prevent groundwater inflows via the alluvial material associated with Glennies Creek. The barrier will be developed as a trench ahead of the mining operation.

The out of pit dump has been designed to the east of the pit between the low wall and the lease boundary. The out of pit dump is ultimately merged with the inpit dump.

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Underground

From a geotechnical perspective, the mine has generally good development and longwall conditions. Roof and floor materials are generally competent and the underground roadways exhibit high levels of roof and rib stability. The seams vary in thickness, as well as undulating across the lease. This results in slightly higher levels of out-of-seam dilution, as well as reducing confidence in seam volume calculations.

Three drifts have been driven from the open cut to gain access to the target area. One drift houses the main coal clearance conveyor. A second drift is for personnel and materials access, configured as a rubber tyred drive in, drive out drift. The remaining drift initially served as return ventilation roadway and was connected to the main mine fan. This roadway has since been superseded by a 5.5m internal diameter upcast shaft to satisfy the return air ventilation requirements.

Typical parameters used for the mine plan layout include:

Table 10-11 Ashton UG Design Parameters

Parameter	Ashton
Main headings roadways	5
Gateroad panel roadways	2
Main headings pillar length (centres) (m)	30 – 100
Main headings pillar width (centres) (m)	25.3
Gateroad pillar length (centres) (m)	100
Gateroad pillar width (centres) (m)	33.4 – 60.4
Roadway width (m)	5.4
Roadway height (m)	2.7
Longwall panel width (block width) (m)	205
Longwall cutting height (m)	
Longwall caving height(m)	
Lease boundary Minimum barrier (m)	20
Longwall Extraction Height (m)	2.3 – 2.8

The longwall mining method is employed at Ashton underground. The mine is operated seven days a week, 24 hours a day on a rotating shift basis.

One feature of multi-seam mining is that the location and severity of geological structure in the lower seams is generally significantly clarified during mining of the upper seams. As the Pikes Gully Seam has been fully extracted at Ashton underground, no reduction in recoverable tonnes of the lower seams has been made for geological structure.

A small north-south trending dolerite dyke was mined through in the eastern part of the Pikes Gully and Upper Liddell seam layouts. The dyke was found to be up to 4m thick and up to 214 MPa UCS. Softer zones within the dyke were mined by the longwall without significant issues, while explosives were used to mine through the harder zones. The dyke has been pre-mined in the Upper Lower Liddell Seam, ahead of longwall extraction.

Additional mining factors were applied to the Coal Resources model for deriving ROM Coal quantities. The approach to convert in situ to ROM coal and the application of mining factors involved the following:

- Roof and Floor Dilution: It was assumed that a combined minimum of 100 mm of higher ash material will be mined with the roof and the floor of the coal seam during development and longwall operations, thereby diluting the in situ coal quality. The quality defaults assigned to the waste rock were assumed to be relative density of 2.34 t/cu.m, ash of 85% and specific energy of 0 kcal/kg;
- Moisture: Relative density data in the geological model is based on assumed in situ moisture of 6.5%, while all qualities are based on air-dried moisture gridded values. Preston Sanders has been used in the

estimation of in situ moisture. RPM has assumed that ROM moisture will be 8.65% and product moisture will be 8.5%.

Mine Schedule

Mining commenced in the ULLD Seam longwall in 2017. Panels progress from east to west until 2021 when the longwall is planned to be moved to the ULD seam to exploit the remainder of the western longwall panels. Following this the eastern longwall panels are completed in the ULLD before moving to the Lower Barrett seam in 2024. Underground operations are scheduled to be completed at Ashton in 2029.

The South east open cut (SEOC) has been approved however a condition of approval is that Ashton owns 100% of the land or has access agreements in place. At present this has not been achieved and hence the commencement date is not currently scheduled until 2024. RPM notes that this date is not fixed nor does the current plan if changed impact the underground operations. As such if all approvals and permit conditions are met operations can commence prior to plan. The SEOC schedule commences in the northern end of the pit and progresses to the south in a haulback mining method. All waste is initially hauled to out of pit waste dumps followed by inpit dumping when sufficient dump capacity is generated.

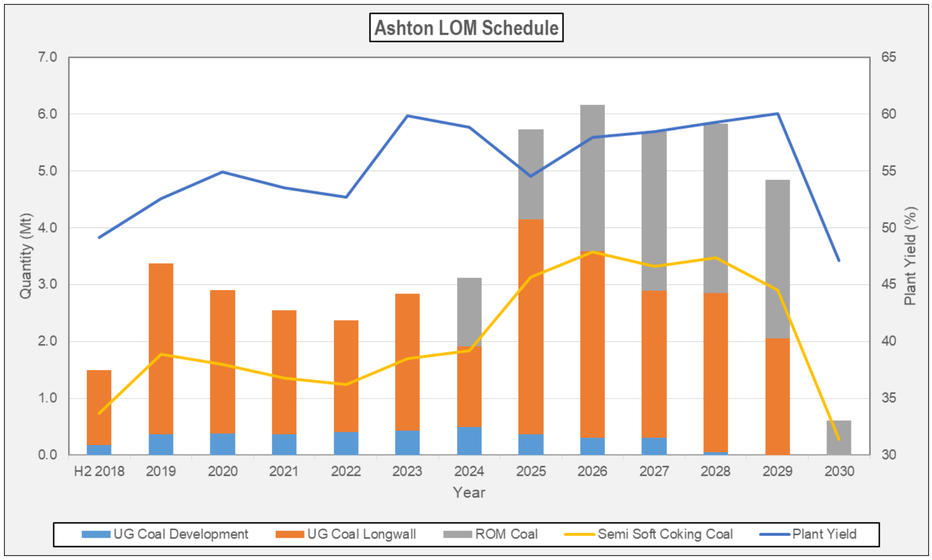
The combined underground and open cut quantity schedule for Ashton is shown in **Table 10-12**.

Table 10-12 Ashton Quantity Schedule Summary

Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total LOM
Total ROM Coal	**Mt**	**1.5**	**3.4**	**2.9**	**2.6**	**2.4**	**2.8**	**3.1**	**5.7**	**6.2**	**5.7**	**5.9**	**4.8**	**0.6**	**47.6**
UG mining															
Total UG Coal	**Mt**	1.5	3.4	2.9	2.6	2.4	2.8	1.9	4.2	3.6	2.9	2.9	2.1		**33.0**
UG Coal Development	**Mt**	0.2	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.0			**3.7**
UG Coal Longwall	**Mt**	1.3	3.0	2.5	2.2	2.0	2.4	1.4	3.8	3.3	2.6	2.8	2.1		**29.3**
Development	**km**	7.0	14.3	15.0	13.5	15.7	15.5	17.8	13.6	11.7	11.4	3.0			**138.5**
OC Mining															
ROM Coal	**Mt**							1.2	1.6	2.6	2.8	3.0	2.8	0.6	**14.5**
Prime Waste Mined	**Mbcm**							11.3	12.9	18.2	20.4	20.5	16.7	2.4	**102.3**
Rehandle Waste	**Mbcm**							0.1	0.1	0.2	0.2	0.2	0.2	0.0	**1.0**
Total Waste mined	**Mbcm**							11.4	13.0	18.4	20.6	20.7	16.9	2.4	**103.4**
Prime Strip Ratio	**bcm/ROM t**							9.3	8.1	7.1	7.3	6.9	6.0	4.0	**7.0**
Total Strip Ratio	**bcm/ROM t**							9.4	8.2	7.1	7.4	7.0	6.0	4.0	**7.1**
CHPP															
Coal Processed	**Mt**	1.5	3.4	2.9	2.6	2.4	2.8	3.1	5.7	6.2	5.7	5.9	4.8	0.6	**47.6**
Plant Yield	**%**	49.1	52.6	54.9	53.5	52.7	59.9	58.8	54.6	57.9	58.4	59.3	60.0	47.1	**56.7**
Bypass	**Mt**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Coal Product	**Mt**	0.7	1.8	1.6	1.4	1.3	1.7	1.8	3.1	3.6	3.3	3.5	2.9	0.3	**27.0**
Effective Yield	**%**	49.1	52.6	54.9	53.5	52.7	59.9	58.8	54.6	57.9	58.4	59.3	60.0	47.1	**56.7**
Product Type															
Semi Soft Coking Coal	**Mt**	**0.7**	**1.8**	**1.6**	**1.4**	**1.3**	**1.7**	**1.8**	**3.1**	**3.6**	**3.3**	**3.5**	**2.9**	**0.3**	**27.0**

Figure 10-8 shows the Ashton life of mine quantities including the product coal and predicted Washplant yield.

Figure 10-8 Ashton LOM Schedule Summary



10.6 Yarrabee

Yarrabee operations are contained within 10 Mining Leases (ML's), one Mineral Development Licence (MDL) and four Exploration Permits for Coal (EPC's). The area covered by these licenses and permits is about 9,100ha with the area having approximate dimensions of 13.5 km north south and 10 km east west.

Pit Limits

Within in the mine footprint are the designated mining pits:

- On the eastern side of the deposit Yarrabee East North (YEN) in the northern and central eastern side of the deposit;
- Also on the eastern side of the deposit to the south of YEN pit is Yarrabee East South (YES) pit;
- Domain (DOM) 6 the northern most pit on the western side of the deposit; and
- DOM 2 N and DOM 2 S in the central to southern regions of the west side of the deposit.

Previous mining Domains 1, 3, 4 and 5 and the northern most part of YEN have been mined out. These areas were also structurally complex however containing the lower strip ratios of Yarrabee.

Pit optimisation completed by the YAL has been used as the basis to determine Yarrabee's pit limits. The input costs were validated against the annual budget costs and the revenue values for the product coal were sourced from the marketing team of YAL.

Pit limits were targeted to achieve sufficient margin based on the optimiser shell to allow for a buffer of sustaining capital and other variances not captured in the optimiser process.

Pit limits at Yarrabee are not only defined by pit optimisation, however by the complex geology where the pits end at major fault intersections or at the edge of synclines. Pits are generally designed along the floor of the basal seam for stability. As a result structural regions can become entirely economic or not. Many of the areas within the pit limits have steeply dipping coal and requires additional coal to maintain wall stability.

RPM generated a break-even strip ratio to confirm the pit limits. The cost inputs in the estimation of the break-even stripping ratio were similar to those used in the above described margin rank process. The estimated break-even strip ratio for Yarrabee is 24:1 bcm /t ROM.

The break-even strip ratio analysis confirmed the results of the pit optimisation study completed by YAL. RPM has reviewed the current mine plans for the pits that are scheduled to be mined over the life of the projects and considers that the pit limits were designed with suitable level of detail taking into account the recommended geotechnical and mining operation parameters.

Table 10-13 Yarrabee Break Even Strip Ratio Input Parameters

Description	Units	Yarrabee
Prices		
High Ash PCI	USD /tonne	98
PCI	USD /tonne	131
Exchange Rate	AUD/USD	0.75
Average Mining Costs		
Coal Mining	AUD /tonne	1.75
Waste Mining	AUD /bcm	3.06
Site Overheads		
Processing	AUD /t ROM	11.45
Administration	AUD /t Prod	4.60
Offsite Costs		
Rail	AUD/t Prod	20.4
Port	AUD/t Prod	13.3
Other Offsite Costs	AUD/t Prod	3.5
Average Yield		
CHPP	%	75
Bypass	%	15

Notes:
1. *Coal Prices in USD*
2. *All costs in Australian Dollars*

The Pit limits are shown in ***Appendix C***.

Mine Design

Seismic hazard studies were not included in the documents available however, the region is classified as a low seismicity area and seismic hazard is not a critical design consideration.

Geotechnical hazards are controlled through mine planning via determination of wall angles, placement of benches and pit wall orientation. Independent geotechnical assessments are conducted annually and recommendations are implemented in the mine plans.

Pits are generally designed to be mined down dip of the deposit to reduce geotechnical hazards. Pit orientation is designed to intersect major faults and the bedding planes in the area perpendicular to their strike. This limits the presence of wedge material in highwalls through fault and fracture planes. Highwalls are designed to achieve an average angle of approximately 45° with shallower wall angles in the tertiary material and catch benches at the base of weathering (BoW)

The Yarrabee mine planning team manages the technical components on site. A specialist geotechnical consultant is used to monitor mine plans, conduct regular field inspections and validate the Yarrabee geotechnical management process. Each of the current pits are assessed and all of the dig plans are assessed to ensure a Factor of Safety associated with the design is greater than 1.2.

RPM considers the geotechnical parameters applied to pit designs are suitable and reasonable for the rock types identified.

Overburden is hauled to a combination of in-pit and out of pit or out of pit dumps. Once pits are in a steady state of operation (after completion of the boxcut) all of the waste that is excavated can be hauled to inpit dumps.

With the development of DOM 6 and YES pits during the LOM plan, boxcuts will be excavated for the development of these pits that will require out of pit dumping before steady sate conditions are in place that will require all waste removal to be dumped in pit.

Waste movements from the excavation source to its destination assumes all waste is scheduled block by block for the entire schedule and waste dumps are designed for each annual period using the "max spoil" method to determine the closest practical dumps for each period.

RPM considers the Yarrabee waste dump designs and strategy to be adequate to support the Life of Mine Production Schedule. Opportunities may exist to optimise waste handling and storage through detailed reviews of mine designs and scheduling.

Mine Schedule

The current operation is producing from DOM 2 and YEN pits at an annual mining rate of approximately 3.5Mtpa ROM coal which will produce about 3.0Mt per annum of product coal. DOM 2 coal is being produced down to the Pollux seam which constitutes the pit floor. YEN pit coal seams are also being mined down to the Pollux seam which constitutes the pit floor.

The LOM plan for Yarrabee is to increase the annual production from the current level of about 3.5Mtpa to an average level of 4.1Mtpa ROM with the annual tonnage ranging between 3.4Mtpa ROM to 5.2Mtpa ROM. The earlier years of the schedule, when the higher margin pits are mined, allows for an increase in the maximum production due to the higher bypass recovery, while in the later years in the poorer quality pits (YEN South and YES) the bulk of the ROM coal that is produced requires washing to produce product specification and hence the annual product coal production in the schedule decreases.

The years of increased production is realised through a capital upgrade to the wash plant that will increase the feed rate to 585tph with an annual washing capacity of 4.1Mt per annum. Where the feed tonnage is less than the annual tonnage requiring washing, the excess coal will be bypassed as high ash thermal coal product YP5.

Table 10-14 Yarrabee Quantity Schedule Summary

Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-	Avg. 2041-	Avg. 2051-	Total LOM
OC Mining																			
ROM Coal	**Mt**	2.1	4.0	4.3	4.8	4.6	5.2	5.1	4.9	5.2	4.2	4.2	4.2	4.0	4.2	4.0	4.0	3.5	**147.6**
Prime Waste Mined	**Mbcm**	23.5	43.9	63.7	65.3	66.8	67.9	67.8	69.1	67.5	66.9	61.1	68.5	67.7	67.4	67.7	67.1	43.8	**2,277.0**
Rehandle Waste	**Mbcm**	1.2	2.2	3.2	3.3	3.3	3.4	3.4	3.5	3.4	3.3	3.1	3.4	3.4	3.4	3.4	3.4	2.2	**113.9**
Total Waste mined	**Mbcm**	24.6	46.1	66.9	68.5	70.1	71.3	71.2	72.5	70.8	70.3	64.1	71.9	71.0	70.7	71.1	70.4	46.0	**2,390.9**
Prime Strip Ratio	**bcm/ROM t**	11.4	11.0	14.8	13.6	14.5	13.1	13.3	14.1	13.0	15.9	14.5	16.3	16.9	16.0	17.1	17.0	12.5	**15.4**
Total Strip Ratio	**bcm/ROM t**	12.0	11.5	15.5	14.3	15.2	13.7	14.0	14.8	13.6	16.7	15.3	17.1	17.8	16.8	18.0	17.8	13.1	**16.2**
CHPP																			
Coal Processed	**Mt**	1.1	2.3	3.2	3.6	3.4	3.6	4.1	4.1	4.1	3.5	3.4	3.5	3.4	3.5	3.4	3.4	2.7	**120.6**
Plant Yield	**%**	78.8	85.5	75.9	78.6	76.5	77.4	74.0	74.7	80.4	75.8	75.5	74.1	74.1	73.8	73.4	74.1	75.8	**76.1**
Bypass	**Mt**	0.9	1.7	1.1	1.2	1.2	1.6	1.0	0.8	1.1	0.7	0.8	0.7	0.6	0.7	0.6	0.5	0.8	**26.9**
Coal Product	**Mt**	1.8	3.7	3.5	4.0	3.8	4.4	4.0	3.9	4.4	3.4	3.4	3.3	3.1	3.3	3.1	3.1	2.9	**117.5**
Effective Yield	**%**	88.2	91.5	82.0	83.8	82.9	84.4	79.2	78.7	84.4	79.9	79.9	78.2	77.9	77.9	77.1	77.5	82.0	**79.6**
Product Type																			
PCI Coal Ash 9.5% S 0.65% P 0.100%	**Mt**	0.7	2.7	2.8	2.4	2.5	2.8	2.9	2.7	3.1	2.6	2.5	2.5	2.3	2.4	2.1	2.3	1.5	**82.1**
PCI Coal Ash 12.0% S 0.85% P 0.150%	**Mt**	0.2	0.4	0.3	0.5	0.5	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.9	**15.7**
YP5 High Phos High Flourine (Thermal)	**Mt**	0.9	0.6	0.4	1.1	0.8	1.2	0.9	0.7	0.8	0.5	0.5	0.5	0.6	0.5	0.6	0.4	0.4	**19.7**

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Figure 10-1 Yarrabee LOM Schedule by Pit

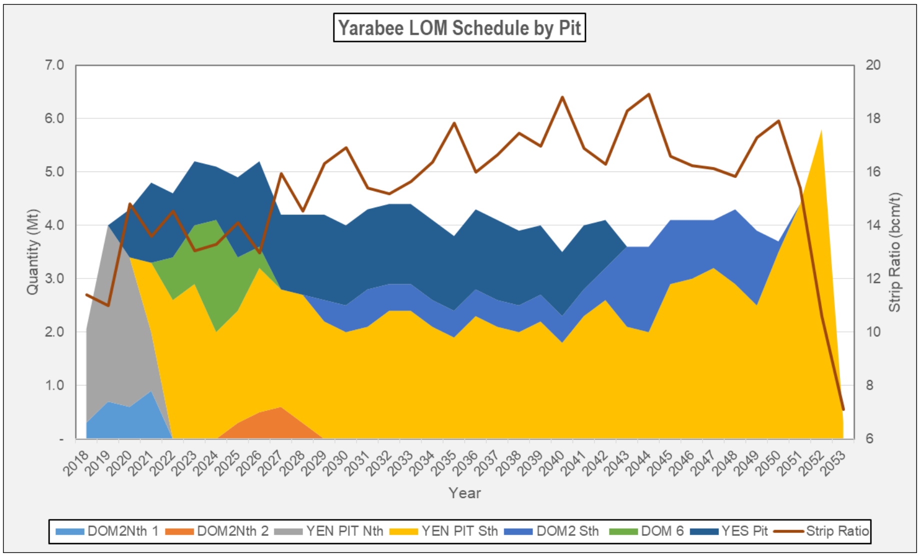
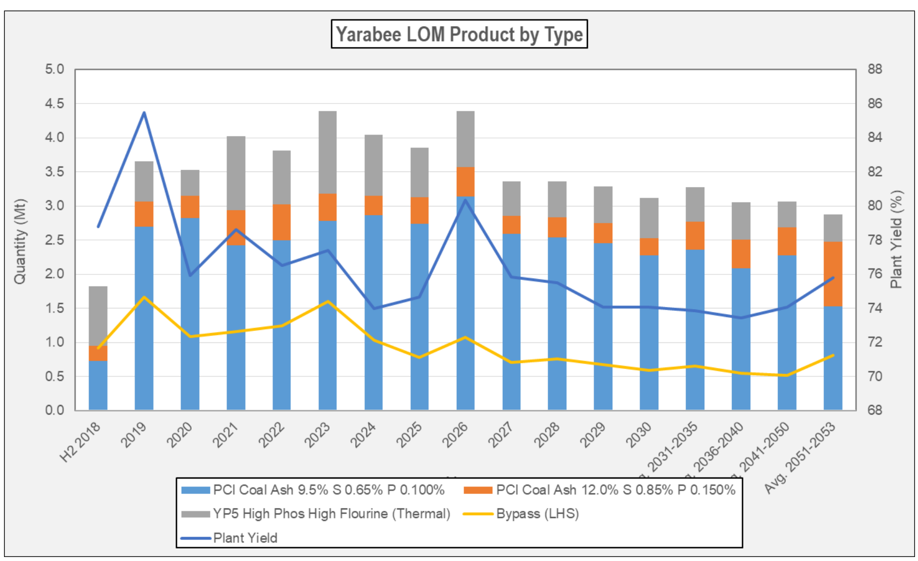


Figure 10-2 Yarrabee LOM Product Schedule



10.7 Stratford and Duralie

Pit Limits

The ply geological models provided by a third party included both coal surfaces and quality for coal plies, except for the CoDam model and the Avon North model which only included structure. The geological models used are outlined in ***Table 10.15***. In the case of Avon North, insufficient raw coal quality data existed to allow a model to be generated. In this instance coal quality defaults were used based on historical experience in the same seams in the neighbouring Stratford Main Pit.

Table 10-15 Stratford and Duralie Geological Models

Pit Area	Model Name	Model Date	Quality Included
Roseville West (RVW)	WCR _0811	Sep 2011	Yes
Avon North (AN)	StratfordStrat_0315model	Mar 2015	No
Stratford East (SE)	SE_0512	Jun 2012	Yes
CoDisposal (CoDam)	CODAM_0912	Sep 2012	No
Stratford South (SS)	GC_0812	Aug 2012	Yes
Grant & Chainey (GC)	GC_0812	Aug 2012	Yes
Duralie West (DW)	DuralieMicroModel0716	Jul 2016	Yes
Duralie East (DE)	DUR_0714	Jul 2014	Yes

The process used by a third party for the 2017 JORC Reserves estimate included a minimum interburden thickness of 300 mm which was applied to the Coal Resource geological model to create a working section. The mining quantities from this model subsequently had a 95% recovery factor applied to represent the in situ to ROM coal mining factor. The values reflect current working knowledge for various hydraulic excavator and truck mining methods and equipment sizes used for waste and coal mining at Stratford and Duralie. Small excavators (350 t class and 100 t class) and trucks (150 – 180 t class) have been selected for mining as an owner/operator mine.

The Roseville West geological model had an additional mining factor applied with the rejection of isolated coal plies. Any ply that met two of the following criteria was removed from the ROM model:

- Where the incremental stripping ratio was less than 10:1 bcm:t;
- Where the coal thickness was less than 500 mm; and/or
- Where the underburden is greater than 5m.

All in situ density was modelled at 6% total moisture and washed product was produced at an 8% as received moisture.

To provide guidance on the selection of pit limits, the ROM geological models and metallurgical, cost and revenue factors were used as inputs for a series of pit optimiser simulations completed across the deposit as part of the 2017 Coal Reserves. Each mining area was simulated in the Geovia Minex Optimiser (Optimiser) based on specific combinations of working section geological models and assumptions relevant to each mining area.

The pit limits are shown in ***Appendix C***.

Mine Design

The following pit designations were created by a third party and both the process and outcomes have been reviewed by RPM and deemed appropriate for the Coal Reserves estimation.

Roseville West Pit

- The Roseville West LOM pit is a result of pit optimiser analysis using current economic assumptions. No detailed pit design has yet been completed on this pit with the optimiser shell used to estimate Coal Reserves. The northern and southern pit limits are constrained by the lease limit and the coal ROM stockpile respectively. The northern end of the pit targets the Bowens Road seam with the southern end saw toothing on the Bowens Road seam and the Deards seam. The pit shell does include over 50% of Inferred Coal Resource, however, this coal generally lies in the bottom and western edge of the pit which can be excluded from mining with little impact on the upper lying, Reserve classified coal seams.

Avon North

- The Avon North mining area has extensive reverse faulting. This faulting results in a terraced pit design to the east with the Avon H ply the basal seam on the eastern low wall. Detailed ramp designs are needed to demonstrate how access to the bottom of the pit will be achieved.

Stratford East

- The SE pit is limited to the east by seam outcrops with the low wall following the Clareval seam. The highwall angle and endwall batter angles were at a maximum of 40°. The northern limit of the pit is a dam and out of pit dump.

Stratford South Avon

- The northern endwall crest is limited by a watercourse and runs to the fault in the south and the low wall targets the Avon seam. Detailed pit design with ramp access has not been completed for this pit but is not considered a major risk with a similar pit structure mined previously in the Duralie Mine.

Duralie West

- The Duralie West Weismantel current pit design is almost complete. Optimisation work showed a potential expansion to the north called Wards River Station Pit (Wards). Most of this pit falls in AUTH0315 which Yancoal are currently applying to have converted to a mining lease. The Pit runs along the same strike as the current DWW pit and stops approximately 300m before the Bucketts Way road.

Duralie East

- Two pits were identified in the eastern crop of the Duralie deposit, targeting the Clareval and Weismantel crops. Pits designs were created and used in LOM schedule however only the Weismantel pit was taken forward a potential coal Reserve.

RPM has previously developed mine plans for the Stratford and Duralie mining areas as part of the Stratford and Duralie Coal Basin Mine Planning Study. The key pit design changes in this JORC Reserve are larger and deeper Avon North (AN) and Roseville West (RW) pits, smaller Stratford East, Stratford South Avon and Duralie East Weismantel pits. The high level dumping analysis conducted as part of the Mine Planning Study is still deemed relevant to this JORC Reserve estimate.

Mine Schedule

The mining schedule was based on the block data for each pit supplied by a third party, generated as part of the 2017 JORC Reserve estimate. The data includes Inferred and non-classified coal and has been included in the schedule but has not been classified as a Coal Reserve. RPM have used the block data to create a LOM schedule that aligns with the first five years of the site's forecast. Production increases to 1.4Mt in 2019 and then 2.0Mtpa ROM coal is achieved in 2027 and held for the life of the mine. With these targets, Stratford and Duralie has a predicted mine life of 36 years to 2053.

Table 10-16 Stratford and Duralie Schedule Summary

Year	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2040	Avg. 2041-2050	Avg. 2051-2053	Total LOM
OC Mining																			
ROM Coal	**Mt**	0.5	1.1	1.7	1.9	1.8	1.3	1.6	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	**68.2**
Prime Waste Mined	**Mbcm**	2.8	7.0	7.9	13.0	11.5	7.6	12.4	14.2	13.6	11.1	11.7	11.1	14.3	11.3	10.3	10.0	4.4	**359.4**
Rehandle Waste	**Mbcm**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Waste mined	**Mbcm**	2.8	7.0	7.9	13.0	11.5	7.6	12.4	14.2	13.6	11.1	11.7	11.1	14.3	11.3	10.3	10.0	4.4	**359.4**
Prime Strip Ratio	**bcm/ROM t**	6.2	6.5	4.7	6.8	6.4	5.8	7.7	7.1	6.8	5.6	5.9	5.5	6.2	5.7	5.1	5.0	2.2	**5.3**
Total Strip Ratio	**bcm/ROM t**	6.2	6.5	4.7	6.8	6.4	5.8	7.7	7.1	6.8	5.6	5.9	5.5	6.2	5.7	5.1	5.0	2.2	**5.3**
CHPP																			
Coal Processed	**Mt**	0.5	1.1	1.7	1.9	1.8	1.3	1.6	2.0	2.0	2.0	2.0	2.0	2.3	2.0	2.0	2.0	2.0	**68.2**
Plant Yield	**%**	49.9	56.9	59.4	57.8	58.3	62.4	67.6	64.8	60.1	60.5	60.8	61.4	61.3	61.2	55.3	54.4	36.2	**58.4**
Bypass Coal	**Mt**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Coal Product	**Mt**	0.2	0.6	1.0	1.106	1.0	0.8	1.1	1.3	1.2	1.2	1.2	1.2	1.4	1.2	1.1	1.1	0.7	**38.2**
Effective Yield	**%**	49.9	56.9	59.4	57.8	58.3	62.4	67.6	64.8	60.1	60.5	60.8	61.4	61.3	61.2	55.3	54.4	36.2	**56.0**
Product Type																			
Semi Hard Coking	**Mt**	0.1	0.4	0.6	0.5	0.4	0.3	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.3	**17.4**
High Ash Thermal	**Mt**	0.1	0.2	0.4	0.6	0.6	0.5	0.6	0.7	0.7	0.6	0.6	0.6	0.8	0.7	0.6	0.6	0.4	**20.8**

Figure 10-9 Stratford and Duralie Schedule by Pit

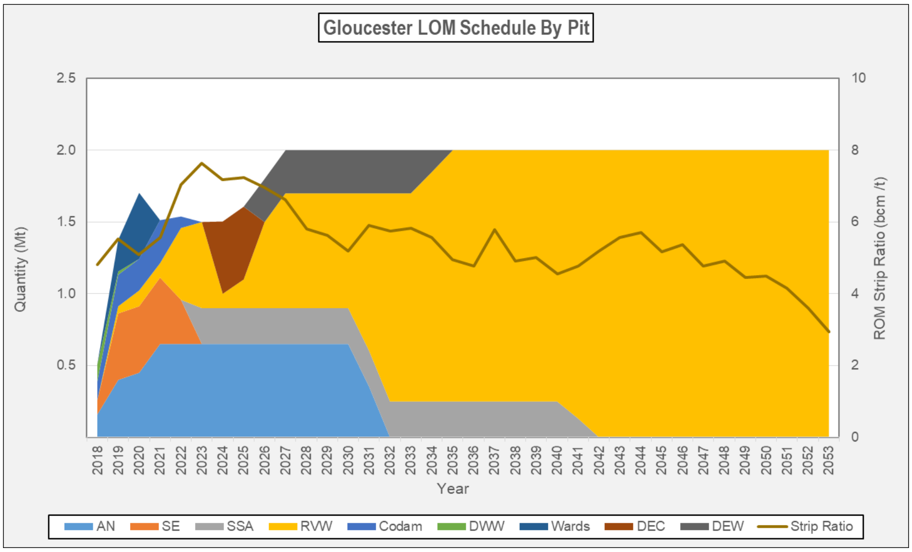
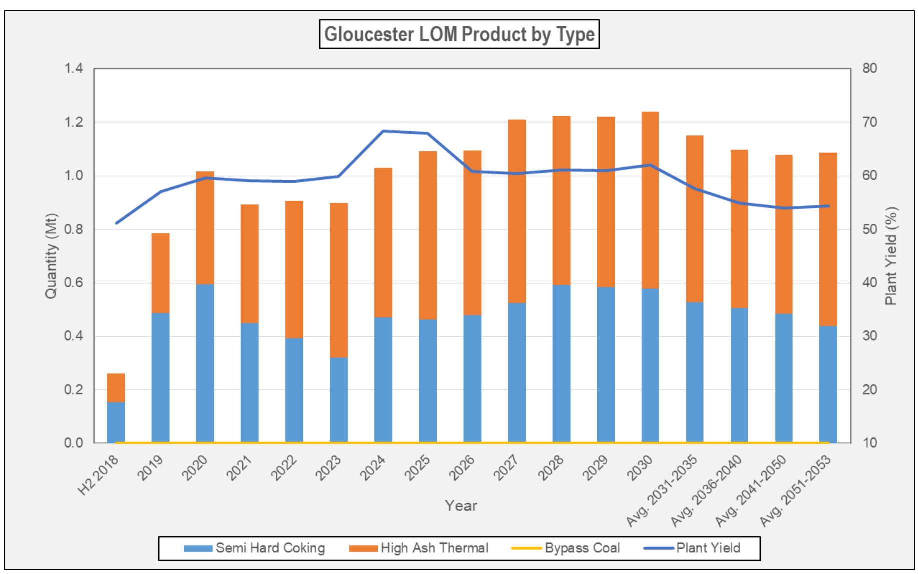


Figure 10-10 Stratford and Duralie Product Schedule Summary



10.8 Austar

The conventional longwall and the Longwall Top Coal Caving ("LTCC") mining methods are employed at Austar Mine.

Mine Limits

The Austar underground mine covers an area approximately 6.5 km long (N-S) and 9.5 km wide (E-W). The physical mining constraints used to determine the underground target area are a combination of the lease boundaries, geological structure and old mine workings. Seam thickness over the target area is consistently above 6m except where the identified seam splitting in the east occurs.

The Quorrobolong Fault extends down the south-west side of the Stage 3 area and the Abernathy Fault along the northern boundary of the Stage 3 area. The Kitchener Dyke runs through the middle of the Stage 3 area and it is currently proposed to take the longwall face through the dyke. The dyke is proposed to be pre-mined where appropriate but it may also be necessary to step the longwall face around the dyke in areas.

The Pelton Seam overlies the Greta Seam. The interburden varies considerably in thickness but is consistently laminated and caves well. The strata above the Pelton Seam (which has a material impact on the mining environment) is the Cessnock Sandstone which is typically 30m thick and very strong.

The Greta Seam at Austar is unusual in comparison to other seams, in that it has a very low, consistent desorbable gas content at seam depths in excess of 400 m. The desorbed gas is predominantly CO_2.

Gas drainage requirements to date have been limited, with in-seam exploration holes connected to return airways where required.

The Greta Seam has high pyritic content in its roof plies. This renders the seam liable to spontaneous combustion. An underground fire did occur in 2003, due to spontaneous combustion in a longwall goaf. The mine has adopted new practices aimed specifically at preventing any further spontaneous combustion incidents. These practices include revised goaf seal construction methods, as well as the inclusion of a surface nitrogen plant to assist with goaf inertisation. Subsequent mining experience has shown that sound management of this issue can prevent any significant incidence of spontaneous combustion.

Mine Design

A drift has been driven from the surface to gain access to the Greta Seam. The drift houses the main coal clearance conveyor, as well as being used for personnel and materials access, configured as a steep grade drift with rails and a dolly car system. The mine has 5 shafts which provide the bulk of the ventilation capacity for the underground workings.

Table 10-17 Austar UG Design Parameters

Parameter	Austar
Main headings roadways	5
Gateroad panel roadways	2
Main headings pillar length (centres) (m)	90 – 100
Main headings pillar width (centres) (m)	50 - 61
Gateroad pillar length (centres) (m)	100 – 150
Gateroad pillar width (centres) (m)	51 – 60
Roadway width (m)	5
Roadway height (m)	3.2
Longwall panel width (block width) (m)	226
Longwall cutting height (m)	2.3 – 2.8
Longwall caving height(m)	0.0 – 3.9
Lease boundary Minimum barrier (m)	20
Longwall Extraction Height (m)	

Additional mining factors were applied to the Coal Resources model for deriving ROM Coal quantities. The approach to convert in situ to ROM coal and the application of mining factors involved the following:

- Coal Loss: It was assumed that an average of 25% of the coal from the caving section coal will be lost during longwall extraction utilising the LTCC method;
- Roof and Floor Dilution: The development roadways incorporate coal tops and bottoms and therefore no out-of-seam dilution has been included for development operations. It was assumed that a 30 mm of higher ash material will be mined with the floor of the coal seam during longwall operations and that any longwall

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caving tonnes will be supplemented with an additional 8% (by mass of the caving tonnes) of roof dilution. The quality defaults assigned to the waste rock were assumed to be relative density of 2.38 t/cu.m for floor dilution and 2.40 t/cu.m for roof dilution and ash of 90%;

- Moisture: Relative density data in the geological model is based on assumed in situ moisture of 5.0%, while all qualities are based on air-dried moisture gridded values. Preston Sanders has been used in the estimation of in situ moisture. RPM has assumed that ROM moisture will be 6.0% and product moisture will be 6.0%.

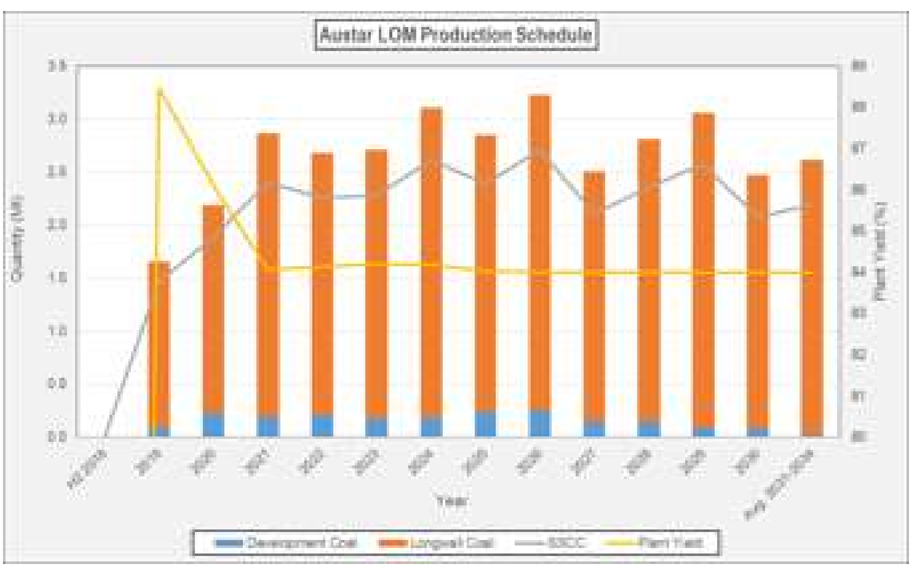
Mine Schedule

RPM is aware that the longwall operating permit is currently suspended with no definitive timeframe for reinstatement. Through discussions with the Company, RPM has assumed that this permit will be reinstated by the end of the 2018 and as such normal operations will recommence in 2019. Furthermore, RPM notes that all site personnel have been relocated to other mines in the district and have not be made redundant. As such upon reinstatement the site personnel can be recommissioned to the mine at short notice.

Table 10-18 Austar Schedule Summary

Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2034	Total LOM
UG Mining																
UG ROM Coal	Mt	0.0	1.7	2.2	2.9	2.7	2.7	3.1	2.8	3.2	2.5	2.8	3.1	2.5	2.6	**42.6**
Development Coal	Mt	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.0	**2.2**
Longwall Coal	Mt	0.0	1.6	2.0	2.7	2.5	2.5	2.9	2.6	3.0	2.4	2.7	3.0	2.4	2.6	**37.8**
Development	km	0.0	4.2	10.4	8.5	9.4	8.0	8.3	11.0	11.1	6.6	6.5	3.9	3.7	2.8	**97.3**
Development main	km	0.0	1.6	3.0	0.7	3.8	1.3	1.3	3.8	2.0	2.2	1.6	0.0	0.4	1.0	**22.7**
Development gateroad	km	0.0	2.7	7.5	7.8	5.7	6.7	6.9	7.2	9.1	4.4	5.0	3.9	3.3	2.3	**74.6**
CHPP																
Coal Processed	Mt	0.0	1.7	2.2	2.9	2.7	2.7	3.1	2.8	3.2	2.5	2.8	3.1	2.5	2.6	**42.6**
Plant Yield	%	0.0	88.4	86.1	84.1	84.1	84.2	84.2	84.0	84.0	84.0	84.0	84.0	84.0	84.0	**84.3**
Bypass Coal	Mt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Coal Product	Mt	0.0	1.5	1.9	2.4	2.3	2.3	2.6	2.4	2.7	2.1	2.4	2.6	2.1	2.2	**35.9**
Effective Yield	%	0.0	88.4	86.1	84.1	84.1	84.2	84.2	84.0	84.0	84.0	84.0	84.0	84.0	84.0	**84.3**
Product Type																
Semi Hard Coking Coal	Mt	0.0	1.5	1.9	2.4	2.3	2.3	2.6	2.4	2.7	2.1	2.4	2.6	2.1	2.2	**35.9**

Figure 10-11 Austar Production and Product Summary



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10.9 Donaldson

Mine Design

The Donaldson underground mine covers an area approximately 8km long (N-S) and 7km wide (E-W). The physical mining constraints used to determine the underground target area are the existing workings to the north, M1 Freeway to the east, the lease boundary to the south and seam splitting to the west. The Hunter Expressway traverses the target area and has formed a subsidence protection zone that will necessitate longwall equipment being relocated from one side of the expressway to the other in each longwall panel, leaving a subsidence protection pillar in between.

Depth of cover for the Lower Donaldson Seam in the target area varies from 120m to a maximum 520m, with an average of 340m. These values are within the range of depths for Australian underground coal mines and are not considered likely to create any major impediments to mining.

From a geotechnical perspective, the mine is expected to have generally good development and longwall conditions. Roof and floor materials are generally competent and the underground roadways should exhibit satisfactory levels of roof and rib stability. The seam varies in thickness from 2.0 – 2.9m.

The three existing adits at Abel Mine will be used to gain access to the target area. One drift houses the main coal clearance conveyor. A second drift is for personnel and materials access, configured as a rubber tyred drive in, drive out drift. The remaining drift initially served as return ventilation roadway and was connected to the main mine fan. This roadway has since been superseded by a 5.5m internal diameter upcast shaft to satisfy the return air ventilation requirements.

Table 10-19 Donaldson UG Design Parameters

Parameter	Donaldson
Main headings roadways	5
Gateroad panel roadways	2
Main headings pillar length (centres) (m)	70 – 100
Main headings pillar width (centres) (m)	35
Gateroad pillar length (centres) (m)	100 – 150
Gateroad pillar width (centres) (m)	35 – 50
Roadway width (m)	5.4
Roadway height (m)	2.7
Longwall panel width (block width) (m)	250 - 300
Longwall Extraction Height (m)	2.4 – 3.2

The longwall mining method is proposed at Donaldson underground.

Seam splitting in the roof in some areas could create localised zones of less competent roof. It is anticipated that the level of roof support will need to be increased in these areas.

Gas studies have determined that compared to other operating and planned longwall operations, Donaldson would be considered in the medium range for longwall gas emissions. Various levels of pre-drainage and post-drainage will be necessary, as depth of cover and other factors vary.

Additional mining factors were applied to the Coal Resources model for deriving ROM Coal quantities. The approach to convert in situ to ROM coal and the application of mining factors involved the following:

- Out of Seam Dilution: Seam splitting and seam thickness variation across the target area results in stone forming part of the working section (mid-seam or at the seam roof) during development and longwall operations, thereby diluting the in situ coal quality. The quality defaults assigned to the waste rock were assumed to be relative density of 2.2 t/cu.m, ash of 80% and specific energy of 0 kcal/kg;

- Moisture: Relative density data in the geological model is based on assumed in situ moisture of 2.5%, while all qualities are based on air-dried moisture gridded values. Preston Sanders has been used in the estimation of in situ moisture. RPM has assumed that ROM moisture will be 6% and product moisture will be 11%.

Mine Schedule

The mining schedule was based on the XPAC model created by Donaldson, generated as part of the 2017 JORC Reserve estimate. The data includes Inferred and non-classified coal and has been included in the schedule but has not been classified as a Coal Reserve. RPM have reviewed the LOM schedule and considers it reasonable, albeit that there is currently no set date for commencement of the mine. ROM production peaks at 5.8Mt in year 10 of operation. Average ROM production (once in steady state operation) is 4.7Mtpa. With these targets, Donaldson has a predicted mine life of 18 years.

Table 10-20 Donaldson Schedule Summary

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	TOTAL
Development	metres	9,661	23,409	27,016	24,713	17,988	9,182	9,525	9,340	10,055	12,423	18,588	14,681	9,358	9,457	9,575	8,348	-	-	223,318
Development ROM Coal	kt	227	534	617	580	422	220	223	219	236	290	433	338	214	217	224	198	-	-	5,192
Longwall ROM Coal	kt	-	-	4,331	4,309	4,342	4,537	5,227	4,311	5,286	5,507	4,109	4,328	4,700	4,031	3,914	3,633	3,467	2,667	68,701
TOTAL ROM PRODUCTION	**kt**	227	534	4,948	4,889	4,764	4,757	5,451	4,529	5,523	5,798	4,542	4,666	4,915	4,249	4,138	3,830	3,467	2,667	73,893
CHPP Feed	kt	227	534	4,948	4,889	4,764	4,757	5,451	4,529	5,523	5,798	4,542	4,666	4,915	4,249	4,138	3,830	3,467	2,667	73,893
CHPP Product	kt	122	316	3,023	2,926	2,505	2,306	2,629	2,130	2,489	2,570	2,094	2,129	2,306	2,134	2,191	2,086	1,917	1,462	37,335
CHPP Yield	%	54%	59%	61%	60%	53%	48%	48%	47%	45%	44%	46%	46%	47%	50%	53%	54%	55%	55%	51%
Bypass	kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Effective Yield	%	54%	59%	61%	60%	53%	48%	48%	47%	45%	44%	46%	46%	47%	50%	53%	54%	55%	55%	51%
TOTAL PRODUCT COAL	**kt**	122	316	3,023	2,926	2,505	2,306	2,629	2,130	2,489	2,570	2,094	2,129	2,306	2,134	2,191	2,086	1,917	1,462	37,335

RPM is aware ongoing studies are being completed to optimise Donaldson prior to commissioning.

10.10 Middlemount

Middlemount operations are contained within two Mining Leases (ML's) and one Mineral Development Licence (MDL). The area covered by these licenses and permits is about 1,600 ha with the area having approximate dimensions of 5 km north south and 2 km east west.

Pit Limits

The open cut pit limits at Middlemount are based on the following criteria:

- An off set of 50m on the Middlemount seam from the Jellinbah fault on the eastern side of the deposit;
- An off set of approximately 300m on the Pisces Upper seam along the northern boundary of ML 70379;
- The southern boundary within ML 70379 is the diversion and flood protection levee associated with Roper Creek.

RPM generated a break-even strip ratio to confirm the pit limits. A break-even strip ratio is the ratio of burden (waste) to ROM coal tonnes at which there is AUD0 margin. The cost and revenue inputs in the estimation of the break-even stripping ratio are outlined in the table below. The estimated break-even strip ratio for Middlemount is 17.5:1 bcm /t ROM.

RPM has reviewed the current mine plan for the pit and notes that the majority of the strips and blocks in the Middlemount design are within this break-even strip ratio and is satisfied with the determination of the mine pit limits.

Table 10-21 Middlemount Break Even Strip Ratio Input Parameters

Description	Units	Yarrabee
Prices		
SHCC	USD /tonne	147
PCI	USD /tonne	131
Exchange Rate	AUD/USD	0.75
Average Mining Costs		

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Coal Mining	AUD /tonne	4.72
Waste Mining	AUD /bcm	4.92
Site Overheads		
Processing	AUD /t ROM	5.63
Administration	AUD /t Prod	6.3
Offsite Costs		
Rail	AUD/t Prod	18.0
Port	AUD/t Prod	6.0
Other Offsite Costs	AUD/t Prod	8.6
Average Yield		
CHPP	%	75
Bypass[3]	%	-

Notes:
1. *Coal Prices in USD*
2. *All costs in Australian Dollars*
3. *No Bypass assumed at Middlemount*

The pit limits are shown in ***Appendix C***.

Mine Design

The following outlines the mine design aspects of Middlemount operations.

- The geotechnical design criteria that are applied at Middlemount can be summarised as follows:
- A 35° degree slope for the low wall in weathered Permian and Tertiary/Cenozoic sands;
- Individual 50° degree batter slopes for highwalls, sidewalls and endwalls in weathered Permian and tertiary/Cenozoic sands. 10m berms are included every 12m vertically to give an overall slope angle of approximately 35°;
- 25m berm for the highwalls and on top of the fresh Permian. On some endwalls a 50m haul bench is included;
- Individual 70° slope for the highwalls, sidewalls and endwalls in fresh Permian;
- Above the cast blasting zone 25m berms are included approximately 50m vertically to give an overall angle of 55°; and
- A 25m berm is included on top of the cast blasting horizon.

RPM considers the geotechnical parameters applied to pit designs are suitable and reasonable for the rock types identified. Overburden is hauled to a combination of in-pit and out of pit dumps. At Middlemount the upper tertiary material is excavated and hauled to the out of pit East dump. The East dump is beyond the extent of the Jellinbah thrust fault in the east and does not sterilize any future coal occurrence.

Haul routes from the excavation faces to the east dumps are also shorter than the alternatives which are to the top of the inpit dumps on the western side of the lease.

The Permian waste that is cast blast and dozer pushed from either above the Pisces or Middlemount seams forms the base of the inpit dump in the previously mined out strip. The balance of the Permian waste excavated from the strips and blocks to uncover the coal seams is hauled to the in pit dumping levels using the cast/dozer push waste levels as the base of the in pit dump profile.

Middlemount does have to manage surface water associated with Roper creek, which has branches flowing along the western and eastern boundary of the deposit, with the western branch then flowing to the east along the southern boundary of the deposit. It would appear that appropriate diversions/levees have been put in place to control surface water associated with this creek system. RPM considers the surface mining water management to be suitable for the operations. RPM did not review the flood control management systems.

Mine Schedule

The existing operation is producing at an annual mining rate of approximately 5.4Mtpa ROM coal which will produce about 4.2Mt per annum of product coal. Coal is being mined from the Middlemount seam, the Tralee seam where it exists greater than 0.3m thick and the basal Pisces seam.

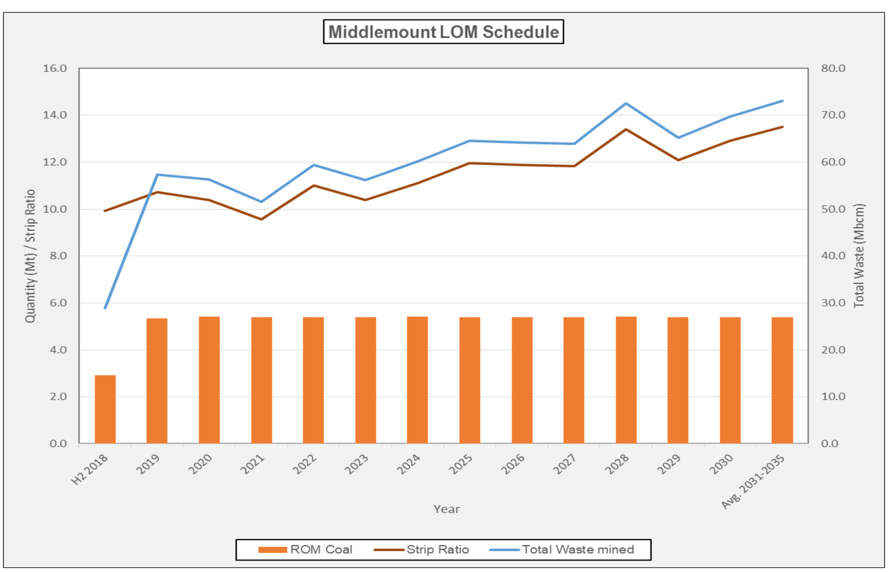
The LOM plan for Middlemount is to continue at a ROM production level of 5.4Mtpa with a progressively increasing strip ratio as the mining sequence progresses down dip from lower strip ratio strips and blocks to higher strips and blocks within the central part of the pit to the Yarrabee fault. The pit will then advance along strike to the north and south which will average the stripping ratio in the deeper sections of the mine. The addition of the north western extension area to the plan provides an additional mining area and assists in averaging the stripping ratio.

The Middlemount production schedule is shown in **Table 10-22** with the product and yield results shown in **Figure 10.12**

Table 10-22 Middlemount Schedule Summary

Year	Units	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2037	Total LOM
OC Mining																	
ROM Coal	Mt	2.9	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	2.8	**100.4**
Prime Waste Mined	Mt	28.9	57.3	56.4	51.6	59.4	56.2	60.2	64.6	64.2	63.9	72.5	65.2	69.7	73.0	30.9	**1,197.0**
Rehandle Waste	Mt																
Total Waste mined	Mbcm	28.9	57.3	56.4	51.6	59.4	56.2	60.2	64.6	64.2	63.9	72.5	65.2	69.7	73.0	30.9	**1,197.0**
Prime Strip Ratio	bcm/ROM t	9.9	10.7	10.4	9.6	11.0	10.4	11.1	12.0	11.9	11.8	13.4	12.1	12.9	13.5	10.9	
Total Strip Ratio	bcm/ROM t	9.9	10.7	10.4	9.6	11.0	10.4	11.1	12.0	11.9	11.8	13.4	12.1	12.9	13.5	10.9	**11.9**
CHPP																	
Coal Processed	Mt	2.7	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	2.8	**100.2**
Plant Yield	%	79.7	76.8	78.0	77.0	76.9	77.1	75.6	74.5	74.1	74.1	70.7	74.6	75.9	76.1	77.0	**75.8**
Bypass	Mt																**0.0**
Coal Product	Mt	2.1	4.1	4.2	4.2	4.2	4.2	4.1	4.0	4.0	4.0	3.8	4.0	4.1	4.1	2.2	**76.0**
Effective Yiekd	%	79.7	76.8	78.0	77.0	76.9	77.1	75.6	74.5	74.1	74.1	70.7	74.6	75.9	76.1	77.0	**75.8**
Product Type																	
PCI Coal	Mt	0.8	1.7	1.5	1.4	1.6	1.9	1.6	1.7	1.7	1.9	1.5	1.8	1.7	1.7	0.8	**31.3**
Coking Coal	Mt	1.3	2.4	2.7	2.7	2.5	2.3	2.5	2.3	2.3	2.1	2.3	2.2	2.4	2.4	1.3	**44.7**

Figure 10-12 Middlemount Schedule Summary



11. Processing and Blending

11.1 Blend Strategy

Due to the number of pits, product types and required product specification of its customers, the Company has the ability to blend ROM coal and washed coal to optimise products and revenue. The concept of a blend strategy is to shift the coal supply philosophy from operational constraints to be driven by customer demand. This strategy facilitates blending high and low quality coals from the various Company mines within each operation required to meet some standard product specifications.

The concepts of a companywide blend strategy are sound but may be difficult to translate into real outcomes for the project and further planning is warranted.

11.2 Coal Processing Overview

CHPP are typically separated into four functional areas; 1) ROM coal receival, 2) beneficiation or washing, 3) reject disposal and 4) product coal stockpiling and train loading.

- ROM coal receival – ROM coal from the open cut or underground coal faces is trucked or conveyed to the ROM coal receival area where it is crushed to a maximum size (typical <50mm) that enables it to be efficiently washed (based on testwork completed). ROM coal can also be stockpiled in this area prior to crushing to assist with wash scheduling, blending or when the CHPP is down for maintenance. After crushing, coal is then either stockpiled and later reclaimed, or fed directly into the Plant for washing.
- Beneficiation or Washing – Washing or beneficiation is the separating of the coal from the waste products (rejects). Once fed into the Plant, the coal is separated into various size fractions which are each washed using different types of separating equipment.
- Reject disposal - The coarse and fine waste, or reject, can be disposed of together or more commonly disposed separately with coarse reject being trucked to the waste dumps (to be disposed of with the overburden from the mine) and fine reject, or tailings, being pumped to a tailing storage facility.
- Product coal stockpiling and Train Loadout – washed coal (commonly called product coal, saleable coal or marketable coal) is stockpiled into separate stockpiles depending on its quality. It is then loaded onto trains for railing to the port. Blending can occur on the product stockpiles when two or more separate coal products are combined to meet a particular market specification.

Bypass coal is ROM coal that does not require washing to meet the marketing specification. After extraction, ROM coal is crushed, bypass coal is placed directly onto the product coal stockpile.

11.3 HVO

HVO site infrastructure, consisting of two coal preparation plants and two coal loading points, is in reasonable condition however much of the equipment requires ongoing maintenance due to its age. RPM is aware that significant sustaining CAPEX has been provisioned as part of the ongoing maintenance to minimise downtime and ensure utilisation is consistent with the planned production. These costs have been included in the cost forecast in ***Section 14***.

HVO Coal Handling and Preparation Plants (CHPP)

HVO utilises two wash plants in the HVO north area, as shown in ***Figure C-1***. The plants are considered to be well maintained and are capable of typical industry benchmark utilisation of 7,200 hours per year, however ongoing maintenance is required. Debottlenecking of plant circuits where necessary and with a consistent feed of coals to not overload any part of the processing circuit, should enable a total throughput of 21Mtpa, which is in excess of the current mine target of 20.6Mtpa ROM Coal and the potential to produce up to 16Mtpa of Product. The design capacity of the CHPPs is based on 7000 operating hours per year. RPM notes that it is the product type, quality and quantities including the distribution of the size fractions in the feed that will dictate the ultimate capacity of the plants during the mine life. The combined HVO CHPP facilities have a capacity to produce approximately 16Mtpa products currently with 20-25% SSCC and the balance being a range of low to high ash thermal coals.

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Hunter Valley CHPP

The Hunter Valley CHPP (HVCPP) is located in the central eastern portion of HVO north and has a ROM coal throughput capacity of approximately 2,500tph or approximately 17Mtpa ROM. The utilisation of the plant in 2015 was less than 80% based on potential throughput and typical 7,000 operating hours per year, however has an upside of 7,200 operating hours per year. The HVCPP was commissioned in 1982 and has development consent to process 20Mtpa ROM coal. The flowsheet for the HVCPP is shown in ***Figure 11-1*** with the plant producing up to three thermal coal products.

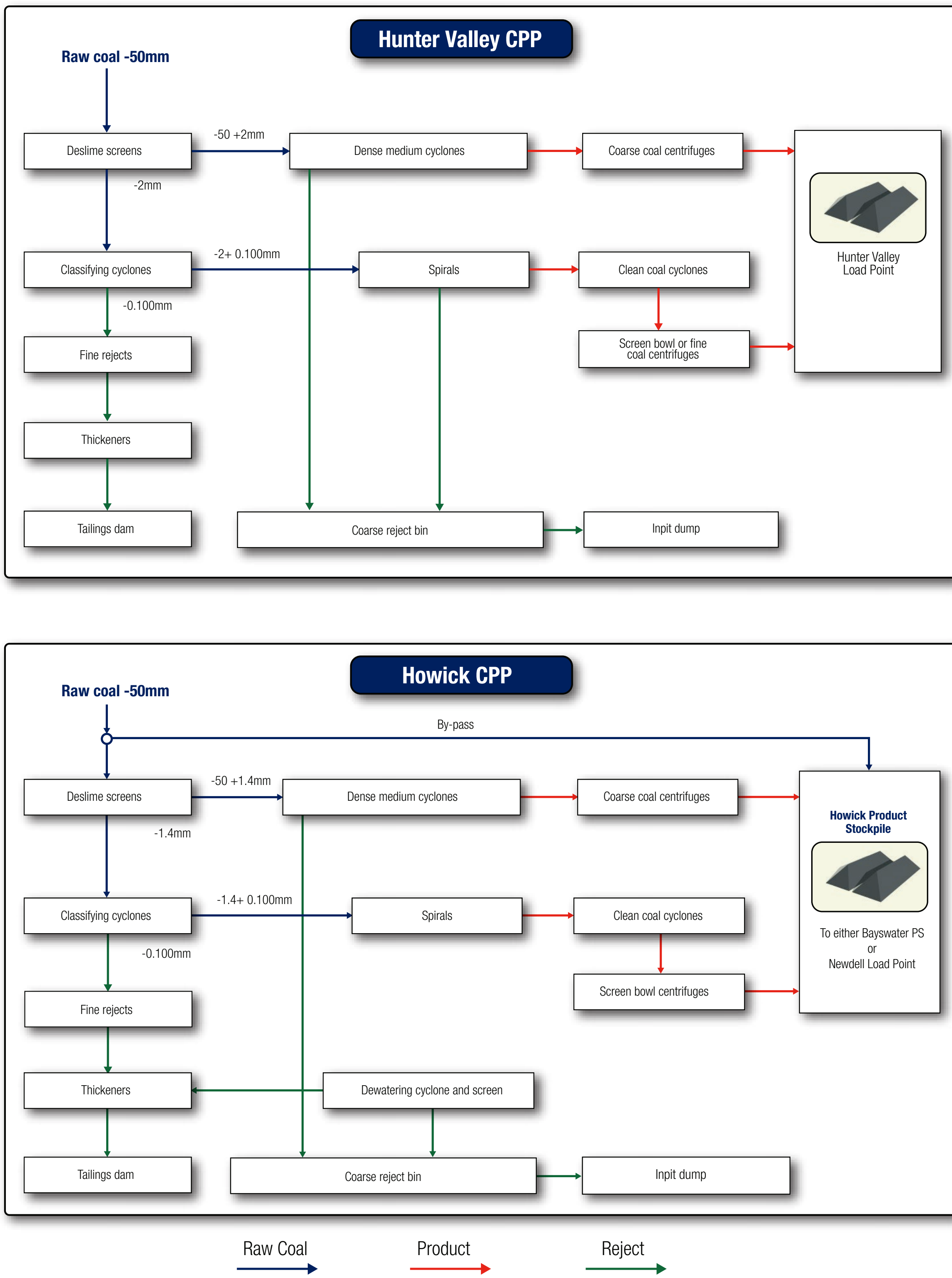
Howick CHPP

The Howick CHPP (HCPP) is located in the northern part of the lease and has a ROM coal capacity of 450tph or approximately 3.2Mtpa. The HCPP was originally designed and constructed to supply product thermal coal to the adjacent Bayswater Power Station however that is no longer serviced with all coal exported. The HCPP was commissioned in 1982 and has consent to process 6Mtpa of ROM coal with a flowsheet as shown in Figure 10-1.

RPM Comments

RPM notes that:

- The SSCC products from HVO have better fluidity than those produced at the MTW operation. However, the CHPP has to wash the ROM coals very hard and at a low S.G. of 1.3 to get the right SSCC properties for sale.
- There are some clayey seams and interburden materials that can cause loss of yield and higher ash thermal coals at HVO.
- HVO undertakes regular integrity inspections to keep the CHPP infrastructure in good working order and this was evidenced during the brief HVO site visit.
- Due to the sticky nature of some ROM coals (like the Bowfield seam) HVO typically schedule feed to the CHPP without allowing the coals to 'age' on the stockpile.
- The HVCPP can bypass raw coal to Product Coal stockpiles however no bypass is assumed as part of the LOM plan presented in ***Section 9*** and ***Section 10***. RPM considers this to be an upside to the project value and OPEX.
- Both CHPP's have product samplers however no ROM coal or reject samplers. Mass balance checks across the CHPP facility, for reconciliations and for plant optimisation, are completed by manual sampling.
- RPM considers this to be a shortfall in the ability to actively control the feed and wash settings on a real time basis and could be a contributing factor to the poor outcomes of the reconciliation.
- Product coal sampling is used to fine tune blending onto trains and onto PWCS and NCIG port stockpiles. Final blending and sampling is always done at the ports – which have incoming sampling and sampling on the outgoing ship loading streams.
- Typical in-pit coal inventory is around 1Mt ROM.



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CLIENT	PROJECT		
YANCOAL	NAME COMPETENT PERSON REPORT		
	DRAWING HVO CHPP's SIMPLIFIED FLOWSHEETS		
	Figure No. 11-1	PROJECT No. ADV-BR-11019	Date November 2018

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Coal Yield

The coal yield from the HVCCP in 2015 was 77% and the plant processed 92% of the total coal washed at HVO with a combined yield from both plants of 76% with the decrease due to the small contribution from the Howick CHPP with yield of 67% (***Table 11-1***) During 2016 this yield stayed consistent at 76% with a total throughput of approximately 18Mt of ROM coal, however decreased slightly to 75% in 2017 (versus 69% planned). The actual distribution of these coals to the individual plants is not provided in the data, however the current plan is for a maximum of 20.6Mtpa of ROM coal feed, as such a similar Yield is forecast.

RPM notes that the HVCCP and HCPP both process coal from the Cheshunt Pits, West, Wilton and GRS (completed) Pits with markedly different yield outcomes. The majority of the coal being delivered to the HCPP is from the Foybrook Formation coal seams although raw ash from all seams appears variable within each pit. There is no apparent explanation to the lower yields obtained at the HCPP apart from a slightly lower efficiency. Coal from the top of the seam sections may be diverted to the HCPP with higher dilution included.

Table 11-1 HVO Plant Yields (2015)

Pit	HVCPP			HCPP		
	Feed (kt)	Product (kt)	Yield (%)	Feed (kt)	Product (kt)	Yield (%)
Cheshunt1	4,469.7	3,493.0	78.1%	3.1	2.1	68.1%
Cheshunt2	3,227.1	2,403.9	74.5%	5.4	3.1	56.8%
Cheshunt Deep	224.9	174.4	77.5%			
Riverview North	583.1	433.9	74.4%			
Riverview West	2,440.3	1,805.0	74.0%			
West Pit	1,748.2	1,415.0	80.9%	889.1	604.5	68.0%
Wilton	466.0	381.2	81.8%	279.3	171.6	61.4%
Glider Pit	298.5	242.6	81.3%	20.4	10.7	52.5%
GRS	179.7	131.1	73.0%			
Total	**13,637.6**	**10,479.0**	**76.8%**	**1,197.3**	**791.9**	**66.1%**

The Company's models forecast that there will be a gradual trend for decreasing yield over time (average 74% in the first 10 years to average 68% in the last 10 years. This is primarily due to the change in the mix of the seams being mined. RPM is aware these yields were forecast to be conservative to account for the age of the equipment.

RPM notes that the high total yields currently being achieved at HVO are not consistent with the raw data in the coal quality ROM models. RPM has taken a conservative approach and reduced the yields by 3% partly in consideration to provide a balance between the actual results and yield model outcomes. RPM notes these higher yields could be related to the mining method being utilised to minimise dilution and lower ROM coal ash content. This is evidenced by the performance in 2017 with 69% planned versus the actual of 75% however this is forecast to increase to 71% in 2018.

Product Coal Handling

There are two train loading points at HVO, the Hunter Valley Rail Loading Point and the Newdell Rail Loading Point, as shown in ***Figure 11-1***. An 8km long cable belt conveyor connects the HVCPP with the Hunter Valley Rail Loading Point while the HCPP Product Coals are trucked to the Newdell Rail Loading Point as the volumes are typically low at up to 3Mtpa. Overflow from the Hunter Valley Loadout point can be sent to the Newdell loading point via a transfer conveyor, which also facilitates blending for product specifications.

Product coals of the different product types are segregated onto Product Coal stockpiles at each loading point and thereafter kept separate. Product coal is blended from the required stockpiles to meet specific customer and marketing requirements. Most blending is done off Product Coal stockpiles and onto trains. Product coal is typically campaign railed to either PWCS or NCIG to build shipments at the ship terminal. HVO has a large number of stockpile machines (Stackers/ Reclaimers) that are aging and that could be suffering from the early stages of structural fatigue. Unfortunately, little information has been provided for review on this matter. Structural integrity assessments have been provided for review on this matter and include the stockpile machines, however that information is more than 4 years old (prepared in 2012) and does not provide any clarification on the likelihood of an HVO stockpile machine failure or the costs associated with a major rebuild of one or more of these machines to significantly extend their service lives. Due to this, additional CAPEX has been included as a contingency.

The number of products produced by HVO adds complexity to the coal supply chain network in that additional Product Coal stockpile capacity is required both at the mine and at the port to allow shipments to be campaigned to specific customer requirements. The Company's proposed introduction of the Hunter Blend Strategy will likely place even more pressure on HVO mining operations, wash plant performance, coal loss minimisation, ROM, raw and Product Coal stockpile capacity, train management and port operations in an attempt to realise incremental improvements to efficiencies, with further works to be undertaken to confirm the assumed improvements. RPM highlights that the LOM plan does not include these assumed improvements.

11.4 MTW

A regional road (Putty Road) separates the WML and MTO operations. An overpass was constructed to facilitate haul truck access between the sites when the operations were combined in the early 2000's. An additional overpass has been completed to enable overburden to be dumped in the mined out voids of MTO with waste from WML pits.

MTW consists of two coal wash plants and two rail loading points which are connected via a series of conveyors throughout the site.

While RPM has not been provided with a detailed plant and equipment list, maintenance records, utilisation records, or any other information to allow for a thorough assessment of the serviceability of coal handling plant and equipment, wash plants, RPM has completed a review of the forecast costs, historical production records and maintenance requirements. In addition, during the site visit RPM completed a high-level review of the equipment in operation and considered, while ongoing maintenance is required, the forecast costs outlined in ***Section 13*** and the onsite infrastructure is suitable to support the forecast production.

Coal Preparation Plants

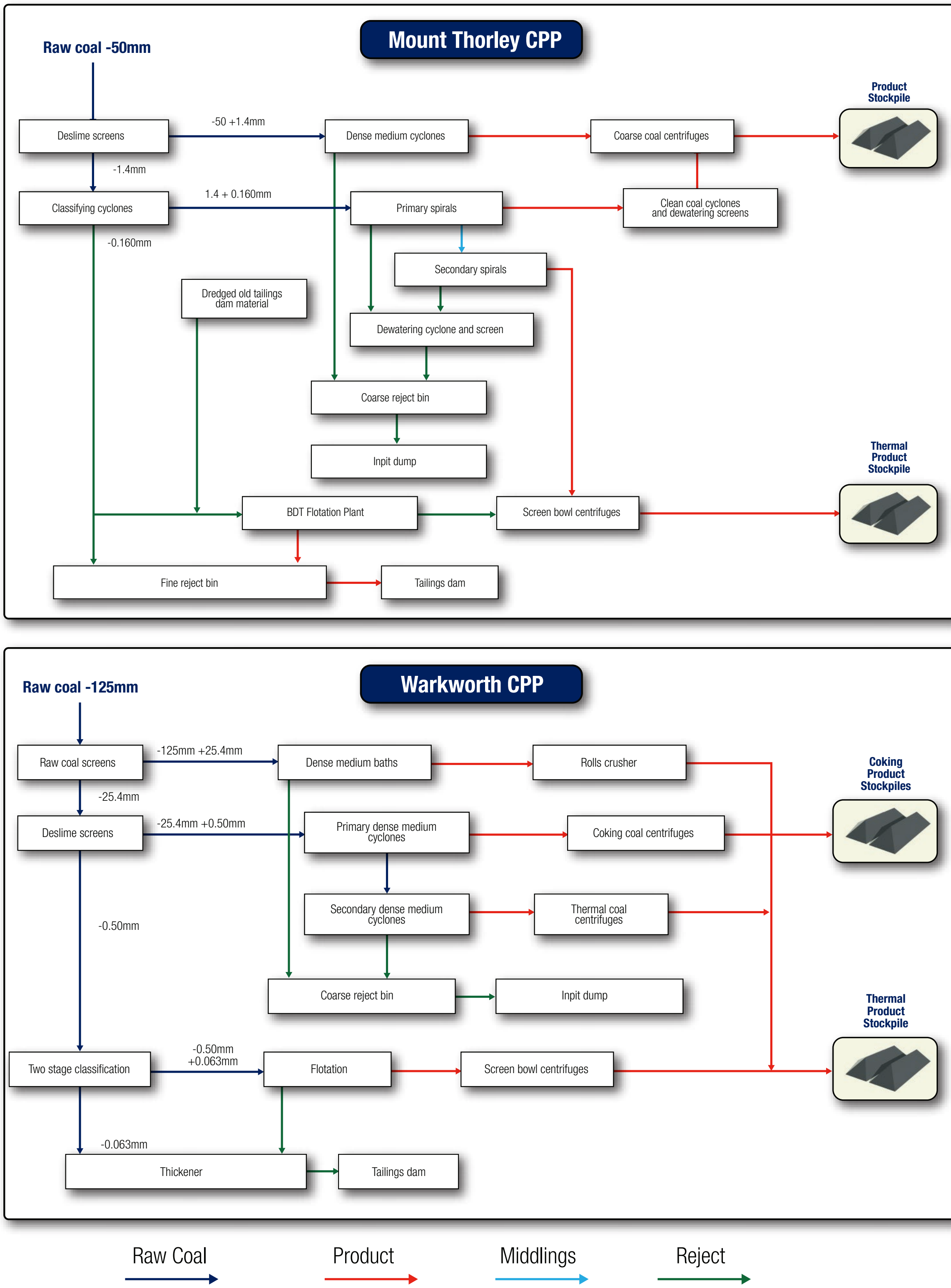
The CHPP facilities at MTW are well-established and capable of processing up to 18Mtpa ROM Coal feed. While the infrastructure is quite old, it appears to be reasonably well maintained which is required and forecast to continue. There are two CHPP's at MTW (Warkworth CHPP and Mt Thorley CHPP) which have a combined capacity of 18.6Mtpa ROM Coal feed to produce between 12Mtpa to 13Mtpa products. These CHPP's produce a number of products which comprise a range of thermal coals and a single semi-soft coking coal via a flowsheet as shown in ***Figure 11-2***.

Coal Yield

The average product yield for the MTW is forecast to be LOM 69.6%. This varies year-on-year from 67.8% to 70.0% and is in-line with recent yield performance by MTW as shown in ***Table 11-2***. This annual variation is mainly due to the differing proportions of coal seams that are produced at MTW each year. RPM highlights that the MTW Blakefield seam is 'clayey' and thus somewhat more difficult to beneficiate relative to the other seams. Most of the other MTW seams are easier to wash without loss of yield and/or reduction in Product Coal quality.

Table 11-2 Historical MTW Yield Performance

Year	2013	2014	2015	2016	2017
Yield	67.2%	68.4%	67.7%	68.0%	67.0



CLIENT	PROJECT		
YANCOAL	NAME COMPETENT PERSON REPORT		
	DRAWING MTW CHPP's SIMPLIFIED FLOWSHEETS		
	Figure No. 11-2	PROJECT No. ADV-BR-11019	Date November 2018

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Coal Product

Both MTW CHPP facilities produce a split of approximately 80% thermal and 20% SSCC products. RPM notes that while there is little detail to support the product split; considers that the overall mix seems reasonable for similar mines in MTW part of the Hunter Region and the historical production. The thermal coals are of varying ash levels allowing the operation to maximise revenue through blending.

MTW in-pit coal inventory is typically 1Mt which allows for the management of the delivery to the CHPP of coal types to suit the product blending strategy in the short and medium term.

Coal Handling

The MTW blending strategy typically starts in the pit with various seams delivered to the ROM coal stockpiles and washed one seam at a time in campaigns to maximise yields and throughput. Some seam blending partners are identified (those seams with similar wash characteristics) that are blended onto raw coal stockpiles ahead of washing.

MTW has a large number of stockpile machines (Stackers/Reclaimers) that are aging and that could be suffering from the early stages of structural fatigue. Structural integrity assessments have been provided for review on this matter and include the stockpile machines, however that information is more than 4 years old (prepared in 2012) and does not provide any clarification on the likelihood of a MTW stockpile machine failure, or the costs associated with a major rebuild of one or more of these machines to significantly extend their service lives. Due to this, additional CAPEX has been included as a contingency.

The MTW operations rely upon blending onto trains and at the port to achieve the required product coal quality for each shipment.

The Company's site management have confirmed that near term future MTW CHPP tailings will be impounded in the Loders Pit where mining will be completed in 2019. Half of the Loders Pit final void will also be used for overburden waste placement and other half for tailings emplacement.

There are two Train Load Outs (LTO) on the Mount Thorley rail loop with a combined capacity of up to 19Mtpa in railings. The two TLO bins are located close enough together such that a train can be loaded from Mount Thorley and Warkworth TLO bins at the same time, which helps with blending and doubles the speed of train loading.

11.5 Moolarben

Coal Preparation Plant (CHPP)

The Moolarben CHPP was designed as a 1,800tph, two module plant (2 x 900tph throughput) able to be operated in single or two product mode. The CHPP processes include two stage dense medium cyclones (DMC) for the -50mm to +1.8mm sized coal, two stage spirals for the -1.8mm to +0.1mm sized coal and two stage froth flotation for the -0.1mm sized coal.

Both modules were designed to operate for over 7,300 hours per year (approximately 83% overall utilisation including maintenance allowance) to achieve a 13Mt coal feed per annum rate. RPM understands that at the time of commissioning that the second product mode was not configured as a result of the selected mining practice at the time and to achieve this capability at some later stage a reconfiguration of the DMC and spirals circuits would be required. In RPM experience the decision to modify the coal processing strategy would require detailed study and is largely driven by the ROM coal characteristics producing favourable product splits and a market being available for the products produced. Additionally such a change can result in reduced overall feed throughput which would also have to be considered for such a change. There are two Open Cut ROM coal receival feeders that can operate at a peak rate of 2,500tph which provides ample throughput to maintain CHPP feed. Coal hopper and surge bin capacity of 1,800 tonnes allows for storage of approximately 1 hours processing to assist with management of any ROM coal receival system delays.

Coal from underground mining is placed on a 100kt ROM stockpile and bypasses the CHPP being crushed and conveyed straight to an UG product coal stockpile. The UG coal handling system is similar to the OC and has a throughput of 2,500tph for an annual rate of up to 8Mt ROM pa, sufficient for the UG mining output.

Coal Yield

The average washed product yield for the Moolarben CHPP is forecast to be LOM 77% with the overall yield including bypass coal approximately 82%. The washed product only yield varies year-on-year from 73% to 78% with annual variation mainly due to the differing proportions of coal seams that are produced from the Open Cut operations each year while overall yield ranges between 76% and 88% with varying quantities of bypass coal associated with ramp up and down of underground mine output. RPM has not up to this point had access to significant historical plant performance data however understand the scheduled performance is largely in line with the outcome of the 2015-2016 years with a Plant yield of 77% being achieved in 2016 and 76% in 2017.

The site has developed a detailed coal washability database with the assistance of a specialist coal quality consultancy to improve the coal product yield and quality for future mining areas. This has resulted in a modest forecast improvement in CHPP yield. The validation of the model is being completed using large diameter borehole cores which is standard practice for the type of modelling undertaken.

Coal Product

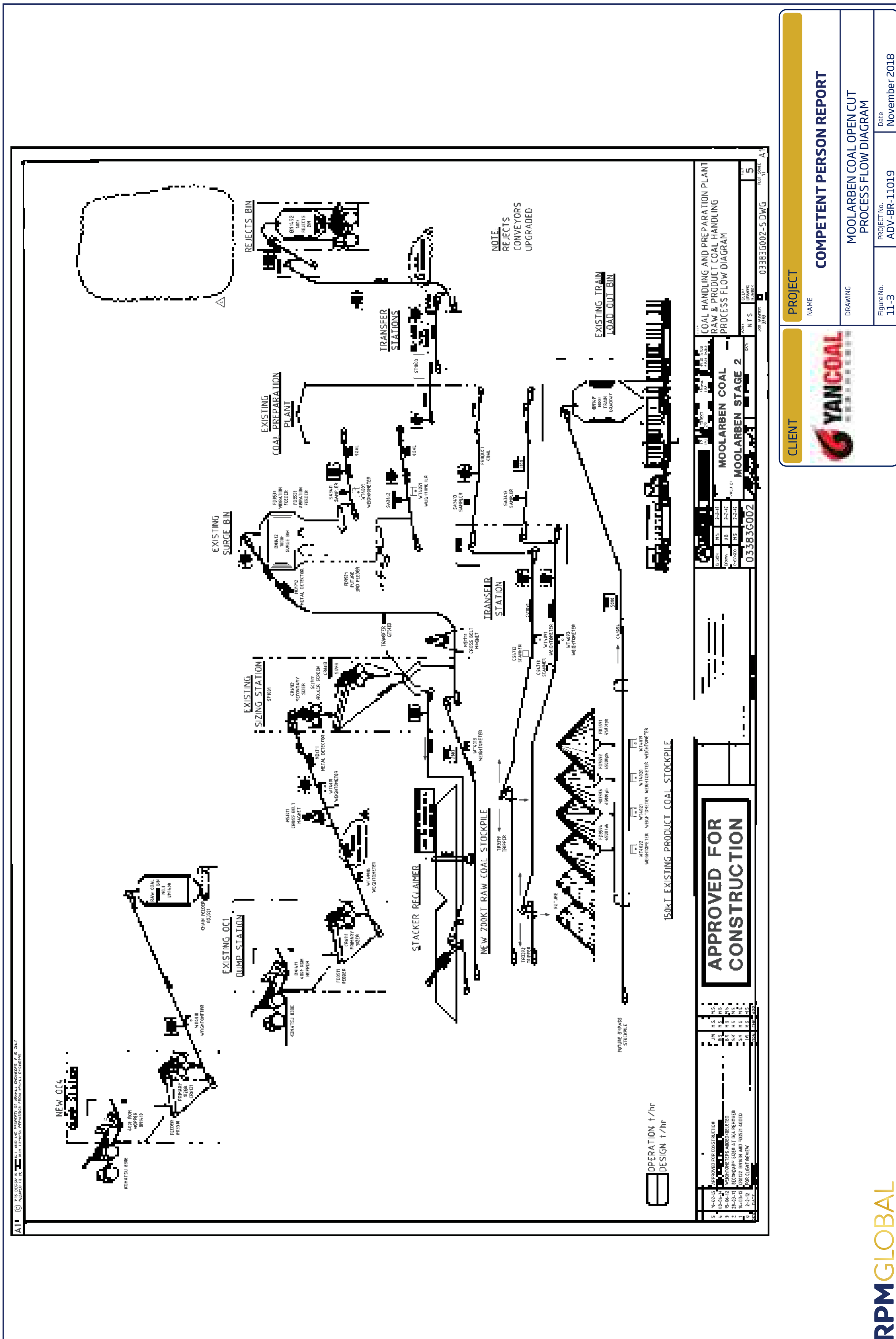
The CHPP facilities thermal coal products only with product ash categories of 16%, 18%, 22% and 28%. The proportion of each product in the LOM plan is summarised below in **Table 11-3**.

In-pit coal inventory is typically 1Mt which allows for the management of the delivery to the CHPP of coal types to suit the product blending strategy in the short and medium term.

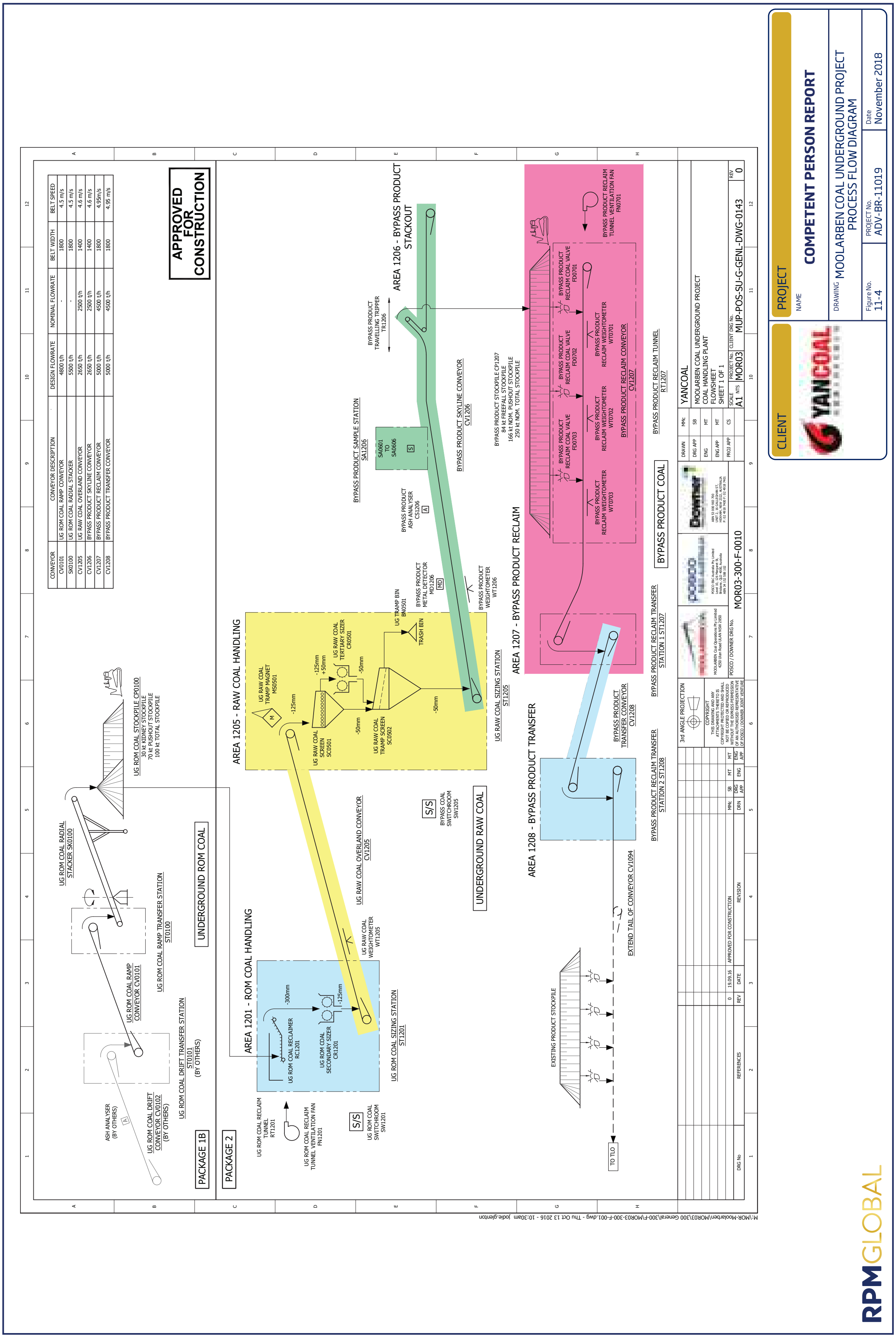
Table 11-3 LOM Product Coal Split ***(1)***

	Product Ash Category (%)			Total Product
Product	16	18	22/28	
LOM Total Product (Mt)	61.7	95.3	97.8	254.8

(1) Source: Moolarben 2017 Life of Mine Plan.pdf, Tables 1-2 & 1-3.



CLIENT
YANCOAL
PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
MOOLARBEN COAL OPEN CUT PROCESS FLOW DIAGRAM
Figure No.
11-3
PROJECT No.
ADV-BR-11019
Date
November 2018
APPROVED FOR CONSTRUCTION
MOOLARBEN COAL
MOOLARBEN STAGE 2
COAL HANDLING AND PREPARATION PLANT RAW & PRODUCT COAL HANDLING PROCESS FLOW DIAGRAM
EXISTING PREPARATION PLANT
EXISTING SURGE BIN
EXISTING SIZING STATION
EXISTING OC1 DUMP STATION
NEW OC4
TRANSFER STATIONS
TRANSFER STATION
REJECTS BIN
EXISTING TRAIN LOAD OUT BIN
STACKER RECLAIMER
NEW 200KT RAW COAL STOCKPILE
150kT EXISTING PRODUCT COAL STOCKPILE
NOTE REJECTS CONVEYORS UPGRADED
OPERATION t/hr
DESIGN t/hr
RPMGLOBAL


CLIENT
YANCOAL
PROJECT
NAME COMPETENT PERSON REPORT
DRAWING MOOLARBEN COAL UNDERGROUND PROJECT PROCESS FLOW DIAGRAM
Figure No. 11-4
PROJECT No. ADV-BR-11019
Date November 2018
APPROVED FOR CONSTRUCTION
AREA 1201 - ROM COAL HANDLING
AREA 1205 - RAW COAL HANDLING
AREA 1206 - BYPASS PRODUCT STACKOUT
AREA 1207 - BYPASS PRODUCT RECLAIM
AREA 1208 - BYPASS PRODUCT TRANSFER
UNDERGROUND ROM COAL
UNDERGROUND RAW COAL
BYPASS PRODUCT COAL
PACKAGE 1B
PACKAGE 2
MOOLARBEN COAL UNDERGROUND PROJECT
COAL HANDLING PLANT
FLOWSHEET
SHEET 1 OF 1
MOR03-300-F-0010
MUP-POS-SU-G-GENL-DWG-0143
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Coal Handling

The Moolarben blending strategy typically starts in the pit with various seams delivered to the ROM coal stockpiles and washed one seam at a time in a campaign to improve yields and throughputs. The Raw Coal stockpile and associated stacker reclaimer system allows for separate stacking and reclaiming of coal based on quality which provides sufficient flexibility to batch wash coal to meet coal product quality requirements.

Stockpile capacity for the end to end CHPP system is the equivalent of approximately 16 days production.

Table 11-4 Stockpile Capacity

Facility	Capacity (kt)	Days Production
OC1 ROM	200	8
OC4 ROM	120	5
ROM UG	100	6
Product	180	5
Prod. UG Bypass	250	14
Total	850	38

With the existing stockpile facilities available at maximum ROM and product coal production rates there is substantial capacity to maintain throughput during off site rail or port outages.

A single train loading bin and dedicated rail loop with a capacity of up to 18Mtpa in railings. Port allocation exists at both the PWCS Kooragang Coal Terminal (KCT) and the Newcastle Coal Infrastructure Group (NCIG) facilities.

The CHPP is relatively new, well-constructed and laid out and is expected to be able to deliver the sustained higher throughput rates outlined in the LOM plan with regularly completed maintenance and the continuation of typical industry operational standards.

11.6 Ashton

The Ashton CHPP consists of two modules. Module 1 was constructed in 2004 however is currently being dismantled. The mine plan is based on using the operating Module 2 which has a throughput capacity of 600 to 800 tpa subject to the nature of the ROM feed. The CHPP includes Dense Media Cyclones, spirals and flotation process which are all industry standard.

The plant is currently operating on a 5 day roster, which at the achieved throughput rates provides for sufficient operating time to wash the ROM coal from the underground project which has a peak rate of 3.4Mtpa. To achieve the LOM plan peak production rate of 6Mtpa which includes coal from both the underground and the South East Open Cut, Yancoal propose to operate the plant on a 24/7 roster system. An allowance in the financial model has also been made for an upgrade of the reject drain and rinse screen and dense medium cyclone circuit.

Ashton has been processing coal seams from the Foybrook coal measures since 2004 including the Pikes Gully seam through to the Upper Hebden seam. The Ashton CHPP washes to a 9.5% ash product which is based on analysis of value versus yield.

Stockpile capacity at Ashton is currently 250kt for the underground ROM coal and 400kt for product coal. The plant has a LOM yield of 56.8% and is forecast at 49.1% for 2018 based on the expected dilution due to seam thickness. This is in line with the 42% in 2017, which was caused by seam thickness variations at the commencement of a longwall panel. These seam thickness variations are expected to decrease based on increased geological knowledge from drilling.

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11.7 Yarrabee

The Yarrabee CHPP was commissioned in 2009 to enable more ROM coal to be processed to produce a PCI coal product. The CHPP uses standard technology and liberates coal through sizing, gravity and flotation separation. After sizing, dense medium cyclones are used for processing the coarse material and spirals and flotation cell are used for the fine coal.

The CHPP was originally commissioned with a nameplate capacity of 350tph. Through debottlenecking improvements, the current throughput capacity is 450tph. Yarrabee commissioned a study to assess alternatives for increasing throughput at the site. The two options were to install a new module and achieve a rate of 700tph or to make further upgrades to the existing plant and achieve a rate of 585tpa. The option to modify the existing plant through upgrades has been selected as the basis for this plan.

Bypass coal is hauled to various bypass stockpiles located adjacent to YEN Pit or at the CHPP. Bypass coal is crushed at each bypass pad by a mobile crushing plant. Bypass product coal is then hauled 37km direct from the bypass pads to the Boonal rail siding. Washed coal is crushed at the main CHPP pad and fed directly into the CHPP feeder bin. Washed product is placed into stockpiles which are managed by dozers to maintain capacity. Product coal is also hauled by road train to the Boonal siding. The Boonal Load Out Facility is owned and operated by a Joint Venture between Yancoal and Jellinbah Coal Mine.

Potential bypass coal is identified in the geological model and confirmed through the application of appropriate loss and dilution assumptions to estimate the run of mine coal quality. If the quality of the coal meets the required product specification then the coal can be bypassed. Because of the campaign washing of coal on a seam by seam basis, data can be collected to correlate wash plant yield with ROM ash on a seam basis. This correlation allows prediction of actual CHPP yields for each seam and ply from each pit. This method has been used for the estimation of Marketable Reserves.

The Yarrabee CHPP operates on a six day, three panel roster with planned maintenance schedules on the down day.

The plant has a LOM yield of 76% and is forecast at 78.5% for 2018 resulting in an effective yield of 86.7%. This is in line with the 75% in 2017 and an effective yield of 83%.

11.8 Stratford and Duralie

The Stratford CHPP is a two-stage plant processing coarse, fine & ultrafine coals to achieve specified coal quality and to maximise product yield. The CHPP is fed by Front End Loader (FEL) which feeds the nominated ROM coal blend from the stockpiles into the CHPP ROM Bin. The coal goes through the raw coal circuit which reduces the coal to a top size of 50mm before entering the plant. The coal is then separated into various size fractions by screening and by classification. The following systems are used in the nominated size fractions:

- Dense Medium Cyclones, 50 mm - 1.4 mm size fraction,
- Spirals, 1.4 mm +0.25 mm size fraction,
- Teetered Bed Separator, 1.4 mm - 0.25 mm size fraction and
- Flotation, < 0.25 mm size fraction.

The Stratford CHPP has excess capacity with low utilisation in the proposed life of mine plan. It is therefore not anticipated that plant upgrades will be required to achieve the proposed plan. The following points outline the development and improvements made to the Stratford CHPP:

- 1995 initial plant nameplate 350 tph
- 1996 Daniels Bath circuit installed to scalp rock out of the Avon pit feed. Nominal capacity increased to 500tph.
- 1997 First HBF and Jameson cells, TBS & Lime silo upgrade. Nominal feed rate to 550tph.
- 2003 Duralie mine started. Stratford main pit (Avon seam) completed. Due to the change in feed coal types (Duralie feeds had much less rock), the Daniels Bath circuit was no longer required and was removed. Nominal capacity reduced to 400tph.

- 2007 SMART cell installed as a secondary flotation machine.
- 2008 – Drum filter installed to filter product from the Smart Cell due to overloading of the original HBF.
- 2009 - 2010 Fines upgrade and new product stockpile expansion. Double pumping of co-disposal.
- 2011 Desliming screen and coarse coal centrifuge upgrade enabled 670tph on Duralie feed tonnes and 490tph on Stratford feed tonnes, Second HBF and Jameson cell upgrade. Drum filter removed.
- 2013 Raw coal crushing and screen tower upgrade

The plant has a LOM yield of 59.6% and is forecast at 59.4% for 2018. This is much lower than the 71% achieved in 2017. There are a large number of seams mined that have varying forecast yields, mining in 2017 was from a higher yielding seam. The development of the Avon North and Roseville West pits in 2018 will result in a reduction in the average annual yield at the site.

11.9 Austar

The Austar CHPP was designed, built and installed in the early 1960's and has undergone substantial modifications since this time. The CHPP is located to the north of Wollombi Rd near the village of Pelton.

The design feed rate of the plant is 600tph, however improvements have enabled the plant to operate at rates between 720 to 750tph which provides capacity to process 5Mt per annum. The Austar is a Heavy Medium plant with a fine coal spirals circuit. There are two heavy medium circuits which are set up to treat different size fractions:

- No.1 Circuit treats the 12mm to 1mm size fraction using dense medium cyclones (DMC),
- No.2 Circuit treats the 40mm to 12mm size fraction also using DMC and
- Fines (-1mm) are treated in the spirals circuit.

ROM coal is transported from the pit top to the CHPP via a 2.5km overland conveyor. After primary sizing ROM coal can either be fed directly into the CHPP or stored on the ROM stockpile. Washed coal is transported to the product stockpile via a skyline conveyor and tripper and deposited on the washed coal stockpile via the moving tripper.

Product coal is transferred via a reclaim tunnel and the reclaim conveyor which operates at a rate of 1,200tph. The reclaim conveyor transfers the product coal to a rail loadout bin which sits directly over the rail line adjacent to the CHPP.

The plant has a LOM yield of 84.2% and is forecast at 86.1% for 2018. This is lower than the 91% achieved in 2017 due to the planned dilution and mine methods.

11.10 Donaldson

Donaldson coal has historically been hauled via road train to the neighbouring Bloomfield Colliery where it was processed under a toll washing arrangement. The mine is currently under care and maintenance, however RPM understand that this is the proposed coal processing option for the mine in the future.

11.11 Middlemount

The Middlemount CHPP designed in 2007 and construction was completed in 2010. The plant has had modifications completed to aspects of the design in 2011 which were aimed at improving coking coal yields from the plant. The CHPP is a single stage plant with the ability to produce two products. The plant uses standard industry technologies which includes; dense medium cyclones, spirals and Jameson cell systems.

The Middlemount plant has a nominal throughput capacity of 700tph and operates 24 hours per day, 7 days a week. This is sufficient to process up to 5.4Mtpa of ROM coal feed. The Middlemount plant operates at high utilisations by industry standards.

All ROM coal is washed at Middlemount to produce PCI and semi hard coking products. Product coal is stored on two separate stockpiles with a combined capacity of 250kt.

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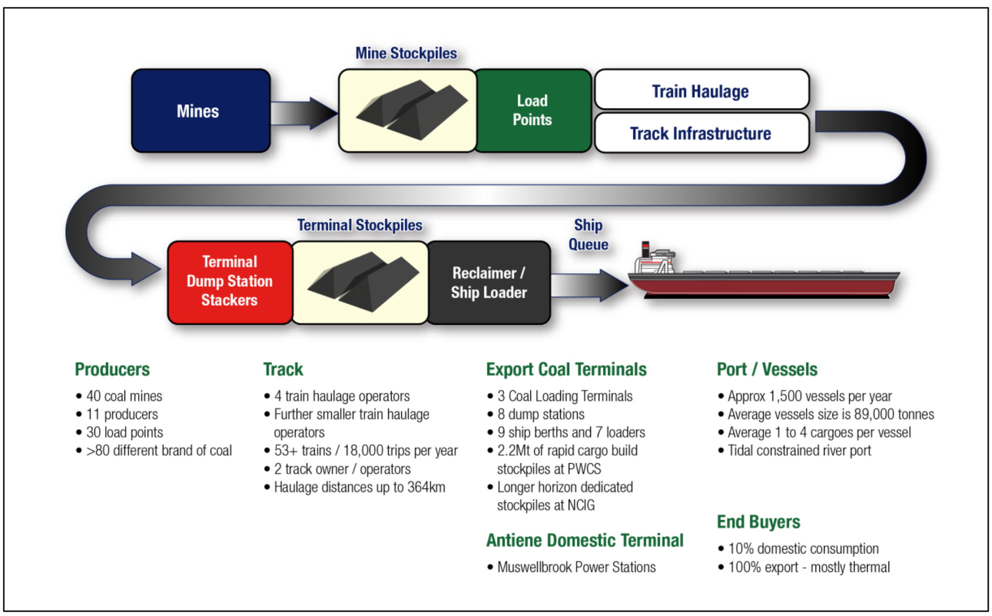
12. Railway and Port Infrastructure

Upon arrival at the various loading points within the Assets, the coal is transferred to coal trains for transport via railway to one of three terminals at the deepwater port in Newcastle, or one of three ports in Gladstone and Mackay in QLD.

The Newcastle terminals are operated by Port Waratah Coal Service ("PWCS") and Newcastle Coal Infrastructure Group ("NCIG") and service the Company as well as other coal producers in the region. The ports in Queensland include the Port of Gladstone, the Port of Abbott Point and the Port of Hay Point. The company exports via four separate coal terminals in Queensland

Both the rail networks and port facilities are operated by third parties and, as such, the Company has various contracts in place. The NSW network is a regulated network that is often referred to as the Hunter Valley Coal Chain ("HVCC") and requires no capital investment from the Company, instead the Company pays contracted rates. An overview of the HVCC as at 2012 is shown in ***Figure 12-1***. RPM highlights this figure shows the current total user of the network, not just the Company.

Figure 12-1 Overview of HVCC at as 2012.



Source: Provided by the Company

12.1 NSW Rail Supply Chain

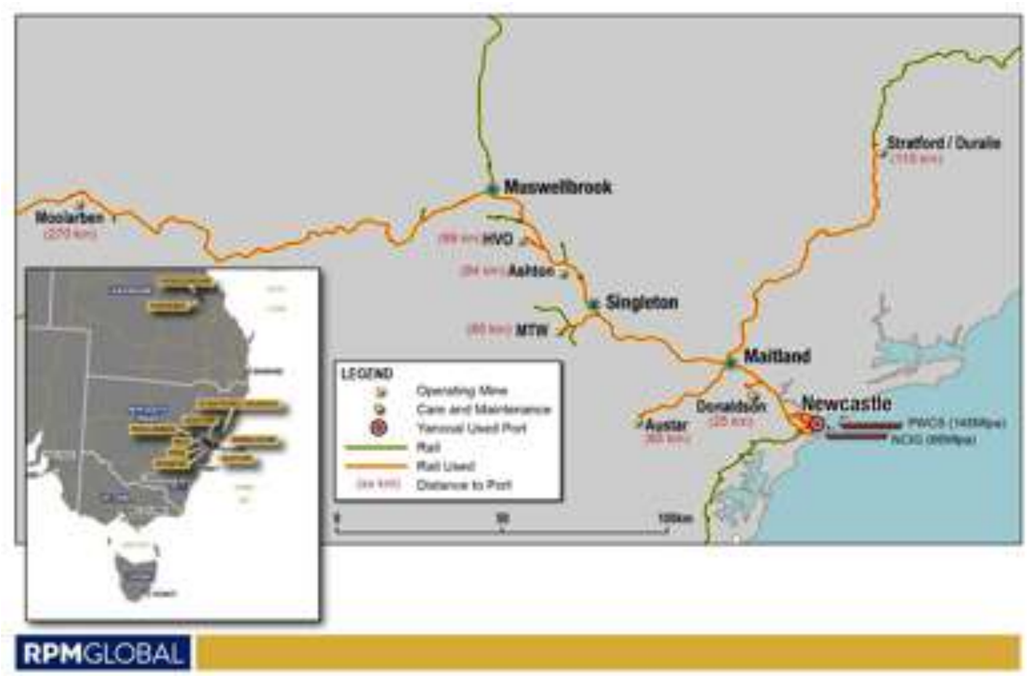
The Company's supply chain is a sub-set of the broader rail and port network operating in NSW (***Figure 12-2***) which is a regulated network referred to as the Hunter Valley Coal Chain ("HVCC") which is managed by the Hunter valley Coal Chain Coordinator ("HVCCC"). The NSW mines use the HVCC rail network to transport products to the Port of Newcastle coal terminals PWCS and NCIG with the Company required to schedule coal transport, as do all other HVCC users.

RPM notes that the Australian Rail Track Corporation ("ARTC") provides all below-rail access with capacity aligned to contracted port volumes for all HVCC users. The ARTC is a federal government owned corporation established in 1998 that manages the majority of the interstate rail network in Australia. The role of the ARTC is to operate and coordinate the operation of the national rail network and to ensure rail capacity will be sufficient to meet future growth demands. Importantly for the Company the ACCC restructured the access framework for the Hunter Valley rail system that resulted in the ARTC contracting directly with coal producers for rail access for coordination with the HVCCC.

RPM is aware that ARTC has produced a 2017 to 2026 Hunter Valley Corridor Capacity Strategy report which outlines the necessary rail infrastructure requirements to meet the track capacity requirements of the coal industry over this period. The system improvements are proposed to be funded by access charges paid by the coal producers utilising the track as per current arrangements.

It is expected that below-rail capacity will lag port capacity in the HVCC until 2017 when a number of the key congestion projects are expected to be completed. Importantly, the corridor strategy also identifies the necessary rail network upgrades that would enable track system capacity to support the development of terminal 4 at PWCS by delivering system capacity of approximately 280-300Mtpa. RPM has not reviewed this strategy document and provides this information for reference only.

Figure 12-2 Assets Rail Network to Port of Newcastle



Rail Contracts

Through discussion RPM is aware the company has sufficient rail access and freight contracts to meet its current production requirements for each asset. RPM notes that as per industry standards renegotiations occur periodically, as such allotments for the LOM are expected to be available. Rail contracts are commercially sensitive and as per JORC Code clause 49 information regarding these contracts is not presented in this report.

12.2 NSW Port Facilities

Upon arrival at the Port of Newcastle, the products are exported via coal terminals PWCS and NCIG. Several producers utilise these terminals which have a total nameplate capacity of 211Mtpa after recent expansions. Similar to the rail supply chain, the port facilities are operated by a third party. Below is a brief summary of each of the terminals. RPM presents this for information purposes only.

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PWCS

The PWCS terminal has a capacity of 145Mtpa and consists of two terminals, namely Carrington Terminal and Kooragang Terminal, as described below:

- Carrington Terminal – Commenced operation in 1976 and is located on 51Ha of land on the south side of Newcastle Harbor. Initially with 16mtpa of capacity it has been expanded to the current level of 25mtpa. Coal is transported by rail or road, with the vast majority by rail, to two offloading facilitates. Two ship loaders are in operation.
- Kooragang Terminal – Commenced operation in 1984 and is located on 265Ha on the North side of Newcastle Harbor. With an initial capacity of 15mtpa, it has been incrementally increased to the current capacity of 120mtpa. All coal is received via rail into four offloading facilities.

PCWS has a plan developed for an additional terminal (Terminal 4) to be constructed in stages according to demand. This terminal is yet to commence construction however technical studies are underway along with the governmental approval process. No timeline has been set for construction of the 120Mtpa capacity terminal due to recent decreases in commitments of throughput from various coal producers.

NCIG Terminal

The NCIG terminal commenced operation 2010 with an initial capacity of 30Mtpa, after further stages of expansion were completed resulting the current capacity of 66Mtpa. The terminal contains storage capacity of 5.7Mt, which is allocated based on proportion of the capacity allocation.

Port Contracts

Each coal producer is provided with a contracted port allocation which is the upper limited of export coal and are obliged to meet under a TPC. RPM is aware the Company does not necessarily follow these allocations per operation. Instead, the Company takes into consideration the NCIG port capacity allocation and splits that on a Product Coal optimisation basis between its operations. As with the rail allocation RPM is aware the company has sufficient rail allotments to meet its current and medium term production requirements. RPM notes that as per industry standards renegotiations occurs periodically, as such allotments for the LOM are expected to be available, further more as these contracts are commercially sensitive, as per JORC Code clause 49 information regarding these contracts is not presented in this report.

The current port capacity contracts do not reflect mine ownership, nor do these reflect the current ARTC rail allotment agreements for contracted volumes from each operation. Given the Company also holds the rail contracts which are in excess of current Assets product requirements, the mines are exposed to substantial TPC charges. RPM notes that these additional charges are INCLUDED in the OPEX as outlined in **Section 14**.

The Company holds the typical 10 year rolling TPC port contracts at both NCIG and PWCS. Whilst these long-term contracts act as security over the Assets operations they can also be problematic in terms of meeting, however not exceeding, contracted volumes. In fact, the Company has failed to export sufficient coal volumes to cover all of its NCIG and PWCS port contracts for at least the last 5 years. That would indicate that the Company has made a commercial decision to accept TPC charges for unused port capacity rather than not have that capacity in hand should it be required.

It is necessary for the Company to revise the allocations and assess the risk for TPC penalties. This is important as the NCIG port has a higher charge than PWCS however better cargo handling and blending facilities.

12.3 Hunter Region Infrastructure Comments

RPM is of the opinion that the current HVCC and contracts in place are sufficient to support the forecast production as reported in this Report. HVO expansion plans, in combination with a 12Mtpa MTW production volume, will require additional rail and port capacity that the Company does not currently have secured (other than that noted above). As with all 10 year evergreen rail and port capacity allocations it is possible to apply for additional train paths and port capacity on an annual basis. There is sufficient time for the Company to use the annual process to apply for increased allocations if it so desires and in the current market, there should be no issues in receiving increased rail and port allocations in a timely manner. However, this scenario could rapidly change with relatively minor increases to the current FOB Port of Newcastle revenues across the coal industry.

The proposed Terminal 4 expansion at Newcastle Port is on hold. Even without that project proceeding there are a number of efficiency upgrades underway at PWCS and NCIG that will increase the Port handling capacity over the short to medium term without the need to invest in a major upgrade like T4.

In the current climate it is difficult to predict when the next cycle of major rail and port expansion projects will proceed, however expansions of the HVCC are not seen as short to medium term risks to the implementation or timing of any expansion.

There always exists some confusion about medium to long term rail and port charges. However, at this point in time RPM considers there are some opportunities for coal miners to seek and obtain better deals across the HVCC.

12.4 QLD Rail Supply Chain

The Yarrabee and Middlemount mines are located in Queensland's Bowen Basin. The mines of the Bowen Basin are connected to the ports by four separate rail networks; Moura, Blackwater, Goonyella and Newlands which collectively are referred to as the Central Queensland Coal Network (CQCN). The total network includes 2,670km of rail track and has a total capacity of approximately 360Mt per annum.

Coal from the Yarrabee mine is railed via the Blackwater System to the Port of Gladstone and coal from Middlemount is railed via the Goonyella System to the Port of Hay Point and via the Newlands network to the Port of Abbot Point.

The below rail infrastructure of the CQCN is owned and managed by Aurizon Network. Aurizon Network's operations are governed by 99 year lease arrangements with the State of Queensland. Access to the rail network is managed under a detailed process approved by the competition regulator, the Queensland Competition Authority. The CQCN can be seen in ***Figure 12-3***

There are currently two above rail operators on the CQCN; Aurizon Operations and Pacific National. Middlemount Mine has above rail contracts in place with Pacific National and Yarrabee with Aurizon Operations.

Figure 12-3 Queensland Rail Networks and Ports

12.5 QLD Port Facilities

The Bowen Basin is serviced by five coal terminals across three ports. Between the two Queensland based operations coal is exported via four of the coal terminals: Yarrabee has a contracts with Wiggins Island Coal Terminal and RG Tanna Coal Terminal. Both of the terminals are based at the Port of Gladstone. Middlemount Coal has contracts with Abbot Point Coal Terminal at the Port of Abbot Point and with Dalrymple Bay Coal Terminal at the Port of Hay Point.

Abbot Point Coal Terminal

The Port of Abbot Point is Australia's northernmost export facility located approximately 25 km North of Bowen in North Queensland, Australia. The T1 terminal has a nameplate capacity throughput of 50Mtpa. In fiscal Year 2016-2017, 25.4Mt was shipped through Abbott Point

The facilities at Abbot Point comprises coal handling and stockpile areas, a rail unloading facility, a single trestle jetty and a conveyor connected to a berth and shiploader 2.75 km offshore.

Dalrymple Bay Coal Terminal

Dalrymple Bay Coal Terminal (DBCT) is located 38km south of Mackay in the Port of Hay Point. The coal terminal has a nameplate capacity of 85Mtpa. DBCT was established by the Queensland Government in 1983 and in 2001 awarded a 50 year lease plus a 49 year option to DBCT Management Pty Ltd.

The facilities at the site include four berths, three ship loaders, train unloading facility and coal stockyards with a live capacity of 2.3Mt.

Wiggins Island Coal Export Terminal

The Wiggins Island Coal Export Terminal (WICET) is located to the west of the RG Tanna Terminal in the Port of Gladstone. WICET has a current capacity of 27Mtpa and a current throughput of 16Mtpa. The offshore wharf and loading facilities are situated north of Wiggins Island, adjacent to the Targinie Channel. The rail unloading facilities are located immediately south of the North Coast Line (NCL) and are connected to the Golding Point stockyard via a 5.6km long overland conveyor.

The facilities include a train unloader, stockyard with a capacity of 1.85Mt, wharf and shiploader.

RG Tanna Coal Terminal

RG Tanna Coal Terminal (RGTCT) is located in the Port of Gladstone. The coal terminal has a nameplate capacity of 74Mtpa. The terminal is operated by the Gladstone Ports Corporation which is a Queensland Government owned corporation.

The facilities at the site include four berths, three ship loaders, three train unloading stations and coal stockyards with a live capacity of 5.8Mt in up to 22 separate stockpiles.

13. Site Infrastructure

Supporting regional and local infrastructure for the Assets is well established and has ample capacity for the continued support of the planned LOM operation. The Assets are located in close proximity to regional townships and serviced by national highways and good quality tarred roads. The surrounding towns provide suitable accommodation and supporting industries for the operations. Below is a description of the major infrastructure requirements of the Assets (other than rail and port transport infrastructure). RPM's observations during the various site visits confirm each site has fit for purpose infrastructure in suitable condition to support the estimated project life.

13.1 Transportation Facilities

All of the mines are currently operating with the exception of Donaldson which is currently under care and maintenance. As part of the site visits, RPM observed that the installed transport infrastructure including rail loading facilities, site access roads and conveyors were generally in good working condition. Open cut projects will require periodic construction of haul roads and site access roads however this is standard practice for operating mines.

RPM make the following specific comments:

- MTW - A new heavy vehicle underpass (beneath the Putty road) has recently been completed to allow overburden to be hauled from Warkworth pits to Mt Thorley waste dumps. This is the second heavy vehicle road linking the two mines.
- Stratford and Duralie - two road diversions are required to achieve the life of mine plan. The roads are not main thoroughfares. The Wenham Cox Road diversion is required to access the Avon North pit which is due to commence in the next 12 months. The Johnsons Creek Road will be required to mine the Duralie East pits from 2024.
- The SEOC at Ashton will require a new ROM pad and overland conveyor for coal handling.
- Ashton currently relies on trains using the Ravensworth Operations rail loop which is managed by Glencore to turn trains around after loading at Ashton. The rail loop access agreement expires in 2024 and either a renewal or alternate strategy is required to complete the LOM Plan.

13.2 Buildings and Yards

The operations are equipped with the usual complement of facilities including parking areas, gate-houses, offices, warehouses, storage yards, workshops, scrap yards, laboratories, change rooms, lunch rooms, emergency-service facilities (medical clinics and fire-fighting), food-service facilities, etc. required to serve the mines and plants.

RPM have not completed a detailed audit of the facilities at each site. Given the majority of the sites are operating mines, RPM anticipate that the existing infrastructure is in place to support mining activities except for the following specific comments:

- Ashton LOM plan suggests the requirement of additional workshop due to the isolated location of the SEOC. Capital allowance is included in the LOM Plan for site infrastructure adjacent to the SEOC pit.

13.3 Water Supply and Storage

HVO

Water supply requirements for HVO differ depending on whether the area is a net user or producer of water during the various rain seasons as outlined in ***Section 2***. The water management system for HVO, including the West Pit, operates through the separation of clean and dirty water via separate water circuits between the tails and CHPP facilities. The main consumption of water is for dust suppression on haul roads, mining areas and coal stockpiles and CHPP circuit losses. Water has historically been supplied from three sources:

- surplus mine water stored in pit (and subsequently pumped);

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- intercepted runoff water; and
- ground water percolation into the open-cuts.

HVO has an active water management strategy and manages surface and subsurface water according to key objectives:

- Ensure that statutory requirements and corporate standards are met;
- Manage catchments and water on the mine lease in a way that minimises surface water impacts to environment and downstream neighbours and limits interference to mining production;
- Maintain quality control and segregation of clean and mine affected water;
- Reduce reliance on fresh water usage; and
- Keep the local community and regulators informed of activities where required and to respond quickly and effectively to issues and complaints.

RPM is aware that HVO is not connected to the Singleton Shire town water supply with potable water trucked in from local suppliers in the Singleton and Muswellbrook area. Rehabilitated Class I and II land on the Alluvial Lands mining area is irrigated using an agricultural licence issued by NSW Office of Water (see ***Section 14***). The licence and allocation were pre-existing and were purchased with the land before mining commenced.

MTW

Water supply and on-site storage at MTW was significantly upgraded by approvals for major out of pit dams in 2009 and is further secured by access to Hunter River entitlements and also supply supplement via HVO. The current operations and possibly the expanded operation should it occur, are adequately covered by raw water supply and storage infrastructure.

Following the internal and regulatory approvals being secured construction of two dams, South out of pit Dam and North out of pit Dam were completed to increase out of pit water storage capacity from 685Ml to 2,340Ml, thus allowing the Mt Thorley Pit to be returned to mining. The South out of pit Dam was constructed in 2010 and has a capacity of 2,110 Ml.

If site water stocks are low or not available, fresh water is sourced from the Hunter River via the MTCV Water Supply Scheme. If MTW's allocation has been exceeded during periods of extended dry weather, MTW has historically purchased water from HVO to meet the surplus demand.

MTW has adequate water licences (3GL) to supply washeries and dust management systems across the mine site.

Moolarben

On-site water storage is largely associated with de-watering of the Underground 4 workings. The proposed mitigation strategies and RPM comment are outlined below:

- Making additional areas available for increased on site water retention and storage through modification of planned open cut mining sequence. This strategy potentially decreases the available open cut working room and may decrease mining efficiency or output.
- Desalination and discharge from site relies on achieving he requisite environmental discharge licences from relevant NSW Government department. These licences are typically only made available for the short term discharge of mine water associated with significant storm events.

RPM have not reviewed the detailed water balance modelling associated with the site water storage plan work is ongoing to understand the likely magnitude of impact to open cut mining associated with additional retention and the volume of discharge being proposed to ascertain the likelihood of approvals being granted in relation to existing approvals for other nearby mines.

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Ashton

The Water Management Plan for Ashton was developed in association with the DPE and DPI. The plan was last approved in 2016 and was under review as at 26/06/2017. Underground water management is achieved via

- a series of pumps at low points;
- peak loads identified from the site groundwater model; and
- air operated at face to a series of electric staging pumps (25L/S) either pumped to sumps at the mine access portals or to vertical borehole pumps (40L/S).

Site water balance modelling indicates a progression to a surplus water supply however no detailed water modelling for the SEOC has been completed at this time. A water inventory risk monitoring program is completed monthly and risk around inflows from alluvium during underground mining of ULD seam is reviewed at six monthly intervals. Sufficient licences are in place for predicted water intakes with recent consolidation and simplification of licences. 2007 and 2008 flood events were successfully controlled.

Yarrabee

Yarrabee maintains a water management plan which aims to achieve the following:

- Maintain separation between mine affected water and clean surface water runoff.
- Capture surface water for use on site.
- Comply with statutory requirements.
- Protect local water resources.

The site water balance indicates that the mine has a water deficit of approximately 1,300ML per year. The site has 10 water storage areas of which 9 are mined out voids. Water is preferentially stored in voids with low predicted evaporation levels.

Yarrabee is not susceptible to flooding from the nearby Mackenzie River but has been impacted during periods of heavy rainfall by 12 Mile Creek which runs through the project. Flood diversion structures were developed to mitigate this issue in 2017. There is the requirement of the 12 Mile Creek to be relocated.

Stratford and Duralie

The Stratford and Duralie project has a number of contained water storages including the existing voids at the site, there are also the voids of planned pits as the project is developed. The project water management system is designed to achieve no overflow from contained water storages to downstream watercourses.

The main water requirement is for CHPP make-up supply and for dust suppression. The water balance at the Stratford complex has historically been in surplus. The Main Pit Void water storage is deemed suitable for water and tailings management at Stratford. The Duralie operation has multiple evaporator sprays in place to mitigate some of the excess water.

Austar

Austar has a Site Water Management Plan (SWMP) in place which covers the following aspects of the project:

- Underground mine water management,
- Pelton CHPP Site and
- Surface water storage and management.

There are a number of geographically separated and interrelated systems that are managed as a whole to ensure that the operational needs of the mine are met whilst also meeting licence requirements. There are a number of large water storage areas both on the surface and underground that effectively act as buffers to enable each of the areas listed above to act broadly as independent systems. The site has a water treatment plant which allows the mine to operate almost independently of the town potable water supply. The site only discharges treated water to Bellbird creek in accordance with approved conditions.

Donaldson

A water management plan has been developed for Donaldson and was last updated in 2014. Water supply for the mine is made up from surface water runoff that is diverted to a storage dam on site and mine water from the underground mine. Excess water from the underground mine is currently transferred to Bloomfield CHPP under an agreement between the two parties. During the course of the Life of Mine Plan it is predicted that an excess of water will produced at the site.

The surface water management plan is integrated with the Bloomfield Colliery plan that serves the mine and the CHPP through which Donaldson coal is planned to be processed. The surface water management system includes the following aspects:

- All surface water runoff is directed to the Big Kahuna dam from the mine facilities area
- Underground inflows may be stored in some areas of old workings, inflows from localised areas are to be transferred to Big Kahuna dam
- Water for underground operations is drawn from Hunter Water potable supply
- Water from Big Kahuna dam is used for onsite purposes
- Water is periodically transferred from Big Kahuna dam to Lake Kennerson at Bloomfield via pipeline
- Water may be periodically discharged off site from Big Kahuna dam to Four Mile Creek under approved conditions.

Middlemount

Middlemount mine is currently operating and has sufficient water supply to achieve current planned production at the site. A staged set of flood protection levies are planned at the southern end of the pit to protect the pit from inundation.

13.4 Power Supply

All of the operating sites have developed electrical reticulation systems in place. The sites have sufficient supply to achieve the proposed development plans. Routine ongoing maintenance is all that is anticipated. In addition to this RPM make the following specific comments:

HVO

Electricity is supplied to HVO via a 66kV transmission line and associated substations and switchyards. Electricity is supplied to mining equipment such as draglines, electric rope shovels, employee amenities and CHPP's from the main grid. In addition, 330kV transmission lines pass through HVO.

MTW

As noted in ***Section*** 2 the MTW is an amalgamation of Mount Thorley and Warkworth mines separated by the Putty Road. As a result two separate high voltage electrical supply and reticulation systems are in place with Mount Thorley having a capacity of 66kV, while 33kV was adopted at Warkworth. Both systems are fed from Ausgrid's Mount Thorley 66kV switchyard located approximately 150m east of Warkworth's main administration building.

Recent modifications have been completed to standardise reticulation to the mining fleet across MTW at 33kV. As such electrical supply to the mining fleet at Mount Thorley is supplied from Warkworth.

Moolarben

Power is supplied to the site via a 66kV transmission line from the Ulan Switchyard. The line runs adjacent to the road and rail corridor to the CHPP facilities where a 66/11kV substation is located. The site has sufficient power supply to support the planned operations.

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Ashton

The proposed higher capacity longwall face necessitates the current electrical infrastructure to be upgraded to accommodate higher electrical load requirements. The SEOC requires the relocation of the 132kV powerline and additional aerial lines and transformers.

13.5 Internal Services

Internal services provided by the operations include medical, fire-protection, purchasing, accounting, human-relations, community-relations, environmental-safety-health (ESH), legal and marketing. For the larger sites, these facilities are located onsite and are sufficient for the operation of the mines. The smaller sites have services such as legal, marketing and accounting offsite in the head office. A proportion of these costs are reallocated to the smaller sites in economic modelling.

13.6 Personnel

The management organisation is conventional and considerable effort appears to be devoted to planning, to resolving foreseeable problems ahead of time and taking advantage of opportunities. RPM considers the current structure suitable to manage the operations. Given the majority of the assets are operating mines and have existing workforces in place, RPM anticipate that the main requirement for ongoing recruitment will be for maintaining workforce levels as a result of typical levels of turnover.

The exceptions are that a workforce will be required to run the planned South East open Cut at Ashton and underground operators will be required at Donaldson.

14. LOM Operating and Capital Costs

The Capital and Operating costs outlined below reflect the Operating Assets Consolidated Production Schedule which is summarized in ***Section 9*** and detailed by operation in ***Section 10***. The forecast costs assume all Inferred Resources are included as coal. All costs are assumed to be Australian Dollars unless denoted otherwise.

RPM notes that the consolidated cost forecast excludes Donaldson (which is presented in ***Section 14.3***, as this is a re-start project with stat date not confirmed due to internal project development priorities of the Company.

This section provides an overview of the annualised costs for each project on a Free on Board and Free on Rail basis as well as CAPEX, however detailed annualised forecasts (broken into those centres in ***Section 14.1***) are provided in ***Appendix G*** for reference. The detailed breakdowns in ***Appendix G*** include the

14.1 Operating Costs

Operating costs for the Projects are reported as Free on Rail ("FOR" or "Onsite Costs") and Free of Board ("FOB" or "FOR plus off site costs") cash costs. These cost centres incorporate the following costs:

- **FOR or Onsite costs**: include all costs to produce the product from mining to the rail loading facilitates and incorporate the following:
  - **Open cut mining of waste and coal**: This includes the drill and blast costs, dragline, excavators, trucks and haulage costs to the waste dumps and CHPP's.
  - **Site Administration (G & A costs)**: This includes technical services and administration labour costs etc.
  - **CHPP**: All costs associated with washing of the coal and transport to the rail loading facilities.
- **FOB costs**: includes all costs to transport the coal products to the ship for transfer to customers. These costs include the following:
  - **Rail**: Costs associated with third party rail freight from the rail loading facilities to the port terminals
  - **Port**: Costs associated with transfer of coal product from rail freight to boat via the coal handling terminals at the Port of Newcastle.
  - **Other costs**: These include royalties (unless otherwise noted) and levies, corporate management and demurrage at the port.

RPM highlights that all costs presented are real costs with no inflation included.

Historical Costs

The historical costs per costs centre and operation as shown in ***Table 14-1*** show a general decrease from 2016 through to 2017. This decrease was primarily due to the cost saving measures the Company implanted across the majority of their operations. The exception to this are Yarrabee and Ashton where increases are due to short term mining difficulties which are isolated in the schedule.

Forecast Operating Costs

Estimated LOM average operating costs for the Assets are summarized in ***Table 14-2*** while the LOM yearly operating costs are summarised in ***Table 14-3***. RPM notes that the unit costs presented in ***Table 14-2*** and ***Table 14-3,*** while sourced from information provided by the Company, were adjusted where considered appropriate to reflect RPM's independent review and LOM schedule presented in this Report. Review of the forecasts clearly highlights the differentiation between the HVO, MTW and Moolarben low cost operations versus the remainder with these assets having significantly lower FOB and FOR costs than the other operations.

Table 14-1 Historical Average Operating Costs

Operation	Center	Unit	2016	2017	H1 2018
HVO	FOR	AUD/Product t	N/A[1]	50.9	53.2
	FOB	AUD/Product t		72.3	77.3
MTW	FOR	AUD/Product t	N/A[1]	52.1	52.3
	FOB	AUD/Product t		72.0	71
Moolarben	FOR	AUD/Product t	32.5	29.2	22.4
	FOB	AUD/Product t	56.6	54.4	48.9
Yarrabee	FOR	AUD/Product t	62.5	73.3	101.3
	FOB	AUD/Product t	94.7	122.0	146.3
Ashton	FOR	AUD/Product t	82.7	87.0	128.8
	FOB	AUD/Product t	104.4	120.1	166.1
Austar	FOR	AUD/Product t	91.6	67.6	157.3
	FOB	AUD/Product t	120.7	95.8	196.5
Stratford and Duralie	FOR	AUD/Product t	86.0	66.2	124.2
	FOB	AUD/Product t	123.8	101.4	160.6
Donaldson	FOR	AUD/Product t	153.9	Note 2	Note 2
	FOB	AUD/Product t	235.7		
Middlemount	FOR	AUD/Product t	62.40	74.485	84.60
	FOB	AUD/Product t	113.018	137.17	149.67

Source: Total Costs Supplied by the Company with Unit Costs based on total reported tonnages.
Notes: 1. HVO/MTW was purchased in 2017, 2.no production occurred during 2017 and H1 2018 for Donaldson and production during 2016 was limited.

Further analysis shows that the 2017 costs are generally in line with the 2018 forecasts costs for Moolarben and Yarrabee as expected due to the steady state production, however Ashton is significantly lower while Austar and Stratford and Duralie are higher. As outlined in ***Section 11***, RPM expects improvement in the Plant Yield at Ashton due to decreased dilution as such will reduce the FOB costs, however an increase in dilution is expected at Stratford and Duralie, hence the increase in costs.

Austars' increasing costs are a reflection of the changes in operating procedures onsite and production limitations in relation to the management of coal bursts. RPM considers the forecasts reasonable and achievable however notes that the mine is currently not operating with all staff being relocated to nearby mines in the district to minimise OPEX during the shutdown. RPM notes that the FOR cost during H2 2018 are associated with placing the mine of care and maintenance and not operations, while the FOB costs are associated with the Take or Pay contracts for the rail and port.

At MTW and HVO, the 2018 LOM plans were scheduled during 2016 with certain assumptions on equipment and labour efficiency gains as part of the Company's plans. The transaction with Coal and Allied was delayed from January to September 2017 which delayed the ability to achieve meaningful efficiency gains in 2017. As such RPM anticipate that cost savings will begin to be realised at MTW and HVO during 2018 and more so in 2019. RPM also notes that due to multiple pits the OPEX changes over the long life of the projects as such the 2018 H1 numbers do not reflect the LOM averages in most cases as noted in ***Table 14-3***.

Table 14-2 LOM Average Operating Costs

Operation	Centre	Unit	LOM Average Cost
HVO	FOR	AUD/t prod	45.8
	FOB	AUD/t prod	67.2
MTW	FOR	AUD/t prod	49.3
	FOB	AUD/t prod	67.1
Moolarben	FOR	AUD/t prod	25.9
	FOB	AUD/t prod	50.4
Yarrabee	FOR	AUD/t prod	85.2
	FOB	AUD/t prod	124.8
Ashton	FOR	AUD/t prod	67.1
	FOB	AUD/t prod	91.3
Austar	FOR	AUD/t prod	70.5
	FOB	AUD/t prod	95.6
Stratford and Duralie	FOR	AUD/t prod	80.4
	FOB	AUD/t prod	107.1
Donaldson	FOR	AUD/t prod	34.1
	FOB	AUD/t prod	93.8
Middlemount	FOR	AUD/t prod	87.5
	FOB	AUD/t prod	133.1

Source: Unit Costs were provided by the Company however were adjusted to reflect RPM independent Consolidated Production schedule. Unit costs were calculated based on total costs which vary to the Company's due to unit costs changes and production schedule variations.

14.2 Capital Costs

Capital Costs for the project are separated into the following Cost Centres:

- Growth Capital: Includes capital required for the upgrades of the CHPP's and site infrastructure.
- Sustaining capital: Includes capital required to replace mobile and fixed plant as part of ongoing maintenance and production requirements as well as closure costs. This includes all site infrastructure production fleets and CHPP's and Tails Storage Facilities and other CAPEX items. This also includes land purchases required for Ashton.
- A summary of the CAPEX is shown in ***Table 14-3***, while further asset by asset breakdowns are provided in ***Appendix G***.

An average of 228 Million AUD is required per year for Growth and Sustaining CAPEX over the LOM of the group's assets ranging between 258 Million AUD in 2021 to 535 Million AUD in 2020 over the next 10 years. As shown in ***Table 14-3***, the relatively large increases in 2021 and 2024 are due to equipment purchases at Yarrabee and the commencement of SEOC respectively. The majority of the CAPEX is spent at HVO, MTW and Moolarben while Yarrabee, due to it mine life, also requires significant CAPEX.

Growth Capital Expenditure

As the Assets are operating site limited capital development expenditure is required in the near term with the only forecast CAPEX in the next five years for updates to the CHPP's. Growth capital is required for the establishment of the SEOC at Ashton which is planned to commence in 2024.

Sustaining Capital

A variety of sustaining capital levels are required over the remainder of the operational life for of the assets. These vary (as shown in ***Table 14-3 and Figure14-2***) depending on the development sequences, fleet

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requirements and life of the Projects. As outlined in ***Section 10***, the operations require continued replacement and sustained maintenance for both mobile and fixed plant to ensure the required production performance and processing yield are met. New and replacement production fleet (shovels, trucks, excavators, UG equipment) capital encompasses the majority of the sustaining capital for all operation (approximately 60%). The remainder of the capital includes maintenance of the CHPP's and site infrastructure construction etc. RPM considers the forecast reasonable to support the LOM mine life plans.

Figure 14-1 Graphical Representation of the LOM OPEX

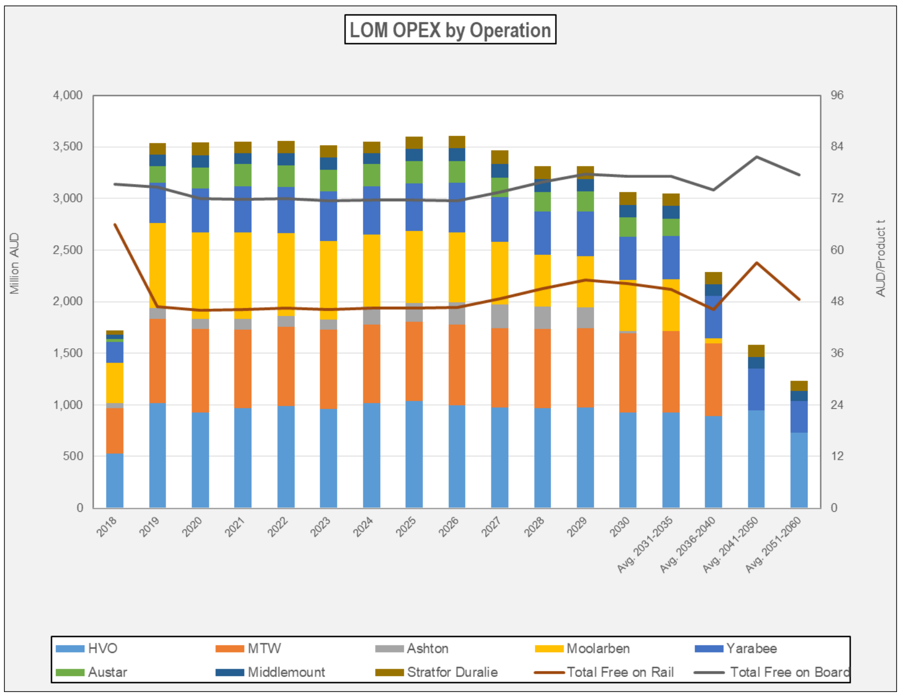

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Table 14-3 LOM Annual (calendar) Operating Costs

Operation	Cost Centre	Unit	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2040	Avg. 2041-2050	Avg. 2051-2060	Total LOM
HVO	Free on Rail	Million AUD	366	703	610	653	673	639	693	712	676	656	652	664	615	611	579	643	494	**25,628**
		AUD/prod t	50.4	48.8	42.1	44.9	46.2	43.4	46.8	48.2	46.4	44.8	45.0	46.9	43.1	42.9	41.7	46.5	46.2	**45.2**
	Free on Board	Million AUD	529	1,017	923	967	986	957	1,016	1,037	998	972	964	972	928	924	890	948	730	**38,114**
		AUD/prod t	72.7	70.6	63.7	66.5	67.8	65.1	68.6	70.2	68.5	66.4	66.6	68.7	65.1	65.0	64.0	68.6	68.3	**67.2**
MTW	Free on Rail	Million AUD	321	595	586	540	548	543	532	538	549	546	540	543	532	556	501			**12,204**
		AUD/prod t	54.2	51.7	49.7	45.6	46.3	45.7	45.0	45.7	46.8	47.0	46.5	47.4	46.1	47.8	48.2			**47.6**
	Free on Board	Million AUD	435	815	810	763	772	770	759	767	779	772	768	770	762	787	706			**17,208**
		AUD/prod t	73.4	70.8	68.6	64.4	65.3	64.8	64.2	65.1	66.5	66.6	66.2	67.2	66.0	67.6	67.9			**67.1**
Ashton	Free on Rail	Million AUD	60	102	101	104	99	97	175	184	217	229	219	201	21					**1,808**
		AUD/prod t	81.6	57.8	63.4	75.9	79.3	56.8	95.4	58.7	60.7	68.7	62.9	69.0	74.1					**67.1**
	Free on Board	Million AUD	77	141	136	139	136	148	232	258	297	304	298	268	29					**2,462**
		AUD/prod t	104.1	79.6	85.1	102.2	108.9	87.2	126.4	82.4	83.1	91.4	85.6	92.0	99.8					**91.3**
Moolarben	Free on Rail	Million AUD	227	453	441	442	414	390	319	324	319	299	257	251	257	266	26			**5,752**
		AUD/prod t	27.9	28.6	26.4	26.8	24.7	25.0	20.1	20.3	21.2	23.1	27.3	27.0	29.1	29.9	30.0			**25.9**
	Free on Board	Million AUD	393	825	834	837	805	762	697	695	677	611	503	497	496	503	51			**11,196**
		AUD/prod t	48.4	52.0	49.9	50.9	48.0	48.9	43.9	43.7	45.0	47.1	53.5	53.4	56.1	56.5	48.5			**50.4**
Yarabee	Free on Rail	Million AUD	131	249	296	301	301	322	321	317	317	299	282	301	299	289	287	281	198	**10,013**
		AUD/prod t	71.8	68.0	83.9	74.7	79.0	73.4	79.5	82.2	72.3	89.0	84.0	91.6	95.8	88.3	93.8	91.8	68.9	**85.2**
	Free on Board	Million AUD	203	394	432	450	446	484	473	464	482	432	415	432	424	420	410	406	308	**14,661**
		AUD/prod t	111.7	107.6	122.4	111.8	117.0	110.3	117.1	120.2	109.7	128.6	123.8	131.6	136.2	128.4	134.3	132.6	107.2	**124.8**
Austar	Free on Rail	Million AUD	10	119	150	152	156	153	149	158	143	134	135	132	133	116				**2,189**
		AUD/prod t		83.8	86.6	71.8	83.2	77.2	70.6	79.4	60.6	79.7	65.7	60.6	70.2	60.9				**70.5**
	Free on Board	Million AUD	26	156	193	204	204	202	200	206	197	177	184	184	179	163				**2,968**
		AUD/prod t		109.6	111.7	96.4	108.8	102.2	94.8	103.5	83.8	105.3	89.7	84.7	94.3	85.5				**95.6**
Stratfor Duralie	Free on Rail	Million AUD	29	67	80	110	91	63	95	110	106	93	96	93	115	94	87	86	51	**3,068**
		AUD/prod t	126.8	109.2	79.9	99.6	87.2	77.2	87.3	84.9	88.3	77.0	79.4	75.9	82.0	77.2	78.8	78.7	70.6	**80.4**
	Free on Board	Million AUD	42	92	116	150	130	94	121	143	136	124	127	124	150	125	115	113	69	**4,088**
		AUD/prod t	180.7	149.9	115.8	135.8	124.5	114.6	111.9	109.6	113.2	102.2	104.5	101.1	106.9	102.4	104.0	103.8	95.5	**107.1**
Middlemount	Free on Rail	Million AUD	157	316	304	302	299	317	321	329	333	338	347	381	398	416				**6,644**
		AUD/prod t	73.2	76.8	71.9	72.5	71.9	76.1	78.4	81.7	83.2	84.5	90.7	94.5	97.0	101.1				**87.5**
	Free on Board	Million AUD	280	533	524	521	519	523	522	528	514	501	504	544	565	584				**10,108**
		AUD/prod t	130.5	129.7	124.0	125.3	124.9	125.5	127.5	131.3	128.3	125.0	131.7	135.2	137.9	141.9				**133.1**
Total	Total Free on Rail	Million AUD	1,301	2,605	2,569	2,602	2,582	2,523	2,606	2,672	2,660	2,593	2,528	2,564	2,370	2,349	1,481	1,009	743	**67,305**
		AUD/prod t	49.6	48.8	46.6	46.8	46.7	45.7	46.8	47.1	46.8	49.1	51.1	52.8	52.2	51.9	50.5	56.2	52.0	**48.9**
	Total Free on Board	Million AUD	1,984	3,972	3,968	4,032	3,999	3,939	4,021	4,097	4,080	3,891	3,764	3,791	3,533	3,506	2,172	1,466	1,107	**100,804**
		AUD/prod t	75.6	74.4	72.0	72.5	72.3	71.3	72.2	72.2	71.7	73.7	76.1	78.1	77.7	77.4	74.0	81.6	77.5	**73.2**

Source: Unit Costs were provided by the Company however were adjusted to reflect RPM's independent LOM schedule. Unit costs vary to the Company's due to unit costs changes and production schedule variations.
Total Free on Board includes Royalties

Table 14-4 Annual (calendar) LOM Capital Cost Estimate (Average Per Year)

Operation	H2 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Avg. 2031-2035	Avg. 2036-2040	Avg. 2041-2050	Avg. 2051-2060	Total LOM
HVO	79.1	80.1	125.5	79.6	88.2	114.8	102.8	116.8	116.2	106.2	106.1	84.1	91.6	102.9	148.1	180.4	54.2	**4,892.1**
MTW	59.7	113.0	119.7	74.7	80.6	68.2	86.7	45.9	120.3	103.2	111.5	104.7	108.1	83.4	33.4	0.0	0.0	**1,780.1**
Moolarben	34.2	97.4	46.7	46.8	101.4	76.7	70.2	50.0	80.6	69.3	53.7	40.3	72.0	32.5	17.6	0.0	0.0	**1,019.2**
Yarrabee	3.5	2.0	136.2	2.0	5.0	4.0	20.4	18.4	2.0	57.5	76.4	31.7	23.7	28.5	26.0	25.9	35.3	**1,020.2**
Austar	0.0	53.1	57.5	24.2	21.7	27.0	18.0	7.3	33.4	29.3	15.6	25.0	19.9	16.7	0.0	0.0	0.0	**365.3**
Ashton	16.4	31.6	39.0	23.3	45.8	141.3	95.0	25.5	28.2	36.0	22.8	16.6	0.0	0.0	0.0	0.0	0.0	**521.6**
Stratford and Duralie	12.9	7.9	2.6	2.5	2.5	2.5	2.5	2.7	2.9	3.1	2.8	2.7	2.5	2.7	2.4	2.4	1.8	**105.6**
Middlemount	10.5	27.7	8.1	5.3	3.1	5.9	4.7	4.4	3.3	3.0	5.3	3.7	3.6	4.3	3.9	0.0	0.0	**125.7**
Total	**216.3**	**412.8**	**535.4**	**258.3**	**348.3**	**440.4**	**400.3**	**271.0**	**387.0**	**407.6**	**394.2**	**308.6**	**321.5**	**271.0**	**231.4**	**208.8**	**91.3**	**9,829.5**

Source:CAPEX Costs Provided by the Company and utilised by RPM in the Coal LOM Schedule

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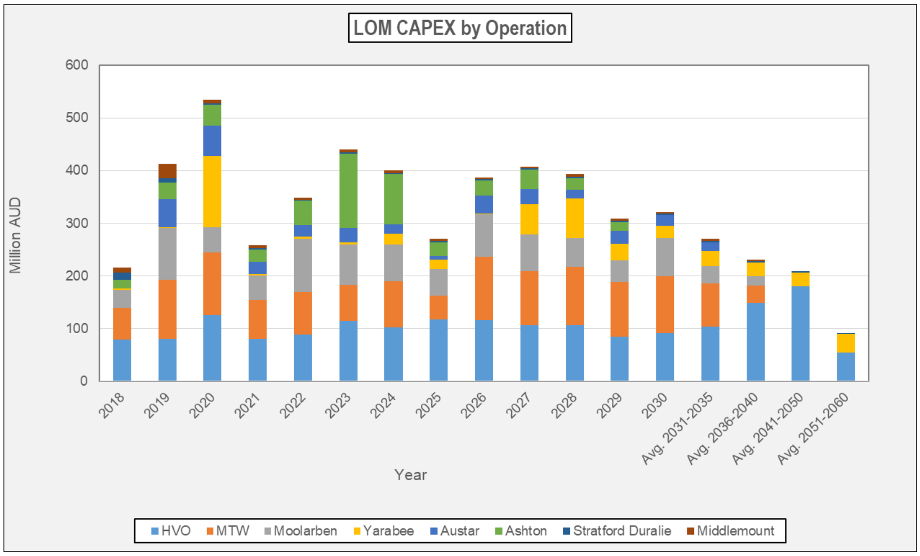
Figure 14-2 Graphical Representation of LOM CAPEX



14.3 Donaldson

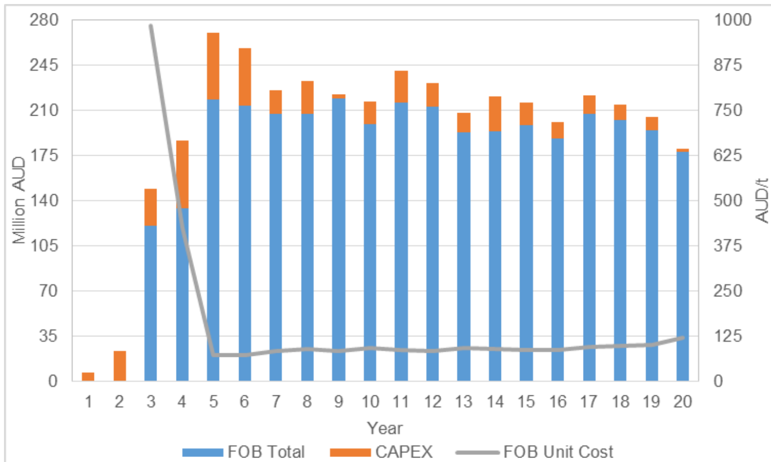
Based on the LOM plan, the forecast OPEX and CAPEX for Donaldson are presented in ***Table 14-5*** and ***Figure 14-3***. RPM highlights that as there is no start date as yet, the dates are set by year only.

Table 14-5 Donaldson LOM OPEX and CAPEX

Centre		Unit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
OPEX	FOR	Mill AUD			90.6	98.5	152.9	151.8	149.2	147.5	155.3	145.0	156.3	159.8	146.8	147.5	149.3	141.9	140.6	136.9	131.3	120.4
		AUD/ ROM t			399.6	184.4	30.9	31.0	31.3	31.0	28.5	32.0	28.3	27.6	32.3	31.6	30.4	33.4	34.0	35.8	37.9	45.1
	FOB	Mill AUD			120.3	134.2	218.7	213.6	207.2	207.0	219.0	199.1	216.1	212.6	192.8	193.7	198.6	188.2	207.3	202.3	194.5	177.8
		AUD/Prod t			986.3	425.4	72.4	73.0	82.7	89.8	83.3	93.5	86.8	82.7	92.1	91.0	86.1	88.2	94.6	97.0	101.5	121.6
CAPEX		Mill AUD	6.7	23.4	29.1	52.4	51.8	45.0	18.1	25.9	3.9	17.7	24.4	18.9	15.6	27.1	17.9	12.9	14.4	12.5	10.6	2.6

Source: Unit Costs were provided by the Company however were adjusted to reflect RPM independent LOM schedule. Unit costs vary to the Company's due to unit costs changes and production schedule variations.
Total Free on Board includes Royalties
CAPEX Costs Provided by the Company and utilised by RPM in the Coal Reserve Schedule

Figure 14-3 Graphical Representation of Donaldson LOM OPEX and CAPEX



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15. Overview of Permitting, Environmental Impact and Social & Community Impact

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15.1 HSE Assessment Overview

The objective of the HSE assessment is to provide an independent evaluation of potential environment, health and safety issues related to the Company's assets that could pose a material risk to future investors. The material threshold agreed for the Project is AUD10M per issue per site. In addition, ERM has identified the following key issues for the assets:

- Key non-material issues associated with recent non-compliances and / or regulatory action;
- Issues subject to actual or imminent prosecution by the environmental or safety regulatory authorities; and,
- Reasonably foreseeable issues within scope that could cause imminent significant delays (i.e. risk of delays associated with non-issue of approvals).

The aspects reviewed in this Assessment were as follows:

- ***Environmental, Safety and Social Management***: Through review of available documentation, ERM assessed the Company's current EHS management across each asset to identify material HSE risks and data gaps, identify potential liabilities and obligations in terms of HSE risks and / or HSE issues that may significantly constrain the Company's future development;
- ***Environmental Approvals***: ERM conducted the following:
- a review of key environmental permits and permit applications; and
- an assessment of environmental, health and safety and social regulatory and compliance issues associated with Project components, based on currently available information.

15.2 Approach

The HSE review of environmental, health and safety issues that could pose a material risk to future investors consisted of the following tasks:

- Review of documents made available by the Company in the Virtual Data Room (VDR);
- Submission of Project questions to the client and Requests for Information (RFI) via the agreed communication process; and
- Review of available public information.

15.3 HSE Governance and Management System

Organisational HSE structure

Yancoal's Health, Safety, Environment Committee sets the direction for the Company's continuing commitment to the highest safety, environmental management and community engagement standards. Working with Yancoal's executive and senior management teams, the Committee helps ensure Yancoal has the leadership, capabilities, systems and reporting procedures required to achieve zero harm.

The Health, Safety and Environment Committee assists the Board in overseeing Yancoal's health, safety and environmental responsibilities, with the following objectives:

- Fulfil its responsibilities in relation to the health, safety and environment (collectively HSE) matters arising out of the activities of the Company;

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- Consider, assess and monitor whether or not the Company has in place the appropriate policies, standards, systems and resources required to meet the Company's HSE commitments; and
- Provide necessary focus and guidance on HSE matters across the Company and
- The Committee makes recommendations to the Board.

HSE performance at the Assets is delivered by means of the overarching Yancoal Environment and Community Relations Policy (E&C Policy) which provides the governing principles for environmental and community management.

Environmental Management

Each Asset has an Environmental Management Strategy (EMS), which in turn is supported by a range of procedures, strategies, plans and programmes, designed to deliver compliance with applicable regulatory Commitments, Obligations, Undertakings and Requirements (COURs), which are a function of Project Approval conditions and Environmental Protection Licence conditions for NSW operations and Environmental Authority conditions foe QLD operations. These include:

- Strategies, Plans and Programmes (Environmental Assessments, management strategies, management plans and monitoring programmes); and
- Support Documents (environmental work instructions, training manuals, single point lessons, forms, permits, checklists, registers and risk assessments).

The key building blocks of the EMS are the Environmental Management Plans (EMPs) which have been prepared to guide the day to day management of environmental aspects on the mines. Critical review of a selection of these management plans from all assets indicated that in general, they were of a standard consistent with the size and nature of the development and fit for purpose. In NSW, the conditions of Project Approval require management plans to be prepared to the satisfaction of and / or approved by the consent authority and / or other relevant regulators.

A team of environmental advisors are employed to implement the management plans and maintain the EMS. This team currently consists of 17.5 personnel, as well as two contactors, in addition to corporate support and includes specialists in the fields of environmental approvals and mine rehabilitation and community liaison. This level of resourcing is considered appropriate for the size, complexity and maturity of the mining operations.

The Company is proactively engaged in the local communities in which it operates. In 2017, Yancoal invested more than AUD1.3 million into local initiatives, including environmental projects; employment education and training; community event sponsorship; funding for technology and equipment purchases used by hospitals and regional rescue services; and educational and social initiatives for disadvantaged groups. Yancoal continues to work co-operatively with its community stakeholders, relying upon community consultative committees, local newsletters, community days and site-specific websites to engage and inform stakeholders of relevant matters related to nearby operations.

Health and Safety Management

Yancoal has a set of values and a code of conduct appropriate for a business of its size. Each region has a Health and Safety Management System (HSMS) designed in typical structure for the key elements (based on Australian Standard 4801: Occupational Health and Safety Management Systems) and to cover any specific regulatory issue. The integrated health and safety management system (HSMS) is structured on 13 System elements (leadership& accountability; document control; risk & change management; engineering & design; contractor management & suppliers; consultation & communication; training & competence; operational controls; health & hygiene; emergency management; incident reporting & investigation; measure, monitor & record; and audit & review). The HSMS is audited every two years for regulatory compliance and effectiveness.

The HSMS also requires a site to develop principle hazard management and principle control plans. These plans are reviewed on a 3 yearly basis and fall into two groups depending on the nature of the risk;

- Principle hazard management plans: used to manage risks that have potential to result in multiple deaths in a single incident or a series of recurring incidents;
- Principle control plans: an integrated approach to hazards across different aspects of the operation.

Yancoal has been developing a set of corporate principle hazards and associated control plans for the business. To date they have developed and implemented 4. In 2018/2019 they are implementing a further 9 and conducting two control plan/bow tie workshops. These principle hazard control plans are being developed to ensure consistency of control across the business, effective measurement of effectiveness and overview. This process is being adopted across mining industries as a way to focus on fatality prevention. Although not all of the corporate set of controls have not implemented, the sites will already have controls in place that may be identical (as principle hazard management plans or principle control plans) but are not articulated in a standard way.

Not all risk assessments were available for review. The broad-brush risk assessments are high level and may not identify specialist risks for a specific site (geotechnical associated risks primarily). To identify key safety performance for the purposes of this review, total recordable injury frequency rate (TRIFR) has been used as the key lag performance indicator. The TRIFR numbers quoted against each site are the 12 month moving average from the April 2018 Management report. The comparison figures are taken from the latest regulatory reports as follows:

- UG NSW average 15/16 was 30.4
- UG QLD average 16/17 was 23.8
- OC NSW average 15/16 was 6.6
- OC QLD average 16/17 was 12.6

HSE budgets

Detailed analysis of HSE budgets has not been undertaken in the course of this study, however complementary information, including review of HSE staff numbers and information provided regarding environmental controls implemented in recent years have been used to assess the general adequacy of the EHS budgets of the Assets. The HSE budget for the Assets mines includes provision for 19.5 full time equivalent staff within the mining operations (including two contractors), as well as additional corporate HSE support which is considered adequate. Rehabilitation rates have broadly approximated those nominated in the relevant Mining Operations Plans (MOPs) for NSW sites and Plan of Operations for QLD sites over recent years and progressive rehabilitation budgets are therefore assumed to be adequate. Major projects, such as the retrofitting of mobile plant with noise attenuation measures and the installation of additional noise and dust monitoring equipment have also been funded in recent years, further supporting the view of satisfactory HSE budgeting in recent years.

In summary, the HSE management system at the Assets is generally considered satisfactory for the size, complexity, degree of regulation and risk profile represented by these mines. The HSE management system is comprehensive, adequately resourced and has proven to be broadly effective in managing health, safety and environmental risks. Key asset specific issues are discussed further in ***Section 15.4***.

There is an inherent risk in having contaminated tailings present on-site. It is understood rehabilitation of these materials by encapsulation is planned for the assets, however the variables associated with successful rehabilitation are many and existing budgets available can become insufficient if rehabilitation failures occur. ERM has not considered material risk of contamination tailings and rehabilitation failure, however it is understood that ongoing monitoring of these risks are undertaken by each asset to ensure they do not become material. Closure of any mine before the end of their mine life (e.g. due to environmental and/or health and safety issues), could trigger significant employee redundancy costs, closure and rehabilitation expense and other costs or loss of revenues. Many of these costs will also be incurred where mines are closed at the end of their planned mine life or placed on care and maintenance. ERM has not considered material risk of any unexpected or unplanned mine closures however it is understood that these costs are factored into the mine cashflows.

15.4 Assets

All other assets assessed are currently operational and or under care and maintenance. These assets are discussed further in the following section.

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HUNTER VALLEY OPERATIONS AND MT THORLEY WARKWORTH

EHS Setting and Context

The Upper Hunter region is a rural landscape characterised by irrigated agriculture on the alluvial flats of the Hunter River, transitioning to pastoral land use and nature conservation reserves on the more marginal soil landscapes found in the surrounding hills. The region also includes a number of coal mining operations and two coal fired power stations, situated predominantly on the valley floor. Given the large scale of the project there are a number of potential receptors associated with mining activities in the area. Where possible these are monitored by the company on site. . The Hunter Valley Operations (HVO) is bounded by the localities of Howick, Warkworth, Ravensworth and Jerry's Plains, which is situated 4.5km south east of the closest HVO mining pit.

The Mt Thorley Warkworth (MTW) mine is located immediately to the south of HVO mine. A number of rural residences are located in the vicinity and are potential receptors of dust, noise and light emissions from the mines. The village of Bulga is situated 4km west of the current active mining area at MTW (noting that approved pit limits under the Warkworth Continuation Project are 2.5km from Bulga). These Assets are situated in close proximity to public roads including the Golden Highway (separating the Assets), Putty Road (separating Mt Thorley and Warkworth) and Wallaby Scrub and Charlton Roads which bound the MTW mine to the West. The altered land form is visible to motorists utilising these public roads. Visual amenity is enhanced by the presence of an earthen bund placed on the northern side of Putty Road, to visually screen the mine. This visual screening bund is complemented by a programme of aerially seeding of un-rehabilitated waste dumps that are visible from public roads. Visible waste dumps now have a good cover of grass and shrubs which results in suitable aesthetics, however noting that these waste areas will be rehabilitated in the future, consistent with the MTW Mine Operations Plan (MOP).

The 2016 Annual Review report for HVO identifies a total of 26 complaints during 2016, representing a decrease of 10 community complaints from the previous year. Complaints related to noise, dust and blasting. The 2016 Annual Review report for MTW identifies a total of 463 complaints, down 29% compared to 2015. The 463 complaints were registered by 58 people, 61% were received from 10 individuals, most of which were from Bulga residents, making up 83% of the complaints record.

Heritage Values

MTW and HVO both have comprehensive policies, standards and protocols in place to guide Aboriginal Cultural Heritage management across all of their operations. These policies are applied consistently and in close consultation with the Aboriginal community stakeholders who have interests in this region including the Upper Hunter Valley Aboriginal Cultural Heritage Working Group (CHWG) which was established in September 2005. The CHWG oversees all aspects of Aboriginal Cultural Heritage management associated with MTW and HVO.

The MTW Aboriginal Heritage Management Plan (2017) including the Warkworth Operations Aboriginal Cultural Heritage Zoning Scheme (CHZS) and Aboriginal Cultural Heritage Management Database (ACHMD) is a comprehensive document that guides mine and land use activities. .

A separate Conservation Management Plan for the Wollombi Brook Aboriginal Cultural Heritage Conservation Area (WBACHCA) was developed in June 2017 for the conservation and protection, in perpetuity, of significant Aboriginal cultural heritage landscapes and sites and in particular, the Bulga Bora Ground area, by and for the Aboriginal people of the Upper Hunter. Yancoal will seek to register covenants on the land titles for all of the lands located within the WBACHCA which will prohibit development activities including all mining (open cut, underground, highwall), exploration drilling, mining infrastructure, overburden/top soil dumps and any other associated mining development disturbance. Covenants for each lot that are binding on current and future owners of these lands will be established pursuant to section 88 of the Conveyancing Act 1919 (NSW). The future arrangements for Aboriginal community ownership and control of the WBACHCA lands, including any funding requirements are yet to be determined although it is unlikely to reach the material threshold in any calendar year.

Native Title Claims

NC2013/006 (Scott Franks and Anor on behalf of the Plains Clan of the Wonnarua People) was registered on 16 January 2015. Native Title has not been extinguished for some areas (including crown land, water ways and access roads) and Native Title may still exist. The majority of the Assets holdings are however not subject to native title and future material risk associated with currently approved projects is not anticipated as a result of the Native Title. It is noted no native title issues occur in the current LOM.

Emission Discharges

Air Emissions

Emissions at HVO and MTW are predominantly a combination of windblown dust and direct emissions from off-road diesel vehicles. Air quality criteria for Total Suspended Particulates, PM10 and deposited dust are detailed in the Project Approvals for the respective operations. Air quality is managed in accordance with site based Air Quality and Greenhouse Gas Management Plans which identify statutory obligations and air quality criteria from the operation's Project Approvals and EPLs, as well as air quality monitoring, management measures and reporting requirements.

Air quality monitoring includes a combination of real time and supplementary dust monitoring. This includes use of real time investigation triggers for ongoing performance assessment, which informs pre-emptive management actions to maintain compliance with criteria. PM10 and meteorological monitoring is a requirement within the site EPLs and additional dust deposition monitoring is undertaken. HVO has previously undertaken studies into best practice control implementation for wheel generated dust and for disturbing and handling overburden in adverse weather conditions as part of a series of completed Pollution Reduction Programs imposed by the EPA on previous versions of EPL 640 (now all complete). The most recent HVO Independent Environmental Audit (ERM, 2016) concluded that for the audit period HVO complied with all air quality criteria. The most recent MTW Independent Environmental Audit (Horn, 2016) concluded that for the audit period MTW complied with all commitments of the MTW Air Quality and Greenhouse Gas Management Plan. Under EPL 1976, EPL 1376 and EPL 640, HVO / MTW were required to undertake dust risk forecasting (by measurement of daily total tonnes moved and timestamped PM 10 concentrations form upwind and downwind of the premises from 1 September 2017 to 30 November 2017. These were to be reported to the EPA by 19 January 2018. Ongoing EPA requirements relating to the trial are unknown.

Current air emissions from the Assets are not considered likely to pose a regulatory risk, given the efficacy of the dust management procedures and process currently in place. These include a real time monitoring and reporting system, paired with a policy of progressively shutting down mobile plant (primarily trucks and drag-lines) in response to elevated dust emissions. Dust emissions from roadways are minimised through regular watering by a water cart fleet, while emissions from other exposed surfaces are reduced by progressive clearing and rehabilitation, aided by aerial seeding of waste dumps that are not proposed for immediate rehabilitation. The potential for ongoing equipment downtime as a result of management responses to elevated dust emissions needs to be managed, particularly as downtime hours are expected to increase as mining at MTW continues in the direction of the town of Bulga (and the current buffer distance is reduced).

Noise

HVO and MTW manage noise and vibration in accordance with site specific Noise Management Plans (NMP) and Blast Management Plans, including real time monitoring, attended monitoring and complaints handling system for noise. The most recent HVO Independent Environmental Audit (ERM, 2016) identified two exceedances that were considered non-compliant with the project approval criteria. Further, three blast events returned airblast overpressure results greater than the 0% allowable criterion of 120.0dB (L). Incidents reports were prepared and submitted to regulators. It is understood there have been no regulatory action by the regulator. The most recent MTW Independent Environmental Audit (Horn, 2016) identified an exceedance of blasting criteria associated with one airblast overpressure result greater than the 0% allowable criterion of 120.0dB(L). The report also noted that MTW generally has a history of noise complaints totalling approximately 85% of all complaints during the audit period, suggesting noise is a significant concern for the surrounding community. There were some major exceedances of noise criteria recorded during routine compliance monitoring during 2011 - 2013 which were addressed in accordance with proper procedure at the time. It is reported that independent noise monitoring conducted in 2011 (SKM) and 2015 (WMPL) found general compliance with noise criteria and no formal noise criteria exceedances have occurred during routine attended compliance monitoring since March 2013. Noise complaints for 2015 were considerably less than for the previous three years. Noise requires continued focus as the mining at

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the Warkworth operation moves towards Bulga village. This is well noted by the Company with plans to address this concern in place.

Water

The most recent HVO Independent Environmental Audit (ERM, 2016) stated that there are four surface water discharge points identified in the EPL 640. Only one licensed discharge occurred during the audit period from Points 4 and 8 and that the discharge met the relevant water quality criteria and was within the allowable volume/mass limits set by the EPL. The most recent MTW Independent Environmental Audit (Horn, 2016) states that during the audit period there were a number of discharges from the MTW complex that were outside the discharge criteria and that MTW was investigating options to reduce the turnaround for laboratory analysis to facilitate a more robust monitoring protocol. It is understood actions have been implemented to address these concerns

Emission discharges are unlikely to represent a material risk based on the documentation reviewed along with the implemented procedures.

Land Tenure and Permitting

HVO and MTW operate under a range of current Mining Leases: HVO: MLs 1406, 1428, 1465, 1474, 1482, 1500, 1526, 1560, 1589, 1622, 1634, 1682, 1704, 1705, 1706, 1707, 1732, 1734, 1748, 1753; MTW: MLs 1412, 1590, 1751 and 1752

The HVO mine is permitted under two planning approvals, HVO North development consent DA 450-10-2003 and HVO South Project Approval PA 06-0261. HVO North has been subject to seven modifications and HVOS has been subject to five modifications to date. The HVO North is permitted to extract up to 22Mtpa of ROM coal until 2025 and HVO South is permitted to extract up to 20Mtpa of ROM coal until 2030. HVO operates under one Environment Protection Licence (EPL) 640. Hunter Valley Operations are subject to one EPBC Act Controlled Action Approval 2016/7640. An EPBC Act referral (2016/7641) for water related impacts at HVOS was determined to be 'not a controlled action'.

The MTW operations are permitted under two planning approvals, Mt Thorley SSD 6465 was approved 26 November 2015 for a period of 21 years, with an annual extraction rate of up to 10Mtpa ROM coal. Warkworth SSD 6464 was approved 26 November 2015 (after various appeals and public objection) for a period of 21 years with an annual production rate of 18Mtpa ROM coal. Three Environment Protection Licences (EPLs) apply: EPL 1376 (Warkworth), EPL 24 (Mount Thorley Loading Area) and EPL 1976 (Mount Thorley Operations). Warkworth operations are also subject to two EPBC Act Controlled Action Approvals (EPBC 2002/629 and EPBC 2009/5081).

The assets also operate under a number of other approvals, including for the storage of explosives, storage of dangerous goods and water licences, as well as under a number of operational and management plans approved by relevant regulators.

One approval in relation to the Warkworth Mine expansion is understood to be outstanding at the time of writing, being local council approval for the closure of Wallaby Scrub Road to facilitate the West pit westward advance, RPM has advised that agreement has now been established between the local council and MTW in relation to the closure of Wallaby Scrub Road. It is understood that finalisation of the agreement is pending monetary negotiations and it is expected to be completed well in advance of the required mining activities. Based on this, it is considered unlikely to be a material issue.

Operations EHS Performance

Environmental Performance

An Independent Environmental Audit for HVO in December 2016 (ERM 2016) demonstrated a high degree of compliance with respect to statutory requirements and internal management plans, reporting out of 363 instruments, 14 non-conformances (2 high, 7 medium and 5 low) and 9 administrative non-conformances. An independent review of MTW in May 2016 (covering the period 11 November 2010 to 22 January 2016) (Horn, 2016), reported 41 non compliances (none being high risks and some being administrative only). The key identified non-compliances were associated with noise/blasting, dust and water related issues. MTW have progressed in the areas of noise and dust management through the audit period though these are still areas of concern with the community (data from complaints). As the mining operation moves towards

Bulga village, attention to key elements in the management of noise and dust will ensure ongoing improvement in environmental performance. This is well noted by the Company with limitations on production as well as noise muffling on mobile equipment being including the LOM plan to mitigate any potential risk.

Environment Protection Authority (EPA) compliance audits were undertaken at HVO and MTW (EPA, March 2017). The sites were audited as part of a joint Department of Planning and Environment (DPE), Department of Industry - Resources Regulator (DIRR) and EPA compliance audit program focusing on the management of tailings, wastewater holding and sedimentation dams ('mine dams') at NSW mines. For HVO, the audit identified 61 compliant findings, two non-compliant (low environmental impact / environmental harm rating), five administrative non-compliance and three undetermined. For MTW the audit identified 57 compliant findings, five non-compliant (low environmental impact / environmental harm rating), 17 administrative non-compliance and one undetermined. An Action Plan was included in the audit findings for each operation, requiring HVO and MTW to implement measures with respect to controlling stormwater run-on to the tailing dam, maintenance of plant and equipment at the wastewater holding dams, as well as address the administrative and reporting matter. It is understood the issues have been addressed and therefore do not pose a material risk.

EPA compliance audits were also undertaken at HVO and MTW in 2014 as part of EPA compliance audit program on coal train loading and unloading facilities with a focus on management methods and procedures in place to prevent or minimise coal lost (in the form of leaks, spills and dust emissions) during rail transport. The audits identified a number of non-compliances and provided Action Plans and Pollution reduction Program conditions on the EPLs, which have since been closed out and no longer remain as conditions on the EPLs. .

Noise impacts on surrounding residents have been a key driver of complaints from the community over recent years, particularly at MTW. A program to progressively reduce noise impacts from mining at the Assets has been implemented over recent years, consisting of enhanced sound attenuation for mobile plant combined with enhanced predictive noise monitoring and real time telemetry of data, combined with progressive shutting down of noisy plant. The MTW 2016 AEMR indicates work was completed in attenuating 100% of MTW's Heavy Mobile Equipment fleet. The AEMR also reported no non compliances against consented noise limits and that there was a 62% reduction in the number of attended noise measurements which exceedance the trigger for action compared to 2015.

There were a number of surface water related incidents between 2013 and 2017. These incidents generally involved unauthorised or low quality water discharges into the environment, either as a result of overflows from water storages during high rainfall events or failures of plant and infrastructure. It is understood that one incident that occurred in October 2014 resulted in MTW entering into an enforceable undertaking with the EPA to improve water management practices on site. Further, a Clean Up Notice from the EPA issued January 2016 followed by a Prevention Notice dated 1 February 2016 was issued to MTW in relation to a separate water-related incident that occurred in January 2016 (partial dam wall failure resulting in release of water from the premises). The EPA subsequently prosecuted in the NSW Land and Environment (L&E) Court, with the Court handing down a fine of AUD50,000 to Warkworth Mining Limited in August 2017. .

Three penalty notices for non-compliance with requirements of HVO's EPL 640 have been issued by the EPA during 2017 and 2018. A Penalty Notice was issued 28 February 2017 for contravention of a licence condition (date of offence 4 November 2016). A Penalty notice was issued 18 August 2017 for pollution of waters (date of offence 30 March 2017). A Penalty notice was issued 2 May 2018 for the contravention of a licence condition (date of offence 17 January 2018). The latest penalty notice was related to exceedances of air blast overpressure at two monitoring points and resulted in an AUD15,000 infringement being issued. The above infringements are not material to the assets nor impact the LOM plan.

Blasting over-pressure incidents have occurred on the Assets, as have blast fume incidents. Whilst these incidents are generally infrequent and with procedures in place to manage any potential impact there have been some exceedances of criteria resulting in penalty notices. These however are unlikely to be material. As noted previously blasting is monitored and non-compliance is reported.

Current air, noise and water management and compliance of the Assets are not considered likely to pose an ongoing material risk, given the efficacy of the environmental management procedures and processes currently in place.

H&S Performance

HVO

The key comparable statistic of TRIFA is running at 6 is marginally lower than the NSW coal mining open cut industry average (2015/16) of 6.6. There was no safety and health management system audit or system documentation available for review. There were no risk assessments provided for this operation. With little data available the assessment of materiality could not be completed.

MTW

The key comparable statistic of TRIFA is running at 7.2 is marginally higher than the NSW coal mining open cut industry average (2015/16) of 6.6. The MTW risk register provided dated September 2017 was a broad risk register covering all the classic hazards (safety and health) in Open cut mining. There was no indication of who was involved or closure of outstanding actions. There was no safety and health management system audit or system documentation available for review. With limited data available the assessment of materiality did not indicate an issue.

While limited information was provided it was noted no material issues or concerns or occurrences have occurred under the current or previous owners in the past 3 years.

Water Management

HVO

The site is subject to the conditions of EPL 640 and includes the following relating to water management:

- Discharge points and monitoring locations;
- Concentration limits and sampling frequency; and
- Volume limits and monitoring for certain discharge points.

A Water Management Plan has been prepared by a NSW DP&E approved, suitably qualified expert to meet conditions of consent relating to water management. The WMP was approved on 19 May 2014. Water management at the mine includes clean water diversion, dewatering bores, sediment basins and a network of infrastructure, including dams, pipelines, channels and contour banks that have been established to enable the transfer of water around the site.

Groundwater and surface water access licences for take of surface and groundwater water exist for the site. With take occurring in 2016, in volumes below the allowable limits. The water balance found that HVO is typically a net generator of water (i.e. the site runs at a surplus).

As outlined in the environmental performance - water section above, there has been penalty notices issued by the EPA though no environmental harm resulted, this demonstrates previous issues with water management on-site. Previous issues have the potential to compound fines resulting from any future incidents, however this is unlikely to be of material significance unless a catastrophic incident.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

MTW

The site is subject to the conditions of EPL 24, EPL 1976, and EPL 1376 including the following relating to water management:

- Locations of monitoring and discharge points (EPL 1976 and 1376);
- Concentration and discharge volume limits (EPL 1976 and 1376);

A Water Management Plan has been prepared by a NSW DP&E approved, suitably qualified expert to meet conditions of consent relating to water management. The WMP was approved in January 2016. Water management includes clean water diversion, sedimentation ponds and a network of infrastructure (i.e. dams, pipelines, contour banks) to control the movement of water around site.

The water balance simulation modelling identified that there is a 50% chance that between 1,500 to 2,000 ML/year of external water would be required. The current allocation is 1,012 ML/year (at 100% Available Water Determination). It is likely that additional water licenses will need to be sought and purchased over the life of the project to meet external raw water demands; though this is unlikely to be of material significance.

Flood management measures are incorporated into the site and includes a flood levee. The 100 year ARI design flood event peaks at approximately 3.5 m below the crest levee. The levee was constructed to protect the mine from floods to the 500 year ARI design flood event, on this basis there is significant freeboard to mitigate flood impacts and thus alleviate any potential material issue.

Groundwater and surface water access licences are held to account for take of surface and groundwater. With take occurring in 2016, in volumes below the allowable limits. The 2016 Annual review identified one incident involving water that required notification to government agencies when a sediment dam had a partial embankment failure. The incident is resulted in an AUD50,000 fine from proceedings in the Land and Environment Court in 2017. While this is not considered material ongoing monitoring as site personnel are aware, is prudent. It is noted that site personnel are aware of these issues.

The 2016 Independent audit identified that events occurred in the period resulting in non-compliances relating to water discharges and quality criteria not being met. It is noted that overflows have occurred although the review could not confirm if the overflows where greater than design basin design criteria. It was also found that discharge events did not meet Total Suspended Solids (TSS) criteria, with laboratory results being received the day after discharge occurred, hence release occurred prior to water quality being confirmed. On-going management issues could result in fines from Government agencies, with fines compounding with each incident. Review of site management could potentially identify opportunities for improved management, such as developing a TSS-Turbidity correlation to allow for immediate, in the field water quality results prior to commencing discharge. RPM is aware that the HVO was only recently under the Company's control as such further review of system and procedures are taking place.

Issues reviewed are of concern however individually are not material and are being managed by site personnel.

Soils and Contamination

During previous discussions and reviews of the HVO/MTW site detailed that the site contains a range of potential sources of contamination, including bulk fuel storages, tailings disposal facilities, wastewater treatment plants and washdown bays, mechanical workshops and associated waste oil storages. The majority of which do not pose a material risk.

Review of the HVO contamination register (2015) indicates 12 sites listed as 'contaminated' are present within the HVO operational area. Another 89 sites are listed as having various likelihoods of contamination, some of which have been remediated to various extents. An equivalent register prepared for MTW indicates three contaminated sites at the mine and 81 other sites have the potential to be contaminated. A firefighting training area is located on the MTW mine. Whilst not listed on the register, this area has a high likelihood of being impacted by perfluorinated compounds, which are a contaminant associated with the use of Aqueous Fire Fighting Foams (AFFF). It is further noted that the use of AFFF containing perfluorinated compounds has been phased out. RPM notes that the identified and potential contaminated sites could be investigated and remediated progressively as new facilities are constructed to replace older infrastructure, or following cessation of mining in that location. Accordingly, potential contamination from the sources outlined above is not deemed likely to pose a material risk.

In line with similar operations in the region, a contamination risk is potentially posed by the current and historic tailings storage facilities. RPM is aware that due to the processing methods, heavy metals are stored in these facilities. These can lead to contamination if not contained appropriately. Data held on the National Pollutant Inventory database indicates the HVO mine deposited a total of 1,785 tonnes of potentially hazardous heavy metals (including lead, mercury, chromium, arsenic and cadmium) into on-site tailings storage facilities during the 2016-15 reporting period.

The MTW mine disposed of a total of 1,122 tonnes of heavy metals into tailings facilities over the same reporting period. It is therefore evident that a significant reservoir of potential contaminants is present within the tailings storage facilities at the Assets. RPM has not been provided detailed information to quantify the potential risk, however notes that no breaches have been filed against the Company or instances of contamination of the groundwater have been publically reported. It is understood that all reporting requirements have been met.

There is an inherent risk in having contaminated tailings present on-site. It is understood rehabilitation of these materials by encapsulation is planned, however the variables associated with successful rehabilitation are many and existing budgets available can become insufficient if rehabilitation failures occur. ERM has not considered material risk of contamination from tailings and rehabilitation failure, however it is understood that ongoing monitoring of these risks are undertaken by the asset to ensure they do not become material.

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Ecology

HVO

The HVO South mine holds 140 ha of offsets in the Goulburn River Biodiversity Area, triggered by approval 06_0261. EPBC 2016/7640 approval (last modified in August 2017), also requires additional offsets including Central Hunter Valley Eucalypt Forest (CHVEF) - 61ha, Swift Parrot (Lathamus discolor) foraging habitat – 68.1ha, Regent Honeyeater (Anthochaera phrygia) breeding and foraging habitat – 68.4ha and Green and Golden Bell Frog (Litoria aurea) breeding (2.6ha) and foraging habitat (102.7ha).

The approved Offset Strategy as reported EPBC 2016/7640 Annual Compliance Report (2017) includes:

- Wandewoi Biodiversity Area BA – To offset approximately 63% of the action's impacts on Central Hunter Valley Eucalypt Forest (CHVEF) and 100% of the action's impacts on the Swift Parrot.
- Mitchelhill BA - To offset the residual 37% of the action's impacts on CHVEF and 53.9% of the Regent Honeyeater impacts.
- Condon View BA - To offset the remaining 46.1% of the Regent Honeyeater impacts.
- Crescent Head BA - To offset 99.25% of the action's impacts on the Green and Golden Bell Frog.
- The residual 0.75% offset for the Green and Golden Bell Frog will be provided through other compensatory measures, which are likely to comprise contribution to a research program.

The EPBC 2016/7640 Annual Compliance Report (2017) has not reported any non-compliance although it is noted that the offset sites at Mitchelhill BA, Condon View BA, and Crescent Head BA are to be secured in perpetuity, with legally binding agreements in place by 23 October 2018. Additionally, the Wandewoi BA is required to be secured in perpetuity by 10 October 2019.

Ongoing costs of note are associated with the management and maintenance of the biodiversity areas and the rehabilitation of degraded vegetation communities in the BAs. These costs have not been reviewed by ERM and potential material risk cannot be confirmed although it is unlikely to reach the material threshold of AUD10M in any given year.

MTW

The EPBC 2002/629 approval (last modified in November 2016) requires MTW to offset the impact upon Matters of National Environmental Significance (MNES) by protecting and managing no less than 1,586 hectares (ha) of habitat for the Regent Honeyeater (Anthochaera phrygia) and Swift Parrot (Lathamus discolor). At least 1,586ha of the Goulburn River and Bowditch Biodiversity Areas (BAs) were to be secured as an Offset Area, with a legally binding mechanism for enduring protection by 17 February 2018. The EPBC 2009/5081 approval (also last modified in November 2016) requires WML to offset the MNES by protecting and managing a total of no less than 2,626 hectares (ha), of habitat for the Regent Honeyeater and Swift Parrot, with a legally binding mechanism for enduring protection also by 17 February 2018. Yancoal have requested an extension of the due dates for the provision of a legally binding mechanism to secure the offset areas associated with EPBC 2002/629 and EPC 2009/5081 to 15 February 2019. This revised date will align with that specified in the NSW Planning approval SSD 6464 for legal protection of these offset areas

The Biodiversity Management Plan and Biodiversity Offset Strategy for MTW includes direct offset and indirect compensation measures, including:

- Retirement of species and ecosystem credits within 3 years of the date of commencement of the action.
- Retirement of rehabilitation offsets credits, within 10 years after completion of mining operations.
- Direct land based offsets within designated Regional Biodiversity Areas (Goulburn River, Seven Oaks, Bowditch, Putty, Condon View and North Rothbury BAs) and Local Biodiversity Areas (Southern Biodiversity Area including the Putty Road Offset Area and Northern Biodiversity Area).
- Performance criteria for regeneration of Warkworth Sands Woodland to ensure successful regeneration in the Northern Biodiversity Area within 15 years after commencement of the action. Schedule 3 of NSW approval PA 06_0261 requires the lodgement of a Conservation and Biodiversity Offset Implementation Bond of AUD1 million (indexed to inflation) to provide financial security that the Warkworth Sands EEC would be rehabilitated within the Northern Biodiversity Area. This bond would revert to the state in the event rehabilitation fails to meet performance targets within a 15 year period.
- Development of an Integrated Management Plan for the Warkworth Sands Woodland EEC; and

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- A one off AUD1 million contribution to the Office of Environment and Heritage (OEH's) 'Saving Our Species – Regent Honeyeater' conservation program.

The Biodiversity Management Plan for MTW (RTCA, 2016) reports that the MTW mine holds a total of 6,380 ha of offsets under both state and federal project approvals. Each with different requirements under the relevant permits which requires greater diligence in their management to ensure compliance. The Regional Biodiversity Areas Annual Report (2017) reports that monitoring results indicate that the vegetation and habitat health are being maintained in comparison to the baseline data. The Local Biodiversity Areas Annual Report (2017) identified that trespassing and illegal tree clearing and timber getting have been recorded within the Southern Biodiversity Area. Yancoal has undertaken appropriate actions to prevent a continuation of this activity: Offsets are believed to have been addressed or are in an advanced state of resolution. As such, no material risk is believed to be presented by offsets required by the current MTW approvals.

Rehabilitation and Mine Closure Liability

Rehabilitation is informed by the respective Mine Operations Plans (the HVO North and South MOPs and the MTW MOP, prepared in 2016) and the Mine Closure Plans for the Assets, prepared in 2014. Review of the 2016 MOPs indicates these are comprehensive documents that identify mined land suitable for rehabilitation during the MOP period and provide high quality information to support the rehabilitation and revegetation process.

Rehabilitation is reported to be progressing across the site at a rate generally consistent to that specified within the MOPs. The 2016 HVO Annual Environment Management Report (AEMR) reports a total of 84.9 ha rehabilitation was completed during 2016 against a MOP target of 82.6 ha. Total disturbance undertaken was 120.2 ha, 28.9ha lower than the MOP projection of 149.1 ha. This represents 80% (304 ha) of the area proposed for rehabilitation during the 2013 MOP period. Capping of the Interim Tailings Storage Facility continued during 2016 and is due for completion in 2017. At MTW 102% (180 ha) of land proposed was rehabilitated during the 2013 MOP period. Capping and rehabilitation of Tailings Dam 1 at MTW was undertaken in 2015. A site inspection indicates this landform has been designed to gently shed surface water and is now surfaced with a thick cover of pasture grasses. The 2016 MOPs propose a total of 616 ha of rehabilitation at HVO between 2015 and 2018, compared to 730 ha of new disturbance. At MTW 681 ha of rehabilitation is proposed during the MOP period, which compares to a total of 440 ha of new disturbance.

The adequacy of the woodland rehabilitation undertaken is the subject of ongoing monitoring and comparison with nearby reference sites. Niche (2016) report the findings from rehabilitation monitoring undertaken at sites in which the intended post-mining vegetation community is Central Hunter Grey Box – Ironbark Woodland and Central Hunter Ironbark-Spotted Gum-Grey Box Forest. The results of this study indicate that the monitoring sites have as yet not reached parity with the reference site benchmarks. Three sites of the 20 monitoring sites scored 50% or higher conformance with the 10 benchmark monitoring parameters. The majority of monitoring sites (85%) recorded a degree of divergence from the reference site benchmarks. The soil testing that has been undertaken during rehabilitation monitoring and presented in Appendix 5 of the 2016 AER indicates that many of the rehabilitation sites have soil limitations when viewed in the context of agricultural soil requirements. Most of the rehabilitation to be undertaken at MTW in the future is aimed at re-establishing native vegetation communities so the soil limitations need to be assessed with regards to native vegetation establishment rather than agricultural outcomes.

A grazing trial commenced at HVO in 2014 to document the suitability of rehabilitated pastures for grazing stock. Results reported in the HVO 2015 AEMR indicate cattle grazed on rehabilitated land gained weight faster than those cattle grazed on reference sites. These findings are supportive of the view that rehabilitation of pastures on the site has been undertaken to a suitable standard. The current ACARP funded grazing trial (C23053 Study of Sustainability and Profitability of Grazing on Mine Rehabilitated Land in the Upper Hunter) concluded during June 2017.

No issue of material significance was identified relating to current rehabilitation practices from review of the documents outlined.

MOOLARBEN

HSE and Social Setting

Moolarben is an existing open cut and underground coal mine located approximately 40 km northeast of Mudgee in the Western Coalfields of NSW in the vicinity of the Ulan and Wilpinjong mines and within the

Moolarben Creek Valley, in the headwaters of the Goulburn River catchment. The Goulburn River National Park is to the northeast of the Moolarben and the Munghorn Gap Nature Reserve is to the south. Ulan village to the west comprises residential dwellings, a small rural primary school, one church, commercial premises and a hotel. All of the residences and the majority of vacant freehold land in the village are mine owned. A rural residential development is located approximately 4km to the southwest of the Moolarben. A small number of farms and scattered homesteads occupy the remainder of the surrounding freehold land.

The Company is proactively engaged in the local communities through a range of mechanisms, including biannual newspaper advertorials, quarterly letters to neighbours, local government briefings, community consultation committees and financial sponsorship and support. In total, Moolarben provided AUD146,799 in community donations during 2017 to 45 community groups and events through its Community Support Program and other programs. Complaints received from local community members are recorded and investigated by the Company. During 2017, a total of 119 complaints were received by 17 complainants. All complaints are investigated and included in the complaints register on the Moolarben Coal website (www.moolarbencoal.com.au). Noise remained the primary issue of concern (96% of complaints). A comparison of complaints to previous years indicates an ongoing decrease in the total number of complaints, as well as reduction in noise related complaints. Use of real-time feedback within the mining operation has facilitated proactive and reactive responses. Ongoing community and stakeholder liaison and consultation has continued.

Heritage Values

Moolarben has developed an Aboriginal Heritage Database which includes all previously recorded Aboriginal objects and holds all information on Aboriginal archaeological resources relevant for the entire Moolarben - 454 sites have been reported in the Heritage Management Plan (HMP). The Historic Heritage Sites Database includes 25 sites of known and potential historical (non-Aboriginal) heritage significance (local). Construction/development activities are undertaken in accordance with the HMP (2017). As a result of previous assessments and archaeological salvage works, approximately 270 Aboriginal heritage sites and 13 historic heritage sites have already been managed (e.g. salvaged) and/or require no further management.

As outlined within the HMP, 85 sites will be protected in perpetuity as part of designated heritage conservation areas (Murragamba Creek Management Area, Powers Conservation Area and Red Hills Conservation Area) in accordance with the Stage 2 Project Approval (08_0135). In addition, Moolarben have identified two additional management areas – the Underground 2 Rock Shelter Management Area and Bora Creek Management Area. The long-term management and security of these areas has not been confirmed although it is noted that all five of these Management Areas are clearly identified and protected within the current Life of Mine Plan and are located outside of approved mining activities. As such, they are not considered to present a material risk.

Native Title Claims

NC2017/001 (Warrabinga-Wiradjuri #7) was registered on 01 September 2017. Native Title has not been extinguished for some areas (including crown land and water ways) and Native Title may still exist. The majority of the Assets holdings are however not subject to native title and future material risk associated with currently approved projects is not anticipated as a result of Native Title.

An Ancillary Deed of Agreement is also maintained between Moolarben and the North-Eastern Wiradjuri People of the Bathurst/Lithgow/Mudgee Area. The Deed (Government Party Deed) represents an agreement for the purposes of section 31(1) (b) of the Native Title Act and was executed on 7 July 2008. The Deed includes obligations for Moolarben and the North-Eastern Wiradjuri People, such as the funding of apprenticeships and scholarships and the formation of an Aboriginal Cultural Liaison Sub-Committee and an Implementation Committee. [ERM have not reviewed this agreement and cannot comment on any ongoing commitments or risks].

No issues of material significance were identified relating to current heritage management practices from review of the documents outlined. Heritage related risk and regulatory obligations in respect to cultural heritage values are understood to have been satisfactorily addressed. Future material risk associated with currently approved projects is not anticipated.

Emission Discharges

Similar to other open cut coal mines in the region, air emissions at Moolarben are predominantly a combination of windblown dust and direct emissions from vehicles. Air quality is managed in accordance with an Air Quality Management Plan, approved by DP&E and includes a combination of real time and supplementary dust monitoring at locations representative of sensitive receptors. Moolarben has previously undertaken studies into best practice control implementation for wheel generated dust and for disturbing and handling overburden in adverse weather conditions in accordance with regulatory requirements of the EPA (now all complete). Dust control measures include a real time monitoring and reporting system, paired with a policy of relocating / pausing operations in response to elevated dust emissions. Dust emissions from roadways are minimised through regular watering by a water cart fleet, while emissions from other exposed surfaces are reduced by progressive clearing and rehabilitation. The most recent Independent Environmental Audit (Trevor Brown and Associates, 2016) concluded that the implementation of the Air Quality Management Plan addresses management of operations and monitoring of air quality for the Moolarben activities in accordance with best management practices outlined in the Air Quality Management Plan and that air quality management at Moolarben are in compliance with approval and licence requirements.

Moolarben is licensed to discharge water in accordance with its Environmental Protection Licence EPL 12932 subject to various water quality and rainfall criteria. However, no water discharges occurred from Moolarben during the 2017 reporting period. Further, the most recent Independent Environmental Audit (Trevor Brown and Associates, 2016) concluded that the implementation of the Water Management Plan and sub-plans prepared for the Moolarben project and approved by DP&E on 31 July 2015, demonstrate Moolarben is managing surface water generally in accordance with Project Approval, EPL and bore licence requirements. The audit report concluded that upgrades to the surface water management system, the Water Sharing Agreement with Ulan Coal and no licensed discharges from the site during January 2013 to December 2015, have demonstrated a high level of performance of water management on the site.

Moolarben manages noise and vibration in accordance with the Noise Management Plan (NMP) and Blast Management Plan, including real time monitoring, attended monitoring and complaints handling system for noise. The most recent Independent Environmental Audit (Trevor Brown and Associates, 2016) concluded that Moolarben is currently meeting its obligations under all the Project Approval noise and blast conditions, Statements of Commitment and EPL 12932 conditions. The complaints response procedure is consistent with best practice and with the use of the Mining and Production Environmental Assistants providing real time investigation and advice to the mine operations personnel on noise emissions from the mine activities, is considered to exceed the procedures/protocols implemented at other extractive industry projects in NSW.

No issues of material significance were identified relating to emission discharges from review of the documents outlined.

Land Tenure and Permitting

Moolarben operates under a number of mining leases: ML1605 (expires 20/12/2028), ML1606 (expires 20/12/2028, ML1628 (expires 23/9/2034, ML 1691 (expires 23/9/2034 and ML 1715 (expires 31/8/2036).

Mining operations at the Moolarben are currently approved until 31 December 2038 and are carried out under NSW Project Approval (05_0117) (Moolarben Project Stage 1) (as modified) and NSW Project Approval (08_0135) (Moolarben Coal Project Stage 2) (as modified). Additional approvals under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 apply to mining operations, including Stage 1 mining operations Approval Decision (EPBC 2007/3297) granted 24 October 2007 (as varied) and EPBC 2013/6926) granted 13 November 2014. Stage 2 mining operations are also undertaken in accordance with Approval Decision EPBC 2008/4444) granted 18 May 2015. There are pending requests to modify both the Stage 1 and Stage 2 Project Approvals (05_0117 and 08_0135 respectively), as well as an additional EPBC Controlled Action application associated with the Stage 1 and Stage 2 extension project however it is understood that these are outside the current Life of Mine Plan (LOM) and have not been considered further.

Environment Protection Licence 12932 applies to the Site. Moolarben also operates under a number of other approvals, including for the storage of explosives, storage of dangerous goods and water licences, as well as under a number of operational and management plans approved by relevant regulators.

No issues of material significance were identified relating to permitting from review of the documents outlined.

OPERATIONAL HSE PERFORMANCE

Environmental Performance

Moolarben has exhibited a high degree of environmental compliance over recent years. An Independent Environmental Audit (IEA) dated April 2016 demonstrated a high degree of compliance with respect to statutory requirements and internal management plans (Trevor Brown and Associates, 2016). The next Independent Audit will be required by December 2018. Minor non compliances with the Project Approval conditions more recently in 2017 related to blasting and stockpiling and resulted in Penalty Notices being issued. These have been adequately addressed through procedural review and implementation of corrective measures by the Company and are not material. Various non compliances with conditions of EPL 12932 were reported from 2008 – 2016. These were largely administrative non compliances and / or matters dealt with via pollution studies and reduction program attached to the EPL. Previous pollution reduction programs attached to the licence relating to particulate matter management and water management have been completed. There are no current pollution studies and reduction programs attached to the licence. Historic non compliances and regulatory action related to water management and off site discharges at the site were addressed at the time (2009/2010) and there have been no ongoing reoccurrences.

Current site compliance is not considered to present a material risk based on the documentation reviewed.
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H&S Performance

Moolarben Open Cut

The key comparable statistic for Moolaraban OC, TRIFA is running at 3.9 which is below the NSW coal mining open cut industry (2015/16) average of 6.6.

The Broad Brush Risk Assessment report provided was April 2016 (although an annual review is suggested) with 1 extreme risk and 26 high risks. Although a wide range of hazards were considered the controls noted referred to general control systems with no detail. Some of the hazards may have been assessed with a lower consequence than history would indicate (explosives consequence assessed as a single fatality) but overall considered reasonable.

The SHMS Compliance and Effectiveness Audit conducted in October 2017 was based on the NSW Department of Primary Industries Mine Safety Operations Branch Coal Operation Health and Safety Management System checklist. There was one major non-compliance/effectiveness identified with a deficiency with their management of mining induced seismic activity. It is assumed that with the closure of the action from the most recent safety audit there would be no material risks.

Moolarben Underground

The SHMS Compliance and Effectiveness Audit conducted in October 2017 by Aussafe Consulting was based on the NSW Department of Primary Industries Mine Safety Operations Branch Coal Operation Health and Safety Management System checklist. The audit commented that the HSMS had not long been developed therefore some of the system requirements were not readily available. Some major non-conformances identified were primarily system based but included the following:

- audit schedules to be developed, ensuring audits are conducted to schedule;
- audit action close out;
- inconsistent application of change management system;
- develop an underground mine risk register including health risks; and
- updating of procedures after significant incidents.

There is no Broad Base Risk Assessment (BBRA) for Moolarben UG. Being in a transition state for the HSM systems is a concern with the audit indicating some significant shortcomings. The key comparable statistic of TRIFA is running at 22.8 is below the NSW coal mining underground industry (2015/16) average of 30.4. However, the fact that the lagging indicator of TRIFA is lower than average does not indicate a robust system. The HSMS audit indicated that a detailed safety and health risk assessment was not readily available for the site and therefore confidence in their identification of hazards with appropriate controls is limited. Based on the limited information available for review and in light of the outcomes of the 2017 SHMS

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Compliance and Effectiveness Audit, these shortcomings present a risk, however the mine has identified the weaknesses and it is understood they are addressing them, therefore the risk is unlikely to be material.

Water Management

Moolarben has an EPBC approval for Stage 2 (2008/4444) for the controlling provision: a water resource, in relation to coal seam gas development and large coal mining development. Condition of the approval is to supply data to government and adjacent mining stakeholders (to be provided in Water Management Plan) as monitored in accordance with state approval (08-0135). The site is subject to the conditions of EPL 12932 and includes discharge points and associated sampling requirements/discharge criteria, basin design details and effluent discharge conditions. No discharge occurred in 2016-2017. Realignment of Murragamba and Eastern Creek is approved to allow for the mining activities to occur.

A Water Management Plan (WAMP) has been prepared by NSW DP&E approved, suitably qualified experts to meet the federal and state conditions of consent relating to water management. The WAMP was approved in January 2016. Surface water management on the site includes clean water diversions, creek realignment, clean water dams and sediment basins. Groundwater and surface water access licences are held for take of surface and groundwater. Take occurring in 2017 and 2016 were well below the allowable limits. A review of the 2015-2017 annual compliance and independent audit 2015 reports identified stream gauge issues and proposed revision to trigger levels for surface and groundwater analytes. The 2015 independent audit report identified that the EPA issued a formal warning in relation to daily monitoring of treated effluent discharge volumes in 2013/2014 reporting period. The issue was resolved by a variation to the EPL removing the requirement to monitor daily discharge volumes for the locations in question and there has been no ongoing recurrence of these issues.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

Soils and Contamination

The Moolarben Mine Operations Plan (MOP) states that a land contamination assessment will be undertaken as the decommissioning strategy and closure plan are being developed. Areas that will need to be addressed in the land contamination assessment include:

- Areas impacted by carbonaceous material (coal spillage and coal storage areas);
- Workshops and fuel storage areas (where hydrocarbon spills may have occurred);
- Water treatment ponds and tailings dam locations.

The 2017 Annual Review did not identify any significant contamination events beyond what would be considered normal operations at a similar mining operation. Current industry standard management methods such as bunding of hydrocarbon storage areas, immediate rectification of spills, on-site effluent treatment and disposal are being implemented to prevent the creation of contamination issues beyond currently recognised areas of focus, as outlined above. The 2017 Annual Review identified that progressive rehabilitation is continuing at the site.

In line with similar operations in the region, a contamination risk is potentially posed by the current and historic tailings storage facilities. Due to the coal processing methods, heavy metals are stored in these facilities. These can lead to contamination if not contained appropriately. Data held on the National Pollutant Inventory database indicates the Moolarben site deposited a total of 528 tonnes of potentially hazardous heavy metals (including lead, mercury, chromium and arsenic) into on-site tailings storage facilities during the 2016-17 reporting period. Moolarben typically co-dispose coarse and fine rejects with overburden in the pit

ERM notes that no breaches have been filed against the Company or instances of contamination of the groundwater have been publically reported. There is an inherent risk in having contaminated tailings present on-site. As such it is understood rehabilitation of these materials by encapsulation is planned, however the variables associated with successful rehabilitation are many and existing budgets available can become insufficient if rehabilitation failures occur. Given the above, it is not considered a material risk of contamination tailings and rehabilitation failure, which is further supported with ongoing monitoring is undertaken to ensure they do not become material.

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Ecology

Moolarben manages biodiversity in accordance with the requirements of three separate EPBC approvals and has secured (or in the process of securing) 19 separate Biodiversity Offset Areas covering over 5000 ha. Each of the approvals and offset areas have different requirements, which poses some risk (although not above the materiality threshold) with managing compliance and the status of each of these offset areas and any conservation agreements could not be confirmed by ERM. The relevant EPBC Approvals are:

- Moolarben Coal Project - Stage 1 (EPBC 2007/3297).
- Moolarben Coal Project - Stage 2 (EPBC 2008/4444)
- Moolarben Coal Project Stage 1 Optimisation Modification (EPBC 2013/6926)

Note: Moolarben Coal Project Stage 1 and Stage 2 extension (EPBC 2017/7974) was determined a controlled action on 24 August 2017 and is to be assessed under the Bilateral Agreement, however this project is outside of current LOM plan and not considered further.

The current Biodiversity Offset Management Plan (BOMP), Vegetation Clearance Protocol and Landscape Management Plan has been prepared to address the conditions of the EPBC 2013/6926 approval and is consistent with the management plans and protocols approved under EPBC 2007/3297. On 17 December 2014, DPE approved the plans and agreed that the use of a conservation covenant and restriction of use instrument would satisfy the relevant conditions of consent. Securing the Offset Areas by a legal instrument and providing protection in perpetuity is required within 24 months of the date of the EPBC approval. As highlighted in the 2017 AEMR, 5 of 7 required offsets under EPBC 2008/4444 were not secured in perpetuity within 24 months of the approval. Moolarben has sought extensions to the date by which the offset properties need to be secured.

Conditions of Project Approvals (08_0135) and (05_0117) also require Yancoal to determine and lodge Conservation Bonds with the NSW Department of Planning and Environment which covers the cost of implementing these Biodiversity Offset Strategies for Moolarben. The Conservation Bond cost was subject to Quantity Surveyor verification and endorsed by DP&E (as the consent authority). It is understood that the bonds totalling AUD3,819,982.50 were lodged with DP&E on 25-26 August 2016 however no documentation to that effect has been supplied for review.

Based on the information made available, a potential non-compliance risk associated with securing biodiversity offsets as per development consent conditions has been identified although this is unlikely to reach the materiality threshold of AUD10M.

Rehabilitation and Mine Closure Liability

Rehabilitation Management Plan

Moolarben has a Rehabilitation Management Plan (RMP) dated August 2016 and executed 3 November 2016. Section 2.0 of the RMP outlines the statutory requirements for the project rehabilitation. It is noted that the RMP includes the provisions of the commonwealth approvals associated with Stage 1 of the project and it is understood that the Rehabilitation and Offset management Plan relevant to Stage 1 is incorporated with the current Landscape Management Plan (LMP) and approved by the State government administering authority on 25 November 2013. The 2016 RMP has incorporated the 2013 LMP rehabilitation aspects.

The ML1628 and ML1691 Rehabilitation Cost Estimate (RCE) dated March 2018 noted area of disturbance of 317.84ha with progressive rehabilitation being 112ha. Current security held as at 17 November 2017 was for these ML's under the RCE is AUD5,344,000 with a calculated total security deposit as AUD7,694,218.86.

The RCE for ML1605, ML1606 and ML1715 dated March 2018 has an area of disturbance of 1156 ha and progressive rehabilitation of 253ha with no rehabilitation completed. The securities held under these ML's as at 17 November 2017 were AUD30,596,000 with a calculated total security deposition as AUD41,493,577.10.

The two RCE incorporates costings for the use of a third party for the demolition and removal of infrastructure. It is noted that CMA Contracting Pty Ltd have provided a demolition cost estimate, dated March 2018, of AUD12,083,470.

It is noted that the progressive rehabilitated figures provided in the Annual Review conflict with those provided in the combined RCE's above. The progressive rehabilitation figures provided in the Moolarben

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Annual Review of 226ha is not consistent with the progressive rehabilitation figures provided in RCE having a combined area of 365 ha (112ha + 253ha).

Moolarben Securities Register

The Moolarben Securities Register dated 11 May 2018 indicates a total of AUD41,494,000 for ML1605, ML1606 and ML1715 and AUD7,694,000 for ML1628 and ML1691. Therefore the securities held for the combined ML's is AUD49,188,000. This figure is consistent with the RCE combined calculated total security deposition of AUD49,187,795.74 (AUD7,694,218.86 + AUD41,493,577.10).

Environmental Rehabilitation Budget Allocation

The rehabilitation budget for 2018 was provided at AUD659,000 with an additional bulk shaping and final landform costs of AUD2,000,000 included in the mining budget.

Mining Operations Plan

The Mining Operations Plan (MOP) was sourced from the Moolarben Coal website: http://www.moolarbencoal.com.au/icms_docs/273448_mining-operations-plan.pdf for the assessment.

From a review of the information provided in Section 3.3 of the MOP, Specific Risks Relating to Rehabilitation, there are no material risks associated with the rehabilitation from a soil resource management perspective.

This MOP was executed 6 April 2018 and covers the Period January 2017 to January 2019. Table 21 Section 7.3 outlines the summary of rehabilitation proposed during the MOP Term. The active rehabilitation phase as at 2017 has been identified as 268ha which appears to be inconsistent with the figures provided in Moolarben Annual Review and RCE's.

The MOP also provides for a further 182ha of progressive rehabilitation to be active by the end of the term of the MOP, January 2019. No figures for the current 2018 period have been provided and therefore an accurate indicator of progressive rehabilitation performance against allocated OPEX budgets cannot be determined.

ASHTON

EHS and Social Setting

Ashton is an approved open cut and underground operation located near the village of Camberwell, approximately 14km northwest of Singleton. The North East open cut (NEOC) is located west of Camberwell and Glennies Creek and ceased operations in 2011. The underground mine is located south of the north east open cut and New England Highway and is bounded to the west by the Ravensworth Underground Mine (RUM), to the south by the Hunter River and to the east by Glennies Creek. The South East Open Cut Project is approved (pending land purchase) however as yet undeveloped open cut mine located to the south of Camberwell and east of the underground mine and Glennies Creek.

Ashton receives minimal community complaints, having received two complaints in 2017, one in 2016 and nil complaints in 2015, all in relation to noise (subsequent investigations concluded that the noise was unlikely to have been generated from Ashton's operations).

Heritage Values

Within the Ashton Project Area there are 54 recorded Aboriginals heritage sites, three of which have been identified as having high scientific and cultural significance. A large number of stone artefacts were recovered from the Oxbow site demonstrating historic long term Aboriginal occupancy of the area. The salvage of these sites is carried out under the approved Aboriginal Heritage Impact Permits (AHIPs). The current AHIP's held for the Ashton are:

- AHIP #1130976 granted by the Land and Environment Court ([2011] NSWLEC 1249) in August 2011, encompassing the western underground longwall panels LW5, LW6A, LW6B, LW7A, LW7B and LW8 and the Bowmans Creek diversion. LW 205 in the ULLD seam is also within this area; and

- AHIP #1131017 issued on 23 December 2011, for the eastern underground longwall panels: LW 1 – 4. This AHIP also covers the area that will be subsided by LW 201 – 204 in the ULLD Seam.

While five heritage related issues have been raised within the courts these were all 5 to 6 years ago with not subsequent issues raised.

Ashton have comprehensive policies, standards and protocols in place to guide Aboriginal Cultural Heritage management and have also established an Aboriginal Community Consultation Forum chaired by an independent facilitator and is made up of representatives from Ashton, consulting archaeologists and members of Ashton's 34 Registered Aboriginal Parties (RAPs). Aboriginal heritage related risk, regulatory obligations and all court decisions are understood to have been satisfactorily addressed and future material risk associated with currently approved projects is not anticipated.

Native Title Claims

As of 28 May 2018, two active Native Title Claim Applications are relevant to the Ashton Coal Project.

- NC2013/006 (Scott Franks and Anor on behalf of the Plains Clan of the Wonnarua People) was registered on 16 January 2015.
- NC2017/007 (Wonnarua Traditional Owners #2). This application was lodged on 2 December 2017 and is currently identified for registration decision under section 190A of the Native Title Act 1993. No determinations of native title have been made for this application and it is unclear what, if any material risk this may pose to future development proposals.

There is no material risk associated with these Native Title Claim Applications.

Native Title has not been extinguished for some areas (including crown land and water ways) and Native Title may still exist within the footprint of the South East Open Cut. The South East Open Cute (SEOC) has yet to commence and is understood is not planned to commence within the next 5 years. In 1876, land at Camberwell was devoted to temporary commonage. In 2010, the land was reserved for rural services and revoked as a common. A licence was granted to Ashton over the land for access, grazing and site investigation. It is understood that Yancoal have sought legal advice to clarify the existence, validity and extent of Native Title and Aboriginal Land Rights Claims within and surrounding the SEOC. It is reported that Crown Lands will retain carriage of the resolution of these claims (along with other claims over numerous lots in the Hunter Valley) and the key risks identified as reported in the LOM Plan is the timing and cost impacts to process and resolve these matters. ERM has not reviewed or been provided copies of any legal advice regarding Native Title and Aboriginal Land Rights Claims although it is unlikely to exceed the material threshold of AUD10M. The timing and cost impacts may present a risk to validity of the Upside Case as presented on the LOM Plan.

The remainder of the Ashton Project Area is either Ashton owned or freehold land and is not subject to native title.

Emission Discharges

Air Emissions:

The most recent Ashton Independent Environmental Audit (Horn, 2016) concluded that the site exceeded TSP annual average criteria at the Camberwell Village and deposited dust criteria at three onsite gauges in 2013. These were rated as medium risks at the time with no high risks identified. Current air emissions from the Asset is not considered likely to pose a regulatory risk, given no open cut mining is currently being conducted and the efficacy of the dust management procedures and processes currently in place.

Noise:

Ashton manages noise and vibration in accordance with site specific Noise Management Plan (NMP) and Blast Management Plan, including real time monitoring, attended monitoring and complaints handling system for noise. The most recent Ashton Independent Environmental Audit (Horn, 2016) states that Noise complaints reduced significantly from the previous audit period and that there had been no sustained significant exceedances of noise criteria for the site in the audit period. The 2017 AEMR reported that noise

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monitoring results during the reporting period follow the trends of the past few years, where Ashton Coal's operations are largely inaudible in the surrounding community and minimal noise complaints have occurred.

Water:

The 2016 Independent Environmental Audit (Horn, 2016) identified that there were some issues relating to water management, specifically the lack of containment for potentially saline water leaving site from the eastern emplacement. There was a small catchment on the northern side of the emplacement that was not captured on site and there was evidence of a saline seep from the emplacement at that point. However, the catchment was well vegetated and there was no risk of suspended solids leaving site.

No issues of material significance were identified relating to emission discharges from review of the documents outlined.

Land Tenure and Permitting

Current mining operations are conducted in accordance with the requirements of the conditions of Mining Lease (ML) 1529 (expires 11/11/2021), ML 1533 (expires 25/2/2024), ML 1623 (expires 30/10/2029 and ML 1696 (expires 16/5/2035), granted under the Mining Act 1992. The Ashton MLs exist with freehold land owned by Ashton and other mining companies, power station, RMS and Singleton Council. Various Crown Land permits apply the site.

Mining operations at Ashton are currently approved under DA 309-11-2001-I (as modified). The consent allows Ashton to extract up to 5.45Mtpa of ROM coal from the existing operation (not including the SEOC) with the operational mine life to operate until 11 February 2024, or a period of 12 years following the recommencement of open cut mining operations at the SEOC, whichever is longer.

On 4 October 2012, approval was granted for the Ashton SEOC project (MP 08_0182), however it was subsequently appealed. In 2014, the NSW Land and Environment Court upheld the approval, subject to further conditions. The revised development consent was issued to Ashton in April 2015. The SEOC has yet to commence (and is understood will not commence within 5 years). Under the NSW Environmental Planning and Assessment Act 1979, a development consent lapses five years after the date that approval is granted unless the project has physically commenced on or before that day. Based on the date L&E Court approval dated 17 April 2015, the development consent will lapse on 17 April 2020 if the project has not achieved physical commencement. This is considered a low risk as Ashton has time in which to undertake works to trigger physical commencement to ensure the validity of the approval. The Ashton SEOC Project was deemed to not be a controlled action and thus approval under the Commonwealth Environmental Protection and Conservation Act (EPBC Act) was not required.

Environment Protection Licence 11879 applies to the Site. There is a licence variation application pending for EPL 11879. Ashton also operates under a number of other approvals, including for the storage of explosives, storage of dangerous goods and water licences, as well as under a number of operational and management plans approved by relevant regulators.

Current site permitting is not considered to present a material risk based on the documentation reviewed.

OPERATIONAL EHS PERFORMANCE

Environmental Performance

An independent review of Ashton completed in December 2016 (Horn, 2016), reported 27 non compliances (14 of which were administrative and the remaining low and medium risks). No high risks were identified in the audit. The key identified non-compliances were associated with noise/blasting, dust and water related issues. The Ashton Annual Review report 2017 (covering the period 1 January 2017 – 31 December 2017) states that all actions from the independent audit report have been completed except for one relating to storm water runoff on the north-east open cut, where an options analysis was completed during 2017, followed by peer review in early 2018 and ongoing consultation with the EPA.

A Penalty Notice was issued to Ashton by DPE in February 2017 relating to non-compliance with a condition of Project Approval DA 309-11-2003i relating to failure to maintain and publish a community complaints

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register on its website and update on a monthly basis and failure to provide a 24 hrs Community Compliant line. Ashton was fined AUD15,000 however the issue is now resolved and the operations are now in compliance with the condition.

Reported non compliances against EPL 11879 during 2015 and 2016 are largely administrative non compliances which have not resulted in any penalty notices nor prosecutions. Current site compliance is not considered to present a material risk to the project based on the documentation reviewed

H&S Performance

The last Broad Brush Risk Assessment was completed in December 2017 and appears comprehensive. The process employed demonstrates adequate controls are in place. Since the previous risk assessment a number of hazards have been assessed as higher risks. The group recorded as conducting the assessment shows depth of experience and covered management to the workers in the field.

The SHMS Compliance and Effectiveness audit completed by Aussafe Consulting in August 2017, using criteria based on the NSW Department of Primary Industries Mine Safety Operations Branch Coal Operation Health and Safety Management System checklist identified no major non-conformances and a number of lesser non compliances including two from the 2015 audit.

The key comparable statistic of TRIFA running at 33 is marginally above the NSW coal mining underground industry (2015/16) average 30.4. Overall no material issues were identified.

Water Management

The site is subject to EPL 11879. The EPL outlines ambient surface water monitoring locations, parameters for analysis and frequency of sampling. No licenced discharge location are included. The EPL also outlines the requirement for the development of Storm water Management Plan for the development. Bowmans Creek was diverted to allow for the operation of the project. Numerous Water Access Licences (WALs) exist for the site allowing extraction from the Hunter River and Glennies Creek. Review of the 2016 and 2017 Annual environmental reports identified that no exceedance of allowable take was observed.

A Water Management Plan (WAMP) was prepared for the site and was approved by NSW Department of Planning and Environment (DPE) in March 2018. Water management at the site includes groundwater dewatering bores, surface water and process water holding ponds, disturbed catchment catch drains, upslope diversion, contour drains and settlement basins. The WAMP states that do discharge of surface water occurs from the site as it is stored and managed for site use, also stating that no spills were recorded from the site storages from August 2010 through to January 2017. The 2015, 2016 and 2017 annual environment report identified that no compensatory water needed to be required to private landholders during the reporting periods.

The water supply reliability states that reliability for water that is extracted under the WALs is under 50%. The water balance would predict the likelihood of a water supply deficiency during drought conditions and the site would seek alternative supply sources (such as purchasing additional WALs on the open market). The cost of obtaining such licences will unlikely be of material significance.

The 2015 and 2017 annual environmental reviews identified no incidents or non-compliances in relation to surface and groundwater management. The 2016 independent audit identified two administrative non-compliances related to consultation during the preparation of the management plan and the impracticality of the process to be implemented if a surface water assessment criteria is exceeded. The 2016 audit identified a non-compliance in relation to on-site management of water (and associated sampling) from a rehabilitated area adjacent to the rail line.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

Soils and Contamination

The 2017 Ashton MOP identifies that there are no areas of contaminated land within the site boundaries. The MOP also states that Acid mine drainage is not considered to be a risk at the site. However groundwater seepage and drainage from emplaced materials will be periodically tested for signs of acid

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rock drainage. Hydrocarbons and chemicals are stored in accordance with industry standards to prevent unintentional release and contamination. No issue relating to contamination was raised in the 2016 Independent audit. The 2017 annual review identified a non-compliance in that a drum containing a hydrocarbon material was not fully bunded, though was rectified in the presence of the auditor.

In line with similar operations in the region, a contamination risk is potentially posed by the current and historic tailings storage facilities. Due to the coal processing methods, heavy metals are stored in these facilities. These can lead to contamination if not contained appropriately. Data held on the National Pollutant Inventory database indicates the Ashton mine deposited a total of 43 tonnes of potentially hazardous heavy metals (including lead, mercury, chromium and arsenic) into on-site tailings storage facilities during the 2016-17 reporting period.

ERM notes that no breaches have been filed against Ashton or instances of contamination of the groundwater have been publically reported.

There is an inherent risk in having contaminated tailings present on-site. It is understood rehabilitation of these materials by encapsulation is planned, however the variables associated with successful rehabilitation are many and existing budgets available can become insufficient if rehabilitation failures occur. ERM has not considered material risk of contamination tailings and rehabilitation failure, however it is understood that ongoing monitoring of these risks are undertaken by the asset to ensure they do not become material.

Ecology

The Upper Hunter region is home to a range of threatened species and Endangered Ecological Communities (EECs), which are subject to regulation under NSW and Commonwealth biodiversity legislation. At Ashton, the site progression from open cut to underground has reduced the potential for impact to ecological values.

To offset the ecological and archaeological impacts of the project and provide for the conservation of an important archaeological area, Ashton entered into a Conservation Agreement over part of Lot 3 DP 1114623 on 16 September 2010. This conservation area contains vulnerable threatened fauna (Grey Crowned Babbler, Hooded Robin and Speckled Warbler) and areas of significant cultural Aboriginal heritage value. This conservation agreement also recognises that the original development consent (dated 2002) permits mining of coal by longwall methods in four seams beneath the conservation area. Ongoing management and monitoring are being undertaken in accordance with the Voluntary Conservation Area Plan of Management (2012) to the conditions of AHIP #1131017, Flora and Fauna Management Plan (2017) and the Cultural Heritage Management Plan (2017). Future material risk associated with this agreement is not anticipated.

In accordance with development consent, Ashton has conducted bi-annual monitoring within this Voluntary Conservation Area since 2005 and Bowmans Creek since 2007. Monitoring will continue until the completion of underground mining within the extraction area and up to five years after secondary extraction is complete. As reported in the Independent Audit (2016) and the Annual Environment Management Report (AEMR) (2017), monitoring shows that terrestrial fauna species diversity remains consistent and reports no reduction in biodiversity values for the site, with the Bowmans Creek Diversion increasing aquatic biodiversity as rehabilitation associated with the diversion progresses.

In summary, biodiversity related risk and regulatory obligations in respect to biodiversity impacts at Ashton are understood to have been satisfactorily addressed. Future material risk associated with currently approved projects is not anticipated.

Rehabilitation and Mine Closure Liability

The rate of rehabilitation across the mine is generally proceeding in line with expectations (as detailed in the MOPs) and is broadly keeping pace with new disturbance. Overall 80% of the land has been rehabilitated, however none has been relinquished. Rehabilitation and closure risks are managed through the MOP and in accordance with the requirements of Ashton's DA 309-11-2001-i. Three issues relating to mine closure liability have been noted by ERM and these are already known to Yancoal. These relate to: rehabilitation of subsidence, rehabilitation of final void dimensions and risks associated with a new Rehabilitation Cost Estimate method introduced by the NSW Government on 1 January 2018.

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- Ashton's DA 309-11-2001-i requires subsidence troughs on alluvial land adjacent to Bowmans Creek to be rehabilitated to provide a free draining surface. Up to 8m subsidence troughs are predicted, which will result in the ponding of water above mined land. ERM's review of the Ashton Rehabilitation Cost Calculation (Doc 01.03.04.02.39) provides AUD66,165 for (minor) earthworks to rehabilitate 51.8 ha of subsidence areas. In lieu of the requirement to provide free draining land, the rehabilitation budget for this domain is likely to be insufficient.
- The Environmental Assessment for the SEOC and modification to the Ashton Mine development consent detailed the final NEOC void dimensions. The DA requires mining to be carried out in accordance with these dimensions. ERM understands that the final void dimensions may not be achievable if the SEOC does not proceed, in particular the base of the void will be 20-30m below the required elevation. Changes to the final void dimensions may require approval and until such approval is obtained there is a potential risk that the assets will not meet rehabilitation and relinquishment requirements.
- Yancoal is understood to be addressing both rehabilitation matters and has formally extended the term of the current MOP to July 2018 to allow time to address these matters for approval in the subsequent MOP. The progress of this work has not been viewed by ERM at the time of writing, however it is expected that both matters will be able to be resolved for approval.

Stratford and Duralie

EHS and Social Setting

The Stratford operations currently consist of the Bowens Road North Open Cut (BRN) and Roseville West Open Cut (Roseville) pits with a CHPP and associated raw and product coal handling and rail loading and unloading facilities. Various other pits have been mined in the past. The Duralie Open Cut Coal Mine, is located about 20 km south of the Stratford mine. The Bucketts Way is the main road through the Gloucester Valley which connects to the Pacific Highway, approximately 12 km north of Raymond Terrace, to Gloucester over approximately 80 km through a number of small villages including Stroud, Craven and Stratford. The Stratford operation is located on the eastern side of the Bucketts Way, near the villages of Stratford and Craven.

The mines are situated within the Gloucester Valley and are surrounded by a range of agricultural land uses and native bushland and small hamlets. The closest residential receiver is located 500m north of the Duralie project area boundary. In addition, there are in the order of 150 privately owned residences within a 6 km radius of the mine.

Heritage Values

There are no Native Title determinations, claims or Indigenous Land Use Agreements at either Stratford or Duralie.

Stratford Mine Complex (SMC)

Heritage assessments at Stratford have recorded a total of 15 Aboriginal heritage sites, two Potential Archaeological Deposits (PADs) and a potential cultural area. In accordance with the requirements of the Stratford Extension Project Development Consent SSD-4966 (refer below), the approved Heritage Management Plan (2018) guides the management of Aboriginal cultural heritage sites impacted by the initial activities. The Initial Stage of the Stratford Extension Project would result in partial loss of value to five known sites. As per the letter from DP&E (dated 30 November 2017), Aboriginal cultural heritage sites impacted by later activities will be considered in a later revision of the HMP.

As detailed in the Stratford Extension Project (SEP) Environmental Impact Statement (EIS), five items identified in the site survey were assessed as having local heritage significance, including the Stratford Timber Railway (cutting and routes 1 and 2), the Glen Timber Railway, the Stratford Cemetery and the Craven Village. These items are all located outside of the SMC disturbance area and present no material or statutory risk.

Duralie Open Cut Coal Mine (Duralie OC)

The Heritage Management Plan describes eleven (11) Aboriginal heritage artefacts and two (2) Aboriginal sites in the Duralie development area and provides management for the Aboriginal heritage sites. Under the approved extension of Duralie, three (3) of these known Aboriginal heritage sites have been directly impacted (as approved). In accordance with the Heritage Management Plan topsoil disturbance during earthworks, construction and operation of the mine has been monitored utilising officers of the Karuah Local Aboriginal Land Council (KLALC). Following the completion of rehabilitation, salvaged artefacts that have been relocated into the care of the KLALC may be replaced back onto the rehabilitated landform in consultation with the Aboriginal community and OEH. The only European heritage building within the vicinity of the Duralie mine is the former Weismantels Inn. Photographic and archival recording of the Former Weismantels Inn in accordance with the DP&E's Heritage Branch guidelines was undertaken in June 2011 and impacts to the have been reported within the annual reports.

In summary, heritage related risk and regulatory obligations in respect to cultural heritage vales at the Gloucester Basin Assets are understood to have been satisfactorily addressed. Future material risk associated with currently approved projects is not anticipated.

Emission Discharges

Stratford

Stratford operates under the development consent for the Stratford Extension Project. The development consent for Stratford requires preparation of a series of management plans. Some of these management plans have been combined to address the requirements for both Stratford and Bowens Road North consents.

Air Emissions

Similar to other open cut coal mines in the region, air emissions at the Stratford are predominantly a combination of windblown dust and direct emissions from vehicles. Air quality is managed in accordance with an Air Quality Management Plan and includes a combination of real time and supplementary dust monitoring at locations representative of sensitive receptors. Dust emissions from roadways are minimised through regular watering by a water cart fleet, while emissions from other exposed surfaces are reduced by progressive clearing and rehabilitation. At the CHPP, potential dust emission sources are controlled by automated water sprays at a number of locations. The product coal stockpile sprays are located on the overhead conveyor system. A wind speed/direction device provides information to a computer located in the coal preparation plant control room that can electrically activate spray valves. The valves open and close in a programmed cycle that alternatively activates sprinkler heads above the stockpile. The dust suppression system operates when the wind speed exceeds 5m/s for >30 seconds.

The most recent Independent Environmental Audit (Hanson Bailey, 2018) concluded that the dust emissions were generally well managed with the exception of excessive visible dust seen on the ROM pad near a working loader. SCPL advised at the time that water carts are usually active in this area however, were not at the time of the site visit. There were no exceedances of air quality criteria under the consents in the audit period.

Water Discharge

Stratford is licensed to discharge water in accordance with its EPLs subject to various water quality and rainfall criteria. However, no water discharges occurred from Stratford during the 2017 reporting period. The most recent Independent Environmental Audit (Hanson Bailey, 2018) concluded that the implementation of the Water Management Plan and sub-plans demonstrate that Stratford is managing surface water generally in accordance with its development consent, EPLs and water licence requirements.

Noise Emissions

Stratford manages noise and vibration in accordance with the Noise Management Plan and Blast Management Plan and the EPLs, including real time monitoring, attended monitoring and complaints handling system for noise. The most recent Independent Environmental Audit (Hanson Bailey, 2018) concluded that noise is generally well managed, however coal mining did not occur at Stratford in the audit period. There were no exceedances of noise criteria within the audit period. The main sources of noise during the audit period were from the CHPP and a stockpile dozer (which no longer operates in the area associated with the noise complaints). Operations have since recommenced and noise will require careful management to ensure impacts to sensitive receivers in the area remain within predictions. This is understood to be underway by the Company.

Duralie OC

Air Emissions

Air emissions at the Duralie are predominantly a combination of windblown dust and direct emissions from off-road diesel vehicles. Air quality is managed in accordance with an Air Quality Management Plan and includes a combination of real time and supplementary dust monitoring at locations representative of sensitive receptors. Dust suppression is undertaken using a range of best practice dust control measures. Dust emissions from roadways are minimised through regular watering by a water cart fleet, while emissions from other exposed surfaces are reduced by progressive clearing and rehabilitation. A number of Pollution Reduction Programs (PRP) required under EPL 11701 have previously been completed, including 'Coal Mine Wind Erosion of Exposed Land Assessment' August 2016. Results are available on the Duralie OC website.

On 11 April 2017, a dust incident was reported to the EPA. The dust had resulted from an area of very fine overburden which was being rehandled in the Weismantel pit. Dust emissions were reported internally and control measures implemented in accordance with the Air Quality Management Plan. As the dust emissions were not able to be controlled the activity was ceased. Additional controls were implemented and a written report provided to the EPA. In 2017, fourteen air quality related complaints were received (13 related to odours and one to visible dust). All complaints were responded to promptly and details of the complaint responses and outcomes recorded with no infringement notices.

Water Discharge

Duralie OC is licensed to discharge water in accordance with its EPLs subject to various water quality and rainfall criteria. However, no water discharges occurred from the mine during the 2017 reporting period. A review of the most recent Annual Reviews indicates that the implementation of the Water Management Plan and sub-plans demonstrate that surface water is being managed generally in accordance with development consents, EPLs and bore licence requirements.

Noise Emissions

Duralie OC manages noise and vibration in accordance with the Noise Management Plan and Blast Management Plan and the EPL, including real time monitoring, attended monitoring and complaints handling system for noise. A review of the most recent Annual Reviews indicates that noise is generally well managed. In the last two years, there were two blast related incidents reported to the EPA regarding a blast after the approved time which was not monitored and a blast vibration complaint. Written reports were provided to the EPA and DP&E and no further action was required.

Land Tenure and Permitting

Stratford Mine Complex

Mining operations have been conducted in accordance with the requirements of the conditions of Mining Lease (ML) 1360 (expires 21/12/2036), ML1409 (expired 6/1/2018, renewal pending), ML1447 ((expires 31/3/2020), ML1521 (expires 23/9/2023), ML1528 (expires 19/1/2024), ML1538 (expires 24/6/2024), ML1577 (expires 28/2/2027) and ML1733 (expires 8/4/2037), granted under the Mining Act 1992. Security bonds have been registered for the mining operations. The Stratford MLs exist within freehold land owned by Yancoal.

Operations at Stratford (excluding Bowens Road North) were originally approved under DA 73/94 in January 1995. DA 73/94 was relinquished in July 2000 and operations commenced under DA 23-98/99 (approved in February 1999). Mining operations ceased at Roseville West pit in December 2013 and Bowens Road

North in June 2014 however have since recommenced under SSD-4966 for the Stratford Extension Project in May 2018. The CHPP continues to receive coal from Duralie (as reported in Hanson Bailey, Independent Environmental Audit Report, February 2018).

Development consent for the Stratford Extension Project (SEP) (SSD-4966) was granted by the NSW Planning Assessment Commission (PAC) on 29 May 2015 to extract up to 21.5 million tonnes (Mt) of run of mine (RM), with mining operations permitted until 31 December 2025. The SEP provides for the continuation and extension of operations at Stratford including the mining of three new open cut areas. The approval consolidated Stratford and .Bowens Road North operations under a single development consent. A Mining Operations Plan (MOP) has been prepared for the period March 2018 – March 2021. Based on the MOP, SSD-4966 will be physically commenced within five years of the consent being granted (and based on the MOP, there is no material risk associated with the consent lapsing). In addition, a Commonwealth approval (EPBC 2011/6176) was granted on 29 January 2016 for the extension to open cut coal mining and processing activities at the Stratford of an additional 300 hectares and includes controlling provision: water resources. This approval expires on 30 November 2030.

EPL 5161 applies to Stratford (excluding Bowen Road North) (and being the area to which ML 1360 applies). EPL 11745 applies to Bowens Road North (an application to surrender EPL 11745, dated 11 January 2018, is pending). Stratford also operates under a number of other approvals, including for the storage of explosives, storage of dangerous goods and water licences, as well as under a number of operational and management plans approved by relevant regulators.

Duralie

Mining operations have been conducted in accordance with the requirements of the conditions of Mining Lease (ML) 1646 (expires 4/1/2032) and ML 1427 (expires 6/4/2019) granted under the Mining Act 1992. Security bonds have been registered for the mining operations. The Duralie OC MLs exist within freehold land owned by Duralie Coal Pty Ltd.

Current mining operations are undertaken in accordance with the Duralie Extension Project Approval (PA 08_0203) (as modified), approved in November 2010 for mining activities until 31 December 2021. In addition, a Commonwealth approval (EPBC 2010/5396) was granted on 22 December 2010 for the Duralie UG extension and includes conditions relating to water resources. EPBC approval expires on 31 December 2020 and would need to be extended to continue operations past this date. However, with Project Approval under PA 08_0203 to expire 31 December 2021 (ie only one year later) and with current Mine Closure Planning in preparation of the Mine Closure Plan to be submitted prior to 31 December 2019 (as reported in Hansen Bailey, 2018), the need to extend EPBC approval is unlikely and even if an extension was required, given the limited timeframe an extension would be required (ie for one additional year), the granting of such an extension is likely to be a low risk if there is ongoing compliance with the requirements of EPBC 2010/5396.

EPL 11701 applies to the Duralie Mine. Duralie OC also operates under a number of other approvals, including for the storage of explosives, storage of dangerous goods and water licences, as well as under a number of operational and management plans approved by relevant regulators.

Stratford Extension Project

No issues of material significance were identified relating to permitting from review of the documents outlined.

OPERATIONAL EHS PERFORMANCE

Environmental Performance

Stratford Mine Complex

Stratford has exhibited a high degree of environmental compliance over recent years (2014-2017). An Independent Environmental Audit dated February 2018 covering the period 2014 – 2017 concluded that a good standard of environmental management is generally being applied to the minor recovery operations and rehabilitation activities (Hanson Bailey, 2018). Implementation of site rehabilitation is progressing generally in accordance with supporting documents of the Development Consent and MOP. Some minor inconsistencies were noted between the MOP figure and the Development Consent which requires updating in the MOP. Further planning and assessment is required in consultation with relevant regulators to demonstrate that the long-term closure scenario of the final voids overtopping to natural drainage can be successfully implemented.

Two minor non-compliances with the Development Consent conditions for the Stratford (excluding Bowen Road North) related to dust emissions and air quality monitoring. These have been adequately addressed through procedural review and implementation. Three non-compliances with conditions of EPL 5161 were reported - two were administrative non-compliances and one minor in relation to dust emissions. These do not present a material risk.

At Bowens Road North, only administrative non-compliances with the Development Consent conditions were identified, which have been adequately addressed through procedural review and implementation. No non-compliances with conditions of EPL 11745 were reported. Both these have since been surrendered and no longer apply.

Community concerns are being well managed and recorded within a complaints register. As operations have largely ceased, the number of complaints received in the audit period was low. Seven complaints were received in 2015 for noise issues, primarily in relation to a stockpile dozer. No complaints were received in 2016 for the operation and only two complaints were received in 2017.

Current site compliance is not considered to present a material risk based on the documentation reviewed.

Duralie

An Independent Environmental Audit dated February 2018 covering the period November 2014 – December 2017 concluded that a good standard of environmental management is generally being applied to the operations and rehabilitation activities (Hanson Bailey, 2018). The audit identified seven non-compliances against conditions of development consent and other licenses and approvals. The seven non-compliances comprised five issues. Five non compliances were ranked as low risk and two ranked as administrative non-compliances. Annual Reviews undertaken since 2014 indicate that the Duralie has exhibited a high degree of environmental compliance during its continued operations. Five minor non-compliances with the Project Approval conditions related to dust and odour emissions, air quality monitoring, water discharge and unrolled burning. These have been adequately addressed through procedural review and implementation. No non-compliances with conditions of EPL 11701 were reported.

Community concerns are being well managed and recorded within a complaints register. Hanson Bailey (2018) reported forty one complaints were received in 2015 primarily related to noise, nineteen complaints were received in 2016 primarily for air and odour issues and six complaints were received in 2017, primarily related to odour.

Current site compliance is not considered to present a material risk based on the documentation reviewed.

H&S Performance

The key comparable statistic of TRIFA is running at 20.68 which is significantly higher than the NSW coal mining open cut industry average (2015/2016) of 6.6.

A SHMS Compliance and Effectiveness Audit was completed by Aussafe in June 2017 with criteria based on the NSW Department of Primary Industries Mine Safety Operations Branch Coal Operation Health and Safety Management System checklist. No major non-compliances/effectiveness were identified. Minor issues identified were in the areas of obligation to HSMS, audit/inspection, contractor management, change management, hazardous chemicals, occupational health and accident/incident management.

No risk assessments were available for the assets but the SHMS covers the normal range of hazards. Although the lag indicator is high the site audit could indicate focus is required. With limited data available the assessment of materiality did not indicate an issue.

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Water Management

Stratford Mining Complex

The site is subject to the conditions of EPL 5161, which includes the following related to water management:

- Storm water discharge points and monitoring locations;
- Discharge water sampling parameters and sampling frequency;
- Groundwater monitoring locations;
- Mine wastewater irrigation conditions;
- Special condition relating to drought release of mine wastewater.

A Water Management Plan (WAMP) was prepared by NSW DP&E approved, suitably qualified experts to meet the federal and state conditions of consent relating to water management. The WMP was approved in September 2017. Surface water management on the site includes upslope temporary and permanent clean water diversions, water storage within open pits, irrigation onto rehabilitated areas and sediment basins.

Water access licences are held for the site though were not sighted, however it is understood to be in compliance.

The water supply model for the site indicated that the site runs at a surplus, with a supply reliability of greater than 99%, even in limited precipitation modelling. Modelling was also undertaken to determine the potential for an overflow from water storages on-site. The modelling indicated that the spill risk from the contained storages being less than one percent across all modelled climate scenarios. The surface water management plan identified that as of 2010 there has been no significant acid mine drainage issues.

Review of the 2017 and 2016 Annual Compliance reviews identified:

- No water discharges in 2016 and 2017 (though one overflow in 2017 that was monitored as required);
- Water take from water access licences was less than the entitlement;
- One water related complaint in the 2012/13 reporting period;
- No significant or measurable change in water table level or quality that could be attributed to the mines activities; and
- No water related non-compliances.

The most recent environmental audit (Hansen Bailey, February 2018) identified two administrative non-compliances. The first due to no evidence being provided that the site water balance was being updated on a six-monthly basis, with the site water balance was being undertaken on an annual basis. The second was due to a sampling event not being undertaken due to no flow events at the sampling locations.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

Duralie

Duralie OC has an EPBC approval (2010/5396) that includes conditions relating to water resources. The site is subject to the conditions of EPL 11701 and includes the following related to water management:

- Storm water discharge points and monitoring locations;
- ambient and discharge water sampling parameters and sampling frequency;
- Surface water quality concentration limits
- Effluent irrigation conditions;

The EPL does not provide sediment basin design criteria. The WAMP outlines that basins will be constructed in accordance with the Landcom (2004) Managing Urban Storm water: Soils and Construction.

No defined criteria are pre-established. This is not considered a material issue. Coal Shaft Creek has been diverted to allow for the operation of the mine. This diversion and other water management structures on-site have been undertaken in accordance with the Water Supply Works Approval (20WA202053). A Water Management Plan (WAMP) was prepared by NSW DP&E approved, suitably qualified experts to meet the federal and state conditions of consent relating to water management. The WAMP was approved in July 2016, though a revised version following DP&E on annual review awaits approval. Surface water management on the site includes upslope clean water diversions, a main water dam with two auxiliary dams, irrigation of excess water, in-pit water storage, sewage treatment plant and system for disposal of effluent and sediment basins. To manage captured water on-site the pumps are used to transfer water between the Main Water Dam and Auxiliary Dam water storages and the open pits to minimise the disruption to mining and to maintain storm runoff storage capacity needed to achieve a negligible risk of uncontrolled release of mining-related water off-site.

A groundwater extraction licence (20BL168404) applies to the site. No surface water access licences are held by the site for surface water extraction.

The water balance simulation modelling identified that there was a negligible risk (<0.1%) of uncontrolled release of mining related water from site dams, with no overflow from the main water dam in the 1,000 climatic sequences simulated. The modelling notes that there is a potential risk to mining operation due to water being transferred to the open pits to prevent exceedance of the management systems capacity. Hence the material risk to the environment is low, though risk to expense from disrupted mining operations may occur, with the modelling stating the risk was determined to be economically and operationally acceptable. The water balance simulation model also indicates that there is a low probability (<0.1%) of non-potable water shortfall occurring over the remaining mine life, with no shortages being simulated in any of the 1,000 climatic sequences.

Auditor review of the 2014 independent audit and the 2015, 2016 and 2017 Annual Compliance reviews identified:

- No non-compliances related to ground or surface water management in the 2014 audit, 2015 and 2017 annual compliance reports;
- A low risk non-compliance in the form of rainfall runoff discharge from the irrigation area during the 2016 reporting period. A written report was submitted to the EPA and DP&E, with the EPA confirming that no further action was required.
- Two complaints related to water in 10/11 reporting period and one in the 11/12 reporting period.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

Soils and Contamination

Stratford Mining Complex

The 2018 Stratford MOP identifies that the site has a bioremediation area for the treatment of hydrocarbon contaminated soil and waste rock. The MOP outlines that sewage is treated on-site and released via transpiration trench. The MOP states that a land contamination assessment will be undertaken as the development of the decommissioning strategy and closure plan are being developed. Areas that will need to be addressed in the land contamination assessment include:

- Areas impacted by carbonaceous material (coal spillage and coal storage areas);
- Workshops and fuel storage areas (where hydrocarbon spills may have occurred);
- Water treatment ponds and tailings dam locations.

The sediments within the return water dam will also require characterisation and remediation. The above are considered consistent with typical mine sites.

Duralie

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The Annual Review 2017 identified that the site has a bioremediation area for the biological degradation and treatment of hydrocarbon contaminated soils. The report also identified that the overburden dump is being progressively rehabilitated to the final landform, minimising disturbed land and the generation of contaminated water requiring treatment. The site has a fuel tank farm containing two double skinned 100,000L storage tanks. Runoff from these locations are managed by being conveyed across the concrete containment to an oil water separator. Industry standard hydrocarbon storage and management methods are applied in in the workshop. Effluent is treated via aerated waste water treatment system and the treated effluent is irrigated on-site.

The independent environmental audit of 2014 identified that the current practice of irrigating on the site appeared to be sustainable and that predicted irrigation water salinities would not cause soil structural degradation or plant growth issues in irrigation areas.

The MOP identified a key risk for mining closure and rehabilitation as the rehabilitation of PAF waste emplacements causing mine drainage contamination of surface and groundwater and long term contamination from mine water stored in prescribed dams and acid mine drainage contamination of groundwater. Risk reduction strategies were proposed to address these risks. The Duralie Coal Mine MOP states that a land contamination assessment will be undertaken as the development of the decommissioning strategy and closure plan are being developed. Areas that will need to be addressed in the land contamination assessment ae the same as at Stratford.

Ecology

Stratford Mining Complex

A review of the ecological conditions provided throughout DA 39-02-01 (Bowens Road North) was undertaken by Cumberland Ecology (as commissioned by Hansen Bailey Environmental Consultants) as part of the 2017 Independent Environmental Audit of the Stratford. No development consent conditions for ecology were required to be assessed for Stratford (Stratford DA 23-98/99) and Stratford Coal Extension (SSD-4966) and this project has therefore not been considered further within this assessment.

The ecological audit indicated that the majority of the relevant biodiversity conditions have been or are being addressed and that various management plans and reporting were largely adequate in addressing requirements of conditions of consent.

No issues of material significance were identified relating to compliance with ecological conditions from review of the documents outlined.

Duralie OC

The Biodiversity Management Plan was approved by the DP&E (formerly DP&I) on the 29 March 2012 and by the Commonwealth under the EPBC approval on 28 August 2012. The BMP has been subject to various revisions, the most recent as reported in Hansen Bailey (February 2018) having occurred in 2017. The Independent Environmental Audit covering the period November 2014 – December 2017 (Hansen Bailey, February 2018) stated that the biodiversity offset areas were performing well, with one low risk non-compliance related to approval of the revised BMP by DP&E. No issues of material significance were identified relating to compliance with ecological conditions from review of the documents outlined.

Mine Rehabilitation and Mine Closure Liability

Stratford Mining Complex

The Independent Environmental Audit completed by Hansen Bailey (February 2018) covering the period November 2014 – December 2017 concluded that areas of rehabilitation were in accordance with the planning staging of areas approved in the relevant Mining operation Plan and that rehabilitation types, areas and success were consistent with the what was proposed in the EIS applying to the site. .

No issues of material significance were identified relating to compliance with specific mining rehabilitation practices from review of the documents outlined.

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Duralie

The Independent Environmental Audit (Hansen Bailey, February 2018) for the period November 2014 – December 2017 found the operations to be compliant with development consent conditions relating to rehabilitation and that progressive rehabilitation of the site was being undertaken including active final shaping in preparation for rehabilitation.

Yancoal has advised that for 2018, there is an environment budget of AUD2.4 million for Stratford / Duralie, with an additional AUD500,000 for rehabilitation (excluding bulk shaping and final landform costs of AUD2 million, which are included in the mining budget to cover these works. Based on the reported progress and success to date of rehabilitation (as reported by Hansen Bailey in the Independent Environmental Audits for each asset (February 2018), no issues of material significance were identified relating to compliance with specific mining rehabilitation practices from review of the documents outlined.

AUSTAR

EHS and Social Setting

Austar is an amalgamation of four former mines (Ellalong, Pelton, Cessnock No. 1 and Bellbird South collieries). It is located approximately 10 km south of Cessnock in the Lower Hunter Valley. There is a long history of underground mining at the site. The dominant land uses in the vicinity of the mine include Werakata State conservation area, old mine workings, active mines and rural properties. There are also a number of small residential areas in the vicinity of the mine including Ellalong, Paxton, Millfield and Kitchener. Natural features in the vicinity of the site include Quorrobolong Creek, Sandy Creek and Cony Creek. Topography of the site is undulating hills and alluvial flats.

Heritage Values

Austar includes lands within the boundaries of one active registered native title claim - NC2013/006 (Scott Franks and Anor on behalf of the Plains Clan of the Wonnarua People). A second claim, NCS2013/002 (Awabakal and Guringai People) was withdrawn in July 2017. It is noted that representatives of both claimant groups are registered Aboriginal parties for the most recent project works and have been invited to provide cultural information where relevant. As outlined within the MOP, all current and proposed mining activities occur within or below a combination of Austar and privately owned land, the Werakata State Conservation Area and Crown land. No evidence has been reviewed to suggest that native title has been extinguished within the Werakata State Conservation Area and Crown land. Assuming that Austar continues to consult with and provide notification of all future proposals, to the Plains Clan of the Wonnarua People, material risk associated with native title is not anticipated.

Aboriginal and non-Aboriginal heritage surveys have been undertaken at Austar to support the development approvals process. In consultation with Aboriginal stakeholders and representatives of the Department of Environment and Climate Change (DECC, now OEH), it was agreed mitigation measures may not successfully prevent the grinding groove site from cracking and that Austar would contribute AUD100,000 to an Aboriginal project or program to be decided by Aboriginal stakeholders as an offset for the potential impacts. Since 2013 it is reported in the Independent Audit that a total of AUD88,344 has been provided by Austar to support this initiative. Aboriginal Heritage monitoring to date and reported within the Independent Audit has not identified any impacts to artefact or grinding groove sites during the 2014-2017 audit period. Based on the data available for review, no material risk is anticipated to either Aboriginal or Non-Aboriginal (Historic) heritage values.

Emission Discharges

Air Emissions

Air quality has generally been a low level environmental and community risk for Austar due to limited sources of dust at site compared to open cut coal mines. Air quality is managed in accordance with an Air Quality and Greenhouse Gas Management Plan and includes high volume air sampling and continuous dust monitoring at locations representative of sensitive receptors. Air quality management controls (design and operational) have been successfully implemented with no exceedances of air quality criteria. No air quality complaints have been received, however a few combustion/odour complaints were made in 2016.

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Water Discharge

Austar is licensed to discharge water in accordance with its EPL subject to various water quality and rainfall criteria. The most recent Independent Environmental Audit (SLR, 2018) notes that surface water is a key aspect for Austar, with erosion and sediment control and pumping of water across site requiring ongoing management. There have been incidents relating to water discharge and pipeline leakages and recommendations made to avoid further incidents. However, with the proper implementation of the Water Management Plan and sub-plans, Austar should be able to manage surface water in accordance with development consents, EPLs and water licence requirements.

Noise Emissions

Austar manages noise and vibration in accordance with the Noise and Vibration Management Plan and EPL, including attended and continuous unattended monitoring and complaints handling system for noise. The most recent Independent Environmental Audit (SLR, 2018) notes that noise is a significant risk for Austar due to the proximity of the site to the community, with some low level noise non - compliances relating to the low frequency modifying factor. Austar has been undertaking a voluntary noise pollution reduction program (PRP) for the CHPP site in consultation with the EPA over several years. As a result, there have been improvements in noise management at the site with a reduction in complaints during the last audit period compared to the two previous audit periods.

Land Tenure and Permitting

Mining operations have been conducted in accordance with the requirements of the conditions of Consolidated Mining Lease (CML) 2 ML 1666 and ML 1661. , ML 1157, ML 1283, ML 1345, ML 1388 and ML 1550, ML 1677 granted under the Mining Act 1992. Security bonds have been registered for the mining operations. The MLs exist within freehold land owned by Austar, private land owners and the Crown. Various other MPL, CCL and EL apply to the asset.

Two key approvals apply to the Austar: DA 29/95 applies to the Bellbird South and Project Approval for the Stage 3 Extension Project (PA 08_0111, as modified), granted in September 2009 for the extension to longwall mining until 31 December 2030. It is understood that since 2016, coal extraction from the Stage 3 mining area of PA 08_011 has been suspended with operations focused on the Bellbird South Longwalls B1 – B7 mining area of DA 29/95. Austar has not been referred under the EPBC Act.

Austar also operates under a number of other approvals, including for the storage of explosives, storage of dangerous goods and water licences, as well as under a number of operational and management plans approved by relevant regulators.

No issues of material significance were identified relating to permitting from review of the documents outlined.

OPERATIONAL EHS PERFORMANCE

Environmental Performance

Austar has exhibited a good standard of environmental management over recent years (2014-2017). An Independent Environmental Audit was conducted by SLR Consulting Australia Pty in November 2017. The audit conclusions indicated a generally high standard of compliance of the Austar Mine activities with the conditions of approval granted to the project under the Development Consent DA29/95, Project Approval 08_0111, EPL 416 and mining lease conditions.

Three minor and two moderate non-compliances with the Development Consent and Project Approval conditions related to meteorological data, noise emissions and water discharges. These have been adequately addressed through procedural review and implementation by Austar. Eight non-compliances with conditions of EPL 416 were reported - two were administrative non-compliances, three were minor in relation to monitoring of weather and water discharges and three were moderate in relation to water discharges.

Community concerns are being well managed and recorded within a complaints register. A total of 5 complaints were received in the 2016-2017 reporting period and 4 complaints in 2015-2016 reporting period. Complaints received were in relation to odour (from spontaneous combustion), vibration and surface water.

H&S Performance

Two fatalities occurred in April 15, 2014 at the Mine. This was investigated by the NSW Department of Industry, Resources and Energy, Mine Safety unit and there is an ongoing prosecution risk, however any regulatory penalty is unlikely to meet the materiality threshold. Reputational risk has already been realised. The investigation report made criticism of the risk assessment process as assumptions were made on geotechnical risks that were incorrect. A further significant coal burst event on 17 May 2018 has led to the NSW Resources Regulator prohibiting all underground longwall production activities at the Austar mine. It is understood the prohibition notice is to remain in place until a detailed geotechnical assessment is carried out and the Regulator is satisfied that that comprehensive risk controls can be implemented to protect workers against the threat of further and escalated outburst events.

The Broad-brush risk assessment (BBRA) reviewed indicated that Austar are in the process of conducting or reassessing lower level risk assessments that provide the detailed controls. It should be expected that the lower level detailed risk assessment would identify the effectiveness of the controls and assess the adequacy of the combination of controls to demonstrate ALARP. The BBRA cannot demonstrate either of these important factors. The Austar BBRA indicates that there are numerous risk assessments conducted at a level focused on that individual hazard. The lasts RA conducted in July 2017 did involve a broad spectrum of the workforce and appears to cover the wide range of risks expected of a facility but is effectively a collated risk assessment that does not demonstrate adequacy or effectiveness of the controls.

The safety management system was audited in 2017 with the SHMS Compliance and Effectiveness Audit report issued in July 2017 (Aussafe Consulting). The audit was based on the NSW Department of Primary Industries Mine Safety Operations Branch Coal Operation Health and Safety Management System checklist. Although there were no major non-conformances there were control ineffectiveness/minor non-conformances identified in the areas of Audit/inspection, change management, training/consultation, contractor safety performance/procurement, obligations of HSMS, fixed plant, hazardous chemicals, mobile plant and occupational health.

The key comparable statistic is TRIFA and the site is running at 30 which is marginally below the NSW coal mining underground industry average (2015/16) of 30.4.

Water Management

A pollution reduction program is imposed on the site EPL, requiring the CHPP Clean Water Drain be investigated and the cause of orange staining/residue be determined. It is understood that an investigation report was due to be submitted to the NSW EPA (regulatory body) in March 2018. Whilst this is an ongoing issue, it is unlikely to represent a material issue.

The site holds water licences for groundwater wells used for dewatering. The site also holds a water access licence for surface water extraction from the Upper Wollombi Brook Water Source. Groundwater inflow was within limits in Annual environmental management reports reviewed (2016 and 2017). No evidence was provided to confirm that surface water take was within allowable limits, however this is unlikely to be a material issue.

The site has a water management plan that was approved in May 2013, with the most recent update being prepared in April 2017. Water management at the site involves a reverse osmosis plant to treat water from surface and underground water storage areas prior to offsite discharge. Water is managed across the surface and groundwater storages to prevent discharges to only when EPL conditions allow.

The independent audit in 2017 identified incidents including:

- A discharge event on 21 and 22 April 2015 from LDP001. pH was outside of range (3.55) on 22 April 2015. EPA correspondence indicated that no regulatory action was going to be undertaken;
- Leak of mine water pipelines on 26 March 2015, 24 February 2017;

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- Kitchener SIS Sediment Dam discharge on 6 January 2015 and 4 May 2015 (rainfall was greater than design capacity of the basin); and
- Orange staining in cleanwater drain on 7 June 2017.

An administrative non-compliance was also recorded in the 2017 independent report due to samples not being collected as creek conditions were dry. There have been discharges and pipeline leakages occurring at a frequency that suggest that the storm water management system could undergo improvements. On-going issues may continue to be a risk, however the incorporation of amelioration measures to improve management of basin capacities could likely be achieved for under the material threshold. The amelioration of leakages from pipelines may identify that new infrastructure is required, dependant on the extent of new infrastructure required, however any such upgrade works are unlikely to exceed the material threshold

Whilst there is an outstanding issues associated with the pollution reduction program relating to the CHPP Clean Water Drain, the asset is investigating the issue and liaising with relevant regulators. This issue, whilst ongoing, is unlikely to represent a material risk.

Soils and Contamination

The 2017 Annual Environmental Management Report (2017) identified that a phase one contamination assessment was undertaken on the site during the 2015-2016 reporting period and was awaiting finalisation. This report would guide further management dependant on extent of contamination identified. The 2017 AEMR details that the method of management for spills and hydrocarbon storage infrastructure is to clean-up spills immediately and remediated on-site/send off-site by an authorised waste contractor. The site operates a hydrocarbon remediation area, composed of three bunded cells on a redundant laydown area.

The colliery is managed in accordance with Australian Standards and EPA guidelines to minimise the likelihood/extent of hydrocarbon spills. The site has a workshop and equipment storage at the Pit top surface facilities area and includes fuel and oil containment and treatment systems. The Environmental Management Strategy for the site identifies that the Coal Handling and Preparation Plant and reject emplacement areas will have long term issues at the washery site from acid mine drainage, though rehabilitation is proposed in the MOP.

Tailings are discharged into the old Pelton underground mine workings and the return water is recovered by dewatering bores into the sites contaminated water management system for reuse or discharge under the EPL following treatment (AEMR 2017). In line with similar operations in the region, a contamination risk is potentially posed by the current and historic tailings storage facilities. Due to the processing methods, heavy metals are stored in these facilities. These can lead to contamination if not contained appropriately. Data held on the National Pollutant Inventory database indicates the Austar deposited a total of 86 tonnes of potentially hazardous heavy metals (including lead, mercury, chromium and arsenic) into on-site tailings storage facilities during the 2016-17 reporting period. On-going phase 1 investigations will identify the extent of any contaminated areas on the site.

There is an inherent risk in having contaminated tailings present on-site. It is understood rehabilitation of these materials by encapsulation is planned, however the variables associated with successful rehabilitation are many and existing budgets available can become insufficient if rehabilitation failures occur. ERM has not considered material risk of contamination tailings and rehabilitation failure, however it is understood that ongoing monitoring of these risks are undertaken by the asset to ensure they do not become material.

Ecology

Austar has not been referred under the EPBC Act. Targeted assessment to date has concluded that mining would not have any significant impacts on any of the identified threatened species, populations or EECs, or on any EPBC Act listed MNES and therefore referral to the Minister for Environment and Water Resources was not required. Based on the information available, the risk of not referring this project appears to be low.

A Biodiversity Offset Area was established as part of the approved Stage 3 project to offset impacts from clearing of approximately 10ha of the surface infrastructure site. After the Stage 3 project was approved, Austar transferred ownership of the Offset Area to the National Parks Estate as part of the Werakata State Conservation Area. As such, the Offset Area will be managed in perpetuity by the NSW National Parks and Wildlife Service. Based on this transfer of ownership to reserved lands, the long term management of the Offset Area does not present any material obligations.

In accordance with project approvals, Austar have implemented an ecological monitoring program of riparian vegetation over Stage 2 Longwall Panels A3 to A5a and prepared the Stage 3 Biodiversity Management Plan for Longwall panels A7 to A10. Routine surveys are continuing and to date, there is no evidence of any impacts on ecological features as a result of longwall mining at Austar. Biodiversity related risk and regulatory obligations in respect to biodiversity impacts are understood to have been satisfactorily addressed. Future material risk associated with currently approved projects is not anticipated at Austar.

Rehabilitation and Mine Closure Liability

The majority of rehabilitation to be undertaken will principally involve reshaping of disturbed areas once demolition works and rubbish removal has been completed and establishment of a stable vegetative cover in these areas. As outlined in the 2017 AEMR, Austar's project approval PA08_0111 is valid until 31 December 2030 and final rehabilitation remains as proposed in the current MOP although it is noted that site has currently rehabilitated less land than predicted in the MOP rehabilitation schedule. For 2017, 57.8 ha was planned to be rehabilitated but Annual Environmental Management Reports for the period 2015-2017 indicate that 2 ha of the site was rehabilitated in 2015 and approximately 4,000 cu.m of capping had been placed on the Aberdare Emplacement Area in 2016-2017. The MOP plans 88 ha of rehabilitation to be completed by year 2022. There is therefore a rehabilitation deficit of approximately 55 ha as of 2018. Significant works will be required to rehabilitate 55 ha by 2022. There is the potential for the site to not comply with the MOP rehabilitation requirements however this is not considered to be material to Austar.

It is understood that a significant sinkhole draining 360 ha of catchment appeared in the Aberdare Area 13 emplacement, despite this area having been previously rehabilitated. In addition to affecting underground works, this area will require remediation prior to relinquishment. ERM has not viewed any remediation plan or results of corrective / preventative actions, although such activities are stated to occur during the current MOP.

Given the current attention rehabilitation and closure is receiving from the NSW Government, including a reform of rehabilitation, any short comings in the site's rehabilitation are to be addressed within the current term of the MOP. As budgetary provisions for rehabilitation have not been provided, the materiality of this is not able to be ascertained however unlikely to meet the threshold.

DONALDSON, ABEL AND TASMAN

EHS and Social Setting

The dominant land uses above the mining area are agricultural, rural residential and a State forest. Two hard rock quarries, the Black Hill Quarry and the Stockrington Quarry, are also located within the mining footprint. The F3 Sydney-Newcastle freeway is located around 1 km east of the underground mining area. The Hunter Expressway is located about 1 km southwest of the mining area. The closest urban areas are Beresfield and Thornton, about 2 to 3 km north of the mine. The land upon which the surface infrastructure is located is understood to be private land owned by Donaldson Coal.

The Donaldson, Abel and Tasman mines (excluding the Tasman Underground Extension Project (Tasman UG Extension) which has not yet commenced) are all currently under Care and Maintenance. All three assets for Donaldson are referred to in the report.

Heritage Values

At Abel UG there are no sites of European Heritage although it is noted in the Part 3A assessment (2006) that land in the south-eastern section of the proposed Abel Underground area, near Pambalong Nature Reserve, associated with the former Richmond Vale Railway was listed by Cessnock City Council as having local Environmental Heritage'. Sixty-three (63) Aboriginal heritage sites and Potential Archaeological Deposits (PADs) are present within the Abel Project area, including 18 within the surface area north of John Renshaw Drive and 45 within the underground area south of John Renshaw Drive. At least two places that may be of traditional or historical cultural significance to Aboriginal people, however do not necessarily host physical remains, occur within the southern investigation area. These comprise an Aboriginal pathway along Black Hill Spur that probably extended from Hexham Swamp to Mount Sugarloaf and a ceremonial site known as 'the Doghole' in the vicinity of Stockrington and Long Gully. Ongoing management of heritage values at Abel are guided by the signed Aboriginal Heritage Management Agreements between Donaldson Coal and Awabakal LALC (signed 19/01/09) and Mindaribba LALC (not dated). For the term of these agreements, Donaldson is required to pay a management fee of AUD40,000 per year to ALALC and AUD200,000 per year to MLALC.

At Donaldson, thirty-one (31) sites of Aboriginal Cultural Heritage have been identified on property owned by Donaldson Coal. No European heritage sites have been identified at the mine. In accordance with Conditions 84, 85 and 86 of the Development Consent, Donaldson Coal has prepared an Aboriginal Sites Management Plan for each year of operation at the mine (and has not required revision since 2005). In accordance with Condition 83 of the Development Consent, a 50 metre buffer along Four Mile Creek has been established as an Aboriginal Conservation Area (ACA).

As Tasman UG has ceased and no known items or cultural heritage values have been reported within the surface infrastructure or rehabilitation areas, no ongoing heritage monitoring or management measures are required. Within the Tasman UG Extension, Aboriginal cultural heritage will be managed by an Aboriginal Cultural Heritage Management Plan as required by the Development Consent to be prepared prior to commencement of construction activities. The project area also includes a culturally sensitive men's area, keepa pathways and burial caves. The Tasman UG Extension EIS and supporting Aboriginal Cultural Heritage Assessment (Kuskie 2012) commits that Donaldson Coal will facilitate and fund further documentation of Aboriginal cultural values by RAPS with cultural knowledge and traditional connection. The Development Consent requires that the Aboriginal Cultural Heritage Management Plan include appropriate payment and reporting mechanisms for the provision of up to AUD20,000 for an Aboriginal heritage educational documentation program for the Mount Sugarloaf area and for the provision of up to AUD10,000 to further investigate selected grinding groove sites in the underground mining domain.

In summary, heritage related risk and regulatory obligations at these mines are understood to have been satisfactorily addressed. Based on a review of available data, material risk associated with currently approved projects is not anticipated.

Native Title Claims

There are no active Registered Native Title claims within the Donaldson OC or Abel UG. There are no active Registered Native Title claims within the Tasman UG since NCS2013/002 (Awabakal and Guringai People) was withdrawn in July 2017. The Wonnarua People also made a Native Title Claim with respect to the existing Tasman UG Mining Lease (ML) 1555 (formerly MLA 186). This is recorded within the National Native Title Register (Tribunal File No. NC02/07, Federal Court File No. NSD6008/02). As reported within the Tasman UG Extension EIS, Response to Submissions Report (2012), an agreement was reached with the Wonnarua People with respect to this claim. ERM do not have any details regarding this agreement although we do note that this Native Title Claim was withdrawn in 2005.

Emission Discharges

The Donaldson, Abel UG and Tasman UG mines (excluding the Tasman UG Extension Project which has not yet commenced) are all currently under Care and Maintenance. Environmental monitoring activities continue during the care and maintenance period in accordance with the MOPs and requirements of MLs and project approval conditions, including ongoing surface water, groundwater, noise, flora and fauna and rehabilitation monitoring. Annual reviews for each mine site have not identified any material risks associated with current emission discharges.

Land Tenure and Permitting

Donaldson OC: Mining Lease 1461 applies to the Donaldson OC and expires on 20 December 2020. Approved operations at the mine operated under Development Consent 98/01173 (as modified) which approved mining operations to end December 2013. Mine operations were completed in April 2013, however in accordance with the requirements of the approval, ongoing compliance is required with respect to biological monitoring, bushland conservation and rehabilitation. The current Mining Operations Plan (MOP) for the period 16 May 2014 to 16 May 2021 was submitted to relevant regulators to cover the final rehabilitation of the Donaldson OC. This MOP was approved on the 16 May 2014. Environment Protection Licence 11080 applies to the mine. An application was made in April 2018 seeking to surrender the licence as activities approved by the licence have ceased. Other licences apply to the site including bore licence and water supply works approval.

Abel UG: Abel mine activities occur under Mining Lease 1618 which expires on 15 May 2029 and Mining Lease 1653 which expires on 21 January 2032. Exploration licence 4597 applies to the Site and expires on 21 July 2019. Operations at the mine are approved under Development Consent 05_0136 (as modified) which approves mining operations to 2030 and permits Run of Mine (ROM) coal production of 6.1 million tonnes per annum (Mtpa). EPL 12856 applies to the site. Other licences that apply to the site including Water Licence 20BL171935 for groundwater interception, due to expire on 4 August 2018. The mine was placed in Care and Maintenance from 28 April 2016 and is managed in accordance with the MOP covering the period ending 1 May 2019. No mining activities are proposed during the term of the MOP. Environmental monitoring activities continue and are reported in the 2017 Annual Environmental Management Report (AEMR).

Tasman: Mining Lease 1555 applies to the Tasman UG, expiring on 6 October 2025. Construction and mining operations at the mine occurred between 2006 and 2013 under Development Consent 274-9-2002. Operations ceased in July 2013 and site rehabilitation was completed in September 2014. Since that time the mine has been under care and maintenance whilst the revegetated landform continues to develop. It is understood that Development Consent 274-9-2002 has been surrendered. Environment Protection Licence 12483 applied to the Tasman UG and was surrendered on 8 July 2015. Groundwater Bore Licence 20BL171792 also applied to the Tasman UG and has since expired as groundwater extraction ceased at the completion of mining operations.

The Tasman UG Extension Project received planning approval (SSD 4962) on the 18 March 2013 for an extension to the west of the previous underground operations Donaldson has physically commencement development at the site to enliven the development consent, however construction or mining is not planned to commence in the near term. There is no current Mining Lease covering the whole of the extension project area (ML 1555 covers a portion of the area only). It is understood that a Mining Lease application for this area has been made.

OPERATIONAL EHS PERFORMANCE

Environmental Performance

Donaldson OC: The most recent Independent Environmental Audit (Trevor Brown and Associates, 2015) covering the period 2011 – April 2013 confirmed a high degree of compliance and did not identify any non-compliance with the Project Approval at the completion of mine operations in April 2013, stating that all mining and associated operations were undertaken in accordance with the development consent, EPL and other statutory instruments as issued by the various government agencies. The 2017 Annual Review reported minor non-compliance with the development consent and water licence relating to reporting and documentation requirements that are of no material risk. Various non compliances with EPL 11080 are noted on the Public Register over the last few years, however these have either been identified as adequately addressed or formal warning issued. It is understood that these matters have been closed out and as such present no ongoing material risk.

Abel UG: The most recent Independent Environmental Audit (Trevor Brown and Associates, 2015) covering the period 2012 – 2015 confirmed a high degree of compliance with the Project Approval. The 2017 Annual Review reported minor non-compliance with the Project Approval and water licence relating to reporting and documentation requirements that are of no material risk.

Tasman UG: The most recent Independent Environmental Audit (Trevor Brown and Associates, 2015) covering the term of the Tasman mine between 2007 and 2013 confirmed a high degree of compliance and did not identify any non-compliance with the Project Approval. The report noted that the Tasman Mine developed under Development consent 274-9-2002 had essentially been completed with rehabilitation of the Tasman Mine site after closure of the underground mine and surface infrastructure areas having occurred generally in accordance with the rehabilitation targets set within the Mining Operations Plan. The 2017 Annual Review identified one administrative non-compliance with ML 1555. No other non-compliances were identified.

Current site compliance at the three operations are not considered to present a material risk to the projects.

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H&S Performance

Donaldson OC: Although the site is non-operational, there are risks in care and maintenance. No risk assessments were provided for review so any special restrictions and concerns are difficult to identify and quantify. The site is monitored in the monthly report with a TRIF of 0. No safety management system was available for review. With little data available the assessment of materiality could not be completed. With the number of people involved and the limited activities on site the likelihood of a material issue arising is very low.

Abel UG: Although the site is non-operational there are risks in care and maintenance. No risk assessments were provided for review so any special restrictions and concerns are difficult to identify and quantify. The monthly board report is not tracking statistics for this site (4 people in care and maintenance mode). It is noted that there is a safety management system for Underground Operations Eastern region but it is unclear if all the controls are still in place in care and maintenance. With little data available the assessment of materiality could not be completed. With the number of people involved and the limited activities on site the likelihood of a material issue arising is very low.

Tasman UG: Although the site is non-operational, there are risks in care and maintenance. No risk assessments were provided for review so any special restrictions and concerns are difficult to identify and quantify. No safety management system was available for review. With no data available the assessment of materiality could not be completed. With the number of people involved and the limited activities on site the likelihood of a material issue arising is very low.

Water Management

Donaldson OC

The 2017 annual environmental report identified that the mining operations at the site were completed in April 2013. Progressive rehabilitation occurred throughout the life of the mine and the final rehabilitation activities were completed in March 2014. The site is currently subject to the conditions of EPL 11080, which is currently pending a decision from the EPA to allow for surrender. A Water Management Plan was prepared for the site in 2000 (not provided for review).

A groundwater licence applies to the site to allow for the groundwater extraction from the mining area. A water supply work approval applies to the site for the works associated with the open cut mining pits within the Hunter unregulated and Alluvial Water Sources 2009 Water Sharing Plan. The site is under care and maintenance and no issue of material significance was identified relating to current water management practices from review of the documents outlined.

Abel UG

A Water Management Plan has been prepared for the site and was approved by the DP&E in May 2008. Water management at the underground mine includes clean water diversion and water runoff from the 'box cut' area and surface infrastructure area as well as excess mine water directed to the sump within the West Pit adjacent to the Box Cut. This is then pumped to the Big Kahuna Dam within the Donaldson Mine site as needed. This water is then used for operational purposes or transferred to the neighbouring Bloomfield mine Lake Kennerson or discharged to Four Mile Creek. This is in accordance with approvals for the site.

The site is under care and maintenance for the period ending 01 May 2019. The Care and Maintenance MOP of 2016 identifies that no acid mine drainage issues have been encountered or are expected to occur. The water management strategy will continue throughout the care and maintenance period. The site is subject to a water licence (groundwater) that allows for the interception of groundwater. Annual reporting from 2016 and 2017 identified that take was below allowable limits and no compensatory water has been required to be supplied throughout the life of the mine. Review of the 2016 and 2017 annual reporting identified an administrative compliance relating to the submission of an annual return, otherwise there was no reportable ground or surface water incidents or non-compliances.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

Tasman UG

RPMGLOBAL

The site was subject to EPL12483, with this licence being surrendered in July 2015. A site inspection was undertaken by the EPA and the licence surrender is considered confirmation that on-going risk of sediment laden water from site is no longer a significant risk. The Care and Maintenance MOP details that no acid mine drainage issues were experienced during mining activities.

The 2017 Annual Review and 2015 independent audit states that no reportable incidents or non-compliances relating to surface or groundwater were identified in the reporting period.

The independent audit of 2015 revealed that the mining at Tasman ceased in July 2013 and no further groundwater extraction has occurred since that date. The groundwater licence applicable to the site was valid until March 2013 and was not renewed upon expiration.

No issue of material significance was identified relating to current water management practices from review of the documents outlined.

Soils and Contamination

Donaldson OC

As outlined above, a surrender notice has been supplied to the NSW EPA to relinquish the EPL. In order to surrender the licence, the site must have managed all previously contaminated areas to an acceptable limit. The 2015 Independent audit report for the site identified that contamination assessments were undertaken in 2013 to determine the extent of excavations required to remove contamination from the fuel farm and workshop areas. The remediation works occurred in 2013 and 2014 and potentially contaminating sources, such as oil drums, were removed from site by a suitably licenced contractor. Excavated material was landfarmed in the west pit. No evidence of confirmation that landfarmed material was classified as 'acceptable for final land use' was provided.

Abel UG

The MOP for Care and Maintenance identifies that the identification and remediation of contaminated lands has not yet commenced and will likely commence post current MOP. The Plan assigned a Medium risk rating for the perceived risk to rehabilitation posed by failing to address contamination on the site. The Annual Review for 2017 identified that no specific rehabilitation works were proposed for 2018, with works limited to rehabilitating subsidence impacts or erosion and sediment control measures. The approved Water Management Plan includes an Erosion and Sediment Control Plan that was prepared with consideration to Managing Urban Storm water: Soils and Construction.

Tasman UG

As outlined above the development consent and EPL were surrendered in 2015 following site rehabilitation. The MOP for Care and Maintenance identified that the contaminated land assessment had been completed and confirmed that there is no residual soil contamination that would pose a threat of environmental harm and was compatible with the final land use. The MOP also stated that all available soil had been re-spread for use in the final rehabilitation and as such specific controls are not required, beyond possible amelioration in areas where revegetation areas are not stabilising.

Ecology

Long-term monitoring programs are in place for Abel UG coalmine integrated with Donaldson OC and Tasman UG which are all currently in care and maintenance.

At Abel UG, an EPBC referral (2007/3695) confirmed no controlled action. The Biodiversity Management Plans provide for the management of the potential impacts and/or environmental consequences of the Abel UG second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species, populations and their habitats, endangered ecological communities and water dependent ecosystems. Project Approval 05_0136 requires that a Biodiversity Offset Strategy is prepared prior to the commencement of construction of the coal conveyor or the vegetation clearing described in the EA, whichever is sooner. As the mine is currently in care and maintenance, this requirement has not yet been triggered. The biodiversity offset costs have not been confirmed.

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At Donaldson OC one threatened flora species (Tetratheca juncea) has been recorded. A Tetatheca juncea Management Plan was developed to provide a comprehensive program for monitoring and management of this population on site. A Bushland Conservation Area Management has also been prepared in accordance within consent condition 72(iii). The property around the open cut is owned by Donaldson Coal and has been retained as a buffer and a compensatory conservation area totalling 625ha. Donaldson Coal will retain management and ownership of this conservation area for a minimum of 36 years from the commencement of construction.

Tasman UG referral (EPBC 2001/253) and Tasman UG Extension Project referral (EPBC 2011/6211) were both determined to be 'not a controlled action'. Mining of coal at Tasman UG ceased in mid-July 2013 and biodiversity values continue to be monitored through ongoing implementation of the flora and fauna monitoring program for the disturbance areas and compensatory habitat area. As reported in the 2017 AEMR, species diversity has returned to levels observed in 2007 and 2008 following a steady decline between 2009 and 2014. Ongoing monitoring will help to develop insight in whether mining activities had an impact on the compensatory habitat area and to track its ongoing recovery.

A Biodiversity Offset Strategy is required to be prepared prior to the commencement of construction of the new pit top (Tasman UG Extension Project). As this project has not yet commenced, these requirements have not been triggered. It is understood that this project is not envisaged to be developed in the short to medium term (ie not within the 3-4 years) and as such has not been considered further. No issue of material significance was identified relating to current biodiversity practices from review of the documents outlined. ERM notes that the Abel UG and Tasman UG Extension biodiversity offset costs and required conservation bonds have not yet been triggered and their costs have not been confirmed.

Rehabilitation and Mine Closure Liability

Donaldson OC:

All rehabilitation works have been completed at this asset. Assessment of rehabilitation performance at the Donaldson OC has been conducted by Global Soil Systems since August 2009. The results of this rehabilitation assessment were compared with the completion criteria for soil quality, vegetative cover, growth rates, species diversity and stem densities, as adopted by Donaldson Coal in the Rehabilitation Plan and MOP. The Global Soil Systems assessment found that several of the rehabilitated areas had met the completion criteria. The remaining rehabilitated areas assessed, were on track to meet the required completion criteria (Donaldson Coal Mine Rehabilitation Monitoring Report, Global Soil Systems 2014).

Under the current MOP limited maintenance works will be carried out to maintain the rehabilitated landform at the site. The site is still receiving small volumes of waste rock from the Abel operations which are placed in West Pit (1,000 cu.m/yr). In addition, West Pit and Square Pit are to be used for the temporary storage of excess water from the Abel UG operations, prior to transfer to the Big Kahuna dam. West Pit and Square Pit are planned to be transferred to the Abel Mining Leases during the term of the current MOP, effectively relinquishing these domains from the Donaldson OC. Until this transfer takes place, the security will remain against ML 1461. For the remaining areas, confirmation that rehabilitation has been successful is required before relinquishment and monitoring of this is planned during the current MOP. The 2017 Annual Review confirmed rehabilitation areas have met or are progressing to meet completion criteria. No material closure issues have been identified for this site. However, the sooner completion criteria can be met, the sooner the site can be relinquished and the appropriate security held by Government released.

Abel UG:

The current MOP provides for the site's rehabilitation requirements specified under the site's approvals. The current MOP states that rehabilitation works have not yet commenced in any active mining areas but progressive rehabilitation of subsidence areas have been completed to the satisfaction of landholders and council, as appropriate. Given the mine is an underground operation, the only significant rehabilitation will be for surface infrastructure. No specific issues affecting the ability to successfully rehabilitate the site have been identified by the most recent Independent Environmental Audit (2017). The costing for the proposed closure of Abel UG was estimated by Umwelt in 2014 and as highlighted in the Life of Mine (LOM) Plan, it did not include personnel costs although it did include a 20% contingency on the total closure cost.

Tasman UG:

Mining of coal at Tasman UG ceased in mid-July 2013. Rehabilitation activities commenced shortly after with sealing of the mine portals in December 2013. The removal of the surface infrastructure was completed in May 2014 and final landform shaping and revegetation was completed in September 2014. Since that time the mine has been under care and maintenance whilst the revegetated landform continues to develop towards a sustainable community acceptable for the relinquishment of ML1555. There have been no disturbance or rehabilitation activities conducted for the Tasman UG Extension Project. The current MOP states that only care and maintenance monitoring of rehabilitation will be carried out and remediative measures implemented if any non-compliance with trigger actions occurs. By the end of the current MOP, it is expected that ecosystem and land use sustainability will be achieved but lease relinquishment will not occur until the following MOP term and is dependent on the future operation of the Tasman UG extension project.

YARRABEE

EHS and Social Setting

A number of existing coal mining operations occur nearby including Jellinbah and Curragh mines located to the south. Blackwater is a mining town with large scale coal mining ongoing since the 1960s. The site operates a Stakeholder Engagement Strategy which provides procedures for external communications.

Heritage Values

A Cultural Heritage Management Plan (CHMP) was signed with the traditional owners Gaangalu Nation People in 2014. All land to be disturbed by mining is surveyed prior to works in accordance with this CHMP.

A Native Title application was made by the Gaangalu Nation People (Tribunal No QC2012/009 Fed Court No QUD400/2012) in August 2012. There are no known issues in relation to cultural heritage or native title that would be considered material risks to the project based on the information available at the time of the assessment.

Emission Discharges

Emissions and discharges are typical of similar open cut coal mining operations. The site operates a number of Environmental Management Plans to control all emissions and discharges and implement appropriate procedures in the event of any incident. These Plans include the following aspects: dust, noise, waste, topsoil, weeds and pests, erosion and sedimentation, surface water and tailings. Plans are in place for the mine and Boonal Train Loadout. Apart from two water discharge non-compliances at Yarrabee in 2015 and 2016 there has been no other non compliances as a result of emissions or discharges in the last three years.

No issues of material significance were identified relating to emission discharges from review of the documents outlined.

Land Tenure and Permitting

The site comprises of ten mining leases (MLs) 1770, 80049, 80050, 80096, 80104, 80172, 80195, 80196, 80197 and 90198. The MLs occupy 15 land parcels and two road reserves. All activities across these tenements is authorised under a single environmental authority (EA) EPML00844613.

Of the ten MLs, one is due to expire in October 2018 – ML80050 Yarrabee South. In the current Plan of Operations, this ML is still proposed for use in 2019. A renewal for this permit will need to be lodged at least 6 months prior to its expiry i.e.

May 2018 which is understood to have occurred). This is a standard administrative process and renewal of the ML is expected to occur. It is not expected that any renewal application would be refused by the QLD Government if sufficient time for renewal is provided.

Coal from the mine is hauled to the Boonal Train Loadout Facility located 37 km from the MLs. Activities at the Train Loadout are regulated under a separate EA EPPR00832813 operated by the Boonal Joint Venture. No EPBC Permit applies to the site.

There are no other issues of material significance identified relating to permitting from review of the documents outlined.

OPERATIONAL EHS PERFORMANCE

Environmental Performance

One non-compliance with EA EPML00844613 was reported between 2015 and 2016, based on the Annual EA returns for the site. This related to a mine water discharge event in Feb 2016 following a significant rainfall event which required excess water to be released from site under a Temporary Emissions Licence. A small exceedance of electrical conductivity was recorded in Twelve Mile Creek. Monitoring of the release was undertaken and reported. No environmental impacts were likely to have occurred and no ongoing investigation by the regulator is taking place. Overall, however, the site has demonstrated compliance with all other aspects of its EA (note: no third party audit reports have been provided to ERM for the mine and this finding is based on site's annual EA returns).

Based on the 2016 third party audit of the Boonal Train Loadout, non-compliances with EA EPPR00832813 were reported for: exceeding throughput tonnages, non-submission of 3 monthly dust monitoring reports and uncontrolled discharge of water following high rainfall events in February and July 2016. Corrective and preventative actions are documented as being implemented to ensure compliance with dust reporting and risk of water discharges and, in regards to the latter, the QLD regulator is understood to have accepted additional water management controls for the period February to May 2016..

Annual Return and environmental performance reporting including correspondence with the administering authority post May 2016 (post the pit dewatering TEL Application timeframe) has not been provided for assessment.

Based on the information reviewed, no material issues associated with environmental performance and compliance has been identified.

H&S Performance

The SHMS Compliance and Effectiveness Audit conducted in May 2017 was based on the Queensland Department of Mines and Energy (DNRM) produced Guidance Note QGN09, "Reviewing the Effectiveness of Safety and Health Management Systems (October 2008, version 2)". There were no major non-conformances with minor non-conformances focused on audit/inspections, obligations to HSDMS requirements, change management, training/consultation, contractor management, fixed plant and hazardous chemicals.

The Broad Brush Risk Assessment conducted in December 2016 indicated consultation with the required wide range of personnel. The risk assessment reviewed indicated a wide range of hazards were identified and assessed by identifying the controls and their adequacy.

The key comparable statistic of TRIFA is running at 7.6 is slightly below the Queensland coal mining open cut industry average (2016/17) of 12.6. No material issues were identified.

Water Management

The site manages water in accordance with the EA under the Water Management Plan (WMP). The WMP provides controls for the mine and Boonal Train Loadout. ERM notes that the WMP is required to be reviewed and updated annually to ensure it remains current to operations. The Version Control on page 2 of the WMP suggests the Plan was not reviewed for 7 years between 2010 and 2017. This is a minor non-compliance. However, the current version of the Plan was reviewed in August 2017, indicating it is likely to be appropriate to operations at the present time. Further review is required to confirm this interpretation.

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Based on the information reviewed, no material issues associated with water management has been identified.

Soils and Contamination

Whilst there is no detailed mapping of soils in the area it is acknowledged in the Rehabilitation Report and Success Criteria 2013 that the mine is subject to cracking clays and dispersive soils with the presence of Gilgai and sodic soils. The presence of these soils is not considered to be a material risk based on the information provided however further investigation to the soil types is required to assess the management methodology and costs associated with the treatment of these soils to ensure their stability.

No information on known contamination on the Yarrabee open cut mine site has been provided for assessment. Under Section 8.3 Rehabilitation Methods of the Rehabilitation management Plan any contaminated soil material is to be placed in the pit for burial then partially back filled with spoil to create a residual void within the landscape. Section 10.3.2 of the RMP also notes that a contaminated land assessment is to be performed to determine contaminated areas of areas of highly saline material associated with major pieces of infrastructure across the Yarrabee Coal Mine site. The locations of these sites and volume of potentially affected material is unknown from the information provided and hence no determination on the actual level of risk can be determined.

Ecology

Rehabilitation and Mine Closure Liability

The site's Rehabilitation Management Plan (RMP) implements the requirements of EA EPML00844613 for the rehabilitation of the MLs. On review, it is noted that the RMP provided in the data room is a 2012 version and refers to operations on only six MLs (rather than 10). It therefore appears that rehabilitation on the remaining 4 MLs is not provided for in the RMP, including existing disturbance listed in the Plan of Operations for infrastructure on ML80197 and 80198. This is a non-compliance with the EA and potential material risk. However, ERM also notes that the EA requires an amended RMP to be submitted to the QLD regulator by 31 December 2017 and a more recent version of the RMP may not have been provided to ERM to view. The 2017 RMP must include all 10 MLs within its scope. If operating under the 2014 RMP, the site is presently not in compliance with the EA with disturbance already having occurred on ML80197 and ML80198 without appropriate rehabilitation measures being identified first.

No evidence has been provided to confirm the Financial Assurance bond of AUD69M has been lodged with the QLD Government as security for rehabilitation. However as the mine is in operation it is assumed the FA has been lodged.

The current Plan of Operations states that DE Pit, which was receiving tailings slurry from the wash plant, will require several years of drying before the surface will be solid enough to allow machinery or waste rock to be placed on the surface for rehabilitation. This risk has not been identified in the RMP. However, the Pit DE Tailings Operations Plan (2014) does present conceptual management methods for the drying of tailings through natural evaporation and collection of water in low point sumps. Given DE Pit has now entered the decommissioning phase, the drying out of tailings is critical to the success of the domain's rehabilitation. Generally, the drying of coal tailings can present a significant risk to rehabilitation success and eventual relinquishment of this infrastructure. Without appropriate monitoring and management, this issue could present a material risk to the site if drying does not occur as expected. Notably, no rehabilitation was reported in the EA annual returns during the last three years. The Plan of Operations states rehabilitation targets of 385 ha and 428 ha in 2018 and 2019 respectively. These are large areas to be rehabilitated in the next 18 months and AUD9M budget has been allocated to rehabilitation during the 2018 financial year. With rehabilitation reforms underway in QLD, the lack of rehabilitation to date could become a risk in the next 12-24 months, however further information on the reforms is required. Condition F4 of EPML008446613 requires the proponent to apply to amend the environmental authority to adopt the final landform domains and rehabilitation success criteria required by condition F5 and condition F7 by 31 May 2018 however no information has been provided to determine if this approval requirement has been met.

Section 7.3 Rehabilitation Methods included in the Rehabilitation Report and Success Criteria 2013 provides that the regrading of areas are to have a slope of no greater than 15% for rehabilitation of spoil. Currently it is understood that the slope is between 25-30% and hence is a potential material risk associated with the costs associated with reforming the landscape to achieve 15% to stabilise the re-contoured landform.

As no rehabilitation has been reported in the EA annual returns during the last three years and with significant rehabilitation targets in 2018 and 2019 and rehabilitation reforms underway, achieving successful rehabilitation to meet targets is a key issue for the asset which requires focus and effort to ensure targets are met over the next 12 – 24 months, otherwise this may become a material risk.

MIDDLEMOUNT

EHS and Social Setting

The site is within the Isaac Regional Council area. Land uses surrounding the site include low density cattle grazing and separate coal mining operations i.e. German Creek, German Creek East and Foxleigh.

The December 2017 external audit report for the compliance against the Environmental Authority (EPML00716913) for Middlemount noted a complaint has been received in relation to vibration from blasting activities. The report also highlighted that vibration monitoring for blasting activities had not been undertaken however details of this aspect have not been provided for review. Complaints associated with noise and vibration are not uncommon for open cut mining operations and a one off complaint as the external report infers (although not explicitly stated) are unlikely to be a material risk.

Heritage Values

The site has an approved Cultural Heritage Management Plans in place with the Barada Barna People and Barada Barna, Kabalbara & Yetimarla People #4 native title claimants. Management of Aboriginal cultural heritage is conducted in accordance with the CHMPs. ERM is not aware of any non-compliances.

The MCPL Environmental Management Plan (MP003) dated 26 April 2017 does not indicate the presence of existing cultural heritage or Native Title issues associated with the operation. The EMP has provisions for surveys and inspections to be conducted on new clearing and works activities with the involvement with the BBKY#4 appointed Field Officers to assess for any unexpected finds.

The EMP does refer to the Cultural Heritage Management Plan however this has not been provided for review however based on the information provided in the EMP (MP003) cultural heritage for the existing operation does not pose a risk to the project.

A search of the public Native Title register has indicated that there is an active native Title application over the southern portion of ML70417 by the Barada Kabalbara .Yetimarala People (Tribunal No QC2013/004 Fed Court No QUD383/2013) which also incorporates the south eastern corner of ML70379. Additionally the southern portion of ML70379 has an active native title claim (QC2013/004 Feb Court No QUD383/2013) by the Barada Kabalbara Yetimarala People. This latest claim does not affect operations on the ML.

The risks associated with the existing operational footprint are considered minimal to the project and where additional clearing and land disturbance activities are planned for areas within the native title claim areas are addressed in the EMP includes involvement with the native title claimants in the pre-works survey and assessment process.

No non compliances or additional issues are associated with cultural heritage are known to ERM.

Emission Discharges

Emissions and discharges are typical of similar open cut coal mining operations. The site's Environmental Management Plan provides controls for all emissions and discharges and appropriate procedures in the event of any incident. No non-compliances as a result of emissions or discharges have occurred in the last three years.

The EA requires particular limits to be applied to exploration activities (Conditions F31 – F45). The environmental management of exploration activities is not included within the Site's Environmental

Management Plan and it is understood from interviews on site that there is no formal Plan for managing these activities within the relevant ML. The lack of a formal Plan presents a risk of non-compliance with the EA for exploration activities, assuming other process and activity controls are not implemented as part of exploration activities on site, however such risk is unlikely to be material.

Land Tenure and Permitting

The current mine operates within three mining leases (MLs) 70379, 70417 and 700014. The expiry date of all three MLs is 30 September 2031. There are four land parcels within the MLs and two road reserves. Three of the land parcels are freehold owned by Middlemount Coal Pty Ltd. One parcel is leasehold land, owned by the Queensland Government but leased to a joint venture lead by BHP Coal Pty Ltd. This leasehold parcel is located in the centre of ML70379.

All mining activities across the three MLs are carried out under a single environmental authority (EA) EPML00716913. A Plan of Operations for activities to be undertaken in 2018 has been lodged with the Department of Environment and Science (DES), along with a corresponding Financial Assurance cost estimate proportional to the rehabilitation liability.

Under the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act, operations are approved through two separate permits: EPBC 2010/5394 (Middlemount Stage 2) and EPBC 2016/7717 (North-eastern Extension).

Secondary permits are in place for water diversions and allocations required by the Water Act 2000 (QLD).

New tenure and environmental permit applications commenced in 2017 to enable the expansion of the pit to the newly acquired tenement to the North West. In relation to tenure for this tenement, an application for surface rights across ML70379 has been made to the Qld Department of Natural Resources, Mines and Energy (DNMRE) along with a new ML application for new infrastructure to facilitate the extension of the East Dump. Approval of these applications will require finalisation of any Native Title, landholder compensation / land acquisition issues to be resolved prior to grant. The expansion of the pit is within the current mine plan and that further permits are required to allow the continuation of mining in the later years of the mine life. Further, it is noted that part of the offset area for Stage 2 approved under EPBC 2010/5394 will be affected when the this planned expansion project is approved and commences. It however noted that this permit is not required for over 5 years and as such it is envisaged that the required permits will be approved prior to the commencement of mining in these areas. As such this is not considered a material risk to the continued mining and mine plan presented.

OPERATIONAL EHS PERFORMANCE

Environmental Performance

An audit by DES in March 2016 did not identify any matters of concern or evidence of non-compliance of the EA. However, one area of concern was identified at Sediment Dam 1, in particular a risk of potential overtopping. It is understood this concern was resolved and a repeat audit by DES in July 2017 did not identify any non-compliances or matters of concern.

The third party independent audit of the EA in December 2017 (LRS Environmental, Dec 17) identified three non-compliances with the EA (i.e. Conditions E3 Tailings sampling, D1 Blast Vibration Monitoring and G33 Supply of Register of Regulated Dams to DES with annual returns). Based on interviews with site personnel, ERM understands that all of these matters have been closed out. No material issues have been identified.

H&S Performance

The Middlemount safety management system describes the critical hazards for the site and the cardinal rules (related to single fatality hazards). This document is a shared document with the five contracting firms. They have individual implementation plans and various forms of internal monitoring which appears to be effectively implemented.

Running between 2 and 3, their performance is well below the Queensland industry average for open cut coal mining (2016/17) of 12.6. Their statistics are very good and they have lead indicator such as hazard identifications that demonstrate an increase in recognition of hazards and reporting. No material issues have been identified.

Water Management

The site operates a Water Management Plan (WMP) in accordance with the requirements of the EA. The WMP forms part of a broader water management system which collectively addresses site water balance, regulated structure operations, receiving environment monitoring, erosion and sediment control and severe weather practices. The WMP must be updated at least every three years and the current version was updated in 2016 which is compliant.

No material issues have been identified.

Soils and Contamination

The 2010 Environment Impact Statement indicated that the project area is subject to limited subsoil suitability for rehabilitation due to dispersivity, a tendency for gully erosion and alkalinity/sodicity. If dispersive subsoils are left exposed and not rehabilitated within an adequate timeframe they could be impacted by wind erosion. The risk of soil salinity was considered low.

The Rehabilitation Management Plan Version 1.0 dated 2012 confirms that to date no detailed site specific analysis of the tunnel erosion potential of spoil on the site has been conducted. Further, Chapter 11 of the RMP provides a risk assessment for the rehabilitation program however the mitigation plans to address unmitigated risks are based on proposed characterisation, trials and consideration of various methodologies. No information has been provided as to the status of the existing topsoil stockpile condition and the costs associated with the ongoing management and trialling of this material for rehabilitation purposes.

No information has been provided on potential and actual contamination associated with the project for this review, however in the Rehabilitation Management Plan Addendum 2014 it is noted that most of the coarse reject and tailings material generated from processing coal from the Middlemount and Pisces seams and some of the floor material from the Middlemount sea, are likely to be potentially acid forming (PAF) and will require management. As the volume of material that may be affected by PAF is unknown the costs associated with the management of these soils at the time of rehabilitation is unable to be estimated.

Condition F14 of the Environmental Authority EPML00716913 requires the completion of a Rehabilitation Management Plan. Therefore it is considered that the RMP is a regulated approved document by the administering authority and as such the commitments in mitigation plan outlined under Chapter 11 of the RMP are enforceable and as such the costs associated with implementing the mitigation plan commitments needs to be considered with respect to the overall final rehabilitation of the project area. With consideration to the commitments in the RMP and the limited information provided for assessment with respect to the status of progressive rehabilitation activities being undertaken the management of soils and potential contamination arising from the tailing management may present as a material risk for the project if not addressed as part of the upcoming study. As such currently is not considered a material risk within the LOM plan.

Ecology

Ecological impacts of mining activities are regulated under the EA and the two EPBC permits. Three offset areas are active, each with different requirements under the relevant permits. This poses some risk with managing compliance. Furthermore, part of one offset area (Stage 2 Offset Area approved under EPBC 2010/5394) is planned to be mined in the future by the Western Expansion.

It is understood that the site intends to develop a single Offsets Plan that is consistent and integrates all offset requirements into a single document. Whilst no non-compliances with offset requirements have occurred to date, having a single Offsets Plan will assist to ensure compliance is maintained. The need to mine an existing offset area will require negotiation with the relevant regulator. In principle, offset areas are intended to be protected in perpetuity. However, it is understood that only 1.1% of the total Stage 2 Offset Area is planned to be mined.

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Rehabilitation and Mine Closure Liability

No evidence has been viewed by ERM to confirm the Financial Assurance (FA) bond of AUD25.8M has been lodged with the QLD Government. However, given the mine is operational it is assumed that the FA has been lodged.

The Rehabilitation Management Plan (RMP) identifies key risks to rehabilitation success as being a lack of suitable (non-erosive) spoil and capping material. Mitigation measures involving spoil characterisation and material balance calculations, as well as field trials, are planned to control these risks. The RMP was updated to include the results of these initial studies but it appears additional work is required. Should these risks not be managed then there may be a requirement to amend the rehabilitation criteria required by the EA. Such an amendment would be a material risk to completing the site's rehabilitation requirements, if it was required which currently it is not.

The Middlemount Mine operation incorporates an area of 3,344ha in total. Section 5 of the Middlemount Plan of Operations, Revision 1.0 dated 8 January 2018 confirms that 32.5ha of area has been rehabilitated since 2014, with a number of issues occurring during the 2016-2017 rehabilitation program which resulted in rehabilitation being restricted to 25ha instead of the proposed 63ha. These issues included changes to the mining program within the vicinity of the proposed rehabilitation area, buffering from completed rehabilitation areas to new mining activity areas and the lack of competent pit rock to complete the rehabilitation methodology. A further 20 ha planned for the 2018 period. No information has been provided as to the success of the 32.5ha of rehabilitation completed in the past four years of operation.

Based on the commitments made in the RMP and in the absence of information to confirm the completion and outcomes from these commitments to date, it is considered that the final rehabilitation may exceed the amount currently calculated for FA, being AUD25M and therefore may present a risk for the project whoever is not considered to meet the material risk threshold. Rehabilitation is likely to be constrained by a lack of suitable spoil and capping materials on site. Initial studies have been completed to address these risks but additional investigations will be required to confirm final rehabilitation success. The need for an EA amendment of rehabilitation outcomes could become a permitting risk, particularly given the current reform of rehabilitation requirements by the Qld regulator.

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16. HVO/MTW Underground Mining Potential

RPM highlights that the current HVO and MTW Ore Reserves and LOM Production Schedule presented in ***Section 8*** and ***Section 9*** are based on the current open cut mine designs and specifically excludes the underground resources. RPM notes that there is significant potential for underground mining to be undertaken on this material.

The Company and previous owners completed various studies for the underground portion of the HVO/MTW area of the Project (the "UG Project"). RPM has completed a review of the associated reports which outlines the proposed production profile, operations and costs. RPM utilised these reports and completed further in-house review and designs to better define the economic viability of an underground operation within the Project (the RPM Scoping Study).

The following summarises the results of a review into the underground mining potential at MTW and HVO and conceptual planning outcomes. RPM highlights the quantities and forecasts presented below are not Coal Reserves, nor does the review and underlying studies constitute a Prefeasibility Study, rather is considered a scoping level study to an accuracy of +- 50%.

RPM notes that the study presented is high level in nature and requires additional drilling and mining studies to be undertaken and may not result in an economically viable project being defined and are presented to highlight the potential for additional mining to be undertaken if drilling and studies show the economic viability of any defined resource.

16.1 Asset Description

Within the HVO and MTW leases, there has been a significant amount of coal identified as potential underground targets by various studies. Based on current inputs, the open cut operations are economic to deeper seams as the basal cut off (as outlined in ***Section 10***) and as such the underground mineable quantities tonnage is now significantly reduced from previous studies. To date, all underground mine planning that has been completed to a conceptual level only with the focus of most of the previous work being the MTW area. High-level geotechnical and gas reservoir characterisation work has been undertaken for MTW. The most recent study work includes a technical review of previous conceptual work undertaken by a third party in June 2013 and internal modelling by the previous owners conducted in 2015. RPM notes the Company is currently undertaking further reviews however this is not finalised as at the effective date of this Report.

The June 2013 study was designed primarily as a review of the Lower Hunter assets and as a tool for the development of a conceptual underground mining strategy that would sit as either complementary, or as an alternative, to open cut mining at MTW and HVO. This work involved development of mine layouts, production scheduling and economic evaluation. It appears that little consideration was given during this study to the timing and interaction between open cut and underground operations.

The 2015 study work was completed by the previous owner and RPM has only sighted the XPAC design and schedule. This provides an insight into the most recent strategic thinking however, as would be expected for the level of study, no detailed timeframe was presented nor would it be expected.

The coal working section is that part of a coal seam, or aggregated coal seams including non-coal parting material that can be worked by underground methods. A set of criteria was applied to assessment of working sections for underground extraction. The criteria used to assess the suitability for working section development are outline in ***Table 16-1***

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Table 16-1 Criteria used by previous owners in the assessment of underground working sections

Parameter	Factor
Working section thickness	1.6m to 6.0m
Maximum parting thickness	0.3m
Working section raw ash	< 45%
Depth	75m to 600m
Seam dip	< 10 degrees

RPM has reviewed the characteristics of each of the potential underground targets within the context of latest thinking in relation to open cut operations.

MTW

Potential underground targets at MTW have been identified in the Mount Arthur, Vaux and Bayswater Seams. Due to open cut extraction or insufficient depth of cover to open cut final voids the Mount Arthur target has been confined to the Thorley lease area as shown in ***Figure 16-1***. The Mount Arthur seam characteristics are provided on ***Table 16-2***.

The Vaux Seam lies 20m to 30m below the Mount Arthur Seam and as such could be mined in areas where the Mount Arthur Seam has been extracted by underground methods however would be too close to the surface in areas where the Mount Arthur had been extracted by open cut. Review of existing and planned cover remaining over the Vaux Seam following open cut activity has resulted in the identification of two target areas, one covering the MTO lease and the other below the northern part of the Warkworth Pit. These areas are shown on ***Figure 16-2*** and the seam characteristics are provided on ***Table 16-3***.

The Bayswater Seam lies an additional 80m below the Vaux Seam and is not constrained through prior open cut mining or lack of fresh cover. As shown on ***Figure 16-3*** the Bayswater target covers the extent of the MTO lease and the Warkworth pit. It should be noted that the MTO lease is stratified and includes all Resources above the Bayswater Seam. This means that a lease extension would need to be secured if underground mining is to be undertaken in the Bayswater Seam at MTO. YAL has submitted an application for an exploration lease for this purpose. The characteristics of the seam are provided on ***Table 16-4***. There is very little exploration of either the Lemington Seam or the Barrett Seam which are located below the Bayswater Seam and as such neither are considered to be underground mining targets at this time. RPM understands that YAL will be completing exploration drilling to these seams within the next 2 years.

Table 16-2 MTW – Mount Arthur Seam characteristics

Parameter	Factor
Proximity to open cut pits	Thorley pit
Proximity to surface infrastructure	South tailings dam and Putty/Charlton Road
Seam thickness	2.4m to 4.2m
In Situ estimate	86Mt
Depth of cover (from topo)	175m to 245m
Cover to base of open cut	100m
Seam dip	Shallow, except for south east potion of MTW South
Raw ash	22.0% to 37.0%
Likely products	Semi soft coking and thermal

Table 16-3 MTW – Vaux Seam characteristics

Parameter	Factor
Proximity to open cut pits	West pit and Thorley pit
Proximity to surface infrastructure	North/south tailings dam and Putty/Charlton Road
Seam thickness	1.2m to 4.1m
In situ estimate	67Mt
Depth of cover (from topo)	100m to 400m
Interburden to seam above	20m to 30m below Mt Arthur seam
Seam dip	Shallow, except for south east potion of MTW South
Raw ash	15% to 20%
Likely products	Low ash semi soft

Table 16-4 MTW – Bayswater Seam characteristics

Parameter	Factor
Proximity to open cut pits	West pit and Thorley pit
Proximity to surface infrastructure	North/south tailings dam and Putty/Charlton Road
Seam thickness	2.7m to 8.4m
In situ estimate	338Mt
Depth of cover (from topo)	200m to 450m
Interburden to seam above	60m below Vaux seam
Seam dip	Shallow, except for south east potion of MTW South
Raw ash	25% to 30%
Likely products	Low ash thermal


Singleton
Main Northern Railway
Hunter River
Idano Road
Putty Road
Warkworth Rail Loading Point
MLA548
South CHPP
Bulga Balloon Loop
Mount Thorley Loading Point
North CHPP
CD Pit
CCL753
WARKWORTH
North Pit
West Pit
South Pit
ML1752
CL219
EL7712
Thorley Pit
Loders Pit
MOUNT THORLEY
Abbey Green South
Charlton Road
Broke Road
Wallaby Scrub Road
ML1751
ML1752
Putty Road
Mount Arthur Seam
Underground Area
Sandy Hollow Creek
Jerrys Plains Road
Wollombi Brook
Parsons Creek
Putty Road
LEGEND
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Current Application
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Secondary Road
Local Road
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MTW - MOUNT ARTHUR SEAM TARGET AREA
Figure No.
16-1
PROJECT No.
ADV-BR-11019
Date
November 2018
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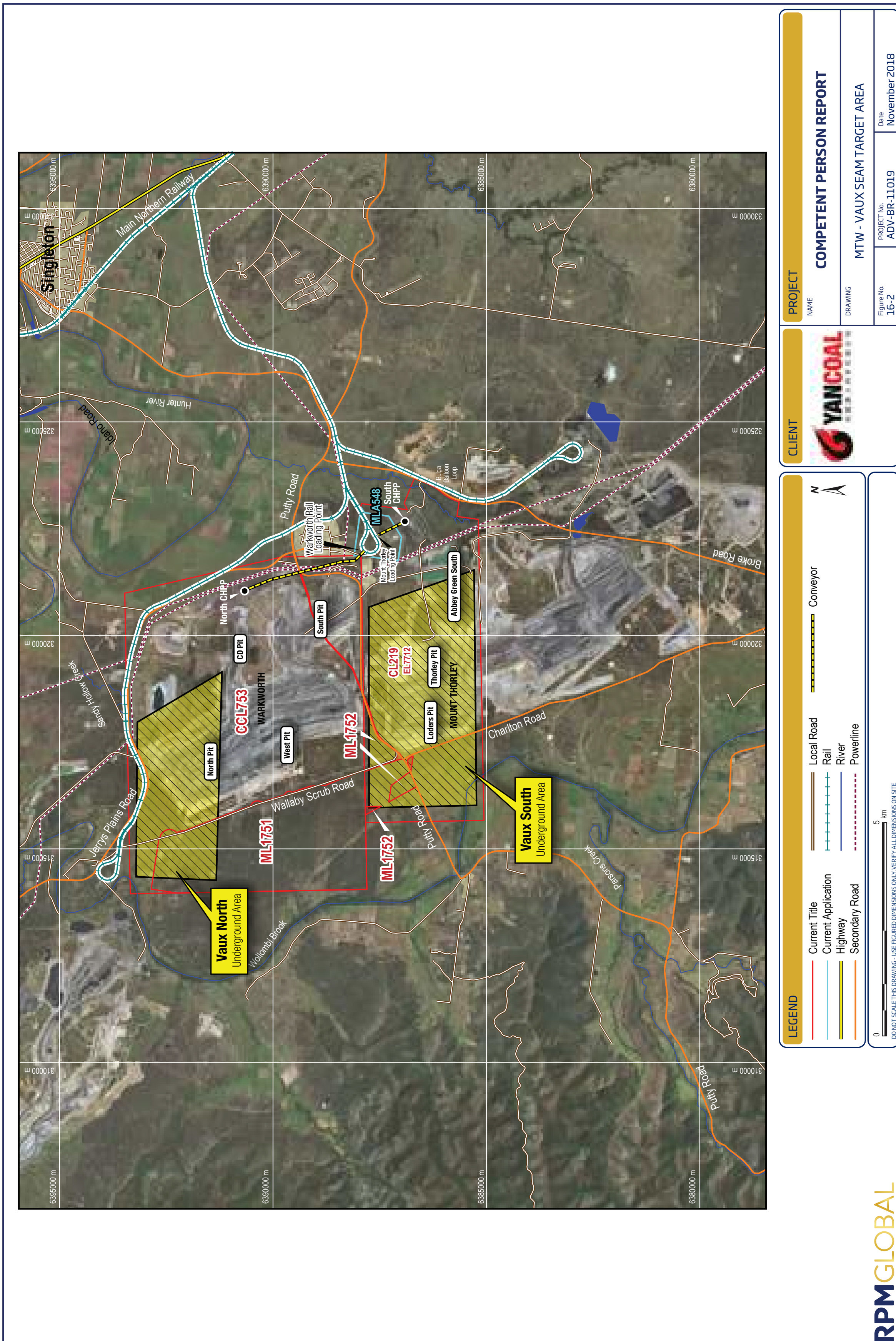
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Main Northern Railway
Hunter River
Putty Road
Broke Road
Charlton Road
Wallaby Scrub Road
Jerrys Plains Road
Sandy Hollow Creek
Wollombi Brook
Parsons Creek
Warkworth Rail Loading Point
Mount Thorley Loading Point
Bulga Balloon Loop
MLA548
South CHPP
North CHPP
CD Pit
South Pit
Abbey Green South
North Pit
West Pit
Thorley Pit
Loders Pit
CCL753
WARKWORTH
MOUNT THORLEY
CL219
EL7712
ML1752
ML1751
Vaux North
Underground Area
Vaux South
Underground Area
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Current Title
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NAME
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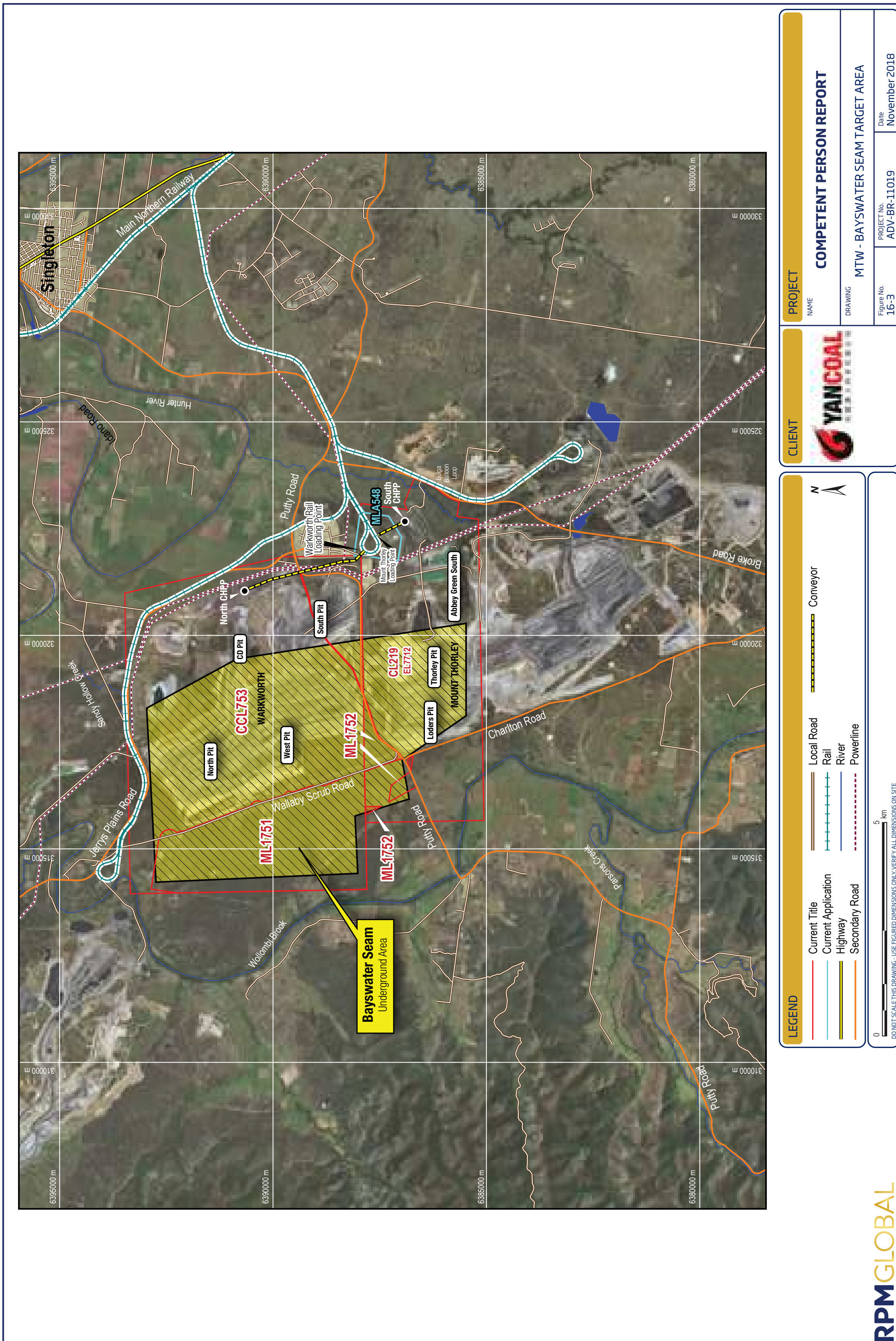
MTW - VAUX SEAM TARGET AREA
Figure No.
16-2
PROJECT No.
ADV-BR-11019
Date
November 2018
RPMGLOBAL


PROJECT
NAME
COMPETENT PERSON REPORT
DRAWING
MTW - BAYSWATER SEAM TARGET AREA
Figure No.
16-3
PROJECT No.
ADV-BR-11019
Date
November 2018
CLIENT
YANCOAL
LEGEND
Current Title
Current Application
Highway
Secondary Road
Local Road
Rail
River
Powerline
Conveyor
DO NOT SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. VERIFY ALL DIMENSIONS ON SITE
RPMGLOBAL
Bayswater Seam
Underground Area
Singleton
Main Northern Railway
Hunter River
Putty Road
Broke Road
Charlton Road
Wallaby Scrub Road
Jerrys Plains Road
Wollombi Brook
Parsons Creek
Sandy Hollow Creek
North CHPP
South CHPP
Warkworth Rail Loading Point
MLA548
CCL753
WARKWORTH
ML1752
ML1751
CL219
EL7712
MOUNT THORLEY
North Pit
West Pit
CD Pit
South Pit
Loders Pit
Thorley Pit
Abbey Green South

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HVO

At HVO potential underground mining targets have been identified in the Arties Seam, Liddell Seam and Barrett Seam. As shown in ***Figure 16-4 to Figure 16-6*** these seam are much thinner than the MTW targets. The Arties and Liddell seams are constrained through a lack of sufficient cover and as such have been confined to the areas shown on Figure 16-4 and Figure 16-5. The deeper Barrett Seam is not affected by open cut operations and as shown on ***Table 16-6*** and covers a wider area.

Table 16-5 HVO – Arties Seam characteristics

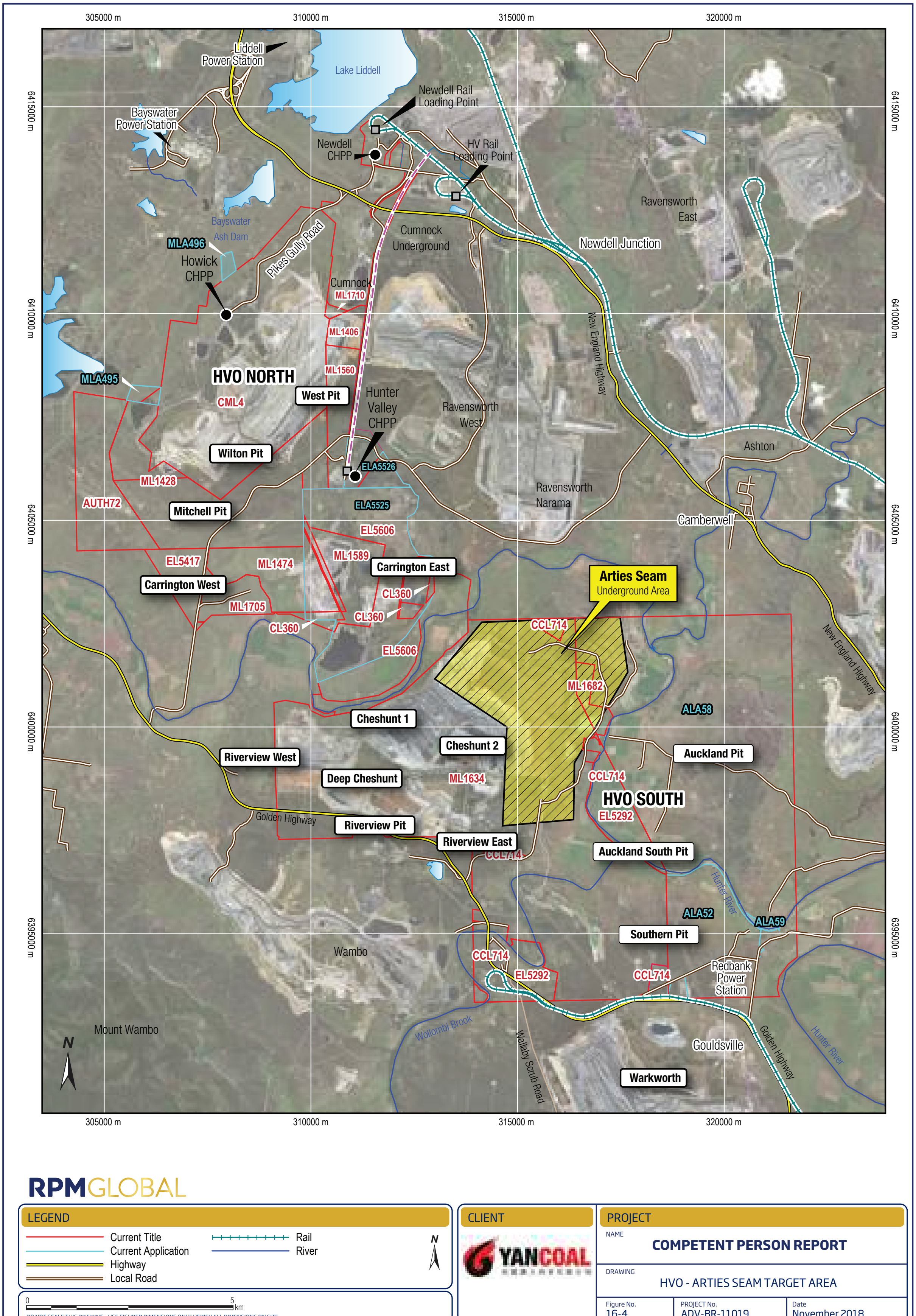
Parameter	Factor
Proximity to open cut pits	Cheshunt pit
Proximity to surface infrastructure	-
Seam thickness	1.5m to 2.3m
In situ estimate	35Mt
Depth of cover (from topo)	200m to 375m
Burden to base of open cut	170m – 180m
Seam dip	Shallow
Raw ash	28% to 46%
Likely products	Low ash thermal to semi-soft

Table 16-6 HVO – Liddell Seam characteristics

Parameter	Factor
Proximity to open cut pits	Cheshunt pit
Proximity to surface infrastructure	-
Seam thickness	1.2m to 2.6m
In situ estimate	Insufficient data to estimate
Depth of cover (from topo)	275m to 475m
Interburden to seam above	60m – 70m
Seam dip	Shallow
Raw ash	22% to 35%
Likely products	Low ash thermal to semi soft

Table 16-7 HVO – Barrett Seam characteristics

Parameter	Factor
Proximity to open cut pits	Cheshunt pit
Proximity to surface infrastructure	-
Seam thickness	1.9m to 2.9m
In situ estimate	82Mt
Depth of cover (from topo)	300m to 500m
Interburden to seam above	17m – 32m
Seam dip	Shallow
Raw ash	22% to 33%
Likely products	Semi soft



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6395000 m
Liddell Power Station
Lake Liddell
Newdell Rail Loading Point
Bayswater Power Station
Newdell CHPP
HV Rail Loading Point
Bayswater Ash Dam
Cumnock Underground
Ravensworth East
Newdell Junction
MLA496
Howick CHPP
Pikes Gully Road
Cumnock
ML1710
ML1406
ML1560
New England Highway
MLA495
HVO NORTH
West Pit
Hunter Valley CHPP
Ravensworth West
CML4
Wilton Pit
Ashton
ELA5526
ML1428
Ravensworth Narama
AUTH72
Mitchell Pit
ELA5525
Camberwell
EL5606
ML1589
EL5417
ML1474
Carrington East
Arties Seam
Underground Area
Carrington West
CL360
ML1705
CL360
CL360
CCL714
EL5606
New England Highway
ML1682
ALA58
Cheshunt 1
Cheshunt 2
Auckland Pit
Riverview West
Deep Cheshunt
ML1634
CCL714
HVO SOUTH
EL5292
Golden Highway
Riverview Pit
Riverview East
CCL714
Auckland South Pit
Hunter River
ALA52
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Southern Pit
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Mount Wambo
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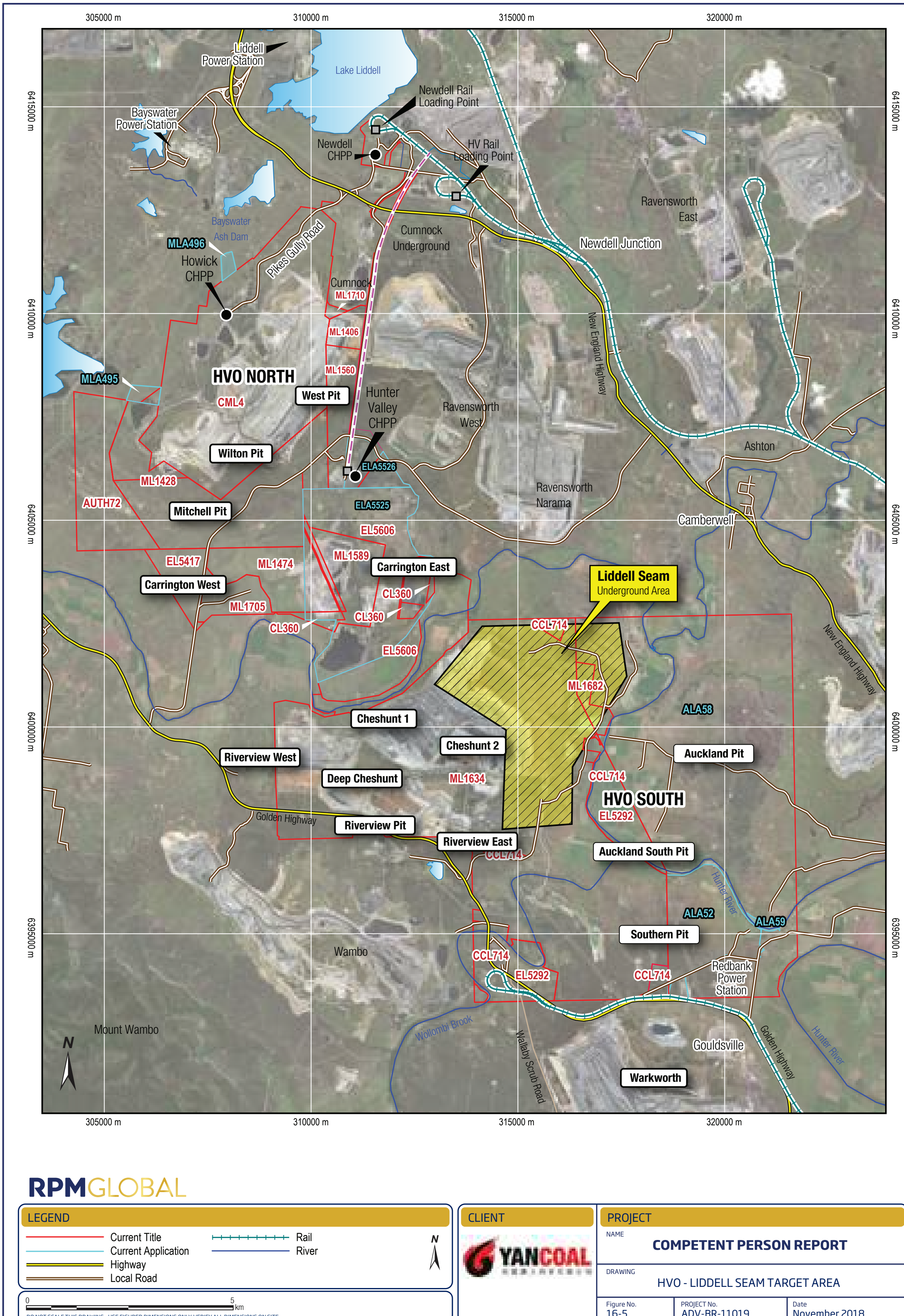
ADV-BR-11019
Date
November 2018



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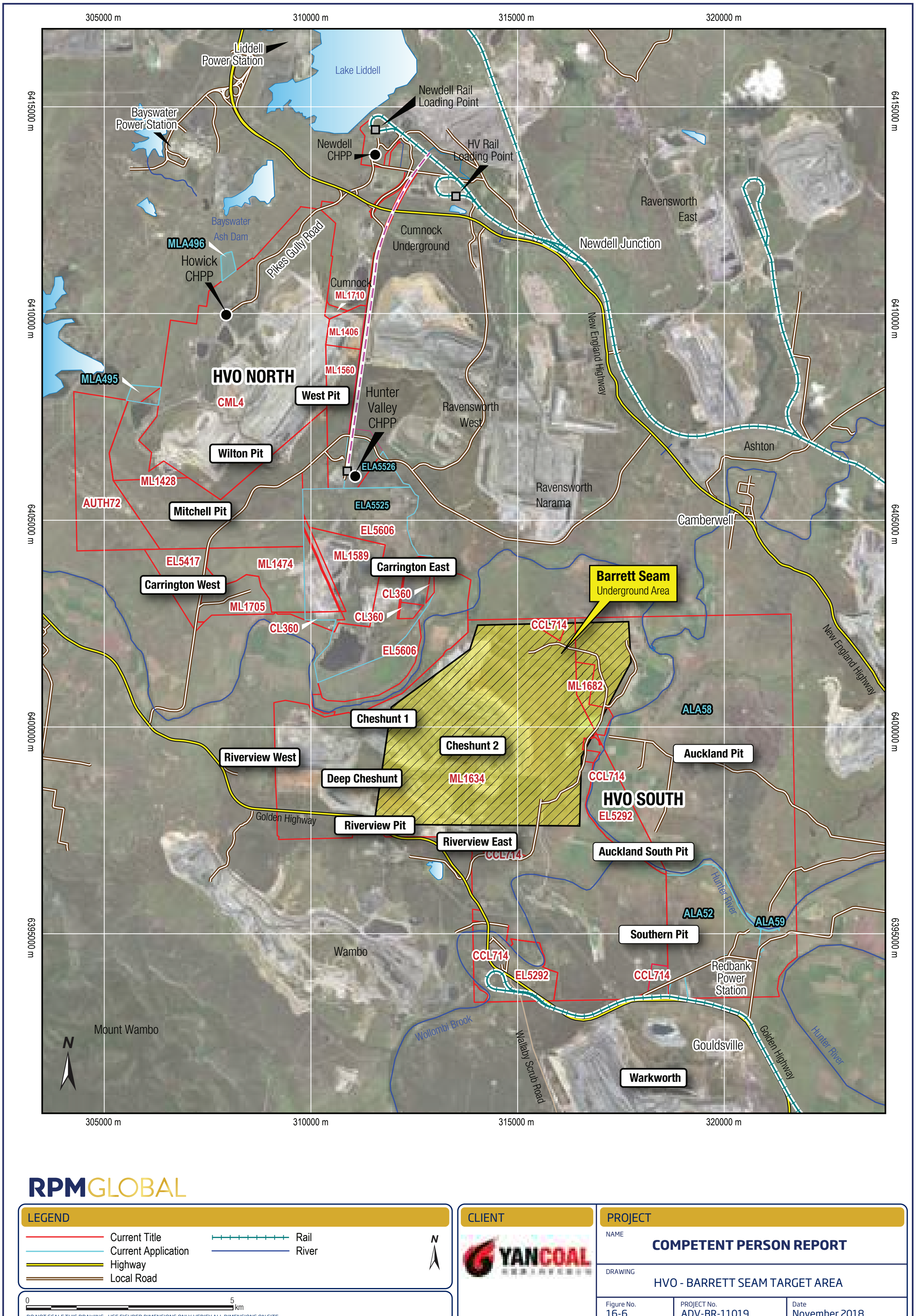
PROJECT No.
ADV-BR-11019
Date
November 2018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16.2 Production Estimate

RPM has reviewed the Resource areas and quantities available for underground mining operations in order to consider the possible production range for individual operations and the number of operations that could operate concurrently at the site as required for the Scoping level of study. Operational considerations that contribute to a conceptual underground development strategy include:

- The conversion of in situ tonnages to potential ROM production.
- Interaction between underground and open cut operations.
- Interaction between separate underground production units operating in close proximity (either within the same seam or overlying seams).
- Productivity range relative to the seam characteristics (depth, thickness, continuity, geotechnical considerations, etc)
- Economics of the Resource, i.e. how much capital does the scale of the Resource naturally support.

All scenarios have applied either longwall or the Longwall Top Coal Caving method. As discussed within the individual seam commentary below, RPM considers that the seam characteristics are generally favourable for longwall mining as is being utilised at Ashton and Austar by the Company.

Figure 16-7 shows the performance of the top Australian longwall operations over the last fifteen years based upon publically available production information collated by RPM. This illustrates the long-term trend of the top performers remaining within a fairly tight range of 3.5Mt to 5.5Mt in a year with a single outstanding performer recording between 7Mt and 9Mt. Historically, it would be expected that the outstanding performer would typically hold its position for four or five years before returning to the pack and another high performer takes is place. This trend is generally attributed to the commencement of new operations that are mining in the shallowest and most favourable conditions with new equipment and latest technology. As the mine progresses, conditions become more challenging and equipment downtime increases.

In terms of mine planning it has therefore been assumed by industry that an operation should be designed to produce up to 10Mtpa with the operation potentially achieving up to this figure for a limited period. Long-term (life of mine) rates however, should be pegged at much lower levels. Until recently, the long-term rate assumed for this purpose was up to 5.5Mtpa.

The graph does however show that the industry has broken out of this trend over the last three or four years and the majority of the top performers are now appearing to consistently produce in the range of 5.0Mtpa to 7.5Mtpa. RPM considers that this is due to widespread adoption of automation technology that is able to maintain more consistent operating conditions on the face and reduced delays as a result of operator error.

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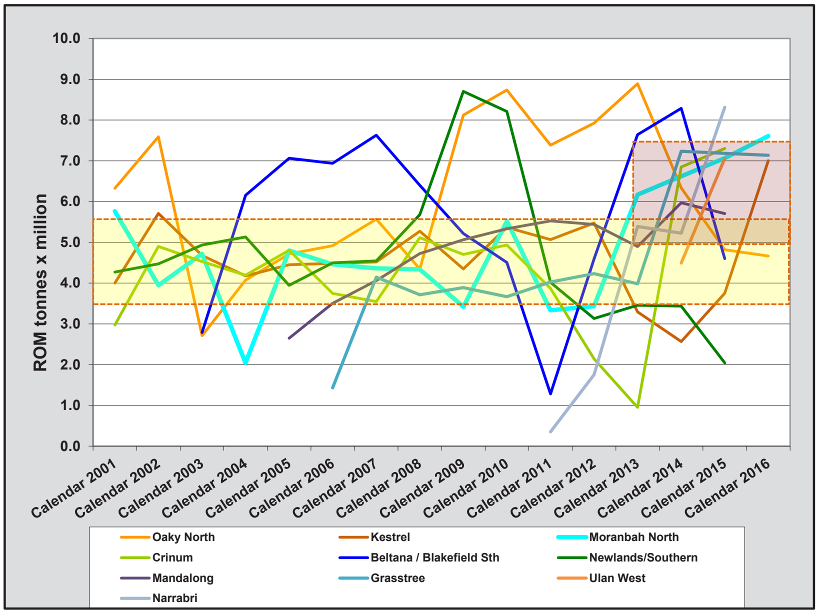
Figure 16-7 Historic production for top 10 producers



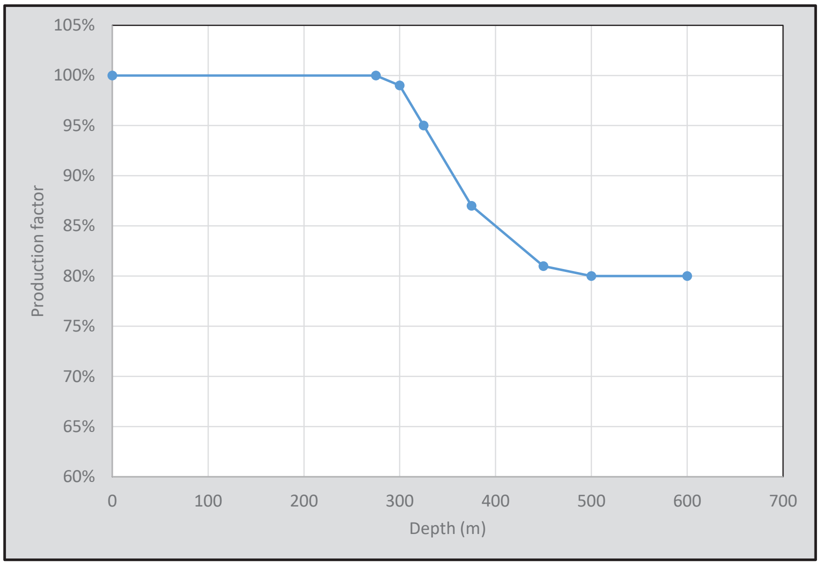
The scenarios proposed by previous studies all require the application of twin longwall systems (two units operating in the same general vicinity) or dual (two units operating in otherwise disconnected workings however at the same site) longwall mines.

In Australia there is currently limited operational experience of operating these systems with the majority of underground mines working a single longwall. The original Gordonstone Mine, renamed Kestrel Mine, was initially setup to operate two longwalls and more recently the Oaky North Mine was expanded to operate with two longwalls.

In RPM's experience running multiple longwall units at full production presents significant operational challenges and it is often difficult to maintain adequate development inventory in advance of the longwall. Ventilation and gas management systems as well as general underground logistics support are also often made far more difficult, however having said that with careful planning these challenges can be overcome to form a successful operation.

Longwall production has been found historically to be highly dependent on depth of cover with horizontal and vertical stress generally increasing with depth and creating a more challenging operating environment. Through industry experience, RPM has developed a guideline for estimating productivity relative to depth. This is illustrated in ***Figure 16-8*** whereby there is little or no production derating up to a depth of 300 m, after which production is expected to decline to a minimum factor of 80% from around 450 m. This means that a longwall that is deemed capable of producing at 7Mtpa at 250m depth would be expected to produce around 5.6Mtpa in the same seam however at 500m deep.

Figure 16-8 Production factor relative to depth



Production can also be dependent on seam thickness although the relationship has historically been far less defined than the depth relationship. In theory thicker seams yield more coal per meter cut than their thinner counterparts and so overall productivity is expected to be higher. Higher longwall faces are however harder to manage and are more vulnerable to deterioration in high stress environments. Historically in Australia, thicker seam operations have often exhibited large swings in production whilst more moderate thickness operations (3m to 4 m) have been able to achieve more a consistent operating environment and more reliable production rates.

RPM is of the opinion that recent successes with the introduction of automation will enable operators to maintain greater control over the longwall face and as such thicker-seam operations will be better placed to achieve their potential. Importantly there is a similar seam thickness range in the Mount Arthur and Vaux seams at MTW and Arties, Liddell and Barrett at HVO and as such similar productivities may be expected. The Bayswater Seam at MTW is much thicker (up to 8.4 m) and would be expected to produce at higher rates.

Issues related to placement of tailings and spoil in the open cut voids directly above underground mines further complicates underground extraction in most areas at MTW and HVO. Overlying liquid tailings can present a significant hazard to underground mining as a result of the risk of inrush. Unconsolidated spoil can significantly impact stress regimes (and consequently productivity and roof support requirements) and access to the underground workings via surface boreholes. The significance of these issues should not be underestimated and technical solutions will have to be found before underground mining can commence. These will be addressed in future studies.

RPM has assumed that a minimum fresh interburden thickness of 80m is required below any surface spoil. In areas where this cannot be maintained, the higher coal seam is assumed to remain unmined, however operations may continue in deeper seams.

Seam-wise production and productivity

MTW Mount Arthur Seam

The Mount Arthur Seam provides a potential underground mining target within the MTO lease area only. Open cut operation will be concluded in the area within the next 6 months and will not directly impact underground mining. The old pits are however planned to be backfilled with a combination of waste and tailings which may impact the geotechnical loading of the in situ strata. The burden between the base of the open pit, mined to the Woodlands Hill Seam and potential underground operation is estimated to be around 100m and as such should be sufficient however this would need to be confirmed through geotechnical review.

The backfilling of the open pit areas conflicts with the underground option to obtain a low-cost access point from an existing highwall. Detailed design would be required to define the optimal access point and any compromise required with open cut waste storage.

The average thickness of the seam is 3.2m which makes it well suited to high production mechanised mining. An 80 cm claystone band sits directly above the Mount Arthur Seam with the Warkworth Seam lying directly above the claystone. The claystone is deemed too thick to extract as part of the mining sequence thereby providing access to the Warkworth Seam. The competence of the claystone with overlying coal has not been assessed as part of this review however RPM considers there may be a risk with this material in the immediate roof. It is estimated that there is approximately 86Mt of Mount Arthur Seam Resource within the MTO lease.

The potential ROM quantity of 44.5Mt was scheduled for this seam in the 2015 model. In consideration of the shallow depth and moderate seam thickness RPM expects the production range for this target would average 5.5Mtpa with annual output ranging from 4.5Mt to 6.5Mt.

MTW Vaux Seam

As shown on Figure 16-2 the Vaux Seam target is divided across two distinct areas, Vaux North and Vaux South. Vaux South lies 20m to 30m below the Mount Arthur underground target and would have to be scheduled to commence following completion of the Mount Arthur operations.

The depth of cover averages 190m and the seam thickness averages 2.5m thus making is an appropriate target for underground mechanised mining. The Vaux North depth of cover under the Warkworth Pit extends to 320m which may result in a drop off in productivity however not to a significant level.

It is estimated that there is 42Mt of Resource in Vaux South which equates to 27Mt ROM when allowing for 80% resource recovery and 80% mining recovery. Productivity would be expected to be similar to the Mount Arthur Seam, averaging 5.5Mtpa, with a range from 4.5Mt to 6.5Mt.

For Vaux North it is estimated that there is approximately 25Mt of Resource and with the same recovery factors applied, this equates to 16Mt ROM. It is expected that there will be a slight reduction in productivity to 5.2Mtpa resulting from the increased depth.

MTW Bayswater Seam

The average thickness of the Bayswater Seam in MTW is 7.05m with thickness increasing to over 8m in some areas. Previous studies have recommended the application of the longwall top coal caving (LTCC) method. Elevated stress levels are required with this method to assist in fracturing the coal as part of the caving process. RPM does not consider that LTCC will be a viable choice in this case due to the relatively low depth of cover and the expected reduction in horizontal stress with the extraction of the overlying Vaux Seam.

RPM has therefore based production assumptions on a thick-seam longwall operation with a maximum extraction height of 6.0 m. The total Resource estimate is 338Mt and allowing for a Resource recovery of 80% and a reduced mining recovery of 68% to allow for up to 6m extraction, this results in a mineable quantity of 184Mt ROM.

As shown in Figure 16-9 average productivity is expected to range from 6.5Mtpa to 7.5Mtpa based on depth. For any one year the potential output could be expected to range from 5.5Mt to 8.5Mt.

Access would be expected from the eastern side of the Resource as an extension of the Vaux Seam workings.

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HVO Arties Seam

The depth below open cut final voids appears to be sufficient to protect the underground from connection to the surface.

The Arties Seam thickness ranges in thickness from 1.5m to 2.3 m. Resources with seam thickness less than 2.0m are generally considered to be thin and will require more specialised equipment in order to effectively mine. The lack of height provides ergonomic challenges for operators and generally result in reduced productivity.

The Resource is estimated to be 35Mt which translates to 22Mt when applying a Resource recovery of 80% and mining recovery of 80%.

RPM has assumed that given the limited seam thickness, average productivity would not be expected to significantly exceed 4Mtpa. RPM considers that whilst this may remain a potential underground target there is currently a high level of uncertainty and a low probability of a favourable economic outcome. This target has therefore not been considered any further.

HVO Liddell Seam

The Liddell Seam lies 60m to 70m below the Arties Seam and as such can be considered over a similar area to the Arties Seam.

The Liddell Seam thickness ranges in thickness from 1.2m to 2.6m which places it in a similar marginal category as the Arties Seam.

There is limited exploration upon which to base a Resource estimate or mine plan. Based on seam thickness it is assumed that the in situ and ROM tonnages for the Liddell Seam will be similar to the Arties Seam.

RPM has assumed that given the limited seam thickness, average productivity would not be expected to significantly exceed 4Mtpa. RPM considers that whilst this may remain a potential underground target there is currently a high level of uncertainty and a low probability of a favourable economic outcome. This target has therefore not been considered any further.

HVO Barrett Seam

The Barrett Seam lies between 17m and 32m below the Liddell Seam however is predominantly greater than 20 m. Should the Liddell Seam be mined, detailed geotechnical analysis would be required to confirm sufficient coverage lies between the two seams to allow mining to proceed in the Barrett. The Barrett Seam thickness ranges between 1.9m and 2.9m which provides a more attractive target for underground mechanised mining than either the Arties or the Liddell.

As the Barrett target area falls beneath the Cheshunt Pit then open cut mining would need to be largely complete in this pit before underground operation could proceed. It is estimated that there is up to 82Mt of in situ Resource within the Barrett Seam area which converts to 52Mt based on 80% Resource recovery and 80% mining recovery.

With an average seam thickness of 2.5m the Barrett Seam lies at the low end of the moderate thickness mining however does not necessarily fall into the thin seam mining category. An average production rate of 4.8Mtpa has been estimated for working in this seam.

Summary

Table 16-8 shows the in situ and ROM estimates for each of the underground targets as discussed in the previous sections. It should be noted that not all ROM tonnage has been included in the table for the Arties or Liddell seams due to the high levels of uncertainty and high probability of a negative or very marginal economic outcome.

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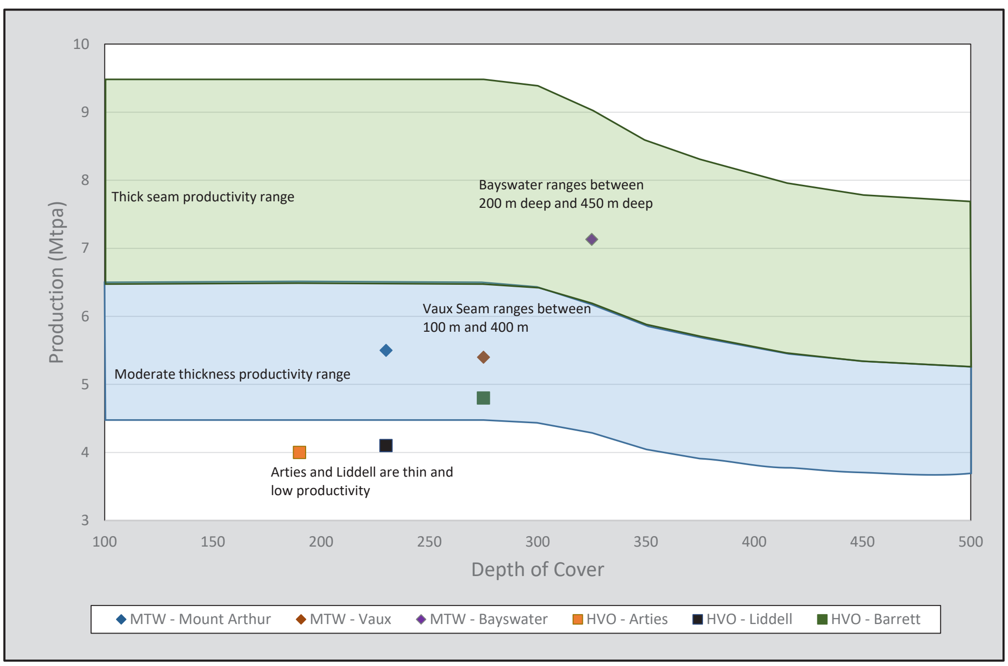
Table 16-8 Underground tonnage summary

Site / Seam	In situ (Mt)	ROM (Mt)
MTW		
Mount Arthur	86	45
Vaux	67	40
Bayswater	338	185
Total MTW	**491**	**270**
HVO		
Arties	35	
Liddell		
Barrett	82	50
Total HVO	**117**	**50**
TOTAL MTW / HVO Complex	**608**	**320**

Figure 16-9 shows the high-level productivity estimation for each seam based on depth and seam thickness characteristics.

Figure 16-9 Average productivity by seam



16.3 Production Schedule

A full underground schedule has not been completed at this level of study, however comment can be made on when operations may commence, the potential production and life of each operational sector, the number of contiguous longwall operations and potential annual output from the complex.

Figure 16-9 provides a high-level estimate of each seam based on the productivities and projected ROM tonnage. The Bayswater Seam is estimated to take up to 26 years to complete whilst the other seams combined are estimated to take 27 years to mine. With the Bayswater Seam using one height of longwall

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equipment and the other targets all requiring smaller equipment this lends itself to a two longwall arrangement with one longwall in the Bayswater Seam and the second longwall working simultaneously through the other mining targets.

The powered roof supports are the major high-cost capital item with long life and so scheduling to ensure optimal utilisation over the total life of the complex is a key schedule consideration. Roof support life is measured in cycles where one cycle is completed every time the longwall moves a single web forward. Longwalls typically advance between 0.8m and 1.0m every cycle depending on the equipment set up which is a consideration of the seam characteristics. Based on support life of 70,000 cycles RPM has estimated that a single set of supports would be sufficient to mine the thick seam Resources at MTW in the Bayswater Seam. One set of moderate height supports would be required for the Mount Arthur and Vaux Seam operations at MTW and one additional set would be required to mine the Barrett Seam at HVO.

Table 16-9 Life of mine and roof supports

Target	ROM (Mt)	Rate (Mtpa)	Life (years)	Thickness (m)	Cycles (#)	LW Life (%)
MTW – Mt Arthur	44	5.5	8	3.20	28,971	41%
MTW – Vaux	50	5.4	8	2.54	35,269	50%
MTW – Bayswater	184	7.1	26	6.00	63,889	91%
HVO - Barrett	52	4.8	11	2.40	45,573	65%
Total	**323**					

Figure 16-10 provides a conceptual schedule for the underground operations across MTW and HVO. The sequencing and timing has been organised to achieve continuous operation whilst minimising interaction between the underground operations and the open cuts. At this time no consideration has been given to the impact on total output of the complex or processing capacity.

Figure 16-10 Conceptual underground production schedule

16.4 Operating and Capital Costs

Capital Costs

RPM has provided indicative capital costs based upon typical industry costs observed in recent years. The general logic behind the estimate is as follows:

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- MTW - Mount Arthur is a new operation and must bear the initial capital cost of all new equipment and infrastructure.
- MTW - Vaux South is an incremental extension of the MTW - Mount Arthur operations and other than the installation of new underground services and infrastructure, should be able to utilise much of the equipment already in operation.
- MTW - Vaux north is a satellite operation and as such will require the installation of all new fixed infrastructure however will be able to utilise the production and mobile equipment from existing operations.
- MTW - Bayswater represents an expansion to the underground operations, it is operating in a much thicker seam and so little of the existing equipment is transferrable. Other than the limited additional depth for access, this will be similar to establishing a completely new operation.
- HVO - Barrett is another satellite operation and has been costed in a similar manner to Vaux North. By this point however, it is estimated that the original powered roof supports will have completed their life and a new set will need to be purchased.

Table 16-10 provides a summary of the timing and breakdown of the estimate of initial capital costs. As estimates have been based upon database figures, individual line items should be considered with a level of accuracy of +/- 50%. Contingency has been applied at 15%.

Table 16-10 Initial capital estimate

	Owners Cost	Mt Arthur	Vaux South	Vaux North	Bayswater	Barrett	Total
Key Dates							
Mine access		Y-2	Y6	Y11	Y10	Y14	
Longwall		Y1	Y9	Y14	Y13	Y17	
Initial Capital							
Set up	100						100
Mine access		87	15	128	30	102	362
MIA		25				25	50
Ventilation		40		40	20	40	140
Development		75			75		150
Longwall eqt		163			190	163	516
Coal clearance		30	15	30	15	30	120
Diesel eqt		22	11		22	11	66
UG Infrastructure		55	28	55	28	55	220
Closure	100						100
Neat estimate	**200**	**497**	**69**	**253**	**380**	**426**	**1,824**
Contingency	30	75	10	38	57	64	274
Total	**230**	**572**	**79**	**291**	**436**	**490**	**2,098**

Sustaining capital is required to cover the replacement of operational equipment, other than the powered roof supports which are costed individually. Historical records show that sustaining capital for underground operations typically ranges between AUD4/t ROM and AUD8/t ROM depending on the age and complexity of the operation. RPM has applied high level sustaining capital rates in ***Table 16-11*** to provide a life of mine sustaining capital estimate. It is assumed that this is distributed over the life of mine in proportion to total ROM output.

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Table 16-11 Sustaining capital estimate

	Mt Arthur	Vaux South	Vaux North	Bayswater	Barrett	Total
ROM (Mt)	45	25	15	185	50	320
Rate (AUD/t ROM)	3	5	5	5	5	
Total (AUDM)	**135**	**125**	**75**	**925**	**250**	**1,510**

Operating Costs

Operating cost ranges for the underground have been developed from RPM's industry knowledge in line with the level of accuracy of the CAPEX. Underground costs are typically categorised into development, longwall, outbye and engineering to provide a "Pit Top Cost". Additional costs for technical services and general and admin have also been applied to provide a total underground operating costs. Costs are included to a ROM pad at the Pit Top, however surface transport costs to CHPP's, Coal processing, rail freight and Corporate overhead are not included. These are assumed to be in line with the current open cut OPEX which are detailed in Appendix G (LOM average of AUD13.8/ROM t HVO and AUD10.7/ROM t MTW). Examples of a breakdown of these costs for three scenarios are provided on ***Table 16-12***. The three scenarios are as follows:

- Scenario 1 – 2.0m seam at 250m depth of cover with a production rate of 4.5Mtpa. This is similar to the HVO Barrett underground target.
- Scenario 2 – 2.5m seam at 150m depth of cover with a production rate of 5.5Mtpa. This would be similar to the MTW Mount Arthur operation.
- Scenario 3 – 6.0m seam at 350m depth of cover with a production rate of 8.0Mtpa. This would be similar to Bayswater.

Table 16-12 UG OPEX Cost scenarios

	Cost Scenario 1 (AUD/t ROM)	Cost Scenario 2 (AUD/t ROM)	Cost Scenario 3 (AUD/t ROM)
Development	13.1	9.1	3.9
Longwall	8.9	6.8	8.9
Outbye	6.7	5.6	5.2
Engineering	4.2	3.4	3.3
Pit Top Cost	33.5	24.9	21.3
Technical Services	1.1	1.0	0.8
General & Admin	1.7	1.5	1.2
Total Underground	**36.3***	**27.3***	**23.3***

**Excludes CHPP and Offsite costs which total LOM average of AUD13.8/ROM t HVO and AUD10.7/ROM t MTW*

Table 16-12 illustrates the wide variability in costs in respect to different operating conditions and mining approach. This creates a high level of uncertainty with regard to high-level estimates of underground operations and little reliance may be attached to any unit rates before more detailed analysis is undertaken.

Figure 16-11 shows the operating cost output range over depth, thickness and production. Indicative positions of each of the underground targets have been provided on the chart to illustrate the relative attractiveness of each deposit.

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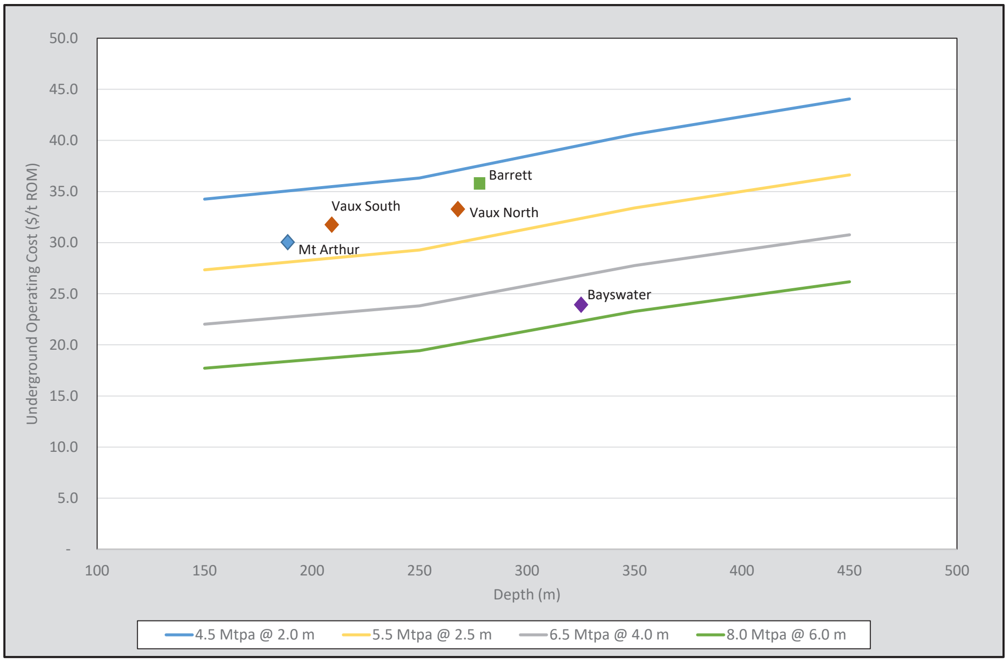
Figure 16-11 Site Operating cost ranges



16.5 Development Sequence Overview

Development of underground mines generally encompasses a number of steps which vary in both length and costs, these include:

- Exploration and Mining Studies.
- External Approvals and
- Construction and Operations.

The UG Project has advanced the initial exploration and study phase as outlined above. These works have highlighted the economic potential in the UG Project.

Exploration and studies

The progression of exploration through the various stages of study, to construction and ultimately operation are dictated by three primary factors:

1. External approvals – this includes federal and state approvals and encompasses environmental and mining approvals.

2. Internal approvals – these approvals predominantly relate to the release of funds and provision of corporate support for progression to the next phase of study or development.

3. Time to complete a phase of study or construction.

Internal approvals

Internal approval processes and the manner in which they are implemented are specific to individual organisations and their objectives. These approvals can in some cases have a greater impact on the project development timeline than external approvals.

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Study phase

An exploration and study program required to prove up a greenfield coal deposit normally follows three distinct study phases. The actual length of each study phase is not fixed and will depend upon the size and complexity of the resource, specific community or environmental issues and the quality of the supporting data and analysis at the start of the study phase. In addition to this, the depth of investigation and analysis required by the client may vary significantly from one organisation to another and this will be reflected in the time that a company is prepared to invest in a particular phase.

RPM understands that The Company will begin Pre-feasibility studies in 2018.

Exploration

Staged exploration work is undertaken prior to and throughout the early stages of each of the above study phases. This exploration work is progressively focused on the higher-value areas within the deposit and is tailored to meet the objectives of the study phases. The deposit's JORC classification status therefore progresses from exploration results through to Measured Resources throughout the study phases.

At the Concept Study phase, much of the data available for the deposit would be Inferred with some broad portions brought up to higher classification status. During the Pre-feasibility stage, the key areas of the deposit sufficient in size on which to base a reasonable-sized mine are typically elevated to an Indicated status. At the completion of a final Feasibility Study, it is typical to have the area which is planned to be mined during the first five to ten years of mine life, explored sufficiently to be classed as Measured Resources, with the remainder of the proposed mine's resources remaining at an Indicated Resource level. As the mine is developed, ongoing exploration required for the completion of detailed mine planning will progressively elevate the life of mine resources from an Indicated to Measured status.

RPM understands that The Company will begin Pre-feasibility exploration in 2018.

The duration of each stage of exploration is largely dependent upon the size, depth and geological complexity of the resource. Access and weather conditions can also impact on the actual time to complete each stage. **Figure 16-12** shows the Company's indicative timeline for the project.

Figure 16-12 Staged Exploration and Study Time Line

Summary

RPM concludes that for a greenfield site with no approvals, it is likely to take around five years to complete exploration, mining and associated studies and relevant environmental studies and approvals. Following this there is likely to be a full year prior to the commencement of construction, during which internal approvals and funding is obtained, engineering design and tendering / procurement commence. Surface construction and underground access plus development can be expected to continue for around 3 years before the longwall can commence operation.

RPM highlights that the HVO/MTW operations are currently active mines, as such the ramp up timeline may be reduced significantly given the current site and regional infrastructure in place. As outlined below there is a number of options to develop the underground operations in conjunction with the open pit operations. These options will be analysed and optimised as part of the ongoing pre-feasibility study being completed by the Company.

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16.6 Development Options

RPM understands that there is no set development option or sequence for the UG Projects, however RPM notes that there are various options which are being considered in current studies which are flexible in timing of commences and can optimise the interaction between the current operations and underground while realising value however not to the detriment to the current open cut LOM.

RPM notes there are two key limitations of the underground production, these include the interactions between the open cut and underground operations along with the ability to process additional material planned to be produced from the underground mines. RPM is aware the Company has significant experience with operating open cut and underground operations, including within the same project such as at Moolarben. As such this is not considered a limiting factor, however will require detailed planning an ongoing optimising to ensure no impact between the two operations such as the waste and tailings material in pit dumping strategy as outlined above. RPM considers the key consideration to the development of the underground operation is the ability to process additional run of mine coal. Of importance, as outlined in Section 11 the HVO and MTW operations have a total of four CHPP's with a total capacity of 42mtpa while planned ROM production is 20.6Mtpa at HVO and 17Mtpa at MTW. As such there is some capacity for increased throughput at the current plants however the likely production rate is well in addition to this level (5 to 8mpta). RPM notes there are three main scenarios for production plant:

- Scenario1 - Delay Underground operations beyond the open pit mine life at MTW. RPM does not consider this an attractive viable option with production currently planned to cease at MTW in 2040. As such no value would be realised in this scenario in the short term, nor would this allow offset of the current take or pay commitments.
- Scenario 2 – Maximise throughput case. Construct an additional CHPP to process all underground production. While this would add additional CAPEX to the start-up costs this scenario but would realise value in the short term, in addition to allow a dedicated CHPP without interaction with the open cut operations or the seams which will be mined. RPM is aware there are potential locations for a CHPP.
- Scenario 3 – Capped throughput case. Limit production to the excess capacity at the current CHPP. This would limit start-up CAPEX and simplify the underground production plan (one Longwall vs two), however would reduce the realised value in the short term. While decreasing the production complexity this would increase the complexity in the CHPP due to variable seam throughputs. RPM notes that the CHPP's currently process up to four seams as such this would not be considered a limiting factor.
- Scenario 4 – A combination of scenario 2 and 3. This scenario would allow significant flexibility in the underground operations while maximising the current CHPP capacity. As with Scenario three this would increase the interaction with the open cut operation however this is not considered a determining factor in optimsation decisions

RPM considers all four scenario to be achievable and realistic and highlight the commercial path to production of the operation, however given the current level of study no detail options analysis has been completed nor it is warranted at this stage. In determining the optimal development scenario a number of studies, both on a technical and commercial front, need to be considered, these are planned to occur over the next 12 to 18 months.

16.7 Risk Overview

Some of the key risks that will be addressed as part of the ongoing studies into the potential for underground operations at MTW and HVO include:

- **Mining Approvals** - No current mining approvals are in place for commencement of UG operations. These are expected to take a period of time, however systematic approach is in place in NSW.
- **Geotechnical Conditions** - Assessment of geotechnical conditions and the resultant productivity and cost impacts arising from mining multiple seams. This will include defining effective subsidence management as well as gas and spontaneous combustion management strategies particularly in areas of reduced interburden.
- **Interaction with Open Cut** - No studies have been undertaken to determine and plan for impact on current operations and CHPP. This would include current tailings and waste storage plans and impact on underground operations.

- **Geological Information** - Delineation of any limiting geological structures (faults, dykes, sills, etc.) in seams not currently mined by open cut methods.

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17. Mine Risks and Opportunity Assessment

17.1 Opportunity

RPM considers there are several opportunities within the Assets. These include:

- **HVO/MTW Underground** –As further outlined in ***Section 16*** this would include multiple areas and could be undertaken in conjunction with the current open pit operations. If undertaken this would increase ROM production by up to 5 to 7Mtpa and have the added advantage of augmenting take or pay commitments of the groups operation.
- **HVO Boundary Coal Pillar**- The current Coal Reserves and LOM plans excludes significant coal within the boundary pillar of the tenement holding due to the inability of mining across the tenement boundary on the neighbouring tenement (***Figure 9-3***). A study from a third party indicates that an additional coal tonnage of between 100 and 120Mt could be exploited with extensions of the West, Carrington East, Riverview East and West and Cheshunt Deep pits. Integrated mine planning to a PFS level of detail is required to confirm this coal is technically feasible and economically viable. Following completion of this work then boundary coal may be considered for inclusion in Company mine plans and inclusion in Coal Reserves.
- **Blending** – The current LOM plan presented in this Report and the supporting cashflow analysis, assumes no blending occurs either within the operations or between the operations. The products generated by the operations are generally high value coal types and blending based on product qualities can realise additional value rathe then selling single products from the operations. In addition as the Company further incorporates HVO/MTW into its operations this blending strategy could be used to further optimise mining operations in both short and medium term planning through careful and meticulous mine plans focusing on:
  - Maximise the exploitation of the in situ resources by potentially increasing pit limits using improved revenue streams and
  - Incorporate the ability to reach quickly to market condition by changing the short term mine plan to target seams with specific coal qualities.
- **Moolarben Expansion** –The expansion involves optimisations to approved Stage 1 and Stage 2 operations at the Moolarben mine which will increase open cut ROM coal production to 16Mtpa and a Moolarben Complex ROM production capacity of 24Mtpa. The Approvals Modification also involves a minor extension to the OC2 pit limit, minor extensions and reductions of the OC3 pit limits, rehabilitation, water management and relocated/additional surface infrastructure.

17.2 Risk

Mining is a relatively high risk business when compared to other industrial and commercial operations. Each mine has unique characteristics and responses during mining and processing, which can never be wholly predicted. RPM's review of the Mines indicates mine risk profiles typical of large scale mines at similar levels of resource, mine planning and development in Australia. Until further studies provide greater certainty, RPM notes that it has identified risks and opportunities with the Assets as outlined in ***Table 17-2***.

RPM has attempted to classify risks associated with the Mine based on Guidance Note 7 issued by The Stock Exchange of Hong Kong Limited. Risks are ranked as **High**, **Medium** or **Low** and are determined by assessing the perceived consequence of a risk and its likelihood of occurring using the following definitions:

Consequence of risk:

- **Major**: the factor poses an immediate danger of a failure, which if uncorrected, will have a material effect (>15% to 20%) on the Mine cash flow and performance and could potentially lead to Mine failure;
- **Moderate**: the factor, if uncorrected, could have a significant effect (10% to 15% or 20%) on the Mine cash flow and performance unless mitigated by some corrective action and
- **Minor**: the factor, if uncorrected, will have little or no effect (<10%) on Mine cash flow and performance.
- Likelihood of risk occurring within a 7 year timeframe:

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- **Likely**: will probably occur;
- **Possible**: may occur and
- **Unlikely**: unlikely to occur.

The consequence of a risk and its likelihood of occurring are then combined into an overall risk assessment as shown in ***Table 17-1*** to determine the overall risk rank.

Table 17-1 Risk Assessment Ranking

Likelihood	Consequence		
	Minor	**Moderate**	**Major**
Likely	Medium	High	High
Possible	Low	Medium	High
Unlikely	Low	Low	Medium

RPM notes that in most instances it is likely that through enacting controls identified through detailed review of the Mine's operation, existing documentation and additional technical studies, many of the normally encountered Mine risks may be mitigated.

Table 17-2 Risk Assessment

Risk Ranking	Risk Description and Suggested Further Review	Potential Mitigant	Area of Impact
M	**Community Relations** Communities have voiced grievances against some mine operations, in particular regarding noise and dust emissions, leading to equipment downtime and subsequent investment in noise attenuation equipment for equipment.	Continue proactively engaging with affected communities and implementing noise mitigation strategy to remain in compliance with applicable regulatory standards and minimize equipment downtime. Assess and regularly review the noise impacts of planned mine development in increasing proximity to Bulga and continuously estimate related equipment downtime	OPEX, MTW, Stratford and Moolarben Asset Economics
H	**Coal Bursts - Austar** Several Coal Bursts have occurred within the Austar mine which has resulted in loss of production and forced shutdowns and 2 fatalities in 2014. RPM is aware the company has introduced a number of measures to manage the issue.	Ongoing monitoring of rib and face stress levels during development, implementation of additional face shielding on the longwall, management systems developed and implemented.	Safety and Production
H	**Austar Restart** RPM is aware that the Austar permit for the operation of the longwall has recently been suspended following a coal bursts in 2018 and now has approval for limited longwall activities under controlled conditions. Limited operations at Austar recommenced on 14 August 2018 subject to certain conditions which the mine can comply with however full scale operations are as yet to recommence.	Continue discussions with the regulators.	Full-scale Recommencement timeframe and reserves.
L	**Plant Maintenance - all**		

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Risk Ranking	Risk Description and Suggested Further Review	Potential Mitigant	Area of Impact
	Several of the CHPP's are ageing and this is reflected in the requirement for more detailed and systematic planning systems. This presents a risk for increased OPEX and unavailability. RPM is aware that maintenance costs are included in the costs presented in this report	The Company has implementing several system to ensure continued operation and utilisations. Ensure management overview of maintenance.	OPEX
L	**Commodity Price Fluctuation** The market for Coal has been variable over recent years, RPM highlights that while the recent lower commodity prices the operations are still profitable, as such the risk to the profit sensitivity	Long term contracts.	Assets Economics
L	**Data Quality - all** Limited original data or sampling and assay protocols or data is available for the drill hole information. However a significant review program has been undertaken.		Resource estimate
L	**Coal Quality – Middlemount/Stratford and Duralie** Drilling suggests potential issues with coking properties in northern area. No estimate completed for SEOC at Ashton. Coal Qualities based on reconciliation with Avon North Pit	Complete Further grade control drilling and modelling	Plant Yield and Costs
L	**Structural Model – Middlemount** Potential for additional structure such as faults to be encountered during mining	Review structural interpretations at the site. Review geotechnical impacts and operational implications.	Resource estimate/ OPEX
L	**Wallaby Scrub Road Permit - MTW** The Closure of wallaby scrub road agreement with the local council is nearing completion. RPM is aware discussions are well advanced and likely to be completed in the near future.	Confirm closure permit	MTW operations
L	**Relative Density - MTW** Some bias may have occurred within for deposits Of particular note is the regressions noted in Section .6	Complete a reconciliation of the BD completed against the mined areas to determine the variation on a local scale.	Local Variation of Resource estimate
L	**Water Management - Yarrabee and Moolarben** Ongoing permits and approval to ensure supply for CHPP and dust suppression. RPM is aware of management's procedure in place which current manage this risk.	Ongoing approvals procedures and management and monitoring	Ongoing production
L	**Potential Acid Forming Tails and Waste- Stratford** Waste and tails storage of PAF material is ongoing in voids etc. Current management plans in place	Ongoing monitoring and planning both short and long term	Ongoing production
L	**Heavy Metals Contaminations- All**		

Risk Ranking	Risk Description and Suggested Further Review	Potential Mitigant	Area of Impact
	Fate of heavy metals in tailings and potential groundwater and soil contamination have not been assessed. Historical or future contamination could lead to regulatory shut-down, community opposition and clean-up costs	Conduct leaching test and soil and groundwater environmental site assessment at relevant locations in and around tailings facilities	Compliance, Assets Economics (closure and/or clean-up costs)
M	**South East Open Cut Approvals** The mining permit is pending an agreement with a single land holder for access in the SEOC area.	Ongoing Negotiation with landholder	Production commencement date.
M	**Groundwater Impacts - Ashton** Potential compliance risks with extracting the lower seam longwall panels around the Bowmans Creek alluvials in the Ashton underground mine, specifically how much water is drained from the alluvials, how well the workforce is able to maintain economic productivity levels with higher groundwater make into the underground workings and any potential discharge issues associated with the higher water make.	Conduct ongoing groundwater modelling, validated by results from environmental testing.	Local Variation of Reserve estimate