NARRABRI MINE – JORC RESOURCE AND RESERVE

Table 1 – Checklist of Assessment and Reporting Criteria (The JORC Code, 2012 Edition)

The following table provides a summary of important assessment and reporting criteria used for the Narrabri Mine in accordance with the Table 1 Checklist of Assessment and Reporting Criteria, in The Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code) 2012 Edition. Criteria in preceding sections apply, where applicable, to the succeeding sections.

Section 1 – Sampling Techniques and Data

Criteria	Explanation
Sampling Techniques	Samples have been collected using wireline drilling methods as well as conventional core. Strip samples taken from the ribs of active workings were used in the coal quality model for various working sections. Analyses of these samples were only used when adequate sample height was taken. The coal seam working section was fully sampled. In some cases, sections were removed for gas content testing, but re-integrated into the sample composite after chemical analysis. The coal seam roof section contains stone bands. All inter-seam stone bands are included in this estimate. Coal quality estimation is inclusive of these stone bands. Intercept lengths and linear recovery are confirmed by wireline logging, where available. This includes, density, natural gamma, calliper deviation and other tools where required. Depths of seam/ply roof and floor picks have been corrected to geophysical logs where required.
Drilling techniques	HQ Triple Tube (HQ TT) core (61mm diameter) is the predominant drilling method. Open holes have been drilled where required for such purposes of piezometer installation, service wells, fault delineation. Convention 6” cores were sampled for specific purposes of washability analysis.
Drill sample recovery	Linear core recoveries are recorded and compared to drillers run lengths as well as geophysical logs. Seam samples with less than 90% linear recovery were excluded from the model. Chip samples were not used to assess coal quality. HQ wireline coring is used to maximise sample recovery. There is no known relationship between coal quality and sample recovery at Narrabri.
Logging	Core and chip samples were logged by geologists experienced in coal resource investigation and evaluation. Depths are recorded using drill strings and tape measures. Logs of rock type, grain size, strength and weathering are qualitative. All holes were wireline logged if possible (i.e. not blocked) and depths adjusted where needed. The minimum suite of downhole geophysical logs is gamma, density and calliper. All bore cores have been photographed. Total aggregate length of drilling from holes used in the geological model is 196,842 in 741 drill holes.
Sub-sampling techniques and preparation	Full cores were used for coal quality analysis. Chip samples were not used to assess coal quality. HQ coring used to ensure sample is representative, and that sufficient material is available for sub-samples.

Criteria	Explanation
	Sample preparation, sub-sampling and quality control procedures ensured by using commercial labs employing recognised QA procedures and following Australian Standards for coal testing. HQ coring used to ensure that sufficient mass and particle numbers are available for representative sub-samples. Linear core recoveries are recorded and results of seam samples with less than 90% recovery were excluded from the model.
Quality of assay data and laboratory tests	Sample preparation, sub-sampling and quality control procedures has been ensured by using commercial labs that use Australian Standards for coal testing. Samples were split and reserves retained where sufficient mass remained after testing. Coal quality was not estimated from geophysical measurements. Samples of known coal quality were sent with samples recovered from boreholes. The results of these standards were graphed over time and all fell within three standard deviations of the commercially stated values of the standard. Acceptable levels of accuracy and precision are maintained by using commercial labs that are regularly benchmarked by external auditors against ISO17025. These labs employ regular internal and external blind proficiency programs to provide a demonstration that results are controlled.
Verification of sampling and assaying	Coal intersections used in the geological model were verified by geophysical measurements obtained by wireline logging, carried out by an independent contractor, and more recently by digital photographs. Coal intersection depths and correlations have been validated by independent reviewers/auditors and/or alternative company personnel with working experience of the Project area. Drill hole data is stored in Geobank electronic database. Source field records, lab reports, core photographs, survey data etc. are stored in electronic form on the Whitehaven Coal network, and hard copy in borehole folders at the Project office and/or the company's Gunnedah office.
Location of data points	Collars for Project boreholes were surveyed by a Registered Surveyor, using triangulation or dGPS RTK methods. Surveyor's Reports are available for most boreholes. Locations for pre-project boreholes were taken from completion reports available from the NSW Trade and Investment "DIGS" web portal. The grid system used is the Map Grid of Australia 1994 (MGA94) based on the Geocentric Datum of Australia 1994 (GDA94) values. Older survey data has been converted from ISG. The Digital Terrain Model (DTM) used for this assessment was sourced from the NSW Department of Lands 1:50,000 topographic sheets for Baan Baa and Narrabri, on a 25m grid resolution.
Data spacing and distribution	Borehole spacing in the mine area (ML1609) varies between 50 m and 400 m, with closely spaced drilling in certain areas. In EL6243 borehole spacing varies between 200 m and 800 m. A geostatistical study was undertaken by MD Geology in 2016. Conditional simulation and kriging variance of seam thickness and ash was conducted for separate domains within the deposit. Seam thickness and ash were considered by MD Geology as the most variable of geological variables for this deposit. Where coal intersections have been sampled in multiple sections per seam, compositing of samples, on a length x RD basis, has been applied to provide representation of ply intervals and working sections.
Orientation of data in relation to geological structure	The orientation of data in relation to geological structure is not believed to have introduced any sampling bias.

Criteria	Explanation
Sample security	Core samples were either delivered to the lab by the field geologist, courier or collected by lab personnel. Appropriate chain of custody documentation has been used throughout the sampling and analysis process.
Audits or reviews	All Project borehole data, irrespective of purpose or use, are stored in the Geobank database. Also, a separate folder for each borehole in the Narrabri server contain the dataset i.e. hole completion form, coordinates, downhole survey, lithology logs, sampling details, geophysical logs, lab testing results. There are 2,629 drill holes listed in the Project database at 30 April 2021, many related to mining support activities. Following exclusion of data that was considered unreliable, or unnecessary for the geological model, 741 drill holes were selected as valid structural points of observation for resource assessment. 259 coal quality points of observation were included for the working section interval. The borehole database was independently audited in 2013, prior to preparation of the previous resource estimate. A new drill hole database (Geobank) was created and validated by the WHC Database Geologist, assisted by external geological personnel. The resulting geological model was audited using reports, tables, contour plans and cross-sections. A detailed review of the borehole database and geological modelling methods was also undertaken in 2019 and 2020 as part of the geological modelling and resource estimate.

Section 2 – Reporting of Exploration Results

Criteria	Explanation
Mineral tenement and land tenure status	The Narrabri coal deposit is currently held under two titles. These are, ML1609, and EL6243. Current mining operations are undertaken only within ML1609.
Exploration done by other parties	The majority of exploration at Narrabri (2,567 holes out of 2,629 in the database) has been completed by WHC. Only the DMR had drilled holes within the deposit prior to WHC's tenure.
Geology	Narrabri is a stratified coal deposit with an angular unconformity overlying the Permian strata. The resource is confined to the Hoskissons Coal which was deposited during the Permian. The coal resource classifies as sub-bituminous.
Drill hole information	All drill holes were (nominally) vertical. Due to the size of the geological database, it is impractical to include a list of collar and their location. Appropriate plans and summary tables are provided in the report. These summaries provide an accurate depiction of the coal resource.
Data aggregation methods	Coal intersections have often been sampled in multiple sections per seam. In these cases, compositing of samples, on a length x RD basis, has been applied. The reported coal quality is for the identified working section. The resource has not been limited by coal quality. All of the remaining resource is of a quality that is suitable for current uses.
Relationship between mineralisation widths and intercept depths	All drill holes used for modelling were (nominally) vertical. Target seam dips are generally less than 3 degrees. Intersections reported are for downhole intercept lengths.
Diagrams	Maps and sections are included in the Resource report.
Balanced reporting	There is no preferential reporting of results.
Other substantive exploration data	Geotechnical, groundwater and geochemical studies have been completed for ML1609, and reported elsewhere. Experience gained from the existing mining operation, together with existing studies, will provide a sufficient level of confidence for the assessment of mining potential for the remainder of ML1609 and EL6243. Approximately 75 line kilometres of 2D Seismic data has been acquired across both ML1609 and EL6243.
Further Work	There is an ongoing drilling program for the mine, carried out ahead of operations. Exploration within EL6243 is ongoing. This is to better define the resource quantity and quality as well as roof and floor characteristics that are essential to understand for underground mining.

Section 3 – Estimation and Reporting of Mineral Resources

Criteria	Explanation
Database integrity	Borehole collar locations and RL's were checked against surveyors' reports, field records (handheld GPS) and the DTM. Lithological logs and coal intersection depths were reconciled with wireline logs. Coal quality data were cross-checked against lab reports and sample depths were correlated with the lithological database. All survey, lithological and quality data are compiled in a Geobank database.
Site visits	Site visits took place prior to completion of the resource estimate and resource report.
Geological interpretation	The geological interpretation is based on drill hole data and reports from the Narrabri underground mine. The drill hole database is extensive and an alternative interpretation is highly unlikely. The location and displacement of faults could be interpreted differently but due to the small displacement any change in resource quantity would be negligible. Different fault interpretations are not expected to exclude any resources from the estimate. The main geological feature affecting seam continuity is the low angle unconformity between the Triassic Digby Formation and the Permian Hoskissons Coal, which eventually erodes the coal in the east of the Project area. The ash content of the working section increases towards the southwest.
Dimensions	The resource is approximately 15 kilometres in the north south direction and 5.5 kilometres in the east-west direction. Maximum depth of the resources is approximately 400 metres.
Estimation and modelling techniques	The geological model was developed by Whitehaven Coal using Maptek Vulcan software. The current estimate supersedes previous estimates and reports made by Whitehaven Coal and their external consultants. Coal seam gas content and coal spontaneous combustion potential have been recognised as variables of economic significance, and operational management plans are in place to address these issues. The selective mining of the working section of the Hoskissons Coal is taking place, and proposed for the remaining Project area. This interval contains the lowest ash content and highest energy coal which is suitable for the export market. The quality of the working section, as well as the roof and floor intervals, is suitable to continue supply of current products to existing and future customers. Higher ash sections, such as the roof interval will require beneficiation to meet current specifications. Contours of thickness and ash were compared to the base drill hole data to ensure the modelling process honoured the data.
Moisture	The basis of the tonnage estimate is in-situ moisture. A&B Mylec Pty Ltd completed an assessment on the estimation of the in situ moisture of the Narrabri resource and its relationship and impact on the known levels of plant feed total moisture (A&B Mylec, 2013). Their study utilised the in-situ moisture prediction equations developed from ACARP project C10042, based on proximate and ultimate analysis data, yielding a result of 12.2% ± 2%. This has been rounded down to 12.0% for the purposes of this assessment.
Cut-off parameters	No maximum raw ash cut off was applied to the working section. The ash content of this section does not exceed 30%. The current CPP can be used for beneficiation of high ash ROM coal. Current mining sequences allow adequate time to modify the CPP before the highest ash part of the resource is mined. No maximum raw ash content was assigned to the roof interval, as it is not considered a stand-alone resource but available for extraction in conjunction with the working section interval should mining and economic conditions permit.

Criteria	Explanation
Mining factors or assumptions	Coal resources are being and will continue to be mined by underground methods. There are no potential open cut resources in the Project area. Roadway development height is ~3.7 m. Minimum seam thickness for continuous miner extraction is 1.8 metres. Remnant coal remains within the mains, gate roads and longwall take-off barrier pillars are excluded from this estimate.
Metallurgical factors or assumptions	Proximate analysis (raw ash, inherent moisture, volatile matter, fixed carbon), total sulphur, specific energy, relative density and in-situ relative density determined from drill hole samples have been modelled. These are reported on a air-dried basis. Product coal quality statistics have been reported as a tabulated summary of drill hole data. Laboratory yield, as well as the method of product differentiation, is provided with the report.
Environmental factors or assumptions	ML1609 is covered by an Environmental Assessment. Project Approval and the necessary environmental licences for underground mining are in place. A MOP, which covers the impact of operations on the environment, is in place. Early consideration of potential environmental impacts of underground mining within EL6243 will be assisted by a Review of Environmental Factors (REF) for exploration activities currently in preparation. There are no known environmental constraints overlying the resources within either tenement.
Bulk density	Air dried relative density, air-dried moisture and in-situ moisture were used to derive in-situ density for each drill hole sample that had been analysed for all of these parameters. The in-situ density values were gridded and used to determine the mass of the coal resources. The method used to estimate in-situ density was developed Preston-Sanders (1993).
Classification	The spatial distribution of points of observation were used as a guide to determine the confidence classification for the resource. The geostatistical assessment discussed previously in this report was also considered. Where confidence in the quantity and quality was reduced due to anomalous drill hole data, the confidence classification was reduced Were the unconformity of the Digby Conglomerate reduces the working section to less than 4.3 metres, the confidence in the resource is reduced.
Audits or reviews	The geological model used to estimate these resources has been reviewed internally by WHC. Peer review of the resource estimate was also undertaken internally by WHC.
Discussion of relative accuracy/confidence	Geostatistical analysis was used to define relative accuracy of the geological continuity for two critical variables: ash and thickness. The Upper and Lower Hoskissons Seam sections were analysed. Each were broken into appropriate geological domains, and results for each domain were defined Measured resources were defined by ±10% for thickness, and ±15% for ash. A higher cut-off for ash was chosen as the overall ash for this seam is quite low (~10%ad). Indicated resources were defined by ±20% for thickness, and ±25% for ash. The Inferred resources are defined by the range of the variograms – which in all cases are less than the previous recommendations of the Australian Coal Guidelines of 4km between Points of Observation. All relative accuracies represent 95% confidence interval, calculated at 100m block size for thickness and 200m block size for ash.

Section 4 – Estimation and Reporting of Ore Reserves

Criteria	Explanation
Mineral Resource estimate for conversion to Ore Reserves	Reserves are based on Whitehaven Coal geological models, and the Resource classification polygons and estimate of Coal Resources prepared by Mr. Jorham Contreras of Whitehaven Coal Ltd. The estimate is dated May 2021. The Reserves are included in, and not additional to, the JORC Resources as reported by Whitehaven Coal.
Site visits	Mr Barker has visited NN on several occasions and has contributed to the technical assessments conducted in the past Palaris staff have corresponded with various NN and WHC staff on various occasions to discuss geology and mining issues related to the NN site.
Study status	Underground mining has been carried out at NN since 2010, with the longwall operations commencing in 2012. Palaris assessed the project to have complete the following areas of study to a feasibility level: Mining, Metallurgy, Economic, Marketing, Legal, Environmental, Social, Governmental, Native title and cultural heritage. This Reserve estimation is based on an XPAC scheduling model provided by Whitehaven, updated in 2016, 2017, 2018, 2019 and 2020 by Palaris. This model incorporates the current 400m wide longwall mine plan. Results from the model were used for independent economic viability testing. Mining of the underground Reserves is considered technically achievable and economically viable. Appropriate modifying factors have been considered that take into account geological structure, seam thickness, geotechnical conditions, loss, dilution and practical mining heights
Cut-off parameters	Variable longwall cut height ranging from 2.5m to 4.3m. Once the low height equipment is installed, the longwall cut height is capped at 3.5m. Coal quality with a raw ash above 14% translated to a thermal only product being produced
Mining factors or assumptions	The underground mining operation uses a conventional retreating longwall mining method. Access to the Reserves is via existing drifts. The underground mine plans address geotechnical conditions, seam gas and spontaneous combustion management, and ventilation requirements. Allowances for roof and floor dilution have been made when estimating run of mine Coal Reserves. Marketable Reserve estimates are based on exploration data, down rated to reflect practical yields achieved by the coal washery. Loss and dilution associated with faulting is applied on a case by case basis directly into the production model. Due to the nature of the working section being contained wholly within the seam – it is assumed dilution is at the seam quality and there are no losses applied. The economic evaluation includes the use of Inferred Mineral Resources that lie in the south-west corner of the mine. The Inferred Resources account for 0.01% of the tonnages used in the economic model and do not have a material impact on the value of the project. Minimum cut height of 2.5m for the Longwall. All infrastructure for the life of mine plan is in place and the purchase of the 400m wide longwall is complete. Additional lower cut height longwall to be purchased in FY2026.
Metallurgical factors or assumptions	ROM coal from the underground operation is currently bypassed or washed to PCI and thermal products.

Criteria	Explanation
	In-situ coal tonnages are based on an average 11.2% (in situ) moisture for the coal portion. An assumed 11.2% ROM and bypass product moisture, 11.4% PCI product moisture and 11.1% CHPP thermal product moisture has been used in the calculation of Coal Reserves and Marketable Reserves. The product spilt has been divided based and modelling and algorithms developed by A&B Mylec and then imported into the production model. Where ROM ash is elevated (above 14%), it is assumed that a single export thermal product would be produced, and lower yields would result from the requirement to wash more coal. The specification for the Thermal product was based on the Newcastle Benchmark 6300kcal GAR specification with discounts and premia applied as required. As large amounts of the bypass coal is passed through on size (20mm) and therefore it is difficult to estimate the amount of bypass coal from the slimcore- hence the current percentage of bypass was used for the Reserve
Environmental	A reject management strategy is in place for NN. Approvals and environmental licenses are in place for the existing mining operation on ML1609. A Mine Operations Plan (MOP) is in place for the period ending 31 December 2023. Stage 2 Project Approval was granted in December 2015 for the 400m wide longwall panels. Mechanisms and a timetable are in place to obtain further approvals for the NS project, and it is anticipated that they will be in place as required.
Infrastructure	All necessary infrastructure to support NN is in place at the mine site. Power is supplied from the grid. Water is supplied from surface water catchments. The workforce is accommodated in the nearby communities.
Costs	CAPEX for NN (panels south of the current mains) and NS based annual CAPEX summaries provided by WHC Financial analysis assumes that the NN MIA and surface infrastructure will be used for NS Sustaining capital costs per tonne are provided by WHC WHC supplied historical FOR operating costs as per the most recent year of production. Projected FOR costs have been estimated based on this data Ex-mine costs including port costs, rail, admin and other ex-mine costs per tonne were provided by WHC Export thermal and PCI coal sale price and foreign exchange rates were determined by Palaris using data from Consensus Economics March 2020 survey. No premium or discount to the benchmarks have been applied in the model Royalty based on NSW government royalty of 7.2% of revenue for underground coal mining. An allowance of 1.0% of revenue for private royalties has been applied in the model
Revenue factors	Export thermal and PCI coal sale price and foreign exchange rate forecasts were determined using Consensus Economics. Adjustments on energy as received and penalties on ash as received were applied where appropriate in the DCF model. These adjustments were applied using the Newcastle Thermal Coal benchmark (6,300kcal/kg GAR) product specification.
Market assessment	Australian thermal coal export volumes are expected to grow by 18 Mt from 213 Mt in 2019-20 to 231 Mt in 2025-2026 as several mines ramp up production. Shift in world coal trade towards the Asia-Pacific is expected to favour Australian thermal coal exporters over competitors such as the United States and Columbia. Newcastle Benchmark spot price is forecast to average US$60 to US$73 a tonne (real terms) over the five years to 2023 up from a 2020 Q3 low (US$50/tonne). Seaborne imports are anticipated to reduce slightly, however there may be some

Criteria	Explanation
	support to prices due to a lack of new projects in the pipeline. (Source: Department of Industry, Resource and Energy Quarterly March 2021). Whitehaven sells thermal and coking coal products to power generators and steel producers in the premium Asian markets. At Narrabri, export thermal and PCI coal products are produced from the Hoskissons seam with the thermal coal product being a recognised brand on the Asian export thermal market
Economic	Palaris have updated the NN XPAC schedule based on Whitehaven's Life of Mine Plan and evaluated that in a financial model. Financial model inputs included: Schedule from updated NCO (NN and NS) XPAC production models, emulating production forecast in the Whitehaven Life of Mine Plan (NB: production tonnages used in the DCF model is 100% covered by Proven and Probable Reserves) FOR operating cost forecasts estimated by Palaris based on a review of historical data and forecast FOR cash costs supplied by WHC Ex-mine operating costs and sustaining capital costs per tonne supplied by WHC CAPEX for NN (panels south of the current mains) and NS based on annualised CAPEX forecasts as provided by WHC. Financial analysis assumes that the NN MIA and surface infrastructure will be used for Royalty based on NSW government royalty of 7.2% of revenue for underground coal mining. An allowance of 1.0% of revenue for private royalties has been applied in the model Australian company tax rate (30%) applied in the model Palaris used thermal and PCI coal sale price forecasts and foreign exchange cross-rate forecasts based on the macroeconomic assumptions as provided by WHC NPV was calculated using 11.5% (real) discount rate and a valuation date of 1st April 2021. Based on this modelling the project showed a positive NPV and is considered economically viable Sensitivities were conducted on several parameters and the project was most sensitive to export coal price, exchange rate, OPEX and yield Sensitivity analysis for coal price, OPEX and yield (±10%) and CAPEX (±25%) showed four years of negative cash flow on an annual basis (related to a period of expected capital investment prior to the commencement of NS) and all cases resulted in a positive NPV.
Social	Palaris are unaware of any Native Title Claims over the NC leases. No Reserves have been omitted on this basis.
Other	Required approvals are in place for current operations, and those required for continued operation have been identified. Mechanisms and a timetable are in place to obtain these approvals, and it is anticipated that they will be in place as required. Whitehaven have applied for a Mining Lease that will cover NS and submitted an EIS for NS in late CY2020.
Classification	Mineral Resource to Ore Reserve conversion: Mining domains within Measured Resource have been converted to Proved Reserves Mining domains within Indicated Resource have been converted to Probable Reserves Mining domains within Inferred Resource areas have not been converted into Reserves The Reserve estimate consists of 94% Proved and 6% Probable Reserves (ROM). This appropriately reflects the view of the Competent Person (Michael Barker) with regard to the confidence levels for NC underground Reserves.
Audits or reviews	Palaris is not aware of any audits or reviews of NC Reserve estimates, or production reconciliations (other than reconciliations in previous Reserve estimates).

Criteria	Explanation
Discussion of relative accuracy/ confidence	The confidence level determined in the Resources was estimated by Mr. Jorham Contreras of WHC, who also is the Competent Person signatory. Palaris considers that the Resource categories are appropriate for the Reserve classification. This meant that it was possible to directly transfer Measured Resources into Proved Reserves and Indicated Resources into Probable Reserves for all areas with sufficient Reserves confidence.