Malabar Resources Limited
Maxwell Underground Mine
Woodlands Hill Seam Longwalls 1-4,
Environmental Risk Assessment Report

Report Title:	**Maxwell Underground Mine Woodlands Hill Seam Longwalls 1-4 ERA Report**
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DOCUMENT DISTRIBUTION AND CONTROL

Ref No.	RM19223
Title	Maxwell Underground Mine – Woodlands Hill Seam Longwalls 1-4 Environmental Risk Assessment Report
General Description	Identification and assessment of key potential environmental issues associated with the mining of Longwalls 1-4 in the Woodlands Hill seam at the Maxwell Underground Mine.
Key Supporting Documentation	AS/NZS ISO 31000: 2009 Risk Management – Principles and Guidelines. IEC61882:2016 Hazard and Operability Studies (HAZOP)

Versions

Rev	Description	Date
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1 Introduction

The Maxwell Underground Mine (Maxwell Mine) is owned and operated by Maxwell Ventures (Management) Pty Ltd (Maxwell), a wholly owned subsidiary of Malabar Resources Limited (Malabar). The Maxwell Mine is located in the Upper Hunter Valley of New South Wales (NSW), east-southeast of Denman and south-southwest of Muswellbrook.

The Maxwell Mine is an underground mining operation that is approved to operate for 26 years (until 2047) (Figure 1). The Maxwell Mine involves extraction of run-of-mine coal from four seams within the Wittingham Coal Measures (Figure 2).

Development Consent State Significant Development (SSD) 9526 (SSD 9526) for the Maxwell Mine was granted by the NSW Independent Planning Commission on 22 December 2020. The Maxwell Mine was subsequently approved under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* in March 2021 (EPBC 2018/8287).

Development Consent SSD 9526 has been modified twice (referred to as Mod 1 and Mod 2). EPBC 2018/8287 has also been varied to address the changes to Development Consent SSD 9526 arising from Mod 1.

This Environmental Risk Assessment (ERA) identifies the key potential environmental issues associated with Woodlands Hill Seam Longwalls 1-4 for consideration in the Woodlands Hill Seam Longwalls 1-4 Extraction Plan (the Extraction Plan). The Woodlands Hill Seam Longwalls 1-4 Study Area is shown on Figure 3.

Figure 1: Approved General Arrangement

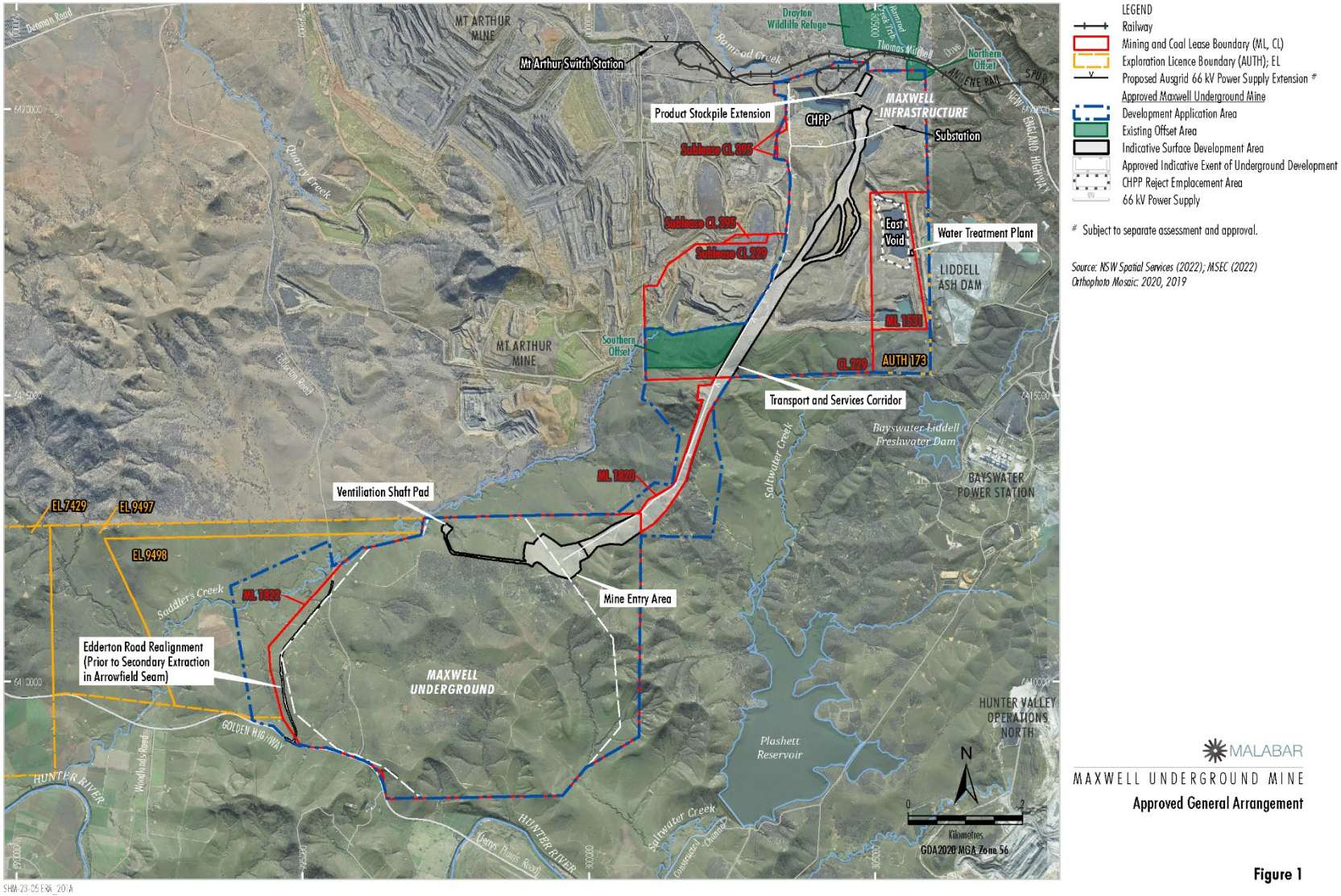


Figure 2: Indicative Underground Mining Layout (Figure 5, Appendix 2 of SSD9526)

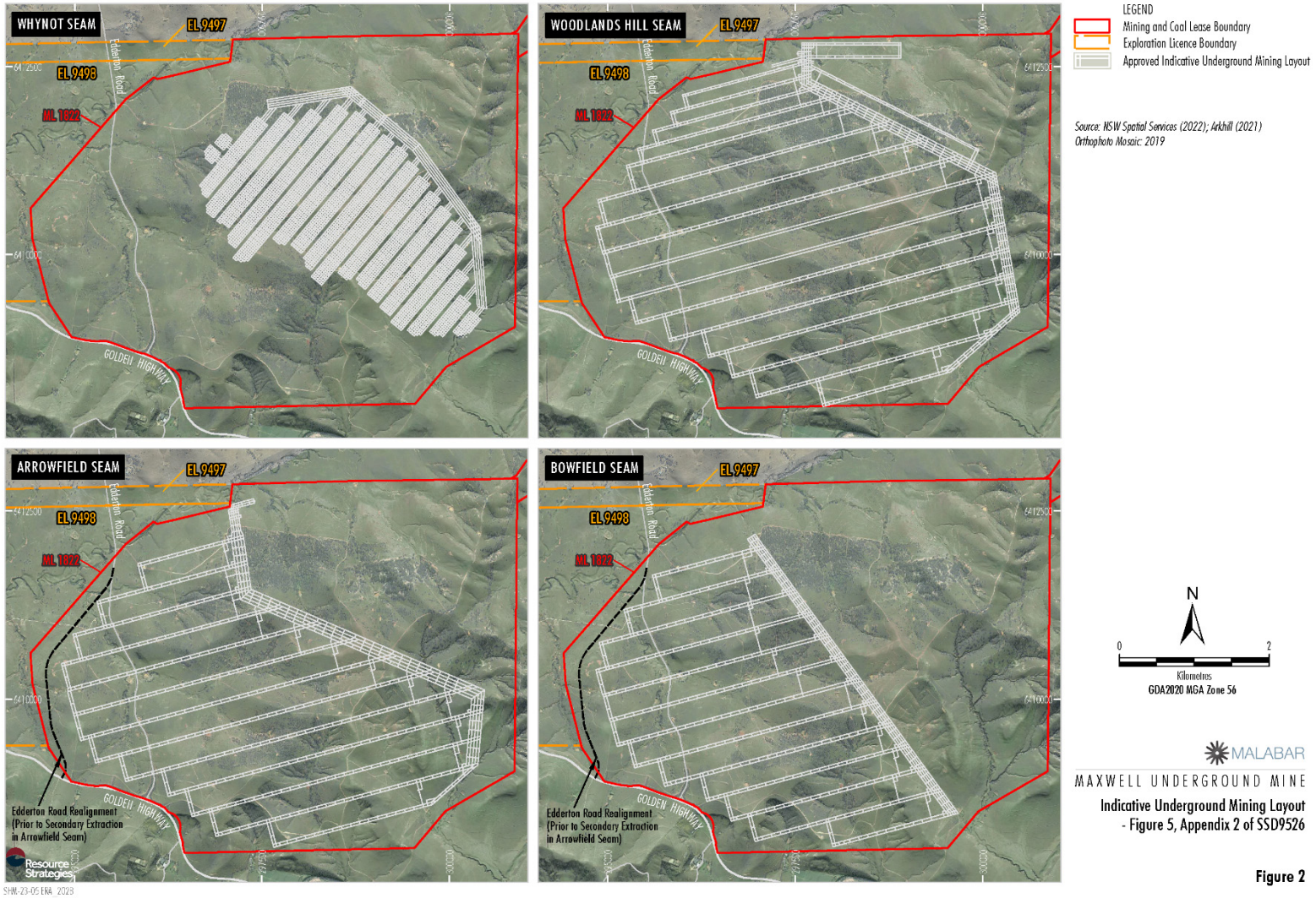
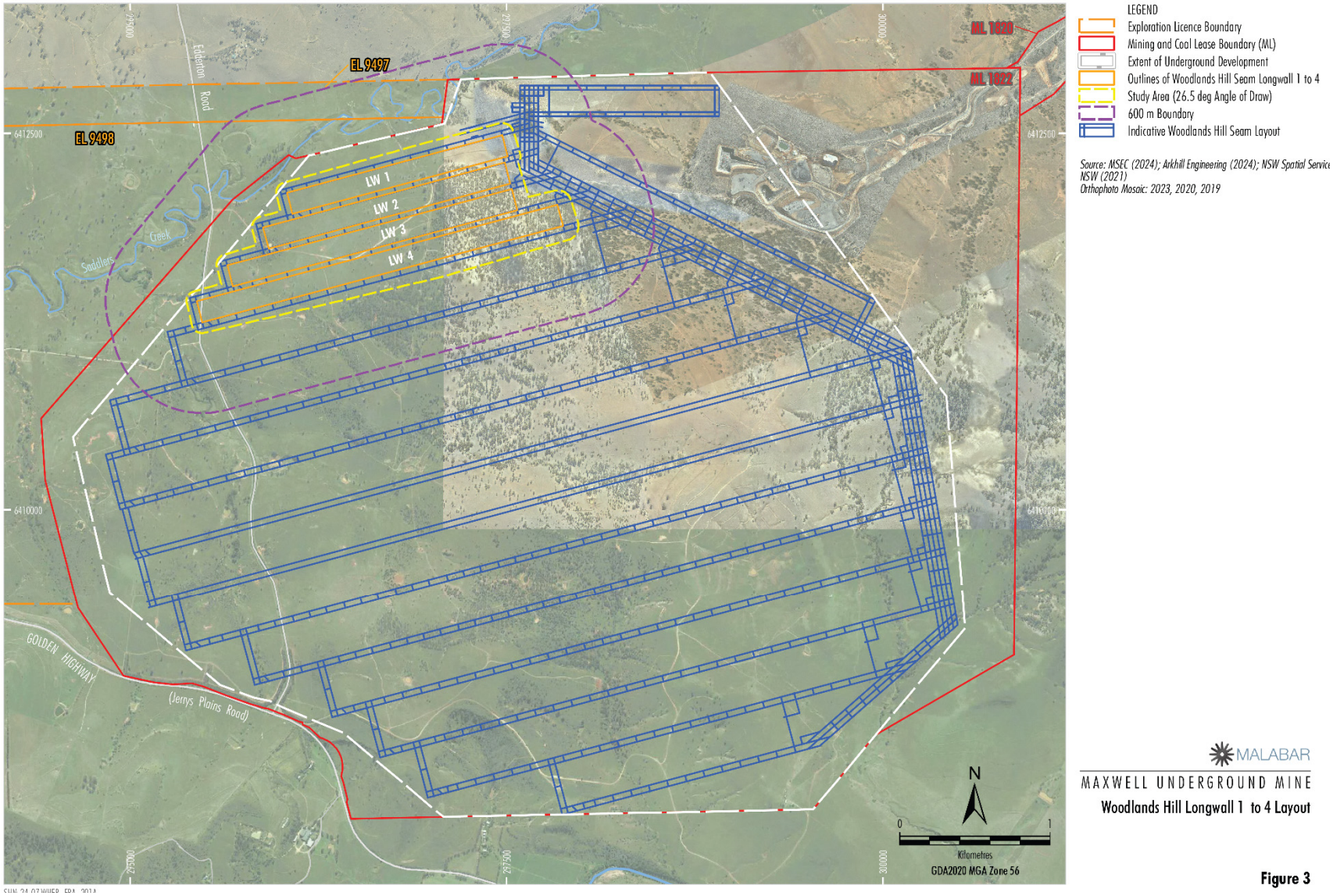


Figure 3: Woodlands Hill Seam, Longwalls 1 to 4 Layout



1.1 Purpose and Scope

The purpose for conducting this ERA was to identify key potential environmental issues associated with mining of the Woodlands Hill Seam Longwalls 1-4 for inclusion in the Extraction Plan. The NSW Department of Planning and Environment (DPE) (2022) *Extraction Plan Guideline* states:

> *All sub-plans should consider risk assessment and risk management, particularly for public safety management plans and built features management plans.*

The six key component plans for the Extraction Plan are as follows:

- Water Management Plan (WMP);
- Land Management Plan (LMP);
- Biodiversity Management Plan (BMP);
- Heritage Management Plan (HMP);
- Built Features Management Plan (BFMP); and
- Public Safety Management Plan (PSMP).

This ERA Report has been prepared for the Extraction Plan and key component plans to assess the potential impacts of Woodlands Hill Seam Longwalls 1-4 extraction on natural, heritage and built features.

Recommendations for follow up items identified by the team in the risk assessment are presented in Table 1 below. The team understood that Malabar will track and review these actions as required and confirm the adequacy of the identified controls.

With the application of the identified controls, the team consensus was that potential subsidence related impacts over Woodlands Hill Seam Longwalls 1-4 could be managed at a tolerable level of risk.

Table 1 – Issues with Identified Follow Up Opportunities

Ref	Issue	Action Item(s)	Responsible	Due
ISEx044	Surface cracking and impact on multiple environmental or built features (e.g. land use, heritage items, agricultural infrastructure, etc.). Noted that majority would be located on Malabar-owned land.	Confirm any required remediation of public roads is covered in Built Features Management Plan considerations.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx057	Potential impact on Aboriginal cultural heritage sites (e.g. open artefact scatters and stone quarry).	Review if there is a requirement for the Registered Aboriginal Parties to be involved in signage around key heritage items. Confirm considered in Heritage Management Plan.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx035	Impacts on access for firefighting or fire management purposes over subsidence affected areas.	Confirm Built Features Management Plan applies to AusGrid powerlines and different roads and tracks.	Technical Services Superintendent	Prior to Extraction Plan lodgement
ISEx061	Impacts on monitoring bores (identified as critical for determining groundwater impacts such as DD1032).	Confirm outputs of the bore study included in the Ground Water Management Plan components of the Water Management Plan.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx046	Subsidence impacts on cadastral reference and state coordinated marks for property boundaries.	Each Extraction Plan application area will need an application to disturb survey marks. One, low value, coordinate mark (some monitoring may be required). Consultation and application to NSW Spatial Services.	Technical Services Superintendent	Q2 2025
ISEx010	Creation of subsidence repairs, monitoring or other tracks affects the conservation values of the Offset areas.	Minimise disturbance in Biodiversity Stewardship Site. Manage as per Biodiversity Stewardship Agreement.	HSEC Manager	Prior to Extraction Plan lodgement

Ref	Issue	Action Item(s)	Responsible	Due
ISEx013	Subsidence impacts and surface disturbance due to the extraction of longwalls resulting in loss of habitat for threatened species.	Consider impacts to woodland vegetation in Biodiversity Technical Report.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx064	Inadvertent disturbance to the Acacia Pendula habitat area that is located within 600 metres (m) of Longwall 4 associated with access tracks.	Review if fencing is required of the Acacia Pendula habitat area to manage traffic flows in the area.	Technical Services Superintendent	Prior to Extraction Plan lodgement
ISEx022	Saddlers Creek damaged by subsidence resulting in inflow to workings and delay to operations.	Review monitoring methodology for Saddlers Creek. Review whether licensing is available as a contingency response.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx038	Impacts to downstream water quality.	Review the impacts of subsidence on any erosion of water way and associated cultural heritage artefacts.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx049	Subsidence resulting in ponding impacts on the surface.	Review predicted surface subsidence and map over the current surface topology and confirm that there are limited potential areas likely to suffer ponding.	HSEC Manager	Prior to Extraction Plan lodgement
ISEx063	Subsidence impacts on farm dams located at the end of Longwalls 2 and 3.	Assess potential for inflow/overflow risk and drain dams in advance of mining, if required.	Technical Services Superintendent	Q3 2025
ISEx067	Subsidence impacts on roads and surface leads to exposure of potential health and safety impacts of vehicles and pedestrians.	Implement controls through Built Features Management Plan.	Technical Services Superintendent	Prior to Extraction Plan lodgement
ISEx078	Identify if there is a gap in the Aboriginal heritage surveys areas as there is an area between the approved mining boundary and 600 m boundary of Woodlands Hill Seam Longwalls 1 to 4 that has not undergone field surveys for the Maxwell Mine.	Review the AHIPs database and BHP register for artefacts on the northern area of the extraction plan area.	HSEC Manager	Prior to Extraction Plan lodgement

1.2 Structure of this Report

The remainder of this ERA Report is structured as follows:

Section 2 Describes the previous ERA's conducted in relation to the Maxwell Project Environmental Impact Statement (Maxwell EIS), earlier ERA for the Whynot Seam Panels 2 to 5 and background information provided to ERA participants in relation to the Woodlands Hill Longwalls 1-4.

Section 3 Details the Woodlands Hill Seam Longwalls 1-4 ERA and outcomes.

Section 4 Provides concluding remarks.

Section 5 Lists the references cited in this ERA Report.

Section 6 Provides some additional information developed during the ERA preparation and team session.

2 Previous Environmental Risk Assessment and Background Information

2.1 2019 Environmental Risk Analysis

An assessment of environmental risks for the Maxwell Mine was conducted as part of the Environmental Risk Analysis prepared by Operational Risk Mentoring (2019) and was included as Appendix S of the Maxwell EIS (Malabar, 2019).

Woodlands Hill Seam Longwalls 1 to 4 are located within the extent of the 'Maxwell Project Underground' area considered as part of the 2019 Environmental Risk Analysis (Operational Risk Mentoring, 2019).

The 2019 Environmental Risk Analysis was conducted by Malabar and its consultants with an appropriate mix of skills and experience. The risk assessment process was aligned with the Australian Standard/New Zealand Standard (AS/NZS) International Organisation for Standardisation (ISO) 31000:2018 *Risk Management –Guidelines.*

The key potential environmental issues identified in the 2019 Environmental Risk Analysis for the Maxwell Mine are provided in Table 2.

2.2 Whynot Seam Panels 2 to 5 Extraction Plan

An ERA (Risk Mentor, 2024) for the Whynot Seam Panels 2 to 5 Extraction Plan was undertaken to identify subsidence impacts with high risk levels and/or potential severe consequences, including a workshop conducted in August 2023. The workshop was facilitated by a risk assessment specialist and attended by relevant Malabar personnel and technical specialists.

The ERA participants reviewed a number of relevant documents including, but not limited to, the 2009 Environmental Risk Analysis (Risk Mentoring, 2019), figures showing the panel layout in relation to key surface features, and the subsidence predictions Whynot Seam Panels 2 to 5. The participants were asked to identify any additional (specific) issues/risks and/or changes to previously assessed levels of risk in preparation for each ERA workshop.
The key potential environmental issues identified for the Whynot Seam Panels 2 to 5 ERA are provided in Table 3.

The assessed level of risk for each of the loss scenarios identified for Whynot Seam Panels 2 to 5 were reviewed for Woodlands Hills Longwalls 1 to 4, considering the experience to date and using the same probability, consequence and risk rankings tables (refer to Tables 5 and 6 in Section 3).

It was recognised that several risks and associated management measures for the Whynot Seam Panels 2 to 5 Extraction Plan were relevant to the Woodlands Hills Longwalls 1 to 4 Extraction Plan. Considering experience to date for the Whynot Seam Panels 2 to 5 Extraction, key controls and actions were identified and implemented, where relevant, for the Woodlands Hill Longwalls 1 to 4 Extraction Plan.

Table 2 – Priority Issues – Maxwell Project

Ref	Issue	Aspect Type
IS024	Increase in leakage from the Hunter River reduces neighbouring landholder's access to water.	Water
IS013	Activities associated with mine construction and operations negatively affect the horse studs' customers' perceptions impacting these businesses and their contributions to the Equine Critical Industry Cluster (CIC).	Land and Agriculture
IS044	Poor consultation or engagement with neighbours, council and other stakeholders results in poor social outcomes and/or a poor relationship (e.g. mistrust) between Malabar and its neighbours and stakeholders.	Social/Economic
IS045	Existing landform at Maxwell Infrastructure proves a key constraint to achieving a desirable final landform.	Land and Agriculture
IS062	Impacts on biodiversity as a result of cumulative baseflow reductions in Saddlers Creek.	Water
IS014	Visual impacts result in a reduction in visitors to Hollydene Estate Wines or the region.	Visual
IS069	Off-site end user impacts from coal use.	Noise and Air Quality
IS020	Impacts on the wellbeing of neighbouring landholders as a result of noise, cumulative noise impacts or cumulative dust deposition from the Maxwell Infrastructure (e.g. sleep, outdoor amenity or rainwater tank water quality).	Social/Economic
IS008	Leakage between aquifers that diminishes the beneficial use value of aquifers due to changes in water quality.	Water
IS009	Leaching of contaminants into aquifers near the Maxwell Infrastructure that reduces their beneficial use.	Water
IS046	Existing final voids at the Maxwell Infrastructure leave legacy issues for the community beyond the mine's closure.	Social/Economic
IS034	Impacts on ecological communities or threatened species.	Biodiversity
IS033	Impacts on groundwater dependent ecosystems as a result of groundwater drawdown or direct disturbance.	Biodiversity
IS037	Excess mine water/groundwater generated on-site exceeds storage/usage requirements resulting in off-site impacts.	Water
IS059	Project traffic movements results in worsening of traffic conditions in Singleton.	Road and Rail
IS015	Noise from Maxwell Infrastructure results in impacts on residential amenity of nearby properties.	Noise and Air Quality
IS017	Noise from mine entry area and conveyors results in impacts on residential amenity of neighbouring properties.	Noise and Air Quality
IS030	Subsidence-related impacts on Malabar-owned land results in reduced agricultural productivity (e.g. increased soil erosion, ponding, degraded agricultural infrastructure, degradation of drainage lines and creeks).	Land and Agriculture
IS047	Population effects due to Project workforce demands.	Social/Economic

Table 3 – Priority Issues from the Whynot Seam Extraction ERA

Ref	Process/Issue/Activity	Aspect Type
MC001	Potential impacts on open artefact scatters.	Archaeological
MC007	Management plan delays cause delays to Extraction Plan approval resulting in potential business losses arising due to operating conditions.	Business
MC011	Ecological species impacted by mining related activities including threatened fauna and flora (and ecological communities).	Flora/Fauna
MC018	Presence of a geological structure mid-block in the panels which might lead to differences between modelled and observed groundwater drawdown (possibly conservative at a distance, but inaccurate locally and the risk also relates to monitoring and licensing issues).	Groundwater
MC044	Subsidence causes damage or harm to other built surface features requiring remediation.	Infrastructure
MC034	Subsidence impacts resulting in injury to livestock.	Land
MC035	Impacts on access for firefighting or fire management purposes over subsidence affected areas.	Public Safety
MC038	Impacts to downstream water quality arising from subsidence (with no credible issues identified beyond the overlying second order streams and very minor potential for ponding).	Surface Water

Risk ranking was undertaken by the team for loss scenarios in consideration of the key potential environmental issues. The risk rankings indicated that the loss scenarios ranked were within the “Medium - ALARP” or “Low” range by the risk assessment team and the outcomes were integrated into the overall management systems so that they would be effectively reviewed, implemented and monitored.

3 Maxwell Mine Woodlands Hill Longwalls 1-4 Environmental Risk Assessment

3.1 The Team

In accordance with Condition C8, Part C of Development Consent SSD 9526, the suitably qualified and experienced experts endorsed by the Planning Secretary of the NSW Department of Planning, Housing and Infrastructure (formerly known as DPE) for the preparation of the Extraction Plan participated in the Woodlands Hill Longwalls 1-4 ERA. The team members involved are presented in Table 4 below. Each team member shared their goals for attending the session – and these were captured and the status of them noted at the end of the team meeting (and are included in Table 4).

Table 4 – Team Members

Name	Role / Affiliation	Skills
Dominic Brown	Malabar - Environment and Community Superintendent	Dip. Env. Technology, Grad. Cert. Occupational Hygiene, Grad. Cert HSE Mgmt. ISO Env. Mgmt System Lead Auditor; 20 years industry experience.
Tim Britten	Malabar - Technical Services Superintendent	B Sc (Geol), M Eng (Geotech), Diploma in Coal Mine Strata Control and Ventilation, VO's ticket; over 20 years industry experience.

Name	Role / Affiliation	Skills
Peter Sergeant	Malabar - Registered Land and Mining Surveyor	B. Surv., Registered Land & Mining Surveyor. Over 25 years industry experience.
Alex Newton	Malabar - Environment and Approvals Coordinator	Air quality skills, 25 years broad operational, construction and planning environmental management.
Geordie Oakes	AECOM Australia – Principal Heritage Specialist	Formal qualifications and over 15 years' experience in field work, consulting and traditional owner liaison
James Barbato	MSEC – Associate Director	B Eng (Civil), PhD and over 20 years' experience in the mining industry.
Noel Merrick	Hydro Algorithmics – Director	PhD, MSc, BSc in Geophysics and Hydrogeology, over 50 years research and consulting experience.
Josh Peters	Resource Strategies – Principal	BSc (Environmental Science and Management) with skills and training in environmental management, rehabilitation, approvals processes and EIS development.
Harper Mulloy	Resource Strategies - Environmental Project Manager	BSc and BA, training and consulting experience in environmental analyses of resource and renewable projects for over 2 years.
Colin Driscoll	Hunter Eco – Independent Environmental Consultant	PhD, BSc, and over 30 years' experience across a number of areas - normally for coal mining operations.
Chris Donohue	Land and Property Coordinator – Malabar	Certificate III in Conservation and Ecosystem Management. 3 years onsite experience as Land and Property Coordinator at Maxwell.
Greg Roads	WRM Water and Environment - Director	B. Eng (Civil) and over 20 years' experience in hydraulic design, monitoring and project management.
Peter Standish	Facilitator / RM	Formal mining qualifications (PhD, B.Eng.), statutory manager qualifications and over 30 years industrial experience. Facilitator for over 20 environmental risk analyses.

3.2 Review of Relevant Documentation in advance of the ERA Workshop

In preparation for the Maxwell Mine Woodlands Hill Seam Longwalls 1-4 ERA workshop, the ERA participants reviewed a number of documents relevant to the risk assessment. This included (but was not limited to):

- The 2019 Environmental Risk Analysis (Operational Risk Mentoring, 2019) conducted for the Maxwell EIS (Appendix S of the Maxwell EIS).
- The 2023 Extraction of the Whynot Seam Panels 2-5 Environmental Risk Analysis (Risk Mentor, 2024).
- Figures showing the Woodlands Hill Seam Longwalls 1-4 layout in relation to key surface features (MSEC, 2024 ref WHLW1 to WHLW4).
- Preliminary subsidence predictions for Woodlands Hill Seam Longwalls 1-4 (including subsidence contours and impacts on identified surface features [MSEC, 2024]).

The ERA participants were asked to identify any additional (specific) issues or risks, and changes to previously assessed levels of risk in preparation for the ERA workshop.

3.3 ERA Workshop (August 2024)

The ERA workshop for Woodlands Hill Seam Longwalls 1-4 was conducted on 29th August 2024, with participants either attending via video conferencing or in person at the Maxwell Mine.

The ERA workshop was facilitated by an independent specialist, Dr Peter Standish of Risk Mentor, a company specialising in risk management processes.

The loss scenarios previously identified in earlier studies were reviewed for Woodlands Hill Seam Longwalls 1-4, considering the experience to date and using the same probability, consequence and risk rankings tables as used for the previous ERAs (Table 5 and Table 6 below).

The consensus of the workshop participants was the issues and risks identified for Woodlands Hill Seam Longwalls 1-4 represented a tolerable level of risk. The rankings of the key issue types are provided in Table 7 below.

Table 5 - Qualitative Measures of Probability

Rank (P)	Descriptor	
E	Almost Certain	Happens regularly
D	Likely	Could easily happen
C	Possible	Could happen and has occurred previously
B	Unlikely	Hasn't happened but could
A	Rare	Conceivable, but only in extreme circumstances

Source: Malabar (2022).

The assessed level of risk for the loss scenarios are provided in Table 7. The risk rankings indicated that the loss scenarios ranked for Woodlands Hill Seam Longwalls 1-4 were within the "Low" to "Medium" range and the outcomes could be integrated into the overall management systems in the Extraction Plan.

The reader should note that the risks stated in Table 7 below were confirmed by the team to broadly summarise the grouped issues presented in Table A-1 in Appendix A of this report.

Table 6 – Maxwell Mine Risk Matrix (Malabar, 2022)

MALABAR **Risk Matrix**		**Consequence (Reasonable Potential Consequence of the Event)**				
Impact	**Code**	**5 Extreme**	**4 Major**	**3 Serious**	**2 Moderate**	**1 Minor**
Harm to People	**H&S**	Multiple fatalities	Single fatality, permanent disabling injury / health impact	Serious Bodily injury or reversible health impact (Lost Time Injury)	Minor injury or exposure to major health risk (Medical or Restricted Work Injury)	Slight injury or exposure to minor health risk (First Aid Injury or less)
Environmental	**Env.**	Extreme environmental harm (irreversible damage or license revoked)	Material environmental harm (long term impact or prosecution)	Serious environmental harm (medium term impact and or infringement notice or caution)	Minor environmental harm (temporary impact or non-compliance)	Negligible environmental harm (administrative non-compliance)
Impact on Reputation	**Rep.**	International Coverage - irreparable brand damage	National Coverage – Temporary withdrawal of license to operate	Regional Coverage -Major compliance failure involving fines	Local coverage - Intervention of regulatory authority	Isolated compliance failure - no brand damage
Impact on NPV	**NPV**	>$50M	>$15M to $50M loss	>$3.5M to $15M loss	$1M to $3.5M loss	<$1M
Life of Mine Capital	**LoM**	>$50M	$10M to $50 increase	$1M to $10M increase	$500k to $1M increase	$100k to $500k increase
Operating Profit (Opex increase or revenue decrease)	**OP**	>$20M	$7.5M to $20M	$2M to $7.5M	$200k to $2M	<$200k
Schedule Delay (Post Approval)	**Delay**	>3 months	>1 month to 3 months	>7 days to 1 month	>2 days to 5 days	<2 days
Likelihood (of event occurring with potential consequence)		**Risk Level**				
Almost Certain Happens regularly	**E**	**25 E – Extreme**	**23 E - Extreme**	**20 E - Extreme**	**16 H - High**	**11 M - Medium**
Likely Could easily happen	**D**	**24 E - Extreme**	**21 E - Extreme**	**17 H - High**	**12 H - High**	**7 M - Medium**
Possible Could happen and has occurred previously	**C**	**22 E - Extreme**	**18 H - High**	**13 H - High**	**8 M - Medium**	**4 L - Low**
Unlikely Hasn't happened but could	**B**	**19 H - High**	**14 H - High**	**9 M - Medium**	**5 L - Low**	**2 L - Low**
Rare Couple happen, but only in extreme circumstances	**A**	**15 H - High**	**10 M - Medium**	**6 L - Low**	**3 L - Low**	**1 L - Low**

Risk Level			**Risk Action – refer to the Malabar Risk Management Procedure**	
Extreme	**20 to 25**		Do not proceed with GM approval and development / implementation of additional controls	Maxwell Complex Risk Matrix
High	**12 to 19**		Do not proceed without risk owner approval and confirmation that existing / additional controls are effectively implemented	MXC_FRM_HS_RiskMatrix_A3_R3
Medium	**7 to 11**		Confirm existing / additional controls are effectively implemented	Owner: HSEC Manager
Low	**1 to 6**		Monitor controls	Date of Issue: 01/11/2021

Note, in the table, Cat refers to the category code of the risk, L for the likelihood and C for the consequence.

Table 7 - Assessed Level of Risk – Woodlands Hill Seam Longwalls 1-4 Loss Scenarios

Ref	Process/Issue/Activity	Aspect Type	Planned Controls (see Issues) - Ranking Basis	Cat	L	C	R
MC001	Potential impacts on open artefact scatters.	Archaeological	High likelihood subsidence may occur in the Extraction Plan Study Area and possible that the event occurs within approved conditions. Likely concerns regarding potential cracking or movement of the soils which could cause movement or damage. Relatively low consequence as the sites known to be located over the Extraction Plan Study Area are of limited significance scientifically and the appropriate mitigation and management processes are in place. Potential impacts on open artefact scatters will be addressed by Inspections and Surveys required under the Subsidence Monitoring Program, Aboriginal Cultural Heritage Management Plan and Heritage Management Plan.	Env	C	2	**8 M - Medium**
MC007	Management plan delays cause delays to Extraction Plan approval resulting in potential business losses arising due to operating conditions.	Business	Multiple measures currently in place to limit the potential for management plans to cause delays in the Extraction Plan approval. Development of the Extraction Plan schedule has allowed for buffer in consideration of potential delays (significant lead time). Any delay would be less than a couple of months with reviews of any mitigations for delays in the mining schedule.	OP	B	2	**5 L - Low**
MC044	Subsidence causes damage or harm to other built surface features requiring remediation.	Business	Built features are located on Malabar owned land and built features management plan mitigates any impacts to tolerable levels.	OP	D	1	**7 M - Medium**
MC011	Ecological species impacted by mining related activities including threatened fauna and flora (and ecological communities).	Flora/Fauna	For the recorded threatened fauna and flora species identified in the Extraction Plan Study Area, it would require significant impacts on the vegetation communities to be affected. The threatened bats species Southern Myotis has the ability to access other nearby dams to compensate for the loss of one dam. Subsidence is unlikely to materially impact native vegetation within the predicted subsidence area as the larger surface cracks would be remediated and potential impacts on trees is unlikely based on experience and monitoring results from similar underground mining operations elsewhere in the Hunter Valley (Hunter Eco, 2019).	Env	B	2	**5 L - Low**

Ref	Process/Issue/Activity	Aspect Type	Planned Controls (see Issues) - Ranking Basis	Cat	L	C	R
MC018	Presence of a geological structure which might lead to differences between modelled and observed groundwater drawdown (possibly conservative at a distance, but inaccurate locally).	Groundwater	Unlikely that there will be a significant structure to connect to Saddlers Creek (as the only groundwater resource of value in proximity). Very small throws and any larger throws would lead to an adjustment of the mine plan. If the presence of a geological structure was identified which may result in difference between modelled and observed groundwater drawdown, it would be of moderate consequence as would lead to non-compliance with conditions.	Env	A	2	**3 L - Low**
MC032A	Edderton Road, including crossing over Saddlers Creek - potential impacts - surface and remediation plan not being comprehensive enough (e.g. frequency of monitoring doesn't match the rate of change [cover late at night and over the weekend]).	Infrastructure	Built Feature Management Plan to include monitoring and remediation measures. Malabar to undertake consultation with relevant stakeholders, and undertake planned traffic management response.	Rep	B	2	**5 L - Low**
MC034	Subsidence impacts resulting in injury to livestock.	Land	Any loss would be constrained to a single event and addressed by crack monitoring and remediation as required. Where necessary, removal of stock and construction fencing may be required. Additionally, mining occurs beneath land owned by Malabar, and the Public Safety Management Plan will include mitigation activities in regard to impacts.	Com	A	1	**1 L - Low**
MC035	Impacts on access for firefighting or fire management purposes over subsidence affected areas.	Public Safety	Built features Management Plan will include monitoring and remediation of roads. Vehicles granted access to the impacted area are off-road rated vehicles that are expected to withstand minor landscape changes. Potential incidents would be rated as slip, trip, fall level of injury.	H&S	B	1	**2 L - Low**
MC038	Impacts to downstream water quality arising from subsidence.	Surface Water	Uptick in sediment release from the banks of Tributaries A and B is expected to be very unlikely and result in limited off-site impact.	Env	A	2	**3 L - Low**
MC045	Environmental consequences associated with inadequate preparation of the Brine Management Strategy.	Surface Water	Brine impacts on environment could be serious. However, implementation of current management would be unlikely to occur. Brine Management Strategy to be included in the Water Management Plan.	Env	B	3	**9 M - Medium**

3.4 Review and finalisation of Woodlands Hill Seam Longwalls 1-4 Report

A draft of this ERA report will be provided to the ERA participants for review, and the participants' comments are intended to be incorporated into the final version of this report.

4 Concluding Remarks

A total of 65 issues were identified during the ERA workshop for Woodlands Hill Seam Longwalls 1-4. All issues were explained systematically by the relevant ERA workshop participants, and each was carefully reviewed. All issues and risks were considered to have been broadly assessed in this study with priority items identified in each of the subject areas that are intended to be addressed by requirements in the developing Environmental Management Plans related to the over-arching Extraction Plan.

Loss scenarios for the key potential issues were identified for each of the subject areas required in the guidelines and additionally for business related issues. All the risk rankings are within the "Low" to "Medium" range and consequently the potential outcomes can be integrated into the existing or developing management systems for effective review and monitoring.

5 References

Department of Planning and Environment (October 2022) – *Extraction Plan Guideline.*

Hunter Eco (2019) *Maxwell Project Biodiversity Development Assessment Report.*

Malabar Resources limited (2019) *Maxwell Project Environmental Impact Assessment.*

Malabar Resources Limited (2022) – *Risk Management Plan.*

Mine Subsidence Engineering Consultants (2024) *Maxwell Project – Woodlands Hill Seam Longwalls 1 to 4 Subsidence Predictions for Natural Features in Support of the Extraction Plan. Subsidence predictions drawings and tables prepared for Malabar Resources Limited.*

Operational Risk Mentoring (2019) – *Maxwell Project – Environmental Risk Assessment*, Reference RM1922

Risk Mentor (2024) – Maxwell Underground Mine, Whynot Seam Panels 2-5, Environmental Risk Assessment Report, *Unpublished Consultant Report.* Version 3, 22 January 2024

Standards Australia – AS/IEC 31000:2009 – Risk Management.

Appendix A

1.1. Consolidated Issues Listing

Table A-1 below presents the consolidated listing of issues confirmed as applicable for Woodlands Hill Seam Longwalls 1-4. The column descriptions are:

- Ref – provides a prefix indicating the study the issue was identified in and the three numbers on the right are a sequential listing used to provide a unique identifier (they were generated sequentially by the team during the course of the studies).
- Issue – is a short description summarising the control, concern or risk identified.
- Grouping – indicates the type of issue and also helps to inform.
- Priority – is the sum of virtual dollars spent by the team on the different issues. The intent of the process is to provide some highlighting of issues seen as more important to the success and operation of the Maxwell Mine. The process is based on the work of psychologists and decision-making academics such as Annie Duke and Robert Cialdini and provides a more graduated allocation of priorities than the risk ranking process.
- Comment on Current Controls – identifies the existing, or intended, control for the Issue.

Action Item(s) – are the follow up identified by the team where there were any opportunities for improvement related to the current controls. These are repeated, with more context, in Table 1 earlier in this report.

Table A-1- Consolidated Issues for Woodlands Hill Seam Longwalls 1-4

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx047	Potential subsidence impacts to Edderton Road resulting from the Surface and Remediation Plan not being comprehensive enough (e.g frequency of monitoring doesn't match the rate of change ([over late at night and over the weekend]).	Built Features (Infrastructure)	Subsidence assessment with subsequent assessment to confirm potential impacts are within expectations. Extensive experience of mining beneath public roads in NSW Coalfields. Mining changes are typically slow. Note that at start of block it might be a more significant change (after initial goaf failure) - to include as a consideration in the Traffic Management Plan and the Built Features Management Plan.	N/A
ISEx007	Management plan delays cause delays to extraction plan approval - consultation delays with Stakeholders and government agencies and other preparation challenges contributing to this delay.	Business	Consultation and Communication plan and schedule (intent is for early engagement with the Department of Planning, Housing and Infrastructure). Schedule allows sufficient time between lodgement to extraction commencing. Production and development schedules tracked with monthly updating and escalation of reporting in the event of any timelines being compromised. Appropriate Subject Matter Experts engaged on the process.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx049	Subsidence resulting in ponding impacts on the surface.	Surface Water	Subsidence assessment to confirm potential impacts are within expectations. Adaptive Management.	Review predicted surface subsidence and map over the current surface topology and confirm that there are limited potential areas likely to suffer ponding.
ISEx005	Ingress of oxygen into mine workings as a result of subsidence cracking and subsequent spontaneous combustion events.	Mine Safety	As for potential for connective cracking. Controls implemented as part of Spontaneous Combustion Management Plan.	N/A
ISEx061	Impacts on monitoring bores (identified as critical for determining groundwater impacts such as DD1032).	Built Features (Infrastructure)	Adaptive Management with ability to re-establish bores as required.	Confirm outputs of the bore study included in the Ground Water Management Plan components of the Water Management Plan

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx044	Surface cracking and impact on multiple environmental or built features (e.g. land use, heritage items, agricultural infrastructure, etc.). Noted that majority would be location on Malabar-owned land.	Land	Cracking expected to be less than subsequent mining in future seams (i.e. multi-seam mining). Surface cracking considered and approved in the Development Consent. Clay content of interstitial materials (above the seam) likely to generate a self-healing process of any cracks which develop (lithology intended to be described). All lands are owned by Malabar (apart from public roads). As such, any remediation can be readily undertaken. Ecology monitoring in place. Trigger Action Response Plan implemented to address any variance between observed and expected cracking or subsidence. Adaptive management in contingency management where any exceedances are addressed. Subsidence measurement, monitoring and reporting with pre-mining, event trigger, and post mining. Change Management process for changes of mine design that link to considerations including impacts on subsidence modelling. Extraction plan included in the High Risk Activity management process. Authority to Mine process with production and statutory reporting against the ATM, underground survey and Mines Inspection Program.	Confirm any required remediation of public roads is covered in Built Features Management Plan considerations

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx060	Impacts of proposed brine management strategy (not yet finalised) and what is the final ultimate location of the brine.	Surface Water	Water Management Plan to include the Brine Management Strategy.	N/A
ISEx010	Creation of subsidence repairs, monitoring or other tracks affects the conservation values of the Offset areas.	Flora/Fauna	Subsidence impacts and remediation are included in the Biodiversity Offset Management Plan.	Minimise disturbance in Biodiversity Stewardship Site. Manage as per Biodiversity Stewardship Agreement.
ISEx067	Subsidence impacts on roads and surface leads to exposure of potential health and safety impacts of vehicles and pedestrians.	Public Safety	Public Safety Management Plan and Built Features Management Plan.	Implement controls through Built Features Management Plan
ISEx062	Impact on ventilation shaft and associated infrastructure (e.g. power lines, tracks, water lines, etc.)	Built Features (Infrastructure)	Ventilation Shaft is located on land owned by Malabar and the Built Features Management Plan includes monitoring and mitigation activities in the event of impacts.	N/A
ISEx011	Ecological species impacted by mining including threatened fauna and flora (and ecological communities).	Flora/Fauna	Subsidence assessment with subsequent water and biodiversity assessments to confirm within expectations. Biodiversity plan that includes monitoring activities. TARPs for surface impacts and adaptive management requirements will be implemented.	N/A
ISEx015	Impacts on vegetation and Groundwater Dependent Ecosystems.	Flora/Fauna	Subsidence assessment with subsequent assessment to confirm within expectations. Biodiversity management plan for monitoring and adaptive management.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx058	Higher than expected subsurface fracture height.	Groundwater	Photographic observations of cracking patterns (survey of observed cracks due to presence of overlying vegetation). Predictions designed to be conservative with experience in nearby mines is that observed subsidence is typically 85% of predicted. First four longwalls, being narrower, will have lesser potential for fracturing to surface. Surface streams are ephemeral (so not a significant issue for water ingress).	N/A
ISEx059	Potential impacts if subsidence predictions are exceeded - and subsequent monitoring and management challenges.	Business	Monitoring and adaptive management.	N/A
ISEx045	Impacts on heritage issues and potential sites within the extraction plan area.	Archaeological	Subsidence assessment with subsequent heritage assessment to confirm within expectations. Heritage Management Plan in place that covers on determining and responding to impacts and training for all personnel on identifying items of significance.	N/A
ISEx056	Surface rolling subsidence due to the presence of stronger (sill) material in the overburden.	Land (Agriculture and Livestock)	Monitoring and adaptive management (as for surface cracking).	N/A
ISEx009	Subsidence impacts on the Biodiversity Stewardship Site reducing biodiversity values.	Flora/Fauna	As for ISEx010 limited impact on Offset Area and covered by Offset Management Plan and Biodiversity Management Plan.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx018	Presence of a geological structure mid-block (F16) which might lead to differences between modelled and observed groundwater drawdown particularly noting proximity to Saddlers Creek.	Groundwater	No major geological structures identified within the mining area (excluding Sills addressed in ISEx056). No impacts on subsidence predictions due to absence of significant fault disturbance. No expected groundwater impacts (no need to modify the model due to the relatively minor throw).	N/A
ISEx024	Structural damage to monitoring bore within the extraction plan area.	Built Features (Infrastructure)	DD1032 within extraction plan area. Adaptive Management (planned replacement with study commissioned).	N/A
ISEx019	Licensing requirements for base flow water loss and confidence in modelled number to address licensing requirements for the whole complex.	Business	Existing ground water licences. Water balance monitoring and Groundwater Management Plan (with metering and capture). TARPs for water take above expected (and licenced) values.	N/A
ISEx017	Failure of the monitoring program to detect and respond to an impact on the groundwater system.	Groundwater	Groundwater monitoring program. Proposed hole layout for additional ground water monitoring. Mine water balance model and ongoing monitoring. TARPs for groundwater monitoring results (levels in surrounding bores) to trigger investigations identifying the source of the variance and providing inputs to ongoing mine design processes.	N/A
ISEx063	Subsidence impacts on farm dams located at the end of Longwalls 2 and 3.	Land (Agriculture and Livestock)	Relevant controls including monitoring and maintenance relevant to agricultural equipment including farm dams will be included in the Built Features Management Plan.	Assess potential for inflow/overflow risk and drain dams in advance of mining, if required.

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx022	Saddlers Creek damaged by subsidence resulting in inflow to workings and delay to operations.	Surface Water	Addressed in Subsidence and Groundwater reviews. Saddlers Creek is located outside the mining area. Model predictions are relatively minor in nature. No more than negligible impacts expected.	Review monitoring methodology for Saddlers Creek. Review whether licencing is available as a contingency response.
ISEx057	Potential impact on Aboriginal cultural heritage sites (e.g. open artefact scatters and stone quarry).	Archaeological	Subsidence assessment with subsequent heritage assessment to confirm within expectations. Review value of installing signage or fencing.	Review if there is a requirement for the Registered Aboriginal Parties to be involved in signage around key heritage items. Confirm considered in Heritage Management Plan.
ISEx069	Subsidence impacts on the alternate emergency access roadway for the site resulting in an impact the site's emergency response capacity.	Built Features (Infrastructure)	Built Features Management Plan and Land Management Plan.	N/A
ISEx070	Subsidence impacts on unknown boreholes resulting in borehole inrush.	Built Features (Infrastructure)	Inrush Management Plan. High Risk Management Plan (authority to mine process).	N/A
ISEx012	Subsidence impacts and surface disturbance due to extraction of longwalls resulting in long-term loss of native vegetation.	Flora/Fauna	Subsidence assessment with subsequent biodiversity assessment to confirm within expectations. Biodiversity Management Plan.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx066	Subsidence impacts resulting in damage to fences and release of stock onto public roads (and subsequent harm to public and stock).	Land (Agriculture and Livestock)	Land Management Plan (and Longwall 4 is the only excavation that will impact a fence line adjoining a public area). Visual monitoring. Ability to exclude cattle from affected areas of Malabar owned lands.	N/A
ISEx052	Ingress of water from surface cracking via ephemeral streams.	Surface Water	Potential for cracking to surface with two ephemeral streams on surface above extraction plan area.	N/A
ISEx021	Subsidence impacts to power and communication lines.	Built Features (Infrastructure)	Covered with Built Features Management Plan	N/A
ISEx035	Impacts on access for firefighting or fire management purposes over subsidence affected areas.	Built Features (Infrastructure)	Bush Fire Management Plan includes access for emergency services and sharing all access tracks (which are mapped) with NSW Rural Fire Services. Built Features Management Plan includes monitoring and management on roads/access tracks. Emergency Response Plan.	Confirm Built Features Management Plan applies to AusGrid lines and different roads and tracks.
ISEx064	Inadvertent disturbance to the Acacia Pendula habitat area that is located within 600 m of Longwall 4 associated with access tracks.	Flora/Fauna	Acacia Pendula species are located outside the extraction plan 26.5 degree angle of draw. Monitoring and management is included in the Biodiversity Management Plan.	Review if fencing is required of the Acacia Pendula habitat area to manage traffic flows in the area.
ISEx034	Subsidence impacts resulting in injury to livestock.	Land (Agriculture and Livestock)	Malabar owned lands and controlled via Agistment processes.	N/A
ISEx068	Survey team and others working are impacted when monitoring or working on or near Edderton Road and other public roadways.	Mine Safety	Built Feature Management Plan to include monitoring and remediation measures. Malabar to undertake consultation with relevant stakeholders, and undertake planned traffic management response.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx040	Reduced base flow to Saddlers Creek resulting from a lowering of the water table associated with the extraction of panels.	Surface Water	Groundwater Monitoring Program. Proposed hole layout for additional ground water monitoring. Mine water balance model and ongoing monitoring. Trigger Action Response Plans for ground water monitoring results (levels in surrounding bores) to trigger investigations, identifying the source of the variance and providing inputs to ongoing mine design processes.	N/A
ISEx032	Potential for impact on the current Ventilation shaft - and any future shafts or surface connecting bore holes.	Built Features (Infrastructure)	Ventilation Shaft is located on land owned by Malabar and the Built Features Management Plan includes monitoring and mitigation activities in the event of impacts.	N/A
ISEx073	Agricultural business impacts with restricted grazing over actively subsiding areas.	Land (Agriculture and Livestock)	Land Management Plan.	N/A
ISEx065	Ponding of water and impacts of inflows and from cracking of base of dams.	Surface Water	As for ISEx063 and ESEx020 and addressed in Surface Water Management Plan and Built Features Management Plan.	N/A
ISEx078	Identify if there is a gap in the Aboriginal heritage survey areas as there is an area between the approved mining boundary and 600 m boundary of Woodlands Hill Seam Longwalls 1 to 4 that has not undergone field surveys for the Maxwell Mine.	Archaeological		Review the AHIPs database and BHP register for artefacts on the northern area of the extraction plan area.
ISEx023	Subsidence impacts to unsealed gravel access roads or fire trails.	Built Features (Infrastructure)	Covered with Built Features Management Plan.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx025	Mine subsidence impacts to fences on Malabar owned land.	Built Features (Infrastructure)	As for ISEx066 and covered in Land Management Plan and Built Features Management Plan.	N/A
ISEx027	Subsidence impacts to other water management infrastructure (pipelines, roads and pumps).	Built Features (Infrastructure)	Built Features Management Plan.	N/A
ISEx030	Subsidence impacts on access tracks restrict access for monitoring/remediation.	Built Features (Infrastructure)	As for ISEx010 and ISEx017 (limited extent, and included in monitoring program).	N/A
ISEx053	Notification areas around prescribed dam walls (including Mt Arthur storage and Bayswater Power Station water storage).	Built Features (Infrastructure)	Extraction plan area is not within any dam notification area.	N/A
ISEx076	Subsidence impacts resulting in the collapse of hay shed (barn) on the West side of Edderton Road to the North of Saddlers Creek.	Built Features (Infrastructure)	Hay shed is located outside of the extraction plan 26.5 degree angle of draw, but within 600 m area. As such, is expected to experience negligible subsidence impacts.	N/A
ISEx079	Infrastructure along Edderton Road impacted by subsidence.	Built Features (Infrastructure)	As for ISEx047, covered in Built Features Management Plan.	N/A
ISEx006	Operational impact associated with mining in proximity to adjacent workings in the other seams.	Business	No multi-seam mining for Woodlands Hill Longwalls 1 to 4 (e.g. Whynot Seam Panels 2 to 5 Extraction Plan does not overlay the Woodlands Hill Seam Longwalls 1 to 4 Extraction Plan).	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx046	Subsidence impacts on cadastral reference and state coordinated marks for property boundaries.	Business	Government requirement for preservation of survey infrastructure for any marks intended to be disturbed or destroyed. One mark and potentially 8 corner marks identified and included in intended reporting to Spatial Services. Surveyor General Direction number 11 and likely to include an annual monitoring process. Subsidence Management Program and Land Management Plan.	Each Extraction Plan application area will need an application to disturb survey marks. One, low value, coordinate mark (some monitoring may be required). Consultation and application to NSW Surveyor General.
ISEx055	Provide updated geological and geotechnical information to the subject matter experts (Noel and James).	Business	As for ISEx018 with information from additional modelling intended to be provided to external advisers.	N/A
ISEx013	Subsidence impacts and surface disturbance due to the extraction of longwalls resulting in loss of habitat for threatened species.	Flora/Fauna	As for ISEx013 and ISEx011 issue addressed in Biodiversity Management Plan.	Consider impacts to woodland vegetation in Biodiversity Technical Report.
ISEx016	Impacts on trees (that access weathered Permian water sources).	Flora/Fauna	Subsidence assessment with subsequent biodiversity assessment to confirm within expectations. Biodiversity management plan for monitoring and adaptive management.	N/A
ISEx075	Collapse of vegetation (old trees) when the subsidence wave passes through.	Flora/Fauna	As for ISEx013 and ISEx011 issue addressed in Biodiversity Management Plan.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx041	A change in land surface slope and preferential pathways for rainfall infiltration resulting from fracturing to the land surface caused by the extraction of coal measures.	Land (Agriculture and Livestock)	As for ISEx052 covered in Surface Water Management Plan.	N/A
ISEx043	Potential for cracking enlargement in dispersive subsoils (where there are surface slopes).	Land (Agriculture and Livestock)	As for ISEx044 and covered in other Business Systems.	N/A
ISEx051	Surface water storage and the requirement to dewater farm dams and other ponded waters prior to the commencement of extraction.	Land (Agriculture and Livestock)	As for ISEx063 and ESEx020 and addressed in Surface Water Management Plan and Built Features Management Plan.	N/A
ISEx077	Newly installed water management (for agriculture) over the lease area.	Land (Agriculture and Livestock)	Requirement to provide guidance to the subsidence management experts on the locations of these features (tanks and pipelines etc.) for Longwall 1.	N/A
ISEx020	Subsidence impact on surface dams including the generation of inrush or inundation events downslope or underground.	Mine Safety	As for ISEx063 and ESEx020 and addressed in Surface Water Management Plan and Built Features Management Plan.	N/A
ISEx050	Secondary extraction results with a mined-out area full of water. Potential impacts if there is a subsequent requirement to dewater the goaves/voids (with ongoing pumping when operating in the lower seams in the same footprint).	Mine Safety	Mine dewatering system. Site water balance to confirm the amounts taken and introduced. Pumping of water is managed through Surface Water Management plan (use of surface voids).	N/A
ISEx074	Seismic impacts on extraction and subsidence extents.	Mine Safety	Outside scope of extraction plan.	N/A

Ref	Issue	Grouping	Comment on Current Controls	Action Item(s)
ISEx008	Impact on ventilation shaft, access road, and other infrastructure, including the 11 kV power lines.	Public Safety	Ventilation Shaft is located on land owned by Malabar and the Built Features Management Plan includes monitoring and mitigation activities in the event of impacts.	N/A
ISEx031	Subsidence impacts on farm dams leads to exposure to potential health and safety impacts.	Public Safety	As for ISEx063 and ESEx020 and addressed in Surface Water and Built Features Management Plans.	N/A
ISEx037	Injury to animals or riders engaged in horse riding activities over subsidence affected areas.	Public Safety	Communication, signage and isolation of areas affected included in Subsidence Management Plan and Land Management Plan.	N/A
ISEx038	Impacts to downstream water quality.	Surface Water	Single cross of gully to Saddlers with potential for changes of flow due to location of chain pillar. Surface Water Management Plan.	Review the impacts of subsidence on any erosion of water way and associated cultural heritage artefacts.
ISEx039	Induced leakage from Saddlers Creek due to subsidence resulting in adverse impact on environmental flow.	Surface Water	As for ISEx018, ISEx022 and ISEX040 limited flow losses and addressed in Surface Water and Groundwater Management Plans.	N/A
ISEx042	A change in flood and flow regimes or extent of potential inundation due to subsidence resulting from the extraction of panels.	Surface Water	As for ISEx039 and ISEx065 addressed in Surface Water Management Plan.	N/A

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