Form 43 (version 3)
UCPR 36.11

AGREEMENT BETWEEN PARTIES
SECTION 34(3)(a) and (b)

COURT DETAILS	
Court	Land and Environment Court of New South Wales
Class	1
Case number	2019/346483
TITLE OF PROCEEDINGS	
Applicant	**AQC Dartbrook Management Pty Ltd**
Respondent	**Minister for Planning and Public Spaces**
FILING DETAILS	
Filed for	**AQC Dartbrook Management Pty Ltd**, Applicant
Legal representative	Alan McKelvey, Sparke Helmore
Legal representative reference	AUS142-00041
Contact name and telephone	Alan McKelvey +61 2 4924 7309
Contact email	alan.mckelvey@sparke.com.au

TERMS OF AGREEMENT

1 The parties have reached agreement as to terms of a decision in the proceedings that would be acceptable to the parties (being a decision that the Court could have made in the proper exercise of its functions).

2 The terms of the decision are as follows:

(a) The Appeal is upheld.

(b) Leave is granted to the Applicant to make the minor amendments to the application to modify DA231-7-2000 reflected in the Dartbrook Mine Modification Response to Contentions (Hansen Bailey July 2020).

(c) The Court notes the Applicant has made an offer to enter into a planning agreement on the terms required by condition 11.4 of Schedule 2 and Appendix 5 of annexure "**A**"

(d) The application to modify DA231-7-2000 (MOD 7) is approved, subject to the conditions in annexure "**A**".

(e) No order as to costs.

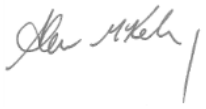
3 A copy of the document referred to in clause 2(b) of this agreement is attached as annexure **"B"**.

4 Pursuant to sections 34(3)(a) and (b) of the *Land and Environment Court Act 1979* (NSW) there is a requirement for the Court to dispose of the proceedings in accordance with the parties' decision, if the parties' decision is a decision that the Court could have made in the proper exercise of its functions. The parties have identified the jurisdictional pre-requisites of relevance in these proceedings, a copy of which is Annexure "**C**" to this agreement. The parties are in agreement that the jurisdictional pre-requisites have been satisfied.

5 The Respondent proposes to give notice for seven days of this agreement and annexures A, B and C on the Independent Planning Commission website on 2 November 2020. The parties request that the Commissioner dispose of these proceedings in accordance with the terms of the decision set out in clause 2 above following the expiry of that notice period and not before 10 November 2020.

SIGNATURES

Applicant

Signature of legal representative	
Capacity	Solicitor for the Applicant
Date of signature	30 October 2020

Respondent

Signature of legal representative	
Capacity	Solicitor for the Respondent
Date of signature	30 October 2020

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

INTEGRATED STATE SIGNIFICANT DEVELOPMENT

DETERMINATION OF DEVELOPMENT APPLICATION PURSUANT TO SECTIONS 76(A)9 & 80

I, the Minister for Urban Affairs and Planning, pursuant to Sections 76(A)9 & 80 of the Environmental Planning and Assessment Act, 1979 ("the Act") determine the development application ("the application") referred to in Schedule 1 by granting consent to the application subject to the conditions set out in Schedule 2.

The reasons for the imposition of the conditions are to:

(i) minimise the adverse impact the development may cause through water and air pollution, noise, visual disturbance and subsidence effects;

(ii) provide for environmental monitoring and reporting; and

(iii) set requirements for mine infrastructure provision.

Andrew Refshauge MP
Minister for Urban Affairs and Planning,

Sydney, 28 August 2001 File No. N99/00230

Schedule 1

Application made by:	Dartbrook Coal Pty Limited (ACN 007 377 577) ("the Applicant").
To:	The Minister for Urban Affairs and Planning (DA 231-07-2000)
In respect of:	Land described in Appendix "1".
For the following:	Extension to an underground coal mine and rejects emplacement area, increase in coal production rate and construction and operation of associated surface facilities ("the Development").
BCA Classification:	Class 5 - Administration building Class 8 – Coal preparation plant building Class 10(a) - Seam Access Slot, Ventilation Shafts
Note:	1) To ascertain the date upon which the consent becomes effective, refer to section 83 of the Act. 2) To ascertain the date upon which the consent is liable to lapse, refer to section 95 of the Act.

SCHEDULE 2

Development Consent Conditions for the Dartbrook Extended Underground Coal Mine

INDEX

DEFINITIONS:

Agricultural Productivity – *as defined by the Agricultural Suitability Classification System used by NSW Agriculture.*

Annual Review - *The Annual Review required by Condition 9.2 (a)*

Applicant - *AQC Dartbrook Management Pty Ltd, or any person carrying out any development under this consent*

Approved mine plan - *The underground mine plan in Appendix 3*

Built features - *Includes any building or work erected or constructed on land, and includes dwellings and infrastructure such as any formed road, street, path, walk, or driveway; any pipeline, water, sewer, telephone, gas or other service main*

Calendar year - *A period of 12 months from 1 January to 31 December*

CCC – *Community Consultative Committee*

CHPP – *Coal Handling and Preparation Plant*

Construction - *All physical works to enable mining operations to be carried out, including demolition and removal of buildings or works, and erection of buildings and other infrastructure permitted by this consent*

DA - *Development Application*

DA area - *Development Application area which encompasses all surface and underground works on the site, as described in the documents referred to in Condition 1.1 (a)*

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Decommissioning - *The deconstruction or demolition and removal of works installed as part of the development*

Delivery shaft - *The coal delivery shaft to the Hunter Tunnel as described in the documents listed in Condition 1.1(a)(xi)*

Development - *The development described in the documents referred to in Condition 1.1 (a), as modified by the conditions of this consent*

East Site – *the CHPP complex (including coal stockpiles, rail loading facility, and rejects emplacement areas) to the east of the Hunter River and the New England Highway.*

EIS - *Environmental Impact Statement*

Environmental consequences - *The environmental consequences of subsidence impacts, including: damage to built features, loss of surface water flows to the subsurface, loss of standing pools, slope changes to streams, adverse water quality impacts, development of iron bacterial mats, cliff falls, rock falls, landslides, damage to Aboriginal heritage sites, impacts on aquatic ecology, and ponding*

First workings - *Development of main headings, bord and pillar workings, longwall gate roads, related cut throughs and other in-seam workings for mine access and ventilation*

Hunter Tunnel Coal Clearance System – *including the Hunter Tunnel underground passage that connects the mine workings to the CHPP, passing beneath the Hunter River, Dart Brook, New England Highway and Main Northern Rail Line, through delivery of coal from the working face to the western end of the Hunter Tunnel by conveyors, then delivers ROM coal by conveyor to the existing ROM hopper at the East Site, where it is crushed in the ROM hopper and placed on conveyors that distribute it to the CHPP for processing.*

Incident - *An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance*

Kayuga Entry - *The mine entry to the Kayuga Seam located at the West Site*

Land - *Has the same meaning as the definition of the term in section 1.4 of the Environmental Planning & Assessment Act 1979, except for where the term is used in the noise and air quality conditions of this consent where it is defined to mean the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this consent*

Land capability - *Refers to the ability of a parcel of land to accept a type and intensity of use permanently, or for specified periods under specific management, without permanent damage*

Material harm - *Is harm that involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment). This definition excludes "harm" that is authorised under either this consent or any other statutory approval*

Mining operations – *The carrying out of underground mining within the area covered by the approved mine plan, the extraction, processing, stockpiling and transportation*

of coal on the site and the emplacement of coarse/fine coal reject material resulting from underground mining on the site

Mine water - *Water that accumulates within, or drains from, active mining and infrastructure areas and any other areas where runoff may have come into contact with carbonaceous material*

Minor - *Not very large, important or serious*

Mitigation - *Activities associated with reducing the impacts of the development prior to or during the occurrence of those impacts*

Modification 7 - *The modification to the development as described in the documents referred to in Condition 1.1 (a)(xi)*

MOP – *Mining Operations Plan*

Mtpa - *Million tonnes per annum*

Negligible - *Small and unimportant, such as to be not worth considering*

Non-compliance - *An occurrence, set of circumstances or development that is a breach of this consent*

Privately-owned land - *Land that is not owned by a public agency or a mining, petroleum or extractive industry company (or its subsidiary)*

Public infrastructure - *Linear and related infrastructure that provides services to the general public, such as roads, railways, water supply, drainage, sewerage, gas supply, electricity, telephone, telecommunications, etc*

Reasonable - *Means applying judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided and the nature and extent of potential improvements*

Recommencement - *Restarting construction or mining operations on the site after a period of care and maintenance*

Rehabilitation - *The restoration of land disturbed by the development to a good condition, to ensure it is safe, stable and non-polluting*

Remediation - *Activities associated with partially or fully repairing or rehabilitating the impacts of the development or controlling the environmental consequences of these impacts*

Residence - *Existing or approved dwelling at the date of grant of this consent*

ROM - *Run-of-Mine coal production*

Safe, serviceable and repairable criteria *– Category 3 to 5 for strain and/or category C or D for tilt, in accordance with Australian Standard AS2870-1996*

Second workings - *Extraction of coal from longwall panels and mini-wall panels*

Secretary - *Planning Secretary under the Environmental Planning and Assessment Act 1979, or nominee*

Site - *The land defined in Appendix 1 Schedule of Lands*

Subsidence - *The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts*

Subsidence effects - *Deformation of the ground mass due to mining, including all mining-induced ground movements, such as vertical and horizontal displacement, tilt, strain and curvature*

Subsidence impacts - *Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised*

buckling of strata caused by valley closure and upsidence and surface depressions or troughs
Surface facilities - *Associated surface facilities and infrastructure to facilitate mining operations*
West Site - *surface facilities to the west of the Hunter River and the New England Highway.*

Government Authorities

ARTC – *Australian Rail Track Corporation*
Department – *NSW Department of Planning, Industry and Environment*
DPIE Water - *Water Group within the Department*
DPIE Environment - *Environment, Energy and Science Group within the Department*
DRG – *Division of Resources and Geoscience within the Department*
DSC - *Dams Safety Committee*
EPA - *Environment Protection Authority*
MSC - *Muswellbrook Shire Council*
NSW Agriculture - *New South Wales Agriculture*
NSW Fisheries - *New South Wales Fisheries*
Resources Regulator – *NSW Resources Regulator*
SA NSW – *Subsidence Advisory NSW*
TfNSW – *Transport for NSW*
UHSC – *Upper Hunter Shire Council*

Red type represents June 2002 modification
Green type represents June 2003 modification
Blue type represents November 2003 modification
Orange type represents March 2004 modification
Pink type represents May 2005 modification
Brown represents November 2005 modification
Purple represents October 2020 modification

1. General

There is an obligation on the Applicant to prevent and minimise harm to the environment throughout the life of the project. This requires that all practicable measures are to be taken to prevent and minimise harm that may result from the construction, operation and, where relevant, decommissioning of the development.

1.1 Adherence to terms of DA, EIS, etc.

(a) The development is to be carried out generally in accordance with Development Application No. 231-07-2000, and the EIS dated June 2000, prepared by HLA EnviroSciences Pty Ltd, and the following documentation:

(i) [1]The following documents supplied to the EPA in relation to the development:

- Odour Analysis of Ventilation Air from the No.1 Ventilation Shaft at Dartbrook Mine, Office Memorandum, David Rollings, HLA Envirosciences Pty Ltd to Colin Phillips, HLA Envirosciences Pty Ltd, (dated 11th May 2000);

- Laboratory Results from The Odour Unit Pty Ltd to HLA Envirosciences Pty Ltd, (dated 29th March 2000);

- Stack Emissions Testing Dartbrook Coal Pty Ltd, Dartbrook, NSW, April 2000, dated 1st May 2000, prepared by HLA Envirosciences Pty Ltd on behalf of Dartbrook Coal Pty Ltd;

- Analysis of Gaseous Discharges from Dartbrook Mine Operations and additionally, Ambient Air Samples from Selected Background Sites, Office Memorandum from Ken Ferguson/Dr Jim Orr, HLA Envirosciences Pty Ltd to Colin Phillips, HLA Envirosciences Pty Ltd, (dated 3 March 2000);

- Dartbrook Ventilation Odour, Facsimile from Nigel Holmes, Holmes Air Sciences to Andrew Kerr, Shell Coal, (dated 28 September 2000);

[1] EPA General Terms of Approval

(ii) Additional information provided by the Applicant to the DPIE Environment in relation to archaeology and flora and fauna matters, during the assessment of DA 231-07-2000;

(iii) Anglo Coal Dartbrook Extended Mine Project Commission of Inquiry, Primary Submission (Dartbrook Coal, dated March 2001);

(iv) Anglo Coal Dartbrook Extended Mine Project Commission of Inquiry, Submission in Reply (Dartbrook Coal, dated May 2001); and

(v) Dartbrook Underground Coal Mine Project Environmental Impact Statement, prepared by Envirosciences Pty Limited, November 1990;

(vi) Development Application No. 53-10-98, dated 12 October 1998, accompanying Statement of Environmental Effects dated October 1998 prepared by Dartbrook Coal Pty Limited and in accordance with the development consent to construct a 450ML Discharge Dam and Pipeline issued by the Minister of Urban Affairs and Planning to Dartbrook Coal Pty Limited on 5 March 1999;

(vii) The information titled *'Dartbrook Extended Coal Project Development Consent Modification Application Supporting Information'* prepared in support of a Section 96(1A) application for the Dartbrook Coal Mine, dated 27 May 2002, prepared by Hansen Consulting;

(viii) The information on the emergency tailings storage cell in the document titled "Dartbrook Extended Coal Project Development Consent Modification Application Supporting Information", dated 10 April 2003, prepared by Hansen Consulting;

(ix) The information titled "Dartbrook Coal Mine: Statement of Environmental Effects for Modification to Rejects Disposal System", dated 9 March 2004, prepared by Hansen Consulting;

(x) The information titled "Dartbrook Mine Statement of Environmental Effects for New ROM Coal Stockpiles, Underground Tailings Disposal & Nitrogen Injection Plant", dated 12 August 2005 and prepared by Hansen Consulting; and

(xi) The environmental assessment titled "*Dartbrook Mine Modification 7 Environmental Assessment Kayuga Seam Bord and Pillar Mining Operations*", dated June 2018 and prepared by Hansen Bailey Environmental Consultants, and the associated Response to Submissions titled "*Dartbrook Mine Modification 7 Response to Submissions*", dated August 2018 and prepared by Hansen Bailey Environmental Consultants, and the additional information dated 12 October and 13 November 2018 and 23 April 2019 as revised by the Dartbrook Mine Modification 7 Response to Contentions (Hansen Bailey 2020) and the Response to

Submissions dated 7 October 2020 and Supplementary Response to Submissions dated 9 October 2020.

(a1) The development must be carried out in compliance with the conditions of this consent.

(a2) The development must be carried out generally in accordance with the development layout in Appendix 2 and the approved mine plan in Appendix 3.

(a3) Consistent with the requirements in this consent, the Secretary may make written directions to the Applicant in relation to:

(i) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Secretary; and

(ii) the implementation of any actions or measures contained in any such document referred to in Condition 1.1 (a).

If there is any inconsistency between the above, either the conditions of this consent or the most recent document shall prevail to the extent of the inconsistency.

(b) In accordance with section 80A(5) of the Environmental Planning and Assessment Act 1979 and clause 97 of the Environmental Planning and Assessment Regulation 2000, the Applicant must, surrender to the Minister of Urban Affairs and Planning, the development consent for the Dartbrook Underground Mine (Authorisation 256) issued by the then Minister for Planning to Shell Company of Australia Ltd and Austen & Butta Limited and Bellambi Coal Company Pty Ltd and Dartbrook Coal Pty Limited on 2 December 1991, and the following development consents for Dartbrook Mine issued by the Minister for Urban Affairs and Planning or Muswellbrook Council by the 30 June 2005, or such other later date agreed by the Secretary:

(i) Amendment of a Development Consent (issued on 2 December 1991 by the Minister for Planning), dated 9 July 1997; and

(ii) Modification to a Development Consent (issued on 2 December 1991 by the Minister for Planning), dated 21 September 1999.

This consent will apply to all facilities and activities subject to these previous consents from the date they are relinquished.

(c) If, at any time, the Secretary is aware of environmental impacts from the proposal that pose serious environmental concerns due to the failure of environmental management measures in place to ameliorate the impacts, the Secretary may order the Applicant to cease the activities causing those impacts until those concerns have been addressed to the satisfaction of the Secretary.

(d) If any licence conditions are breached the applicant must comply with any modification to the work as specified by the relevant agency.

Note: Conditions of this consent relating to the matters of air quality, noise management and proponents obligations (Conditions 6.1, 6.4 and 11.2, 11.3 respectively) must prevail over the conditions related to these matters in the existing consents for Dartbrook Mine as listed under Condition 1.1(b).

1.2 Period of Approval/Project Commencement

(a) Mining operations may be carried out on the site until 5 December 2027.

Note: *Under this consent, the Applicant is required to decommission and rehabilitate the site and carry out other requirements in relation to mining operations. Consequently, this consent will continue to apply in all respects other than to permit the carrying out of mining operations until the rehabilitation of the site and other requirements have been carried out to the required standard.*

(b) At least two weeks prior to the commencement of construction and Mining Operations respectively or within such period as agreed by the Secretary, the Applicant must submit for the approval of the Secretary a compliance report detailing compliance with all the relevant conditions that apply prior to the commencement of construction and Mining Operations.

(c) Date of commencement of construction and Mining Operations is to be notified in writing to the Secretary, Resources Regulator, MSC and UHSC at least two weeks prior to commencement of construction and Mining Operations respectively.

1.3 [Deleted]

1.4 Security Deposits and Bonds

Security deposits and bonds will be paid as required by DRG under mining lease approval conditions.

2. Mine Management

2.1 Mine Management Plan, Operations and Methods

(a) No mining undertaken in accordance with this consent must occur until the Applicant has submitted and had accepted by the DRG, a Mining Operations Plan (MOP) in accordance with current guidelines issued by DRG. The Plan covers mining operations for a period of up to seven years.

(b) The MOP must:

(i) demonstrate consistency with the conditions of this consent and any other statutory approvals;

(ii) demonstrate consistency with the Environmental Management Plans for the project site;

(iii) provide the basis for implementing mining operations, environmental management, and ongoing monitoring;

(iv) include a mine rehabilitation and land use management plan that

(a) describes how the rehabilitation of the site would achieve the objectives identified in Table 3 (see Condition 3.7 (a));

(b) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site (including progressive rehabilitation), and triggering remedial action (if necessary); and

(c) include a program to monitor and report on the effectiveness of the rehabilitation measures and progress against the detailed performance and completion criteria; and

(v) identify a schedule of proposed mine development for the period covered by the plan and include:

- the area proposed to be impacted by mining activity and resource recovery mining methods and remediation measures,
- areas of environmental, heritage or archaeological sensitivity and mechanisms for appropriately minimising impact,
- water management, and
- proposals to appropriately minimise surface impacts.

(c) In preparing the MOP, the Applicant must consult with affected service authorities and make arrangements satisfactory to those authorities for the protection or relocation of those services.

(d) A copy of the MOP, excluding commercial in confidence information, must be forwarded to MSC, UHSC and the Secretary within 14 days of acceptance by DRG.

(e) At least two years prior to the cessation of mining operations the Applicant must investigate, determine and report, taking account of the potential community benefits, on a final strategy for the future use of the mine site, weirs, dams and any other infrastructure in consultation with the Department, DPIE Water, MSC and UHSC for approval of DRG and the Secretary.

2.2 Spontaneous Combustion

The Applicant must prepare, prior to the recommencement of mining operations, a Spontaneous Combustion Management Plan to the satisfaction of Resources Regulator. The plan must describe the measures to be implemented to prevent, detect and control spontaneous combustion.

2.3 Limits on Production or Hours of Operation

(a) Run of Mine coal production must not exceed 6 Mtpa.

(b) Heavy earth moving equipment must not operate on the rejects emplacement area, and coal rejects must not be hauled to the rejects replacement area, between the hours of 6.00pm and 7.00am, except in an emergency, and as agreed by the Secretary.

(c) The Applicant must not extract coal from the Piercefield Seam.

(d) The Applicant may not use the existing Dartbrook coal washery for the purpose of washing ROM coal until the noise mitigation measures described in the report from Bridges Acoustics dated 20 July 2020 (RefJ0073-05-L1) have been completed to the satisfaction of the Secretary.

2.4 Limits on Constructions Authorised in Mod 7

The Applicant must not construct a new shaft site or deep delivery shaft connecting to the Hunter Tunnel and associated infra-structure during the currency of this approval (ie until 2027).

2.5 Limits on Stockpiling

The Applicant must not stockpile ROM coal at the West Site.

3. Land and Site Environmental Management

3.1 [Deleted]

3.2 Environmental Management Strategies and Plans

(a) Prior to the recommencement of mining operations, the Applicant must prepare an Environmental Management Strategy for the development.

(b) This strategy must:

(i) provide the strategic framework for environmental management of the development;

(ii) identify the statutory approvals that apply to the development;

(iii) set out the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;

(iv) set out the procedures to be implemented to:

(a) keep the local community and relevant agencies informed about the operation and environmental performance of the development;

(b) receive, record, handle and respond to complaints;

(c) resolve any disputes that may arise during the course of the development;

(d) respond to any non-compliance and any incident;

(e) respond to emergencies; and

(v) include:

(f) references to any strategies, plans and programs approved under the conditions of this consent; and

(g) a clear plan depicting all the monitoring to be carried out under the conditions of this consent.

(c) The Applicant must assess and manage development-related risks to ensure that there are no exceedances of the criteria and performance measures in this consent. Any exceedance of these criteria or performance measures constitutes a breach of this consent and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.

Where any exceedance of these criteria or performance measures has occurred, the Applicant must, at the earliest opportunity:

(i) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;

(ii) consider all reasonable and feasible options for remediation (where relevant) and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and

(iii) implement reasonable remediation measures as directed by the Secretary.

(d) The Applicant must prepare the following environmental management plans:

- Extraction Plans (refer condition 3.3)
- Archaeology and Cultural Heritage Management Plan (refer condition 3.4)
- Flora and Fauna Management Plan (refer condition 3.5)
- Erosion and Sediment Control Plan (refer condition 3.6(a))
- Soil Stripping Management Plan (refer condition 3.6(c))
- Landscape Management Plan (refer condition 3.8)
- Bushfire Management Plan (refer condition 3.9)
- Land Management Plan (refer condition 3.10(a))
- Site Water Management Plan (refer condition 4.1)
- Flood Response Plan (refer condition 4.3(a))
- Waste Management Plan (refer condition 5.2(a))
- Air Quality and Greenhouse Gas Management Plan (refer condition 6.1(f))
- Blast Management Plan (refer condition 6.3(a))
- Road Closure Management Plan (refer to condition 6.3(j))
- Noise Management Plan (refer condition 6.4.2(a))
- Lighting Management Plan (refer condition 6.5)
- Vibration Management Plan (refer to condition 6.6(b))

(e) The Applicant must implement the environmental management plans in Condition 3.2 (d) as approved by the Secretary.

Management Plan Requirements

(f) Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

(i) a summary of relevant background or baseline data;

(ii) details of:

- the relevant statutory requirements (including any relevant approval, licence or lease conditions);
- any relevant limits or performance measures and criteria; and
- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

(iii) description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;

(iv) a program to monitor and report on the:

- impacts and environmental performance of the development; and
- effectiveness of the management measures set out pursuant to paragraph (iii);

(v) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;

(vi) a program to investigate and implement ways to improve the environmental performance of the development over time;

(vii) a protocol for managing and reporting any:

- incident, non-compliance or exceedance of any impact assessment criterion or performance criterion);
- complaint; or
- failure to comply with other statutory requirements; and

(viii) a protocol for periodic review of the plan.

Note: *The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*

Evidence of Consultation

(g) Where conditions of this consent require consultation with an identified party, the Applicant must:

(i) consult with the relevant party prior to submitting the subject document; and

(ii) provide details of the consultation undertaken including:

- the outcome of that consultation, matters resolved and unresolved; and

- details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

Staging, Combining and Updating Strategies, Plans or Programs

(h) With the approval of the Secretary, the Applicant may:

(i) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);

(ii) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined);

(iii) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and

(iv) combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by a consent or approval for an adjoining mine subject to common, shared or related ownership or management.

(i) With the agreement of the Secretary, a strategy, plan or program may be staged or updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.

(j) If the Secretary agrees, a strategy, plan or program may be staged without addressing particular requirements of the relevant condition of this consent if those requirements are not applicable to the particular stage.

Revision of Strategies, Plans and Programs

(k) Within three months of:

(i) the notification of an incident under Condition 9.3 (a);

(ii) the submission of an Annual Review under Condition 9.2 (a);

(iii) the submission of an Independent Environmental Audit under Condition 8.1 (a); or

(iv) the approval of any modification of the conditions of this consent (unless the condition specifies otherwise),

the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.

(l) If necessary, to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Secretary. Where revisions are required, the revised document

must be submitted to the Secretary for approval within six weeks of the completion of the review on Condition 3.2 (j).

Note: *This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.*

Application of Existing Strategies, Plans or Programs

(m) The Applicant must continue to apply existing management strategies, plans or monitoring programs required under this consent prior to the approval of Modification 7, and approved by the Secretary prior to the approval of Modification 7, subject to the conditions of this consent until the approval of a similar plan, strategy or program following the approval of Modification 7.

3.3 Extraction Plan

(a) The Applicant must prepare an Extraction Plan for all second workings on the site to the satisfaction of the Secretary. Each Extraction Plan must:

(i) be prepared by a suitably qualified and experienced person/s;

(ii) include detailed plans of existing and proposed first and second workings and overlying surface features, including any applicable adaptive management measures;

(iii) include adequate consideration of mine roof and floor conditions, pillar width to height ratio, final pillar design dimensions and the long-term stability of pillars which has been undertaken in consultation with the Resources Regulator;

(iv) provide updated predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed mining covered by the Extraction Plan, incorporating any recently obtained information;

(v) describe in detail the performance indicators to be implemented to ensure compliance with the performance measures in Table 1 and Table 2, and manage or remediate any impacts and/or environmental consequences to meet the rehabilitation objectives in Condition 3.7 (a);

(vi) include a:

- **Subsidence Monitoring Program** which has been prepared in consultation with the Resources Regulator to:
  - describe the ongoing conventional and non-conventional subsidence monitoring program:
  - provide data to assist with the management of risks associated with conventional and non-conventional subsidence;
  - validate the conventional and non-conventional subsidence predictions; and

- analyse the relationship between the predicted and actual conventional and non-conventional subsidence effects and predicted and actual impacts under the plan and any ensuing environmental consequences;

- **Built Features Management Plan** which has been prepared in consultation with the Resources Regulator, to manage the potential subsidence impacts of the proposed underground workings on built features (excluding mine-owned infrastructure), and which:
  - has been prepared in consultation with the owners of potentially affected features and has taken their views into account;
  - ensures that, with the consent of the owner, a pre-mining structural inspection is conducted of each structure and a report prepared on the structural integrity of all buildings in their entirety (including roofs, ceilings, openings, foundations and household sewage treatment and disposal systems);
  - addresses in appropriate detail all items of key public infrastructure (with particular consideration of transmission lines and towers (including angle towers), other public infrastructure and all classes of other built features;
  - recommends appropriate pre-mining mitigation measures to reduce environmental consequences and comply with the performance measures in Table 2;
  - recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate predicted impacts on potentially affected built features in a timely manner; and
  - in the case of all key public infrastructure, and other public infrastructure except roads, trails and associated structures, reports external auditing for compliance with ISO 31000 (or alternative standard agreed with the infrastructure owner), and provides for annual auditing of compliance and effectiveness during extraction which may impact the infrastructure;
- **Water Management Plan** which has been prepared in consultation with EPA, DPIE Water and NRAR, which provides for the management of potential impacts and/or environmental consequences of the proposed second workings on surface water and groundwater resources and flooding, including:
  - surface and groundwater impact assessment criteria that build on the performance measures in Tables 1 and 4;
  - a program to monitor and report on compliance with the surface and groundwater impact assessment criteria, including:
    - stream flows, quality and channel stability;
    - groundwater inflows to underground workings;
    - the height of groundwater depressurisation; and
    - groundwater levels, yield and quality, including for privately-owned bores, in the vicinity of the site; and

- a program to compare predicted impacts with actual impacts, including mapping of subsidence profiles;

- **Biodiversity Management Plan** which has been prepared in consultation with DPIE Environment, which provides for the management of potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species, populations and their habitats, endangered ecological communities and groundwater dependent ecosystems;
- **Land Management Plan** which has been prepared in consultation with any affected public authorities, which provides for the management of potential impacts and/or environmental consequences of the proposed second workings on land in general, with a specific focus on agricultural enterprises, cliffs, minor cliffs, rock face features and steep slopes;
- **Heritage Management Plan** which has been prepared in consultation with DPIE Environment and relevant stakeholders for heritage items, which provides for the management of potential impacts and/or environmental consequences of the proposed second workings on heritage items and includes all requirements under Condition 3.4;
- **Public Safety Management Plan** which has been prepared in consultation with the Resources Regulator to ensure public safety and manage access on the site;
- **Trigger Action Response Plan** to identify risks and specific follow up actions to avoid or remediate exceedances of the performance measures in Table 1 and Table 2; and
- **Contingency Plan** that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Table 1 and Table 2, or where any such exceedance appears likely.

Notes:

- *This condition does not apply to first or second workings which are covered by an Extraction Plan or Subsidence Management Plan approved, or submitted for approval, prior to the approval of Modification 7.*
- *In accordance with Condition 3.2 (i), the preparation and implementation of Extraction Plans may be staged, with each plan covering a defined area of underground workings. In addition, these plans are only required to contain management plans that are relevant to the specific underground methods that are being carried out.*

(b) The Applicant must not undertake second workings until the relevant Extraction Plan is approved by the Secretary.

(c) The Applicant must compensate landowners for compensable loss in accordance with the provisions of the Mining Act 1992 and/or the Coal Mine Subsidence Compensation Act 2017.

Performance Measures – Natural and Heritage Features

(d) The Applicant must ensure that second workings, undertaken following the approval of Modification 7 do not cause any exceedances of the performance measures in Table 1.

Table 1: *Subsidence impact performance measures – natural and heritage features etc*

Feature	***Performance Measures***
Watercourses	
6th Order Streams and their alluvium	• Negligible subsidence impacts and environmental consequences
4th and 5th Order Streams and their alluvium	• No subsidence impact or environmental consequence greater than minor • No connective cracking between the surface, or the base of the alluvium, and the underground workings
1st, 2nd and 3rd Order Streams	• No subsidence impact or environmental consequence greater than predicted in the documents referred to in Condition 1.1 (a)
Water Resources	
Hunter Unregulated and Alluvial Water Sources	• No greater environmental consequences greater than predicted in the documents referred to in Condition 1.1 (a) *or* as permitted under the performance measures for Watercourses (above)
Biodiversity	
Threatened species, threatened populations, or endangered ecological communities	• Negligible environmental consequences
Agriculture	
Agricultural enterprises	• Negligible loss in land capability or agricultural productivity
Heritage sites	
Aboriginal and Heritage sites	• Negligible subsidence impacts or environmental consequences • Negligible loss of heritage value

Notes:

- *Streams are classified in accordance with the Strahler stream order system.*
- *These performance measures apply to all mining taking place after the date of approval of Modification 7.*
- *The Applicant will be required to define more detailed performance criteria for each of these performance measures in the various management plans that are required under this consent (see Condition 3.3(a)).*

(e) Measurement and monitoring of compliance with performance measures and performance criteria in this consent is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans and monitoring programs. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter.

Additional Offsets

(f) If the Applicant exceeds the performance measures in Table 1 and the Secretary determines that:

(i) it is not reasonable or feasible to remediate the subsidence impact or environmental consequence; or

(ii) remediation measures implemented by the Applicant have failed to satisfactorily remediate the subsidence impact or environmental consequence,

then the Applicant must provide an offset[1] offset to compensate for the subsidence impact or environmental consequence, following consultation with DPIE Environment to the satisfaction of the Secretary.

[1] *Offsets must be proportionate to the significance of the subsidence impact or environmental consequence.*

Performance Measures – Built Features

(g) The Applicant must ensure that second workings undertaken following the approval of Modification 7 comply with the performance measures in Table 2.

Table 2: *Subsidence impact performance measures – built features*

Feature	***Performance Measures***
Key Public Infrastructure	
• Dartbrook and Dorset Roads • Main Northern Railway; and • Electricity transmission lines and towers	• Always safe and serviceable • Damage that does not affect safety or serviceability must be fully repairable and must be fully repaired
Other Infrastructure	

Feature	*Performance Measures*
• Electricity distribution lines, poles and associated towers; • Unsealed roads and road culverts, fire trails, fences and other built features; and • Other public infrastructure • Privately-owned residences • Other privately-owned built features and improvements, including farm dams, swimming pools, tennis courts, roads, tracks and fences	• Always safe • Serviceability should be maintained wherever practicable • Loss of serviceability must be fully compensated • Damage must be fully repairable and must be fully repaired or else replaced or fully compensated
Public safety	
• Public Safety	• Negligible additional risk.

Notes:

- *These performance measures apply to all mining taking place after the approval of Modification 7.*
- *These performance measures do not apply to built features owned by the Applicant.*
- *The Applicant is required to define more detailed performance measures in the Built Features Management Plans or Public Safety Management Plan (see Condition 3.3(a)).*
- *Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.*
- *Requirements under this condition may be met by measures undertaken in accordance with the Coal Mine Subsidence Compensation Act 2017.*

(h) Any dispute between the Applicant and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 2 is to be settled by the Secretary, following consultation with the Resources Regulator. Any decision by the Secretary shall be final.

First Workings

(i) The Applicant may carry out first workings within the approved mine plan, other than in accordance with an approved Extraction Plan, provided that the Resources Regulator is satisfied that the first workings are designed to remain stable and non-subsiding in the long-term, except insofar as they may be impacted by approved second workings.

Note: *The intent of this condition is not to require an additional approval for first workings, but to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long-term stability, with negligible resulting direct subsidence impacts.*

Bord and Pillar Mining

(j) Prior to undertaking bord and pillar extraction of the Kayuga Seam above previously extracted Wynn Seam longwall panels (see the area identified in Figure 8 of Appendix 3 as the 'Geotechnical Investigation Area'), the Applicant must prepare and submit to the Secretary for approval, a geotechnical study. This study must:

(i) be undertaken in consultation with the Resources Regulator; and

(ii) describe the final pillar design including pillar width to height ratio, final pillar design dimensions and long-term pillar stability predictions.

3.4 Heritage Assessment, Management and Monitoring

Assessment and Management

The Applicant must prior to the recommencement of construction or Mining Operations:

(a) prepare an Archaeology and Cultural Heritage Management Plan to address Aboriginal and European cultural heritage issues. The Plan must be prepared in consultation with local Aboriginal stakeholders including the Upper Hunter Wonnarua Tribal Council, Wannaruah Local Aboriginal Land Council and DPIE Environment, in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for proponents* (2010) and to the satisfaction of the Secretary. The Plan must include but not be limited to:

(i) provision of management strategies for known Aboriginal heritage sites for all parts of the DA area not affected by mining including protecting extant sites MAC 15 and KAY 4;

(ii) identification of any future salvage, excavation and monitoring programs for any known heritage/archaeological sites within the DA area, prior to and during construction;

(iii) set out management procedures and protocols for issues relating to Aboriginal heritage for all stages of the development (induction of employees on archaeological and heritage issues; training of field crews, Aboriginal stakeholders participation; staging of works; salvage etc);

(iv) details of a program for salvaging known Aboriginal sites;

(iv1) an unanticipated finds protocol to manage the discovery of any unrecorded Aboriginal heritage sites;

(v) details of consultation undertaken with the Aboriginal stakeholders in the preparation of this Plan;

(vi) details of the measures to fully document, in accordance with the NSW Heritage Council guidelines, any non-indigenous heritage sites that will be required to be removed as a result of the development;

(vi) details of proposed monitoring that will be undertaken in the areas adjacent to the non-indigenous heritage sites identified within the DA area during their excavation and removal, to identify any further cultural material that may exist;

(vii) details of the methods to dispose of the excavated non-indigenous heritage sites in a manner approved by the NSW Heritage Council, and following consultation with MSC and the Muswellbrook and Upper Hunter Historical Society;

(viii) details of how public access to the Kayuga Cemetery must be maintained at all times; and

(i) details of the measures to mitigate any potential impacts resulting from the mine on the heritage homesteads Old Kayuga, New Kayuga, Riverview, the McIntyre family cemetery, Kayuga Cemetery and the Kayuga Estate and details of any maintenance procedures proposed to preserve their heritage value in accordance with the NSW Heritage Council requirements.

(b) Within six months of the commencement of construction or Mining Operations, the Applicant must make a $50,000 contribution towards the establishment of a trust fund set up by the Department of Urban Affairs and Planning through the Public Trustee. The funds are to be used for a regional study of Aboriginal sites and other cultural heritage projects as defined by the Trust Deed.

(c) If, during the course of construction of any surface facilities or mining activities, the Applicant becomes aware of any heritage or archaeological sites not previously identified, all work likely to affect the site must cease immediately and the relevant authorities consulted about an appropriate course of action prior to recommencement of work. The relevant authorities may include DPIE Environment, the NSW Heritage Office, the Upper Hunter Wonnarua Tribal Council and Wannaruah Local Aboriginal Land Council. Any necessary permits or consents must be obtained and complied with prior to recommencement of work.

(d) The Applicant is to consult regularly with Aboriginal stakeholders. The results of these consultations must be documented in the Annual Review.

(e) Any proposed works that will affect non-indigenous heritage items, (including the items listed in Section 3.9.2 of the EIS) including demolition of the items, will require an approval under section 139 of the *Heritage Act 1977* and an application for an excavation permit under section 140 of the *Heritage Act 1977* to disturb the relics will be required. This may also require additional

approvals from MSC if the items are listed on the Heritage Schedule of the Local Environmental Plan.

(f) The Applicant must engage an appropriately qualified person to prepare an oral history of the mining lease prior to the dispersal of local residents. This will include an investigation of:

- all buildings and sites within the lease area;
- areas that will be affected by the mine;
- the former Dartbrook authorisation area; and
- the Kayuga cemetery.

The investigation will be carried out in consultation with a member of the Muswellbrook and Upper Hunter Historical Society, who is to be allowed reasonable access to the Applicant's properties for the purposes of assessing European archaeological features. The report must be made available to the Muswellbrook and Upper Hunter Historical Society, MSC and the Secretary.

Monitoring

(g) The Applicant must monitor the effectiveness of the measures outlined in the Archaeology and Cultural Heritage Management Plan [Condition 3.4(a)]. A summary of monitoring results must be included in the Annual Review.

(h) The Applicant must prepare a monitoring program of known indigenous heritage sites identified within the DA area, during the period of construction and mining operations. The monitoring program must be included in the Archaeology and Cultural Heritage Management Plan (Condition 3.4 (a)) and a summary of results will be included in the Annual Review. The program must:

(i) [2]monitor all known archaeological sites 12 months after undermining for the effects of subsidence and report on the results of these inspections in the Archaeology and Cultural Heritage Management Plan;

(ii) [3]monitor the construction of sediment and erosion control works to identify new archaeology sites;

(iii) [4]monitor locations in the subsidence area in order to assess the impacts of subsidence on the land surface, in areas that the Applicant has identified as being potentially affected by the following processes:

- erosion;
- rilling;
- knickpoint initiation; and
- areas prone to pooling.

Note	No Aboriginal archaeological sites, that have been identified, shall be destroyed without the approval of the Secretary of DPIE Environment,

[2] DPIE Environment General Terms of Approval
[3] DPIE Environment General Terms of Approval
[4] DPIE Environment General Terms of Approval

under section 90 of the *National Parks and Wildlife Act 1974*, prior to any disturbance of the identified sites by Construction or Mining Operations.

3.5 Flora and Fauna Assessment, Management and Monitoring

Assessment and Management

(a) The Applicant must prior to recommencement of construction or Mining Operations prepare and implement a Flora and Fauna Management Plan for the management of flora and fauna issues for the DA area. The Plan is specifically required to outline procedures for clearing or disturbing vegetation and other habitat types, along with measures for habitat reinstatement and management.

The Plan must be prepared in consultation with DPIE Environment and to the satisfaction of the Secretary. The Plan must be prepared by an appropriately qualified and experienced ecologist. The ecologist must be responsible for providing advice to minimise potential impacts upon threatened and protected fauna species that may utilise the site and to provide expert advice on the regeneration and reconstruction of flora and fauna habitat on mined areas. The Plan must include but not be limited to:

(i) details of strategic vegetation management, outlining timeframes for clearing and re-vegetation activities and a map illustrating the Plan. The Plan should aim to maximise scope for new vegetation to establish and restore ecological integrity;

(ii) details of the schedule for clearing activities incorporating seasonal habitat requirements for species such as bats and other mammals, with the objective of avoiding incidents during sensitive hibernation and breeding periods;

(iii) details of methods of how medium to large tree hollows (defined as being greater than 20 centimetres in diameter) and nests removed during construction are salvaged and replaced in adjacent vegetation; and

(iv) details of management measures to be applied if threatened species identified in the EIS are found on site.

(b) If threatened species, not identified in the EIS, are identified on the site during construction or operation of the coal mine, the Applicant must cease any work immediately which could adversely impact on the species, pending investigation and negotiation of ameliorative measures. The Applicant must advise the DPIE Environment and engage a suitable qualified person to investigate, and identify appropriate amelioration measures.

(c) The Applicant must ensure that the construction and operation of ventilation shafts must not require the clearing of trees, where practicable.

(e) The Applicant must ensure that any vegetated areas cleared for construction purposes and not utilised in the Mining Operations are restored at least to its original condition.

(f) The Applicant must use locally endemic species for revegetation purposes.

(g) The Applicant must during the life of the mine and until the revegetated areas are established to the satisfaction of the Resources Regulator, maintain revegetated areas. Maintenance must include, where necessary, but not be limited to:

- replanting failed or unsatisfactory areas
- repairing erosion problems
- fire management – fire suppression or fire encouragement
- pest and weed control
- control of feral animal populations
- maintain and repair fencing
- fertiliser application
- application of lime or gypsum to control pH and improve soil structure.

(h) As well as the requirements under subclause (g), the efforts and progress of the Flora and Fauna Management Plan must be documented in the Annual Review.

(i) Measures to control invasion of weeds as a result of construction activities must be addressed and managed.

(j) The Applicant must not clear vegetation in advance of the immediate area required for use during construction or operation of the rejects emplacement area.

Monitoring

(k) The restoration works must be monitored. The results of the monitoring and the effectiveness of the restoration must be reported as part of the Annual Review.

(l) The Applicant must prepare a detailed monitoring program for habitat areas within the DA area, including any wetlands and aquatic habitats, during the development and for a period after the completion of the development to be determined by the Secretary in consultation with DPIE Environment. The monitoring program must be included in the Flora and Fauna Management Plan (Condition 3.5(a)) and a summary of the results must be provided in the Annual Review. The program must:

(i) monitor impacts attributable to the development and include monitoring of the success of any restoration or reconstruction works. The Applicant must carry out any further works required by the Secretary and Resources Regulator as a result of the monitoring;

(ii) establish an ongoing monitoring program of the existing and proposed revegetated areas to assess their floristics and structure and to propose

contingency measures for improvements to revegetation if required; and

(iii) establish an ongoing monitoring program in the rejects emplacement area, of fauna species diversity and abundance and the effectiveness of reconstructed ecosystems in providing fauna habitat and contingency measures should impacts be identified as occurring.

Note: The information obtained from the monitoring must be used to guide future revegetation efforts on the mine site.

3.6 Prevention of Soil Erosion

(a) The Applicant must, prior to the recommencement of construction or mining operations, prepare an Erosion and Sediment Control Plan for construction and ongoing use of surface facilities to the satisfaction of the Secretary.

(b) The Erosion and Sediment Control Plan must include but not be limited to:

(i) details of temporary and permanent erosion and sediment control systems to be used during both construction and/or the expansion of the rejects emplacement area, including earthworks associated with landscaping;

(ii) details of soil salinity management where relevant;

(iii) [5]measures that will be employed to minimise soil erosion and the discharge of sediment and other pollutants to lands and/or waters during construction and/or the expansion of the rejects emplacement area. The Plan should be prepared in accordance with the requirements for such plans outlined in *Managing Urban Stormwater: Soils and Construction* (available from the Department of Housing) or its latest version;

(iv) the consideration of the location and purpose of structures in the erosion and sediment control plan to maximise similarities between pre-development and post-development drainage networks with reference to catchment areas, drainage densities and discharge characteristics;

(v) consideration and management of erosion and sedimentation of affected surface watercourses/waterbodies, including creeklines within the DA areas;

(vi) measures to construct banks, channels and similar works to divert stormwater away from disturbed and contaminated land surfaces such as mine workings, coal handling areas and wastewater treatment facilities. All diversion banks, channels and points of discharge must be constructed or stabilised so as to minimise erosion and scouring; and

[5] EPA General Terms of Approval

(vii) a program for reporting on the effectiveness of the erosion and sediment control systems and performance against objectives contained in the approved Erosion and Sediment Control Management Plan, and EIS.

(c) The Applicant must also prepare a Soil Stripping Management Plan for the expansion of the rejects emplacement area, prior to the commencement of construction of the reject emplacement area, to the requirements of Resources Regulator and DPIE Water that must include, but not be limited to:

(i) details to ensure the maximum retrieval of suitable topdressing material and appropriate management of topsoil stockpiles including immediate revegetation to protect from soil erosion and to control potential weed problems;

(ii) details of the management of soil stockpiles, soil stripping techniques and scheduling;

(iii) control of weed infestation on topsoil stockpile material;

(iii) details of estimated quantities of suitable topdressing material required for subsequent respreading on rehabilitated land; and

(iv) a program for reporting on the effectiveness of the soil stripping methods and performance against objectives contained in the soil stripping management plan, and the documents referred to in Condition 1.1(a).

(d) The company is to re-establish a post-mining drainage system which is comparable to the drainage density and discharge characteristics of the pre-mining land for each affected drainage line discharging from the area of the mining development. The design and implementation of the post-mining drainage system is to be prepared prior to the cessation of mining and to the satisfaction of DPIE Water.

(e) The Applicant must install a flexible drop structure in Sandy Creek or its tributaries and undertake such other measures as required by DPIE Water when headward erosion of the creek bed becomes evident.

(f) The Applicant must implement soil erosion mitigation measures at ventilation shafts to the satisfaction of DPIE Water, including a sedimentation structure to collect runoff from disturbed areas.

3.7 Site Rehabilitation Management

(a) The Applicant must rehabilitate the site to the satisfaction of the Resources Regulator. This rehabilitation must be generally consistent with the proposed rehabilitation activities described in the documents referred to in Condition 1.1 (a) and comply with the objectives in Table 3.

Table 3: *Rehabilitation objectives*

Feature	***Objective***
All areas of the site affected by the development	• Safe, stable and non-polluting • Fit for the intended post-mining land use/s
Areas proposed for native ecosystem re-establishment	• Establish self-sustaining ecosystems comprising flora species selected to re-establish and complement local and regional biodiversity
Areas proposed for agricultural or pastoral use	• Nominated land capability classification is achieved and is self-sustaining
Final Landform	• Consistent with surrounding topography to minimise visual impacts • Incorporate relief patterns and design principles consistent with natural drainage
Rehabilitation materials	• Soil and vegetative materials from areas disturbed under this consent (including topsoils, substrates and seeds) are recovered, managed and used as rehabilitation resources
Surface infrastructure of the development	• Decommissioned and removed, unless the Resources Regulator agrees otherwise • All surface infrastructure sites are to be revegetated consistent with the post-mining land use
Portals and vent shafts of the development	• To be decommissioned and made safe and stable • Retain habitat for threatened species (e.g. bats), where practicable
Watercourses subject to mine water discharges and/or subsidence impacts or environmental consequences that are greater than negligible	• Hydraulically and geomorphologically stable • Aquatic ecology and riparian vegetation that is the same or better than prior to grant of this consent
Water quality	• Water retained on the site is fit for the intended post-mining land use/s • Water management is consistent with the regional catchment management strategy
Built features damaged by mining operations	• Repair to pre-mining condition or equivalent unless the: ○ owner agrees otherwise; or ○ damage is fully restored, repaired or compensated for under the *Coal Mine Subsidence Compensation Act 2017*

Feature	*Objective*
Cliffs, minor cliffs, rock face features and steep slopes	• No additional risk to public safety compared to prior to mining
Community	• Ensure public safety • Minimise adverse socio-economic effects associated with mine closure

(b) The rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by all underground mining as part of the development and to all surface infrastructure components of the development.

(c) Where remediation of watercourses is likely to cause environmental consequences greater than those that require rehabilitation, alternative equivalent works may be undertaken within the affected watercourse.

(d) The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated.

Note: *This condition does not prevent further disturbance at some later stage of the development of areas that have been rehabilitated.*

3.8 Visual Amenity and Landscaping

(a) A Landscape Management Plan must be prepared by the Applicant and approved by the Secretary prior to recommencement of construction. The Plan must be prepared in consultation with Resources Regulator, MSC and UHSC. In preparation of the plan, regard must be given to the Aberdeen Sheet of the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of NSW*. The Landscape Management Plan must be appended to the Mining Operations Plan (Condition 2.1) and must include, but not be limited to, the following:

i) An on-site landscaping strategy detailing design and proposed planting of trees and shrubs and/or the construction of mounding or bunding:

1) adjacent to the Dam and Ventilation Shaft No.1 where screening of new infrastructure is required from Dartbrook Road.

2) screening of new infrastructure, where required, from other public roads including Kayuga, and Dartbrook and Coal Creek Roads;

3) around the Kayuga Entry to reduce lighting effects;

4) in areas of the eastern facilities site where replanting of existing screening is required. This must include, where necessary, the construction of a suitably screened bund wall on the northern and southern ends of the CHPP to reduce visual effects on nearby residences at Aberdeen and nearby rural properties;

5) as part of the rehabilitation of the Rejects Emplacement Area;
6) along sections of the new access road to the mine site;
7) along sections of the New England Highway; and
8) at any other areas identified as necessary by MSC or UHSC for the maintenance of satisfactory visual amenity, and as agreed by the Secretary.

ii) Appropriate erosion control and sediment control practices for earthworks associated with the landscaping.

iii) Details of visual appearance of new buildings, structures, facilities or works (including paint colours, screenings and specifications). New buildings and structures (including the Nitrogen Injection Plant) must be designed and constructed so as to present a neat and orderly appearance and to blend as far as practicable with the surrounding landscape.

iv) Details, specifications and staged work programs to be undertaken, maintenance and monitoring of all landscape works and maintenance of building materials and cladding.

v) Details of a monitoring program to assess the effectiveness of visual impact mitigation measures. The program will be developed in consultation with MSC and UHSC and be prepared to the satisfaction of the Secretary;

vi) Reporting of monitoring results in the Annual Review and to MSC, UHSC and the CCC. Monitoring results would specifically identify any remedial works required;

vii) Details of contingency measures to be applied in the case that proposed visual mitigation measures are not successful;

viii) the process of incorporating vegetation screening and fauna protection corridors into the proposed visual and landscaping works, where practicable;

ix) use of indigenous species;

x) details of predicted visual impacts from the proposed rejects emplacement area on residences not owned by the Applicant, UHSC land and Aberdeen. The predicted visual impacts must be in the form of a montage and transects showing clear sightlines from the viewer to the proposed rejects emplacement area;

xi) details of an off-site landscape strategy which will detail proposed off-site mitigation measures and include the:
1) identification of those properties to be offered off-site visual enhancement works, in accordance with predicted adverse visual impacts;
2) details of consultation with the relevant landowners; and
3) details of the procedure to be followed to design and implement appropriate off-site vegetation screening if requested by landowners identified under 1 above; and

xii) consideration of the visual impact and adequacy of associated mitigating measures on the Aberdeen property of SCC, with recommendations for any additional measures including consideration of buffer land, as

applicable. This consideration must be undertaken by an independent qualified person(s) appointed by the Secretary, in consultation with SCC and Applicant, and paid for by the Applicant.

(b) In the event that a landowner other than those identified in subclause (a)(xi) above, considers that his/her residence is visually impacted by the proposal, greater than predicted in the Landscape Management Plan once the proposal is operational, the Applicant must, upon the receipt of a written request, consult the landowner, discuss their concerns and, if necessary, possible mitigation.

(c) Should the Applicant and/or landowner dispute the level of adverse impact or any proposed mitigation measures from subclause (a)(xi) or (b) above, then either party may refer the matter to the Secretary in consultation with MSC and/or UHSC.

(d) Notwithstanding subclauses (b) and (c) above, the Applicant must fund and undertake an independent review of the visual impact of the proposed rejects emplacement area on UHSC's land, every five years from the commencement of mining operations, unless otherwise agreed by the Secretary. The independent review must be undertaken by an independent Landscape Expert appointed by the Secretary in consultation with UHSC and the Applicant. The independent Landscape Expert must determine whether the actual visual impact of the rejects emplacement area on UHSC's land is greater than that predicted in the Landscape Management Plan. If the independent Landscape Expert determines that the impact on UHSC's land is greater than that predicted in the Landscape Management Plan, the independent Landscape Expert must make recommendations to mitigate the impact.

(e) If either party disputes the determination and recommendations of the independent Landscape Expert in subclause (d) above, either party may refer the matter to the Secretary for final determination.

3.9 Bushfire and other Fire Controls

The Applicant must:

(a) provide adequate fire protection works, fire fighting equipment and hazard reduction measures with particular attention to boundaries of adjoining landholdings;

(b) submit an annual report on fire management activities to the Muswellbrook Fire Management Committee;

(b1) ensure all flammable materials are stored and handled in accordance with its Material Data Safety Sheets and relevant Australian Standard;

(b2) include fire safety as part of mine safety inductions for employees and contractors; and

(c) prepare a Bushfire Management Plan for all its holdings contained in the DA area, prior to commencement of mining operations, to the satisfaction of MSC, UHSC and the Rural Fire Service.

3.10 Land Management

(a) The Applicant must, prior to commencement of construction or Mining Operations update the current Dartbrook Mine Land Management Plan for the areas of the proposed surface facilities, and its holdings in the DA area, to provide for proper land management in consultation with DPIE Water, MSC, and to the satisfaction of the Secretary. The plan must include, but not be limited to:

(i) pastures and remnant vegetation management;

(ii) prevention and rehabilitation of land degradation;

(iv) assessment of the potential for commercial harvesting of standing timber removed from the site;

(v) eradication of vermin and noxious weeds as required by the Rural Lands Protection Board, the Upper Hunter Weeds Authority, the Prickly Pear Authority and other relevant authorities; and,

(vi) feral animal control.

(b) The Applicant must minimise the removal of trees and other vegetation from the proposed surface facilities area, and restrict any clearance to the areas occupied by mine activity, buildings and paved surfaces, and those areas necessary for fire control in accordance with MSC requirements.

(c) The Applicant must ensure that the agricultural capability of lands under its control within the mining lease area are at a level not less than the level at the date of this consent.

(d) The Applicant must maintain a minimum 50 metre wide buffer strip between the southern rejects emplacement area and the adjacent land owned by Mr and Mrs L Wilkinson. Surface drains and an access road may be constructed within the 50 metre wide strip.

4. Water Management and Monitoring

4.1 Surface & Ground Water Management Plans

The Applicant must:

(a) prior to the recommencement of Mining Operations, prepare a Site Water Management Plan for the DA area, in consultation with DPIE Water and NRAR, MSC and to the satisfaction of the Secretary, which must include, but not be limited to, the following matters:

(i) management of the quality and quantity of surface and ground water to comply with the water performance measures in Table 4, including:

1) surface and groundwater impact assessment criteria; and

2) a description of the water management system and water balance ;

(ii) management of stormwater and general surface runoff diversion to ensure separate effective management of clean and mine water; including details of temporary surface drainage works to minimise the flow of surface water onto the rejects emplacement area and details of drainage works to direct runoff from the active rejects emplacement areas to onsite storage dams;

(iii) measures to prevent the degradation of downstream surface water quality below the pre-mining ANZECC beneficial water use classification due to mining operations, particularly in the Hunter River;

(iv) measures to determine whether any groundwater from the Hunter River alluvium aquifers is captured by the mine including a response plan in the event that monitoring shows evidence of a dilution of salinity or change in water chemistry, or increase in inflow rate that may indicate leakage from the alluvium to the Hunter Tunnel;

(v) measures to be implemented in the event that the continued operation of the Hunter Tunnel leads to a significant increase in groundwater salinity in the alluvial aquifer system;

(vi) contingency plans for managing adverse impacts of the development on surface and groundwater quality which must include:

1) contingency arrangements to manage excess saline water if the storage of the mine water management system is exceeded; and

2) contingency measures to manage any impacts identified by monitoring that the management strategies have failed to predict or control, particularly relating to groundwaters associated with the alluvial aquifer of the Hunter River, in consultation with DPIE Water.

(vii) [Deleted]

(viii) measures to ensure that waters of poorer quality are effectively segregated and reused on the site.

(ix) details of a strategy for the decommissioning of water management structures, including mine water dams and clean water diversion dams;

(x) measures to isolate heavily contaminated waters, including waters containing oil and grease, or other pollutants, operation chemical residues or other criteria, to avoid mixing with reuse or discharge waters;

(xi) measures for assessing chemical water quality impacts of the mining operation above and below the mine site;

(xii) projection of potential groundwater changes during mining (short term) and post-mining (long term) with particular attention given to the affect of changes to groundwater quality and mobilisation of salts including downgradient of the rejects emplacement area;

(xiii) details of consultation with landholders who use water from the proposed longwall mining area and adjacent area and those parts of Dart Brook and Sandy Creek alluvia immediately adjacent to the mining areas, in relation to their requirements for and the availability of, water and must consider those water uses in the formulation of the management plan;

(xiv) details of a surface water and groundwater monitoring program (refer to clause 4.2(a)(ii);

(xv) a program for reporting on the effectiveness of the water management systems and performance against objectives contained in the approved site water management plans, and EIS; and

(xvi) measures to minimise the demand for external water supplies, including the reuse of mine waters for operational activities where possible.

(b) The Applicant must undertake annual assessments of the accuracy of the groundwater model predictions outlined in the EIS compared with monitored groundwater impacts in consultation with DPIE Water and NRAR. Details of the assessments must be reported in the Annual Review and the scope of the assessment must be determined in consultation with DPIE Water and NRAR. Should the assessment identify significant differences between the EIS model predictions and monitored impacts, the Applicant must revise the assessment of the potential impacts on groundwater systems in consultation with DPIE Water and NRAR and implement any further mitigation measures in consultation with DPIE Water and NRAR.

(b1) The Applicant must ensure that the development complies with the performance measures in Table 4.

Table 4: *Water management performance measures*

Feature	***Performance Measure***
Water management – General	• Maintain separation between clean and mine water management systems • Minimise the use of clean and potable water on the site • Minimise the use of make-up water from external sources • Design, install, operate and maintain water management

Feature	*Performance Measure*
	infrastructure in a proper and efficient manner
Erosion and sediment control works	• Design, install and maintain erosion and sediment controls in accordance with the guidance series *Managing Urban Stormwater: Soils and Construction* including *Volume 1: Blue Book (Landcom, 2004), Volume 2A: Installation of Services (DECC, 2008), Volume 2C: Unsealed Roads (DECC,2008) and Volume 2E: Mines and Quarries (DECC, 2008)* • Design, install and maintain any infrastructure within 40 metres of watercourses in accordance with the guidance series for *Controlled Activities on Waterfront Land* (DPI Water, 2012) • Design, install and maintain any creek crossings generally in accordance with the *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why Do Fish Need To Cross The Road*? *Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003)
Clean water diversions and storage infrastructure	• Design, install and maintain the clean water system to capture and convey the 100 year Annual Recurrence Interval (ARI) flood • Maximise as far as reasonable the diversion of clean water around disturbed areas on the site, except where clean water is captured for use on the site
Sediment dams	• Design, install and maintain sediment dams in accordance with the guidance series *Managing Urban Stormwater: Soils and Construction* including *Volume 1: Blue Book (Landcom, 2004) and Volume 2E: Mines and Quarries (DECC, 2008)*
Mine water storages	• Design, install and maintain mine water storage infrastructure to avoid unlicensed or uncontrolled discharges to surface waters as far as reasonable and practicable
Mine water discharges	• No discharges to surface waters except in accordance with an Environment Protection Licence, section 120 of the *Protection of the Environment Operations Act 1997* or *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002*
Chemical and hydrocarbon storage	• Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standard
Tailings storages	• Design and maintain tailings storage areas to encapsulate and prevent the release of tailings seepage/leachate

(b2) The performance measures in Table 4 do not apply to water management structures constructed prior to the approval of Modification 7.

Compensatory Water Supply

(c) The Applicant must provide a compensatory water supply to any landowner of privately-owned land whose rightful water supply is adversely and directly impacted (other than an impact that is minor or negligible) as a result of the development, in consultation with DPIE Water, and to the satisfaction of the Secretary.

(c1) The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent, in quality and volume, to the loss attributable to the development. Equivalent water supply should be provided (at least on an interim basis) as soon as practicable after the loss is identified, unless otherwise agreed with the landowner.

(c2) If the Applicant and the landowner cannot agree on whether the loss of water is to be attributed to the development or the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution. The burden of proof that any loss of surface water or groundwater access is not due to mining impacts rests with the Applicant.

(c3) If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant must provide compensation, to the satisfaction of the Secretary.

Notes:

- *The Water Management Plan (see Condition 4.1(a)) is required to include trigger levels for investigating potentially adverse impacts on private water supplies.*

Water Supply

(d) The Applicant must:

(i) ensure that it has sufficient water for all stages of the development;

(ii) implement efficiency and best practice measures to minimise and conserve the use of water; and

(iii) if necessary, adjust the scale of the development to match its available water supply.

(d1) The Applicant must report on water extracted from the site each year (direct and indirect) in the Annual Review, including water taken under each water licence.

Note: *Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain all necessary water licences for the development, including during rehabilitation and following mine closure.*

(e) [6]The construction or mining operations must not damage or interfere with:

- vegetation outside the area of operation;

[6] DPIE Water General Terms of Approval

- the stability of adjacent or nearby streams; or
- the quality of water in the stream or watercourse except as authorised by the EPA.

(f) [7]The Applicant must ensure that soil and/or vegetation material to be removed from the area of operations must be disposed of to an appropriate site where it will not re-enter the watercourses or drainage systems.

(g) [8]The Applicant must be responsible for any excavation or soil removal undertaken by any other person at the mine site.

(h) [9]The Applicant must ensure that all drainage diversion works at the mine site must minimise adverse impacts, in consultation with DPIE Water. This must include:

(i) sufficient flow detention measures to provide flow rates at non-erosive velocities prior to re-entry into the natural drainage system;
(ii) provision of adequate scour protection to ensure that where flows re-enter natural drainage lines from the diversion drains, adverse erosion impacts do not occur;
(iii) designing all diversion systems to provide stability for the long-term for permanent diversions or for the designed life for temporary diversions;
(iv) undertaking a pre-construction survey, by a suitably qualified person, of the channel site and adjacent banks showing design channel profile on cross-sections;
(v) undertaking engineering hydraulic calculations by a suitably qualified person and assessment of scour potential of the channel to meet design flood capacity. This should be related to flow velocities, stability of design bed material type and bed slopes and profiles;
(vi) revegetating the banks of the new channel using suitable species immediately following excavation;
(vii) rehabilitating using locally grown species transplanted and embedded into erosion matting where required in areas of high scour rates. The diversion system may require time for appropriate revegetation prior to its connection to divert water;
(viii) ensuring the sizes of any culverts are determined by a suitably qualified person;
(ix) ensuring the flows or hydraulic levels upstream and downstream of any culverts must not hinder the passage of fish and aquatic animals where appropriate. Any culverts must be constructed so that they comply with NSW Fisheries Policy and Guidelines for culvert construction.
(x) preventing erosion of the bed and banks upstream and downstream of any culvert with suitable scour protection as recommended by a suitably qualified person.

4.2 Surface and Groundwater Monitoring

[7] DPIE Water General Terms of Approval
[8] DPIE Water General Terms of Approval
[9] DPIE Water General Terms of Approval

(a) The Applicant must:

(i) construct and locate surface and groundwater monitoring positions, as identified in the Site Water Management Plan (Condition 4.1(a)) in consultation with DPIE Water and NRAR, and to the satisfaction of the Secretary, at least three months prior to the commencement of mining operations;

(ii) prepare a detailed monitoring program in respect of ground and surface water quality and quantity, including water in and around the DA area during mining works and post mine operations in consultation with DPIE Water and NRAR which must form part of the Site Water Management Plan. The monitoring program must have the capacity to collect sufficient data to adequately assess:

1) the impact on groundwater levels on neighbouring properties and in the locality, and to identify any water quality impacts;
2) the impact of the development on groundwaters associated with the alluvial aquifer of the Hunter River including the ongoing monitoring of the volume and quality of water inflows into the Hunter Tunnel;
3) regional groundwater levels and water quality including the extension of the regional groundwater monitoring network to include bores RDH508-511; and
4) any concerns or complaints from surrounding landholders on groundwater matters, and any ensuing actions, which must be recorded and be available to DPIE Water and NRAR.

(iii) report on the monitoring results and raw data in the Annual Review on the following matters:

1) a basic statistical analysis (mean, range, variance, standard deviation) of the results for the parameters measured in individual bores / wells and as a subset of the aquifer;
2) an interpretation of the water quality results and changes in time for water quality and water levels (supported with graphs, contour plots showing changes in aquifer pressure levels);
3) an interpretation of the water balance identifying the volume of water and comparing this to predictions made in the EIS or the previous Annual Review; and
4) provide an electronic copy of the data for warded to DPIE Water and NRAR.

(iv) [10]The Applicant must consult with the DPIE Water and NRAR and submit the Groundwater and Surface Water Monitoring Program in subclause (a)(ii) to the EPA when an application for a licence variation is submitted.

4.3 Flood Response Plan

[10] EPA General Terms of Approval

(a) The Applicant must, prepare and implement a Flood Response Plan, to the satisfaction of the Secretary. The Plan must identify flood risks and describe the mitigation measures and management procedures to mitigate these risks and ensure the safety of personnel on the site during flood events.

Notes:

- *In this condition, "flood" is considered to be any event exceeding the 20% Annual Exceedance Probability (AEP) up to and including the Probably Maximum Flood (PMF) event.*
- *Under the Work Health and Safety Act 2011 and the Work Health and Safety (Mines and Petroleum Sites) Act 2013, the Applicant is responsible for ensuring the safety of its workers and contractors.*

5. Rejects Emplacement Area and Waste Management

5.1 Rejects Emplacement Area

(a) The Applicant must:

(i) Ensure the construction, operation and decommissioning of the rejects replacement area meets relevant geotechnical factors of safety and long-term stability criteria, suitable for a permanent feature of the landscape;

(ii) Unless otherwise agreed to by the Resources Regulator, ensure the design of the rejects emplacement area addresses:

- the need for subsurface drainage;
- compaction of rejects within the emplacement to achieve a target of 95 percent standard compaction, and at all times achieve a 90 percent standard compaction;
- temperate control and monitoring using thermo-couples within the emplacement; and

(iii) Prepare and implement a surveillance program to monitor the geotechnical stability of the rejects emplacement area, including periodic geotechnical analysis of the reject material to ensure it continues to meet relevant design criteria,

to the satisfaction of the Resources Regulator.

(b) Prior to the emplacement of rejects in the southern and northern rejects emplacement areas, and for any subsequent modifications to the design of these emplacement areas, the Applicant must:

(i) Commission a suitably qualified, experienced and independent geotechnical expert, whose appointment has been approved by the Secretary, to review the detailed design (and surveillance program) for the southern and northern rejects emplacement areas to verify each

design meets relevant geotechnical factors of safety and long-term stability criteria;

(ii) Implement all reasonable and feasible recommendations made by the independent geotechnical expert to improve the detailed design or the surveillance program for the southern and northern rejects emplacement areas; and

(iii) Provide a copy of the independent geotechnical expert's report to the Resources Regulator and the Secretary,

to the satisfaction of the Resources Regulator.

(c) Prior to emplacement of rejects in the southern rejects emplacement area, the Applicant must prepare and implement a revised Rehabilitation Strategy for all rejects emplacement areas at the mine, to the satisfaction of the Resources Regulator.

5.2 Waste

(a) Prior to the commencement of construction or Mining Operations, the Applicant must prepare and implement a Waste Management Plan for the DA area in consultation with MSC and to the satisfaction of the Secretary. The Plan must include, but not be limited to:

(i) details of measures to facilitate waste management on site;
(i) details of compliance with the Applicant's obligations under the *Protection of the Environment Operations Act* (1997);
(ii) identification of all types and quantities of waste materials produced at the mine site during construction, commissioning and operation;
(iii) programs aimed at minimising the production of waste at the mine site through the implementation of operational and management measures;
(iv) details of the potential reuse and recycling avenues for waste materials produced at the mine site, including collection and handling procedures;
(v) details of appropriate disposal routes in the event that reuse and recycling avenues are not available or are not practicable; and
(vi) programs for involving and encouraging employees and contractors to minimise waste production at the mine site and reuse / recycling where appropriate.

(b) The Applicant must dispose of all solid waste and putrescible matter from the site to the satisfaction of MSC or EPA, as relevant.

(c) The Applicant must dispose of all treated sewage and sullage to the satisfaction of MSC and in accordance with the EPA Licence.

5.3 Tailings Disposal

(a) The Applicant must not use tailing dams for the disposal of fine coal rejects, other than in emergency situations when the ratio of fine to coarse rejects are not within the specifications for the waste plant.

(b) The Applicant must prepare a report to the Secretary every five years, or as otherwise agreed by the Secretary, reporting on the feasibility of using goaf areas of the Dartbrook Extended Mine, other than that described in the "Dartbrook Mine Statement of Environmental Effects for New ROM Coal Stockpiles, Underground Tailings Disposal & Nitrogen Injection Plant", dated 12 August 2005 and prepared by Hansen Consulting, for rejects disposal.

6. Air Quality, Noise and Light Management and Monitoring

6.1 Air Quality Management and Monitoring

Air Quality Standards/Goals

(a) The Applicant must ensure that all reasonable and feasible avoidance and mitigation measures are employed so that particulate matter emissions generated by the development do not cause exceedances of the criteria listed in Table 5 at any residence on privately-owned land.

Table 5: *Air quality criteria*

Pollutant	***Averaging period***	***Criterion***
Particulate matter < 10 µm (PM_{10})	Annual	[a, c] 25 µg/m^3
	24 hour	[b] 50 µg/m^3
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	[a, c] 8 µg/m^3
	24 hour	[b] 25 µg/m^3
Total suspended particulate (TSP) matter	Annual	[a, c] 90 µg/m^3

Notes:

a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).
b Incremental impact (i.e. incremental increase in concentrations due to the development on its own).
c Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

(b) The air quality criteria in Table 5 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the air quality criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

(c) Upon receiving a written request for acquisition from the owner of the land listed in Table 6, the Applicant must acquire the land in accordance with the procedures in Conditions 11.2 (C) and (D).

Table 6: *Air quality affected land subject to acquisition upon request*

Acquisition Basis	***Land***
Air Quality	Receiver 181 Property 76 Receiver 212* Receiver 228* Receiver 238* Receiver 242* Receiver 244* Receiver 374* Receiver 391*

Notes:

- **The Applicant is only required to acquire this property if acquisition rights are no longer available under the development consent for the Mt Pleasant mine.*
- *The location of the land referred to in Table 6 is shown on the figure in Appendix 4.*

Mine-owned Land

(d) Particulate matter emissions generated by the development must not exceed the criteria listed in Table 6 at any occupied residence on mine-owned land (including land owned by another mining company) unless:

(i) the tenant and landowner (if the residence is owned by another mining company) have been notified of any health risks associated with such exceedances in accordance with the notification requirements under this consent;

(ii) the tenant of any land owned by the Applicant can terminate their tenancy agreement without penalty at any time, subject to giving reasonable notice;

(iii) air quality monitoring is regularly undertaken to inform the tenant and landowner (if the residence is owned by another mining company) of the likely particulate matter emissions at the residence; and

(iv) data from this monitoring is presented to the tenant and landowner in an appropriate format for a medical practitioner to assist the tenant and landowner in making informed decisions on the health risks associated with occupying the property.

Air Quality Operating Conditions

(e) The Applicant must:

(i) take all reasonable and feasible steps to minimise odour, fume, greenhouse gas and dust (including PM_{10} and $PM_{2.5}$) emissions of the development;

(ii) minimise any visible off-site air pollution generated by the development;

(iii) minimise to the greatest extent practicable, the extent of potential dust generating surfaces exposed on the site at any given point in time;

(iv) ensure all ROM coal and dust-prone surfaces are watered and kept sufficiently moist to prevent or minimise emissions;

(v) operate an air quality management system commensurate with the risk of impact to ensure compliance with the relevant conditions of this consent;

(vi) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see Note c to Table 5 above);

(vii) use all reasonable efforts to co-ordinate air quality management on the site with the air quality management at nearby mines to minimise cumulative air quality impacts;

(viii) carry out regular air quality monitoring to determine whether the development is complying with the relevant conditions of this consent; and

(ix) regularly assess the air quality monitoring data, and modify operations on the site to ensure compliance with the relevant conditions of this consent.

Air Quality and Greenhouse Gas Management Plan

(f) The Applicant must, prior to the recommencement of construction or mining operations, prepare an Air Quality and Greenhouse Gas Management Plan for the development to the satisfaction of the Secretary. This plan must:

(i) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;

(ii) describe the measures to be implemented to ensure:

- compliance with the air quality criteria and operating conditions in this consent;
- best practice management is being employed (including in respect of minimisation of greenhouse gas emissions from the development and energy efficiency); and
- the air quality impacts of the development are minimised during adverse meteorological conditions and extraordinary events;

(iii) outline mitigation measures to be employed to minimise dust emissions including dust from rejects emplacement area in dry and windy conditions;

(iv) describe the air quality management system in detail; and

(v) include an air quality monitoring program that:

- uses monitors to evaluate the performance of the development against the air quality criteria in this consent and to guide day to day planning of operations;
- adequately supports the air quality management system; and

- includes a protocol for identifying an air quality-related exceedance, incident or non-compliance and notifying the Department and relevant stakeholders of any such event.

Odour Monitoring

(g) [11]The Applicant must not cause or permit the emission of offensive odours from the premises and must comply with section 129 of the Protection of the Environment Operations Act 1997.

(h) [12]Prior to construction of each ventilation air discharge vent (ventilation shaft), the Applicant must submit a report to the EPA, which demonstrates, to the satisfaction of the EPA, that the new ventilation air discharge vents are located and designed in a manner that will not cause offensive odour impacts.

(i) [13]Within 90 days of commissioning each new ventilation air discharge vent (ventilation shaft), the Applicant must submit a report to the EPA, which includes the following site specific source emission test results:

- Concentration of odour (OU/m^3);
- Emission rate of odour (OU/s);
- Concentrations and emission rates of all other relevant air pollutants;
- Volumetric flow rate (m^3/s);
- Discharge velocity (m/s); and
- Temperature (°C).

If the above parameters are outside the range used in the dispersion modelling study of each ventilation air discharge vent (ventilation shaft), then the odour impacts must be assessed once more and the results submitted to the EPA.

(j) [14]The location of sampling points and source emissions sampling and analysis must be conducted strictly in accordance with the "Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales", NSW EPA, 2007.

6.2 Dust Suppression and Control

(a) The Applicant must ensure the prompt and effective rehabilitation of all disturbed areas of the mine site to minimise the generation of wind erosion dust.

(b) The Applicant must keep the surface of the coal stockpiles and any unsealed roads sufficiently damp to minimise the emission of wind blown or traffic generated dust.

6.3 Blast Management and Monitoring

[11] EPA General Terms of Approval
[12] EPA General Terms of Approval
[13] EPA General Terms of Approval
[14] EPA General Terms of Approval

Blasting Overpressure

(a) [15]The overpressure level from blasting operations on the premises must not:

- exceed 115dB (Linear Peak) for more than 5% of the total number of blasts over a period of 12 months; and
- exceed 120dB (Linear Peak) at any time,

at any residence or noise sensitive location (such as a school or hospital) that is not owned by the Applicant or subject to a private agreement between the owner of the residence or noise sensitive location and the Applicant as to an alternative overpressure level.

Ground Vibration

(b) [16] Ground vibration peak particle velocity from the blasting operations must not:

- exceed 5mm/s for more than 5% of the total number of blasts over a period of 12 months; and
- exceed 10mm/s at any time,

at any residence or noise sensitive location (such as a school or hospital) that is not owned by the Applicant, or subject to a private agreement between the owner of the residence, or noise sensitive location and the Applicant, as to an alternative vibration level.

Time and Frequency of Blasting

(c) [17] Blasting operations may only take place between 9 am and 5 pm Monday to Friday inclusive;

(d) [18] Blasting at the premises is limited to 1 blast on each day on which blasting is permitted; and

(e) [19] The hours of operation for blasting operations specified in this condition may be varied if the EPA, having regard to the effect that the proposed variation would have on the amenity of the residents in the locality, gives written consent to the variation.

Blast Management Plan

[15] EPA General Terms of Approval
[16] EPA General Terms of Approval
[17] EPA General Terms of Approval
[18] EPA General Terms of Approval
[19] EPA General Terms of Approval

(f) The Applicant must prepare and implement a Blast Management Plan to the satisfaction of the Secretary, prior to the commencement of any blasting. [20]The Plan must include, but need not be limited to, the following matters:

- compliance standards;
- mitigation measures;
- remedial action;
- monitoring methods and program;
- monitoring program for flyrock distribution;
- measures to be undertaken to demonstrate that Dartbrook Mine is achieving best practice in minimising both air blast overpressure and ground vibration levels;
- measures to protect underground utilities (eg: rising mains, subsurface telecommunication and electric cables), native fauna and livestock nearby;
- procedures for the notification of neighbours prior to detonation of each blast; and
- measures to ensure no damage by flyrock to people, property, livestock and powerlines.

(g) The Applicant must as a minimum for large-scale blasts (with a maximum instantaneous charge greater than 20kg), advise residents within three (3) kilometres of blasting locations on a monthly basis and of any changes to monthly programs. For small-scale construction blasts (with a maximum instantaneous charge not greater than 20kg), the Applicant must as a minimum advise residents within one (1) kilometre of blasting locations.

(h) Upon written request of the owner of any dwelling located within three (3) kilometres of large-scale blasting locations (with a maximum instantaneous charge greater than 20kg), or within one (1) kilometre of small-scale construction blasting locations (with a maximum instantaneous charge not greater than 20 kg), the Applicant must arrange at its own costs, for the inspection by a technically qualified person agreed to by both parties, to record the material condition of any structure on such a property within 14 days of receipt of the request. The Applicant must supply a copy of any inspection report, certified by the person who undertook the inspection, to the relevant property owner within fourteen (14) days of receipt of the report.

(i) The Applicant must ensure that blasting must not take place within 500 metres of a public road while such road is open to traffic. Roads must not be closed for blasting purposes during the times that school buses use the road.

(j) The Applicant must prepare a Road Closure Management Plan to the satisfaction of the Secretary, and in consultation with MSC and UHSC prior to any blasting within 500 metres of a public road. The Plan must include, but not be limited to, the following matters:

[20] EPA General Terms of Approval

(i) details of the proposed safety management measures during the period of the road closure and blast;
(ii) details of the procedures for closing Dartbrook Road and the period which the road will be closed during blasting activities;
(iii) methods for ensuring the safety of road users and the general public during the blast period;
(iv) strategies for informing road users and the local community of the proposed road closure;
(v) details of the procedures for permitting the passage of emergency vehicles during the road closure. This must also include details of the proposed methods for sufficiently notifying emergency service providers of the proposed times and period of the road closures;
(vi) methods for clearing the road of any debris resulting from a blast; and
(vii) details of the disruptions that are likely to occur during the closure period.

(k) Notwithstanding subclause (j) above, if blasting is proposed within 500 metres of the New England Highway, The Applicant must prepare a Road Closure Management Plan to the satisfaction of the Secretary, and in consultation with TfNSW, MSC and UHSC, prior to any blasting within 500 metres of the New England Highway. The Plan must include, but not be limited to, the matters in subclause(j) above.

Blast Monitoring

(l) The applicant must monitor ground vibration and overpressure of all blasts.

(m) Ground vibration or the overpressure must be measured at noise sensitive sites (eg. residences, hospitals, schools etc), selected in consultation with the EPA.

6.4 Noise Control

6.4.1 Noise Levels

Intrusive Noise Criteria

(a) Except for the carrying out of construction works, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 7 at any residence on privately-owned land.

Table 7: *Operational noise criteria dB(A)*

Noise Assessment Group	***Day*** $L_{Aeq\ (15\ min)}$	***Evening*** $L_{Aeq\ (15\ min)}$	***Night*** $L_{Aeq\ (15\ min)}$	***Night*** $L_{A1\ (1\ min)}$
Aberdeen	49	42	41	52
East Site Receivers (other than receivers 303 and 422)	50	50	41	52
Receivers 303 and 422	50	50	42	52
West Site Receivers	40	40	35	52
Other privately-owned	40	35	35	52

residences				

Notes:

- *The Noise Assessment locations referred to in Table 7 are listed in Schedule 1 and shown in Appendix 4.*
- *Daytime (between the hours of 7am and 6pm); evening (between 6pm and 10pm) and night time (between 10 pm and 7 am).*

Noise generated by the development must be monitored and measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the *NSW Noise Policy for Industry* (EPA, 2017).

The noise criteria in Table 7 do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to exceed the noise criteria, and the Applicant has advised the Department in writing of the terms of this agreement.

Sale of Mine-Owned Land

If mine-owned land is sold within 6 months of the approval of Mod 7 that will exceed the VLAMP acquisition criteria for noise (specifically receivers 299B, 301 and 69A) or the VLAMP mitigation criteria for noise (specifically receivers 300, 302 and 304) the Applicant must fully inform any purchaser of the acoustic impact of the development at the time of sale and the Applicant must negotiate an agreement to be entered into in accordance with the VLAMP as a condition of the sale.

Noise Acquisition Criteria

(c) Upon receiving a written request for acquisition from the owner of the land listed in Table 8, the Applicant must acquire the land in accordance with the procedures in Conditions 11.2 (C)-(D).

Table 8: *Land subject to acquisition upon request*

Acquisition Basis	***Land***
Noise	Receiver 86

Notes:

- *The location of the land referred to in Table 8 is shown on the figure in Appendix 4.*
- *Land previously identified in the equivalent table to Table 8 prior to Modification 7 as 'Knight' and 'Gordon' are now mine-owned.*

Noise Operating Conditions

(d) The Applicant must:

(i) take all reasonable steps to minimise all noise from construction and operational activities including low frequency noise and other audible characteristics, as well as road and rail noise associated with the development;

(ii) operate a comprehensive noise management system commensurate with the risk of impact to ensure compliance with the relevant conditions of this consent;

(iii) take all reasonable steps to minimise noise impacts of the development during noise-enhancing meteorological conditions;

(iv) only use locomotives and rolling stock that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL and use reasonable endeavours to ensure that rolling stock is selected to minimise noise;

(v) carry out regular attended noise monitoring (at least once a month, unless otherwise agreed by the Secretary) to determine whether the development is complying with the relevant conditions of this consent; and

(vi) regularly assess the noise monitoring data and modify or stop operations on the site to ensure compliance with the relevant conditions of this consent.

6.4.2 Noise Management Plan

(a) The Applicant must, prior to the recommencement of construction or mining operations, prepare a Noise Management Plan for the development to the satisfaction of the Secretary. This plan must:

(i) be prepared by a suitably qualified and experienced person/s;

(ii) describe the measures to be implemented to ensure:

- compliance with the noise criteria and operating conditions in this consent;
- best practice management is being employed;
- noise impacts of the development are minimised during noise-enhancing meteorological conditions;

(iii) seek to minimise road traffic noise generated employee commuter vehicles on local public roads;

(iv) describe the noise management system in detail; and

(v) include a monitoring program that:

- uses a combination of real-time and supplementary attended monitoring to evaluate the performance of the development;
- monitors noise at the nearest and/or most affected residences;
- includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time;
- adequately supports the noise management system; and
- includes a protocol for identifying noise-related exceedance, incident and non-compliance and for notifying the Department and relevant stakeholders of any such event.
- includes a protocol for proactive management of noise emissions during adverse meteorological conditions.

6.5 Lighting Emissions

(a) The Applicant must, prior to commencement of construction, prepare a Lighting Management Plan in consultation with MSC, UHSC and to the satisfaction of the Secretary. The Plan must include details of the implementation of visual controls to screen, direct or manage all on-site lighting from mine related activities in respect of residences and roadways. The Plan must include, but not be limited to:

i) details of the planting of vegetation screens along Dartbrook Road, to screen potential lighting impacts;

ii) details of the tree screen on the north side of the access road at the corner north of the Dam to screen potential lighting impacts;

iii) details of the tree and shrub screening around the Drift Access to reduce potential lighting impacts;

iv) details of technical measures and work practices necessary to minimise the spillage of light from areas to be illuminated, and to minimise the total night time glow from the mine;

v) details of the construction or placement of visual screens to screen lighting impacts;

vi) details of the proposed process and measures to address complaints that may be received from residents or road users impacted by lighting from the mine site; and

vii) details of any other effective operating practices to manage potential lighting impacts.

(b) The Applicant must report on the effectiveness of the lighting emission controls in the Annual Review.

(c) The Applicant must ensure that on-site lighting does not directly emit light into the line of sight of nearby dwellings. The light emitted from any direct flood lighting and any vehicle headlights must be directed away from dwellings and public roads.

(d) The Applicant must ensure that light emitted from locomotive headlights whilst a locomotive is on or moving off the rail loop must be screened from dwellings to the satisfaction of MSC or as otherwise agreed by the Secretary.

6.6 Vibration from Mine Operations

(a) Ground vibration peak particle velocity from the rail loop and/or CHPP facility must not:

- exceed 2.82 mm/s at any time,

at any residence or noise sensitive location (such as a school or hospital) that is not owned by the Applicant, or subject to a private agreement between the owner of the residence, or noise sensitive location and the Applicant, as to an alternative vibration level.

(b) Prior to the commencement of mining operations, the Applicant must prepare and implement a Vibration Management Plan to the satisfaction of the Secretary which will include, but need not be limited to, the following matters:

- compliance standards;
- monitoring program;
- mitigation measures;
- remedial action in an event of exceedance of criteria in subclause 6.6(a) above;
- monitoring methods and program; and
- measures to be undertaken to demonstrate that Dartbrook Mine is achieving best practice in minimising vibration levels from the rail loop and/or CHPP, irrespective of set standards.

7. Transport and Utilities

7.1 Rail Transport

(a) All coal must be transported from the CHPP by rail.

7.2 Road Transport

(a) The Applicant must not transport any coal by road.

(b) The Applicant must not load coal onto trucks before 7.00 am on any day, except under emergency circumstances when short haulage to the emergency stockpile at the access slot is necessary and with notification of MSC and the Secretary as soon as practicable.

(f) The Applicant must ensure that:

(i) All mine personnel (including contractors) access the Dartbrook Mine facilities via the New England Highway and the Western Access Road, with the exception of employees approved by the Dartbrook General Manager and living in the local area most directly accessed by local roads. These employees can access the mine via local public roads and Stair Street;

(ii) A list of approved employees under Conditions 7.2(f)(i) & (ii) be maintained by the Applicant, and made available to the Department upon request;

(iii) Kayuga Road, from the Hunter River bridge to the Castlerock Road intersection, is not used to access the mine or mine satellite surface facilities. Limited use of local roads by mine related traffic for access to mine satellite surface facilities is permitted, with internal access roads to be utilised where practicable; and

(iv) The section of Kayuga Road between Stair Street and Dartbrook Road, and the section of Dartbrook Road between Kayuga Road and the entrance to

the Kayuga Mine surface facilities, be maintained in consultation with MSC and to the satisfaction of the Secretary.

(g) The Applicant must submit all designs and specifications associated with the proposed access road and Blairmore Lane Underpass to MSC or UHSC for approval, prior to the commencement of work. The proposed western access road must be sealed in accordance with the requirements of MSC or UHSC.

7.3 Hunter Tunnel Coal Clearance System

ROM coal is to be transported by conveyors from the West Site to the East Site via the Hunter Tunnel Coal Clearance System.

7.4 [Deleted]

7.5 [Deleted]

7.6 Provision of Utility Services

Refer Mining Operations Plan (Condition 2.1(c)).

7.7 Road and Rail Works

The Applicant must:

(a) Install the pipeline crossings of Ely and Heir Streets (both undeveloped roads) to the satisfaction of Muswellbrook Council;

(b) Install pipelines under the Main Northern Rail Line to the satisfaction of the Australian Rail Track Corporation; and

(c) Prior to the commencement of any construction within the road reserve of the New England Highway the Applicant must prepare and subsequently implement a Traffic Management Plan in accordance with the TfNSW's *Traffic Control at Worksites* guidelines, to the satisfaction of Muswellbrook Council and the TfNSW. The Plan must:
   (i) describes the schedule of the proposed road works;
   (ii) describe the measures that would be implemented to minimise traffic impacts associated with the construction of the proposed development; and
   (iii) include a Traffic Control Plan that describes the measures that would be implemented to control construction traffic access to the classified road network.

(d) Bore pipelines under the New England Highway to the satisfaction of the TfNSW.

Notes:
(a) there will be no access from the New England Highway to the work site;

the boring/ crossing locations must be perpendicular to the New England Highway road reserve at a location which offers the shortest length possible, unless otherwise approved by the TfNSW;

(b) the location of the pipeline crossing must be in accordance with the TfNSW guideline and take into account the location of utilities another infrastructure;

(c) the crossing must be constructed to Australian Standards and allow for future widening requirements of the New England Highway;

(d) the crossing must be installed through trenchless technology unless otherwise approved by the TfNSW;

(e) the crossings must maintain a minimum vertical buffer of 1.5 metres between the pipeline and the highway within the road reserve;

(f) where steel casings are not used a trace wire must be provided to assist with the future location of the pipeline;

(g) pipes installed under the road must be sleeved and grouted;

(h) permanent markers must be provided at the entry and exist point of the road reserve;

(i) any access points and values must be located outside of the road reserve; and

(j) all areas within the road reserve that are disturbed by the development must be restored to their original condition to the satisfaction of the TfNSW.

8. Monitoring/Auditing

(a) Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification, compliance report and independent audit.

Note: *For the purposes of this condition, as set out in the EP&A Act, "monitoring" means monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" means a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.*

(b) Monitoring under this consent is not required at all privately-owned residences and the use of representative monitoring locations can be used to demonstrate compliance with criteria.

8.1 Third Party Monitoring/Auditing

Independent Environmental Audit

(a) Within one year of the recommencement of mining operations, and every three years after, unless the Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development. The audit must:

(i) be led by a suitably qualified, experienced and independent auditor whose appointment has been endorsed by the Secretary;

(ii) be conducted by a suitably qualified, experienced and independent team of experts (including any expert in field/s specified by the Secretary) whose appointment has been endorsed by the Secretary;

(iii) be carried out in consultation with the relevant agencies and the CCC;

(iv) assess the environmental performance of the development and whether it is complying with the relevant requirements in this consent, water licences and mining leases for the development (including any assessment, strategy, plan or program required under these approvals);

(v) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals and this consent;

(vi) recommend appropriate measures or actions to improve the environmental performance of the development and any assessment, strategy, plan or program required under the abovementioned approvals and this consent; and

(vii) be conducted and reported to the satisfaction of the Secretary.

(b) Within three months of commencing an Independent Environmental Audit, or other timeframe agreed by the Secretary, the Applicant must submit a copy of the audit report to the Secretary, and any other NSW agency that requests it, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations. The recommendations must be implemented to the satisfaction of the Secretary.

Note: *The audit team must be led by a suitably qualified auditor and include experts in any fields specified by the Secretary.*

8.2 Meteorological Station(s)

(a) The Applicant must continue to maintain and operate a suitable meteorological station operating in the vicinity of the site that:

(i) complies with the requirements in the *Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales* (2007); and

(ii) is capable of measuring meteorological conditions in accordance with the *NSW Noise Policy for Industry* (2017),

unless a suitable alternative is approved by the Secretary following consultation with the EPA.

9. Reporting

9.1 Reports on Operations

(a) The Applicant must report on mine operations in accordance with the MOP (refer to Condition 2.1).

9.2 Environmental Reporting

Annual Review

(a) By the end of March in each year after the commencement of the development, or other timeframe agreed by the Secretary, a report must be submitted to the Department reviewing the environmental performance of the development, to the satisfaction of the Secretary. This review must:

(i) describe the development (including any rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year;

(ii) include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, including a comparison of these results against the:

- relevant statutory requirements, limits or performance measures/criteria;
- requirements of any plan or program required under this consent;
- monitoring results of previous years; and
- relevant predictions in the documents referred to in Condition 1.1(a);

(iii) identify any non-compliance or incident which occurred in the previous calendar year, and describe what actions were (or are being) taken to rectify the non-compliance or incident and avoid reoccurrence;

(iv) evaluate and report on:

- the effectiveness of the noise and air quality management systems;
  - socio-economic impact of the development including the workforce characteristics of the previous calendar year; and
  - the surveillance of any prescribed dam on the site to the satisfaction of the DSC;
- the outcome of the water budget for the year, the quantity of water used from water storages and details of discharge of any water from the site; and
- compliance with the performance measures, criteria and operating conditions in this consent;

(v) identify any trends in the monitoring data over the life of the development;

(vi) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and

(vii) describe what measures will be implemented over the next calendar year to improve the environmental performance of the development.

(b) Copies of the Annual Review must be submitted to the Department, Council and made available to the CCC and any interested person upon request.

9.3 Incident and Non-Compliance Reporting

Incident Notification

(a) The Applicant must immediately notify the Department and any other relevant agencies immediately after it becomes aware of an incident. The notification must be in writing to compliance@planning.nsw.gov.au and identify the development (including the development application number and name) and set out the location and nature of the incident.

Non-Compliance Notification

(b) Within seven days of becoming aware of a non-compliance, the Applicant must notify the Department of the non-compliance. The notification must be in writing to compliance@planning.nsw.gov.au and identify the development (including the development application number and name), set out the condition of this consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

Note: *A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.*

10. Community Consultation/Obligations

(a) The Applicant must operate a Community Consultative Committee (CCC) for the life of the development, or other timeframe agreed by the Secretary, in accordance with the Department's *Community Consultative Committee Guidelines: State Significant Projects* (2016).

Notes:

- *The CCC is an advisory committee only.*
- *In accordance with the Guidelines, the Committee should comprise an independent chair and appropriate representation from the Applicant, Council and the local community.*
- *This condition does not require the re-constitution of any CCC members established under previous conditions of consent.*

11. Proponents Obligations

11.1 [Deleted]

11.2 Compensation and Land Acquisition and as a Result of Subsidence

Note: Compensation and other measures for subsidence impacts, are also available under the provisions of the Mining Act 1992 and the Coal Mine Subsidence Compensation Act2017.

(A) Compensation and Acquisition – Significant Structural Damage to Dwellings

(a) Where a dwelling within the DA area is, or is likely to be (as identified in the Property Subsidence Management Plan referred to in Condition 3.3(g)(iii)), subject to damage beyond the safe, serviceable and repairable criteria as a result of the development, the landowner, may request the Applicant in writing to:

(i) carry out such works as agreed by the landowner to remedy or mitigate any damage; or

(ii) compensate the landowner for such effects; or as a last resort and failing all other measures,

(iii) acquire the whole of the property, or such part of the property requested by the landowner where subdivision is approved.

(b) The Applicant must comply with any such request for compensation or acquisition in accordance with Conditions 11.2(C) and (D). If necessary to confirm the impact, the Applicant must, at the request of the landowner in writing, conduct a follow-up structural inspection. Any inspection or assessment under this Condition must be conducted as if it were conducted under the relevant part of Condition 3.3(f)(viii).

(c) Any disputes relating to compensation may be referred by either party to:

- the Land and Environment Court at any time in accordance with the provisions of the Mining Act; or
- the SA NSW at any time in accordance with the provisions of the Coal Mine Subsidence Compensation Act 2017.

(d) Any disputes relating to land acquisition (except those relating to valuation matters) may be referred by either party to the Secretary for consideration and advice if no agreement is reached within three months of receipt by the Applicant of the written request.

(B) Compensation and Acquisition – Land Capability Impacts

(a) Where a landowner suffers, or is likely to suffer a loss of land capability or agricultural productivity (as identified in the Property Subsidence Management Plan referred to in Condition 3.3(g)), as a result of the development, the

landowner, after receiving notification from the Applicant in accordance with Condition 3.3(m)(ii), may request the Applicant in writing to:

(i) carry out such works as agreed by the landowner to rectify the problem; or

(ii) compensate the landowner for such effects; or, as a last resort and failing all other measures,

(iii) acquire the whole of the property, or such part of the property requested by the landowner where subdivision is approved.

(b) Any disputes relating to compensation may be referred by either party to the Land and Environment Court at any time in accordance with the provisions of the Mining Act.

(c) Any disputes relating to acquisition (except those relating to valuation matters) may be referred by either party to the Secretary for consideration and advice if no agreement is reached within three months of receipt by the Applicant of the written request.

(d) If the matter is referred to the Secretary in accordance with subclause (c) above, the Secretary shall appoint an Independent Expert, in consultation with the Applicant and the landowner and in accordance with the "Evaluation Process for Land Acquisition due to Land Capability Impacts caused by Subsidence" (refer to Schedule C). The Applicant must bear the costs of engaging the Independent Expert.

(e) The Independent Expert shall determine the level and extent of loss or impacts, and recommend whether acquisition is required, and in doing so, shall consider the following matters:

- the level of predicted or actual subsidence;
- the level of land capability and/or agricultural productivity as unaffected by underground mining;
- the assessment of agricultural utilisation, agricultural improvements and the underlying agricultural productivity of the relevant property prior to mining operations, as determined in the relevant Property Subsidence Management Plan (in accordance with Condition 3.3(f)(vi));
- the impact of subsidence on the land capability and agricultural productivity of the land;
- the nature and extent of feasible mitigation measures; and
- previous compensation considerations under the Mining Act.

A recommendation for acquisition of a property may only be made by the Independent Expert where the Expert is satisfied that after consideration of feasible mitigation measures the impact of subsidence is such as to significantly adversely affect the existing and future land capability and/or agricultural productivity.

(f) Where it is determined by the Secretary that a property is eligible for acquisition, and acquisition is requested by the landowner, the Applicant must comply with any such request in accordance with Conditions 11.2(C)-(D).

(C) Acquisition – Procedure

(a) Upon receipt of a written request to purchase property in accordance with any part of conditions 6.1(c), 6.4.1(c) and 11.2, the Applicant must offer in writing to acquire the whole of the property (unless the request specifically requests acquisition of only part of the property and subdivision has already been approved) within six months of receipt of the request. The Applicant must pay the landowner an acquisition price resulting from proper consideration of:

(i) a sum not less than the current market value of the owner's interest in the land at the date of this consent, as if the land was unaffected by Dartbrook Mine, having regard to:

- the existing use and permissible use of the land in accordance with the applicable planning instruments at the date of the written request; and
- the presence of improvements on the land and/or any Council approved building or structure which although substantially commenced at the date of the request is completed subsequent to that date.

(ii) the owner's reasonable compensation for disturbance allowance and relocation within the Singleton, Upper Hunter or Muswellbrook Local Government Areas, or within such other location as may be determined by the Secretary in exceptional circumstances;

(iii) the owner's reasonable costs for obtaining legal advice and expert witnesses for the purposes of determining the acquisition price for the land and the terms upon which it is to be acquired; and

(iv) the purchase price determined by reference to points (i), (ii) and (iii) shall be reduced by the amount of any compensation awarded to a landowner pursuant to the *Mining Act, 1992* or other legislation providing for compensation in relation to coal mining but limited to compensation for dwellings, structures and other fixed improvements on the land, unless otherwise determined by the Secretary in consultation with the Resources Regulator or SA NSW.

(b) An offer by the Applicant to purchase a property under the conditions of this consent must remain open to the landowner for the following periods from the date of the offer:

(i) for damage to a dwelling beyond the safe, serviceable and repairable criteria (Condition 11.2(A)), three years after completion of mining of longwall panels that affect the property;

(ii) for land capability and/or agricultural productivity impacts (Condition 11.2(B)), five years after completion of mining of longwall panels that affect the property; and

(iii) for land listed in Tables 6 and 8, for the life of the development.

(c) Notwithstanding any other Condition of this consent, the landowner and the Applicant may enter into any other agreed arrangement regarding compensation; or the Applicant may, upon request of the landowner, acquire any property affected by the project during the course of this consent on terms agreed to between the Applicant and the landowner.

(D) Independent Valuation

(a) In the event that the Applicant and the landowner cannot agree within three months upon the acquisition price of the land and/or the terms upon which it is to be acquired under the terms of this consent, then either party may refer the matter to the Secretary who must request an independent valuation to determine the acquisition price. The independent valuer must consider any submissions from the landowner and the Applicant in determining the acquisition price.

(b) If the independent valuer requires guidance on any contentious legal, planning or other issues, the independent valuer must refer the matter to the Secretary, who, if satisfied that there is a need for a qualified panel, shall arrange for the constitution of the panel. The panel shall consist of:

(i) the appointed independent valuer;
(ii) the Secretary; and/or
(iii) the President of the Law Society of NSW or nominee.

The qualified panel shall, on the advice of the valuer, determine the issue referred to it and advise the valuer.

(c) The Applicant must bear the costs of any independent valuation or survey assessment requested by the Secretary.

(d) The Applicant must, within fourteen days of receipt of a valuation by the independent valuer, offer in writing to acquire the relevant land at a price not less than the said valuation.

(E) Additional Mitigation Upon Request

(a) Upon receiving a written request for mitigation from the owner of any residence on the land listed in Tables 6 and 8, the Applicant must implement additional mitigation measures at or in the vicinity of the residence in consultation with the landowner. These measures must be consistent with the measures outlined in the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Development* (2018). They must also be reasonable and feasible, proportionate to the level of predicted impact and directed towards reducing the noise and/or air quality impacts of the development. The Applicant must also be responsible for the reasonable costs of ongoing maintenance of these additional mitigation measures until the cessation of mining operations.

(b) If within 3 months of receiving this request from the owner, the Applicant and the owner cannot agree on the measures to be implemented, or there is a dispute

about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

(F) Notification of Landowners/Tenants

(a) Within one month of the approval of Modification 7, the Applicant must:

(i) notify in writing the owner of:

- the land listed in Tables 6 or 8 that they have the right to require the Applicant to acquire their land at any stage during the development; and
- the residences on the land listed in Tables 6 or 8 that they are also entitled to ask the Applicant to install additional mitigation measures at the residence;

(ii) notify the tenants of any mine-owned land of their rights under this consent; and

(iii) send a copy of the NSW Health fact sheet entitled "*Mine Dust and You*" (2017) to the owners and/or existing tenants of any land (including mine-owned land) where the predictions in the documents referred to in Condition 1.1 (a) identify that dust emissions generated by the development are likely to be greater than the relevant air quality criteria identified in Condition 6.1 (a) at any time during the life of the development.

(b) Prior to entering into any tenancy agreement for any land owned by the Applicant that is predicted to experience exceedances of the recommended dust and/or noise criteria, the Applicant must:

(i) advise the prospective tenants of the potential health and amenity impacts associated with living on the land, and give them a copy of the NSW Health fact sheet entitled "*Mine Dust and You*" (2017); and

(ii) advise the prospective tenants of the rights they would have under this consent,

to the satisfaction of the Secretary.

Notification of Exceedances

(a) As soon as practicable and no longer than 7 days after obtaining monitoring results showing an exceedance of any noise or air quality criterion in condition 6.1 (a) and condition 6.4.1 (a) of this consent, the Applicant must:

(i) provide to any affected landowners and tenants; and

(ii) publish on its website,

the full details of the exceedance.

(b) For any exceedance of any air quality criterion in condition 6.1 (a) of this consent, the Applicant must also provide to any affected land owners and tenants copy of the NSW Health fact sheet entitled "*Mine Dust and You*" (2017).

Independent Review

(c) If a landowner considers the development to be exceeding any air quality or noise relevant criterion in condition 6.1 (a) or condition 6.4.1 (a) of this consent,

they may ask the Secretary in writing for an independent review of the impacts of the development on their residence or land.

(d) If the Secretary is not satisfied that an independent review is warranted, the Secretary will notify the landowner in writing of that decision, and the reasons for that decision, within 21 days of the request for a review.

(e) If the Secretary is satisfied that an independent review is warranted, within 3 months, or other timeframe agreed by the Secretary and the landowner, of the Secretary's decision, the Applicant must:

(iii) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to:

- consult with the landowner to determine their concerns;
- conduct monitoring to determine whether the development is complying with the relevant criteria in condition 6.1 (a) or condition 6.4.1 (a); and
- if the development is not complying with the relevant criterion, identify measures that could be implemented to ensure compliance with the relevant criterion; and

(iv) give the Secretary and landowner a copy of the independent review; and

(v) comply with any written requests made by the Secretary to implement any findings of the review.

11.4 Contributions to Council

Planning Agreement – MSC

(a) Within six months of the approval of Modification 7, or other timeframe agreed by the Secretary, the Applicant must enter into a Planning Agreement with MSC in accordance with:

(i) Division 7.1 of Part 7 of the EP&A Act; and

(ii) the terms of the offer in Appendix 5.

Planning Agreement – UHSC

(b) Within six months of the approval of Modification 7, or other timeframe agreed by the Secretary, the Applicant must enter into a Planning Agreement with UHSC in accordance with:

(i) Division 7.1 of Part 7 of the EP&A Act; and

(ii) the terms of the offer in Appendix 5.

12. Further Approvals and Agreements

12.1 Statutory Requirements

(a) The Applicant must ensure that all statutory requirements including but not restricted to those set down by the Local Government Act 1993, Protection of the Environment Administration Act 1991, Protection of the Environment Operations Act 1997, Rivers and Foreshores Improvement Act 1948, Water Act 1912, National Parks and Wildlife Act 1974, and all other relevant legislation, Regulations, Australian Standards, Codes, Guidelines and Notices, Conditions, Directions, Notices and Requirements issued pursuant to statutory powers by the MSC, EPA, DRG, Resources Regulator, NRAR, DPIE Environment, DPIE Water, TfNSW, NSW Agriculture, and NSW Fisheries, are fully met.

(b) Structural Adequacy

Detailed plans and specifications relating to the design and construction of each structural element associated with the proposed development are to be submitted to the Principal Certifying Authority prior to the construction of each particular building or structure. Such plans and specifications must be accompanied by certification provided by a practicing professional structural engineer or an accredited certifier certifying the structural adequacy of the proposed building design and compliance with the Building Code of Australia.

(c) Verification of Construction

Upon completion of building works and prior to the issue of an occupation certificate, a certificate/s prepared by a suitably qualified person or a compliance certificate/s issued by an accredited certifier, is to be submitted to the Principal Certifying Authority certifying that the following building components, where relevant, have been completed in accordance with approved plans and specifications:

(i) footings;
(ii) concrete structures, including ground floor and any subsequent floors, retaining walls and columns;
(iii) framing and roof structure;
(iv) fire protection coverings to building elements required to comply with the Building Code of Australia; and
(v) mechanical ventilation.

The certificate/s must demonstrate at what stage of construction inspections were undertaken.

12.2 Approvals within a Mine Subsidence District

(a) [21]The Applicant must seek the approval of the SA NSW for the construction of any improvements, including those related to the mine buildings and associated works, any relocation or diversion of infrastructure or existing improvements, prior to undertaking the works.

13. Access to Information

[21] Mine Subsidence Board General Terms of Approval

(a) Prior to the recommencement of mining operations until the completion of all rehabilitation required under this consent, the Applicant must:

(i) make the following information and documents (as they are obtained, approved or as otherwise stipulated within the conditions of this consent) publicly available on its website:

- the documents referred to in Condition 1.1 (a) of this consent;
- all current statutory approvals for the development;
- all approved strategies, plans and programs required under the conditions of this consent;
- minutes of CCC meetings;
- regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent;
- a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;
- a summary of the current stage and progress of the development;
- contact details to enquire about the development or to make a complaint;
- a complaints register, updated monthly;
- the Annual Reviews of the development;
- audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report; and
- any other matter required by the Secretary; and

(ii) keep such information up to date, to the satisfaction of the Secretary.

SCHEDULE A

The table below provides a link between the original receiver 'locations' and the new receiver identifications introduced under Modification 7.

Location	*Receiver ID*	*Lot / Section and DP Number*		
East Site Receivers				
Knight*	302	1453		628493
Day	86	51		776564
O'Brien	303 422	170 7		723261 844651
Gordon*	304	1452		583830
West Site Receivers				
Blairmore Point*	295	3		835733
"Waitomo"	371	100		1177385
"Maryvale"	153	156		750926
Standing	181	5	23	758554
Lonergan	212	7	21	758554
MacIntyre 1*	69	110		873834
MacIntyre 2*	69	110		873834
MacIntyre 3*	69	110		873834
"Woodburn"**	137	102		1124883
"Athlone"**	344	28		750926
"Glenmore"**	512	177		750926
"Belgrave"	336	74		750926
"Woodlands"*	36	180		750951
"Mayvale"	35	178		750951
"Malara"	34	181		750951

** Property acquired by the Applicant, now mine-owned*

***Property acquired by MACH Energy, now mine-owned*

Appendix 1 - Schedule of Land

Schedule of Land

ID	Lot	Section	DP
5	164		750951
6	164		750951
8	165		750951
14	1771		1175346
15	1770		1175346
16	1772		1175346
17	176		750951
18	2		1103375
19	1		1103375
20	195		750951
21	204		750951
22	196		750951
23	191		750951
24	190		750951
25	2		1001266
26	1		1001266
27	167		750951
32	178		750951
34	181		750951
35	178		750951
36	180		750951
37	179		750951
38	183		750951
39	192		750951
40	10		789319
41	11		789319
42	2		578034
43	1852		582597
44	186		750951
45	187		750951
46	188		750951
47	189		750951
48	168		750951
51	169		750951
53	171		750951
54	172		750951
55	173		750951
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481	B		174071
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550	13		112742
553	14		112742

Appendix 2 - Development Layout Plans

Figure 1: *Development Layout – updated version required*

Figure 2: *Existing East Site Infrastructure (Figure 1 of Hansen Bailey Response to Contentions)*

Figure 3: *– Existing Environment - West Site Infrastructure (Figure 2 of Hansen Bailey Response to Contentions)*

Appendix 3 - Underground Workings

Figure 5: *Approved Longwall Mine Plan – Kayuga and Mt Arthur Seams*

Figure 6: *[Deleted]*

Figure 7: *Approved Longwall Mine Plan – Wynn Seam*

Figure 8: *Approved Bord and Pillar Mine Plan – Kayuga Seam*

Appendix 4 - Receiver Zones and Locations

Figure 9: *Receiver Zones and Locations*

Appendix 5 - General Terms of Applicant's VPA Offer

Components of Proposed Planning Agreement with MSC

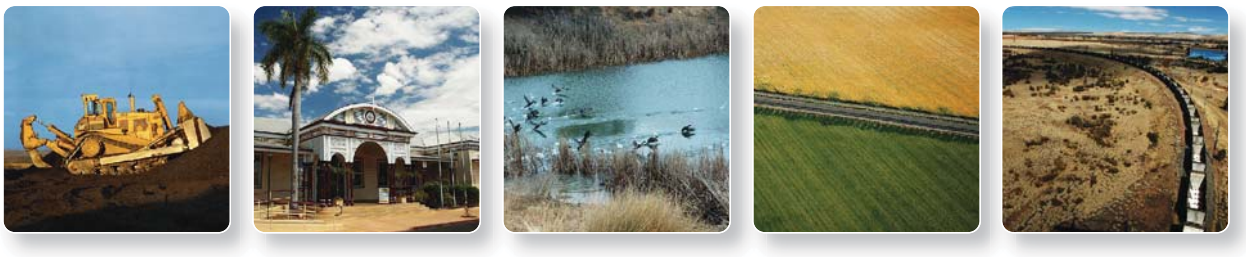
Description of Contribution	Quantity	Purpose of Contribution
Dartbrook Community Contribution	$408,000.00 per annum payable in 12 equal monthly instalments commencing from the date of the approval of Modification 7 to DA 231-7-2000. This amount will be indexed annually according to the Consumer Price Index (CPI).	Funding for the provision of public infrastructure and services within the Muswellbrook LGA. This figure is arrived at consistently with other Shire approvals, at 6.8c multiplied by the maximum approved ROM rate of 6mtpa.
Contribution of funding toward an Environmental Officer	$10,000 per annum. This amount will be indexed annually according to the Consumer Price Index (CPI).	Funding toward an Environmental Officer, who will be responsible for environmental matters associated with development in the Muswellbrook LGA. Noting that the same condition is inserted in proposed UHSC VPA.
Training of Apprentices	Target of two apprentices at any given time with preference given to residents of Muswellbrook & Upper Hunter Shire LGA's	To assist in building a skilled labour force within the Muswellbrook & Upper Hunter Shire LGAs. Same condition proposed in UHSC VPA.
Revision of the Mine Affected Roads Study	Consultant or contractor costs of reviewing and revising the Mining Affected Road Network Plan (or equivalent) as it relates to or is impacted upon by the project together with the proportional contribution, reasonably assessed, payable pursuant to the Mining Affected Road Network Plan (as amended) including the associated Contributions Plan, to MSC for the construction, renewal upgrade or maintenance of road infrastructure.	To reimburse MSC for a revision to the relevant aspects of the Mining Affected Roads Plan (as is relevant to the proposed Modification to DA 231-7-2000 to incorporate the traffic generated by the Modification). Contribute to road upgrades relevant to the modification's traffic contribution.

Components of Proposed Planning Agreement with UHSC

Description of	Quantity	Purpose of Contribution

Contribution		
Community Enhancement Fund	$100,000 per annum payable in quarterly instalments commencing twelve (12) months after the date of approval of MOD 7 to DA 231-7-2000.	Funding for the provision of public infrastructure and services within the Upper Hunter LGA particularly focusing on the Aberdeen Area and its surrounds. This payment will be indexed annually according to the Consumer Price Index (CPI).
Contribution of funding toward an Environmental Officer	$10,000 per annum	Funding toward an Environmental Officer, who will be responsible for environmental matters associated with development in the Upper Hunter LGA. Noting that the same condition is inserted in the proposed Muswellbrook Shire VPA. This annual financial contribution will be indexed annually according to the Consumer Price Index (CPI).
Training of Apprentices	Target of two apprentices at any given time with preference given to residents of Upper Hunter & Muswellbrook LGAs.	To assist in building a skilled labour force within the Upper Hunter & Muswellbrook LGAs. Same condition inserted in proposed MSC VPA.

1. Update the Index in Schedule 2 to reflect the changes made by this instrument.



Dartbrook Mine

Modification 7
Response to Contentions

for

Sparke Helmore Lawyers

July 2020

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

DARTBROOK MINE
MODIFICATION 7

RESPONSE TO CONTENTIONS

Prepared by:

HANSEN BAILEY
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July 2020

For:

SPARKE HELMORE LAWYERS
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EXECUTIVE SUMMARY

Background

AQC Dartbrook Management Pty Limited is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of New South Wales. Dartbrook Mine is authorised by Development Consent DA 231-7-2000 granted under the *Environmental Planning and Assessment Act 1979*. AQC has made an application to modify DA 231-7-2000 under the former Section 75W of the *Environmental Planning and Assessment Act 1979*. This modification application sought approval for an alternative method of underground mining, an alternative coal clearance system and extension of mining operations by 5 years.

The Independent Planning Commission determined the application on 9 August 2019 by approving the bord and pillar mining option and alternative coal clearance system, but refusing the 5 year extension of mining operations (notwithstanding the Department of Planning and Environment's recommendation for approval). The Independent Planning Commission's determination is currently the subject of Class 1 proceedings in the NSW Land and Environment Court.

The proponent has considered the Independent Planning Commission's stated reasons for refusal and the Statement of Facts and Contentions filed in the proceedings. To address these issues, the proponent has:

(a) adjusted aspects of the Modification to reduce its environmental impacts; and
(b) engaged technical specialists to conduct further environmental studies.

These further environmental studies have confirmed that, with adjustments to the Modification, its impacts would be generally consistent with those of the approved development and can be appropriately managed through conditions of development consent.

The Approved Development

DA 231-7-2000 authorises the extraction, processing and transportation of up to 6 million tonnes per annum of run-of-mine coal. Longwall mining is authorised to be undertaken in the Kayuga, Mt Arthur, Piercefield and Wynn coal seams.

The approved Dartbrook Mine includes two surface infrastructure sites. The West Site contains the two entries to the underground mine, main administration buildings, helipad and water management structures. The East Site contains the coal handling and preparation plant, coal and reject stockpiles, rail loop, train loadout facility, reject emplacement area, bathhouse, administration buildings and water management structures.

Run-of-mine coal is transported from the underground mine workings to the East Site via the Hunter Tunnel, which is an approximately 4 km long underground passageway. At the East Site, coal is processed and loaded onto trains for transportation to the Port of Newcastle.

DA 231-7-2000 enables the approved mining and ancillary activities to be undertaken until 5 December 2022.

The Original Modification

The modification application (as originally lodged on 27 February 2018) sought approval for the following activities:

- The option of conducting bord and pillar mining of part of the Kayuga Coal Seam (as an alternative to the approved longwall mining);
- The option of using an alternative coal clearance system to transport run-of-mine coal from the underground mine workings to the East Site; and
- Extending the period of mining operations under DA 231-7-2000 by 5 years (until 5 December 2027).

These activities were proposed in addition to the approved activities under DA 231-7-2000. That is, the Modification did not affect the proponent's authority to undertake the approved longwall mining and coal processing activities.

The Revised Modification

Having regard to the issues raised by the IPC, the scope of the Modification has been adjusted to address its potential environmental impacts. The proponent no longer proposes to proceed with the alternative coal clearance system, which will have the following benefits:

- Avoidance of amenity impacts associated with road transportation of coal; and
- No additional surface infrastructure (i.e. no construction impacts).

In order to reduce subsidence and groundwater impacts, the proponent will not mine in the Piercefield Seam unless further approval is obtained. The proponent would continue to be entitled to undertake all other approved activities authorised under DA 231-7-2000.

If the Revised Modification is approved, DA 231-7-2000 would authorise the following activities:

- Longwall mining and/or bord and pillar mining of the Kayuga Seam;
- Mining of the approved Mt Arthur Seam longwall panels;
- Mining of the approved Wynn Seam longwall panels;
- Transportation of run-of-mine coal from the underground workings to the East Site via the Hunter Tunnel;
- Handling and processing of coal using the approved infrastructure at the East Site;
- Rail transportation of product coal to the Port of Newcastle; and
- Conducting mining operations until 5 December 2027.

The Revised Modification and associated additional assessment that has been conducted has addressed the contentions raised by the IPC and has demonstrated that the environmental consequences of the activities that are the subject of the modification application are limited and satisfactory. Having regard to the State and regional significance of the development and the objectives of the *Environmental Planning and Assessment Act 1979*, approval of the modification application is in the public interest.

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1 INTRODUCTION

1.1 BACKGROUND

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of New South Wales (NSW). Dartbrook Mine is authorised by Development Consent DA 231-7-2000 granted under the *Environmental Planning and Assessment Act 1979* (EP&A Act). DA 231-7-2000 was granted on 28 August 2001 and has been modified on six occasions. Modification 7 is the subject of this report.

DA 231-7-2000 allows for underground longwall mining and associated surface activities to be carried out until 5 December 2022. No mining activities have been conducted since Dartbrook Mine was placed under care and maintenance by the previous owner in December 2006.

AQC is seeking a further modification to DA 231-7-2000 that will facilitate the recommencement of mining operations at Dartbrook Mine.

1.2 APPLICATION HISTORY

The modification application was made under the former Section 75W of the EP&A Act on 28 February 2018. The application originally sought approval for the following activities in addition to the approved activities included under DA 231-7-2000 (the Original Modification):

- The option of conducting bord and pillar mining of part of the Kayuga Coal Seam (as an alternative to the approved longwall mining);
- The option of using an alternative coal clearance system to transport run of mine (ROM) coal from the underground mine workings to the East Site; and
- Extending the approval period under DA 231-7-2000 by 5 years (until 5 December 2027).

The modification application was supported by the *Dartbrook Mine Modification 7 Environmental Assessment* (Hansen Bailey, 2018a) (EA). The EA included experts' reports on the key environmental planning issues relevant to the Modification.

Following consultations and amendments, the EA was accepted by the then Department of Planning and Environment (DP&E) and placed on public exhibition from 28 June to 25 July 2018. During the public exhibition period, a total of 54 submissions were received from regulatory authorities, special interest groups, private enterprises and individuals. The Office of Environment and Heritage (OEH) and Resources Regulator provided submissions after the specified submissions period. Issues raised in submissions were addressed in the *Dartbrook Mine Modification 7 Response to Submissions* (Hansen Bailey, 2018b) (RTS).

Having regard to the EA, RTS, public submissions and advice from other government agencies, DP&E published its Assessment Report on 23 January 2019, which concluded that:

> *"On balance, the Department considers that the modification's benefit would outweigh its costs and that the modification would improve the overall viability of the mine by enabling underground mining operations to recommence, thereby allowing its potential social and economic benefits to be realised. Importantly, many of the modification's impacts are reduced in comparison to the existing consent".*

Appendix G of the Assessment Report (Draft Consolidated Consent) recommended conditions of consent to manage the impacts of the Original Modification.

On 25 January 2019, the Original Modification was referred to the Independent Planning Commission (IPC) for determination. The IPC held a public meeting on 9 April 2019 to allow interested parties to express their views. A total of 45 speakers presented at the public meeting including 5 speakers in support and 40 speakers in opposition.

The IPC determined the application on 9 August 2019 by approving the bord and pillar mining option and alternative coal clearance system, but refusing the 5 year extension of the approval.

The application is currently the subject of Class 1 proceedings in the NSW Land and Environment Court (LEC).

1.3 REVISED SCOPE OF THE MODIFICATION

Following the IPC's determination, the proponent has carefully considered objector's comments, the stated reasons for the IPC's refusal of the 5-year extension component of the Original Modification application and the contentions raised by the Minister in the LEC proceedings. In response to those issues, adjustments were made to some elements of the modification application to address those concerns (Revised Modification).

AQC no longer proposes to proceed with the alternative coal clearance system that was proposed by the Original Modification. The alternative coal clearance system involved truck haulage of ROM coal from the Kayuga Entry and the construction of a new shaft facility. The purpose of the alternative coal clearance system was to bypass a section of the Hunter Tunnel, which is the currently approved method of transporting ROM coal from the underground mine workings to the East Site. Foregoing of the alternative coal clearance system will have the following benefits:

- Avoidance of amenity impacts associated with road transportation of ROM coal; and
- No additional surface infrastructure (i.e. no construction impacts).

DA 231-7-2000 permits longwall mining activities in the Piercefield Seam. In order to reduce subsidence and groundwater impacts, the proponent will not mine in the Piercefield Seam unless further approval is obtained. The proponent would continue to be entitled to undertake all other approved activities authorised under DA 231-7-2000.

The proposed mining and ancillary activities at Dartbrook Mine are described in detail in **Section 2**.

1.4 DOCUMENT PURPOSE

In its statement of reasons for decision, the IPC provided the following explanation for its refusal of the proposed 5 year extension:

> *"the Commission was not provided with a contemporary assessment of the potential impacts of the existing approved longwall mining and coal handling operations to support a 5 year extension of this approval (DA 231-7-2000), in the context of the significant increase in mining activity and other changes in the area since the original approval was granted in 1991".*

The Minister clarified the issues that it required further assessment of in its Statement of Facts and Contentions (dated 16 January 2020) filed in the LEC proceedings. In response, the proponent has commissioned further environmental studies to assess the proposed extension of mining operations from 5 December 2022 to 5 December 2027 (the Extension Period). This document responds to the issues raised in the Statement of Facts and Contentions.

1.5 APPROACH TO DETERMINATION OF MODIFICATION 7 APPLICATION

The approach which a consent authority is required to take to the determination of a Section 75W modification application was considered by the NSW Court of Appeal in *Barrick Australia Ltd v Williams*[1] (*Barrick*). *Barrick* was a case involving a challenge to the determination of a Section 75W modification extending the period of operation of a gold mine. Justice Basten addressed the task of determining an application under Section 75W at paragraphs [41] and at [53] and [54]. These principles have been applied in other cases. They have also been applied by the IPC in other applications for extension of the period over which mining operations may occur (see for example the Mount Pleasant Mine Modification 3 approved in August 2018).

The effect of the decision in *Barrick* in the context of the Modification 7 application is that the consent authority is required to:

- Identify the environmental consequences that have already been the subject of assessment in respect of the whole development up to and including Modification 6;
- Identify those aspects of the development which are, by the application, sought to be changed which involve environmental consequences that have not already been assessed in the process of the determination of the approval already granted;
- Assess those environmental consequences to determine whether they are limited in the sense referred to in *Barrick*;
- Take into account any matters of State and regional significance associated with the application; and

[1] (2009) 168 LGERA 437

- Determine whether the development consent should be modified and, if so, whether any further or amended conditions should be imposed having regard for the impacts of the changes brought about by the modification of the development as proposed in the application.

Of key relevance to the determination of the Modification 7 application is the effect of condition 1.2(a) as it was following Modification 6. Condition 1.2(a) states that "*This approval is for a period of 21 years from the date of granting of a mining lease pursuant to this consent*". The expiry period in condition 1.2(a) does not cause the consent to lapse. That would be contrary to Section 4.53 (and its predecessors) of the EP&A Act which prevents a development consent from lapsing where it has been physically commenced.

For that reason, on a proper analysis, the Modification 7 application does not seek to extend the consent but rather to extend the period over which certain activities authorised by the consent can take place. In short, it does not involve the grant of a new development consent for the period between 2022 and 2027 but the extension of the right to undertake certain activities as part of an existing approved project.

Barrick is authority for the proposition that assessment of the application should not be treated, in substance, as a new application. Determination of the Modification 7 application therefore involves looking at the impacts of the existing project occurring over a longer period rather than treating the consent as lapsing on 5 December 2022 (which is the approach that the IPC has effectively taken). *Barrick* supports the proposition that the consent authority must look at the environmental consequences of the activities that are the subject of the modification application (i.e. the changes to the development) and determine whether those consequences are limited. If so, and if the consent authority is satisfied that the development as modified is otherwise satisfactory having considered all relevant matters of State and regional significance, then the application may be approved if the consent authority is satisfied that it is in the public interest in terms of the EP&A Act.

1.6 DOCUMENT STRUCTURE

This document is structured as follows:

- **Section 2** describes the elements of the Revised Modification including the approved activities that will be undertaken during the Extension Period; and
- **Section 3** addresses the contentions raised by the IPC in its Statement of Facts and Contentions;
- **Section 4** lists the abbreviations used in this document; and
- **Section 5** lists the sources relied upon during the preparation of this document.

2 REVISED MODIFICATION DESCRIPTION

2.1 OVERVIEW

AQC has commissioned further environmental studies in response to the IPC's contentions. As explained in **Section 1.3**, aspects of the Original Modification have been removed to reduce its potential environmental impacts. The Revised Modification application is now proposed to be limited to the following activities:

- The option of conducting bord and pillar mining of part of the Kayuga Seam (as an alternative to the approved longwall mining); and
- Extending the approval period under DA 231-7-2000 by 5 years (until 5 December 2027).

The Revised Modification would enable longwall mining and/or bord and pillar mining to be undertaken until 5 December 2027. Total coal production will be limited to the approved maximum rate of 6 million tonnes per annum (Mtpa) of ROM coal. In addition, coal production via bord and pillar mining will be limited to a total of 10 Mt of ROM coal over the remaining approval duration. Based on these constraints, the indicative maximum production over the remaining approval duration is 37.4 Mt of ROM coal over a seven-year period (2021 to 2027, inclusive). The indicative production schedule is outlined in **Table 1**.

As explained in **Section 1.3**, the approved mining activities in the Piercefield Seam will not be carried out unless further approval is obtained. All other approved longwall mining activities will not be altered by the proposed Modification.

Table 1
ROM Coal Production Schedule

Year	Bord & Pillar Max ROM Coal (Mtpa)	Longwall Max ROM Coal (Mtpa)	**Total ROM Coal (Mtpa)
2021	1.4	Nil Coal Produced	1.4
2022	1.4	6	6
2023	1.4	6	6
2024	1.4	6	6
2025	1.4	6	6
2026	1.4	6	6
2027	1.4	6	6
Total (Mt)	*10.0	36.0	37.4

**Note rounding error*

***Total production is limited to 6 Mtpa by the conditions of DA 231-7-2000*

All ROM coal is proposed to be processed through the existing Dartbrook Coal Handling and Preparation Plant (CHPP). ROM coal is approved to be transferred directly from the mine workings to the CHPP via the Hunter Tunnel. The Modification will not result in any changes to the approved Hunter Tunnel or CHPP (other than implementation of additional contemporary environmental mitigation measures).

2.2 CONTINUATION OF APPROVED OPERATIONS

Dartbrook Mine was originally granted DA 30/91 in December 1991. DA 30/91 allowed for longwall mining operations in the Wynn Coal Seam, as well as the development of surface infrastructure. The two surface facilities at Dartbrook Mine (namely, the East Site and West Site) were constructed in accordance with DA 30/91.

The East Site includes the CHPP, ROM coal stockpile, product coal stockpiles, rail loop, train loadout facility, reject emplacement area, bathhouse, administration buildings and water management structures. The layout of the East Site is shown in **Figure 1**.

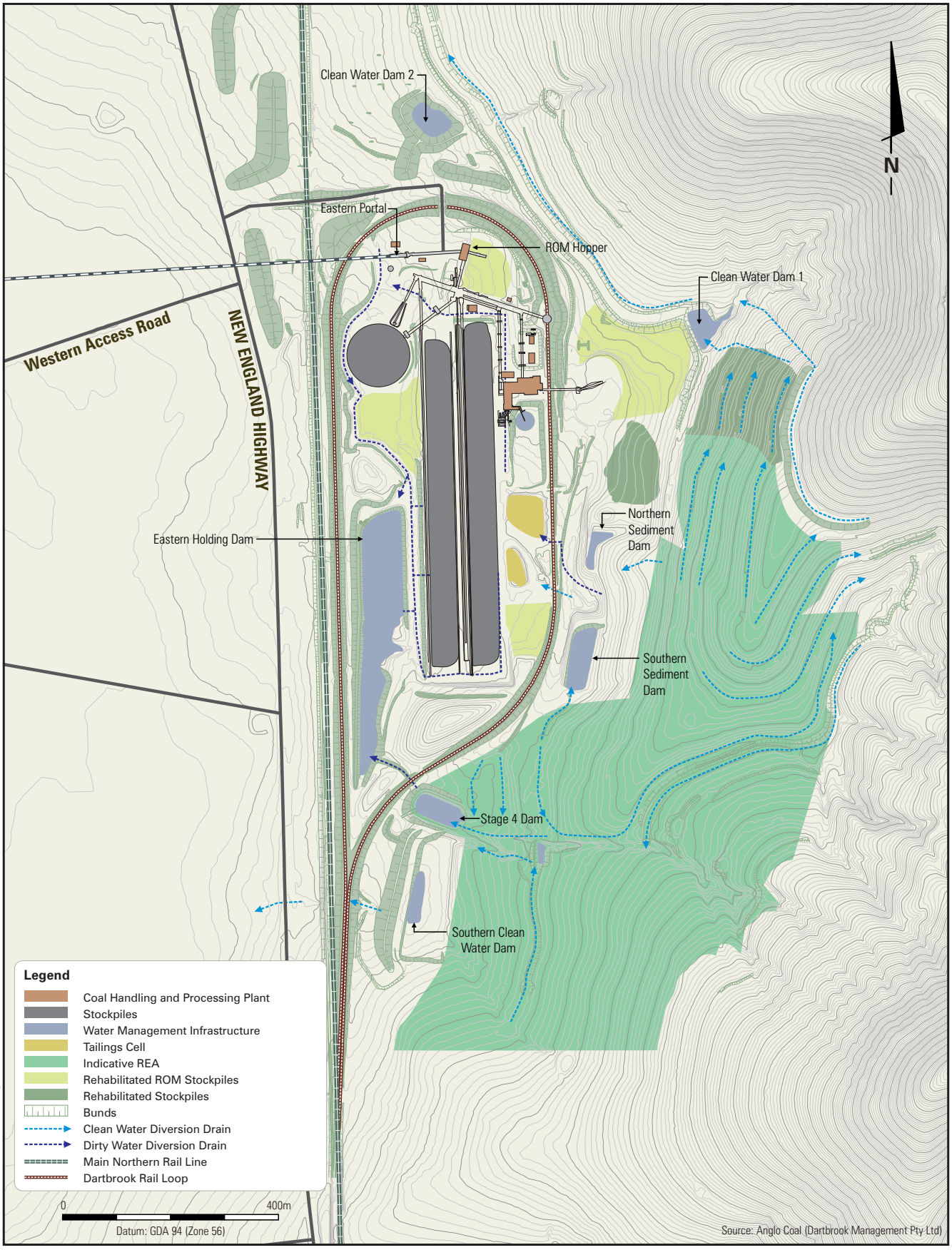
The West Site includes the entries to the underground mine (Western Drift and Kayuga Entry), main administration buildings, helipad, effluent ponds and water management structures. The layout of the West Site is shown in **Figure 2**.

The current development consent (DA 231-7-2000) was granted on 28 August 2001. DA 231-7-2000 provides approval for longwall mining activities in the Kayuga, Mt Arthur and Piercefield Coal Seams, in addition to completion of the previously approved mining activities in the Wynn Seam.

DA 30/91 provided approval to construct the Hunter Tunnel. Prior to Dartbrook Mine being placed into care and maintenance, ROM coal was transferred from the mine workings to the East Site using conveyors in the Hunter Tunnel.

The approved activities under DA 231-7-2000 are described in the *Dartbrook Extended Environmental Impact Statement* (HLA-Envirosciences, 2000) (EIS).

Mining in the Wynn Seam commenced in 1996 and was suspended in May 2004. Ten of the approved longwall panels in the Wynn Seam were extracted during this period. Mining operations were then relocated to the overlying Kayuga Seam. Mining of the Kayuga Seam commenced in 2004 and was suspended in October 2006. Only three of the 20 approved longwall panels in the Kayuga Seam have been mined to date.



HB DARTBROOK Surface Water Management Plan HB1804 F1 East Site Infrastructure 17 07 2020

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Existing East Site Infrastructure

FIGURE 1

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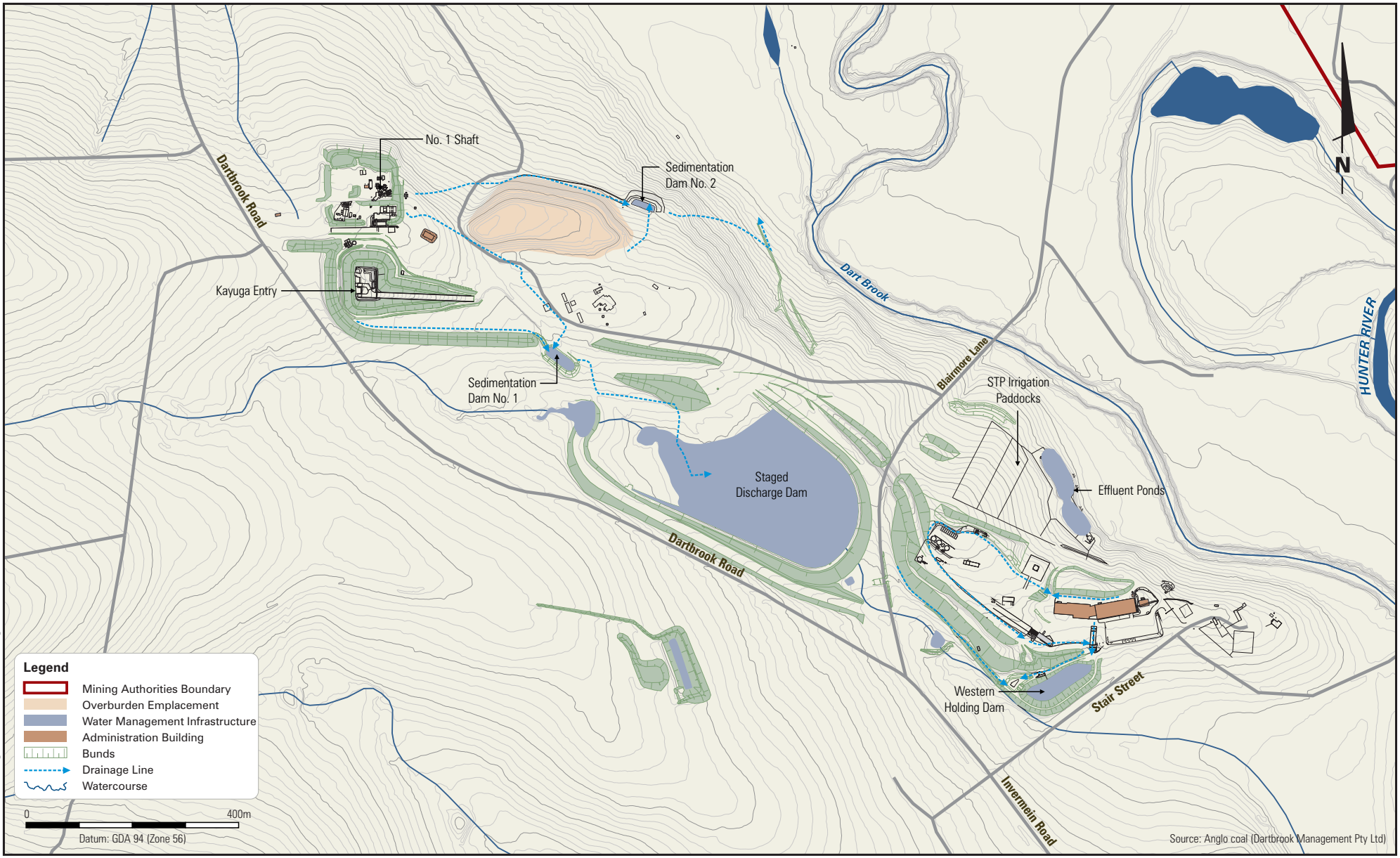

HB DARTBROOK Underground MOD7 1774 F2 Existing Environment - West Site 05 05 2020

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Existing Environment - West Site Infrastructure

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FIGURE 2 90

2.2.1 Underground Mining

Underground mining is approved to be undertaken using retreat longwall methods. The extraction height for longwall mining ranges from 3.0 m to 4.5 m. The approved longwall panels are generally 200 m wide, although DA 231-7-2000 also provides approval for the option of 300 m wide longwall panels.

The approved longwall mining activities for the Kayuga, Mt Arthur and Piercefield Seams are shown in **Figure 3** and **Figure 4**. In the western portion of the approved mining area, the Mt Arthur and Kayuga Seam are coalesced.

The extraction sequence involved completion of the Wynn Seam mine workings, followed by mining of the Kayuga Seam, Mt Arthur Seam and Piercefield Seam (in that order). Within the Kayuga Seam, longwall mining commenced in the southern longwall panels (KA101 to KA112) and was to ultimately progress to the northern longwall panels (KA113 to KA120).

Table 2 summarises the amount of coal approved to be mined in each coal seam, the amount of coal extracted to date and the coal available to be extracted. There is approximately 61.8 Mt of ROM coal remaining in the Kayuga and Mt Arthur Seams that is approved to be extracted. Given that the indicative maximum production for the Revised Modification is 37.4 Mt of ROM coal (see **Table 1**), all mining during the Extension Period is likely to occur within this horizon.

2.2.2 Site Access, Workforce and Hours of Operation

The main administration buildings at Dartbrook Mine are located at the West Site. Access to the West Site is primarily via the Western Access Road, which is owned by the proponent. DA 231-7-2000 also allows locally based employees and contractors to access the West Site using local public roads (such as Kayuga Road, Dartbrook Road and Blairmore Lane).

Dartbrook Mine has approval to employ up to 192 permanent employees and approximately 100 contractors to undertake underground mining operations and surface operations (including the CHPP). Whilst the number of employed contractors fluctuated, the operational workforce was generally in the order of 292 persons (permanent employees plus contractors).

The workforce during the care and maintenance phase is comprised of a contract workforce of approximately 11 personnel.

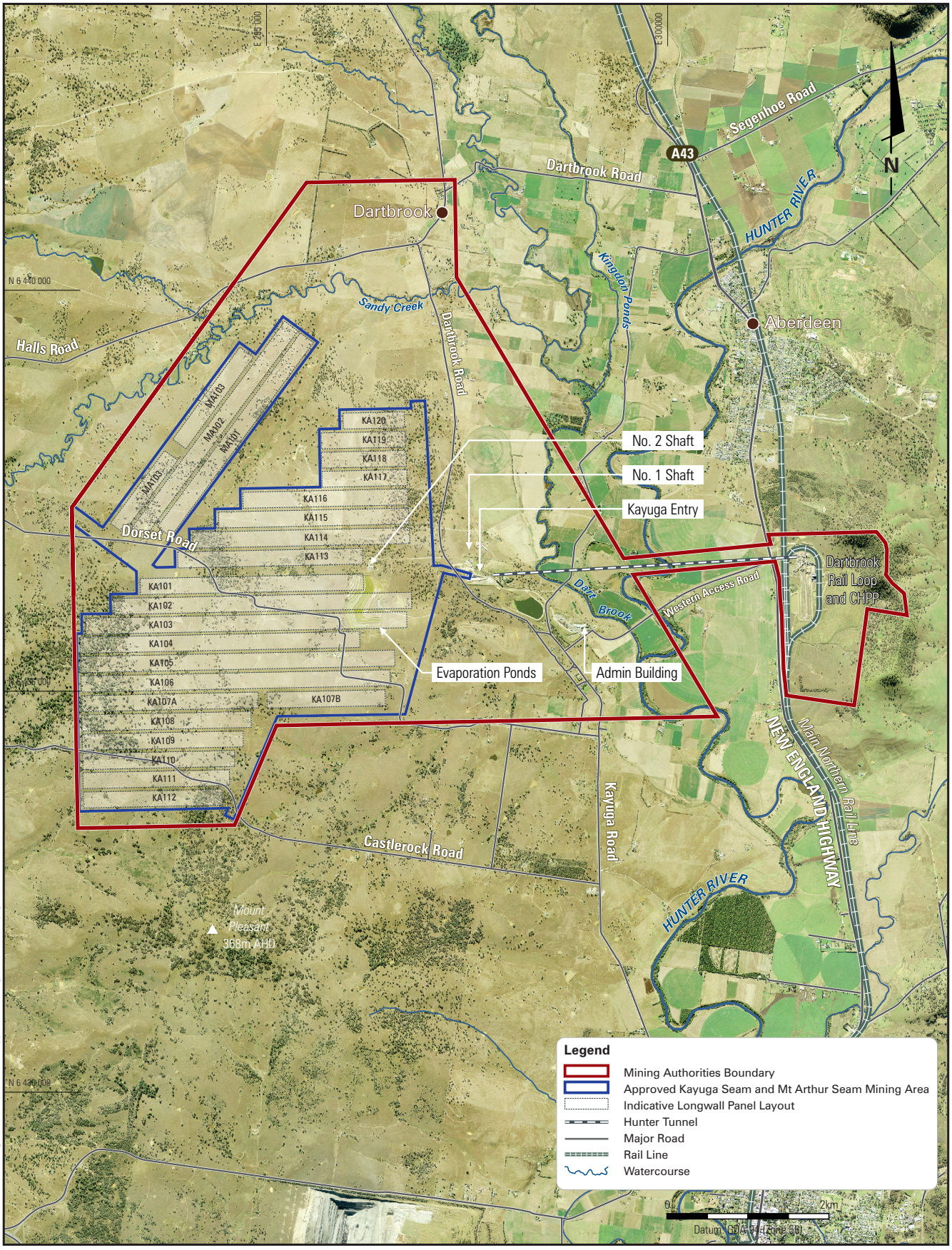
Dartbrook Mine has approval to conduct operations 24 hours per day, 7 days per week.

Table 2
Residual Approved ROM Coal Volumes

Coal Seam	Total Approved ROM Coal Mining (Mt)	Total ROM Coal Extracted to Date (Mt)	Remaining ROM Coal (Mt) Approved for Extraction	Comments
Wynn	22.5[b]	22.5	0	Actual mining 1994 – 2004, inclusive. 2000 EIS Table 5.18 predicted working in the Wynn Seam up until the end of 2002.
Kayuga	57.2 [a]	6.7	50.5	Actual mining 2002 – 2006, inclusive. 2000 EIS Table 5.18 predicted working in the Kayuga Seam up until the end of 2012.
Mt Arthur	11.3[a]	0	11.3	2000 EIS Table 5.18 predicted working in the Mt Arthur Seam from 2013 and 2014. Note that the Kayuga & Mt Arthur seams are coalesced in the western portion of the approved mining area.
Piercefield	76.2 [a]	0	76.2[d]	2000 EIS Table 5.18 predicted working in the Piercefield Seam from 2016 – 2020.

Notes:

a) Dartbrook 2000 EIS, Table 5.6
b) Upper Wynn Mineable Reserve, Table 3.4 of 1990 EIS
c) Dartbrook 2000 EIS, Table 5.9
d) Will not be mined unless further approval is obtained



HB DARTBROOK Underground MOD7 1774 F3 Approved Mining Activities (Kayuga and Mt Arthur Seam) 05 05 2020

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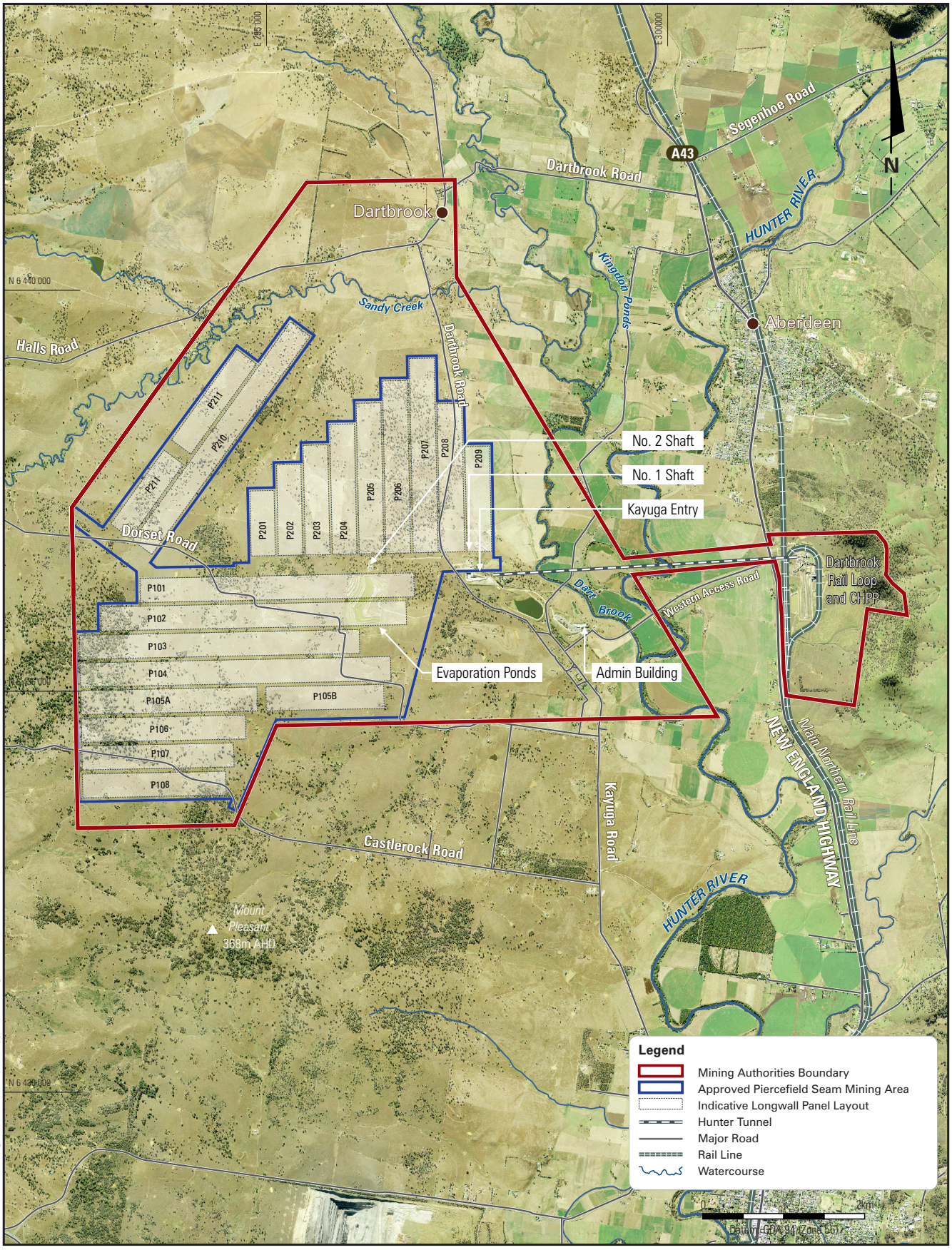
Approved Mining Activities (Kayuga and Mt Arthur Seams)

FIGURE 3



HB DARTBROOK Underground MOD7 1774 F4 Approved Mining Activities (Piercefield Seam) 05 05 2020

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Approved Mining Activities (Piercefield Seam)

FIGURE 4

2.2.3 Coal Handling and Processing Infrastructure

The term "coal clearance system" refers to the system of conveyors, drives, tunnels, bins and associated infrastructure used to transfer ROM coal from the underground mine workings to the CHPP. The Hunter Tunnel is the major component of the approved coal clearance system. The Hunter Tunnel is an approximately 4 km long underground passage that connects the mine workings to the CHPP, passing beneath the Hunter River, Dart Brook, New England Highway and Main Northern Rail Line (see **Figure 5**). Coal is initially delivered from the working face to the western end of the Hunter Tunnel by conveyors within the mine workings. The Hunter Tunnel conveyor then delivers ROM coal to the existing ROM hopper at the East Site. Coal is crushed in the ROM hopper and placed onto conveyors that distribute it to the CHPP for processing. The coal clearance system was designed to handle up to 6 Mtpa of ROM coal (i.e. the maximum approved production rate).

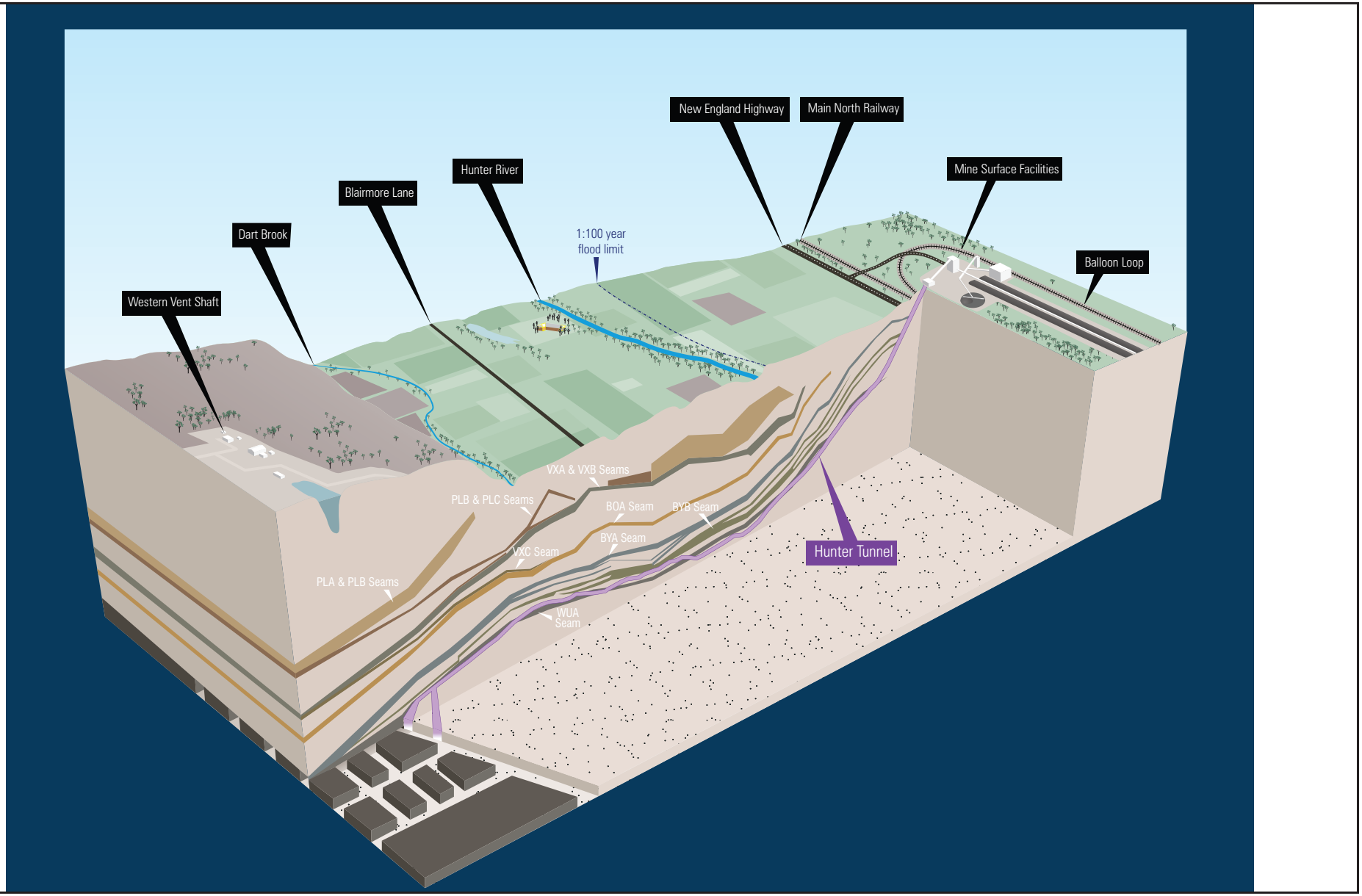
The CHPP was constructed pursuant to DA 30/91. The construction of the CHPP enabled the extraction of the shallower coal seams (such as the Kayuga, Mt Arthur and Piercefield Seams). The CHPP is accompanied by an emergency tailings storage cell with a capacity of approximately 30 ML. Modification 2 to DA 231-7-2000 provided approval for the construction of an additional emergency tailings storage cell (approximately 20 ML capacity), adjacent to the existing cell.

The CHPP has a maximum throughput of approximately 1,000 tonnes per hour (tph) and can deliver ROM coal at a rate of approximately 4,000 tph during peak output. The raw coal is crushed to a maximum size of 150 mm for processing then screened at 16 mm. The 150 mm x 16 mm coal is then treated in a dense medium bath, the 16 mm x 1.4 mm coal is treated in a dense medium cyclone and the fine coal is treated in coal spirals. The product coal is then crushed to 50 mm in order to meet sizing specification for export markets.

The coal stockpiles at Dartbrook Mine are located at the East Site and include:

- Emergency stockpile (ROM Coal) – 5,000 t;
- Circular stockpile (ROM Coal) – 80,000 t;
- Rectangular stockpile No. 1 (saleable coal) – 200,000 t; and
- Rectangular stockpile No. 2 (saleable coal) – 200,000 t.

Acoustics experts have identified that additional noise suppression works will be required at the CHPP to minimise impacts on private receptors (see Section 3 of **Appendix B**). These works will be completed prior to undertaking any further coal beneficiation. The costs of these mitigation measures are reflected in the economic assessment conducted in relation to the Revised Modification (see **Section 3.7**).



HB DARTBROOK PFS 1710 F15 Hunter Tunnel 30 08 2017

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Hunter Tunnel

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FIGURE 5 96

2.2.4 Product Coal Transportation

Dartbrook Mine has approval to transport product coal by rail to the Port of Newcastle. Coal is loaded onto trains via the approved train loadout facility and rail loop at the East Site. The train loadout facility currently has capacity to load coal at rates of up to 3,000 tph. Due to the logistics of train scheduling, the facility is currently authorised for a daily capacity of 45,000 t.

2.2.5 Process Waste Management

Dartbrook Mine was originally authorised by DA 231-7-2000 to produce approximately 125 Mt of ROM coal, yielding 108 Mt of product coal and resulting in the generation of approximately 18.7 Mt of process waste over its 21-year project life. This equates to an average of approximately 890,000 tonnes/year of reject materials. The volume required to store the total quantity of rejects (18.7 Mt) was estimated at 11.68 million cubic metres (Mm^3).

Dartbrook Mine is approved to dispose of process waste in the Browns Mountain Reject Emplacement Area (REA) immediately east of the CHPP. The REA is divided into three sections: Northern, Central and Southern (as shown in the attached Figure 5.15 of the EIS). **Table 3** shows the estimated storage capacity of the REA.

Table 3
Estimated REA Capacity

Section	Volume (m^3)	Storage (t)
South	8,991,069	14,385,710
North	4,336,492	6,938,387
Central	3,008,102	4,812,963
Total	**16,335,663**	**26,137,061**

Table 3 indicates that the Browns Mountain REA theoretically has 40% more capacity than required to store the process waste generated by the Project (as originally approved).

Less than 2.9 Mt of process waste has been placed in the REA to date. This has all been placed in the Central Section of the REA.

Rejects and tailings generated by the CHPP are dewatered and conveyed to the reject stockpile. The reject materials are then transported (via haul trucks) to the REA. DA 231-7-2000 also describes an alternate method of piping a combined waste product to the REA. The emplaced materials are compacted by heavy equipment. If the ratio of tailings is too high for co-disposal, excess tailings are temporarily emplaced within the emergency tailings storage cells. Once dry, these tailings are excavated from the storage cells and disposed of in the REA.

Modification 6 to DA 231-7-2000 provided approval for tailings to be disposed of in the Wynn Seam goaf. Some tailings have been pumped from the CHPP to the underground mining area. Approximately 45,000 t of fine tailings was disposed into the Wynn Seam goaf in 2006. There is capacity to place additional tailings in the Wynn Seam goaf if required in the future.

2.2.6 Water Management

The water management system at Dartbrook Mine operates under the following principles:

- Clean water (i.e. runoff from undisturbed catchments) is diverted away from disturbed areas using diversion drains and catch dams;
- Water that has come into contact with carbonaceous material (i.e. mine water) will be captured and contained in mine water dams;
- Water from disturbed areas (i.e. sediment laden water) will be captured and treated in sediment dams; and
- Water that is likely to be contaminated with hydrocarbons (i.e. from workshop and refuelling areas) will be treated prior to discharge into the mine water system.

If external water supplies are required, raw water can be extracted from the Hunter River (in accordance with AQC's water licences). During wet periods, surplus water can be stored in the Wynn Seam goaf.

To minimise the demand for external water supplies, mine water is reused for operational activities (wherever possible). The surplus water in the Wynn Seam goaf and water make from the Hunter Tunnel will be sufficient to meet the water demands of the Revised Modification.

2.3 COMPONENTS OF THE REVISED MODIFICATION

2.3.1 Option of Bord and Pillar Mining

The Approved Mining Area for the Kayuga and Mt Arthur Seams is contained within CL 386 and ML 1497. DA 231-7-2000 allows for the coal reserves within the Approved Mining Area to be extracted via longwall mining methods. Through the Revised Modification, AQC seeks approval for the option of mining the Kayuga Seam via bord and pillar methods. The proposed bord and pillar mining will take place within the Approved Kayuga Seam Mining Area (see **Figure 6**).

Bord and pillar mining will be designed such that subsidence at the ground surface is imperceptible for all practical purposes. As a result, the environmental impacts of bord and pillar mining will be significantly less than the impacts of mining the same coal via retreat longwall mining.

Bord and pillar mining involves the shearing of coal to develop a network of roadways within the coal seam (see **Figure 7**). The roadways are separated by blocks of intact coal, which are referred to as "pillars". The pillars will be designed to remain stable in the long term, thus resulting in no perceptible surface subsidence.

Due to the geotechnical conditions at Dartbrook Mine, bord and pillar mining will be undertaken using "in-place" methods. The "in-place" mining methodology involves the progressive installation of roof support as roadways are developed. This differs from the "place change" method, where roof support is installed after the roadways have been developed.

The proposed bord and pillar mine plan within the Kayuga Seam will consist of main headings and production panels. Both the main headings and production panels are networks of parallel and perpendicular roadways, which produce square shaped pillars. All bord and pillar workings will be stable in the long-term. The dimensions of the coal pillars will need to increase as depth of mining increases.

The Kayuga Seam has a maximum thickness of approximately 4.5 m. The extraction height for the bord and pillar workings will vary between 3.0 to 3.5 m.

Total production from bord and pillar mining will be limited to 10 Mtpa of ROM coal over a seven-year period. Production from bord and pillar mining will also be limited by the maximum annual production rate of 6 Mtpa of ROM coal.

The proposed bord and pillar mining operations may be undertaken 24 hours per day, 7 days per week consistent with the approved operating hours under DA 231-7-2000.

2.3.2 Extension of the Mining Duration

DA 231-7-2000 enables mining operations to be undertaken until 5 December 2022. The Modification seeks to extend the period of approval by an additional five years until 5 December 2027.

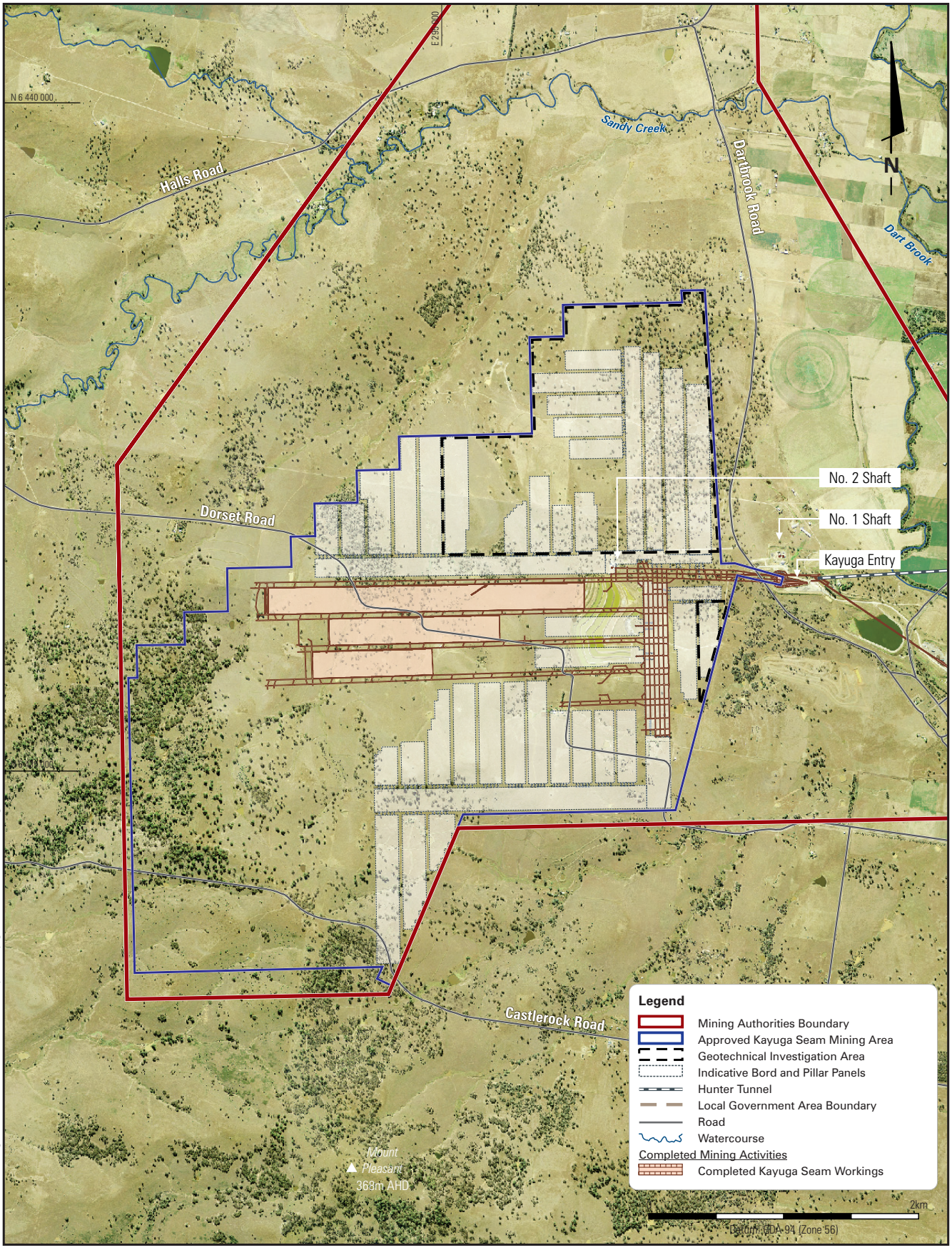
Under DA 231-7-2000 (as approved by Modification 7), the approved longwall mining and/or the proposed bord and pillar mining may be undertaken during the Extension Period. For the purposes of the further environmental assessments undertaken, it has been assumed that:

(a) Bord and Pillar mining will commence in January 2021;
(b) Longwall mining will recommence at the approved maximum rate in January 2022;
(c) Coal extraction from both methods will cease in December 2027.

The indicative production schedule is outlined in **Table 1**.

All approved surface activities are proposed to be carried out during the Extension Period including coal handling and processing, reject disposal, transportation of product coal and water management. These activities have been assessed on the basis of the maximum rates indicated in **Section 2.2**.

To minimise noise impacts on private receivers to the south of the REA, reject emplacement near the southern extent of the REA will be avoided during the night period and/or noise enhancing meteorological conditions.



HB DARTBROOK Underground MOD7 Post RTS 1774 F6 Conceptual Kayuga Seam Bord and Pillar Mining 21 07 2020

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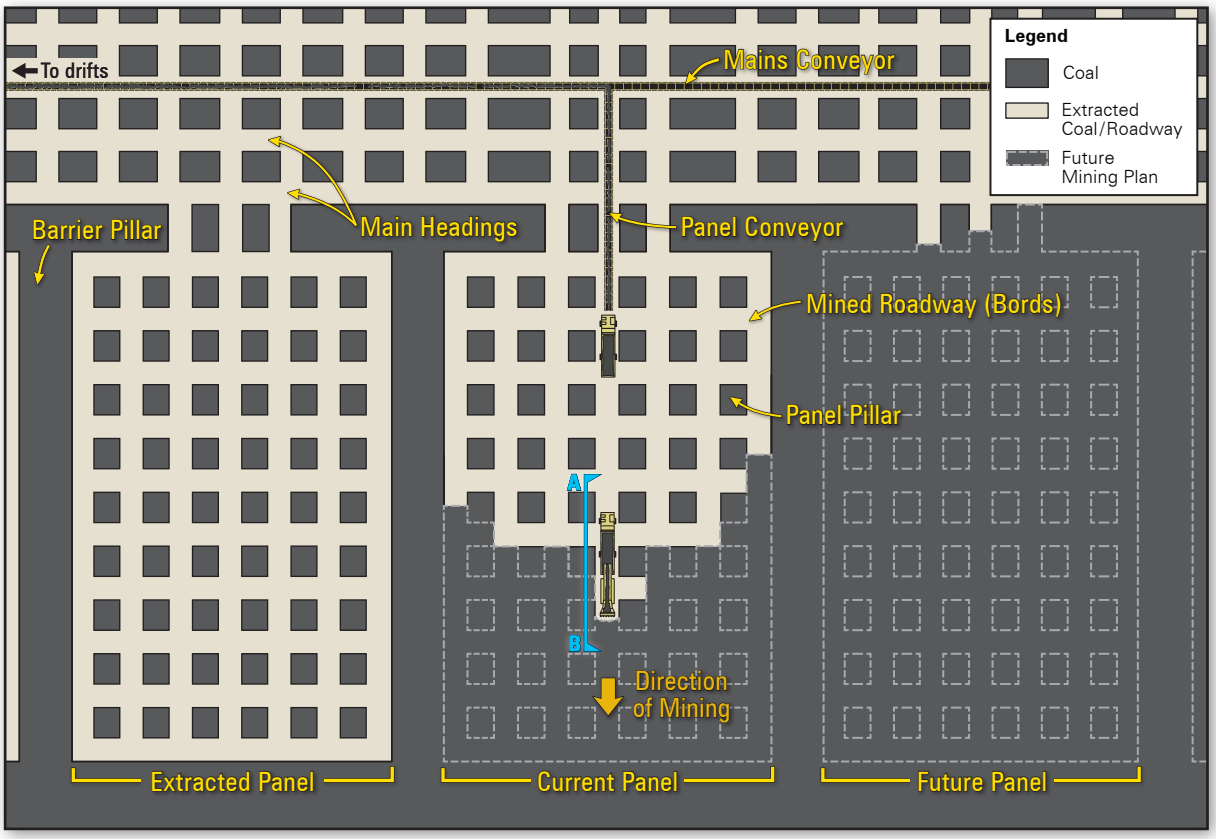
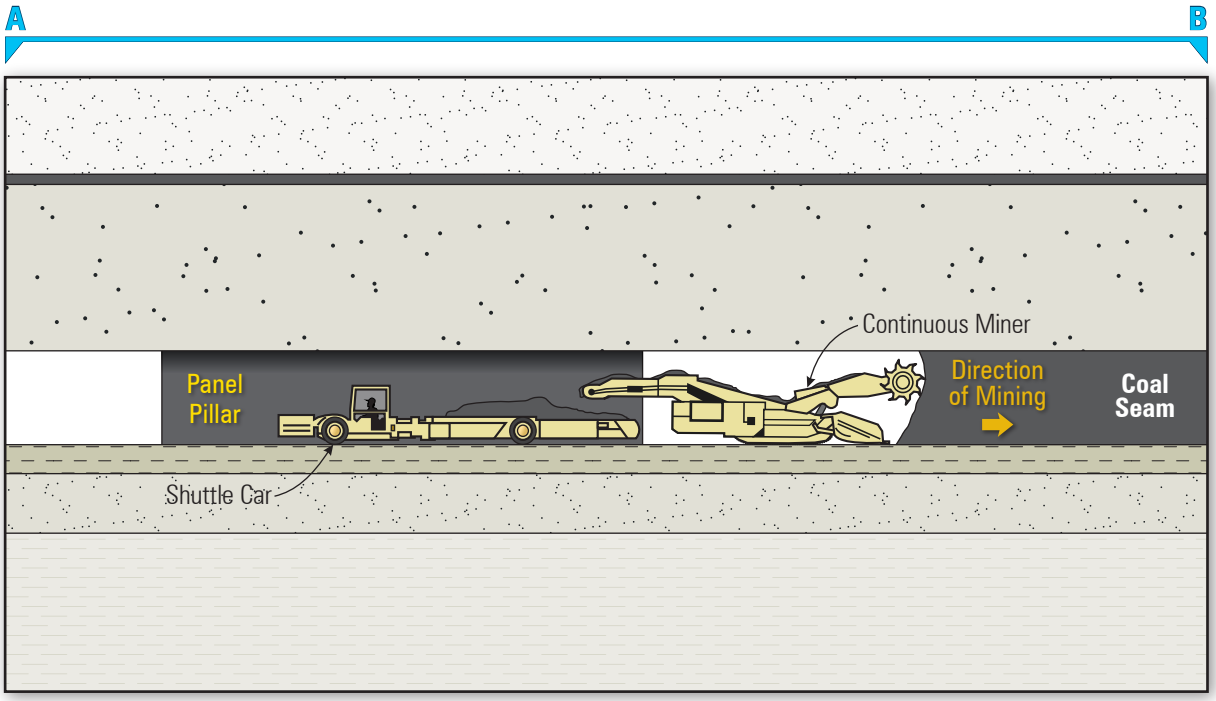
Proposed Kayuga Seam Bord and Pillar Mining

FIGURE 6



Plan View of Bord and Pillar Coal Mining



Cross Section of Active Bord and Pillar Mining Roadway

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Indicative Bord and Pillar Mining Method

FIGURE 7

3 RESPONSES TO CONTENTIONS

This section provides responses to the contentions raised in the respondent's Statement of Facts and Contentions.

3.1 AIR QUALITY

IPC's Contention

The impacts on air quality resulting from a five year extension of mining operations under the Approval have not been appropriately considered or assessed.

Particulars

(a) The AQIA prepared for the Applicant in support of Mod 7 did not adequately assess the full impacts of the proposed extension of the Approval on air quality as:
  (i) the impacts associated with the reopening and operation of the coal washery on the Project site were not included in the air quality modelling; and
  (ii) it did not address the cumulative impacts on air quality of the existing approval for long wall mining being fully operational, in the context of changes in background air quality.

Response

Additional dust dispersion modelling has been undertaken by ERM to predict the impacts of the approved operations during the Extension Period. This assessment is provided in **Appendix A**.

The model has accounted for emissions from all approved surface activities (including coal handling and processing, train loading and reject disposal) as well as emissions from ventilation shafts. To ensure that the worst-case impacts are assessed, the model has adopted the approved maximum production rate of 6 Mtpa of ROM coal.

ERM has assessed both incremental and cumulative air quality impacts. The contributions from other sources are reflected in the background levels adopted for the modelling. The Mt Pleasant Mine was not operational at the time of the background monitoring. For the purposes of the cumulative air quality assessment, the contribution of the Mt Pleasant Mine to cumulative concentrations has been modelled and added to the background concentration and the incremental impact of the Revised Modification.

At the maximum production rate, the Revised Modification is predicted to emit in the order of 72 t/year of total suspended particulate (TSP). The emissions inventory for the Revised Modification is significantly lower than that of the Original Modification due to its use of the existing Hunter Tunnel for transport of ROM coal instead of truck haulage (as discussed in **Section 1.3**). The dust emissions inventory for the Revised Modification at full operation is significantly less than those of the neighbouring open cut coal mines on an emissions per tonne of coal basis. As a result, the Revised Modification will result in only a minor contribution to cumulative dust concentrations during the 5-year extension period.

The model predicts that the Revised Modification will comply with the following criteria at all private receivers:

- Annual average TSP (incremental and cumulative);
- Annual average PM_{10} (incremental and cumulative);
- Annual average $PM_{2.5}$ (incremental and cumulative);
- Annual average dust deposition (incremental and cumulative);
- 24-hour average PM_{10} (incremental); and
- 24-hr average $PM_{2.5}$ (incremental and cumulative).

The only criterion that is predicted to be exceeded is the 24-hr average PM_{10} criterion on a cumulative basis. Under existing conditions, private receivers experience some days where the background 24-hr PM_{10} concentration is above the criterion (50 $\mu g/m^3$). The model predicts that seven private receivers will experience one additional day above the criterion as a result of operations at Dartbrook Mine and Mt Pleasant Mine. **Table 4** presents the contributions of the various sources on this additional day of exceedance. Neither the Revised Modification nor Mount Pleasant Mine are dominant contributors to the cumulative concentration. At six of these receivers (all except Receiver 29), the sum of the background concentration and the contribution of Mount Pleasant Mine is greater than the criterion (50 $\mu g/m^3$). As such, these exceedances would occur regardless of Dartbrook Mine. Receiver 29 is the only residence whether the emissions from Dartbrook Mine result in an additional day exceeding the 24-hr average criterion.

Table 4
Predicted 24-hr Average PM_{10} Exceedances

Receiver ID	Background ($\mu g/m^3$)	Mount Pleasant ($\mu g/m^3$)	Total excluding Dartbrook ($\mu g/m^3$)	Revised Modification ($\mu g/m^3$)	Total ($\mu g/m^3$)
29	48.7	0.97	49.67	0.54	50.21
66	48.7	1.92	50.62	0.07	50.69
67	48.7	3.16	51.86	0.03	51.88
122	48.7	3.34	52.04	0.01	52.05
128	48.7	3.35	52.05	0.02	52.07
445A	48.7	5.36	54.06	0.01	54.06
445B	48.7	5.20	53.90	0.01	53.90

The *'Voluntary Land Acquisition and Mitigation Policy'* (NSW Government, 2018) (VLAMP) prescribes acquisition and mitigation criteria for state significant mining developments. The 24-hr average PM_{10} criterion (50 $\mu g/m^3$) only gives rise to acquisition or mitigation requirements when exceeded on an incremental basis. The incremental impact of the Revised Modification is well below the criterion.

Recommended Conditions of Consent

Condition 6.1(f) of the Draft Consolidated Consent requires the preparation of an Air Quality and Greenhouse Gas Management Plan (AQGGMP). The AQGGMP will outline the dust controls that will be implemented to achieve compliance with contemporary regulatory air quality criteria. Exceedances of the 24-hr average PM_{10} criterion can be avoided by implementing proactive management measures (such as modifying or ceasing operations) during adverse weather conditions. This is standard practice for mining operations in the vicinity.

3.2 NOISE

IPC's Contention

The noise impacts resulting from a five year extension of mining operations under the Approval have not been appropriately considered or assessed.

Particulars

(a) The AIA prepared for the Applicant in support of Mod 7 did not adequately assess the full noise impacts of the proposed extension of the Approval as:
  (i) noise impacts were substantially assessed against the bord and pillar method and the proposed coal clearance system; and
  (ii) the noise impacts of the recommencement of longwall mining and associated operations, as permitted under the Approval, were not considered as part of the five year extension.

Response

Additional noise modelling has been undertaken by Bridges Acoustics to predict the impacts of the approved operations during the Extension Period. This assessment is provided in **Appendix B**.

The approved mining activities and the transport of ROM coal from the West Site to The East Site will take place underground. These activities will not result in any noise at the surface. The noise model has accounted for all approved surface activities at the East Site including coal handling and processing, train loading and disposal of reject materials. To ensure that the worst-case impacts are assessed, the model has adopted the approved maximum production rate of 6 Mtpa of ROM coal.

As explained in **Section 1.3**, truck haulage of ROM coal is no longer proposed and as such, has not been considered in the model. The additional noise controls proposed for the CHPP (described in Section 3 of **Appendix B**) have been accounted for in the model.

Intrusive noise criteria for existing sensitive receptors in the vicinity of Dartbrook Mine are outlined in Condition 6.4.1 of DA 231-7-2000.

The model predicts that the Modification will comply with the intrusive noise criteria at all private residences during the day and evening periods. The Modification is predicted to comply with the night-time criterion at all residences except Receivers 303, 391 and 422. Receivers 303 and 422 are predicted to experience noise levels of up to 42 LAeq,15min, which is 1 dBA greater than the relevant criterion. These exceedances can be avoided by modifying operational activities during unfavourable weather conditions. The NMP will include measures for proactive management of operational noise during unfavourable weather conditions.

Receiver 391 is predicted to experience noise levels of up to 36 LAeq,15min, which is 1 dBA greater than the relevant criterion. This receiver is currently entitled to acquisition under the development consent for Mount Pleasant Mine.

Table 1 of the VLAMP explains that exceedances of 0-2 dBA are considered negligible and would "not be discernible to the average listener and therefore would not warrant receiver based treatments or controls" (NSW Government, 2018). The predicted exceedances at Receivers 303, 391 and 422 fall into the negligible category under the VLAMP.

Recommended Conditions of Consent

Condition 6.4.2 of the Draft Consolidated Consent requires the preparation of a Noise Management Plan (NMP). The NMP will outline the noise controls that will be implemented to achieve compliance with the contemporary regulatory noise criteria. Condition 6.4.2 requires that noise impacts of the development are minimised during noise enhancing conditions. The NMP will include a protocol for proactive management of noise emissions during adverse meteorological conditions, such as avoidance of reject emplacement near the southern extent of the REA at night (see **Section 2.3.2**).

3.3 GREENHOUSE GAS

IPC's Contention

The impact of the estimated GHG emissions resulting from a five year extension of mining operations under the Approval have not been appropriately considered or assessed.

Response

Scope 1, 2 and 3 greenhouse gas (GHG) emissions were estimated by ERM (see Section 11 of **Appendix A**).

Table 5 presents the estimated annual GHG emissions corresponding to the coal production schedule in **Table 1**.

Table 5
Estimated Greenhouse Gas Emissions

Scope 1 Emissions ($t CO_2$-e)				Scope 2 Emissions ($t CO_2$-e)	Scope 3 Emissions ($t CO_2$-e)
Year	**Diesel**	**Fugitive methane**	**Total**	**Electricity**	**Energy Production**
2021	3,579	120,743	124,322	36,022	5,612,549
2022	4,866	131,173	136,039	77,937	18,035,436
2023	4,866	141,603	146,469	77,937	18,035,436
2024	4,866	152,033	156,899	77,937	18,035,436
2025	4,866	162,463	167,329	77,937	18,035,436
2026	4,866	172,893	177,759	77,937	18,035,436
2027	4,866	183,323	188,189	77,937	18,035,436
Total	**32,775**	**1,064,231**	**1,097,006**	**503,644**	**113,825,161**
		Annual average	**156,715**	**71,949**	**16,260,738**

The following components of the total emissions are predicted to occur within the Extension Period:

- 836,645 t CO_2-e of Scope 1 emissions;
- 389,685 t CO_2-e of Scope 2 emissions; and
- 90,177,176 t CO_2-e of Scope 3 emissions.

In the 2017/18 and 2018/19 financial years, Dartbrook Mine reported GHG emissions of 89,453 t CO_2-e and 99,883 t CO_2-e, respectively. These values are representative of fugitive emissions during care and maintenance. As such, a large component of the fugitive emissions listed in **Table 5** l likely to occur in the absence of active mining.

3.4 SUBSIDENCE

3.4.1 Longwall Subsidence

IPC's Contention

The subsidence impacts resulting from a five year extension of mining operations under the Approval have not been appropriately considered or assessed.

(b) The subsidence assessment prepared for the Applicant in support of Mod 7 did not adequately assess the full subsidence impacts of the proposed extension of the Approval as:

(i) the subsidence impacts have only been assessed against the bord and pillar methods and not, the subsidence impacts of the full operations under Mod 7, should longwall mining recommence;

Response

The Modification does not seek to alter any aspects of the approved longwall mining. The potential subsidence impacts of the approved longwall mining were assessed by G E Holt and Associates (Holt, 2000). Byrnes Geotechnical was engaged to review Holt's assessment and advise on the potential impacts of longwall mining during the extension period. The advice of Byrnes Geotechnical is provided in **Appendix C**.

Holt predicted vertical subsidence using standard empirical relationships between maximum subsidence and extraction thickness (referred to as S_{max}/T). Holt adopted an S_{max}/T ratio of 0.55, which was based on the Southern coalfield relationship and validated using subsidence monitoring data from the previous Wynn Seam longwall panels. Using this S_{max}/T ratio, maximum vertical subsidence was predicted to be 55% of the extraction thickness (see **Table 6**).

Holt calculated the total subsidence for the Wynn, Kayuga and Piercefield Seams by adding the predicted maximum values for the individual seams. This was the standard practice at the time of the assessment. A more recent study (Li et al, 2010) suggests that multi-seam subsidence may be greater than the sum of the subsidence values for the individual seams. In a multi-seam environment, the S_{max}/T ratio would be greater than 0.55 for the subsequent seams.

Table 6 presents the maximum vertical subsidence predicted by Byrnes Geotechnical based on the current understanding of multi-seam subsidence behaviour. Due to the higher S_{max}/T ratios for multi-seam mining, extraction of the coal seams overlying the Wynn seam may result in subsidence greater than the values predicted by Holt.

Table 6
Predicted Maximum Vertical Subsidence

Seam	Extraction Thickness (m)	Holt (2010) Predictions (m)	Contemporary Predictions (m)	
			Excluding Piercefield Seam	Including Piercefield Seam
Kayuga	4	2.2	3.0	3.4
Piercefield	4.5	2.48		3.38
Wynn	4	2.2	2.2	2.2
Total		6.88	5.2	8.98

As shown in **Table 6**, total subsidence would exceed the value predicted by Holt (2000) if all three coal seams were mined using longwall methods. However, given that the Piercefield Seam will not be mined under DA 231-7-2000 (without further approval), subsidence due to longwall mining of the Kayuga and Wynn Seams will be within the maximum value predicted by Holt (2000). Accordingly, the potential subsidence impacts during the extension period will be consistent with those currently authorised by the development consent.

3.4.2 Baseline Conditions

IPC's Contention

> *(ii) it did not take into account the effect of the period where the Dartbrook mine was in care and maintenance and so was not impacting baseline environmental conditions to the level that might have occurred had the mine been fully operational over this period; and*

Response

Due to Dartbrook Mine being placed into care and maintenance, mining activities have not progressed as anticipated in the EIS. The EIS assessed mining of the Kayuga/Mt Arthur Seam for 12 years followed by mining of the underlying Piercefield Seam. Under the current circumstances, mining of the Kayuga/Mt Arthur Seam cannot be completed within the duration of DA 231-7-2000 (even with the proposed Extension Period). As such, mining of the Piercefield Seam is not proposed to be undertaken pursuant to DA 231-7-2000 (without further approval) (see **Section 1.3**).

Having regard to current circumstances, mining operations will be limited to two coal seams instead of three. The result is that overall subsidence will be less than originally assessed in the EIS.

3.4.3 Strategic Agricultural Land

IPC's Contention

> *(iii) it did not take into account the substantial changes in the surrounding area since the Approval, in particular the impact on biophysical strategic agricultural land and Equine Critical Industry Cluster land.*

Response

There is mapped BSAL located near but not within the Approved Kayuga Seam Mining Area. The approved longwall mining activities in the Kayuga Seam will not result in any subsidence impacts on the mapped BSAL located to the east.

An area of mapped ECIC is located within the south-western extent of the Approved Kayuga Seam Mining Area. The area is not used for any equine purpose. At this location, the minimum depth to the Kayuga Seam is approximately 170 m. Mining of the Kayuga Seam directly beneath this area of ECIC may result in deformations of ground surface (such as cracking and formation of humps). Such deformations are able to be remediated and will be managed in accordance with the Extraction Plan that will be prepared in accordance with the conditions imposed on DA 231-7-2000.

Recommended Conditions of Consent

Condition 3.3 of the Draft Consolidated Consent requires the preparation of an Extraction Plan prior to commencement of secondary extraction. The Extraction Plan will include a subsidence monitoring program and contingency plan that outline the procedures for identification and remediation of subsidence impacts to natural features (including strategic agricultural land).

3.5 GROUNDWATER

IPC's Contention

The impacts on groundwater seepage and drawdown resulting from a five year extension of mining operations under the Approval have not been appropriately considered or assessed.

Particulars

(a) The GIA prepared for the Applicant in support of Mod 7 did not adequately assess the full groundwater impacts of the proposed extension of the Approval as it:

(i) Only considered the impact of the bord and pillar methods; and

(ii) Did not assess the impacts on groundwater seepage and drawdown should longwall mining operations recommence.

Response

Bord and pillar mining will result in less impact than longwall mining of an equivalent area. This is because bord and pillar mining results in a lower rate of extraction and does not induce significant subsidence (which enhances drainage of groundwater). As such, the worst-case impact of the Modification is represented by the longwall mining case. Any mine plan that partly or entirely uses bord and pillar mining methods will result in less impact than this worst case.

The Modification does not seek to alter any aspects of the approved longwall mining. The potential groundwater impacts of the approved longwall mining were assessed by Mackie Environmental Research (MER, 2000) using a numerical groundwater model. A review of the MER (2000) assessment was conducted by Australasian Groundwater and Environmental Consultants (AGE) to advise whether the predictions of the model are likely to remain plausible. AGE's report is provided in **Appendix D**.

AGE notes that the MER (2000) assessment pre-dates the introduction of groundwater modelling guidelines. Advancements in computer technology have also facilitated the development of more detailed groundwater models. Due to changes in modelling technology and practices, the MER's model would differ from a contemporary groundwater model in certain respects (as discussed in Section 4 of **Appendix D**). Notwithstanding these differences, groundwater monitoring data indicate that MER's overall conclusions based on numerical modelling continue to remain valid.

MER predicted that mine inflow will increase to 1.6 ML/day upon completion of the Kayuga Seam longwall panels. This rate includes inflows to the completed Wynn Seam workings. The model assumed that all extracted areas remain drained throughout the mining duration. This assumption maximises the predicted inflow and drawdown and is therefore appropriately conservative. Due to a number of interacting factors including conservatism of the model, calibration of the model using inflow observations, and not mining the Piercefield Seam (without further approval), mine inflow is expected to remain within the rates predicted by MER.

MER predicted that "*bores and wells in the alluvial lands will be unaffected by depressurisation in the coal measures*". The rate of downward leakage from the alluvium to the Permian was predicted to be 0.1 ML/day, which is significantly less than the rate of rainfall recharge. The Dartbrook groundwater monitoring network includes four bores monitoring the Hunter River alluvium and three bores monitoring the Dart Brook alluvium. These alluvial monitoring bores have not recorded any detectable decline in water levels due to past longwall mining. Changes in water levels at these bores are closely correlated with climatic conditions.

MER predicted that the Permian strata overlying the mine workings will become depressurised (but not completely drained). There are three bores monitoring the overburden strata near the completed Kayuga Seam longwall panels. All three bores recorded declines in water levels during previous mining operations. Water levels have since stabilised in bores CAS4 and TLON1, whereas the water level in bore CAS2 has continued to decline even during care and maintenance. These monitoring results are generally consistent with MER's predictions regarding depressurisation of the overburden.

The trends observed in long-term monitoring data support the conclusions of MER's assessment. Even though modelling practice has changed since this assessment, the model predictions are still likely to be a good indication of the potential impacts of the approved longwall mining.

The MER model included 16 years of mining in the Kayuga Seam followed by 3 years of mining in the Piercefield Seam. Due to the extended period of care and maintenance, the actual footprint of mining will be less than that modelled by MER. In particular, the Piercefield Seam will not be mined during the extension period (without further approval). The Piercefield Seam subcrops beneath the alluvium of the Hunter River and Dart Brook. Not mining the Piercefield Seam will avoid the creation of a new hydraulic connection between the alluvium and the mine workings. Due to the smaller footprint of mining, particularly avoidance of the Piercefield Seam, it is unlikely that longwall mining during the extension period will result in impacts greater than the predictions of the MER model.

<u>Recommended Conditions of Consent</u>

Condition 4.1 of the Draft Consolidated Consent requires the preparation of a Site Water Management Plan (SWMP). The SWMP will include a groundwater monitoring program to

identify impacts to aquifers and other water users, and a contingency plan to address any impacts that are greater than the model predictions.

3.6 SOCIAL

3.6.1 Changes in the Local Area

IPC's Contention

(a) The Social Impact Assessment prepared for the Applicant in support of Mod 7 did not adequately assess the social impacts of Mod 7 as:

(i) it did not take into account the changes in the areas surrounding the Project site (particularly, growth in residential use, tourism and agriculture, especially the equine industry) since mining activities were approved at Dartbrook under the Approval;

Response

Hansen Bailey has conducted a review of available data to identify changes in the local area since the grant of DA 231-7-2000 in 2001.

Trends in population growth (and therefore residential land use) were determined primarily using data from the Australian Bureau of Statistics (ABS). The following trends were identified:

- The population of the Muswellbrook Local Government Area (LGA) increased by 8.5% (1,278 persons) from 2001 to 2019;
- The population of the Upper Hunter LGA increased by 5.5% (750 persons) from 2001 to 2019. However, within this period, the population declined by 2.3% (334 persons) from 2013 to 2019; and
- In the township of Aberdeen, the population increased by 10.9% (186 persons) and the number of dwellings increased by 164 between 2001 and 2016.

The population growth in the Muswellbrook and Upper Hunter LGAs is much slower than the state average (23.7% between 2001 and 2019).

The agriculture industry is the fourth largest employer in the Muswellbrook LGA. From 2006 to 2016, employment in this industry increased by 18% (72 persons). In contrast, employment in the agriculture industry declined by 6% (78 persons) in the Upper Hunter LGA during this period. Notwithstanding, agriculture remains the largest employer in the Upper Hunter LGA.

The equine industry (referred to in ABS data as 'horse farming') is a subcategory of the agricultural industry. From 2006 to 2016, employment in the equine industry decreased by 2.5% (5 persons) in the Muswellbrook LGA and increased by 5.9% (21 persons) in the Upper Hunter LGA. It should be noted that the ABS' horse farming subcategory does not necessarily include employment associated with specialist horse services such as training, racing, medicine and research.

The tourism industry currently employs approximately 364 persons (3.6% of total employment) in the Muswellbrook LGA, and 310 jobs (5.9% of total employment) in the Upper Hunter LGA. The tourism sector is comprised of a variety of sub-sectors including retail trade, food & accommodation services and arts & recreation services. From 2011 to 2016, employment in these sub-sectors declined in both LGAs, with the exception of arts & recreation services in the Upper Hunter LGA (which increased by 4.2%).

There have been no significant changes in the land zoning within and surrounding Dartbrook Mine since the grant of DA 231-7-2000. The dominant land uses within 2 km of Dartbrook Mine are grazing, dairy farming, horse breeding, mining and residential development. The following trends in land use have been identified:

- Grazing and dairying operations near Dartbrook Mine have not changed significantly since 2001;
- A residential subdivision in south-eastern Aberdeen was approved in 2011. Residential development in Aberdeen has occurred at a rate of 10-12 dwellings per year;
- The number of thoroughbred horse studs in the Upper Hunter region increased from approximately 77 establishments in 2006 to 86 establishments in 2011;
- The most significant change in land use near Dartbrook Mine is the commencement of the Mount Pleasant Mine; and
- Coal mining remains the largest employer in the Muswellbrook LGA.

The available data indicates that the residential, agricultural and tourism land uses in the vicinity of Dartbrook Mine have not changed significantly since the grant of DA 231-7-2000.

The aforementioned data is analysed in detail in Section 2 of **Appendix E**.

3.6.2 Strategic Agricultural Land

IPC's Contention

> *(ii) the social impact on the Equine Critical Industry Cluster (ECIC) was not considered, given that areas of ECIC land overlap the mining lease, and the proximity of the mine to thoroughbred industry enterprises;*

Response

ECIC mapping for the Upper Hunter region was released after the grant of DA 231-7-2000 and during the period of care and maintenance at Dartbrook Mine. There is approximately 286 ha of land within the Mining Authorities Boundary that is mapped as ECIC. Of this area, approximately 154 ha (forming one contiguous property) is located above the Approved Kayuga Seam Mining Area. Only the property overlying the approved longwall mining activities may be affected by subsidence. The potential subsidence impacts on this area of ECIC are discussed in **Section 3.4.3**. Given that subsidence impacts on the land surface are able to be remediated, the values that supported the land's designation at ECIC will not be affected.

The property designated as ECIC has not been used for equine purposes at least since the introduction of the ECIC mapping. As such, mining beneath the property will not displace any equine activities. In any event, this property represents a negligible proportion of the mapped ECIC in the Upper Hunter region (254,900 ha) and subsidence impacts on this property will affect neither the future use of this land nor the sustainability of the regional equine industry.

3.6.3 Five Year Extension

IPC's Contention

(iii) no assessment has been conducted on the social and economic impact of Mod 7 in its entirety for the further five year period until 2027, as the social impacts of the Project were assessed against the mine in care and maintenance mode, or against the mine during longwall operation;

Response

The Modification does not involve any increase to the approved operational workforce, coal production rate or mining footprint. As such, the social impacts of further mining operations will be no different to those approved under DA 231-7-2000. However, due to the proposed extension period, these social impacts will occur over a longer timeframe.

A risk assessment was undertaken to evaluate the material social impacts (positive and negative) of the extension period. This risk assessment was based on the air quality and acoustics assessments discussed in **Section 3.1** and **Section 3.2**, respectively. The findings of the risk assessment are presented in Section 4 of **Appendix E** and summarised in **Table 7**.

Table 7
Risk Assessment of Extension Period

Impact Mechanism	Nature of Impact	Residual Risk
Continuation of employment and business opportunities	Positive	Significant
Change to character and identity of the local area	Negative	Low
Access to public services and infrastructure	Negative	Low
Health and wellbeing of employees and their families	Positive	Significant
Community investment	Positive	Significant
Prolonged dust and noise emissions (impacts on near neighbours)	Negative	Moderate – High*
Prolonged dust and noise emissions (impacts on the equine industry)	Negative	Low
Impact on future use of ECIC land for equine purposes	Negative	Low
Impact on water security for agricultural purposes	Negative	Low
Impact on property values	Negative	Moderate
Displacement of agricultural land uses (including equine) due to subsidence impacts on land	Negative	Low
Impact on the tourism values of the local area	Negative	Low

** Risk for rural residential properties near the East Site is assessed as high. For all other receptors (including those in Aberdeen), the risk is moderate.*

3.6.4 Social Impact of GHG Emissions

IPC's Contention

(iv) the information provided regarding the appropriateness of the methodology for estimating the social and economic costs of the projected GHG emissions is unsatisfactory as contended at [38] and [39] above.

Response

The GHG emissions associated with full operations during the Extension Period are presented in **Table 5**. The economic costs of these emissions are discussed in **Section 3.7.2**.

3.6.5 Visual Impact

IPC's Contention

Further, Mod 7 will have a negative visual impact on the surrounding area, as the intensity of truck movements on the haul road will detract from the visual amenity of the area.

Response

Truck haulage of ROM coal is no longer proposed to be undertaken.

3.7 ECONOMICS

3.7.1 Economic Assumptions

IPC's Contention

The economic impacts resulting from a five year extension of mining operations under the Approval have not been appropriately considered or assessed.

Particulars

(a) The cost benefit analysis prepared for the Applicant in support of Mod 7 was inadequate as:

(i) the costs associated with the reopening and operation of the coal washery over the proposed five year extension period were not adequately accounted for;

(ii) there are uncertainties, having regard to concerns raised by UHSC and members of the public in submissions, as to the viability of the assumptions relied on by the Applicant as to coal quality and price, production issues and profitability; and

Response

Gillespie Economics has been commissioned to conduct an economic assessment of longwall mining during the extension period (provided in **Appendix F**). This supplements the economic assessment of the bord and pillar mining option that was included in the EA.

In accordance with the '*Guideline for the economic assessment of mining and coal seam gas proposals'* (NSW Government, 2015), the economic assessment includes a cost benefit analysis (CBA) and local effects analysis (LEA).

The CBA considered two base cases:

- The 'economic base case' assumes that Dartbrook Mine will remain under care and maintenance until December 2022, after which it will be decommissioned; and
- The 'legal base case' assumes that the approved mining operations will continue until December 2022, after which the mine will be decommissioned. This case has been assessed to isolate the impact of the proposed five-year extension.

Relative to the economic base case, the incremental impact of the Modification is the full production schedule outlined in **Table 1**. This scenario includes all capital expenditure required to refurbish the operational infrastructure, including the Hunter Tunnel and CHPP.

Relative to the legal base case, the incremental impact is the production schedule for years 2023-2027 (inclusive).

The coal price assumptions in the CBA were based on KPMG (2020) forecasts for Newcastle Thermal Coal. Exchange rates (AUD to USD) were also adopted from KPMG (2020) forecasts.

The predicted net production benefits to Australia and NSW are outlined in **Table 8**. These benefits are expressed in present value terms (assuming a discount rate of 7%). The net production benefits are similar for the two base cases.

Table 8
Predicted Net Production Benefits

Net Production Benefits ($M)	Economic Base Case		Legal Base Case	
	Australia	NSW	Australia	NSW
Royalties to Government	129	129	97	97
Company Tax	120	38	139	44
Residual Net Production Benefits	252	81	273	87
Total	***500***	***247***	***509***	***229***

The quantifiable externality costs of the Modification include the predicted groundwater, surface water and GHG impacts. The total cost of these environmental impacts has been estimated at $7M (present value).

The net social benefit is determined by subtracting the externality costs from the net production benefits. Accordingly, the net social benefit to NSW is estimated at $240M (present value) under the economic base case and $222M (present value) under the legal base case.

The Modification will also generate economic benefits to employees, suppliers and landholders. When these externality benefits are included, the net social benefit to NSW is estimated at $388M (present value) under the economic base case and $335M (present value) under the legal base case. The outcomes of the CBA are discussed in full in Section 2 of **Appendix F**.

The LEA predicts the following benefits to the local area:

- 196 jobs;
- Total income of $23M per annum; and
- Non-labour expenditure of $96M per annum.

It is assumed that 80% of the operational workforce (156 personnel) will be sourced from the local area. The LEA conservatively assumes full employment in the local area and as such, the 156 locally hired personnel are assumed to be diverted from other occupations. The net income generated by the Modification is difference in income between a mining job and a non-mining job. Of the total income of $23M per annum, the net increase is estimated at $5M per annum.

3.7.2 Cost of GHG Emissions

IPC's Contention

> *(iii) the net present value of the cost of GHG emission impacts from Mod 7 over the extended period of operation have not been considered as contended at [38] to [39] above.*

Response

The predicted GHG emissions for the Revised Modification are presented in **Table 5**.

The economic cost of GHG emissions is determined using shadow prices for CO_2-e. The average of the shadow prices used by the Australian Treasury, European Union and United States Environmental Protection Agency was adopted for this assessment. The adopted shadow price represents the global damage cost of GHG emissions. The global cost is apportioned to NSW based on its share of the global population. Using this methodology, the economic cost of the predicted Scope 1 & 2 emissions to NSW is $0.03M (present value), of which $0.02M (present value) is attributed to the Extension Period.

The economic cost to NSW of the Scope 3 emissions associated with the Revised Modification is $2.24M (present value), of which $1.75M (present value) is attributed to the Extension Period. Scope 3 emissions are generated by end users of the coal and are therefore not included in the CBA of the mining proposal.

For
HANSEN BAILEY

Andrew Wu
Senior Environmental Engineer

James Bailey
Director

4 ABBREVIATIONS

Term	Definition
ABS	Australian Bureau of Statistics
AQC	AQC Dartbrook Management Pty Limited
AQGGMP	Air Quality and Greenhouse Gas Management Plan
BSAL	Biophysical Strategic Agricultural Land
CBA	Cost Benefit Analysis
CHPP	Coal Handling and Preparation Plant
DA 231-7-2000	The current Development Consent for Dartbrook Mine
dB	Decibels
dBA	The peak sound pressure level, expressed as dB and scaled on the '*A-weighted*' scale
DP&E	NSW Department of Planning and Environment
EA	Environmental Assessment
EIS	Environmental Impact Statement
ECIC	Equine Critical Industry Cluster
EP&A Act	*Environmental Planning and Assessment Act 1979*
GHG	Greenhouse Gas
IPC	Independent Planning Commission
LEA	Local Effects Analysis
LEC	Land and Environment Court
LGA	Local Government Area
Mt	Million tonnes
Mtpa	Million tonnes per annum
NMP	Noise Management Plan
OEH	NSW Office of Environment and Heritage
REA	Reject emplacement area
ROM	Run of Mine
RTS	Response to Submissions
SWMP	Site Water Management Plan
t	Tonne
tph	Tonnes per hour
TSP	Total suspended particulates
VLAMP	Voluntary Land Acquisition and Mitigation Policy

5 REFERENCES

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- NSW Government (2018), *Voluntary Land Acquisition and Mitigation Policy*.

APPENDIX A
Air Quality Assessment

Dartbrook Mine Modification 7

Air Quality Assessment

21 July 2020

Project No.: 0559834

Document details	
Document title	Dartbrook Mine Modification 7
Document subtitle	Air Quality Assessment
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21 July 2020

Dartbrook Mine Modification 7

Air Quality Assessment

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Acronyms and Abbreviations

Name	Description
CHPP	Coal Handling and Preparation Plant
EA	Environmental Assessment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act
DPIE	(NSW) Department of Planning, Industry and Environment
NEPM	National Environment Protection Measures
NSW	New South Wales
NSW EPA	(NSW) Environment Protection Authority
PM	(airborne) particulate matter
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 µm
REA	Reject Emplacement Area
ROM	Run of mine
TSP	Total Suspended Particulate (matter)
Tpa	Tonnes per annum
$\mu g/m^3$	Micrograms per cubic metre
VLAMP	Environment Voluntary Land Acquisition and Mitigation Policy

1. INTRODUCTION

ERM has been engaged by Sparke Helmore Lawyers on behalf of Australian Pacific Coal Limited to undertake an air quality and greenhouse gas assessment for the proposed Dartbrook Mine Modification 7 under section 75W of the *Environmental Planning & Assessment Act 1979* (EP&A Act) to Dartbrook Mine's existing development consent DA 231-7-2000.

The assessment uses the computer-based dispersion model, CALPUFF, to predict ground-level dust concentrations for the Modification scenario. An emissions inventory was developed and modelled, and predictions of particulate matter were compared against regulatory air quality criteria. Predictions were made across a model domain and at sensitive receptors identified by Hansen Bailey (see Section 3).

The assessment is based on a conventional approach following the procedures outlined in the NSW Environment Protection Authority's (EPA) document titled "*Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*" (NSW EPA, 2016), hereafter referred to as the 'Approved Methods'.

2. MODIFICATION DESCRIPTION

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of NSW. AQC is a wholly owned subsidiary of Australian Pacific Coal Limited. Dartbrook Mine is managed in accordance with Development Consent DA 231-7-2000 granted under the Environmental Planning and Assessment Act 1979 (EP&A Act). DA 231-7-2000 allows for longwall mining operations to be carried out until 5 December 2022. However, Dartbrook Mine has been in care and maintenance since December 2006.

The Modification originally consisted of the following components:

- Bord and pillar mining activities within the Kayuga Seam (as an alternative to the approved longwall mining activities);
- An alternative method of delivering Run of mine (ROM) coal from the mine workings to the East Site (i.e. an alternative coal clearance system); and
- Extending the approval period under DA 231-7-2000 by 5 years (until 5 December 2027).

The Modification 7 Environmental Assessment (EA) assessed the extraction of 10 Mt of ROM coal via bord and pillar mining and the handling (but not washing) of this coal. These aspects of the Modification were approved by the IPC. The IPC refused the proposed 5-year extension arguing that the impacts of longwall mining during the extension period (2023-2027, inclusive) had not been assessed.

In light of the IPC's decision and AQC's ensuing consideration of its position, the scope of the Modification has been altered in the following respects:

- Extraction of up to 37.4 Mt of ROM coal using bord & pillar and/or longwall mining methods between 2021 and 2027 (inclusive). All mining will occur within the currently approved mining footprint and maximum production rate of 6 Mtpa;
- Delivery of ROM coal from the mine workings to the East Site using the Hunter Tunnel (i.e. truck haulage of coal is no longer proposed);
- Use of the existing Coal Handling and Preparation Plant (CHPP) at the East Site to wash all ROM coal extracted (including washing of coal extracted through bord & pillar mining);
- Disposal of rejects and tailings using the already approved methods; and
- No new surface infrastructure (i.e. the shaft facility adjacent to the Western Access Road is no longer proposed).

3. LOCAL SETTING

Dartbrook Mine is located approximately 10 km north-west of Muswellbrook and 4.5 km west of Aberdeen in the Hunter Valley of New South Wales (NSW) and lies within the Muswellbrook and Upper Hunter Local Government Areas (LGA).

Agriculture and coal mining are the predominant industries in the Hunter Valley. Agricultural activities comprise cropping, horse breeding, some viticulture and pastoral activities. There are a number of approved mining operations located in the vicinity of the Modification. Approved operations include Mount Pleasant, Bengalla, Muswellbrook Colliery, Mount Arthur Coal and Mangoola (see Figure 3-1). The West Muswellbrook Project is located immediately to the west. Section 5.2.6 provides further details of the approved mining operations located in the vicinity of the Modification and how they were considered within the air quality assessment.

Nearby sensitive receptors are shown in Figure 3-2 and a detailed list is provided in Table 3-1.

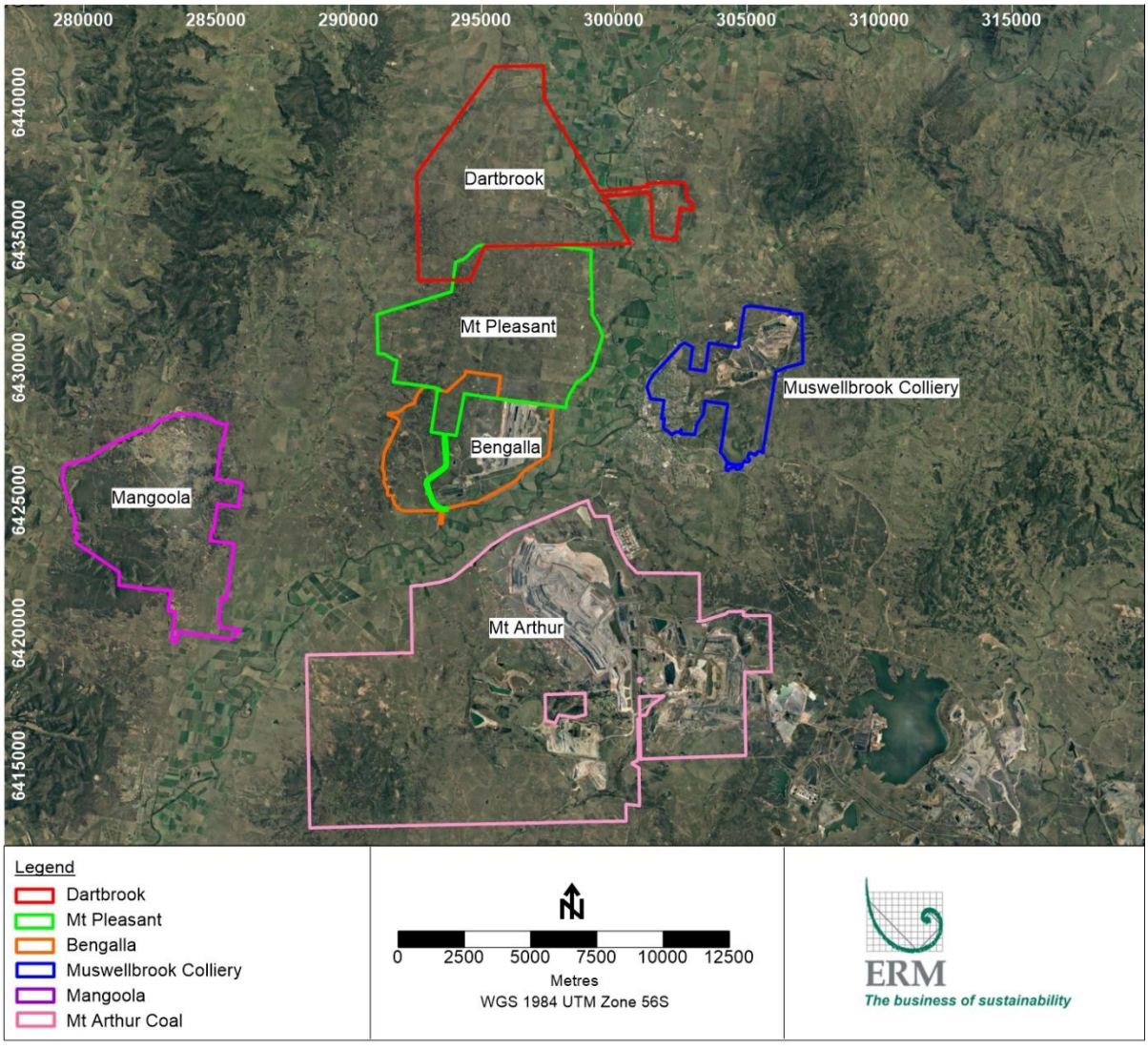


Figure 3-1: Modification location including local mines

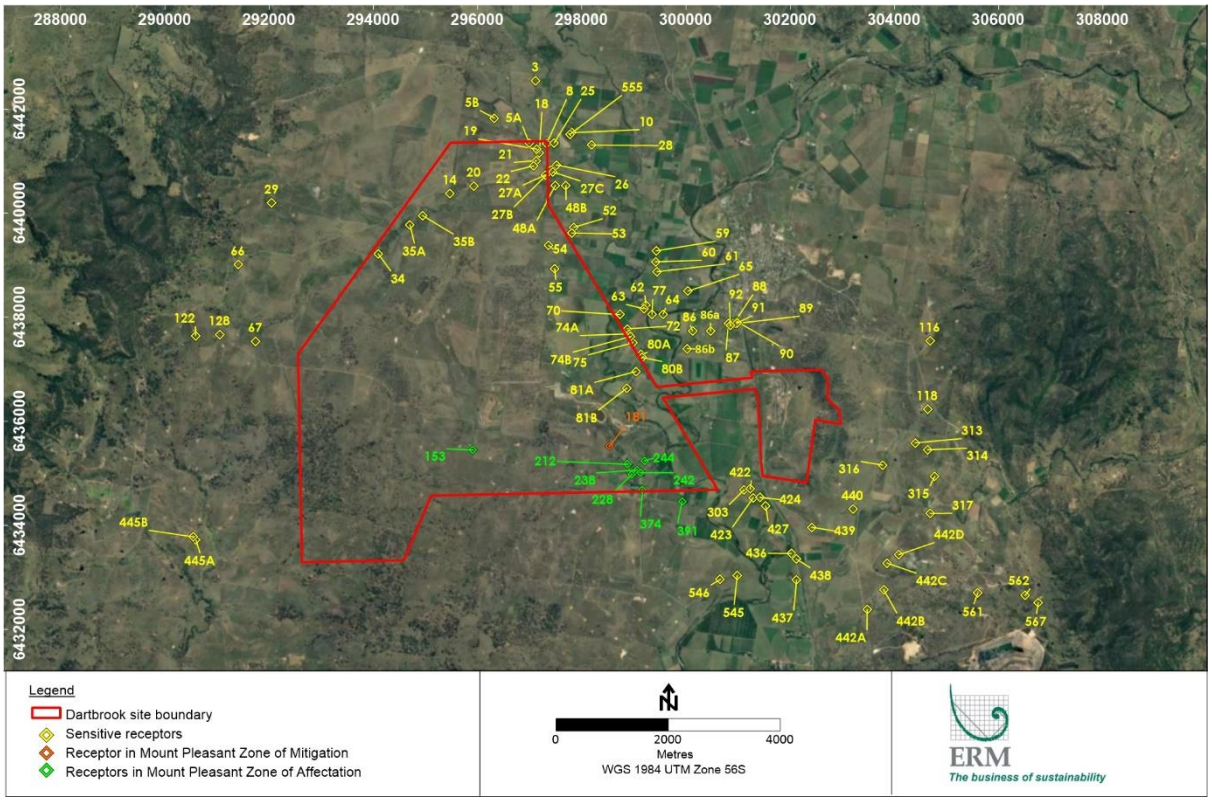


Figure 3-2: Site location and sensitive receptors

Figure 3-3 presents a pseudo three-dimensional representation of the local topography in the Modification area and across the model domain. The map also shows the locations of the meteorological stations as discussed further in Section 5.

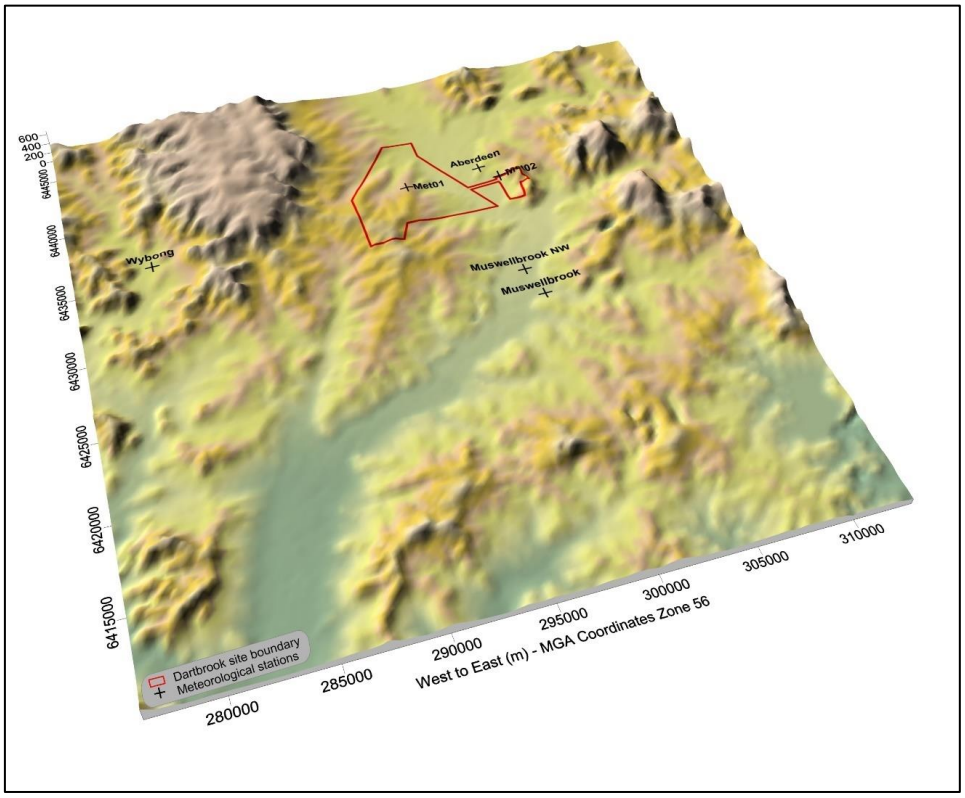


Figure 3-3: Pseudo 3-dimensional plot of the local topography

Table 3-1: Sensitive receptor locations

Receptor ID	x	y
3	297111	6442543
8	297323	6441329
10	297807	6441545
14	295469	6440374
18	297185	6441161
19	297135	6441228
20	295931	6440522
21	297122	6441006
22	297076	6440909
25	297471	6441351
26	297516	6440924
28	298195	6441307
29	292051	6440195
34	294092	6439218
52	297849	6439728
53	297807	6439618
54	297361	6439379
55	297480	6438933
59	299427	6439275
60	299415	6439064
61	299447	6438875
62	299231	6438238
63	299189	6438163
64	299558	6438059
65	300040	6438503
66	291406	6439011
67	291739	6437536
70	298731	6438049
72	298877	6437777
75	298987	6437512
77	299346	6438056
87	300811	6437878
88	300914	6437883
89	300955	6437878
90	300985	6437912
91	300987	6437891
92	300851	6437842
116	304681	6437541
118	304634	6436229
122	290589	6437645
128	291049	6437670
303	301113	6434680
313	304395	6435586
314	304638	6435454
315	304773	6434943
316	303772	6435158
317	304691	6434230
422	301234	6434700

Receptor ID	x	y
423	301289	6434533
424	301419	6434537
427	301529	6434372
436	302020	6433460
437	302121	6432952
438	302120	6433352
439	302411	6433965
440	303203	6434310
545	300981	6433036
546	300655	6432960
555	297774	6441515
561	305599	6432700
562	306504	6432653
567	306757	6432513
27A	297305	6440735
27B	297412	6440821
27C	297447	6440787
35A	294702	6439776
35B	294941	6439955
442A	303475	6432381
442B	303792	6432764
442C	303858	6433275
442D	304086	6433439
445A	290594	6433724
445B	290544	6433780
48A	297488	6440530
48B	297698	6440527
5A	296990	6441346
5B	296323	6441826
74A	298907	6437682
74B	298929	6437626
80A	299137	6437286
80B	299156	6437228
81A	299039	6436957
81B	298866	6436639
86	300126	6437730
181	298536	6435522
212	298881	6435173
228	298964	6434981
238	299063	6435063
242	299128	6435012
244	299210	6435242
374	299164	6434676
391	299924	6434460
153	295900	6435448
86a	300470	6437740
86b	300028	6437398

4. LEGISLATIVE SETTING AND AIR QUALITY CRITERIA

4.1 Introduction

Mining activities proposed by the Modification (described in Section 2) have the potential to generate fugitive dust emissions in the form of particulate matter described as total suspended particulate matter (TSP), particulate matter with an equivalent aerodynamic diameter of 10 micrometres (µm) or less (PM_{10}), particulate matter with an equivalent aerodynamic diameter of 2.5 micrometres (µm) or less ($PM_{2.5}$) and deposited dust. In addition, combustion engines of generators and vehicles release emissions through engine exhausts including carbon monoxide (CO), minor quantities of sulphur dioxide (SO_2) and nitrogen dioxide (NO_2). Diesel combustion also results in the emission of fine particulate matter and fumes from blasting will result in emissions of oxides of nitrogen.

The following sections provide information on the relevant government requirement guidelines and air quality criteria used to assess the impact of pollutant emissions. Some background discussion has been provided to assist in interpreting the predicted pollutant levels.

4.2 Air quality issues and effects

From an air quality perspective, it is important to consider the potential emissions that would occur during the operation of the Modification.

The focus of this assessment is particulate matter – TSP, PM_{10}, $PM_{2.5}$ and deposited dust.

4.2.1 Particulate matter

Particulate matter has the capacity to affect health and to cause nuisance effects, and is categorised by size and/or by chemical composition. The potential for harmful effects depends on both. The particulate size ranges are commonly described as:

- Total Suspended Particulates (TSP) – refers to all suspended particles in the air. In practice, the upper size range is typically 30 µm.
- PM_{10} – refers to all particles with equivalent aerodynamic diameters of less than 10 µm, that is, all particles that behave aerodynamically in the same way as spherical particles with diameters less than 10 µm and with a unit density. PM_{10} are a sub-component of TSP.
- $PM_{2.5}$ – refers to all particles with equivalent aerodynamic diameters of less than 2.5 µm diameter (a subset of PM_{10}). These are often referred to as the fine particles and are a sub-component of PM_{10}.
- $PM_{2.5-10}$ – defined as the difference between PM_{10} and $PM_{2.5}$ mass concentrations. These are often referred to as coarse particles.

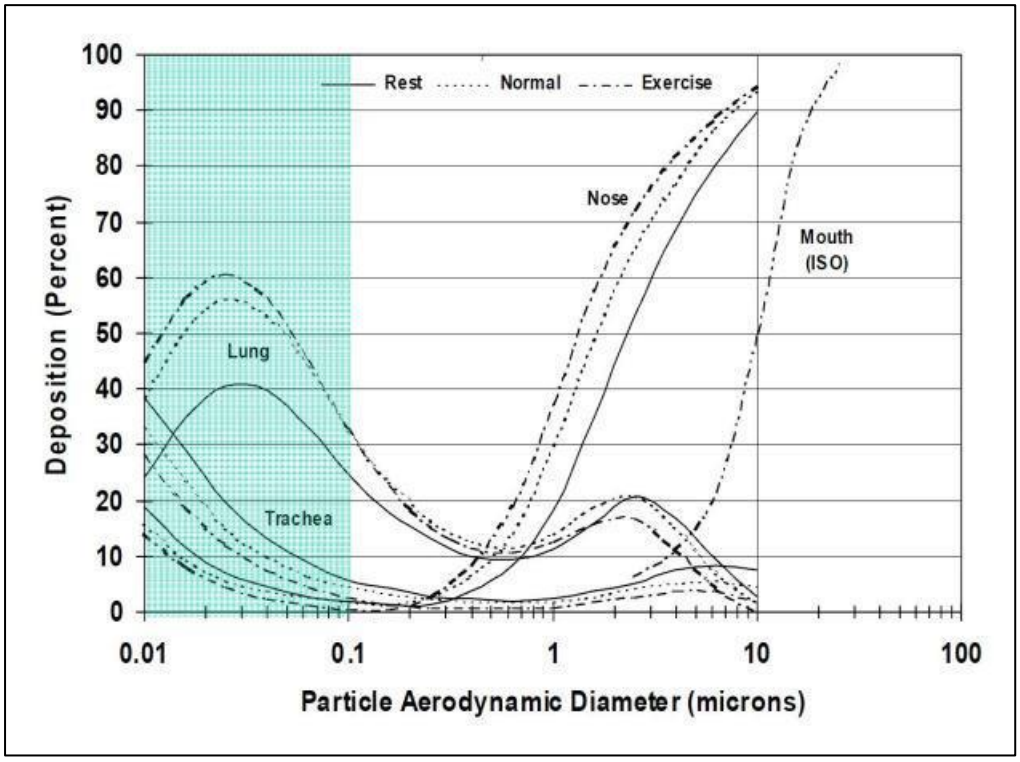
Evidence suggests that health effects from exposure to airborne particulate matter are predominantly related to the respiratory and cardiovascular systems (WHO, 2011). The human respiratory system has in-built defensive systems that prevent larger particles from reaching the more sensitive parts of the respiratory system. Particles larger than 10 µm, while not able to affect health, can soil materials and generally degrade aesthetic elements of the environment. For this reason, air quality goals make reference to measures of the total mass of all particles suspended in the air, referred to as TSP. In practice particles larger than 30 to 50 µm settle out of the atmosphere too quickly to be regarded as air pollutants. The upper size range for TSP is usually taken to be 30 µm.

Both natural and anthropogenic processes contribute to the atmospheric load of particulate matter. Coarse particles ($PM_{2.5-10}$) are derived primarily from mechanical processes resulting in the suspension of dust, soil, or other crustal materials from roads, farming, mining and dust storms.

Fine particles or $PM_{2.5}$ are derived primarily from combustion processes, such as vehicle emissions, wood burning and natural processes such as bush fires. Fine particles also consist of transformation products, including sulphate and nitrate particles, and secondary organic aerosol from volatile organic

compound emissions. $PM_{2.5}$ may penetrate beyond the larynx and into the thoracic respiratory tract and evidence suggests that particles in this size range are more harmful than the coarser component of PM_{10}.

The size of particles determine their behaviour in the respiratory system, including how far the particles are able to penetrate, where they deposit, and how effective the body's clearance mechanisms are in removing them. This is demonstrated in Figure 4-1, which shows the relative deposition by particle size within various regions of the respiratory tract. Additionally, particle size is an important parameter in determining the residence time and spatial distribution of particles in ambient air and is a key consideration in assessing exposure.



Source: Phalen et.al, 1991

Figure 4-1: Particle deposition within the respiratory tract

The health-based assessment criteria used by NSW EPA have, to a large extent, been developed by reference to epidemiological studies undertaken in urban areas with large populations where the primary pollutants are the products of combustion (National Environment Protection Council [NEPC], 1998a; NEPC, 1998b). This means that, in contrast to dust of crustal origin, the particulate matter from urban areas would be composed of smaller particles and would generally contain substances that are associated with combustion.

4.3 NSW EPA impact assessment criteria

The Approved Methods specify air quality impact assessment criteria relevant for assessing impacts from air pollution (NSW EPA, 2016). The impact assessment criteria for pollutants relevant to this assessment refer to the total pollutant load in the environment and impacts from new sources of these pollutants must be added to existing background levels for compliance assessment. In other words, consideration of background dust levels needs to be made when using the goals outlined in the Approved Methods to assess potential impacts.

These criteria are health-based (i.e. they are set at levels to protect against health effects) and for PM_{10} and $PM_{2.5}$ are consistent with Amended National Environment Protection Measure for Ambient Air Quality (Ambient Air-NEPM) (NEPC, 2016). In addition, the Approved Methods include other measures

of air quality, namely dust deposition and Total Suspended Particulates (TSP), which are not stated in the Ambient Air-NEPM.

Table 4-1 summarises the air quality criteria for concentrations of particulate matter that are relevant to this study. It is important to note that these criteria have been applied to the cumulative impacts due to the Modification and other sources.

Table 4-1: NSW EPA impact assessment criteria for particulate matter concentrations

Pollutant	Criteria	Averaging period
TSP	90 µg/m^3	Annual
PM_{10}	50 µg/m^3	24-Hour
	25 µg/m^3	Annual
$PM_{2.5}$	25 µg/m^3	24-Hour
	8 µg/m^3	Annual

Airborne dust also has the potential to cause nuisance dust effects by depositing on surfaces, including vegetation. Larger particles do not tend to remain suspended in the atmosphere for long periods of time and will fallout relatively close to source. Dust fallout can soil materials and generally degrade aesthetic elements of the environment, and are assessed for nuisance amenity impacts.

Table 4-2 shows the maximum acceptable increase in dust deposition over the existing dust levels from an amenity perspective. These criteria for dust fallout levels are set to protect against nuisance impacts.

Table 4-2: NSW EPA impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase (due to Modification)	Maximum total level
Deposited dust (insoluble solids)	Annual average	2 g/m^2/month	4 g/m^2/month

4.4 NSW Department of Planning, Industry and Environment Voluntary Land Acquisition and Mitigation Policy (VLAMP)

In December 2014, the NSW Department of Planning and Environment (now Department of Planning, Industry and Environment (DPIE)) released a policy relating to Mining, Petroleum Production and Extractive Industries and including the identification of voluntary mitigation and land acquisition criteria for air quality and noise (NSW Government, 2014). This is reflected in State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (the Mining SEPP) at Clause 12A.

The policy sets out voluntary mitigation and land acquisition rights where it is not possible to comply with the NSW EPA impact assessment criteria even with the implementation of all reasonable and feasible avoidance and/or mitigation measures.

The DPIE voluntary mitigation and acquisition criteria are summarised in Table 4-3 and Table 4-4, respectively. The Modification has been assessed against these criteria, in addition to the NSW EPA impact assessment criteria discussed in Section 4.3.

The VLAMP was revised by DPIE and reissued in September 2018.

Table 4-3: DPIE particulate matter mitigation criteria

Pollutant	Criterion	Averaging period	Application
$PM_{2.5}$	8 µg/m^3 25 µg/m^3	Annual-mean 24-hour average	Total impact * Incremental impact **
PM_{10}	30 µg/m^3 50 µg/m^3	Annual-mean 24-hour average	Total impact * Incremental impact **
TSP	90 µg/m^3	Annual-mean	Total impact
Deposited dust	2 g/m^2/month 4 g/m^2/month	Annual-mean Annual-mean	Incremental impact ** Total impact *

* Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources)

** Incremental impact (i.e. increase in concentrations due to the development alone), **with zero allowable exceedances of the criteria over the life of the development.**

Table 4-4: DPIE particulate matter acquisition criteria

Pollutant	Criterion	Averaging period	Application
$PM_{2.5}$	8 µg/m^3 25 µg/m^3	Annual-mean 24-hour average	Total impact * Incremental impact **
PM_{10}	30 µg/m^3 50 µg/m^3	Annual-mean 24-hour average	Total impact * Incremental impact **
TSP	90 µg/m^3	Annual-mean	Total impact
Deposited dust	2 g/m^2/month 4 g/m^2/month	Annual-mean Annual-mean	Incremental impact Total impact

* Cumulative impact (i.e. increase in concentrations due to the development plus background concentrations due to all other sources)

** Incremental impact (i.e. increase in concentrations due to the development alone), **with up to five allowable exceedances of the criteria over the life of the development.**

Voluntary acquisition rights apply where the Proposal contributes to exceedances of the acquisition criteria at any residence or workplace on privately-owned land, or, on more than 25% of any privately-owned land, and a dwelling could be built on that land under existing planning controls.

Total impact includes the impact of the Modification and all other sources, whilst incremental impact refers to the impact of the Modification considered in isolation. The incremental impact for the DPIE mitigation criteria also applies to areas where more than 25% of the land has been predicted to exceed.

At Clause 12AB(4), the Mining SEPP also sets a non-discretionary development standard of cumulative annual average PM_{10} concentration for private dwellings of 30 µg/m^3.

5. EXISTING ENVIRONMENT

In 2017, Pacific Environment (now ERM) prepared an air quality assessment for a pre-feasibility study into further mining at Dartbrook Mine (Pacific Environment, 2017). That assessment included a thorough five-year review of the local meteorological and background data for 2012 to 2016. The review found that the most representative year for the assessment was 2014. For more details of the five-year review, please see Pacific Environment, 2017.

In addition, the previous Dartbrook Underground Modification 7 air quality assessment was prepared using the 2014 meteorological and background data (ERM, 2018).

The following sections present the most recently available data for comparison with 2014.

5.1 Meteorology

5.1.1 Introduction

There are several meteorological stations located in the vicinity of the Modification. These include Department of Planning, Industry and Environment (DPIE) stations and two on-site meteorological stations. There is also a meteorological station located at the neighbouring Mount Pleasant Mine site.

The most recent data for the two on-site meteorological stations and Mount Pleasant Mine meteorological station are not considered in this review as these data were not available.

The closest Bureau of Meteorology (BoM) stations are Scone Airport AWS (061363), Merriwa (Roscommon) (061287) and Murrurundi Gap AWS (061392), all of which are a considerable distance (in excess of 22 km) from the Modification. As per the original pre-feasibility study, the meteorological data from these stations have been excluded from this review.

5.1.2 DPIE Stations

As shown on Figure 5-1, there are four DPIE stations located within 12 km of the Modification at Aberdeen, Muswellbrook, Muswellbrook NW and Wybong. For this review, the data was collected for 2015 to 2019 to compare with the 2014 data used in the pre-feasibility study and the previous Dartbrook Underground Modification 7 air quality assessment.

Table 5-1 presents a summary of the percentage completeness of data for each site for 2014 to 2019.

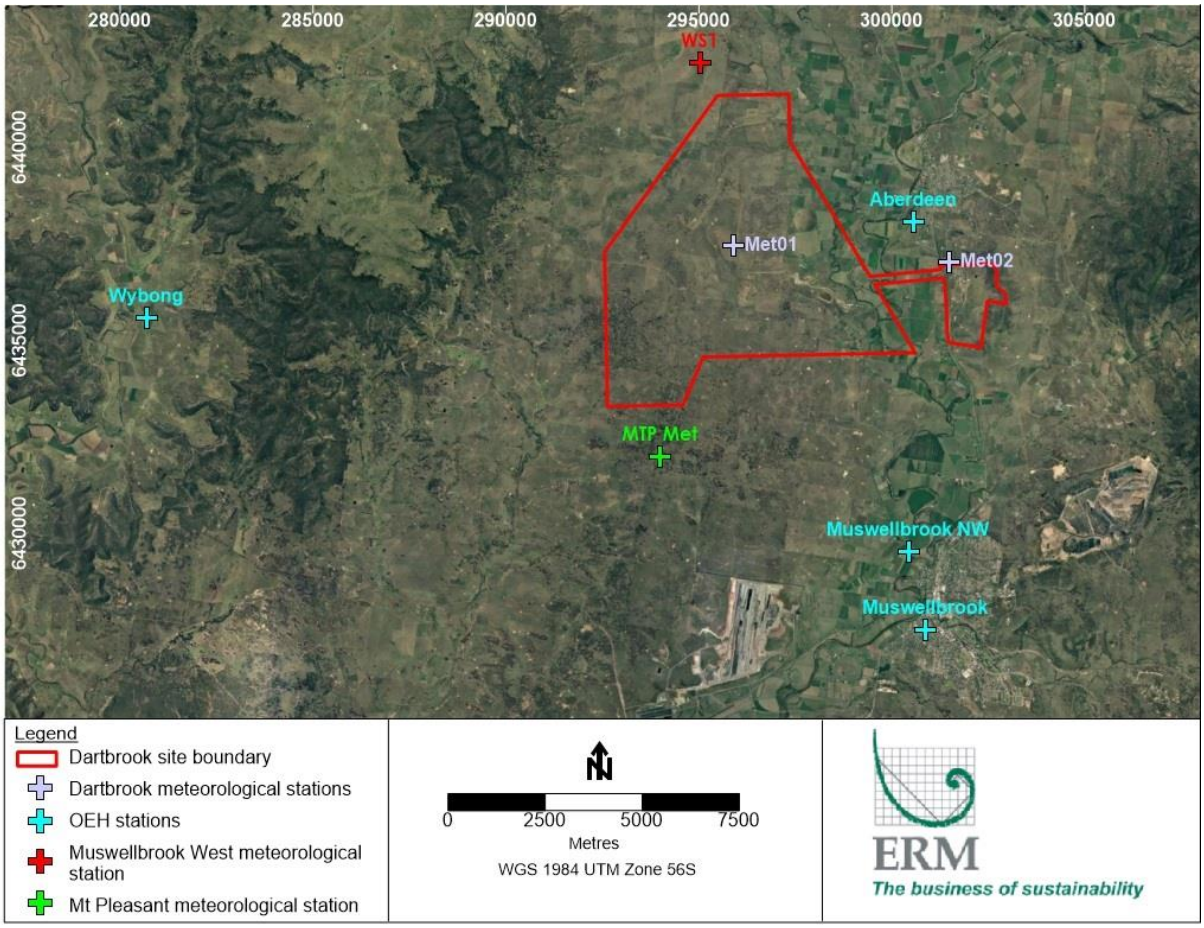


Figure 5-1: Location of DPIE and on-site meteorological stations

Table 5-1: Percentage completeness of meteorological data at each of the DPIE stations

Parameter	Year	DPIE Stations			
		Aberdeen	Muswellbrook	Muswellbrook NW	Wybong
Wind Speed	**2014**	**99.7**	**99.7**	**98.8**	**99.9**
	2015	99.6	99.7	99.2	99.3
	2016	97.2	97.3	98.3	99.5
	2017	99.7	99.8	98.8	99.8
	2018	99.8	98.6	98.6	99.9
	2019	99.8	99.2	99.7	99.8
Wind Direction	**2014**	**99.7**	**99.7**	**98.8**	**99.9**
	2015	99.6	99.7	99.2	99.3
	2016	97.2	97.3	98.3	99.5
	2017	99.7	99.8	98.8	99.8
	2018	99.8	98.6	98.6	99.9
	2019	99.8	99.2	99.7	99.8
Temperature	**2014**	**98.9**	**99.8**	**99.9**	**99.9**
	2015	99.9	99.8	99.9	99.7
	2016	99.3	97.6	99.9	99.9
	2017	99.1	99.9	100.0	99.9
	2018	98.9	98.1	99.0	99.0
	2019	98.7	98.4	98.7	98.7
Relative Humidity	**2014**	**98.9**	**99.8**	**99.9**	**99.9**
	2015	99.9	99.8	99.9	99.7
	2016	99.3	97.6	99.9	99.9
	2017	97.3	99.9	100.0	99.9
	2018	99.0	98.1	99.0	99.0
	2019	98.5	98.3	98.5	97.9

Annual wind roses for each of the DPIE stations from 2014 through to 2019 are provided in Figure 5-2 to Figure 5-5. For Muswellbrook and Aberdeen, the prevailing wind directions are from the north-north-west, south-south-east and/or the south. The Muswellbrook NW site shows a dominant wind from the north-east and also shows prevailing wind directions from the south-east. Wybong shows a dominant wind from the north-north-west and south-south-east.

For all stations the wind roses show consistency across all years presented and shows that the use of 2014 meteorological data is still appropriate.

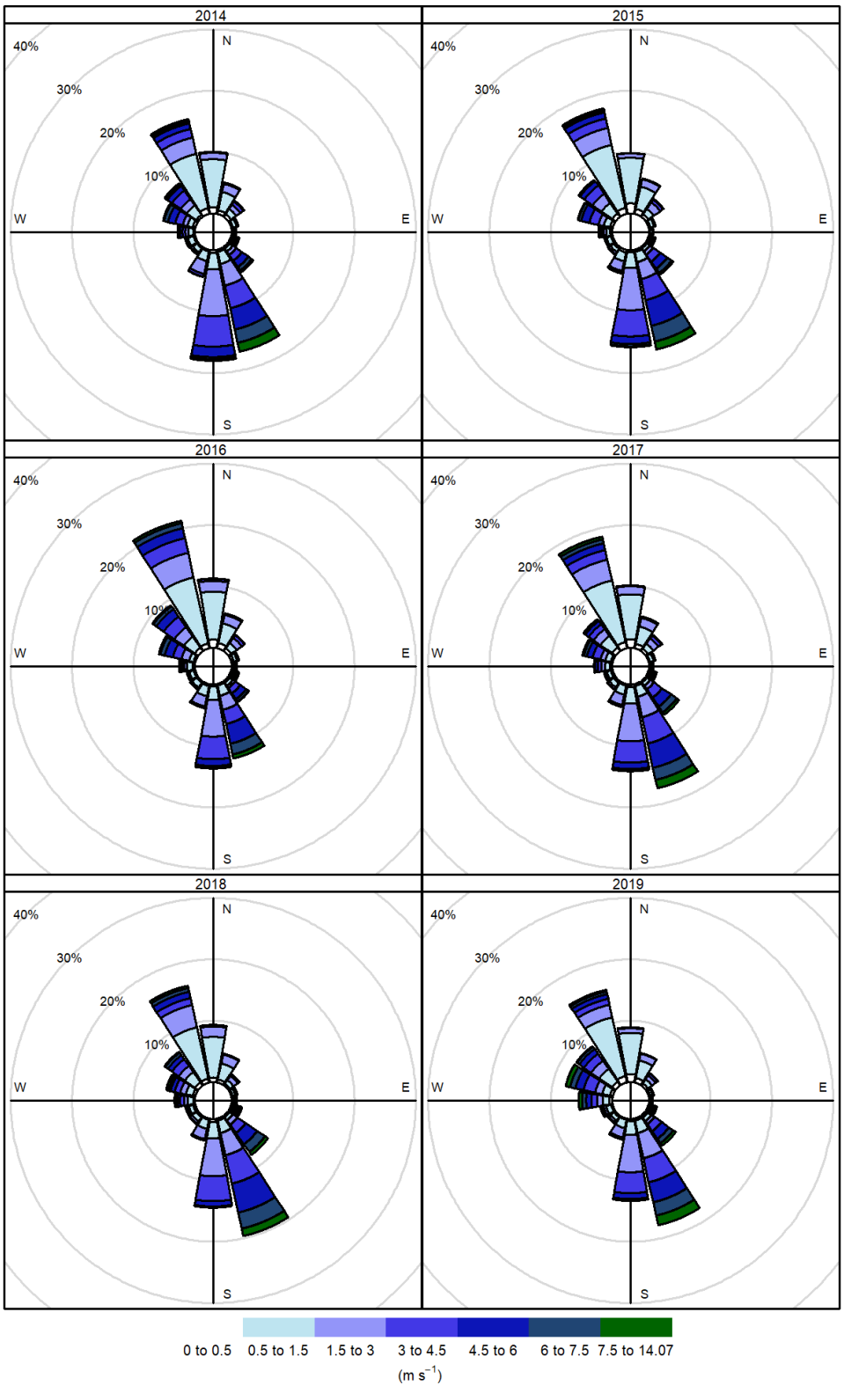


Figure 5-2: Annual wind roses for Aberdeen from 2014 to 2019

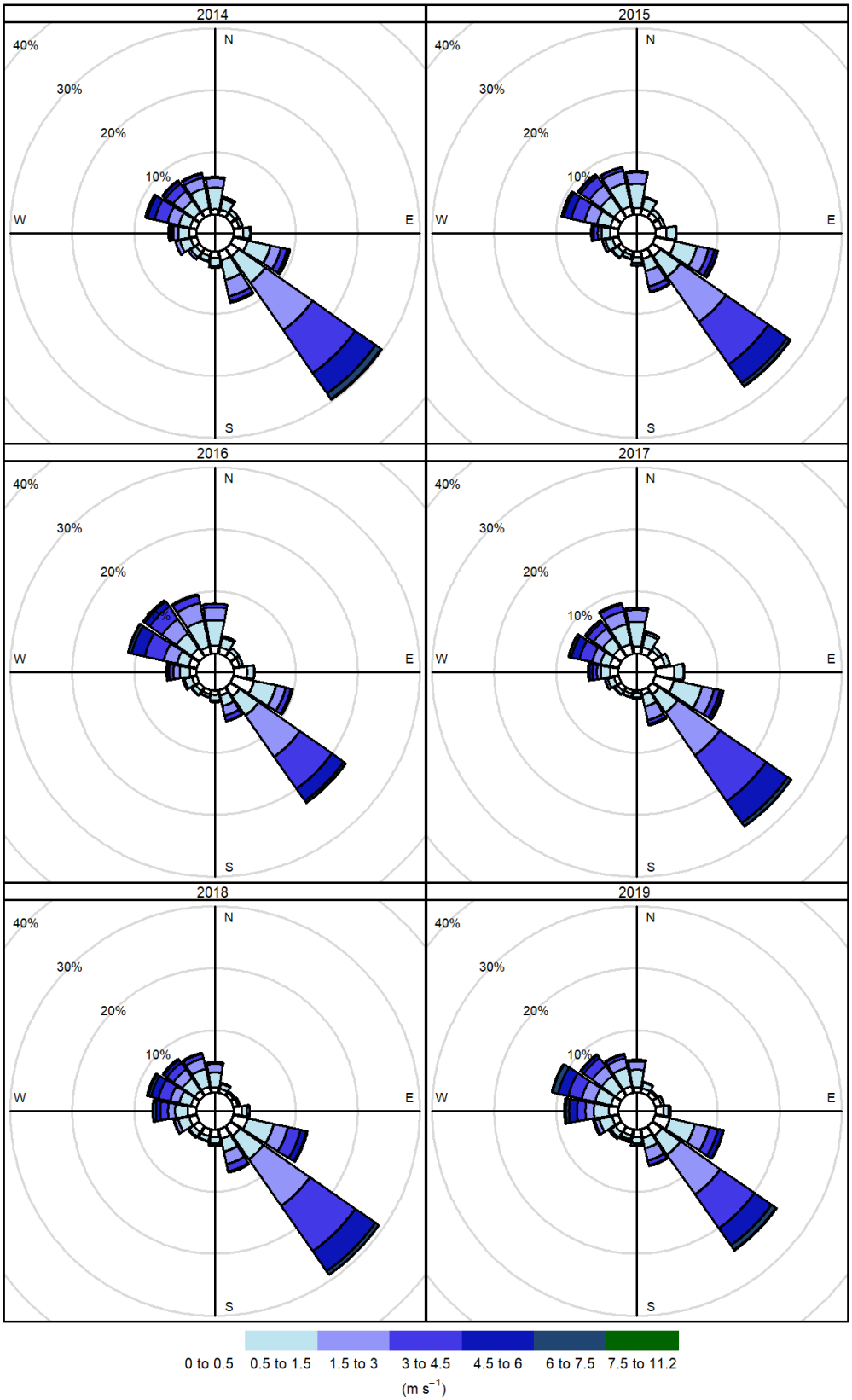


Figure 5-3: Annual wind roses for Muswellbrook from 2014 to 2019

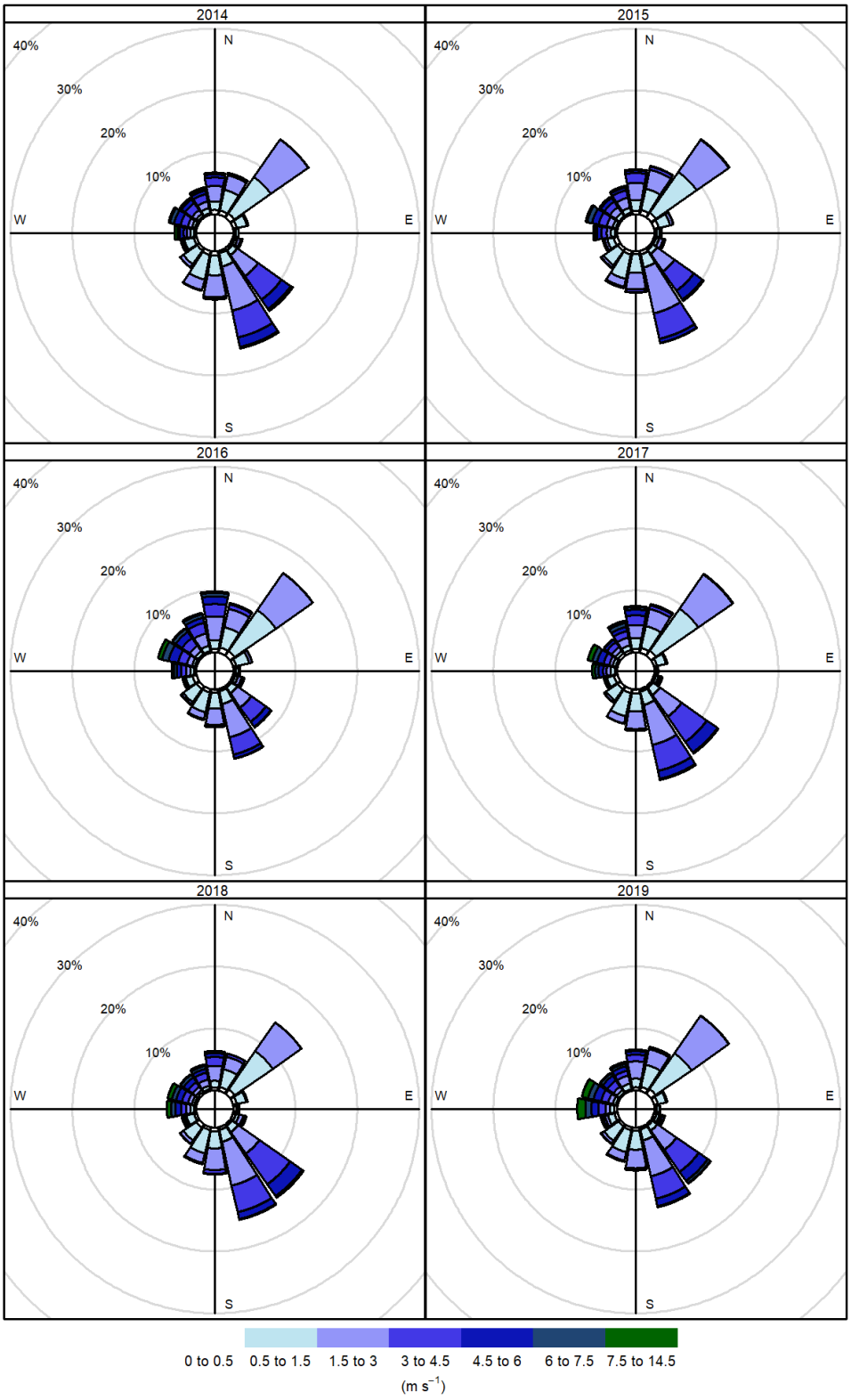


Figure 5-4: Annual wind roses for Muswellbrook NW from 2014 to 2019

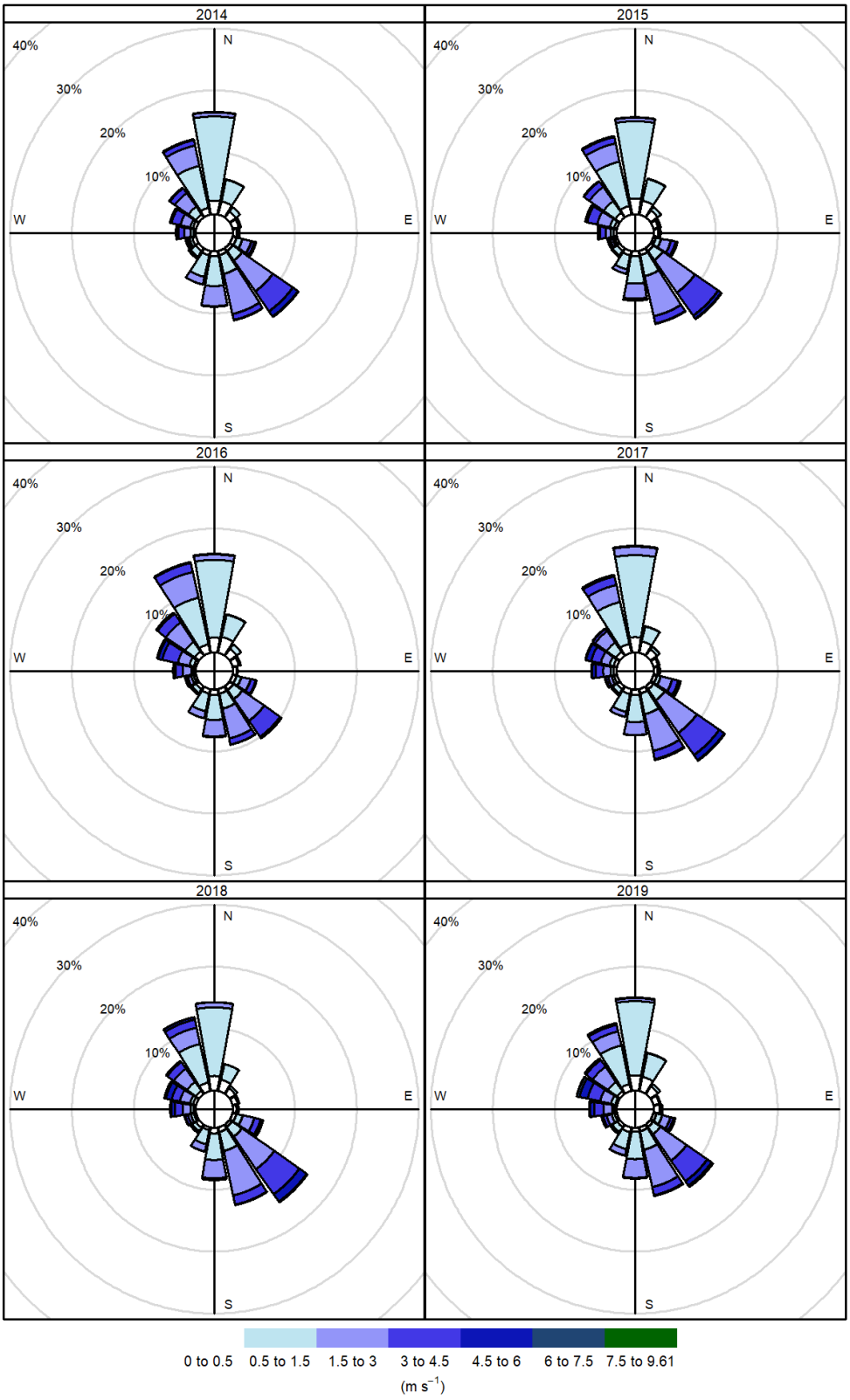


Figure 5-5: Annual wind roses for Wybong from 2014 to 2019

5.2 Existing air quality

5.2.1 Introduction

The four closest DPIE stations (Aberdeen, Muswellbrook, Muswellbrook NW and Wybong) record PM_{10} concentrations. DPIE Muswellbrook also records $PM_{2.5}$ concentrations.

The Dartbrook Mine operates a network of 17 dust deposition gauges, and five High Volume Air Samplers (HVAS) that measure PM_{10} concentrations every sixth day. Most recent data are not considered in this review as these data were not available. The locations of the DPIE stations are shown on Figure 5-6.

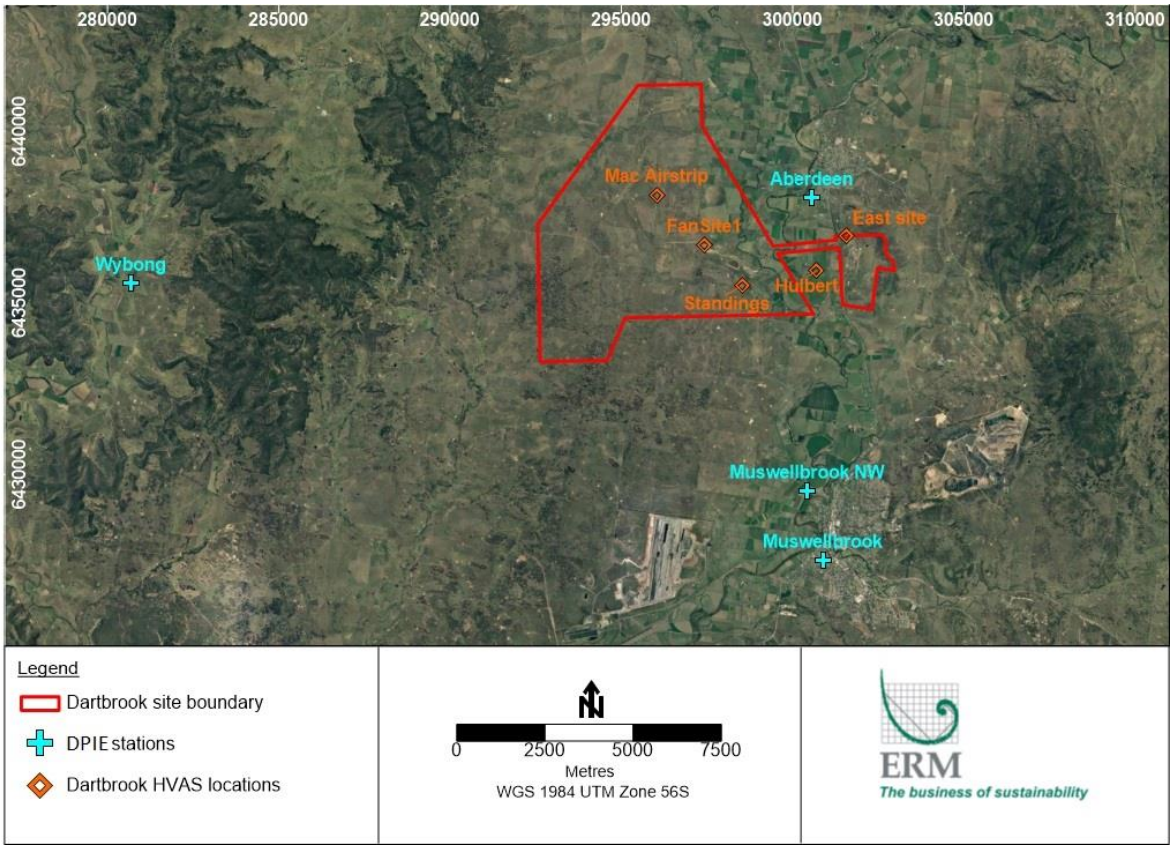


Figure 5-6: Location of DPIE stations and HVAS monitoring sites

5.2.2 TSP

No TSP concentration data are available in the vicinity of the Modification. Estimates of annual average TSP concentrations can be made from the PM_{10} measurements by assuming that 40% of the TSP is PM_{10}. This relationship was obtained from data collected by co-located TSP and PM_{10} monitors operated for long periods of time in the Hunter Valley (NSW Minerals Council, 2000).

In the absence of site specific data this provides an indicative estimate of the ambient TSP. Use of this relationship on the adopted PM_{10} annual average of 17.8 $\mu g/m^3$ (see Section 5.2.6), gives an existing annual average TSP concentration of approximately 44.5 $\mu g/m^3$.

5.2.3 Particulate Matter (PM_{10})

A summary of the annual average PM_{10} concentrations from 2014 to 2019 at the four DPIE stations is provided in Table 5-2. The period average (2014-2019) at all sites is driven up by the high concentrations recorded in 2019 due to extreme drought conditions and bush fire activity. When

considering a five-year average (2014-2018), the concentrations are reduced. The background PM_{10} concentrations determined for the previous assessment was 17.8 µg/m^3 for 2014 at Aberdeen. It can be seen that the five-year average (2014-2018) is very similar to the value at Aberdeen for 2014. On that basis the use of this value for the assessment is still considered appropriate.

Table 5-2: Annual average PM_{10} at DPIE stations from 2015 to 2019

Year	DPIE stations				Criteria
	Aberdeen	Muswellbrook	Muswellbrook NW	Wybong	
2014	17.8	21.3	19.1	16.8	25
2015	15.2	19.1	16.7	14.8	
2016	15.6	19.2	16.6	15.3	
2017	17.6	21.7	18.5	17.6	
2018	22.3	27.2	25.0	21.6	
2019	29.5	34.4	33.7	28.5	
Period average	19.7	23.8	21.6	19.1	
Average (excl. 2019)	17.7	21.7	19.2	17.2	

Figure 5-7 presents a graphical representation of the annual average concentrations at the DPIE stations from 2014 to 2019, along with the NSW EPA impact assessment criteria.

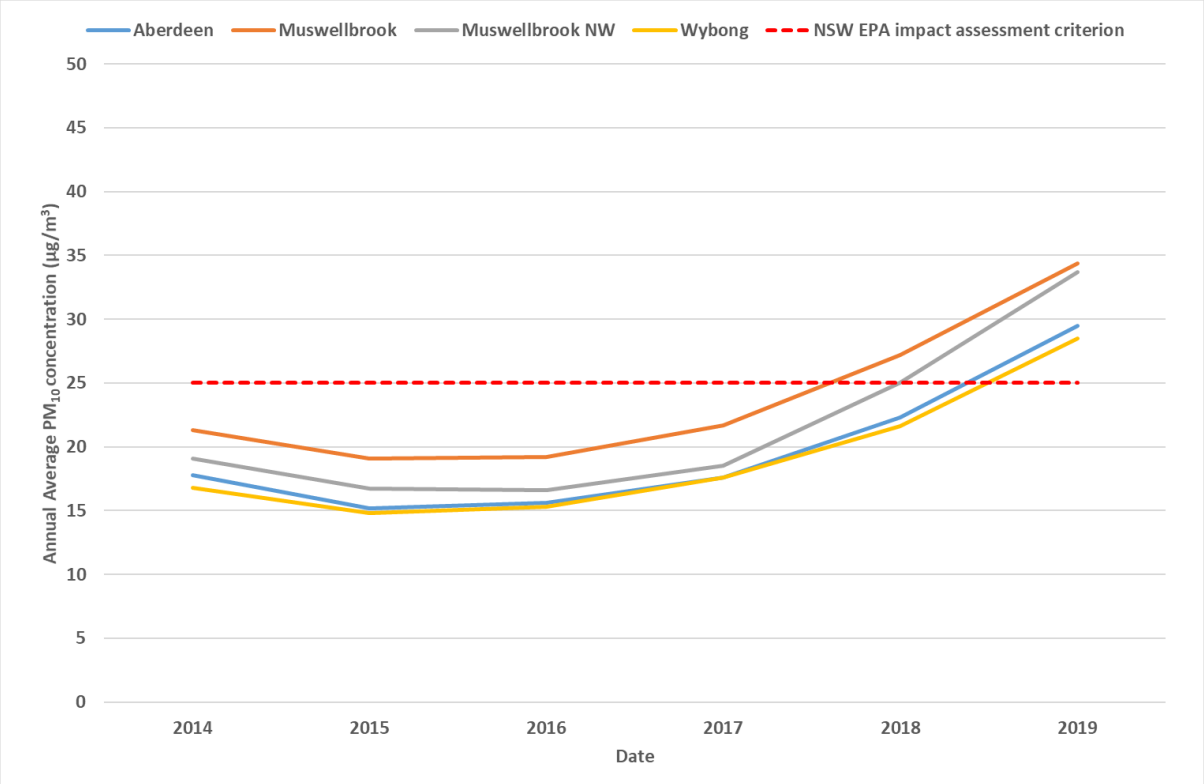


Figure 5-7: Annual average PM_{10} concentrations at the DPIE stations from 2014 to 2019

Figure 5-8 presents the 24-hour average PM_{10} concentrations from the DPIE station at Aberdeen for 2014.

The 24-hour average PM_{10} concentrations at DPIE Aberdeen exceeded 50 µg/m^3 on two occasions during 2014. The first occasion was on 15 November 2014 (recorded concentration of 50.1 µg/m^3) which is explained by a small fire at Wybong (Wybong Rd, Sandy Hollow fire) (NSW OEH, 2015). The second occasion was on 17 December 2014 (recorded concentration of 50.4 µg/m^3) explained by a state-wide dust event originating from Victorian Mallee region (NSW OEH, 2015).

In addition, there was a high 24-hour average PM_{10} concentration of 48.7 µg/m^3 recorded at OEH Aberdeen on 10 February 2014. This high concentration was noted at other nearby OEH stations with a PM_{10} concentration of 52.2 µg/m^3 recorded at Wybong on the same day. These high concentrations were explained by a very large fire to the west (at the Sheepskin Complex) (NSW OEH, 2015).

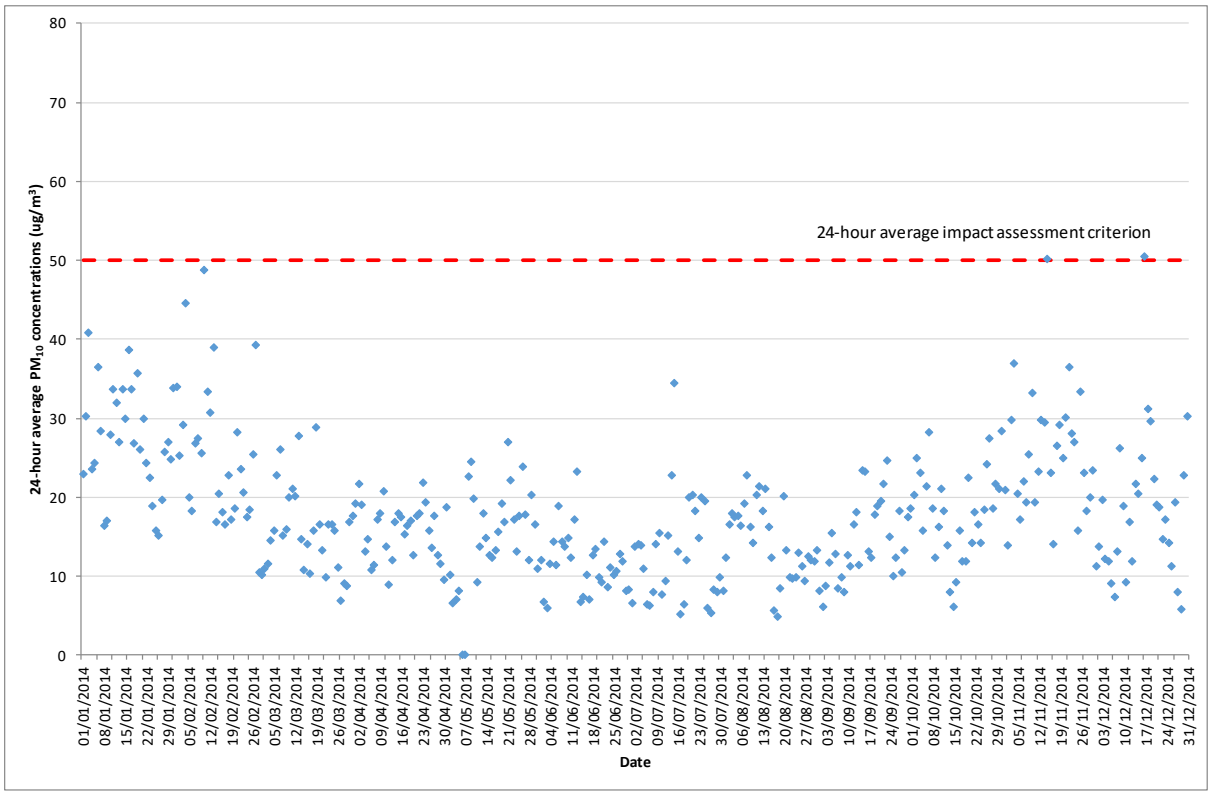


Figure 5-8: Measured 24-hour average PM_{10} concentrations at the DPIE Aberdeen station for 2014

5.2.4 Fine Particulate Matter ($PM_{2.5}$)

DPIE Muswellbrook station also monitors annual average $PM_{2.5}$ concentrations which are shown in Table 5-3. The concentration recorded in 2014 slightly exceeds the average for the six-year period from 2014 to 2019. The annual average for every year presented exceeds the impact assessment criterion of 8 µg/m^3 for $PM_{2.5}$.

Given that the monitor locations are close to the towns of Muswellbrook and Singleton, it is likely that of the $PM_{2.5}$ concentrations monitored in winter months include a significant contribution from wood-burning fires. This is supported by the UHFPCS (NSW OEH, 2013), which found that wood smoke accounted for an average of approximately 30% of $PM_{2.5}$ in Muswellbrook, peaking at approximately 62% in winter. Similarly, in Singleton, wood smoke accounts for an average of approximately 14% of total $PM_{2.5}$, peaking at around 38% in winter.

There are currently no other $PM_{2.5}$ data in the vicinity of the Modification. Therefore, to estimate the $PM_{2.5}$ concentrations at the DPIE Aberdeen station (which is the closest station to the sensitive receptors being assessed), a $PM_{2.5}$:PM_{10} ratio has been calculated for every day during 2014 at Muswellbrook. This ratio has then been applied to DPIE Aberdeen to generate background $PM_{2.5}$ concentrations for this monitoring station.

The calculated annual average $PM_{2.5}$ concentration of 7.6 µg/m^3 has been used as the background $PM_{2.5}$ value in this assessment. It should be noted that this is close to the NSW EPA impact assessment criterion of 8 µg/m^3, and a Modification contribution of greater than 0.4 µg/m^3 will cause an exceedance of the criterion.

The calculations showed seven days where $PM_{2.5}$ was greater than PM_{10} due to the different monitoring methods used. For PM_{10}, a Tapered Element Oscillating Microbalance (TEOM) is used, and for $PM_{2.5}$, a Beta Attenuation Monitoring (BAM) is used. Figure 5-9 presents the monitored 24-hour average PM_{10} concentrations and calculated 24-hour average $PM_{2.5}$ concentrations at DPIE Aberdeen.

Table 5-3: Annual average $PM_{2.5}$ concentrations at DPIE Muswellbrook from 2015 to 2019

Year	Muswellbrook	Criteria
2014	9.7	8
2015	8.7	
2016	8.4	
2017	9.4	
2018	9.4	
2019	12.2	
Average	9.6	
Average (excl. 2019)	9.1	

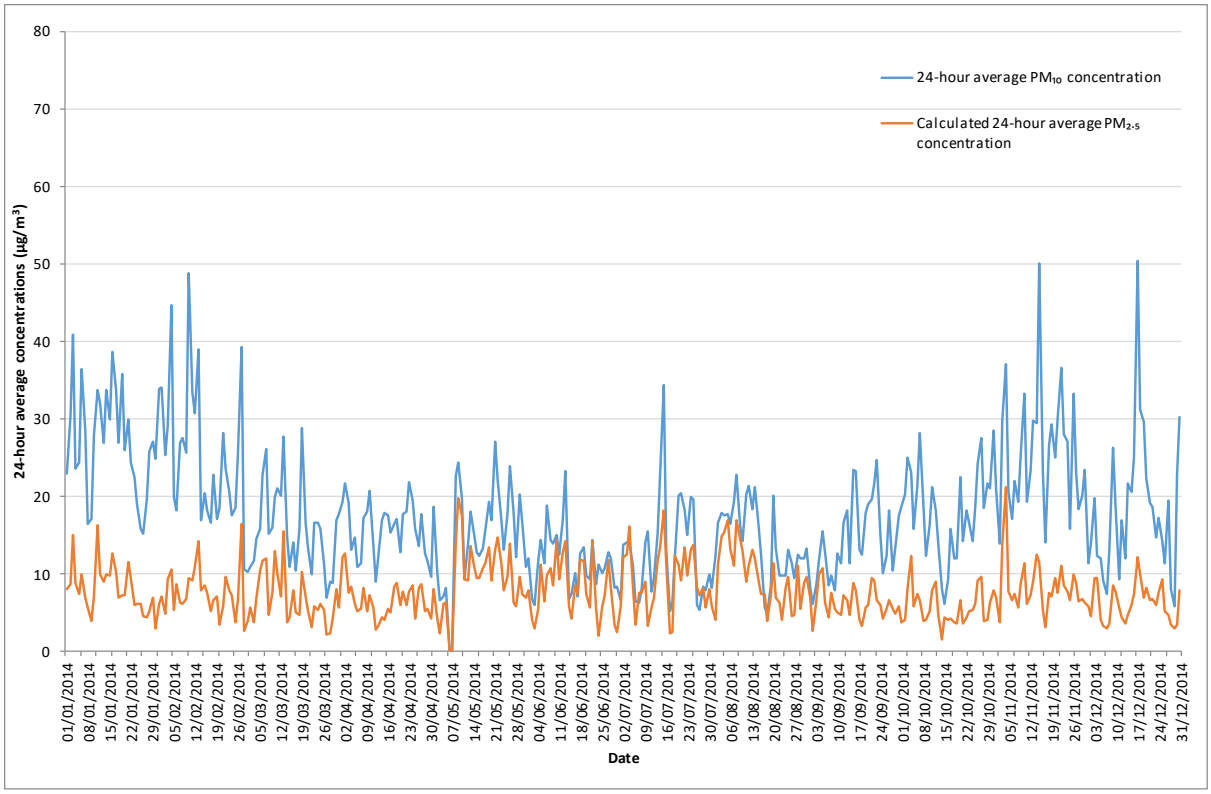


Figure 5-9: Monitored 24-hour average PM_{10} concentrations and calculated 24-hour average $PM_{2.5}$ concentrations at DPIE Aberdeen for 2014

5.2.5 Dust Deposition

The average dust deposition measured at Dartbrook Mine in 2014 was 1.5 g/m^2/month. This value was adopted as the background dust deposition consistent with the previous assessment.

5.2.6 Summary and background values

Based on the above, it has been concluded that the data from DPIE Aberdeen station for the year 2014 is still considered appropriate for use in this assessment. The background year of 2014 is considered representative and conservative.

Table 5-4 presents a summary of the mines operating in the area and their respective production rates. For 2014, the Mangoola, Bengalla, Mount Arthur and Muswellbrook coal mines were all operating at close to maximum production rates. On that basis, background concentrations recorded in 2014 will include emissions from these nearby mines. The exception is Mount Pleasant Mine which was not operating in 2014 and has been modelled in addition to the Modification as part of the modelling exercise.

Table 5-4: Operating mines in the area

Coal Mine	Development Application (DA) current expiry date	Production rate (Mtpa)		Assumptions for modelling
		Max allowable per DA	2014 (per Annual Review)	
Mount Pleasant	2026	10.5	Not operating	TAS (2017) AQ assessment for MTP Scenario 3 emissions = 3,750,801 kg TSP
Mangoola	2029	13.5	11.6	Measured concentrations at monitors to be used as the background is assumed to include contribution
Bengalla	2039	15	10.7	
Mt Arthur	2026	32 (open-cut) 4 (underground)	FY14 – 25.7 (open-cut)	
Muswellbrook Colliery	2022	2	~1.2	

From the available monitoring data, it has been assumed that the following background concentrations apply in the vicinity of the Modification:

- Annual average TSP concentration of 44.8 µg/m^3 (average of calculated TSP assuming that 40% of TSP concentrations are PM_{10} for 2014).
- Annual average PM_{10} concentration of 17.9 µg/m^3 (annual average of 2014 data collected at DPIE Aberdeen station).
- 24-hour average PM_{10} concentration – varies daily (DPIE Aberdeen station 2014 daily data)
- Annual average $PM_{2.5}$ concentration of 7.6 µg/m^3 (annual average of calculated $PM_{2.5}$ for Aberdeen based on the daily ratio between $PM_{2.5}$ and PM_{10} at DPIE Muswellbrook station).
- 24-hour average $PM_{2.5}$ concentration – varies daily (calculated for DPIE Aberdeen station based on the daily ratio between $PM_{2.5}$ and PM_{10} at DPIE Muswellbrook station).
- Annual average dust deposition of 1.5 g/m^2/month (2014 average of all annual data collected at Dartbrook).

6. APPROACH TO ASSESSMENT

The overall approach to the assessment follows the Approved Methods (NSW EPA, 2016) using the Level 2 assessment methodology. The Approved Methods specify how assessments based on the use of air dispersion models should be completed. They include guidelines for the preparation of meteorological data to be used in dispersion models and the relevant air quality criteria for assessing the significance of predicted concentration and deposition rates from the Modification.

The air dispersion modelling conducted for this assessment is based on an advanced modelling system using the models TAPM and CALMET/CALPUFF. The modelling system works as follows:

- TAPM is a prognostic meteorological model that generates gridded three-dimensional meteorological data for each hour of the model run period.
- CALMET, the meteorological pre-processor for the dispersion model CALPUFF, calculates fine resolution three-dimensional meteorological data based upon observed ground and upper level meteorological data, as well as observed or modelled upper air data generated for example by TAPM.
- CALPUFF then calculates the dispersion of plumes within this three-dimensional meteorological field.

Output from TAPM, plus local observational weather station data were entered into CALMET, a meteorological pre-processor endorsed by the US Environmental Protection Agency (US EPA) and recommended by the NSW EPA for use in complex terrain and non-steady state conditions (that is, conditions that change in time and space). From this, a 1-year representative meteorological dataset suitable for use in the 3-dimensional plume dispersion model, CALPUFF, was compiled. An overview of the modelling system is presented in Figure 6-1, and details on the model configuration and data inputs are provided in the following sections.

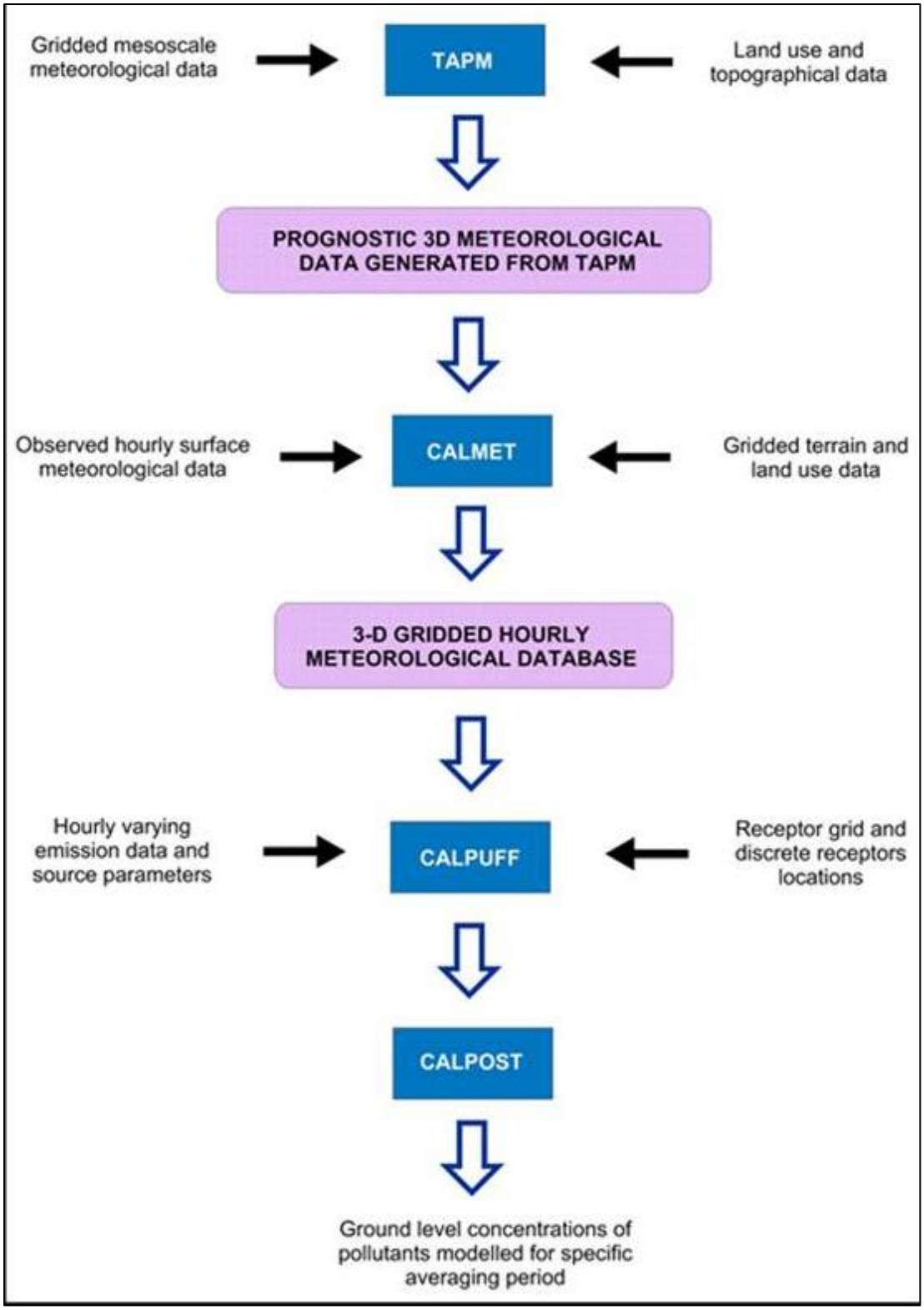


Figure 6-1: Overview of modelling methodology

6.1 TAPM

The Air Pollution Model, or TAPM, is a three-dimensional meteorological and air pollution model developed by the CSIRO Division of Atmospheric Research. Detailed description of the TAPM model and its performance is provided in Hurley (2008) and Hurley et al. (2009).

TAPM solves the fundamental fluid dynamics and scalar transport equations to predict meteorology and pollutant concentrations. It consists of coupled prognostic meteorological and air pollution concentration components. The model predicts airflow important to local scale air pollution, such as sea breezes and terrain induced flows, against a background of larger scale meteorology provided by synoptic analyses.

For this Modification, TAPM was set up with 3 domains, composed of 25 grids along both the x and the y axes, centred on -32˚11' Latitude and 150˚50' Longitude. Each nested domain had a grid resolution of 30 km, 10 km and 3 km respectively.

6.2 CALMET

CALMET is a meteorological pre-processor that includes a wind field generator containing objective analysis and parameterised treatments of slope flows, terrain effects and terrain blocking effects. The pre-processor produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables to produce the three-dimensional meteorological fields that are utilised in the CALPUFF dispersion model (i.e. the CALPUFF dispersion model requires meteorological data in three dimensions). CALMET uses the meteorological inputs in combination with land use and geophysical information for the modelling domain to predict gridded meteorological fields for the region.

A summary of the CALMET modelling is presented in Table 6-1.

6.3 CALPUFF

CALPUFF is the dispersion module of the CALMET/CALPUFF suite of models. It is a multi-layer, multi species, non-steady-state puff dispersion model that can simulate the effects of time-varying and space-varying meteorological conditions on pollutant transport, transformation and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources (Scire et al., 2000). In March 2011, generic guidance and optional settings for the CALPUFF modelling system were published for inclusion in the Approved Methods (TRC, 2011). The model set up for this study has been conducted in consideration of these guidelines.

The CALMET and CALPUFF model options are presented in Appendix A.

Table 6-1: CALMET meteorological model settings

TAPM (v 4.0.4)	
Number of grids (spacing)	30 km, 10 km, 3 km
Number of grid points	25 x 25 x 35
Year of analysis	January 2014 – December 2014
Centre of domain	-32°11’ S, 150°50’ E
CALMET (v 6327)	
Meteorological grid domain	36 km x 36 km
Meteorological grid resolution	250 m
Surface meteorological stations	Inner and outer grid: Dartbrook meteorological station (MET01) - Wind speed, - Wind direction - Temperature Dartbrook meteorological station (MET02) - Wind speed - Wind direction - Temperature DPIE Aberdeen - Wind speed - Wind direction - Temperature - Relative humidity DPIE Muswellbrook - Wind speed - Wind direction - Temperature - Relative humidity DPIE Muswellbrook NW - Wind speed - Wind direction - Temperature - Relative humidity DPIE Wybong - Wind speed - Wind direction - Temperature - Relative humidity TAPM - Cloud height - Cloud content - Station level pressure
3D.dat	Data extracted from 3 km TAPM

7. OVERVIEW OF BEST PRACTICE DUST CONTROL

A number of dust control measures have been applied across the Modification. These are taken from the NSW Coal Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining (Donnelly et al, 2011), a study that was commissioned by the EPA, hereafter referred to as “the Best Practice Report”.

The dust control measures are as follows:

- Enclosure and water sprays at ROM hopper (85% control)
- Enclosure and wet suppression for crushing and screening (70% control)
- Enclosure and water sprays at washery (85% control)
- Water sprays at product stockpile (85% control)
- Water application for loading product coal to train conveyor (50% control)
- Water sprays at the ROM coal stockpile (50% control)
- Water sprays at the reject stockpile (50% control)
- Water sprays at the product coal stockpile (50% control)
- Fencing at the Reject Emplacement Area (REA) (30% control)

8. PARTICLE MATTER EMISSIONS ESTIMATION

This section describes the calculation of the emissions for the assessment. Emissions have been calculated for the following:

- The surface operations associated with the Modification
- Existing ventilation shafts at Dartbrook Mine
- Operations at Mount Pleasant Mine.

The operation of the Modification has been analysed and estimates of dust emissions for the key dust generating activities have been made, including two existing upcast ventilation shafts. A detailed emissions inventory has been prepared for the underground operating scenario.

There are potential sources of dust emissions from the proposed mining activities which have been analysed and estimates of dust emissions for the key dust generating activities have been made.

As discussed in Section 5.2.6, all other local mines are considered to be included within the background concentrations and have therefore not been modelled separately.

8.1 Particle size categories

Emission rates of TSP, PM_{10} and $PM_{2.5}$ have been calculated using emission factors developed both within NSW and by the US EPA. Modelling of TSP, PM_{10} and $PM_{2.5}$ was undertaken using the particle size specific inventories and was assumed to emit and deposit from the plume in accordance with the deposition rate appropriate for particles with an aerodynamic diameter equal to the geometric mass of the particle size range.

Modelling was completed for three particle size categories; Total Suspended Particulates (TSP), Coarse Matter (CM) and $PM_{2.5}$. $PM_{2.5}$ particles were modelled using $PM_{2.5}$ emission rates. The coarse fraction was modelled using $PM_{2.5-10}$ emission rates (PM_{10} emissions minus $PM_{2.5}$ emissions). The particle mass mean diameters were determined from particle size distribution data for various coal mining activities (presented in SPCC, 1986).

The resultant predicted CM and $PM_{2.5}$ concentrations were then summed to determine the PM_{10} concentrations.

8.2 Emissions estimates from the Modification

Estimates of emissions for each source were developed on an hourly time step taking into account the activities that would take place at that location. Thus, for each source and for each hour, an emission rate was determined which depended on the level of activity and the wind speed. Dust generating activities were represented by a series of volume sources situated according to the location of activities for the modelled scenarios. Terrain was incorporated into the modelling.

Figure 8-1 shows the locations of the volume sources used to represent the mining activities and Table 8-1 shows the allocation of sources for each activity.

Detailed emissions tables are provided in Appendix B.

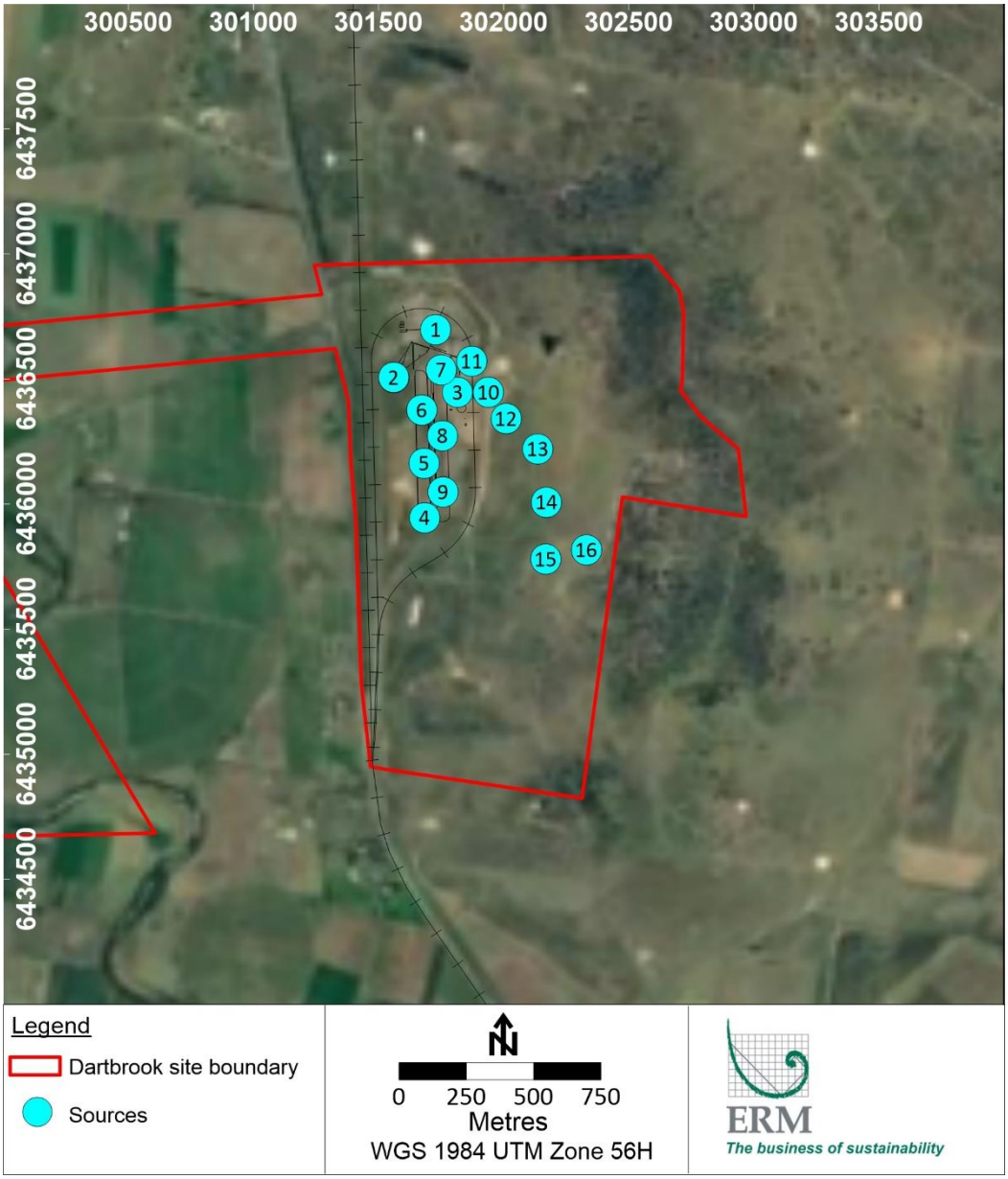


Figure 8-1: Location of dust sources

Table 8-1: Inventory activity and allocated source number

Activity	Source number
Unloading of coal at ROM Hopper	1
Crushing of coal	1
Screening of coal	1
Loading crushed coal to conveyor at ROM Hopper	1
Unloading of coal at ROM Stockpile	2
Unloading of coal at Washery	3
Loading of product coal onto conveyor from Washery	3
Unloading of coal at Product Stockpile	4,5,6,7,8,9
Loading of rejects onto conveyor from Washery	3
Unloading of rejects at Reject Stockpile	10
Reclaiming product coal to train conveyor	4,5,6,7,8,9
Loading of product coal to trains	11
Loading of rejects to trucks at Rejects Stockpile	10
Hauling of rejects from Reject Stockpile to REA (sealed roads)	10,12,13,14,15,16
Unloading of rejects at REA	15,16
Dozers at REA	15,16
ROM Stockpile	2
Reject Stockpile	10
Product Stockpile	4,5,6,7,8,9
Reject Emplacement Area	15,16

Notes: ROM – Run of Mine, REA – Reject Emplacement Area

The information used for developing the inventories is based on the operational descriptions and mine plan drawings and used to determine haul road distances and routes, stockpile areas, activity operating hours, truck sizes and other details that are necessary to estimate dust emissions.

Table 8-2 summarises the quantities of TSP, PM_{10} and $PM_{2.5}$ estimated to be released by each activity of the Modification.

Table 8-2: Estimated TSP, PM_{10} and $PM_{2.5}$ emissions for the Modification

Activity	TSP emissions (kg/y)	PM_{10} emissions (kg/y)	$PM_{2.5}$ emissions (kg/y)
Unloading of coal at ROM Hopper	484	229	35
Crushing of coal	1,080	486	90
Screening of coal	1,980	666	45
Loading crushed coal to conveyor at ROM Hopper	484	229	35
Unloading of coal at ROM Stockpile	1,613	763	116
Unloading of coal at washery	484	229	35
Loading of product coal onto conveyor from washery	178	84	13
Unloading of coal at Product Stockpile	178	84	13
Loading of rejects onto conveyor from washery	41	19	3
Unloading of rejects at Reject Stockpile	137	65	10
Reclaiming product coal to train conveyor	592	280	42
Loading of product coal to trains	1,183	560	85
Loading of rejects to trucks at Rejects Stockpile	273	129	20
Hauling of rejects from Reject Stockpile to REA (sealed roads)	24,413	4,686	1,134
Unloading of rejects at REA	273	129	20
Dozers at REA	33,659	6,857	741
ROM Stockpile	468	234	35
Reject Stockpile	468	234	35
Product Stockpile	2,678	1,339	201
Reject Emplacement Area	1,785	893	134
Total emissions	**72,448**	**18,193**	**2,838**

8.2.1 Emissions estimates from ventilation shafts

To provide an indication of potential emissions from the ventilation shafts, reference is made to particulate matter testing, conducted at other underground mines in NSW. A previous assessment undertaken by PAEHolmes (now ERM) reviewed particulate concentrations for a number of underground mines in the southern coal fields (PAEHolmes, 2010). Particulate concentrations were in the range of 0.4 mg/m^3 to 2 mg/m^3 and the highest value was chosen for the Modification and conservatively applied to each size fraction ($TSP/PM_{10}/PM_{2.5}$).

Two existing ventilation shafts will be utilised during the proposed underground mining. The stack characteristics for modelling are summarised in Table 8-3. The emission rates and stack parameters are provided in Table 8-4. The locations of the proposed vent shafts are shown in Figure 8-2.

Table 8-3: Stack characteristics for modelling

Vent Shaft	x	y	Base elevation (m)	Stack height (m)	Stack diameter (m)	Volumetric flow rate (dry STP) (m^3/min)	Exit velocity (m/s)	Exit temperature (degrees Celsius)
No.1	297540	6436605	196	10	4	136	10.8	293
No.2	296286	6436520	226	10	6	507	17.9	293

Table 8-4: Emission rates and stack parameters

Vent Shaft	Pollutant	Measured concentration (mg/m^3)	Mass emission rate (g/s)
No.1	Particulate matter (TSP/PM_{10}/$PM_{2.5}$)	2	0.27
No.2	Particulate matter (TSP/PM_{10}/$PM_{2.5}$)	2	1.01

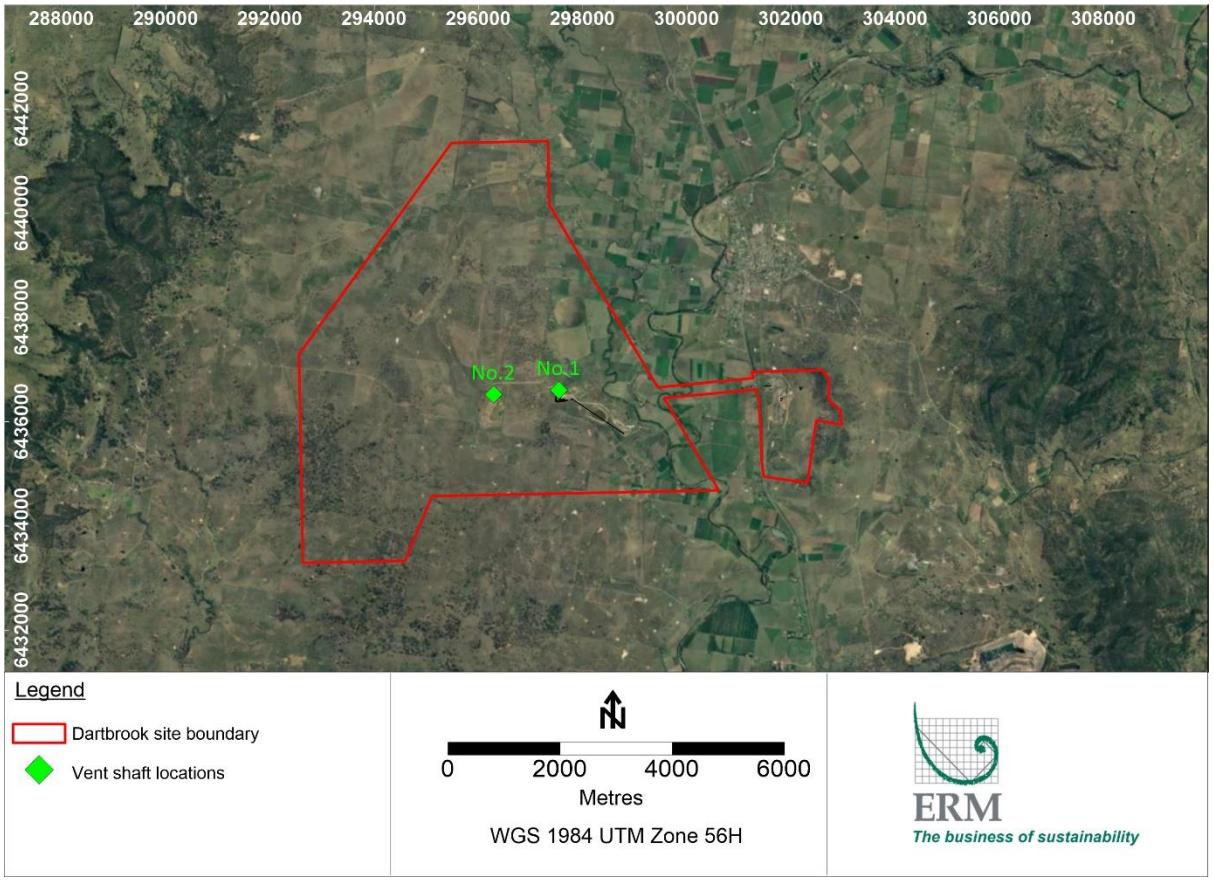


Figure 8-2: Location of vent shafts

8.3 Emissions estimates from Mount Pleasant

As discussed in Section 5.2.6, Mount Pleasant Mine was not operating in 2014 and emissions from this mine have therefore been explicitly included in the modelling.

Mount Pleasant Mine was treated as a number of volume sources located at the points of major emission, as estimated from the locations of pits, dumps and other major dust sources. Sources were considered in three classes covering all dust emission sources for which there are emission factor equations for open cut mines. These classes are:

1. Wind erosion sources where emissions vary with the hourly average wind speed according to the cube of the wind speed (Skidmore, 1998)
2. Loading/dumping operations where emissions vary with the wind speed raised to the power of 1.3 (USEPA, 1987)
3. All other sources where emissions are assumed to be independent of wind speed

The proportion of emissions in each of these categories was calculated for Mount Pleasant Mine based on the activities occurring at that site.

Table 8-5 presents the estimated TSP, PM_{10} and $PM_{2.5}$ for Mount Pleasant Mine.

Table 8-5: Estimated TSP, PM_{10} and $PM_{2.5}$ emissions for Mount Pleasant Mine

Mine	TSP emissions (kg/y)	PM_{10} emissions (kg/y)	$PM_{2.5}$ emissions (kg/y)
Mount Pleasant	3,750,801	1,018,777	156,907

Source: TAS (2017)

9. ASSESSMENT OF IMPACTS

9.1 Introduction

The modelling predictions for the Modification are presented in the sections below. The contour plots are indicative of the concentrations that could potentially be reached under the conditions modelled. It is important to note that the isopleth figures are presented to provide a visual representation of the predicted impacts. To produce the isopleths, it is necessary to make interpolations between predicted concentrations, and as a result the isopleths will not always match exactly with predicted impacts at any specific location.

In the case of maximum 24-hour average concentrations, it is also important to note that individual contour plots do not represent one moment in time, but rather the maximum 24-hour average that could potentially occur at a sensitive receptor over the period of a year. A discussion of cumulative 24-hour average concentrations is presented in Section 9.3.

There are two days during 2014 when the 24-hour average PM_{10} concentrations at DPIE Aberdeen exceeded 50 µg/m^3 (see Section 5.2.3 for further details). Additional analysis has been undertaken which excludes these two days of elevated background concentrations. This provides an indication of additional days of exceedance of the criterion due to the Modification.

9.2 Annual average concentrations

9.2.1 TSP

Table 9-1 presents the predicted annual average TSP concentrations at each of the sensitive receptor locations for the Modification, Mount Pleasant alone and when including existing background concentrations.

Contour plots of the predicted annual average concentrations due to the Modification and cumulatively are presented in Figure 9-1 and Figure 9-2, respectively.

There are no sensitive receptors predicted to experience annual average TSP concentrations above the NSW EPA impact assessment criterion or DPE VLAMP criterion of 90 µg/m^3, either due to the Modification or cumulatively.

Table 9-1: Predicted annual average TSP concentrations from the Modification alone, Mount Pleasant alone and cumulatively

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 90 µg/m^3
3	0.1	0.3	45.2
8	0.1	0.3	45.2
10	0.1	0.3	45.2
14	0.1	0.5	45.4
18	0.1	0.3	45.3
19	0.1	0.3	45.2
20	0.1	0.4	45.4
21	0.1	0.3	45.3
22	0.1	0.3	45.3
25	0.1	0.3	45.2
26	0.1	0.3	45.3
28	0.2	0.3	45.2
29	0.1	0.9	45.9
34	0.2	0.8	45.8
52	0.1	0.4	45.3
53	0.1	0.4	45.3
54	0.1	0.4	45.4
55	0.1	0.5	45.4
59	0.3	0.4	45.4
60	0.3	0.4	45.4
61	0.3	0.4	45.5
62	0.2	0.5	45.5
63	0.2	0.5	45.5
64	0.3	0.5	45.5
65	0.4	0.4	45.6
66	0.1	1.5	46.3
67	<0.1	2.2	47.1
70	0.2	0.5	45.5
72	0.2	0.5	45.5
75	0.2	0.6	45.6
77	0.3	0.5	45.5
87	1.1	0.4	46.3
88	1.3	0.4	46.5
89	1.4	0.4	46.5
90	1.4	0.4	46.6
91	1.4	0.4	46.6
92	1.2	0.4	46.3
116	0.1	0.2	45.1
118	0.1	0.2	45.2

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 90 µg/m^3
122	<0.1	2.1	46.9
128	<0.1	2.1	47.0
303	2.4	0.7	47.9
313	0.2	0.3	45.3
314	0.2	0.3	45.2
315	0.2	0.3	45.3
316	0.4	0.3	45.6
317	0.2	0.3	45.3
422	2.8	0.7	48.3
423	2.4	0.7	47.9
424	2.4	0.7	47.9
427	1.5	0.7	47.0
436	0.3	0.7	45.9
437	0.3	0.8	45.9
438	0.3	0.8	45.9
439	0.3	0.6	45.7
440	0.3	0.5	45.5
545	1.0	1.2	47.0
546	1.0	1.4	47.2
555	0.1	0.3	45.2
561	0.1	0.4	45.3
562	<0.1	0.3	45.2
567	<0.1	0.3	45.1
27A	0.1	0.3	45.3
27B	0.1	0.3	45.3
27C	0.1	0.3	45.3
35A	0.1	0.6	45.6
35B	0.1	0.6	45.5
442A	0.1	0.7	45.6
442B	0.1	0.6	45.5
442C	0.1	0.5	45.4
442D	0.1	0.5	45.4
445A	<0.1	4.0	48.8
445B	<0.1	3.9	48.7
48A	0.1	0.4	45.3
48B	0.1	0.3	45.3
5A	0.1	0.3	45.2
5B	0.1	0.3	45.2
74A	0.2	0.5	45.6
74B	0.2	0.5	45.6
80A	0.2	0.6	45.6

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 90 µg/m^3
80B	0.2	0.6	45.6
81A	0.2	0.6	45.7
81B	0.2	0.7	45.7
86	0.5	0.4	45.7
181	0.3	1.1	46.2
212	0.3	1.1	46.3
228	0.3	1.2	46.3
238	0.3	1.1	46.3
242	0.4	1.1	46.2
244	0.4	1.0	46.2
374	0.4	1.2	46.3
391	0.8	1.0	46.6
153	0.1	2.7	47.6
86a	0.7	0.4	46.0
86b	0.5	0.5	45.7

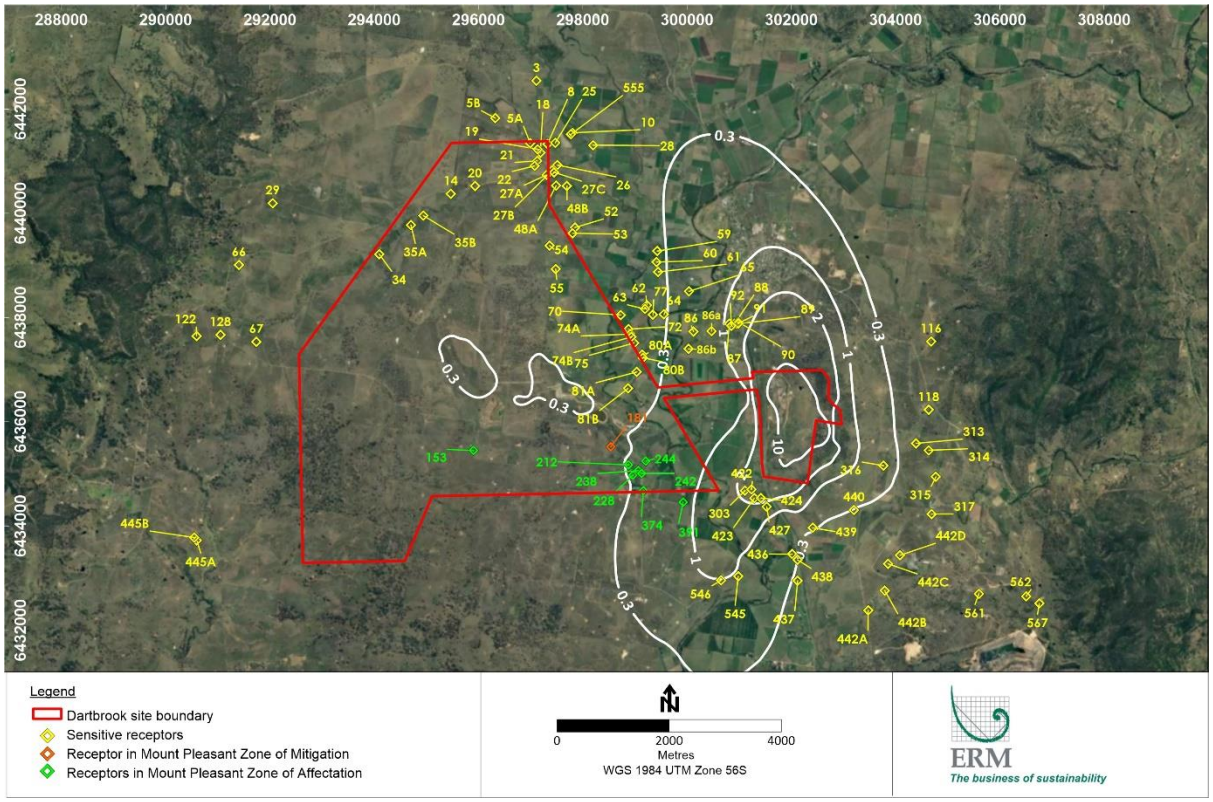


Figure 9-1: Predicted annual average TSP concentrations (µg/m^3) – Modification only

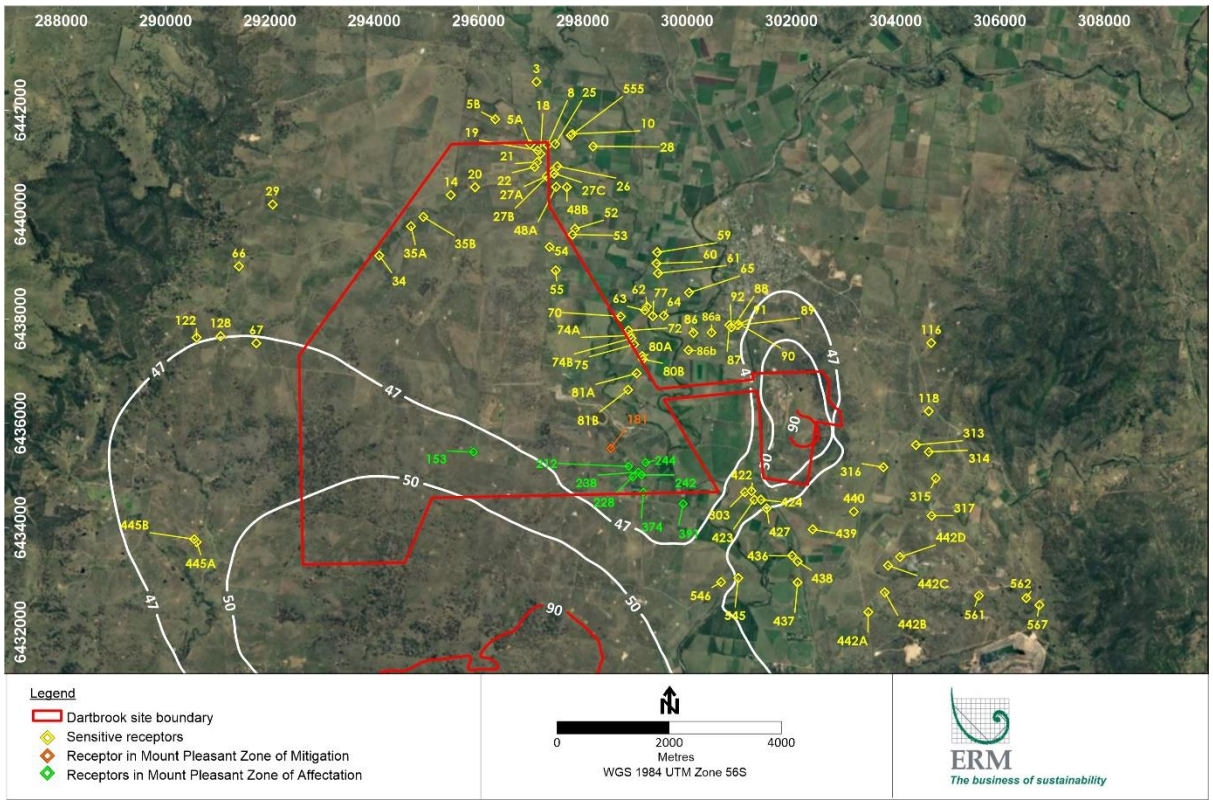


Figure 9-2: Predicted annual average TSP concentrations (µg/m^3) – Cumulative

9.2.2 PM_{10}

Table 9-2 presents the predicted annual average PM_{10} concentrations at each of the sensitive receptor locations for the Modification, Mount Pleasant alone and when including existing background concentrations.

Contour plots of the predicted annual average concentrations due to the Modification and cumulatively are presented in Figure 9-3 and Figure 9-4, respectively.

There are no sensitive receptors predicted to experience annual average PM_{10} concentrations above the NSW EPA impact assessment criterion of 25 µg/m^3 or DPE VLAMP criterion of 30 µg/m^3, either due to the Modification or cumulatively.

Table 9-2: Predicted annual average PM_{10} concentrations from the Modification alone, Mount Pleasant alone and cumulatively

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 25 µg/m^3
3	0.1	0.1	18.1
8	0.1	0.1	18.1
10	0.1	0.1	18.1
14	0.2	0.2	18.3
18	0.1	0.2	18.1
19	0.1	0.2	18.1
20	0.1	0.2	18.2
21	0.1	0.2	18.1
22	0.1	0.2	18.1
25	0.1	0.1	18.1
26	0.1	0.2	18.1
28	0.1	0.1	18.1
29	0.2	0.4	18.5
34	0.3	0.4	18.5
52	0.1	0.2	18.2
53	0.1	0.2	18.2
54	0.1	0.2	18.2
55	0.1	0.2	18.2
59	0.1	0.2	18.2
60	0.1	0.2	18.2
61	0.1	0.2	18.2
62	0.1	0.2	18.2
63	0.1	0.2	18.2
64	0.1	0.2	18.2
65	0.2	0.2	18.3
66	0.1	0.6	18.7
67	0.1	0.9	18.9
70	0.1	0.2	18.2
72	0.1	0.2	18.3

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 25 µg/m^3
75	0.1	0.2	18.3
77	0.1	0.2	18.2
87	0.5	0.2	18.5
88	0.5	0.2	18.6
89	0.5	0.2	18.6
90	0.6	0.2	18.6
91	0.6	0.2	18.6
92	0.5	0.2	18.5
116	0.1	0.1	18.0
118	0.1	0.1	18.1
122	0.1	0.9	18.8
128	0.1	0.9	18.9
303	0.8	0.3	19.0
313	0.1	0.1	18.1
314	0.1	0.1	18.1
315	0.1	0.1	18.1
316	0.2	0.1	18.2
317	0.1	0.1	18.1
422	0.9	0.3	19.1
423	0.7	0.3	18.9
424	0.7	0.3	18.9
427	0.5	0.3	18.7
436	0.2	0.3	18.4
437	0.1	0.3	18.4
438	0.1	0.3	18.3
439	0.2	0.3	18.3
440	0.1	0.2	18.2
545	0.3	0.5	18.7
546	0.3	0.6	18.8
555	0.1	0.1	18.1
561	0.0	0.2	18.1
562	0.0	0.1	18.1
567	0.0	0.1	18.1
27A	0.1	0.2	18.1
27B	0.1	0.2	18.1
27C	0.1	0.2	18.1
35A	0.2	0.3	18.4
35B	0.2	0.3	18.4
442A	0.1	0.3	18.3
442B	0.1	0.2	18.2
442C	0.1	0.2	18.2

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 25 µg/m^3
442D	0.1	0.2	18.2
445A	0.0	1.6	19.5
445B	0.0	1.6	19.5
48A	0.1	0.2	18.1
48B	0.1	0.2	18.1
5A	0.1	0.2	18.1
5B	0.1	0.2	18.1
74A	0.1	0.2	18.3
74B	0.1	0.2	18.3
80A	0.1	0.3	18.3
80B	0.1	0.3	18.3
81A	0.2	0.3	18.3
81B	0.2	0.3	18.4
86	0.2	0.2	18.3
181	0.2	0.5	18.6
212	0.2	0.5	18.6
228	0.2	0.5	18.6
238	0.2	0.5	18.6
242	0.2	0.5	18.6
244	0.2	0.4	18.5
374	0.2	0.5	18.6
391	0.3	0.4	18.6
153	0.2	1.2	19.2
86a	0.3	0.2	18.4
86b	0.2	0.2	18.3

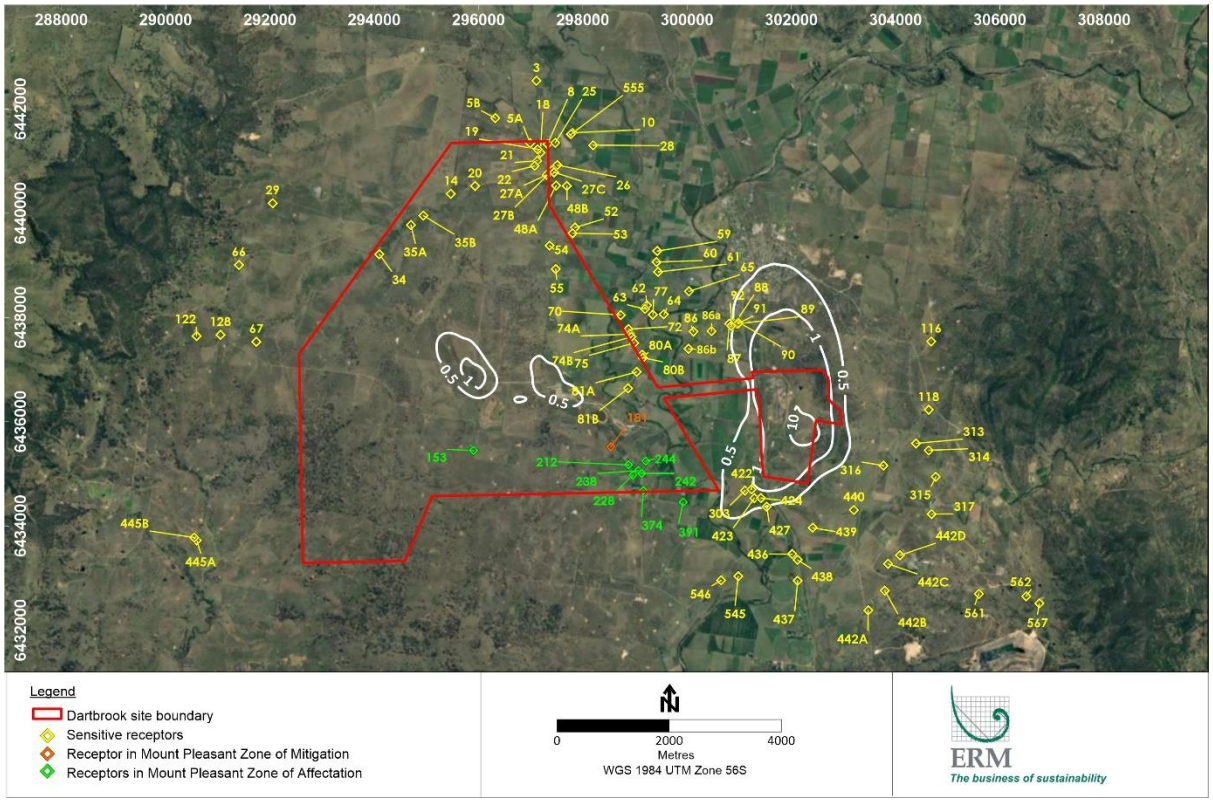


Figure 9-3: Predicted annual average PM_{10} concentrations (µg/m^3) – Modification only

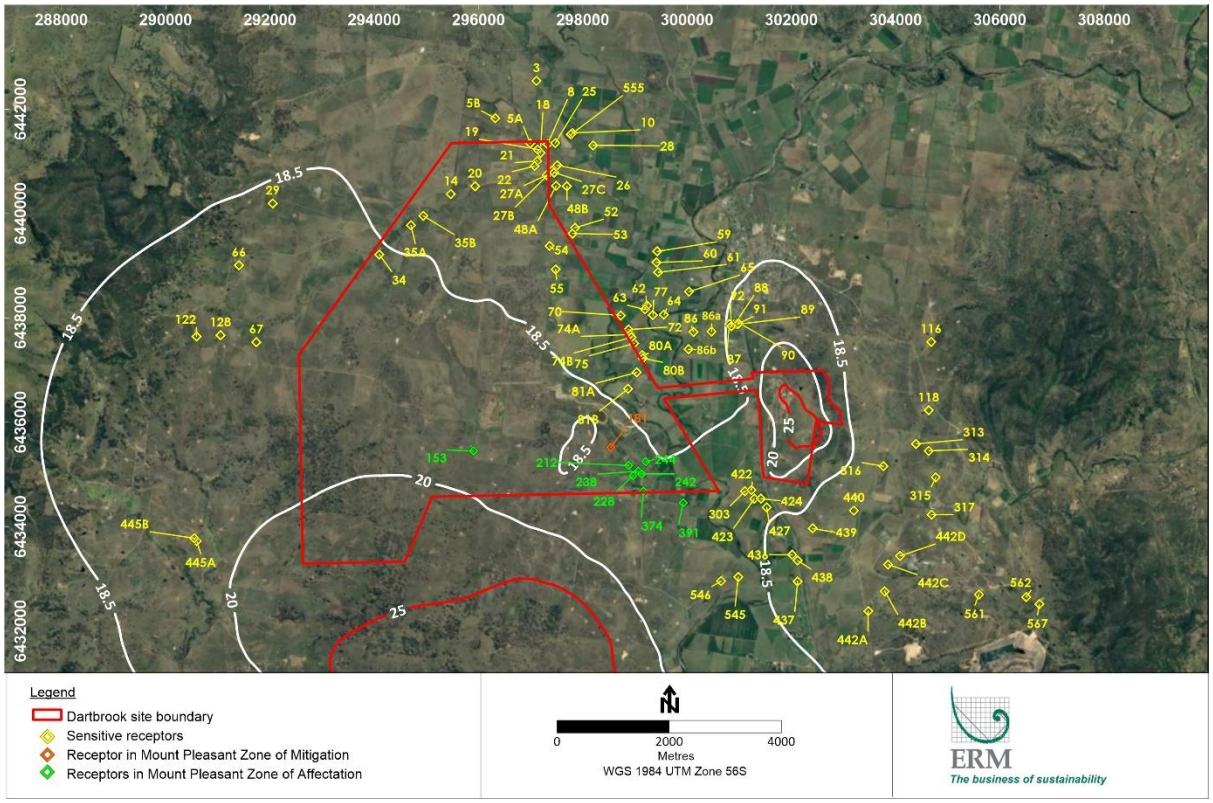


Figure 9-4: Predicted annual average PM_{10} concentrations (µg/m^3) – Cumulative

9.2.3 $PM_{2.5}$

Table 9-3 presents the predicted annual average $PM_{2.5}$ concentrations at each of the sensitive receptor locations for the Modification, Mount Pleasant alone and when including existing background concentrations. The assumed background concentrations have been outlined previously in Section 5.2.6.

Contour plots of the predicted annual average concentrations due to the Modification and cumulatively are presented in Figure 9-5 and Figure 9-6, respectively.

There are no sensitive receptors predicted to experience annual average $PM_{2.5}$ concentrations above the NSW EPA impact assessment criterion of 8 µg/m^3 due to the Modification or cumulatively.

Table 9-3: Predicted annual average $PM_{2.5}$ concentrations from the Modification alone, Mount Pleasant alone and cumulatively

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 8 µg/m^3
3	<0.1	<0.1	7.7
8	<0.1	<0.1	7.7
10	<0.1	<0.1	7.7
14	0.1	0.1	7.7
18	<0.1	<0.1	7.7
19	<0.1	<0.1	7.7
20	0.1	<0.1	7.7
21	<0.1	<0.1	7.7
22	<0.1	<0.1	7.7
25	<0.1	<0.1	7.7
26	<0.1	<0.1	7.7
28	<0.1	<0.1	7.7
29	0.1	0.1	7.8
34	0.1	0.1	7.8
52	<0.1	<0.1	7.7
53	<0.1	<0.1	7.7
54	<0.1	<0.1	7.7
55	<0.1	<0.1	7.7
59	<0.1	<0.1	7.7
60	<0.1	<0.1	7.7
61	<0.1	<0.1	7.7
62	<0.1	<0.1	7.7
63	<0.1	<0.1	7.7
64	<0.1	<0.1	7.7
65	<0.1	<0.1	7.7
66	0.1	0.1	7.8
67	<0.1	0.2	7.8
70	<0.1	<0.1	7.7
72	<0.1	<0.1	7.7

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 8 µg/m^3
75	<0.1	0.1	7.7
77	<0.1	<0.1	7.7
87	0.1	<0.1	7.7
88	0.1	<0.1	7.7
89	0.1	<0.1	7.8
90	0.1	<0.1	7.8
91	0.1	<0.1	7.8
92	0.1	<0.1	7.7
116	<0.1	<0.1	7.6
118	<0.1	<0.1	7.6
122	<0.1	0.2	7.8
128	<0.1	0.2	7.8
303	0.2	0.1	7.8
313	<0.1	<0.1	7.7
314	<0.1	<0.1	7.7
315	<0.1	<0.1	7.7
316	<0.1	<0.1	7.7
317	<0.1	<0.1	7.7
422	0.2	0.1	7.8
423	0.1	0.1	7.8
424	0.1	0.1	7.8
427	0.1	0.1	7.8
436	<0.1	0.1	7.7
437	<0.1	0.1	7.7
438	<0.1	0.1	7.7
439	<0.1	0.1	7.7
440	<0.1	<0.1	7.7
545	0.1	0.1	7.8
546	0.1	0.1	7.8
555	<0.1	<0.1	7.7
561	<0.1	<0.1	7.7
562	<0.1	<0.1	7.6
567	<0.1	<0.1	7.6
27A	<0.1	<0.1	7.7
27B	<0.1	<0.1	7.7
27C	<0.1	<0.1	7.7
35A	0.1	0.1	7.8
35B	0.1	0.1	7.7
442A	<0.1	0.1	7.7
442B	<0.1	0.1	7.7
442C	<0.1	0.1	7.7

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = N/A		Assessment criteria = 8 µg/m^3
442D	<0.1	<0.1	7.7
445A	<0.1	0.3	7.9
445B	<0.1	0.3	7.9
48A	<0.1	<0.1	7.7
48B	<0.1	<0.1	7.7
5A	<0.1	<0.1	7.7
5B	<0.1	<0.1	7.7
74A	<0.1	0.1	7.7
74B	<0.1	0.1	7.7
80A	<0.1	0.1	7.7
80B	<0.1	0.1	7.7
81A	0.1	0.1	7.7
81B	0.1	0.1	7.7
86	0.1	<0.1	7.7
181	0.1	0.1	7.8
212	0.1	0.1	7.8
228	0.1	0.1	7.8
238	0.1	0.1	7.8
242	0.1	0.1	7.8
244	0.1	0.1	7.8
374	0.1	0.1	7.8
391	0.1	0.1	7.8
153	0.1	0.2	7.9
86a	0.1	<0.1	7.7
86b	0.1	<0.1	7.7

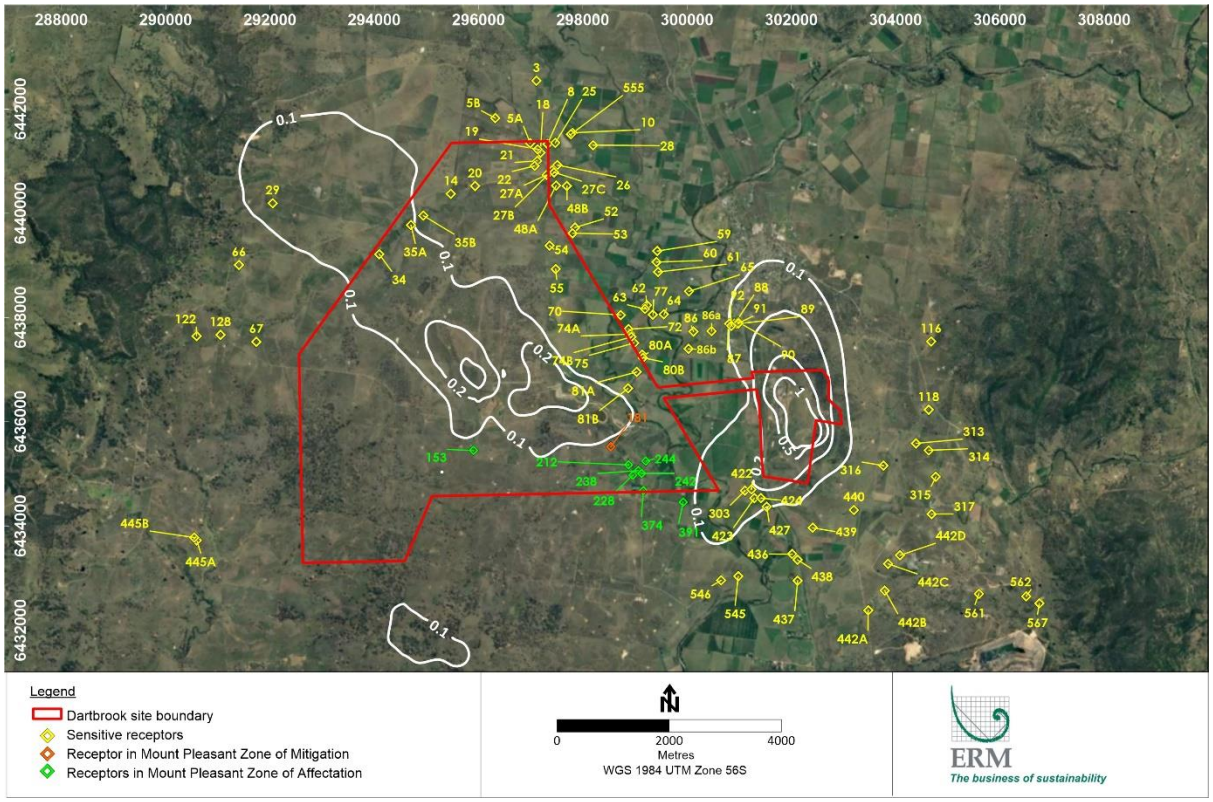


Figure 9-5: Predicted annual average $PM_{2.5}$ concentrations (µg/m^3) – Modification only

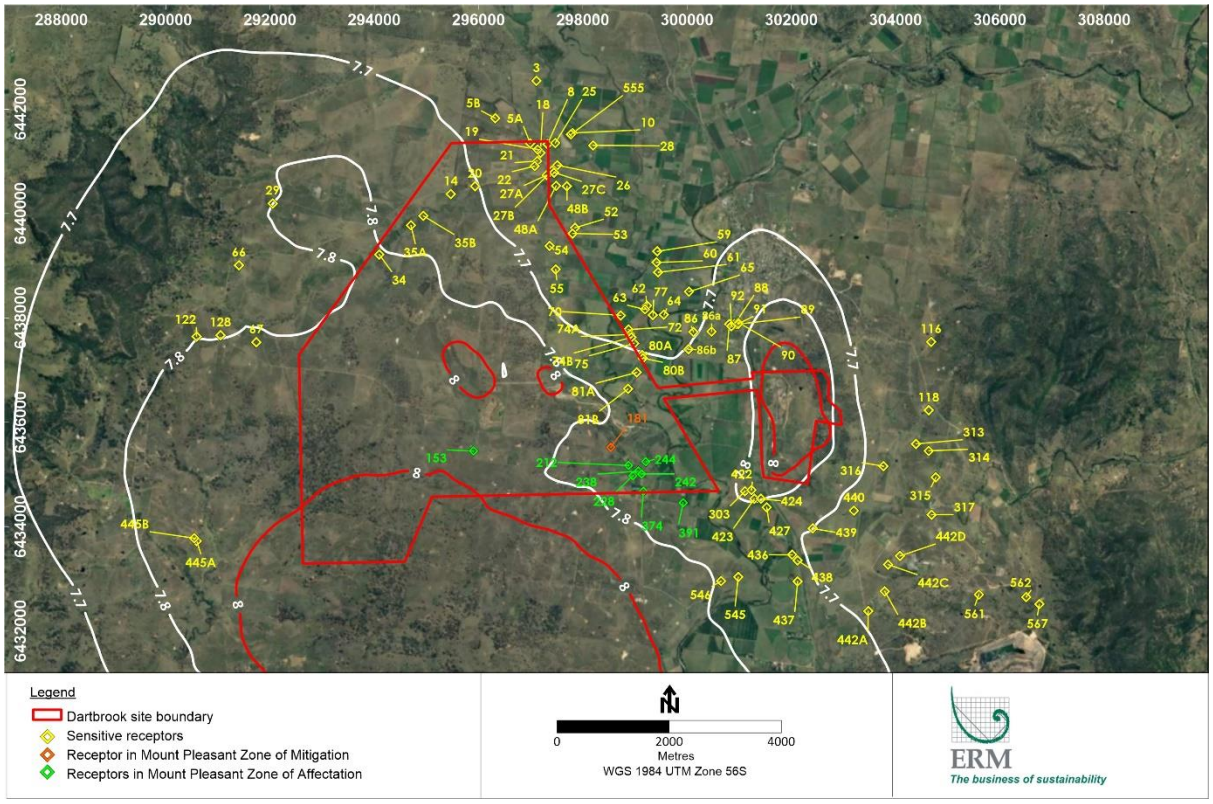


Figure 9-6: Predicted annual average $PM_{2.5}$ concentrations (µg/m^3) – Cumulative

9.2.4 Dust deposition

Table 9-4 presents the predicted annual average dust deposition levels at each of the sensitive receptor locations for the Modification, Mount Pleasant alone and when including existing background concentrations.

Contour plots of the predicted annual average concentrations due to the Modification and cumulatively are presented in Figure 9-7 and Figure 9-8, respectively.

There are no sensitive receptors predicted to experience annual average dust deposition levels above the NSW EPA impact assessment criterion or the DPE VLAMP criterion of 2 g/m^2/month (increment) or 4 g/m^2/month (cumulative).

Table 9-4: Predicted annual average dust deposition from the Modification alone, Mount Pleasant alone and cumulatively

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = 2 g/m^2/month		Assessment criteria = 4 g/m^2/month
3	0.00	0.01	2
8	0.00	0.01	2
10	0.00	0.01	2
14	0.00	0.01	2
18	0.00	0.01	2
19	0.00	0.01	2
20	0.00	0.01	2
21	0.00	0.01	2
22	0.00	0.01	2
25	0.00	0.01	2
26	0.00	0.01	2
28	0.00	0.01	2
29	0.00	0.04	2
34	0.00	0.02	2
52	0.00	0.01	2
53	0.00	0.01	2
54	0.00	0.01	2
55	0.00	0.01	2
59	0.01	0.01	2
60	0.00	0.01	2
61	0.00	0.01	2
62	0.00	0.01	2
63	0.00	0.01	2
64	0.00	0.01	2
65	0.01	0.01	2
66	0.00	0.06	2
67	0.00	0.09	2
70	0.00	0.01	2
72	0.00	0.01	2

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = 2 g/m^2/month		Assessment criteria = 4 g/m^2/month
75	0.00	0.01	2
77	0.00	0.01	2
87	0.02	0.01	2
88	0.03	0.01	2
89	0.03	0.01	2
90	0.03	0.01	2
91	0.03	0.01	2
92	0.03	0.01	2
116	0.00	0.00	2
118	0.00	0.01	2
122	0.00	0.08	2
128	0.00	0.08	2
303	0.03	0.01	2
313	0.01	0.01	2
314	0.01	0.01	2
315	0.01	0.01	2
316	0.02	0.01	2
317	0.00	0.01	2
422	0.04	0.01	2
423	0.03	0.01	2
424	0.03	0.01	2
427	0.02	0.01	2
436	0.00	0.02	2
437	0.00	0.02	2
438	0.00	0.02	2
439	0.00	0.01	2
440	0.01	0.01	2
545	0.01	0.03	2
546	0.01	0.03	2
555	0.00	0.01	2
561	0.00	0.01	2
562	0.00	0.01	2
567	0.00	0.01	2
27A	0.00	0.01	2
27B	0.00	0.01	2
27C	0.00	0.01	2
35A	0.00	0.02	2
35B	0.00	0.01	2
442A	0.00	0.02	2
442B	0.00	0.02	2
442C	0.00	0.01	2

Receptor ID	Modification only	Mount Pleasant only	Cumulative
	Assessment criteria = 2 g/m^2/month		Assessment criteria = 4 g/m^2/month
442D	0.00	0.01	2
445A	0.00	0.12	2
445B	0.00	0.11	2
48A	0.00	0.01	2
48B	0.00	0.01	2
5A	0.00	0.01	2
5B	0.00	0.01	2
74A	0.00	0.01	2
74B	0.00	0.01	2
80A	0.00	0.01	2
80B	0.00	0.01	2
81A	0.00	0.01	2
81B	0.00	0.01	2
86	0.01	0.01	2
181	0.00	0.02	2
212	0.00	0.02	2
228	0.00	0.02	2
238	0.00	0.02	2
242	0.00	0.02	2
244	0.00	0.02	2
374	0.00	0.02	2
391	0.01	0.02	2
153	0.00	0.08	2
86a	0.01	0.01	2
86b	0.01	0.01	2

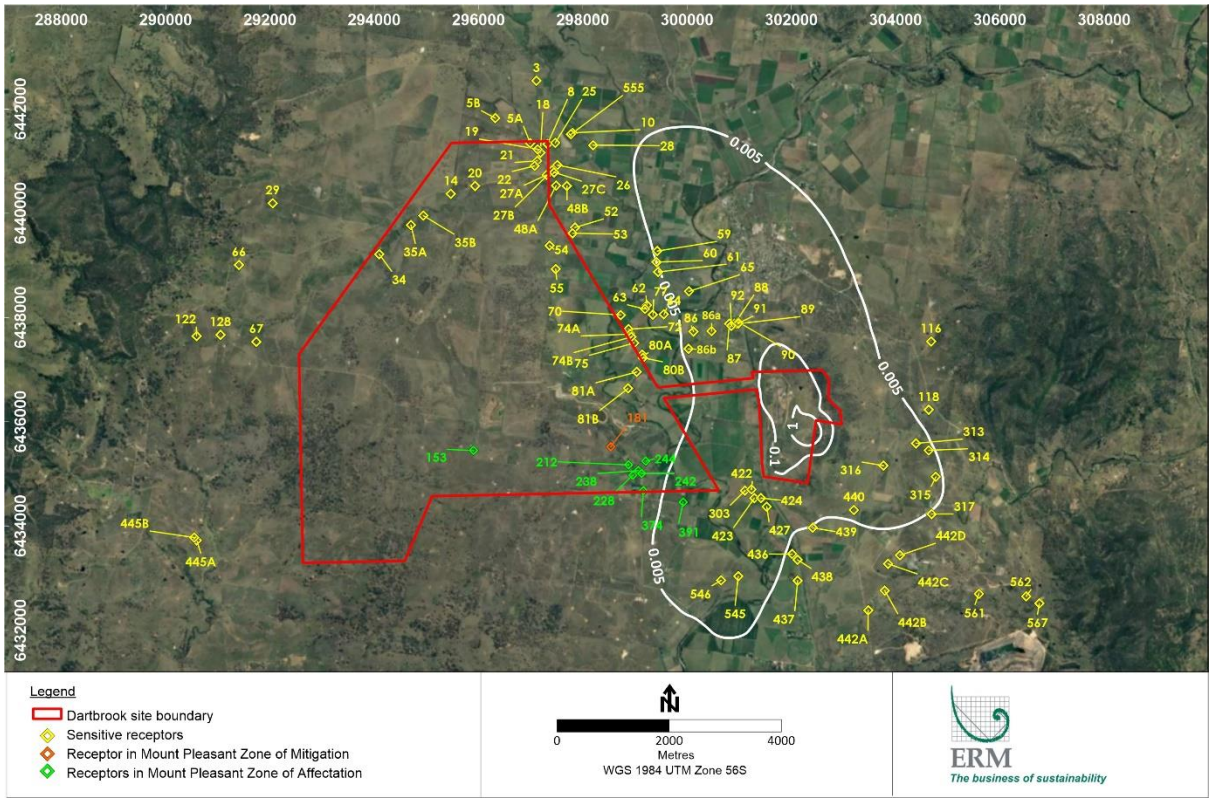


Figure 9-7: Predicted annual average dust deposition concentrations (g/m^2/month) – Modification only

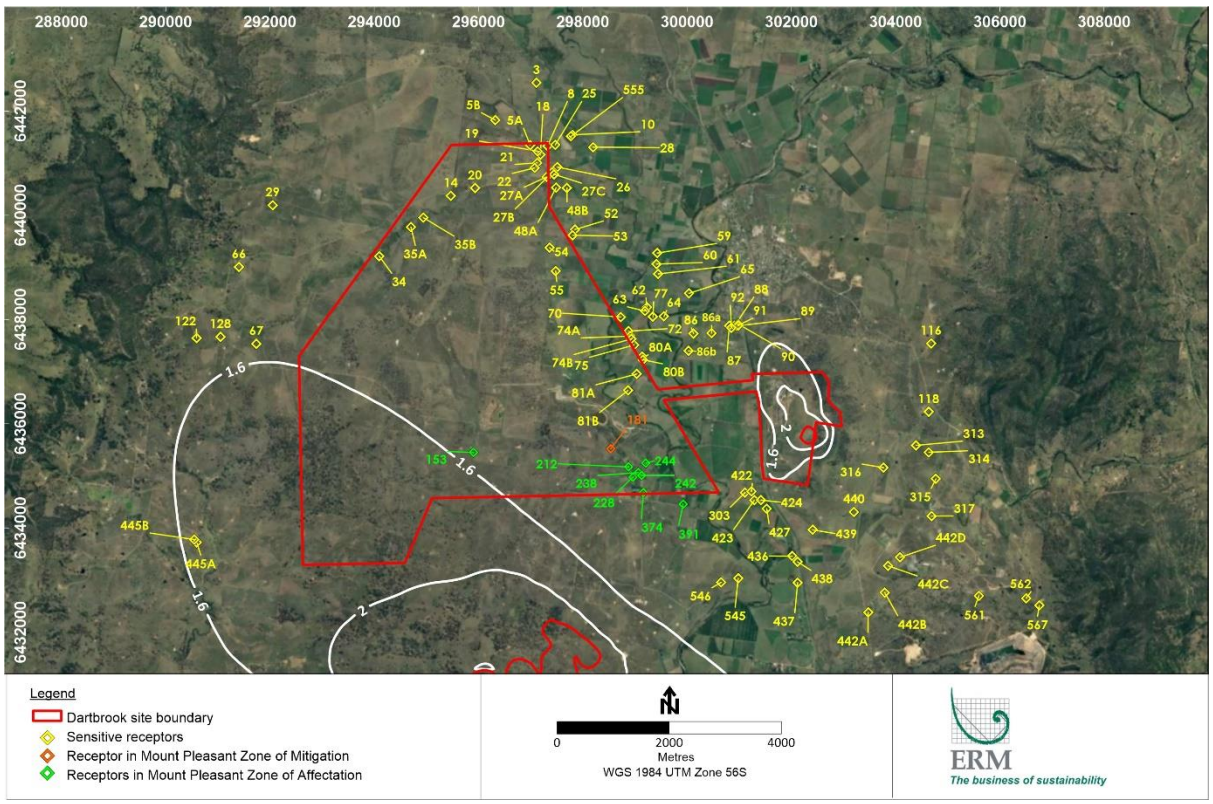


Figure 9-8: Predicted annual average dust deposition concentrations (g/m^2/month) – Cumulative

9.3 24-hour average concentrations

9.3.1 Introduction

It is important to note that it is not possible to accurately predict cumulative 24-hour average concentrations many years into the future using dispersion modelling, principally due to the variability in ambient levels and spatial and temporal variation in any day-to-day anthropogenic activity. Experience shows that the worst-case 24-hour PM_{10} concentrations are strongly influenced by other sources in the area, such as bushfires and inland dust storms, which are unpredictable.

It is also important to note that individual contour plots do not represent one moment in time, but rather the maximum 24-hour average that could potentially occur at a location over the period of a year.

The cumulative concentrations were calculated by adding the maximum predicted 24-hour average concentration due to the Modification and Mount Pleasant to the corresponding concentration measured at DPIE Aberdeen on the same day for the representative year (2014).

9.3.2 PM_{10}

Table 9-5 presents the maximum predicted 24-hour average concentrations of PM_{10} at each of the sensitive receptor locations due to the Modification and cumulatively. Note that the maximum concentration at each receptor resulting from the different operations will not necessarily occur on the same day. That is, the maximum contribution from Dartbrook, may not necessarily occur on the same day as the maximum contribution from Mt Pleasant or the background, at that same location.

A discussion of the results for the Modification and with the inclusion of background concentrations are presented below.

There are no sensitive receptors predicted to experience 24-hour average PM_{10} concentrations above the VLAMP criterion of 50 µg/m^3 due to the Modification alone.

A contour plot of the maximum predicted 24-hour average concentrations due to the Modification is presented in Figure 9-9.

As the background data already contains two days above the impact assessment criterion of 50 µg/m^3 (see Section 5.2.3), all sensitive receptors are predicted to experience 24-hour average PM_{10} concentrations above the NSW EPA impact assessment criterion of 50 µg/m^3 when including background concentrations and the predicted contribution from Mt Pleasant Mine. The high PM_{10} concentrations on these two days are attributed to natural events (fires or dust storms). Accordingly, these exceedances would occur regardless of the Modification and have been disregarded.

When considering additional exceedances (per the Approved Methods), there are seven receptors predicted to have one additional day where the cumulative concentration exceeds the criteria. However, it is noted that all these occur at the background concentration recorded on 10 February 2014. As discussed in Section 5.2.3, a 24-hour average PM_{10} concentration of 48.7 µg/m^3 was recorded at DPIE Aberdeen on this day due to a large bush fire in the area. Elevated concentrations were also recorded at other DPIE stations in the region on the same day indicating that this was the result of a regional event rather than due to local sources.

The concentration recorded at DPIE Aberdeen on 10 February 2014 is the third highest recorded 24-hour average PM_{10} concentration during 2014 but is still below the NSW EPA impact assessment criterion of 50 µg/m^3. If this day was removed from the analysis (due to the influence of natural events) there would be no additional exceedances of the EPA PM_{10} 24-hour average impact assessment criterion of 50 µg/m^3.

Figure 9-10 to Figure 9-16 presents the cumulative 24-hour average PM_{10} concentrations for each day of the year for each of the seven residences (29, 66, 67, 122, 128, 445A, 445B) showing an additional day of exceedance.

Table 9-5: Predicted 24-hour average PM_{10} from the Modification alone, Mount Pleasant alone and cumulatively

Receptor ID	Modification only	Mount Pleasant only	Cumulative	
	DPE VLAMP criteria = 50 µg/m^3		NSW EPA impact assessment criteria = 50 µg/m^3	Additional days > 50 µg/m^3
3	0.4	2.4	**51**	0
8	0.6	3.1	**51**	0
10	0.7	3.1	**51**	0
14	1.0	3.5	**51**	0
18	0.7	3.1	**51**	0
19	0.7	3.0	**51**	0
20	1.1	3.3	**51**	0
21	0.7	3.1	**51**	0
22	0.7	3.1	**51**	0
25	0.6	3.1	**51**	0
26	0.6	3.4	**51**	0
28	0.6	3.1	**51**	0
29	1.5	4.2	**51**	**1**
34	1.2	5.3	**51**	0
52	0.6	4.1	**51**	0
53	0.6	4.1	**51**	0
54	0.5	3.9	**51**	0
55	0.5	4.0	**51**	0
59	0.7	3.0	**51**	0
60	0.7	3.2	**51**	0
61	0.7	3.3	**51**	0
62	0.7	3.9	**51**	0
63	0.6	3.9	**51**	0
64	0.6	3.9	**51**	0
65	0.9	3.3	**51**	0
66	1.1	4.7	**52**	**1**
67	0.7	5.4	**52**	**1**
70	0.6	4.8	**51**	0
72	0.6	4.8	**51**	0
75	0.7	4.9	**51**	0
77	0.6	4.0	**51**	0
87	2.3	3.2	**51**	0
88	2.5	3.2	**51**	0
89	2.6	3.1	**51**	0
90	2.6	3.1	**51**	0
91	2.6	3.1	**51**	0
92	2.3	3.2	**51**	0
116	0.7	1.7	**51**	0
118	1.0	2.1	**51**	0

Receptor ID	Modification only	Mount Pleasant only	Cumulative	
	DPE VLAMP criteria = 50 µg/m^3		NSW EPA impact assessment criteria = 50 µg/m^3	Additional days > 50 µg/m^3
122	0.8	4.3	**52**	**1**
128	0.6	4.5	**52**	**1**
303	2.6	5.5	**52**	0
313	1.4	2.3	**51**	0
314	1.3	2.4	**51**	0
315	1.3	2.5	**51**	0
316	2.0	2.4	**51**	0
317	0.9	2.5	**51**	0
422	3.1	5.3	**52**	0
423	2.8	5.2	**52**	0
424	2.7	5.0	**52**	0
427	1.7	4.8	**52**	0
436	0.8	5.3	**51**	0
437	0.8	6.1	**51**	0
438	0.8	5.4	**51**	0
439	0.9	4.5	**51**	0
440	1.2	3.4	**51**	0
545	1.9	8.2	**51**	0
546	2.0	9.8	**52**	0
555	0.7	3.1	**51**	0
561	0.6	4.2	**51**	0
562	0.5	4.2	50	0
567	0.5	3.9	50	0
27A	0.6	3.4	**51**	0
27B	0.6	3.4	**51**	0
27C	0.6	3.4	**51**	0
35A	1.1	4.3	**51**	0
35B	0.9	3.9	**51**	0
442A	0.5	5.7	**51**	0
442B	0.6	4.4	**51**	0
442C	0.9	3.8	**51**	0
442D	1.0	3.5	**51**	0
445A	0.2	6.6	**55**	**1**
445B	0.2	6.5	**55**	**1**
48A	0.5	3.5	**51**	0
48B	0.5	3.6	**51**	0
5A	0.7	2.9	**51**	0
5B	0.7	2.5	**51**	0
74A	0.6	4.9	**51**	0
74B	0.6	4.9	**51**	0
80A	0.7	4.8	**51**	0

Receptor ID	Modification only	Mount Pleasant only	Cumulative	
	DPE VLAMP criteria = 50 µg/m^3		NSW EPA impact assessment criteria = 50 µg/m^3	Additional days > 50 µg/m^3
80B	0.8	4.8	**51**	0
81A	0.9	5.5	**51**	0
81B	1.5	6.5	**51**	0
86	0.9	3.8	**51**	0
181	0.9	9.6	**51**	0
212	1.0	9.8	**51**	0
228	0.9	9.7	**51**	0
238	0.9	9.2	**51**	0
242	0.9	8.8	**51**	0
244	1.1	7.9	**51**	0
374	0.9	8.9	**51**	0
391	1.5	6.1	**51**	0
153	1.7	11.6	**52**	0
86a	1.6	3.6	**51**	0
86b	0.9	4.2	**51**	0

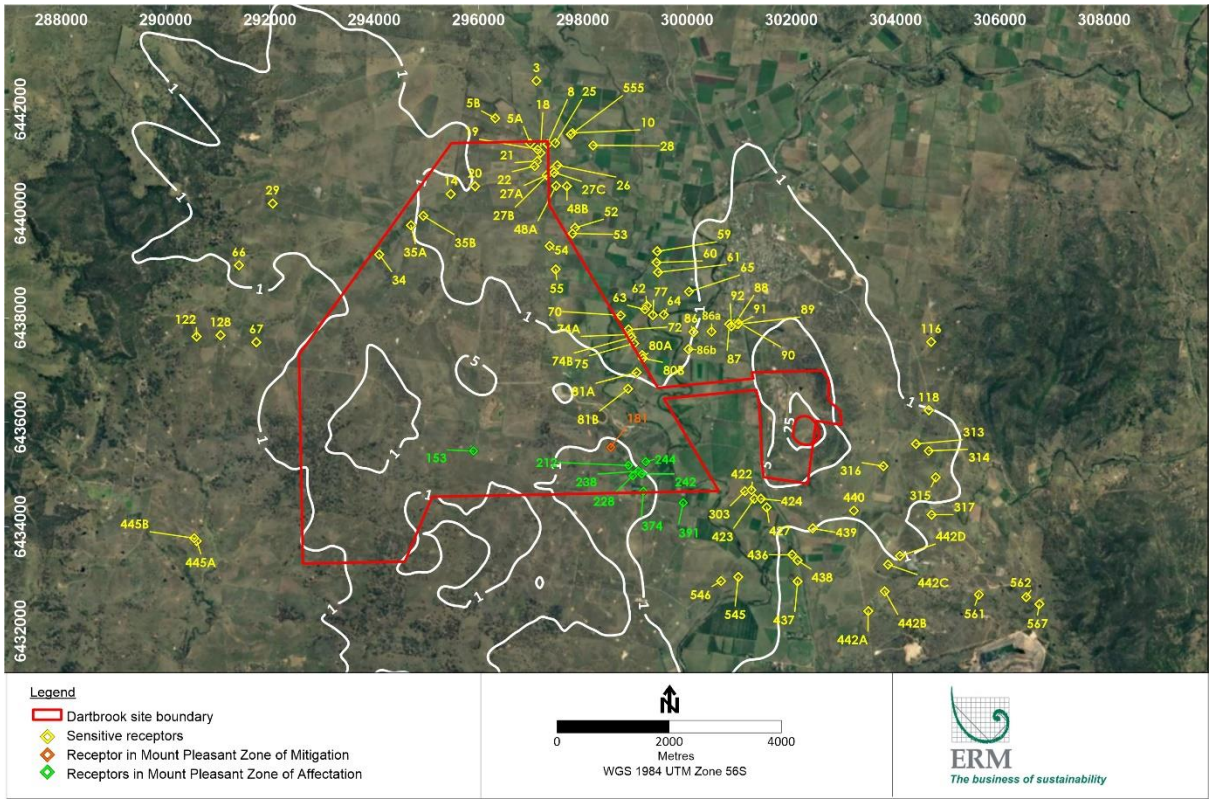


Figure 9-9: Maximum predicted 24-hour average PM_{10} concentrations (µg/m^3) – Modification only

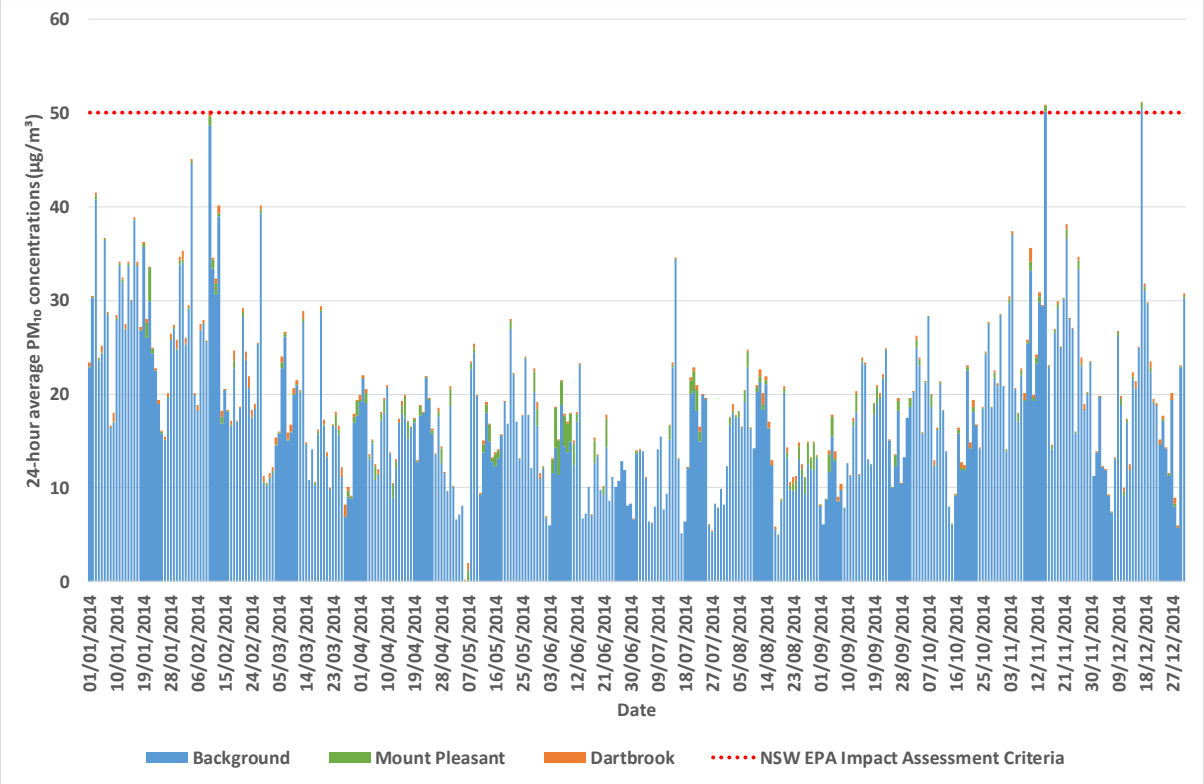


Figure 9-10: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 29 for each day of the year

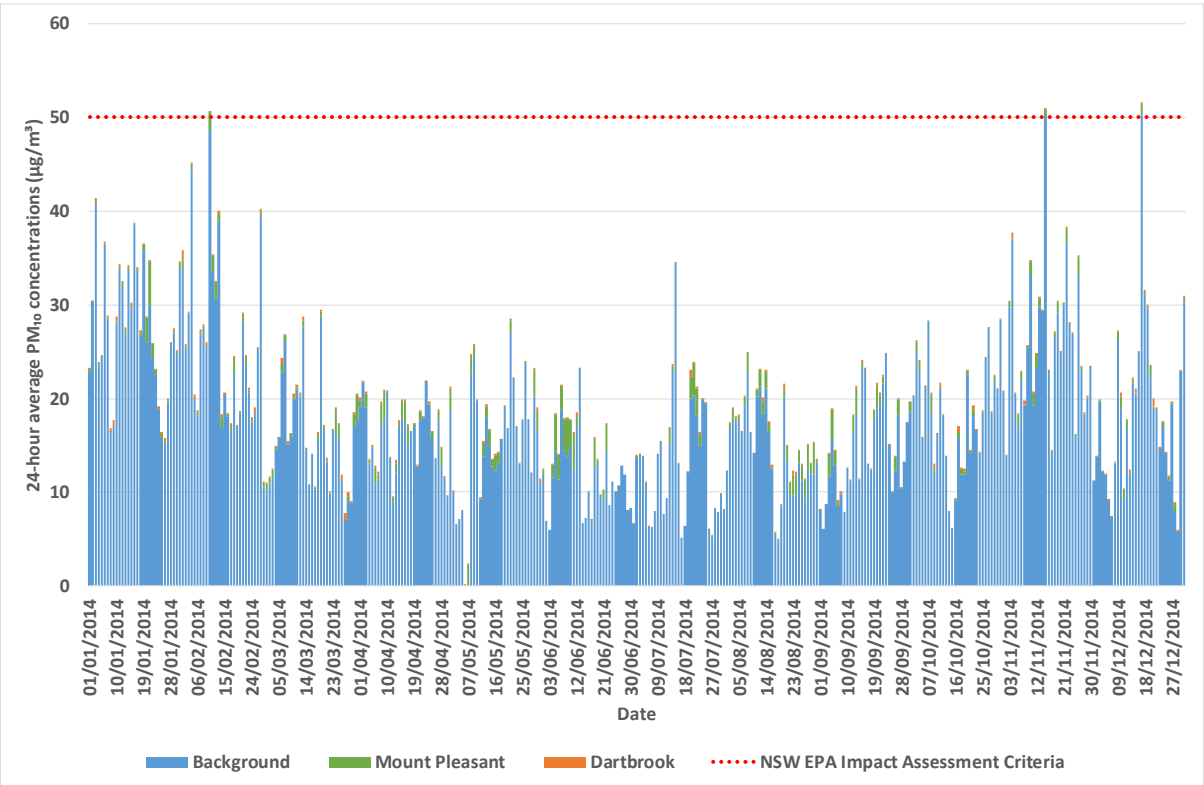


Figure 9-11: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 66 for each day of the year

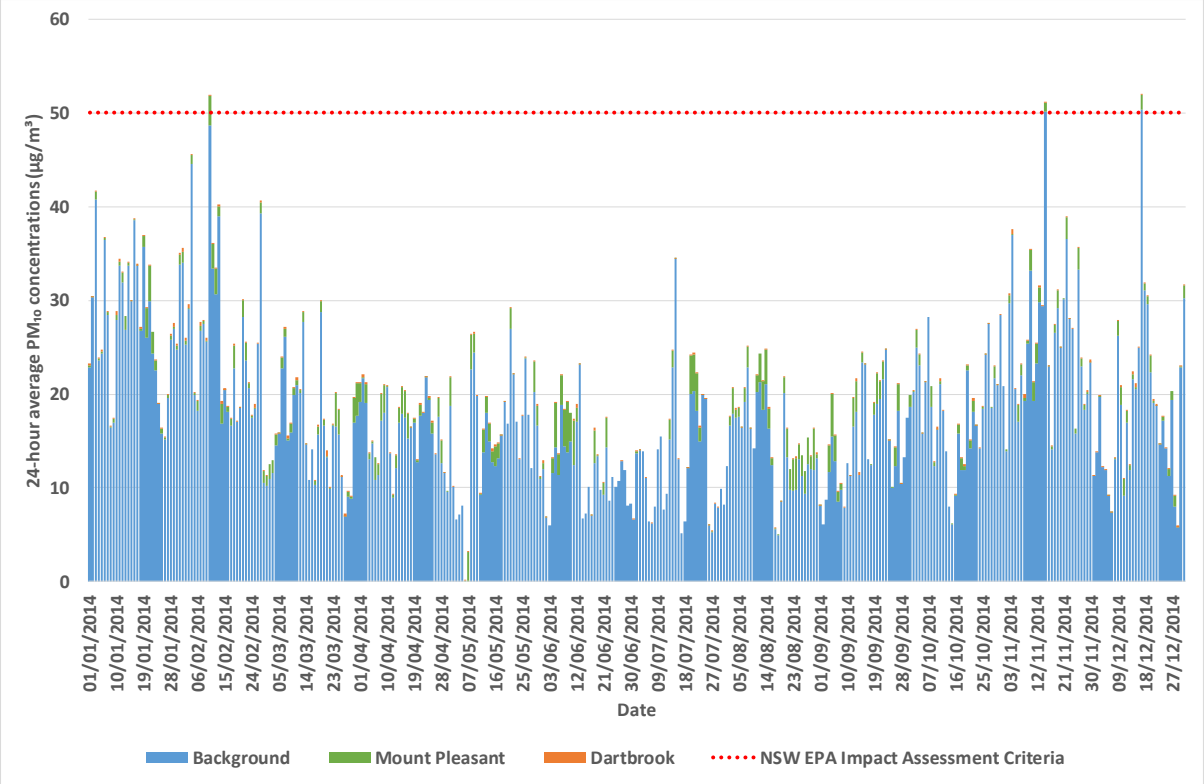


Figure 9-12: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 67 for each day of the year

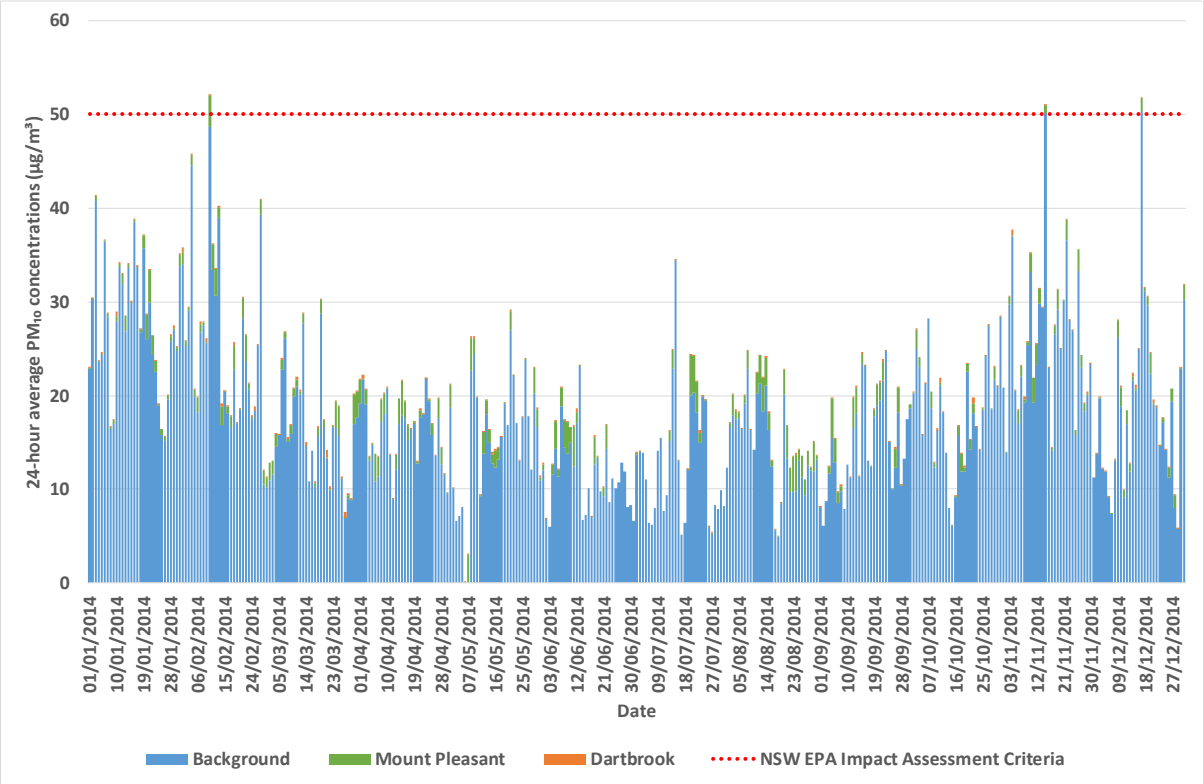


Figure 9-13: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 122 for each day of the year

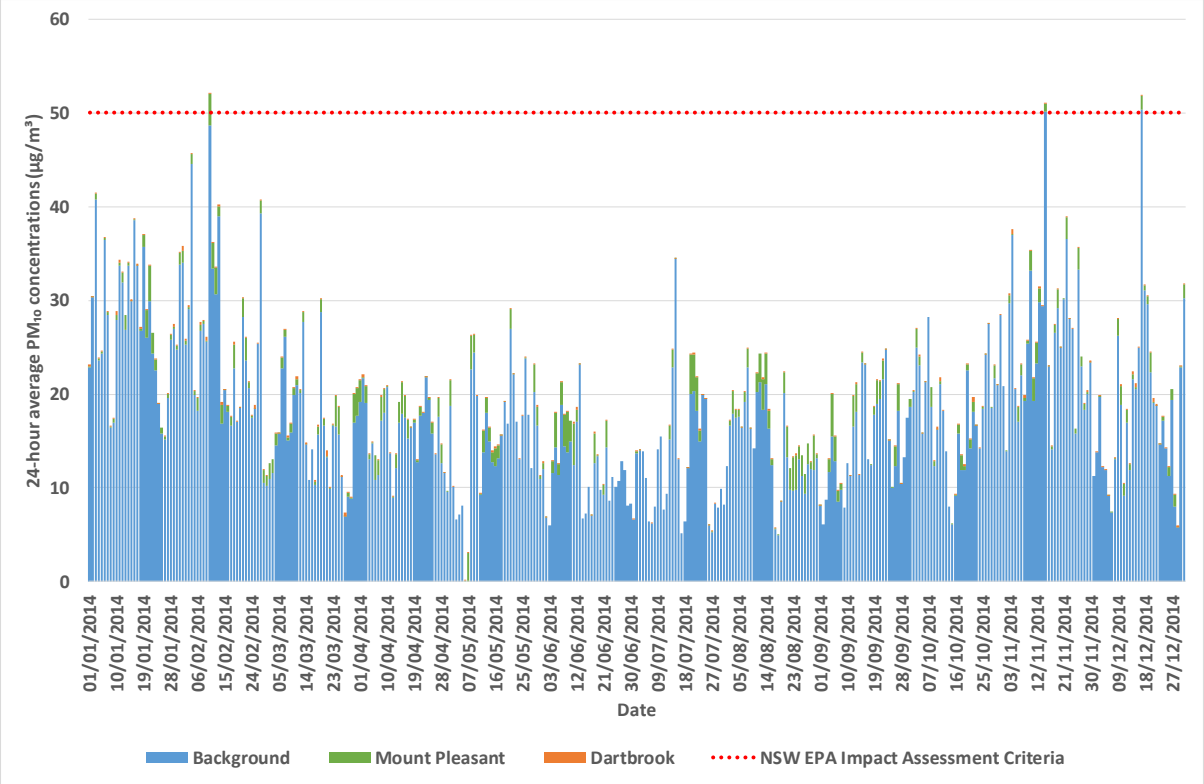


Figure 9-14: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 128 for each day of the year

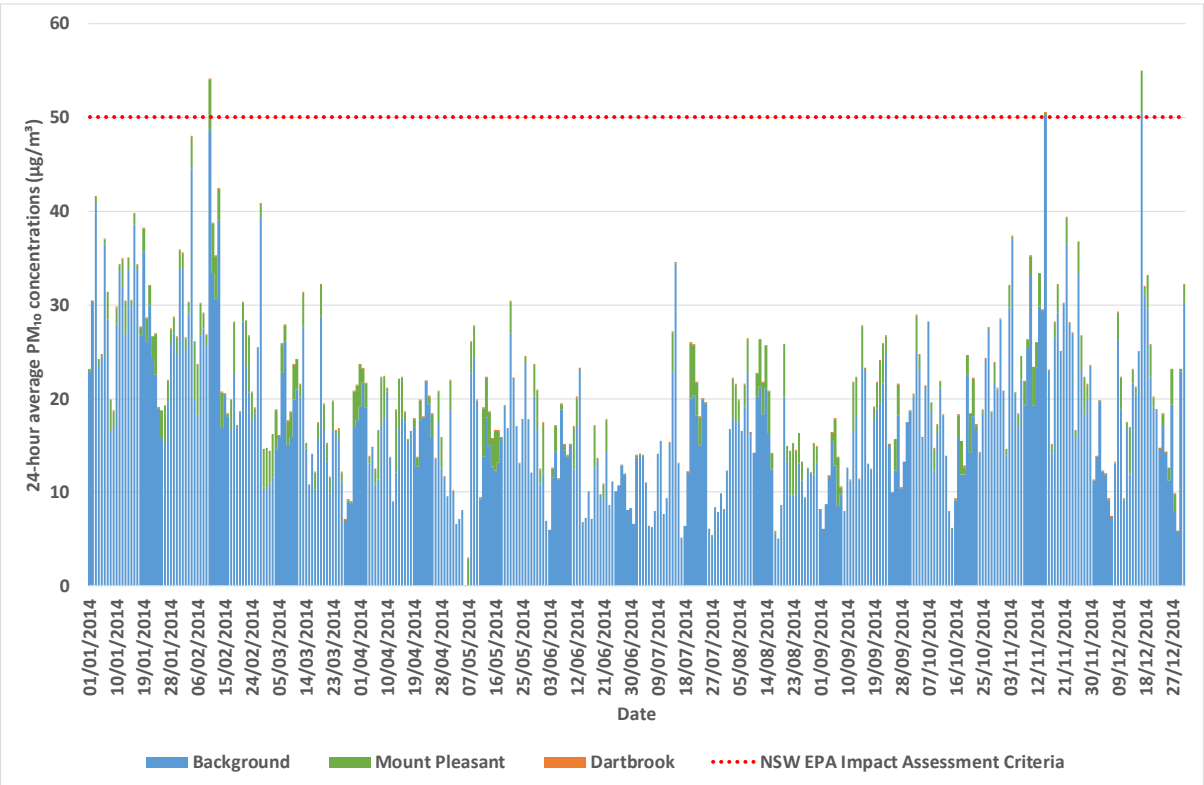


Figure 9-15: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 445A for each day of the year

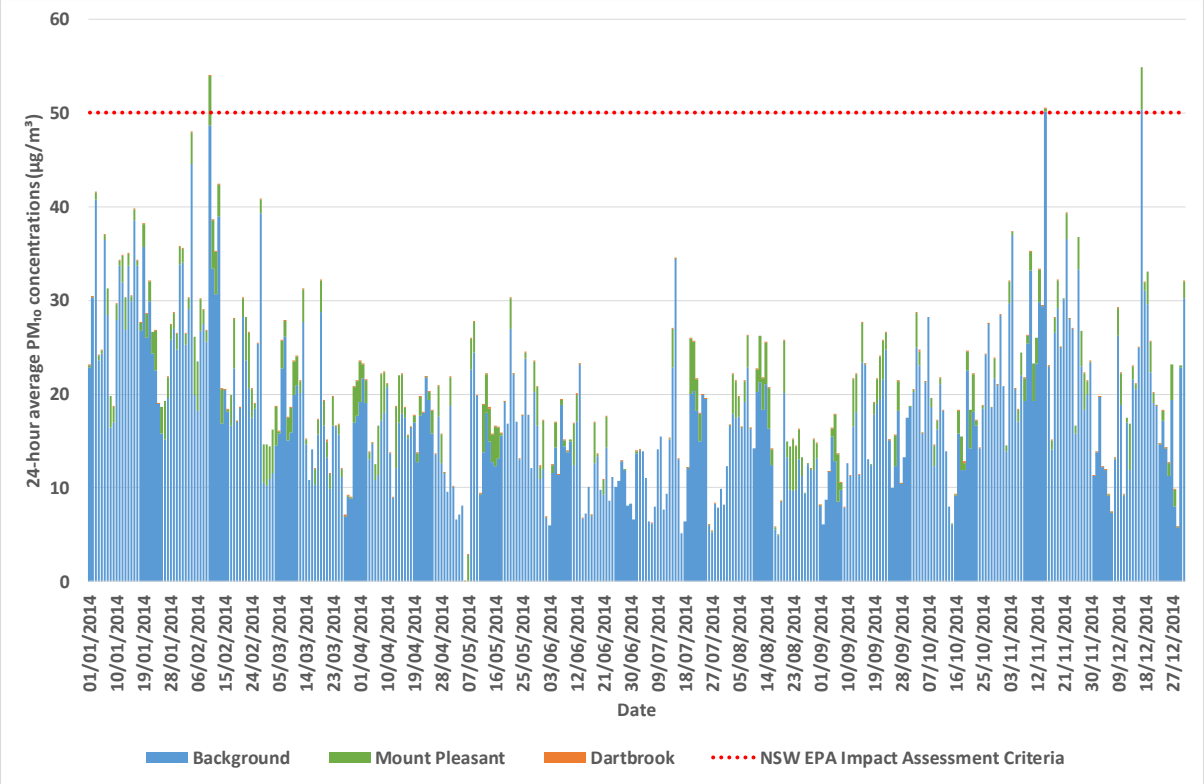


Figure 9-16: Cumulative 24-hour average PM_{10} concentrations (µg/m^3) for Residence 445B for each day of the year

As discussed, the additional day of exceedances all occurred on the same day – 10 February 2014. Figure 9-18 and Table 9-7 present the source contribution to 24-hour average PM_{10} concentrations on 10 February 2014 for each of the seven receptors showing an additional exceedance. It can be seen that the background concentrations are dominating the total concentrations and the contribution from the Modification is small. At all receptors, the contribution of the Modification alone to the total concentration is 1% or less. The maximum contribution is at Receptor 29 and is 0.54 µg/m^3. At receptors 66, 67, 122, 128, 445A and 445B, the sum of the background concentration and the Mount Pleasant contribution is greater than the criteria (50 µg/m^3). In these instances, the exceedance would occur regardless of whether Dartbrook Mine is operating.

Table 9-6: Source contribution to 24-hour average PM_{10} concentrations (µg/m^3) on 10 February 2014 for receptors showing an additional day of exceedances

Receptor	Background	Mt Pleasant	Total before modification	Modification	Total	Percentage contribution from Modification	Criterion
R29	48.7	0.97	49.67	0.54	50.21	1	50
R66	48.7	1.92	50.62	0.07	50.69	<1	
R67	48.7	3.16	51.86	0.03	51.88	<1	
R122	48.7	3.34	52.04	0.01	52.05	<1	
R128	48.7	3.35	52.05	0.02	52.07	<1	
R445A	48.7	5.36	54.06	0.01	54.06	<1	
R445B	48.7	5.20	53.90	0.01	53.90	<1	

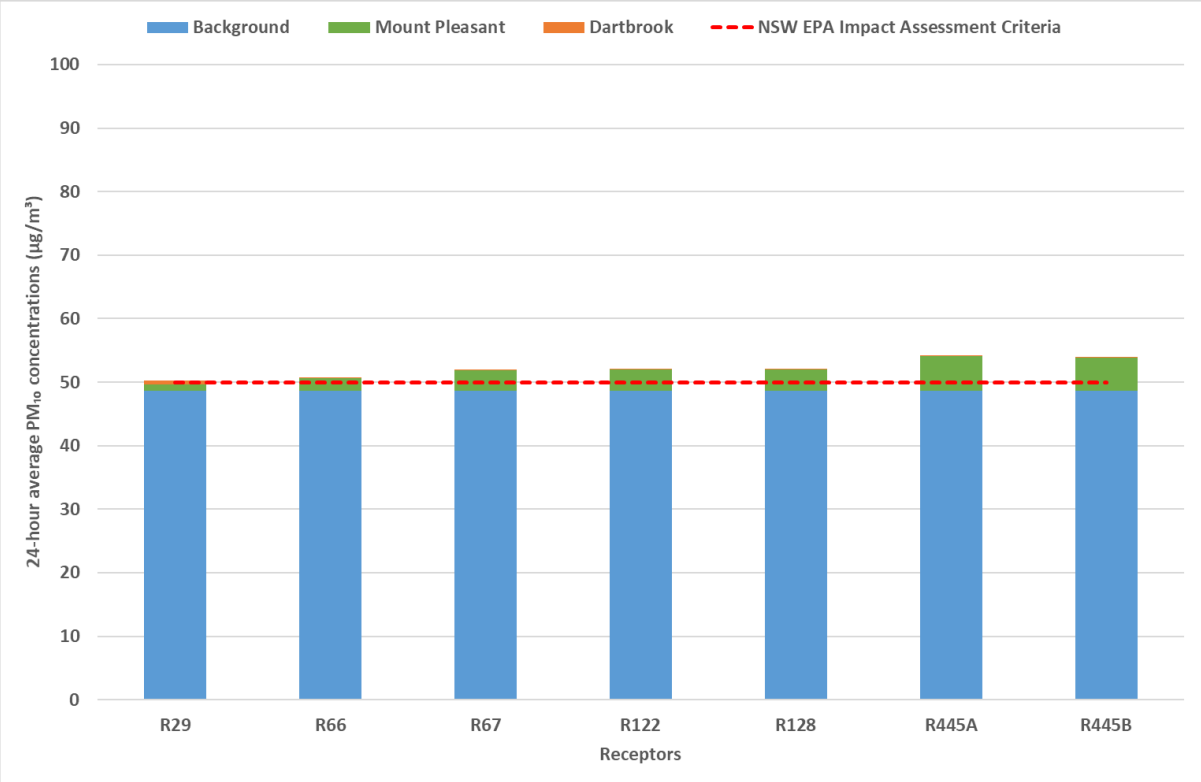


Figure 9-17: Source contribution to 24-hour average PM_{10} concentrations (µg/m^3) on 10 February 2014 for receptors showing an additional day of exceedances

9.3.3 $PM_{2.5}$

Table 9-7 presents the maximum predicted 24-hour average concentrations of $PM_{2.5}$ at each of the sensitive receptor locations due to the Modification and cumulatively.

Contour plots of the maximum predicted 24-hour average concentrations due to the Modification are presented in Figure 9-18.

A discussion of the results for the Modification and with the inclusion of background concentrations are presented below.

There are no sensitive receptors predicted to experience 24-hour average $PM_{2.5}$ concentrations above the impact assessment criterion of 25 µg/m^3 due to the Modification.

There are no sensitive receptors predicted to experience 24-hour average $PM_{2.5}$ concentrations above the impact assessment criterion of 25 µg/m^3 when including background concentrations.

Table 9-7: Predicted 24-hour average $PM_{2.5}$ from the Modification alone, Mount Pleasant alone and cumulatively

Receptor ID	Modification only	Mount Pleasant only	Cumulative	
	Assessment criteria = N/A		NSW EPA impact assessment criteria = 25 µg/m^3	Additional days > 25 µg/m^3
3	0.2	0.6	21.2	0
8	0.3	0.8	21.2	0
10	0.4	0.7	21.2	0
14	0.5	0.8	21.3	0
18	0.3	0.8	21.2	0
19	0.3	0.8	21.2	0
20	0.6	0.9	21.3	0
21	0.4	0.8	21.2	0
22	0.4	0.8	21.2	0
25	0.3	0.8	21.2	0
26	0.3	0.8	21.2	0
28	0.3	0.7	21.2	0
29	0.8	0.9	21.3	0
34	0.6	1.1	21.4	0
52	0.2	0.9	21.2	0
53	0.2	0.9	21.2	0
54	0.3	1.0	21.2	0
55	0.3	1.0	21.2	0
59	0.3	0.8	21.2	0
60	0.3	0.8	21.2	0
61	0.3	0.9	21.2	0
62	0.3	1.0	21.2	0
63	0.2	1.0	21.2	0
64	0.3	1.0	21.2	0
65	0.4	0.8	21.2	0
66	0.6	0.9	21.5	0
67	0.3	1.1	21.4	0
70	0.3	1.0	21.2	0
72	0.3	1.1	21.2	0
75	0.4	1.1	21.2	0
77	0.2	1.0	21.2	0
87	0.8	0.8	21.2	0
88	1.0	0.8	21.2	0
89	1.1	0.8	21.3	0
90	1.1	0.8	21.3	0
91	1.1	0.8	21.3	0
92	0.9	0.8	21.2	0
116	0.3	0.5	21.2	0
118	0.5	0.6	21.2	0

Receptor ID	Modification only	Mount Pleasant only	Cumulative	
	Assessment criteria = N/A		NSW EPA impact assessment criteria = 25 µg/m^3	Additional days > 25 µg/m^3
122	0.4	1.0	21.5	0
128	0.3	0.9	21.5	0
303	0.7	1.0	21.3	0
313	0.6	0.7	21.2	0
314	0.6	0.7	21.2	0
315	0.4	0.7	21.2	0
316	0.5	0.8	21.2	0
317	0.3	0.8	21.2	0
422	0.8	0.9	21.3	0
423	0.7	0.9	21.3	0
424	0.7	0.9	21.3	0
427	0.6	0.9	21.2	0
436	0.3	1.2	21.2	0
437	0.3	1.4	21.2	0
438	0.3	1.2	21.2	0
439	0.3	1.1	21.2	0
440	0.4	1.0	21.2	0
545	0.5	1.4	21.2	0
546	0.5	1.7	21.2	0
555	0.4	0.7	21.2	0
561	0.3	0.8	21.2	0
562	0.2	0.8	21.2	0
567	0.2	0.8	21.2	0
27A	0.3	0.8	21.2	0
27B	0.3	0.8	21.2	0
27C	0.3	0.8	21.2	0
35A	0.5	1.0	21.5	0
35B	0.4	0.9	21.4	0
442A	0.3	1.8	21.2	0
442B	0.3	1.4	21.2	0
442C	0.3	1.1	21.2	0
442D	0.3	1.0	21.2	0
445A	0.1	1.3	21.3	0
445B	0.1	1.3	21.3	0
48A	0.3	0.9	21.2	0
48B	0.3	0.8	21.2	0
5A	0.4	0.8	21.2	0
5B	0.4	0.7	21.2	0
74A	0.3	1.1	21.2	0
74B	0.3	1.1	21.2	0
80A	0.4	1.1	21.2	0

Receptor ID	Modification only	Mount Pleasant only	Cumulative	
	Assessment criteria = N/A		NSW EPA impact assessment criteria = 25 µg/m^3	Additional days > 25 µg/m^3
80B	0.4	1.2	21.2	0
81A	0.4	1.2	21.2	0
81B	0.8	1.3	21.2	0
86	0.4	0.9	21.2	0
181	0.5	1.8	21.2	0
212	0.5	1.7	21.2	0
228	0.5	1.7	21.2	0
238	0.5	1.7	21.2	0
242	0.5	1.6	21.2	0
244	0.6	1.5	21.2	0
374	0.4	1.6	21.2	0
391	0.5	1.1	21.2	0
153	0.8	2.2	21.4	0
86a	0.4	0.9	21.2	0
86b	0.4	1.0	21.2	0

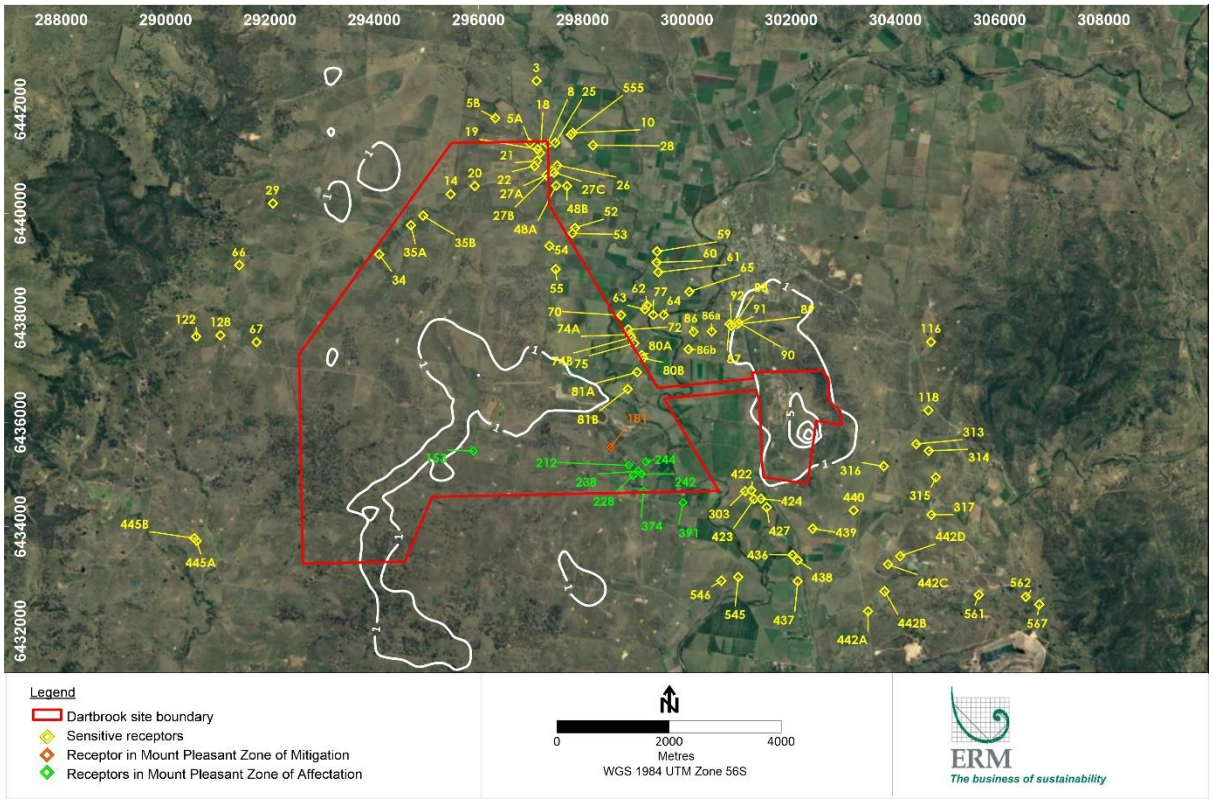


Figure 9-18: Maximum predicted 24-hour average $PM_{2.5}$ concentrations (µg/m^3) – Modification only

10. MANAGEMENT AND MITIGATION

The Modification has the potential to generate dust. It is therefore necessary to take reasonable and practicable measures to prevent or minimise dust impacts at all sensitive residences and in particular those residences predicted to experience 24-hour PM_{10} concentrations above the impact assessment criteria.

AQC is committed to best practice dust management and control. This includes the application of dust controls in accordance with best practice monitoring and a proactive dust management system as stated in this assessment (see Section 7).

The existing air quality management plan will be updated to include the additional commitments in this assessment for the approval for relevant regulators.

11. GREENHOUSE GAS ASSESSMENT

11.1 Relevant legislation

11.1.1 International framework

11.1.1.1 Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is a panel established in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) to provide independent scientific advice on climate change. The panel was originally asked to prepare a report, based on available scientific information, on all aspects relevant to climate change and its impacts and to then formulate realistic response strategies. This first assessment report of the IPCC served as the basis for negotiating the United Nations Framework Convention on Climate Change (UNFCCC).

The IPCC also produces a variety of guidance documents and recommended methodologies for GHG emissions inventories, including (for example):

- 2006 IPCC Guidelines for National GHG Inventories; and
- Good Practice Guidance and Uncertainty Management in National GHG Inventories (2000).

Since the UNFCCC entered into force in 1994, the IPCC remains the pivotal source for scientific and technical information relevant to GHG emissions and climate change science.

The IPCC operates under the following mandate: “to provide the decision-makers and others interested in climate change with an objective source of information about climate change”. The IPCC does not conduct any research nor does it monitor climate-related data or parameters. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide, relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation. IPCC reports should be neutral with respect to policy, although they need to deal objectively with policy relevant scientific, technical and socio economic factors. They should be of high scientific and technical standards, and aim to reflect a range of views, expertise and wide geographical coverage” (IPCC, 2011).

The stated aims of the IPCC are to assess scientific information relevant to:

- Human-induced climate change;
- The impacts of human-induced climate change; and
- Options for adaptation and mitigation.

IPCC reports are widely cited within international literature, and are generally regarded as authoritative.

11.1.1.2 United National Framework Convention on Climate Change

The UNFCCC sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource, the stability of which can be affected by industrial and other emissions of CO_2 and other GHGs. The convention has near-universal membership, with 172 countries (parties) having ratified the treaty, the Kyoto Protocol.

Under the UNFCCC, governments:

- Gather and share information on GHG emissions, national policies and best practices.
- Launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries.
- Cooperate in preparing for adaptation to the impacts of climate change.

11.1.1.3 Kyoto Protocol

The Kyoto Protocol entered into force on 16 February 2005. The Kyoto Protocol built upon the UNFCCC by committing to individual, legally binding targets to limit or reduce GHG emissions. Annex I Parties (which includes Australia) are countries that were members of the Organisation for Economic Co-operation and Development (OECD) in 1992, plus countries with economies in transition such as Russia. The GHGs included in the Kyoto Protocol were:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulfur hexafluoride (SF_6)

Each of the above gases has a different effect on the earth's warming and this is a function of radiative efficiency and lifetime in the atmosphere for each individual gas. To account for these variables, each gas is given a 'global warming potential' (GWP) that is normalised to CO_2. For example, CH_4 has a GWP of 28 over a 100 year lifetime (IPCC, 2014). This factor is multiplied by the total mass of gas to be released to provide a CO_2 equivalent mass, termed 'CO_2-equivalent'.The emission reduction targets were calculated based on a party's domestic GHG emission inventories (which included land use change and forestry clearing, transportation and stationary energy sectors). Domestic inventories required approval by the Kyoto Enforcement Branch. The Kyoto Protocol required developed countries to meet national targets for GHG emissions over a five year period between 2008 and 2012.

To achieve their targets, Annex I Parties had to implement domestic policies and measures. The Kyoto Protocol provided an indicative list of policies and measures that might help mitigate climate change and promote sustainable development.

Under the Kyoto Protocol, developed countries could use a number of flexible mechanisms to assist in meeting their targets. These market-based mechanisms include:

- Joint Implementation – where developed countries invest in GHG emission reduction projects in other developed countries.
- Clean Development Mechanism – where developed countries invest in GHG emission reduction projects in developing countries.

Annex I countries that failed to meet their emissions reduction targets during the 2008-2012 period were liable for a 30 per cent penalty (additional to the level of exceedance). A second commitment period was agreed in 2012 that spans from 2013 to 2020, whereby 37 countries, including Australia, were bound to emissions targets (DFAT, 2015).

11.1.1.4 Paris Agreement

In 2015, a historic global climate agreement was reached under the UNFCCC at the 21st Conference of the Parties (COP21) in Paris (known as the Paris Agreement). The Paris Agreement sets in place a durable and dynamic framework for all countries to take action on climate change from 2020 (that is, after the Kyoto period), building on existing efforts in the period up to 2020. Key outcomes of the Paris Agreement include:

- A global goal to hold average temperature increase to well below 2°C and pursue efforts to keep warming below 1.5°C above pre-industrial levels.
- All countries to set mitigation targets from 2020 and review targets every five years to build ambition over time, informed by a global stocktake.

- Robust transparency and accountability rules to provide confidence in countries' actions and track progress towards targets.
- Promoting action to adapt and build resilience to climate change.
- Financial, technological and capacity building support to help developing countries implement the Paris Agreement.

Australia ratified the Paris Agreement in November 2016. Australia's target under the Paris Agreement is to reduce emissions by 26-28 per cent below 2005 levels by the year 2030, progressing the levels of reduction required to meet the Kyoto Protocol targets.

11.1.2 Australian context

According to the Department of Environment and Energy (DoEE), Australia's GHG emissions have increased by 27.9% since 1990 reaching 534.7 Million tonnes of CO_2-equivalent ($MtCO_2$-e) in 2016 (excluding Land Use, Land Use Change and Forestry - LULUCF) (DoEE, 2017). Stationary energy excluding electricity includes emissions from direct combustion of fuels, predominantly in the manufacturing, mining, residential and commercial sectors. In 2016, stationary energy excluding electricity accounted for 18% of Australia's national inventory (DoEE, 2016).

11.1.2.1 State Environment Planning Policy (Mining, Petroleum and Extractive Industries) 2007

Clause 14(2) of State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007 – The Mining SEPP, provides:

"(2) in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions".

In this context, although the GHG protocol does not require indirect or downstream emissions (Scope 3) to be reported, they are included in this assessment.

11.1.2.2 National Greenhouse and Energy Reporting Framework

The National Greenhouse and Energy Reporting Act 2007 (Cth) (the NGER Act) establishes a mandatory obligation on corporations which exceed defined thresholds to report GHG emissions, energy consumption, energy production and other related information.

Corporate and facility reporting thresholds for GHG emissions and energy consumption or energy production are provided in Table 11-1.

Table 11-1 NGER Act reporting thresholds per financial year

Parameter	Reporting Threshold	
	Corporate	Facility
GHG Emissions (Scope 1 & 2) (kt CO_2-e)	50	25
Energy production (TJ)	200	100
Energy consumption (TJ)	200	100

Source: Clean Energy Regulator (2019)

If a corporation has operational control over facilities whose GHG emissions or energy use in a given reporting year:

- Individually exceed the relevant facilities threshold; or
- When combined with other facilities under the corporation's operational control, exceed the relevant corporate thresholds.

That corporation must report the relevant GHG emissions or energy use (as the case may be) for that year under the NGER Act. For example, this may include construction or other contractors.

It is anticipated that during construction, there will be multiple parties with operational control over different aspects of the site development. For this reason, while it is anticipated that there is likely to be some reporting requirement under the NGER scheme, this is likely to be apportioned across the NGER reporting corresponding to several corporations.

Once operational, the Project's total Scope 1 and 2 GHG emissions are anticipated to exceed 25,000 tonnes CO_2-e in a financial year. Because of this, the reporting of emissions is expected to be required under the NGER scheme.

Dartbrook reports under the NGER scheme. The total scope 1 and 2 emissions reported under this scheme are shown in Table 11.2 (Clean Energy Regulator, 2019). It is noted that Dartbrook was not actually operating at this time and so the majority of these scope 1 emissions are likely to be due to fugitive methane emissions. In the absence of any additional data, and to remain conservative, it is assumed that all these emissions are from fugitive methane. The calculations presented in Section 11.3.1.2 have assumed the same increase from 2017/18 to 2018/19 will apply going forward for the life of the project.

Table 11.2 Scope 1 and 2 emissions reported under the NGER scheme

Reporting year	Scope 1 emissions (t CO_2-e)	Scope 2 emissions (t CO_2-e)	Net energy consumed (GJ)
2017 / 18	89,453	4,891	21,685
2018 / 19	99,883	4,377	219,019

Source: Clean Energy Regulator (2019)

11.1.2.3 NSW Climate Change Policy Framework

The NSW Office of Environment and Heritage (now part of DPIE) published the NSW Climate Change Policy Framework in 2016, which aims to "maximise the economic, social and environmental wellbeing of NSW in the context of changing climate and current and emerging international and national policy settings and actions to address climate change". The long-term objectives of the Framework are to achieve net-zero emissions by 2050 and ensure NSW is more resilient and responsive to climate change. The key policy directions under the Framework are:

- Create an investment environment which manages the transition to reduced emissions
- Boost energy productivity and put downward pressure on energy bills
- Capture co-benefits and manage unintended impacts of external policies
- Take advantage of opportunities to grow new industries
- Reduce risks and damage to public and private assets arising from climate change
- Reduce climate change impacts on health and wellbeing
- Manage impacts on natural resources, ecosystems and communities

The Framework is being delivered through:

- A climate change fund strategic plan
- Developing value for emissions savings
- Embedding climate change considerations in government decision making
- Developing action plans and strategies and undertake additional policy investigation for sectors with risks, such as mining

11.2 Assessment methodology

Quantification of GHG emissions has been completed in accordance with the GHG Protocol (WRI & WBCSD, 2004), IPCC and Australian Government GHG accounting/classification systems.

This GHGA is also guided by the emission estimation methodologies endorsed under the National Greenhouse and Energy Reporting Regulations 2008 (the NGER Regulations) (as amended in 2019). These describe the detailed requirements for reporting under the NGER framework and also provide a basis for estimating emissions from proposed activities.

The Technical Guidelines for the Estimation of Greenhouse Gas Emissions by Facilities in Australia (the NGER Guidelines) (DoEE, 2017) support reporting under the NGER Act. They have been designed to assist corporations in understanding and applying the NGER Measurement Determination.

The NGER Guidelines are reporting year specific, and outline calculation methods and criteria for determining GHG emissions, energy production, energy consumption and potential GHG emissions embodied in combusted fuels. The latest published NGER Guidelines (at the time of writing) have been referenced.

11.2.1 The GHG protocol

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions. The GHG Protocol has been adopted by the International Organization for Standardisation, endorsed by GHG initiatives (such as the Carbon Disclosure Project) and is compatible with existing GHG trading schemes.

Under this protocol, three “scopes” of emissions (Scope 1, Scope 2 and Scope 3) are defined for GHG accounting and reporting purposes. This terminology has been adopted in Australian GHG reporting and measurement methods and has been employed in this assessment. The definitions for Scope 1, Scope 2 and Scope 3 emissions are provided in the following sections, with a visual representation provided in Figure 11-1.

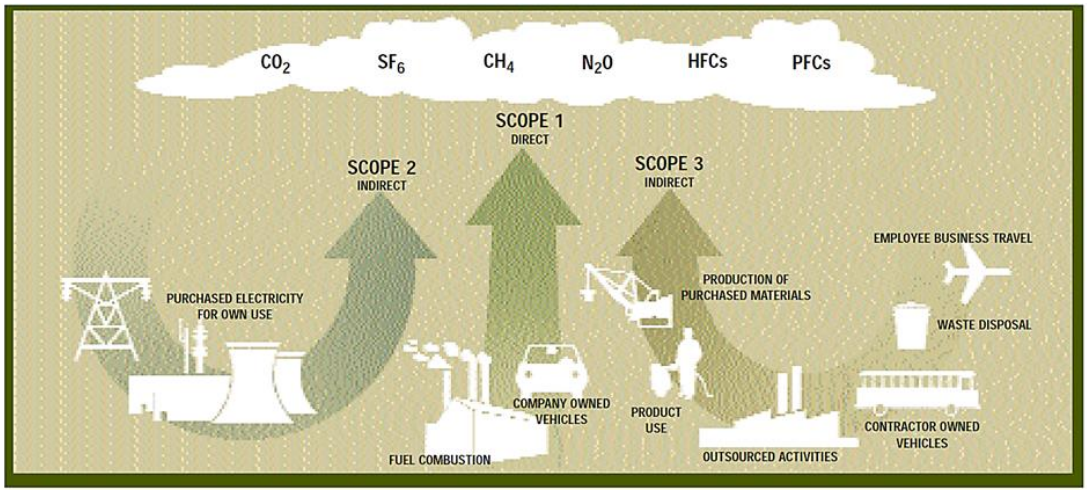


Figure 11-1: Overview of scope and emissions across a reporting entity

11.2.1.1 Scope 1: Direct greenhouse gas emissions

Direct GHG emissions are defined as those emissions that occur from sources that are owned or controlled by the reporting entity. Direct GHG gas emissions are those emissions that are principally the result of the following types of activities undertaken by an entity:

- Generation of electricity, heat or steam. These emissions result from combustion of fuels in stationary sources;
- Physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g., the manufacture of cement, aluminium, etc;
- Transportation of materials, products, waste and employees. These emissions result from the combustion of fuels in entity owned/controlled mobile combustion sources, e.g., trucks, trains, ships, aeroplanes, buses and cars; and
- Fugitive emissions. These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; HFC emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport.

11.2.1.2 Scope 2: Energy product use indirect greenhouse gas emissions

Scope 2 emissions are a category of indirect emissions that accounts for GHG emissions from the generation of purchased energy products (principally, electricity, steam/heat and reduction materials used for smelting) by the entity.

Scope 2 covers purchased electricity defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity. Scope 2 emissions physically occur at the facility where electricity is generated. Entities report the emissions from the generation of purchased electricity that is consumed in its owned or controlled equipment or operations as Scope 2.

11.2.1.3 Scope 3: Other indirect greenhouse gas emissions

Scope 3 emissions are defined as those emissions that are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 activities provided in the GHG Protocol are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

The GHG Protocol provides that reporting Scope 3 emissions is optional. If an organisation believes that Scope 3 emissions are a significant component of the total emissions inventory, these can be reported along with Scope 1 and Scope 2. However, the GHG Protocol notes that reporting Scope 3 emissions can result in double counting of emissions and can also make comparisons between organisations and/or products difficult because reporting is voluntary. Double counting needs to be avoided when compiling national (country) inventories under the Kyoto Protocol. The GHG Protocol also recognises that compliance regimes are more likely to focus on the “point of release” of emissions (i.e. direct emissions) and/or indirect emissions from the purchase of electricity. Notwithstanding that Scope 3 reporting is optional, they have been estimated and are reported in Section 11.3.3. As noted in Section 11.1.2.1, Scope 3 emissions are also required to be taken into consideration by consent authorities so should be calculated as part of the assessment process for the development application.

11.2.2 Assessment approach

GHG emissions have been estimated for the Project based upon the methods outlined in the following documents:

- The National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2008 (as amended 2019);
- Site specific information;

- The NGER Guidelines; and
- The NGA Factors.

11.3 Greenhouse gas calculations

The following sections present the GHG calculations and resultant estimated emissions from each of the GHG scopes as described in Section 11.2.1. All GHG calculations have been made using the relevant equations and emissions factors given within the NGER Measurement Determination. Data provided by Dartbrook has been used as input into these equations.

11.3.1 Calculation of scope 1 emissions

11.3.1.1 Diesel fuel consumption

Estimated annual consumption of diesel oil has been provided by Dartbrook. The total diesel accounted for within the data is equal to diesel used for transport, stationary and non-combustion purposes. Diesel is consumed on-site for the following activities:

- Exploration and drilling;
- Extraction of coal (underground);
- Operation of heavy machinery and diesel generators; and
- Coal handling.

Emissions for Scope 1 diesel consumption are calculated using the following method:

Method 1 – emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum based oils or greases (Subdivision 2.41 of the NGER Determination 2008 (as amended in 2019)).

GHG emissions from diesel consumption were estimated using the following equation:

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1000}$$

Where:

E_{ij}	=	Emissions of GHG from diesel combustion	(t CO_2-e)
Q_i	=	Quantity of fuel	(GJ)[1]
EC_i	=	Energy content of fuel	(GJ/kL)
EF_{ijoxec}	=	Emission factor (Scope 1) for diesel combustion	(kg CO_2-e/GJ)[2]

[1] GJ = giga joules

[2] kg CO_2-e/GJ = kilograms of carbon dioxide equivalents per gigajoule

Scope 1 fuel consumption emissions have been calculated using the energy content and emission factors from Part 3 of the NGER Measurement Determination and are presented in Table 11-3 and Table 11-4.

Table 11-3 Diesel (for stationary purposes) GHG emission factors – Scope 1

Fuel type	Energy Content (GJ/kL)	Emission factor (kg CO_2-e/GJ)		
		CO_2	CH_4	N_20
Diesel oil	38.6	69.9	0.1	0.2

Source: Schedule 1, Part 3 of the NGER Determination (2008) (as amended 2019).

The estimated annual and total GHG emissions from diesel usage are presented in Table 11-4.

Table 11-4 Annual diesel fuel consumption and GHG emissions

Year	Estimated Diesel Usage (kL/y)	Scope 1 Emissions (t CO_2-e)
2021	1,321	3,579
2022	1,803	4,866
2023	1,803	4,866
2024	1,803	4,866
2025	1,803	4,866
2026	1,803	4,866
2027	1,803	4,866
Total	**12,142**	**32,775**

11.3.1.2 Fugitive methane

As discussed in Section 11.1.2.2, Dartbrook reports scope 1 and 2 CO_2-e emissions under the NGER scheme and these have been reported for 2018 and 2019 when the mine was not operating. The assumption has been made that these are likely to therefore represent fugitive emissions of methane and increased slightly from 2018 to 2019. This is a conservative assumption but in the absence of other information this annual increase has been carried forward for the life of the project, as shown in Table 11-5.

The estimated GHG emissions by year are presented in Table 11-5.

Table 11-5 Annual estimated GHG emissions from fugitive methane

Year	Scope 1 Emissions (t CO_2-e)
2021	120,743
2022	131,173
2023	141,603
2024	152,033
2025	162,463
2026	172,893
2027	183,323
Total	**1,064,231**

11.3.2 Calculation of scope 2 emissions

11.3.2.1 Electricity consumption

Consumption of electricity has been provided by Dartbrook. Emissions for Scope 2 electricity consumption are calculated using the following method:

Method 1 – Indirect (scope 2) emission factors from consumption of purchased electricity from a grid (Subdivision 7.2 of the NGER Technical Guidelines 2008 (as amended in 2017).

GHG emissions from electricity consumption were estimated using the following equation:

$$Y = Q \times \frac{EF}{1000}$$

Where:

Y	=	Scope 2 Electricity emissions	(CO_2-e tonnes)
Q	=	Quantity of electricity purchased from the electricity grid during the year	(kWh/annum)[1]
EF	=	Scope 2 emission factor for the State of Territory in which the consumption occurs	(kg CO_2-e/kWh)[2]

[1] kWh/annum = kilowatt hours per annum

[2] kgCO_2-e/kWh = kilograms of carbon dioxide equivalents per kilowatt hour

Scope 2 emissions have been calculated using an emission factor of 0.83 kg CO_2-e/kWh for New South Wales and Australian Capital Territory as sourced from Part 7.2 of the NGER Technical Guidelines 2008 (as amended 2017).

The estimated annual and total GHG emissions from electricity usage are presented in Table 11-6.

Table 11-6 Projected electricity consumption and Scope 2 GHG emissions

Year	Estimated Electricity Consumption (kWh/y)	Scope 2 Emissions (t CO_2-e)
2021	43,400,000	36,022
2022	93,900,000	77,937
2023	93,900,000	77,937
2024	93,900,000	77,937
2025	93,900,000	77,937
2026	93,900,000	77,937
2027	93,900,000	77,937
Total	**606,800,000**	**503,644**

11.3.3 Calculation of scope 3 emissions

11.3.3.1 Energy production from product coal

Scope 3 greenhouse gas emissions from Dartbrook Mine have been estimated based upon the methods outlined in the following documents:

- The Corporate Value Chain (Scope 3) Accounting and Reporting Standard (Scope 3 Standard)
- The World Resources Institute/World Business Council for Sustainable Development (WRI/WBCSD) Greenhouse Gas Protocol The Greenhouse Gas Protocol – A Corporate Accounting and Reporting Standard Revised Edition (WRI/WBCSD, 2004) (hereafter referred to as the GHG Protocol);
- National Greenhouse and Energy Reporting (Measurement) Determination 2008; and
- The Australian Government Department of Climate Change and Energy (DCCE) National Greenhouse Accounts (NGA) Factors 2018 (DCCE, 2018).

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions. The GHG Protocol has been adopted by the International Standard Organisation, endorsed by GHG initiatives (such as the Carbon Disclosure Project) and is compatible with existing GHG trading schemes. The GHG Protocol Corporate Accounting and Reporting Standard classifies corporate GHG emissions into three 'scopes'. Scope 1 emissions are direct GHG emissions from operations that are owned or controlled by the reporting company. Scope 2 emissions are indirect emissions from the generation of purchased energy consumed by a company. Scope 3 emissions are all other indirect emissions (not included in scope 2) that occur in the value chain of the reporting company.

The Scope 3 Standard allows companies to assess their entire value chain emissions impact and identify where to focus reduction activities. It divides scope 3 emissions into upstream and downstream emissions, based on the financial transactions of the reporting company:

- Upstream emissions are indirect GHG emissions related to purchased or acquired goods and services;
- Downstream emissions are indirect GHG emissions related to sold goods and services.

Scope 3 emissions are defined as those emissions that are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of scope 3 activities provided in the GHG Protocol are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

In the case of Dartbrook Mine, scope 3 emissions are indirect emissions outside of AQC's operational control. As part of this assessment these include:

- Indirect emissions from the consumption of purchased electricity at Dartbrook Mine
- Indirect emissions from the extraction, processing and transport of diesel used at Dartbrook Mine
- Indirect emissions from the transportation and combustion of product coal.

The Scope 3 emission factors applied to the assessment are summarised in Table 11-7.

Table 11-7 Summary of Scope 3 greenhouse gas emission factors

Emission Source	Emission factor		Source
Diesel - on-site transport activities	3.6	kg CO_2-e/GJ	Table 40 (DCCE, 2018)
	38.6	GJ/kL	Table 3 (DCCE, 2018)
	138.96	kg CO_2-e/kL	Calculated
Electricity	0.10	kg CO_2-e/kWh	Table 41 (DCCE, 2018)
Rail transport	12.3	g CO_2-e/tonne.km	QR Network Access (2002)
Fuel oil (ship transport)	0.00354	kg CO_2-e/tonne.km	UK Government (2018)[(a)]
Burning coal	2.97	kg CO_2-e/tonne (Japan)	IEA,WEO, 2018
	4.90	kg CO_2-e/tonne (Republic of Korea)	Enerdata (2018)[(b)]

Notes:
(a) Average of bulk carrier conversion factors
(b) Calculated from Republic of Korea coal and lignite consumption/CO_2 emissions

Using the same assumptions around annual diesel usage and electricity consumption as presented in Sections 11.3.1 and 11.3.2, and the same assumptions around transportation methods and destinations of coal in the recent Scope 3 emissions report (ERM, 2019), the scope 3 emissions are summarised in Table 11-8.

Table 11-8 Scope 3 GHG emissions summary

Year	ROM (Mt/y)	Upstream diesel usage (t CO_2-e)	Upstream electricity usage (t CO_2-e)	Transport by rail (t CO_2-e)	Transport by ship (t CO_2-e)	Burning of coal (t CO_2-e)	Total (t CO_2-e)
2021	1.4	184	4,340	4,477	94,548	5,509,000	5,612,549
2022	6	251	9,390	14,391	303,904	17,707,500	18,035,436
2023	6	251	9,390	14,391	303,904	17,707,500	18,035,436
2024	6	251	9,390	14,391	303,904	17,707,500	18,035,436
2025	6	251	9,390	14,391	303,904	17,707,500	18,035,436
2026	6	251	9,390	14,391	303,904	17,707,500	18,035,436
2027	6	251	9,390	14,391	303,904	17,707,500	18,035,436
Total	**37.4**	**1,687**	**60,680**	**90,823**	**1,917,971**	**111,754,000**	**113,825,161**

11.4 Summary of GHG emissions

A summary of the annual GHG emissions is provided in Table 11-9.

Table 11-9 Summary of estimated CO_2-e (tonnes) – all scopes

Scope 1 Emissions ($t CO_2$-e)				Scope 2 Emissions ($t CO_2$-e)	Scope 3 Emissions ($t CO_2$-e)
Year	Diesel	Fugitive methane	Total	Electricity	Energy Production
2021	3,579	120,743	124,322	36,022	5,612,549
2022	4,866	131,173	136,039	77,937	18,035,436
2023	4,866	141,603	146,469	77,937	18,035,436
2024	4,866	152,033	156,899	77,937	18,035,436
2025	4,866	162,463	167,329	77,937	18,035,436
2026	4,866	172,893	177,759	77,937	18,035,436
2027	4,866	183,323	188,189	77,937	18,035,436
Total	**32,775**	**1,064,231**	**1,097,006**	**503,644**	**113,825,161**
		Annual average	**156,715**	**71,949**	**16,260,738**

Note: Total values may not always equate to the sum of the numbers shown due to rounding

12. CONCLUSIONS

ERM has prepared an air quality and greenhouse gas assessment for the proposed Dartbrook Mine Modification 7.

The air quality assessment uses the computer-based dispersion model, CALPUFF, to predict ground-level dust concentrations for the Modification scenario. An emissions inventory was developed and modelled, and predictions of particulate matter were compared against regulatory air quality criteria. Predictions were made across a model domain and at sensitive receptors identified by Hansen Bailey.

The assessment is based on a conventional approach following the procedures outlined in the NSW Environment Protection Authority's (EPA) document titled "*Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*" (NSW EPA, 2016), hereafter referred to as the 'Approved Methods'.

For annual average TSP concentrations there are no predicted exceedances of the NSW EPA or VLAMP impact assessment criteria of 90 µg/m^3 either due to the Modification alone, or cumulatively. For annual average PM_{10} concentrations there are no predicted exceedances of the NSW impact assessment criterion of 25 µg/m^3 or the VLAMP criteria of 30 µg/m^3, either due to the Modification, or cumulatively. For annual average $PM_{2.5}$ concentrations there are no exceedances of the NSW EPA impact assessment criterion of 8 µg/m^3, either due to the Modification, or cumulatively.

For annual average dust deposition there are no exceedances of the NSW EPA impact assessment criteria/VLAMP criteria of 2 g/m^2/month due to the Modification alone. When including background concentrations and the predicted contribution from Mount Pleasant, there are no exceedances of the NSW EPA impact assessment criterion/VLAMP criteria of 4 g/m^2/month.

No sensitive receptors are predicted to experience 24-hour average PM_{10} concentrations above the VLAMP criteria of 50 µg/m^3 due to the Modification alone. When including background concentrations, all sensitive receptors are predicted to experience 24-hour average PM_{10} concentrations above the EPA impact assessment criterion of 50 µg/m^3 as there are already two days when the background concentration alone exceeds the criterion. The exceedances on these two days would occur regardless of Dartbrook Mine. When considering additional exceedances, seven receptors are predicted to experience one additional day exceeding the cumulative criterion. It is noted that the additional exceedances at all seven receptors occur on the same day (10 February) when the background concentration was 48.7 µg/m^3 and there was a large bush fire in the area. The contribution from the Modification at these seven receptors on 10 February is a maximum of 1% of the total concentration. If this day is disregarded due to the presence of the fire, there would be no predicted exceedances.

There are no sensitive receptors predicted to experience 24-hour average $PM_{2.5}$ concentrations above the NSW EPA impact assessment criterion of 25 µg/m^3 due to the Modification alone or cumulatively.

GHG emissions have been estimated over the life of the Modification. All calculations have been made based on the relevant guidance documents using the relevant equations and emissions factors given within the NGER Measurement Determination. Data provided by Dartbrook has been used as input into these equations.

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Appendix A MODEL SET-UP

Table A-1: CALMET model options

Flag	Value Used
IEXTRP	-4
BIAS (NZ)	-1, 0, 0, 0, 0, 0, 0, 0
TERRAD	7
RMAX1 and RMAX2	5
R1 and R2	3.5

Table A-2: CALPUFF model options

Flag	Flag Descriptor	Value Used	Value Description
MCHEM	Chemical transformation	0	Chemical transformation not modelled
MDRY	Dry deposition	1	Yes
MTRANS	Transitional plume rise allowed?	1	Yes
MTIP	Stack tip downwash	1	Yes
MRISE	Method to compute plume rise	1	Briggs plume rise
MSHEAR	Vertical wind shear	0	Vertical wind shear not modelled
MPARTL	Partial plume penetration of elevated inversion	1	Yes
MSPLIT	Puff splitting	0	No puff splitting
MSLUG	Near field modelled as slugs	0	Not used
MDISP	Dispersion coefficients	2	Based on micrometeorology
MPDF	Probability density function used for dispersion under convective conditions	1	Yes
MROUGH	PG sigma y, z adjusted for z	0	No
MCTADJ	Terrain adjustment method	3	Partial Plume Adjustment
MBDW	Method for building downwash	1	ISC Method

Appendix B EMISSIONS ESTIMATION

Table B-1: Dartbrook Underground emissions inventory for TSP

ACTIVITY	TSP emissions (kg/y)	Intensity	Units	Emission Factor	Units	Variable 1	Units	Variable 2	Units	Variable 3	Units	Variable 4	Units	Variable 5	Units	Variable 6	Units	CONTROLS ASSUMED	Source Type	Emission Factor Source
CHPP operations																				
Unloading of coal at ROM Hopper	484	6,000,000	t/y	0.00054	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Crushing of coal	1,080	6,000,000	t/y	0.00060	kg/t											70	% control	Enclosed & emission factor assumes wet suppression	1	AP-42 Table 11.19.2-1
Screening of coal	1,980	6,000,000	t/y	0.00110	kg/t											70	% control	Enclosed & emission factor assumes wet suppression	1	AP-42 Table 11.9-2
Loading crushed coal to conveyor at ROM Hopper	484	6,000,000	t/y	0.00054	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at ROM Stockpile	1,613	6,000,000	t/y	0.00054	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							50	% control	Water sprays	2	AP-42 c13s2.4.3
Unloading of coal at Washery	484	6,000,000	t/y	0.00054	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Loading of product coal onto conveyor from Washery	178	4,500,000	t/y	0.00026	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at Product Stockpile	178	4,500,000	t/y	0.00026	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Loading of rejects onto conveyor from Washery	41	1,500,000	t/y	0.00018	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of rejects at Reject Stockpile	137	1,500,000	t/y	0.00018	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							50	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Reclaiming product coal to train conveyor	592	4,500,000	t/y	0.00026	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							50	% control	Water application	1	AP-42 Table 11.9-2
Loading of product coal to trains	1,183	4,500,000	t/y	0.00026	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							0	% control	No control	2	AP-42 Table 11.9-2
Loading of rejects to trucks at Rejects Stockpile	273	1,500,000	t/y	0.00018	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							0	% control	No control	2	AP-42 c13s2.4.3
Hauling of rejects from Reject Stockpile to REA (sealed roads)	24,413	1,500,000	t/y	0.0163	kg/t	40	t/load	45	Vehicle mean mass (t)	2.0	km/return trip	0.33	kg/VKT	2.0	g/m2 silt loading	0	%control	No control	1	AP-42 c13s2.2.2
Unloading of rejects at REA	273	1,500,000	t/y	0.00018	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							0	% control	No control	2	AP-42 c13s2.4.3
Dozers at REA	33,659	5,520	h/y	6.1	kg/h	3.7	silt content in %	13	moisture content in %							0	% control	No control	1	AP-42 Table 11.9-2
Wind erosion																				
ROM Stockpile	468	1.1	ha	850	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Reject Stockpile	468	1.1	ha	850	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Product Stockpile	2,678	6.3	ha	850	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Reject Emplacement Area	1,785	3.0	ha	850	kg/ha/y											30	% control	Fencing	3	AP-42 Table 11.9-2
Total TSP emissions (kg/yr)	**72,448**																			

Table B-2: Dartbrook Underground emissions inventory for PM_{10}

ACTIVITY	PM10 emissions (kg/y)	Intensity	Units	Emission Factor	Units	Variable 1	Units	Variable 2	Units	Variable 3	Units	Variable 4	Units	Variable 5	Units	Variable 6	Units	CONTROLS ASSUMED	Source Type	Emission Factor Source
CHPP operations																				
Unloading of coal at ROM Hopper	229	6,000,000	t/y	0.00025	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Crushing of coal	486	6,000,000	t/y	0.00027	kg/t											70	% control	Enclosed & emission factor assumes wet suppression	1	AP-42 Table 11.19.2-1
Screening of coal	666	6,000,000	t/y	0.00037	kg/t											70	% control	Enclosed & emission factor assumes wet suppression	1	AP-42 Table 11.9-2
Loading crushed coal to conveyor at ROM Hopper	229	6,000,000	t/y	0.00025	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at ROM Stockpile	763	6,000,000	t/y	0.00025	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							50	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at Washery	229	6,000,000	t/y	0.00025	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Loading of product coal onto conveyor from Washery	84	4,500,000	t/y	0.00012	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at Product Stockpile	84	4,500,000	t/y	0.00012	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Loading of rejects onto conveyor from Washery	19	1,500,000	t/y	0.00009	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of rejects at Reject Stockpile	65	1,500,000	t/y	0.00009	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							50	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Reclaiming product coal to train conveyor	280	4,500,000	t/y	0.00012	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							50	% control	Water application	1	AP-42 Table 11.9-2
Loading of product coal to trains	560	4,500,000	t/y	0.00012	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							0	% control	No control	2	AP-42 Table 11.9-2
Loading of rejects to trucks at Rejects Stockpile	129	1,500,000	t/y	0.00009	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							0	% control	No control	2	AP-42 c13s2.4.3
Hauling of rejects from Reject Stockpile to REA (sealed roads)	4,686	1,500,000	t/y	0.0031	kg/t	40	t/load	45	Vehicle mean mass (t)	2.0	km/return trip	0.1	kg/VKT	2.0	g/m2 silt loading	0	%control	No control	1	AP-42 c13s2.2.2
Unloading of rejects at REA	129	1,500,000	t/y	0.00009	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							0	% control	No control	2	AP-42 c13s2.4.3
Dozers at REA	6,857	5,520	h/y	1.2	kg/h	3.7	silt content in %	13	moisture content in %							0	% control	No control	1	AP-42 Table 11.9-2
Wind erosion																				
ROM Stockpile	234	1.1	ha	425	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Reject Stockpile	234	1.1	ha	425	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Product Stockpile	1,339	6.3	ha	425	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Reject Emplacement Area	893	3.0	ha	425	kg/ha/y											30	% control	Fencing	3	AP-42 Table 11.9-2
Total PM10 emissions (kg/yr)	18,193																			

Table B-3: Dartbrook Underground emissions inventory for $PM_{2.5}$

ACTIVITY	PM2.5 emissions (kg/y)	Intensity	Units	Emission Factor	Units	Variable 1	Units	Variable 2	Units	Variable 3	Units	Variable 4	Units	Variable 5	Units	Variable 6	Units	CONTROLS ASSUMED	Source Type	Emission Factor Sour
CHPP operations																				
Unloading of coal at ROM Hopper	35	6,000,000	t/y	0.00004	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Crushing of coal	90	6,000,000	t/y	0.00005	kg/t											70	% control	Enclosed & emission factor assumes wet suppression	1	AP-42 Table 11.19.2-1
Screening of coal	45	6,000,000	t/y	0.00003	kg/t											70	% control	Enclosed & emission factor assumes wet suppression	1	AP-42 Table 11.9-2
Loading crushed coal to conveyor at ROM Hopper	35	6,000,000	t/y	0.00004	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at ROM Stockpile	116	6,000,000	t/y	0.00004	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							50	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at Washery	35	6,000,000	t/y	0.00004	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	6	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Loading of product coal onto conveyor from Washery	13	4,500,000	t/y	0.00002	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of coal at Product Stockpile	13	4,500,000	t/y	0.00002	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Loading of rejects onto conveyor from Washery	3	1,500,000	t/y	0.00001	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							85	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Unloading of rejects at Reject Stockpile	10	1,500,000	t/y	0.00001	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							50	% control	Enclosed & water sprays	2	AP-42 c13s2.4.3
Reclaiming product coal to train conveyor	42	4,500,000	t/y	0.00002	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							50	% control	Water application	1	AP-42 Table 11.9-2
Loading of product coal to trains	85	4,500,000	t/y	0.00002	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	10	moisture content in %							0	% control	No control	2	AP-42 Table 11.9-2
Loading of rejects to trucks at Rejects Stockpile	20	1,500,000	t/y	0.00001	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							0	% control	No control	2	AP-42 c13s2.4.3
Hauling of rejects from Reject Stockpile to REA	1,134	1,500,000	t/y	0.00076	kg/t	40	t/load	45	Vehicle mean mass (t)	2.0	km/return trip	0.015	kg/VKT	2.0	g/m2 silt loading	0	%control	No control	1	AP-42 c13s2.2.2
Unloading of rejects at REA	20	1,500,000	t/y	0.00001	kg/t	2.114	average of (wind speed/2.2)^1.3 in m/s	13	moisture content in %							0	% control	No control	2	AP-42 c13s2.4.3
Dozers at REA	741	5,520	h/y	0.1	kg/h	3.7	silt content in %	13	moisture content in %							0	% control	No control	1	AP-42 Table 11.9-2
Wind erosion																				
ROM Stockpile	35	1.1	ha	63.75	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Reject Stockpile	35	1.1	ha	63.75	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Product Stockpile	201	6.3	ha	63.75	kg/ha/y											50	% control	Water sprays	3	AP-42 Table 11.9-2
Reject Emplacement Area	134	3.0	ha	63.75	kg/ha/y											30	% control	Fencing	3	AP-42 Table 11.9-2
Total PM2.5 emissions (kg/yr)	**2,838**																			

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APPENDIX B
Acoustic Assessment

BRIDGES ACOUSTICS

ABN: 73 254 053 305

78 Woodglen Close
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20 July 2020
Ref: J0073-05-L1

Sparke Helmore Lawyers
Level 7, 28 Honeysuckle Drive
NEWCASTLE NSW 2300

Attn: Mr Alan McKelvey

Dear Alan,

RE: DARTBROOK MODIFICATION 7 – ACOUSTIC ASSESSMENT

PRIVILEGED AND CONFIDENTIAL

1. This report presents predicted noise levels from the proposed recommencement of mining at Dartbrook Mine, including production of up to 6 million tonnes per annum (Mtpa) of Run Of Mine (ROM) coal if longwall mining recommences as currently approved. The assessment has been commissioned by Sparke Helmore Lawyers for consideration by the Land & Environment Court as part of a Class 1 merits appeal to a previous IPC determination of a Modification Application in which a proposed 5 year extension of mining operations was not approved.
2. I have read Schedule 7 to the Uniform Civil Procedure Rules 2005, the expert witness code of conduct, and agree to be bound by the Code. My CV is appended to this report.

1. PURPOSE OF THIS REPORT

3. A previous Modification Application (for Modification 7) considered by the IPC sought approval for bord and pillar mining as an alternative to the currently approval longwall method, trucking of ROM coal as an alternative to the approved coal clearance system and a 5 year extension of the current approval period. The alternative mining method and coal clearance system was approved by the IPC in August 2019. The proposed 5 year extension was not approved as the IPC determined that noise (and other potential environmental impacts) associated with recommencement of longwall mining and production of up to 6 Mtpa of ROM coal were not assessed in the Modification Application.
4. Noise levels from proposed bord and pillar mining producing up to 1.5 Mtpa of ROM coal were assessed and were considered acceptable by the IPC. The previous noise assessment omitted noise from some CHPP equipment including the preparation plant (washery) and reject handling infrastructure as the project at that time did not include washing the coal. The project as currently proposed includes washing coal for both the bord and pillar and longwall options.
5. This report therefore considers noise levels from full operation of the Dartbrook CHPP as it operated up to the year 2006, before the extended period of care and maintenance.

2. RECEIVERS AND NOISE CRITERIA

2.1 Development Consent Noise Criteria

6. Current noise criteria from Development Consent DA 231-07-2000 are assumed to apply to this assessment. The criteria are taken from Condition 6.4.1a Table 3 in the current Development Consent. Receiver locations are shown on the figures attached to this report and are separated into privately owned and mine owned residences.

East site receivers	50/50/41 LAeq,15min day/evening/night, 52 LA1,1min night;
West site receivers	40/40/35 LAeq,15min day/evening/night, 52 LA1,1min night; and
Aberdeen receivers	49/42/40 LAeq,15min day/evening/night, 52 LA1,1min night.

2.2 Cumulative Noise Criteria

7. Cumulative noise levels, from Dartbrook Mine combined with other sources of industrial noise in the area such as other nearby mining developments, are compared to the recommended amenity noise levels in the Noise Policy for Industry (NPI) (EPA, 2017). Table 2.2 in the NPI recommends, for rural residences, amenity noise levels of:

Day	50 LAeq,11hr from 7 am to 6 pm, or from 8 am Sundays and public holidays;
Evening	45 LAeq,4hr from 6 pm to 10 pm; and
Night	40 LAeq,9hr from 10 pm to 7 am, or to 8 am Sundays and public holidays.

8. Alternative amenity criteria apply to suburban and urban residences considering the typically higher levels of traffic and other noise in these environments. Table 2.3 of the NPI indicates receivers located on land zoned R1 and B4 are typically urban receivers. Urban receivers are also characterised by exposure to noise from heavy and continuous through-traffic during peak periods. The residences in southern Aberdeen are generally located on land zoned R1 and B4 and are exposed to continuous noise from the New England Highway during peak periods. Accordingly, the urban amenity criteria are appropriate for the receivers in southern Aberdeen. Table 2.2 prescribes the following amenity criteria for urban residences:

Day	60 LAeq,11hr from 7 am to 6 pm, or from 8 am Sundays and public holidays;
Evening	50 LAeq,4hr from 6 pm to 10 pm; and
Night	45 LAeq,9hr from 10 pm to 7 am, or to 8 am Sundays and public holidays.

9. The development consent noise criteria are similar to the cumulative noise criteria for the day and night periods and above the cumulative noise criteria for the evening period for East Site receivers. In these cases, alternative cumulative noise criteria set 3 dBA above the development consent criteria are adopted, provided the resulting criteria do not exceed the urban amenity limits recommended in the NPI. Adopted cumulative noise criteria are therefore:

East Site receivers	53 LAeq,11hr day, 50 LAeq,4hr evening and 44 LAeq,9 hr night;
West Site receivers	50 LAeq,11hr day, 45 LAeq,4hr evening and 40 LAeq,9 hr night; and
Aberdeen receivers	52 LAeq,11hr day, 45 LAeq,4hr evening and 43 LAeq,9 hr night.

3. NOISE MODEL DATA AND ASSUMPTIONS

10. Noise level calculations were completed using RTA Technology's Environmental Noise Model (ENM) software, originally developed in conjunction with the NSW Environment Protection Authority (EPA) and used for projects of this nature for over 20 years. ENM is particularly suitable where a number of noise sources require assessment and the effects of various weather conditions on noise propagation are important. Input data to ENM include:

    - Terrain data, which were reused from previous Dartbrook Mine assessments completed for the proponent as contours in 2 m vertical intervals;
    - Noise source locations including source elevation, which are consistent with previous assessments and intended to include all potentially significant noise sources associated with the CHPP including mobile plant required to transport and place reject material;
    - Source noise levels, which were based on on-site noise measurement data taken by Bridges Acoustics in December 2004 and March 2005 when the CHPP was operating. The data include 1/3 octave percentile noise levels at each of 61 separate locations around significant components of the CHPP. Notes for each noise measurement indicating distances from each significantly audible source allowed 1/3 octave source sound power levels to be determined with reasonable accuracy;
    - Noise mitigation measures as described below; and
    - Weather conditions for the day and the combined evening/night periods which were determined according to current EPA recommendations and are identical to the weather conditions considered in previous acoustic assessments.

11. Terrain over the CHPP site and noise source locations for the noise model are shown on the figures appended to this report. The actual source location is the small cross at the lower left corner of each source code.

12. Mobile equipment required to transport and place reject material within the REA have been modelled operating to the junction of the central and southern REA, relatively remote from receivers, and to the south western corner of the southern REA representing the closest point to receivers. Noise contours and reported noise levels represent the worst case from these two options, with the exception of the noise contours in Figure B4 which exclude mobile plant operating in the south western corner of the REA to manage noise levels to closest receivers during the most sensitive night period.

13. Noise mitigation measures include:

    - Fibre cement or equivalent sheet walls adjacent to the western side of unenclosed stockyard conveyors, to a height just above the top idlers;
    - A large noise barrier/wall on the northern side of the train loadout conveyor (CV17/CV05) from its western end to the CHPP access road, to a height of 2 m above the conveyor which requires a variable height of 5 m at the western end to 18 m at the eastern end. This wall would be clad with a sheet of sandwich panel, fibre cement or similar material;
    - Upgraded cladding for the preparation plant building including minimal openings on the northern and western faces, using sandwich panel or fibre cement for additional noise reduction;
    - Upgraded cladding for the elevated section of the train loadout conveyor (CV05) east of the noise barrier, using sandwich panels for the roof, fibre cement sheeting for the northern walls and steel sheets for the floor;
    - Upgraded cladding for elevated conveyors CV07, CV08, CV10 and CV14 generally as described for CV05;
    - Cladding for CV12 including 0.6 mm corrugated steel sheeting or similar for the roof and northern side and steel sheet floor;

- Low noise conveyor idlers for all conveyors except those within the preparation plant building;
- An enclosure on the rear of the raw coal reclaimer consisting of reused conveyor belt or similar material;
- Replacement bucket chains and sprockets for the two product coal reclaimers to minimise noise from these components.

14. Noise mitigation measures have been developed to the concept stage and may require refinement to avoid unnecessary work and materials. The refined design would be intended to meet relevant noise criteria at all noise sensitive receptors.

3.1 Source Sound Power Levels

15. Modelled source sound power levels, converted to octave bands for ease of presentation, are presented in Table 1. Sound power spectra are presented as dBL levels, which are unweighted sound power levels used directly by the noise model without the usual A-weighting frequency correction applied. Total sound power levels are presented as both dBL and dBA.

16. Some sources, particularly long conveyors, were modelled as a series of points along the conveyor rather than as one source in the centre of the conveyor's length. Both CV03 and CV04 were divided into four sections, with each section assigned the reduced sound power level shown in Table 1. Other divided conveyors were modelled in two sections, with each section assigned the lower sound power level indicated in Table 1. In most cases, shorter conveyors were divided into two sections to account for the widely varying height of the conveyor above the ground along its length. In these cases the two modelled source heights, representing the height of the midpoint of each half of the conveyor, are both shown in Table 1.

17. Conveyor CV05 is divided into two separate sections as the eastern section would be enclosed and the western section would not. The two sections are therefore assigned different sound power levels.

18. Noise from proposed reject truck movements is evenly distributed along the haul routes to the REA, while the loader is modelled at the reject stockpile and the dozer is modelled at representative locations within the REA. The loader is assumed to operate for approximately 25% of the time to load up to 7 trucks per hour, representing a production rate of up to 6 Mtpa.

Table 1: Modelled Sound Power Levels and Source Heights Above Ground.

Code, Description	Height, m	Sound Power dBL in Octave Band, Hz									Total	
		31.5	63	125	250	500	1000	2000	4000	8000	dBL	dBA
H1, HT01	4	107	99	101	98	96	93	90	84	78	110	98
H1d, HT01 drive	1	112	101	92	80	72	64	58	46	34	113	81
CR, Primary crusher	6	122	106	100	84	75	69	62	51	40	122	88
C2, CV02	6	104	96	98	95	93	90	87	81	75	107	95
C7, CV07	10	104	96	98	95	93	90	87	81	75	107	95
RS, Raw stacker	12	107	100	102	98	98	94	92	85	78	110	100
RR, Raw reclaimer	3	96	91	93	85	79	72	66	52	42	99	82
C8, CV08	3	104	96	98	95	93	90	87	81	75	107	95
C9, CV09	3 - 6	95	97	99	94	90	84	81	75	65	103	92
C10, CV10	6 - 15	96	96	99	94	90	86	83	77	71	103	93
CP, Prep plant	20	130	115	106	96	87	80	73	64	54	130	94
C12, CV12	8	93	93	96	91	87	83	80	74	68	100	90
C14, CV14	3 - 8	93	89	86	76	66	58	53	44	34	95	73
C15, CV15	6	96	96	99	94	90	86	83	77	71	103	93

Code, Description	Height, m	Sound Power dBL in Octave Band, Hz									Total	
		31.5	63	125	250	500	1000	2000	4000	8000	dBL	dBA
C3, CV03	1	103	97	98	93	95	89	87	79	67	106	96
PS, Product stacker	10	94	91	94	90	91	94	92	83	73	101	97
PR, Prod reclaimer	3	108	102	92	87	78	70	63	53	41	109	82
C4, CV04	1	103	97	98	93	95	89	87	79	67	106	96
C5W, CV05 west	6	108	107	108	104	98	93	90	84	75	113	101
C5E, CV05 east	16	102	97	90	80	65	56	50	40	28	103	77
LD, Train loadout	3	104	99	96	95	95	95	97	96	87	107	102
Lo, Locomotive	3	108	104	106	100	100	98	92	90	75	112	102
L, Loader (25%)	2.5	114	122	107	99	98	94	92	84	75	123	101
T, Truck 40t	2.5	111	115	111	110	107	102	96	91	82	119	108
Z, Dozer D8	2	101	110	114	107	110	103	98	92	82	117	109

3.2 Modelled Weather Conditions

19. Weather conditions included in the noise model are summarised in Table 2 and are consistent with the previous Modification Application considered by the IPC. The weather parameters were determined according to current EPA policy, based on weather data from the proponent's weather station located approximately 180 m north of the East Site access road. The evening and night time periods have been combined as the weather analysis showed very similar parameters would apply to both periods.

Table 2: Summary of Modelled Weather Parameters, Dartbrook CHPP.

Atmospheric Parameter	Day Calm	Day Prevailing			Evening/Night Prevailing				
Temperature °C	20				10				
Relative Humidity %	70				90				
Wind Speed m/s	0	3			0	3			2
Wind Direction	-	SSW	W	SE	-	SSW	ENE	SE	N
Temp Gradient °C/100m	-2				3	0			3
Equivalent Inversion[1]	-2	5.5	5.5	5.5	3	7.5	7.5	7.5	8

1 The equivalent inversion is based on a 1 m/s wind towards a receiver providing the same noise enhancement as a 2.5 °C/100m inversion, as calculated by the noise model for the 'rural' terrain category and 'rough pasture' surface category which apply to this region.

4. CALCULATED NOISE LEVELS

4.1 Longwall Mining Up to 6 Mtpa of ROM Coal

20. Calculated noise levels for full CHPP operation are presented in the noise contour figures attached to this report and in Table 3 to representative privately owned and mine owned residences. Residences outside the 30 dBA contour in all time periods have been omitted from the table. Calculated noise levels above the noise criteria at privately owned receivers are shaded green, while blue shading highlights receivers that are entitled to acquisition by Mt Pleasant Mine and any exceedances of relevant noise criteria at these receivers.

Table 3: Calculated Noise Levels, Longwall Mining Up to 6 Mtpa of ROM Coal

Receiver ID	Calculated Noise Level, LAeq,15min				
	Day Neutral	Day Wind	Evening/Night Wind/Inversion	Evening/Night (excluding SW REA)	Noise Criteria Day/Evening/Night
Privately Owned East Site Receivers					
303	30	31	42	42	50/50/41
422	31	31	44	42	50/50/41
423	26	26	40	40	50/50/41
424	25	25	40	40	50/50/41
427	23	23	40	40	50/50/41
436	16	17	36	32	50/50/41
437	15	15	36	32	50/50/41
438	16	17	35	32	50/50/41
545	21	21	34	33	50/50/41
546	20	20	32	32	50/50/41
Privately Owned West Site Receivers					
62	19	28	31	30	40/40/35
63	19	28	31	30	40/40/35
64	19	29	31	31	40/40/35
65	18	29	32	32	40/40/35
72	20	28	30	30	40/40/35
74A	21	28	31	31	40/40/35
74B	21	28	31	31	40/40/35
75	22	29	32	32	40/40/35
77	19	29	31	31	40/40/35
80A	23	30	33	33	40/40/35
80B	24	31	34	33	40/40/35
81A	23	30	33	32	40/40/35
81B	22	30	33	32	40/40/35
181	23	28	32	31	40/40/35
212	24	28	33	32	40/40/35
228	24	28	34	32	40/40/35
238	24	29	34	33	40/40/35
242	24	29	35	33	40/40/35
244	25	30	35	34	40/40/35
391	27	28	37	36	40/40/35
Privately Owned Aberdeen Receivers					
87	25	35	37	37	49/42/40
88	24	34	37	37	49/42/40

Receiver ID	Calculated Noise Level, LAeq,15min				
	Day Neutral	Day Wind	Evening/Night Wind/Inversion	Evening/Night (excluding SW REA)	Noise Criteria Day/Evening/Night
89	24	34	37	37	49/42/40
90	24	34	36	36	49/42/40
91	24	34	37	37	49/42/40
92	25	35	37	37	49/42/40
105	17	31	34	34	49/42/40
Mine-Owned East Site Receivers					
86N	26	34	36	36	N/A
86S	25	32	35	34	N/A
299A	34	39	42	41	N/A
299B	41	45	49	49	N/A
300	41	45	48	46	N/A
301	42	43	50	47	N/A
302	36	36	46	45	N/A
304	36	36	46	44	N/A
Mine-Owned West Site Receivers					
82	26	34	36	35	N/A
85	23	30	34	32	N/A
167	23	28	32	31	N/A
207	24	28	33	32	N/A
268	25	30	36	34	N/A
295A	23	30	34	33	N/A
295B	24	31	35	33	N/A
381	24	26	34	32	N/A
543A	20	20	31	30	N/A
543B	19	19	31	29	N/A
Reference	Figure B1	Figure B2	Figure B3	Figure B4	-

21. Calculated noise levels meet relevant criteria at all privately owned receivers that are not entitled to acquisition by Mt Pleasant Mine, except East Site receivers 303 and 422. Receivers 303 and 422 are predicted to receive a night noise level of 42 and 44 LAeq,15min, respectively, including noise from mobile reject handling plant operation at the south-western corner of the southern REA which is the closest point to these receivers. Calculated noise levels reduce to 42 LAeq,15min at both receivers if operation of reject handling plant is avoided in the south-western half of the southern REA during the most sensitive night period. Reject material could be placed in closer REA areas during the day, and in more remote areas of the REA during the evening and night to minimise noise to these receivers.

22. A calculated noise level of 42 LAeq,15min remaining at Receivers 303 and 422 is only 1 dBA above the criterion which, according to the Voluntary Land Acquisition and Mitigation Policy (VLAMP), is a negligible noise impact that is unlikely to be perceptible to residents and therefore does not warrant mitigation measures.

23. Noise levels from the West Site under the longwall mining option have not been reassessed in this report, however would remain substantially unchanged from previous mining operations. If anything, more modern equipment operating on the surface may produce less noise than the previous operation.

4.2 Bord and Pillar Mining Up to 1.4 Mtpa of ROM Coal

24. Noise levels from the proposed bord and pillar mining option would be identical to the levels calculated for the longwall mining option with the CHPP operating, however would occur for a smaller percentage of the time in an average week due to the lower production rate for this option. Noise from full CHPP operation would not occur continuously as the CHPP has a higher hourly capacity than the proposed bord and pillar mining system.

25. The reported noise levels for the longwall option, as shown in Table 3 and Appendix B, therefore also apply to the bord and pillar option for periods of time in which the CHPP is operating.

4.3 Sleep Disturbance

26. The LA1,1min noise criteria in consent condition 6.4.1a are intended to minimise the potential for sleep disturbance to residential receptors during the night period. A detailed assessment of sleep disturbance is not included in this report as normal operation of the CHPP, whether at 1.4 Mtpa for the bord and pillar option or at 6 Mtpa for the longwall mining option, does not include any sources of noise with the potential to cause sleep disturbance at any privately owned residence.

5. CUMULATIVE NOISE LEVELS

27. Residences near Dartbrook Mine may receive additional industrial noise from Mt Pleasant Mine. Other known industrial developments in the area that are considered unlikely to affect cumulative noise levels to assessed receptors include:

- Muswellbrook Colliery located approximately 5.6 km to the south east;
- Bengalla Mine located approximately 8.6 km to the south west; and
- Rossgole Quarry located approximately 10.8 km to the north west.

28. The cumulative noise level contribution from Dartbrook Mine has been calculated based on the noise contours in Figure B4 for the night period, assuming the longwall mining option up to 6 Mtpa and excluding south western REA activity at night.

29. Noise levels from Mt Pleasant Mine have been determined from the most recent acoustic assessment, described in *Mount Pleasant Operation, Mine Optimisation Modification, Noise and Blasting Assessment* (Wilkinson Murray, May 2017). Appendix C of the Mt Pleasant noise assessment contains tables of predicted noise levels at each receiver for years 2018, 2021 and 2025. The highest of the 2021 or 2025 noise levels, for the night period under noise enhancing weather conditions, has been adopted for each receiver.

30. Exceedances of the adopted cumulative noise criteria are predicted at four privately owned residences in Kayuga Village as highlighted in Table 4, with all of these residences primarily affected by noise from Mt Pleasant Mine rather than Dartbrook Mine. All of these residences are entitled to acquisition by Mt Pleasant Mine. As such, no further mitigation or acquisition rights are required to be imposed on Dartbrook Mine.

Table 4: Cumulative Noise Levels, Longwall Mining Up to 6 Mtpa of ROM Coal, Night

Dartbrook Mine		Mt Pleasant Mine		Cumulative Level, LAeq	Cumulative Noise Criteria, Night
Receiver ID	Night LAeq,15min	Receiver ID	Night LAeq,15min		
Privately Owned East Site Receivers					
303	42	190	36	43	44
422	42	189	35	43	44
423	40	192	35	41	44

Dartbrook Mine		Mt Pleasant Mine		Cumulative Level, LAeq	Cumulative Noise Criteria, Night
Receiver ID	Night LAeq,15min	Receiver ID	Night LAeq,15min		
424	40	191	35	41	44
427	40	193	35	41	44
436	32	194	34	36	44
437	32	195	36	37	44
438	32	547	35	37	44
545	33	140	36	38	44
546	32	139	36	37	44
Privately Owned West Site Receivers					
62	30	180	30	33	40
63	30	179	30	33	40
64	31	180b	30	34	40
72	30	173	31	34	40
74A	31	174	32	35	40
74B	31	175	32	35	40
75	32	176	32	35	40
77	31	178	31	34	40
80A	33	310	33	36	40
80B	33	172	33	36	40
81A	32	171	33	36	40
81B	32	169	33	36	40
181	31	154	38	39	40
212	32	156	39	40	40
228	32	157	41	42	40
238	33	158	40	41	40
242	33	159	40	41	40
244	34	161	39	40	40
391	36	143	40	41	40

6. CONCLUSION

31. This assessment has determined predicted noise levels from approved longwall mining at the maximum annual production rate of 6 Mtpa of ROM coal from Dartbrook Mine. The calculated noise levels reflect full operation of the Dartbrook Mine CHPP including mobile plant to transport and place reject material within the Browns Mountain REA. Noise mitigation measures applied to CHPP equipment as described in Section 3 have been included in the assessment.

32. Calculated noise levels at closest receivers are predicted to meet the existing Development Consent Condition 6.4.1a noise criteria at all except for two privately owned receivers. Receivers 303 and 422, located west of the New England Highway south of Dartbrook Mine's East Site, are predicted to receive a noise level 1 dBA over the noise criteria during the night period under noise enhancing weather conditions. As the VLAMP regards a 1 dBA exceedance of a noise criterion to represent a negligible and not perceptible impact, and as these residences are subject to significant traffic noise from the adjacent New England Highway during all time periods, the predicted noise levels at these residences are considered acceptable.

33. Cumulative noise levels, including noise from Dartbrook Mine and from other major sources of industrial noise in the area such as Mt Pleasant Mine, are predicted to exceed relevant cumulative

noise criteria at four residences within Kayuga Village. Cumulative noise levels at these receivers are primarily affected by Mt Pleasant Mine noise, and all are entitled to acquisition by Mt Pleasant Mine. No further mitigation or acquisition rights are required to be imposed on Dartbrook Mine.

34. Calculated noise levels for the proposed bord and pillar option are identical to the predicted noise levels for the longwall option, as both options include the same CHPP equipment. The lower production rate for the bord and pillar option would require CHPP operation for only part of an average week, however would not change the noise levels from the CHPP while it is operating.

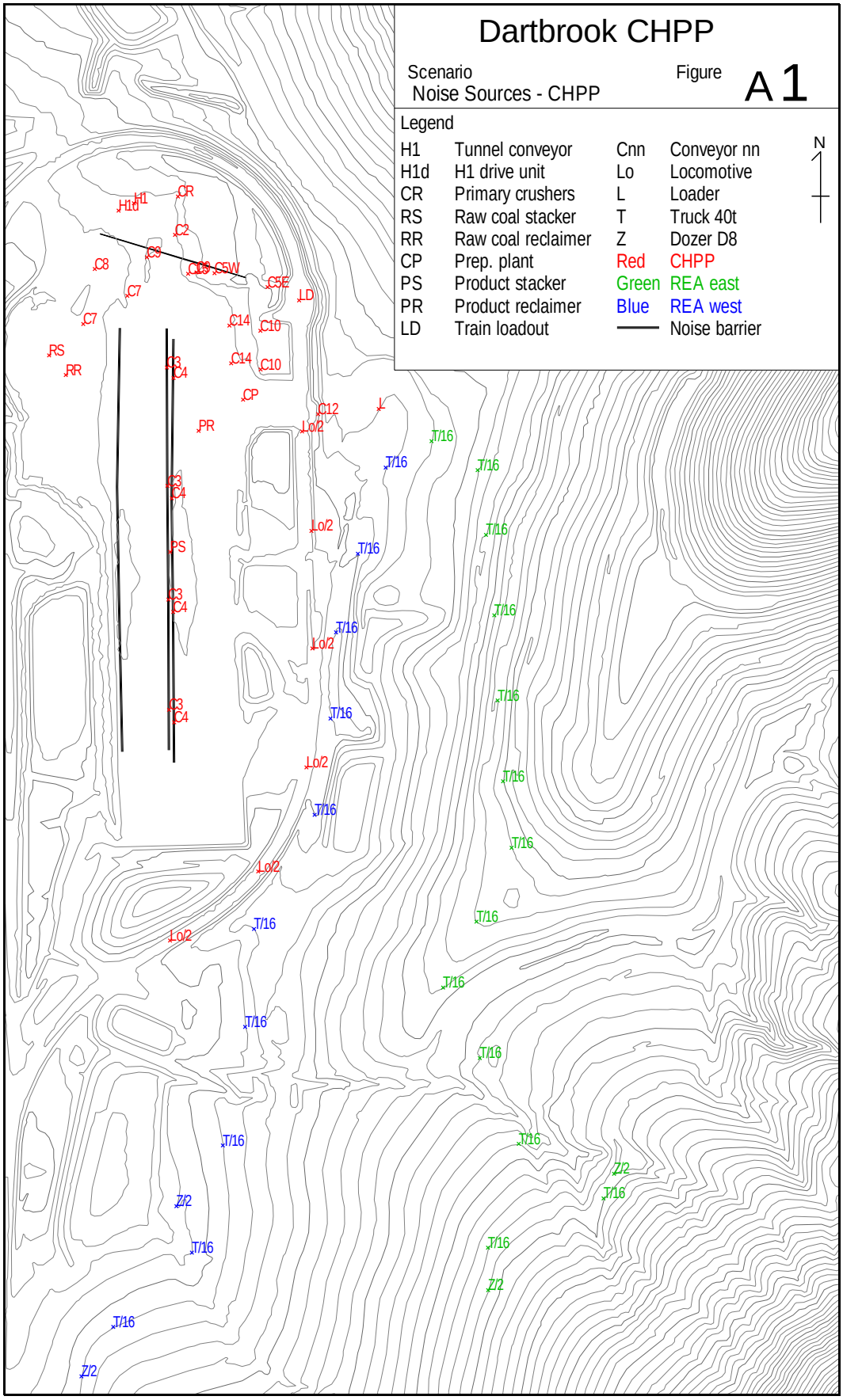
35. Based on the results presented in this assessment, noise levels from a restart of longwall mining at Dartbrook Mine are consistent with current Development Consent noise criteria and should therefore not prevent approval of the proposed Modification including the proposed extension of the approval period.

Yours faithfully,

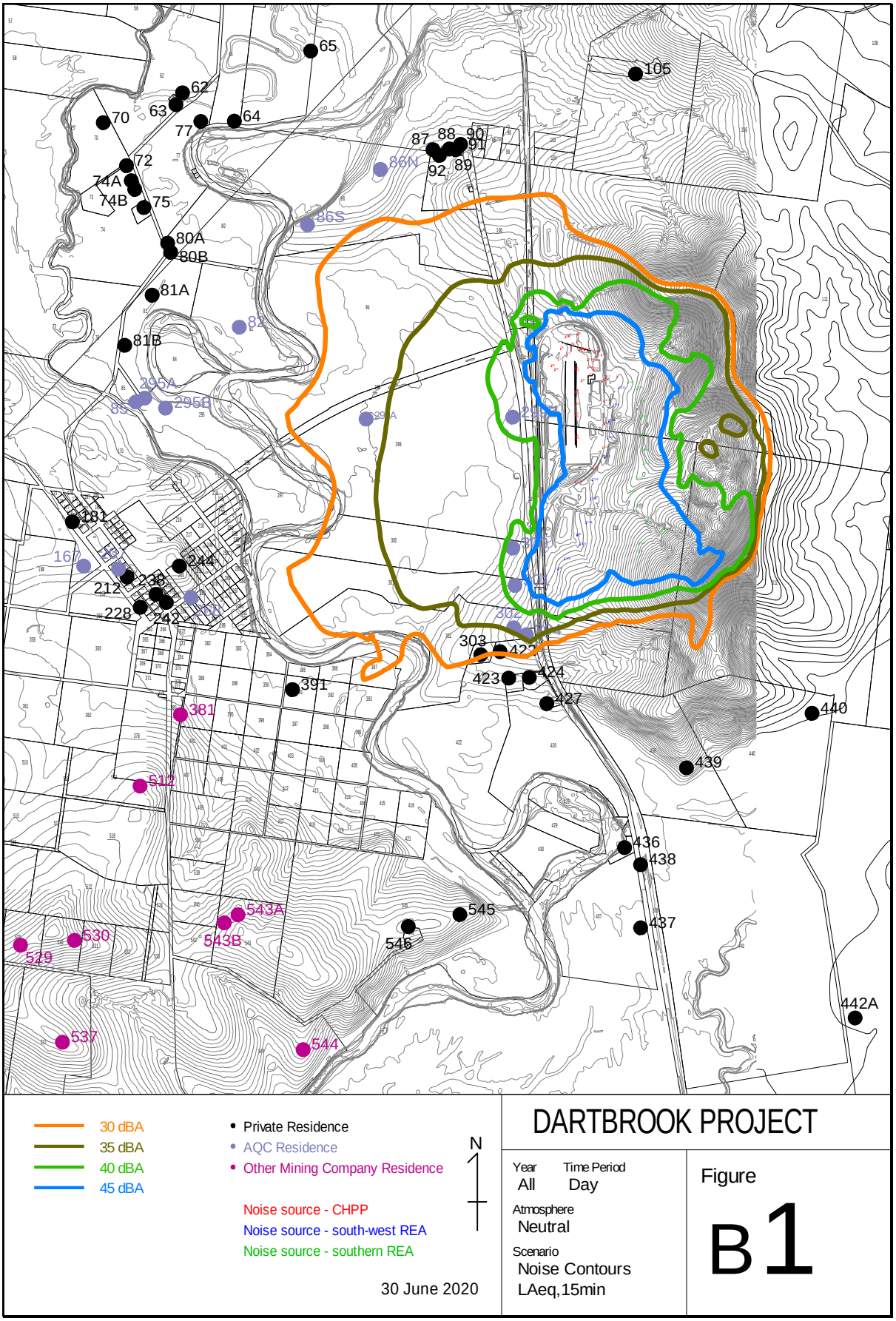
BRIDGES ACOUSTICS

MARK BRIDGES BE (Mech) (Hons) MAAS
Principal Consultant

APPENDIX A: MODELLED NOISE SOURCE LOCATION FIGURE



APPENDIX B: NOISE CONTOUR FIGURES



30 dBA
35 dBA
40 dBA
45 dBA

- Private Residence
- AQC Residence
- Other Mining Company Residence

Noise source - CHPP
Noise source - south-west REA
Noise source - southern REA

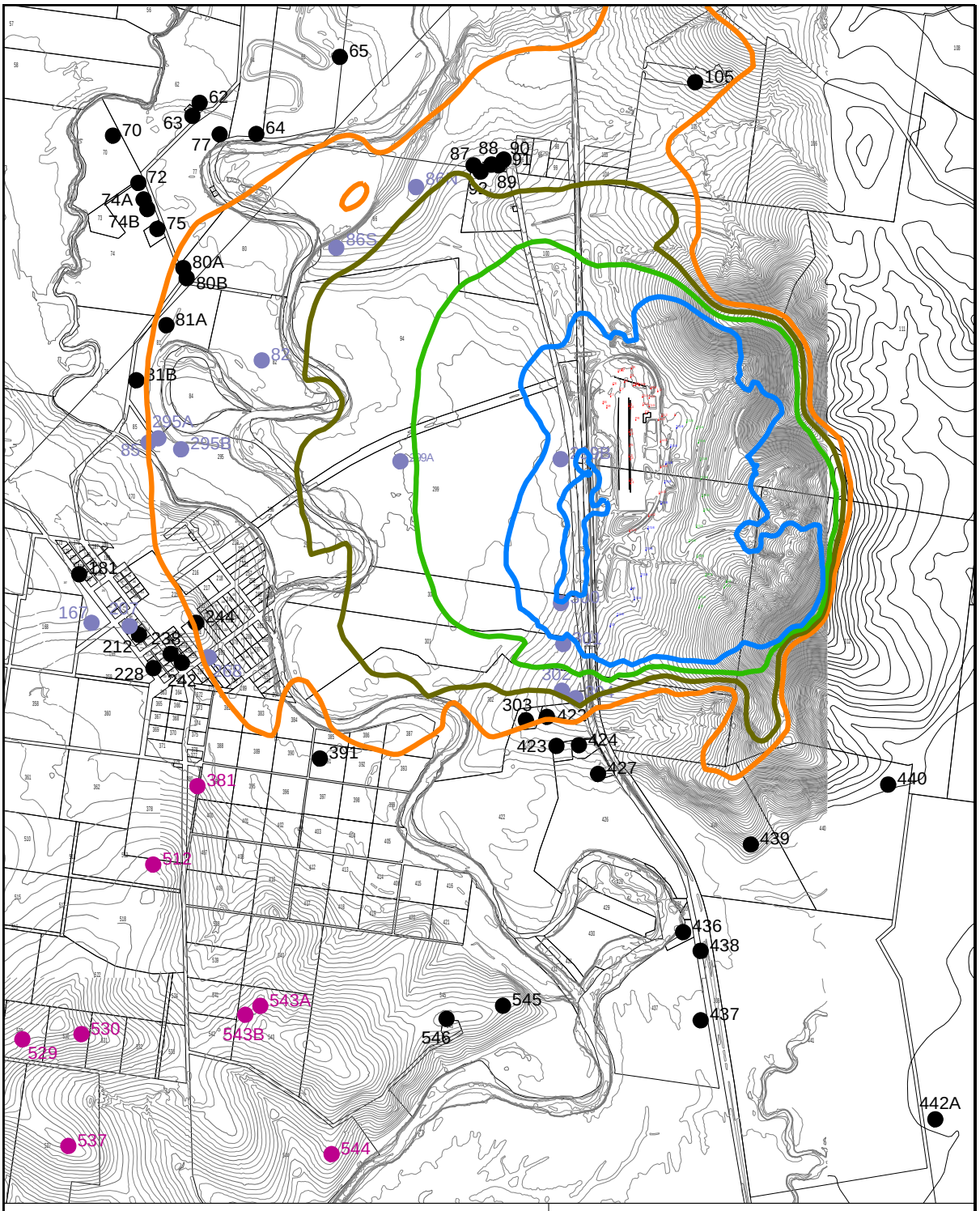
30 June 2020

N

DARTBROOK PROJECT

Year: All
Time Period: Day
Atmosphere: Neutral
Scenario: Noise Contours LAeq,15min

Figure B1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86S
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295A
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212
228
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303
423
424
427
391
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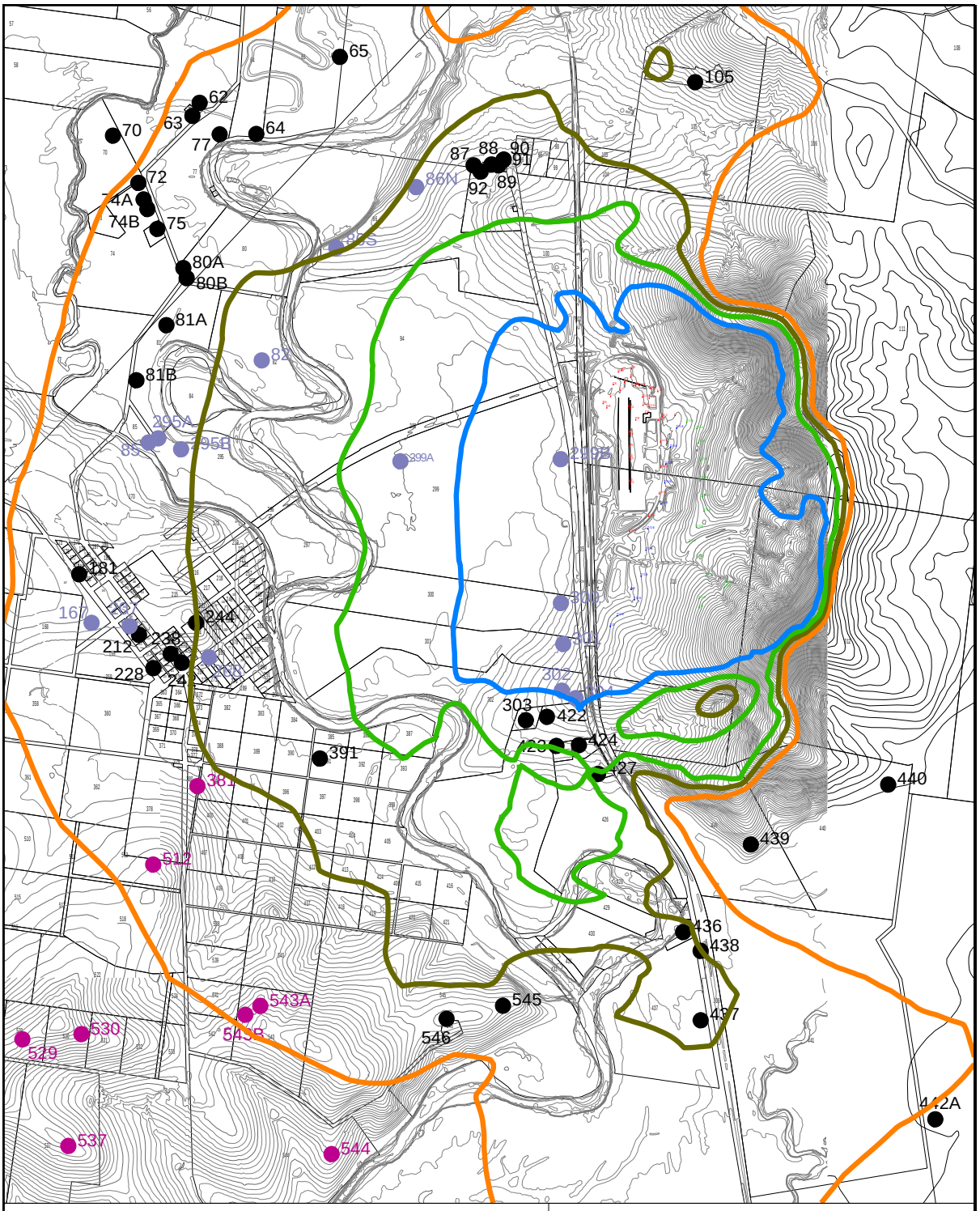
512
440
439
436
438
437
545
546
543A
543B
530
529
537
544
442A
30 dBA
35 dBA
40 dBA
45 dBA
Private Residence
AQC Residence
Other Mining Company Residence
Noise source - CHPP
Noise source - south-west REA
Noise source - southern REA
N
30 June 2020
DARTBROOK PROJECT
Year
All
Time Period
Day
Atmosphere
Prevailing
Scenario
Noise Contours
LAeq,15min
Figure
B2



30 dBA
35 dBA
40 dBA
45 dBA

- Private Residence
- AQC Residence
- Other Mining Company Residence

Noise source - CHPP
Noise source - south-west REA
Noise source - southern REA

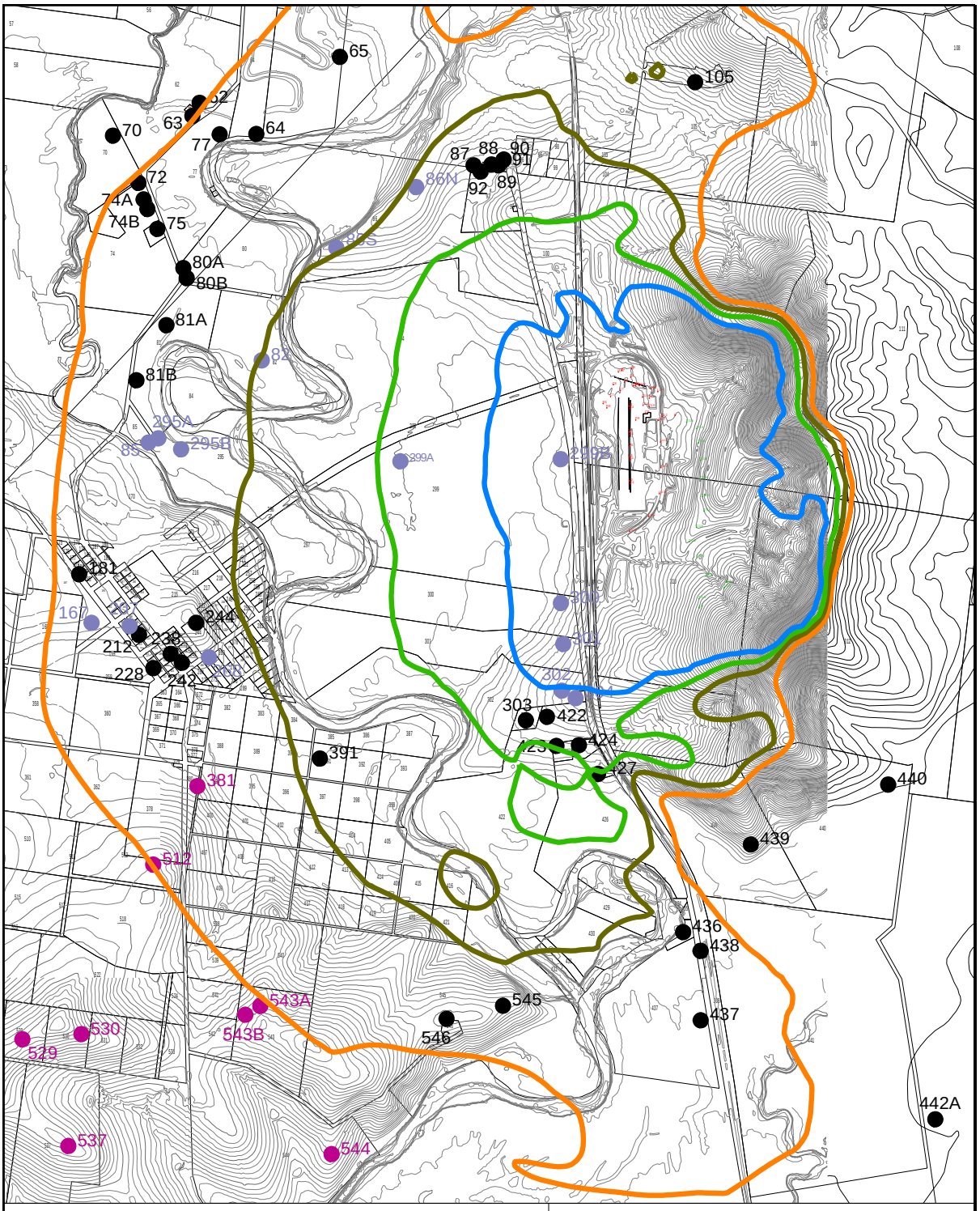
N

30 June 2020

DARTBROOK PROJECT

Year: All
Time Period: Evening/night
Atmosphere: Prevailing
Scenario: Noise Contours LAeq,15min

Figure B3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295B
399A
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212
228
242
391
381
512
543A
543B
530
529
537
544
545
546
303
422
424
427
440
439
436
438
437
442A
30 dBA
35 dBA
40 dBA
45 dBA
Private Residence
AQC Residence
Other Mining Company Residence
Noise source - CHPP
South-west REA reject handling plant excluded
Noise source - southern REA
N
30 June 2020
DARTBROOK PROJECT
Year
All
Time Period
Evening/night
Atmosphere
Prevailing
Scenario
Noise Contours
LAeq,15min
Figure
B4

APPENDIX C: CURRICULUM VITAE

Name:	Mark Leslie BRIDGES.	
Address:	78 Woodglen Close, PATERSON NSW 2421	
Qualifications:	Bachelor of Mechanical Engineering (Hons), awarded May 1991.	
Affiliations:	Member of the Australian Acoustical Society, admitted February 1999.	
Employment:	Since Feb 2000:	Principal, Bridges Acoustics.
	Oct 1998 to Feb 2000:	A/Manager, Caleb Smith Consulting.
	Nov 1995 to Oct 1998:	Senior Acoustic Engineer, Caleb Smith Consulting.
	Feb 1995 to Nov 1995:	Acoustic Engineer, Caleb Smith Consulting.
	Feb 1984 to Feb 1995:	Various trainee and graduate engineering positions in the Water, Hydraulics and Manufacturing industries.

Experience: Over 25 years as a professional acoustical consultant specialising in environmental noise measurement, prediction and control. Published two professional papers on best practise environmental noise reduction in the open cut coal mining industry.

Completed over 100 major noise impact statements and more than 160 other environmental noise assessments in the mining, industrial commercial, domestic, utilities and services sectors.

Prepared expert evidence and appeared in the Land & Environment Court or the Liquor Licensing Court on over 15 occasions, primarily for Lake Macquarie City Council and Great Lakes Shire Council and other private clients.

Current and previous clients include:

- Hansen Bailey Pty Ltd (environmental engineers);
- CH2M Hill Australia Pty Ltd (environmental and process engineers);
- Energy Australia (power industry);
- Essential Energy (power industry);
- AGL Energy (gas supply);
- MRM Thompson Norrie (legal);
- Perception Planning (planning and development);
- BlueScope Steel (steel making);
- OneSteel Market Mills (heavy manufacturing);
- Shell Refining (Australia) Pty Ltd (oil and fuel industry);
- Anglocoal (Dartbrook Management) Pty Ltd (coal mining);
- Liddell Operations Pty Ltd (coal mining);
- Centennial Coal (coal mining);
- NSW Roads & Maritime Services (transport industry); and
- Department of Planning & Infrastructure (independent noise surveys).

Completed mining related projects include:

- Isaac Plains East EIS, Central Queensland, for Stanmore Coal;
- Peer Review of Bylong Coal Project Acoustic Report, Upper Hunter, for Bylong Coal;

- Gemco Eastern Leases EIS, Groote Eylandt NT, for BHP Billiton;
- Eagle Downs Gas Project, Central Queensland, for Eagle Downs Coal Management;
- Acoustic audit of Environmental Management System, for Ulan Coal;
- Cook Colliery EIS, Central Queensland, for Blackwater Coal;
- Continuation of Bengalla Mine EA, Hunter NSW, for Bengalla Mining Company;
- Watermark Project EA, Gunnedah Basin NSW, for Watermark Coal;
- Minyango Project EIS, Central Queensland, for Blackwater Coal;
- Drayton South EA, Hunter NSW, for Anglo American;
- Maules Creek Coal Mine EA, Gunnedah Basin NSW, for Aston Resources;
- Foxleigh Plains Coal Mine EIS, Bowen Basin Qld, for Anglo Coal;
- Coalpac Consolidation Project EA, Lithgow Region NSW, for Coalpac;
- Grosvenor Mine EIS, Bowen Basin Qld, for Anglo Coal;
- Boggabri Coal Mine Extension EA, Gunnedah Basin NSW, for Boggabri Coal;
- Eagle Downs Coal Mine EIS, Bowen Basin Qld, for Bowen Central Coal Management.

APPENDIX C
Subsidence Review

REF:sh-01

Friday, 3 July 2020

Alan McKelvey
Partner – Corporate and Commercial
Sparke Helmore Lawyers
Level 7, 28 Honeysuckle Drive
Newcastle

Confidential and subject to Legal Professional Privilege
Prepared for the dominant purpose of actual or anticipated litigation.

Dear Alan

At your request, I have examined the supplied documents on the Dartbrook project:

- G.E.Holt and Associates Pty Ltd. 2000. Subsidence impact study for proposed extension of longwall operations at Dartbrook Colliery. Appendix N of EIS
- SCT Operations Pty Ltd. 2018. Pillar layout to limit surface subsidence from mining in the Kayuga Seam. Letter to Hanson Bailey Environmental Consultants

In your email of 19 June 2020 (*Item 03 - 200501 Dartbrook Legal Challenge_Subsidence scope (73755332.1*)) you listed a number of items for me to address. They are reproduced below along with my comments.

Attached to this letter is a brief CV that outlines my experience in coal mine subsidence.

Review the subsidence assessment in the Dartbrook EIS (conducted by G.E. Holt and Associates) and SCT's assessment in the MOD7 EA

G.E.Holt and Associates (Holt)

Holt adopted standard empirical guidelines to predict vertical subsidence for each coal seam and used the Newcastle relationship for isolated panels and the Southern coalfield relationship to assess the subsidence of a series of panels separated by chain pillars. In these guidelines one of the key parameters is the ratio of the maximum vertical subsidence to the extracted seam thickness (Smax/T). Holt adopted a Smax/T ratio = 0.55 which was validated by information then available from the Dartbrook operations in the Wynn Seam.

Holt then added the maximum vertical subsidence from each seam to obtain a maximum value for when multiple seams are extracted. This was standard practice at the time. To estimate the ground strains and tilts Holt applied the standard Newcastle factors of 400, 600, 1800 to the maximum multiple-seam vertical subsidence. This was also standard practice at the time.

There is no new data since that time that makes these empirical relationships for a single seam invalid but there is published work[1] that post-dates the EIS that indicates a change in thinking for multiple seams. This 2010 paper differentiates between overmining (where the first extracted seam

[1] Li, G., Steuart, P., Paquet, R., and Ramage, R. 2010. A case study on mine subsidence due to multi-seam longwall extraction. Second Australasian Ground control in Mining Conference, Sydney NSW, 23-24 November 2010.

is the deepest – as is the case of the Dartbrook project where the Wynn Seam has been extracted) and the more common undermining where the extracted seams are progressively deeper.

The paper includes two examples of overmining with inconclusive conclusions. There is very little monitoring data so extrapolation to Dartbrook is somewhat difficult. My interpretation for the Kayuga Seam above the Wynn longwalls is that there is a need to increase the subsidence level for the Kayuga extraction by increasing the Smax/T ratio by an additional 0.2 – i.e. the 0.55 used by Holt should be 0.75. For Dartbrook the situation is even more complicated in that the proposed Piercefield Seam extraction is overmining with respect to the Wynn Seam but undermining with respect to the Kayuga Seam.

The implication is that there is a possibility that the simple summing of individual Smax values may be an underestimate (see Table 1). Mining the Piercefield after Kayuga could make the underprediction even larger. It is emphasised that the absolute subsidence values in Table 1 may not actually be achieved as this depends on how the mine layout interacts with the seam depths. The point of the table is simply to compare how the prediction could differ in the light of more recent knowledge.

Table 1 Estimation of maximum vertical subsidence in the case of multiple seams being extracted using empirical guidelines of 2000 and 2010

	Extracted thickness (m)	Holt 2000 (m)	Application of Li et al (2010) guidelines (m)	
Kayuga	4	2.2	3.0	3.4
Piercefield	4.5	2.48		3.38
Wynn	4	2.2	2.2	2.2
Total		6.88	5.5	8.98

SCT MOD 7 – Kayuga Seam

SCT modified an empirical pillar design process such that pillar dimensions are reduced to incorporate rib spall. This is a modification to the published method that utilises the as planned/mined dimensions and is considered to be inappropriate. Consequently, the SCT proposed pillars would be very stable (in fact more stable than necessary) and should not collapse if undermined by either longwall or pillar extraction. The depths of the Kayuga Seam will mean that any collapse of the 5.5 m roadways that form the pillars in the Kayuga Seam will not result in subsidence at the surface if the pillar workings are undermined.

The calculations that underpin the SCT estimation of subsidence (30 mm - 80 mm) are not given. My estimation of pillar subsidence is 50 mm - 90 mm so I accept the SCT values to be appropriate.

Determine whether the subsidence that may be induced by longwall mining in the years 2022-2027 (inclusive) will be less than the predictions in the 2000 EIS. It is envisaged that only one seam (likely the Kayuga/Mt Arthur Seam) can be mined during the remaining mine life. Assume that all management measures required by the conditions of DA 231-7-2000 following the determination of MOD7 are implemented;

Maximum vertical subsidence induced by longwall mining in the three seams could exceed the 2000 EIS predictions. If keeping the subsidence to less than the EIS 2000 predictions is critical, then only

one of the Piercefield or Kayuga can be mined by longwall. Extraction by bord and pillar in any of the seams will result in subsidence less than the 2000 EIS predictions.

Regarding the conditions in DA 231-7-2000, with two seams extracted by longwall there will be fracture connection to the surface.

Advise whether the active mining at the neighbouring Mt Pleasant Mine will affect subsidence behaviour;

The Mount Pleasant Mine approval lies immediately to the south of Dartbrook (Figure 1).

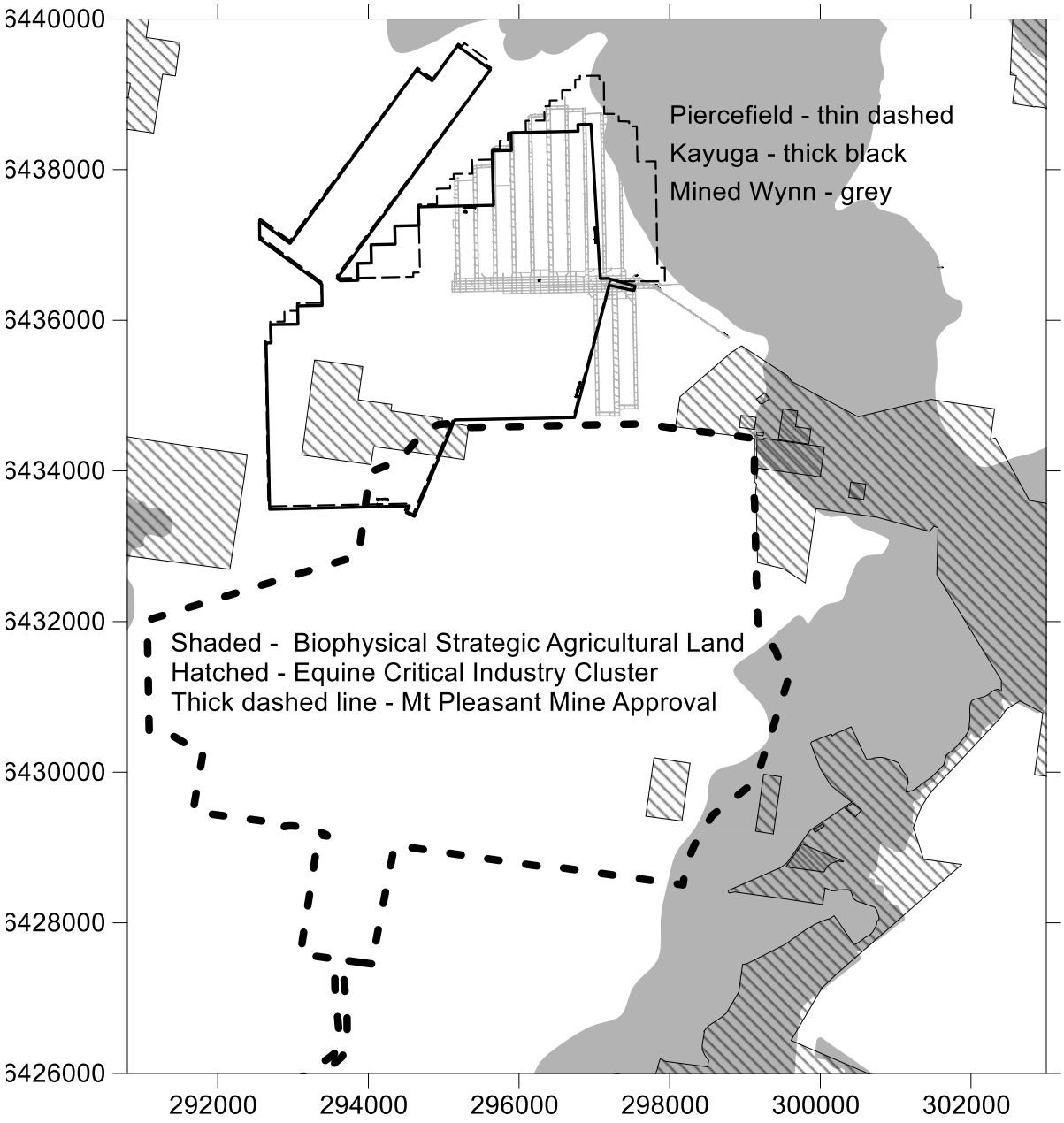


Figure 1 Map showing mined Wynn, approved Kayuga and Piercefield limits, Mount Pleasant approval area, and BSAL and ECIC areas

I am not aware of any reports of additional surface subsidence in the Hunter Valley associated with adjacent surface mining (for example Bulga/Beltana or Ashton) nor do I expect such impacts from my understanding of the geotechnical regime. On this basis I assess that surface mining operations at Mount Pleasant will not impact on subsidence at Dartbrook.

Where the approvals overlap, any mining in the Mount Pleasant area will be in shallower seams and if the operation is surface mining there will be a need to consider pit wall stability – the surface mine disturbance will over-ride any Dartbrook subsidence. If the Mount Pleasant mining is to be longwall mining, then the subsidence deformations associated with the Mount Pleasant mining will need to consider the impact of multiple seam extraction.

Assess the potential subsidence impacts on the land identified as BSAL or ECIC. There is a small area of ECIC overlying the other approved longwall panels. Other areas of BSAL or ECIC are laterally offset from the mine plan;

Longwalling within the approved Kayuga Seam layout is offset from (Figure 1) and will not result in subsidence deformations in the adjacent BSAL and hence no subsidence impacts.

Longwalling of the four easternmost panels in the Piercefield Seam (referred to as P210-P213 in the Holt report) will result in subsidence deformations within the BSAL. In this area the Piercefield would be the only seam to be extracted. The mining depths are less than about 130 m. Holt did not provide predictions for these panels but using his method and assuming a 4.5 m extraction thickness the following predictions can be made:

Depth (m)	Vertical subsidence (m)	Tensile strain (mm/m)	Compressive strain (mm/m)	Tilt (mm/m)
60	2.47	16	25	74
90	2.47	11	16	50
120	2.47	8	12	37
150	2.47	7	10	30

In terms of subsidence impacts of Piercefield extraction on the BSAL in this area the tensile strains will result in the formation of substantial open cracking at the surface – possibly in the order of several hundred millimetres. The compressive strains will result in the formation of humps that may be in the order of 100-200 millimetres high. The tilts could result in localised ponding in any ephemeral water courses. There will be connective cracking from the seam to the surface. The surface deformations should be readily remediated and the impacts and environmental consequences should be capable of management through an Extraction Plan approval process.

For the ECIC located to the south west of the area of interest (see Figure 1), the minimum depth to the Kayuga Seam is about 170 m and to the Piercefield Seam is about 250 m. The Holt predictions for KA108 apply for the extraction of the Kayuga Seam at 170 m depth:

- Maximum vertical subsidence - 2.08 m
- Maximum tensile strains – 5.2 mm/m
- Maximum compressive strain – 7.8 mm/m
- Maximum tilt – 23 mm/m

At the same location the depth to the Piercefield Seam is 250 m and assuming both seams are extracted the subsidence parameters for multiple seam extraction and making reference to the Li et al (2010) paper are:

- Maximum vertical subsidence – 6.6 m
- Maximum tensile strains – 11 mm/m
- Maximum compressive strain – 21 mm/m
- Maximum tilt – 48 mm/m

Similar to the previous the tensile strains induced under ECIC will result in the formation of substantial open cracking at the surface – possibly in the order of several hundred millimetres. The cracking would be less if only the Kayuga Seam was extracted – in general the crack aperture will be in proportion to the maximum tensile strain. The compressive strains will result in the formation of humps that may be in the order of 100-200 millimetres high and once again such humps will be smaller if only the Kayuga Seam is extracted. The tilts could result in localised ponding in any ephemeral water courses and once again the magnitude of the tilts will be less if only the Kayuga is extracted. There will be connective cracking from the seam to the surface for both single and two seam extraction. The surface deformations should be readily remediated and the impacts and environmental consequences should be capable of management through an Extraction Plan approval process.

I am instructed that there are no built structures identified in the ECIC, but if there were, any damage would be beyond safe serviceable and repairable.

If bord and pillar mining in the Kayuga Seam is conducted under the ECIC the vertical subsidence will be less than 90 mm and the associated tensile and compressive strains and tilts will not be detectable by standard survey techniques. There would be no observable or measurable impacts.

Assess the potential implications of longwall mining on the previously assessed bord and pillar workings (e.g. pillar instability);

The dimensions of the proposed pillars in the Kayuga Seam are such that they can be undermined without inducing collapse or additional surface subsidence. There is the opportunity to reduce the pillar sizes by 3 m - 4 m and still have adequate stability if the underlying seams are longwalled.

Advise if there are any other developments since G.E. Holt and Associates' assessment that would materially affect the validity of those predictions;

There are two published papers on multiple seam longwalling that post-date the EIS[2]. The focus in those papers is undermining (which is not what will happen at Dartbrook) and the main finding in both

[2] Li et al 2010 – see footnote #1,

Mills, K. and Wilson, S. 2017. Insights into the mechanics of multi-seam subsidence from Ashton underground mine. *in* Aziz, N. and Kininmonth, R. (eds.), Proceedings of the 17th Coal Operators' Conference, Mining Engineering, University of Wollongong, 8-10 February 2017, 51-66.

papers is that adding subsidence predictions for each seams in not valid and will underestimate the vertical subsidence.

The 2010 paper includes inconclusive comments regarding the impact of ascending order of extraction with only one case example given. My interpretation is that there is a need to assume that the Holt estimates will be too low and I have adopted a subsidence factor of 0.75 instead of the 0.55 used by Holt.

Advise whether further mining (by longwall and/or bord and pillar) are able to be designed to and managed to be compliant with the performance measures in DA 231-7-2000;

In the context of connective cracking, extraction voids will need to be less than 40 % the depth of cover if there are Category 5 streams above.

Yours truly

Ross Seedsman
PhD, FAusIMM(CP)

Ross Seedsman

rossseedsman@gmail.com

M| 0417 279 556

Qualifications & professional affiliations

Bachelor of Science (Hons), University of Melbourne

Master of Science, University of Melbourne

Doctor of Philosophy, University of Queensland

Fellow, Australasian Institute of Mining and Metallurgy

Chartered Professional (Mine Geotechnical) – AusIMM

Member, Australian Geomechanics Society

Ross has more than 35 years' experience working in mining consulting and research. He has expertise in mine planning for surface operations and underground coal mines, the design and specification of ground support for underground coal mines, pit-wall stability, and mine subsidence.

In the underground coal sector, Ross has published a strength criterion that can be used for laminated low strength rock and has made significant contributions to the understanding of boundary crushing in the roof and sides of excavations. He is a strong advocate of the importance of debonding cables to survive such crushing. Ross has also combined his understanding of boundary crushing in coal with his experiences in pitwall stability to make better correlations between coal and rock bursts.

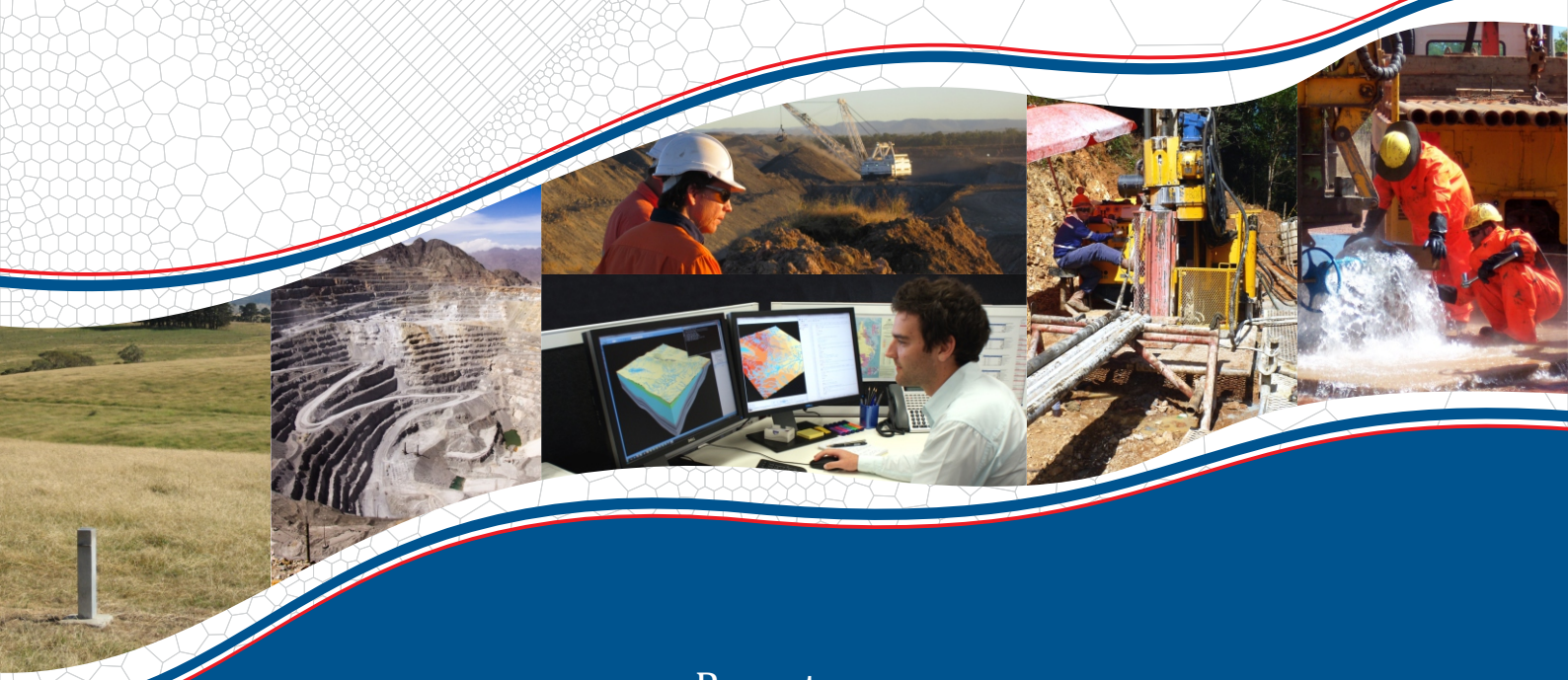
Ross has also worked extensively on the prediction of mine subsidence in both NSW and Queensland coal fields. He introduced the influence function prediction method (SDPS) to Australia and adapted its use to better suit Australian mining geometries. He has had success in redesigning pillar and longwall-panel widths so as to better balance surface impacts with mine economics – this has involved both narrowing and widening of extraction panels and specific design of the chain pillars. His experiences with the prediction of mine water inflows in the NSW and Bowen Basin coalfields have led to the formulation of a fracturing model that substantially differs from currently accepted views.

Ross has published both locally and internationally. As well as presenting case studies in local and international conferences, he was invited by the SME (USA) to write the rock mechanics chapter of the 2010 edition of the Mining Engineering Handbook. He recently contributed a chapter in an AusIMM Monograph on geotechnical modifying factors for longwall reserves. More recently he has focussed on publishing new insights into ground control and mine water inflow in international journals. Such publications include:

- Prediction of the height of caving and fracturing above an isolated longwall extraction panel. Mining Technology, 129:2, 95-103.
- Interpretations of mine water pumpout data and revisions to caving and fracturing models for longwalls. Mine Water And The Environment, 38,3,67-685.
- On the deception in requiring and providing singular accurate predictions for surface subsidence, tilt, and strain. Proceedings of the 9th Triennial Conference on Mine Subsidence. Pp 449 - 459.
- Calibrated parameters for the prediction of subsidence at Mandalong Mine. Coal 2010 - 10th Australasian Coal Operators' Conference, Wollongong

APPENDIX D
Groundwater Assessment

Australasian Groundwater and
Environmental Consultants Pty Ltd



Report on

Dartbrook Mine
Revised MOD7
Groundwater Assessment

Prepared for
AQC Dartbrook Management Pty Limited

Project No. G1730N July 2020
www.ageconsultants.com.au ABN 64 080 238 642

Document details and history

Document details

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File name	G1730N.Dartbrook Revised MOD7 v02.01.docx

Document status and review

Edition	Comments	Author	Authorised by	Date
v01.03	First draft for client comment	JT	JT	2/07/2020
v01.04	Final	JT	JT	3/07/2020
v02.01	Addressed client comments	JT	JT	20/7/2020

Australasian Groundwater and Environmental Consultants Pty Ltd

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Report on

Dartbrook Mine
Revised MOD7 – Groundwater Assessment

1 Introduction

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of NSW. AQC is a wholly owned subsidiary of Australian Pacific Coal Limited. In August 2019 the Independent Planning Commission (IPC) determined an application from AQC to modify the Dartbrook Mine's development consent (DA 231-7-2000) to facilitate limited bord and pillar mining. The Modification allowed for bord and pillar mining in part of the Kayuga Seam within the footprint of already approved longwall mining activities which have been on care and maintenance since December 2006.

Whilst the IPC approved the bord and pillar mining component of the Modification, it refused AQCs application to extend the project approval by five years to 5 December 2027. The IPC concluded it *"..was not provided with a contemporary assessment of the potential impacts of the existing approved longwall mining and coal handling operations to support a 5 year extension of this approval (DA 231-7-2000), in the context of the significant increase in mining activity and other changes in the area since the original approval was granted in 1991. This gives rise to uncertainty about the Applications future impacts, and the veracity of mitigation available, should some aspects of the currently approved Project, such as longwall or coal washery operations continue or restart after 2022."*

In response AQC commissioned an assessment of the potential impacts of extending the approved mining operations until 2027 The proposed activities would extract up to 6 million tonnes of ROM coal per annum utilising longwall and/or bord and pillar methods. Mining would occur within the existing approved footprint of the mine. Sparke Helmore Pty Ltd engaged Australasian Groundwater and Environmental Consultants Pty Ltd (AGE), on behalf of AQC to assess the impact of extending longwall mining at Dartbrook for five years on the groundwater regime.

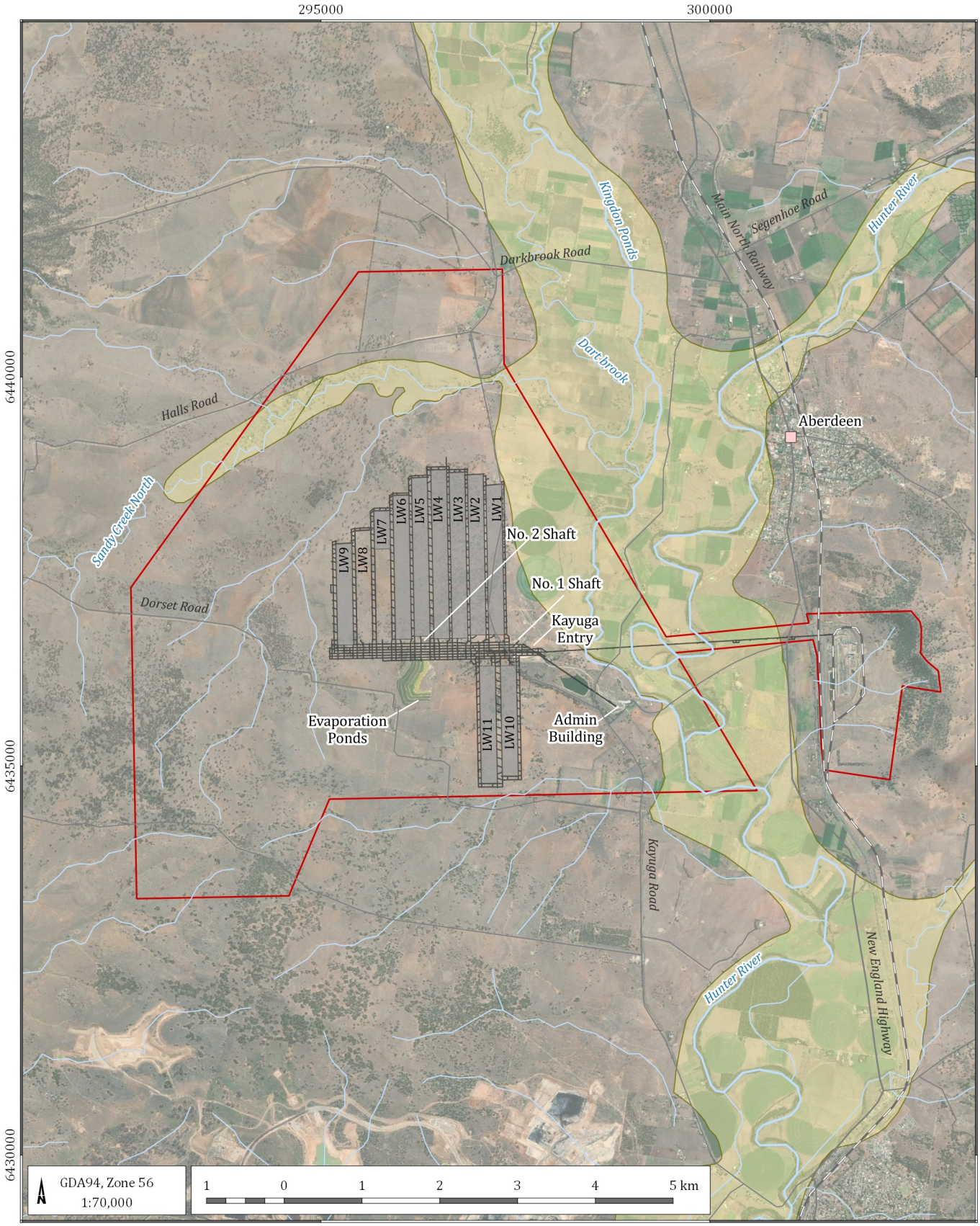
2 Objectives and scope of work

The objective of the consultancy engagement was to provide an opinion on the likely magnitude of groundwater impacts generated by a revised MOD 7, compared with the currently approved impacts associated with longwall mining. The objective was not to determine the absolute impacts on groundwater associated with MOD7, but rather to determine if there could be significant changes to impacts from extending the mine life for five years beyond what is already approved.

To achieve this objective the scope of work included review of the impact assessment upon which the longwall mining was previously approved. This assessment was conducted by Mackie Environmental Research (MER 2000) and included numerical groundwater modelling. The groundwater modelling conducted by MER (2000) was reviewed against contemporary expectations for modelling, and by review of groundwater monitoring data collected since 2000. This information was then used to provide an opinion on the expected effects of the revised MOD7, and whether the potential impacts on the groundwater regime may be significantly different from those already approved. As noted the assessment was based on the review of existing available information, and previous experience conducting groundwater assessments for major projects. Numerical modelling was not part of the scope of work.

3 Approved activities

Figure 3.1 shows the longwall mining within the Wynn Seam approved under the previous development consent for Dartbrook Mine (DA 30/91. Mining within the Kayuga/Mt Arthur and Piercefield Seams was approved under the current consent DA 231-7-2000. The approved longwall panels within these seams are shown in Figure 3.2 and Figure 3.3. The Kayuga and Mt Arthur seams are separated by about 30 m of interburden and become single seam to the west where three panels are approved in the Mt Arthur Seam. This seam is referred to as the Kayuga Seam for the purposes of this report.



LEGEND

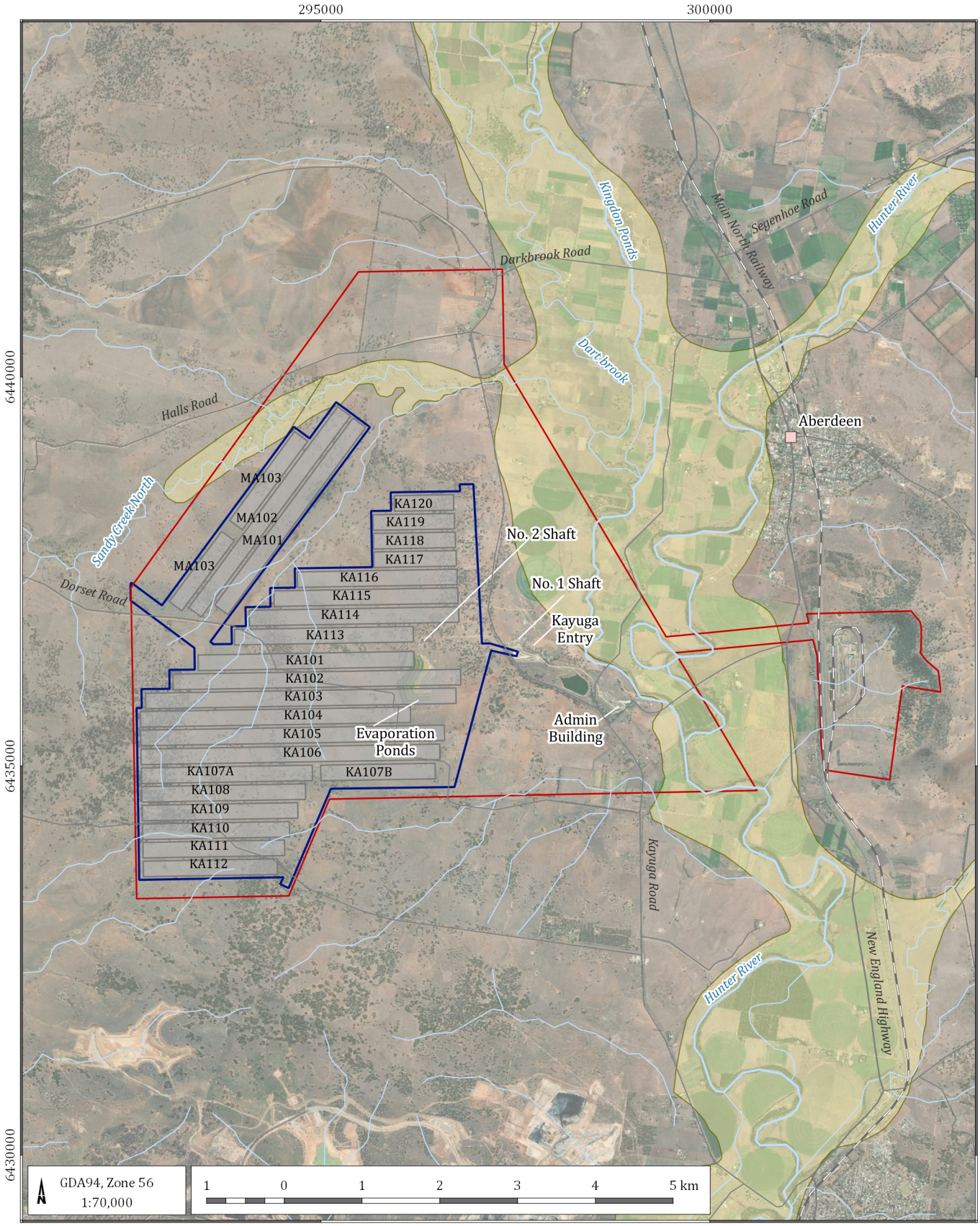
- Populated place
- Road
- Drainage
- Rail
- Mining Authorisation
- Extracted Longwall Panels
- Indicative Longwall Panel Layout
- Alluvium boundary (Source: 1:250k Singleton Geology Sheet, modified after AGE (2007))

Dartbrook MOD7 (G1730N)

Approved mining activities (Wynn seam)

DATE 02/07/2020

FIGURE No: **3.1**



LEGEND

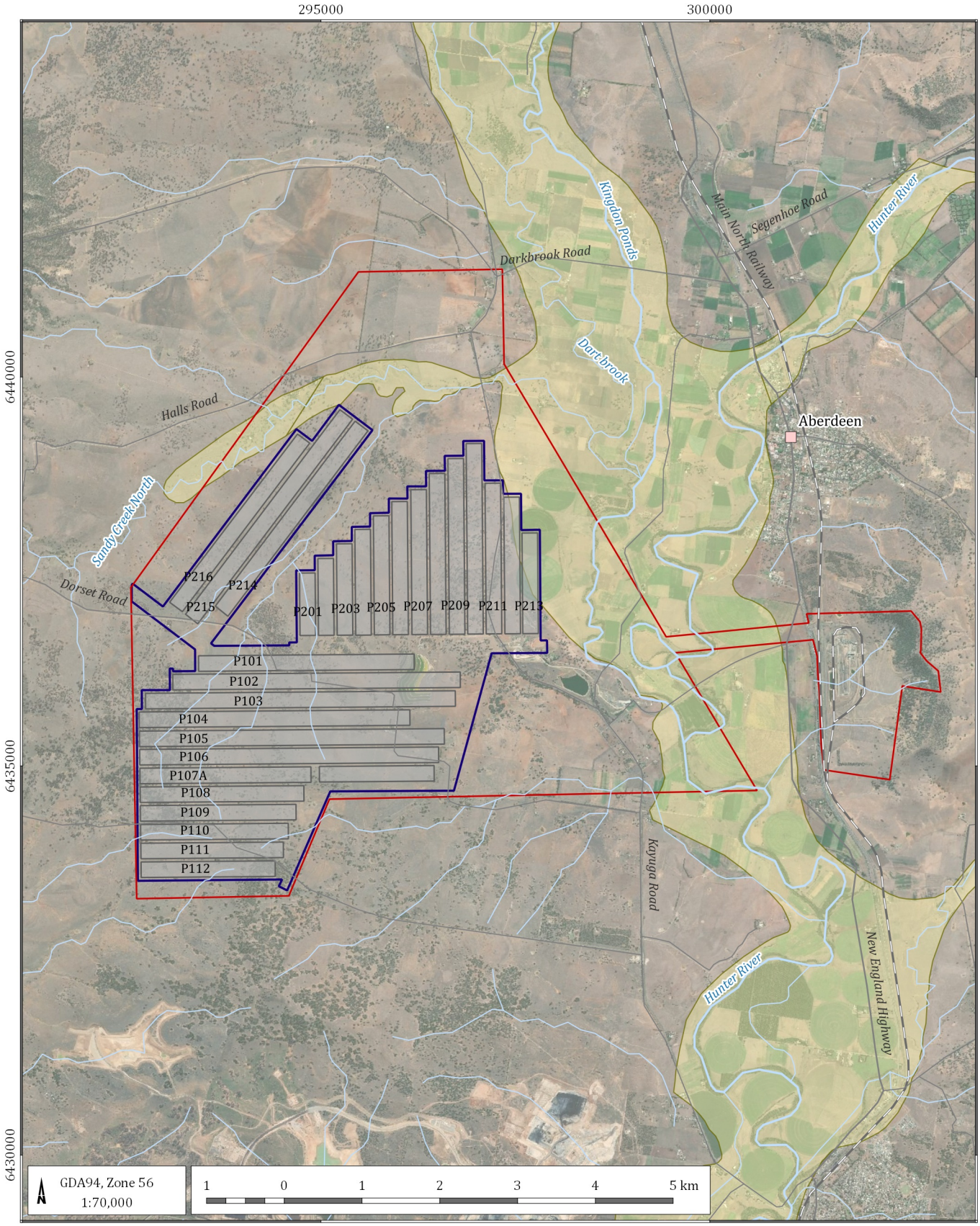
- Populated place
- Road
- Drainage
- Rail
- Mining Authorisation
- Approved Kayuga and Mt Arthur Seam Mining Area
- Indicattive Longwall Panel
- Alluvium boundary (Source: 1:250k Singleton Geology Sheet, modified after AGE (2007))

Dartbrook MOD7 (G1730N)

Approved mining activities (Kyuga and Mt Arthur seam)

DATE 02/07/2020

FIGURE No: **3.2**



LEGEND

- Populated place
- Road
- Drainage
- Rail
- Mining Authorisation
- Approved Piercefield Mining Area
- Indicatetive Longwall Panel Layout
- Alluvium boundary (Source: 1:250k Singleton Geology Sheet, modified after AGE (2007))

Dartbrook MOD7 (G1730N)

Approved mining activities (Piercefield seam)

DATE 02/07/2020

FIGURE No: **3.3**

4 Review of groundwater model

4.1 Model setup

MER (2000) developed a computer based numerical groundwater flow model of the Dartbrook mine and surrounding region using the MODFLOW 88 code. The model results were documented in Appendix L of the Dartbrook Extended EIS, dated June 2000.

The groundwater model was used to simulate the historical impact of approved mining which commenced in the Wynn Seam in 1996, as well as the impact of proposed longwall mining of the Kayuga and Piercefield seams over a period of 20 years.

The model represented the groundwater regime with 11 layers covering the main hydrostratigraphic units including Hunter River/Dartbrook alluvium, and alternating layers representing Permian non coal interburden and the Wynn, Kayuga and Piercefield seams. Layer 1 represented the Hunter River/Dartbrook alluvial aquifer and the Permian interburden outside the alluvial plain. Layers 3 and 6 and 9 were set at 50 m thick above each of the Kayuga, Piercefied and Wynn seams to allow higher vertical permeabilities associated with subsidence induced fracturing to be assigned.

Contemporary models for coal mining projects typically have more model layers due to improved computer processor speeds, however eleven model layers was significant at the time the Dartbrook model was developed, and as the major aquifers and aquitards are represented it is not expected to have compromised it's usefulness for estimating impacts.

The model domain was discretised into cells varying from 100 m x 100 m to 250 m x 250 m, with a total of 6396 model cells per layer. Again, improved computer processor speeds now allow smaller cells and more cells to be built into contemporary numerical models, however the dimensions of the cells were appropriate for the time, and many contemporary models continue to use similar model cells dimensions.

4.2 Boundary conditions, parameters and calibration

The hydraulic conductivity of the model layers was guided by field measurements and adjusted during the calibration process. The values of hydraulic conductivity were uniform in each model layer as follows:

- alluvium 30 m/day
- shallow interburden 0.001 m/day
- deep interburden 0.0002 m/day
- coal seams 0.01 m/day

Whilst it is now common in contemporary models to allow hydraulic conductivity to vary spatially within each layer, the values adopted are considered representative based on experience in the region. An anisotropy ratio for horizontal to vertical conductivity of 1:1 was adopted in the alluvium and coal seams, and 5:1 in the Permian interburden. Higher contrasts between horizontal and vertical hydraulic conductivity are considered possible within the Permian strata due to the inter layering of fine grained lower permeability layers within the strata. Slow declines observed in monitoring bores installed above the completed longwall panels supports this conclusion (refer Section 5.2.2). The anisotropy adopted for the Permian interburden in the model is therefore a likely conservative assumption that enhances transmission of groundwater between the alluvium and Permian layers in the model.

The report notes that the vertical hydraulic conductivity was adjusted in the layers overlying the mined coal seams, but the changes made to the hydraulic conductivity does not appear to be provided in the report. The height of the zone above the mining where fracturing occurs appears to be set 100 m, although this is not clearly stated in regards to the model. Whilst the report does not clearly provide this information (which would be required in a contemporary assessment), figures provided within Appendix E of MER (2000) indicates that the mining depressurises the Permian strata overlying the mining areas, but does not completely drain the overlying strata (Figures E6 and E7). Groundwater monitoring sites overlying the mined panels have recorded declining levels above the Kayuga Seam since mining commenced, but not induced complete drainage at the monitoring sites (refer Section 5.2.2). Therefore, whilst all the details of the fracturing represented in the model are not known, at a high level the available monitoring data, aligns with the predictions from the groundwater model.

A value of unconfined storage of 25% was adopted for the alluvium in the model, with a uniform specific storage of $1 \times 10^{-4} m^{-1}$ in all confined layers. Specific storage is a parameter used in the groundwater model that represents how much water is released from confined geological strata in response to declining water levels. Recent research into poroelastic theory has determined there are upper and lower bounds on the specific storage parameter. Rau et al. (2018) showed using poroelastic theory that specific storage can only occur in the range of $\simeq 2.3 \times 10^{-7}$ m^{-1} and 1.3×10^{-5} m^{-1}.

The Dartbrook numerical model therefore adopts a value about one order of magnitude higher than the theoretical maximum. It is not uncommon for numerical models prepared prior to this research being available in 2018 to have adopted values of specific storage higher than the theoretical maximum. The effect of this is that a larger volume of water can be represented in storage available for drainage to the mining activities during depressurisation than would be present in reality. If the specific storage was reduced in the Dartbrook model to within the theoretical bounds, and no further calibration conducted the model would predict a wider zone of depressurisation, particularly within the confined Permian strata. During calibration other adjustable parameters including recharge and hydraulic conductivity may have compensated for the adopted value of specific storage. The impact of this is difficult to determine, but the adopted value of this parameter cannot be considered conservative. As discussed, this issue is present in many pre-2018 numerical models and is a reflection of changes in modelling methodology rather than any shortcomings specific to the Dartbrook numerical model.

The model represented the Hunter River with a constant source boundary condition that could provide leakage into the alluvium where hydraulic heads allow. This is an appropriate representation as the Hunter River flow is maintained by releases from the upstream Glenbawn Dam. All other creeks were set as drains and could not enhance recharge to groundwater systems, which is considered an appropriate conservative assumption. Average rainfall recharge was set over the Permian strata at 2mm/year, and in the alluvium at 90mm/year. These values were estimates of long term averages based on available data. Of course, the future climate conditions could not be known when the modelling was conducted, and therefore the model does not represent periods of drought or above average rainfall. This is normally addressed by analysing the sensitivity of the model calibration and predictions to the adopted values of recharge. A sensitivity analysis is not included with the Dartbrook report, a task that is standard practice in contemporary models. It is worth nothing that the numerical modelling was conducted prior to guidance on groundwater modelling being released within Australia (Barnett et al, 2012, Murray Darling Basin Commission 2000).

The model was calibrated to match groundwater inflow rates to the Wynn Seam mine which were noted to be about 0.3 ML/day. There is no discussion of history matching of measured and predicted groundwater levels which is the most appropriate method to calibrate groundwater models. There is also no groundwater level monitoring included within the report and therefore the response of groundwater levels to the Wynn Seam mining is not known. This is a significant omission from the report that, again would not be acceptable in contemporary models.

MER (2000) openly noted the model limitations discussed above as including *'consolidation of many lithologies into single layers, simplified assignment of permeability based on consolidation of numerous field tests, generalisation of storatvity based on barometric efficiency of piezometers and limited tests, and uniform assignment of rainfall recharge. Groundwater abstraction from the alluvium by local land holders for stock and irrigation purposes, has not been included.'*

4.3 Model predictions

The model represented approved mining in the Wynn Seam and proposed mining in the Kayuga and Piercefield seams. Longwall mining was represented via nine longwall panels in the Wynn Seam from 1996 to 2003. Actual mining that occurred in this seam differs from the numerical model because two additional Wynn Seam panels were approved through a later modification. These are LWs 10 and 11 shown on the attached Figure 3.1.

A total of 20 panels of longwall mining in the Kayuga Seam were included in the model from 2003 to 2016, and three where is coalesces within the Mt Arthur Seam from 2016 to 2019. The first three Kayuga longwall panels in this layout were mined but not to the full approved length before the mine was placed on care and maintenance (Figure 3.2). The model represented four panels within the Piercefield Seam active from 2019 to 2023, none of which were extracted before the mine was placed into care and maintenance. The Dartbrook Extended EIS presented a mine plan for the Piercefield Seam that included 20 longwall panels (Figure 3.3). However, not all of these panels were to be mined within the duration of DA 231-7-2000.

The groundwater model predicted 0.3 ML/day groundwater inflow to the Wynn Seam, increasing to 0.6 ML/day at completion of Wynn Seam panels in 2003. Groundwater inflow is then predicted to gradually rise to 1.4 ML/day during extraction of Kayuga Seam. A notable increase occurs during mining of the Kayuga Seam which is expected to occur when the southern panels which move away from the alluvium are completed and mining changes to a northernly direction in closer proximity to the alluvium. The final three years occur in the Piercefield Seam and are predicted to generate about 0.3 ML/day inflow. All of the mining areas remain drained during the mine life, which is considered an appropriate conservative assumption that will maximise the inflow and drawdown. In practice panels are sometimes sealed and allowed to fill with water when completed.

The model indicated the mining will result in an indirect impact on the alluvial aquifer with a net loss of about 0.1 ML/day due to all mining represented in the model. The report notes the mining will reduce the upward leakage from the Permian to the alluvium and potentially create areas of reversed gradients where leakage is downwards from the alluvium into the Permian. The maximum change in downward leakage was assessed to be less than 0.01 L/m^2/day at the completion of underground mining of the Kayuga Seam. The leakage rate from the alluvium was calculated to be less than that of rainfall recharge which was calculated to be approximately 0.25 L/m^2/day. That is, more than two orders of magnitude higher than the predicted loss. This is a common conclusion of numerical modelling conducted in the Hunter Valley that indicates alluvial systems can buffer loses of groundwater due to mining, as losses are relatively small compared to the inputs of water within the alluvial systems. There are examples of mines operating adjacent to the Hunter River alluvium that have not recorded detectable drawdown within adjacent alluvium that supports this common modelling prediction

The groundwater inflow into the mining areas was predicted to depressurise the Permian strata and result in a zone of drawdown around the mining area. Figures included within the groundwater assessment show the drawdown grows outwardly from the mining areas over time and becomes most extensive towards the north, south and west. The growth in the zone of drawdown is retarded to the east by the available water within the alluvium that readily replenishes losses due to mining and prevents the zone of drawdown propagating significantly into the alluvial aquifer system. MER (2000) concluded that due to the high storage and recharge within the alluvium *"existing bores and wells in the alluvial lands will remain unaffected by depressurisation in the coal measures".*

Groundwater monitoring has shown this conclusion to be valid with monitoring bores within the alluvium not being detectably impacted by mining activities (refer Section 5.2.1).

MER (2000) did indicate the drawdown predicted within the Permian strata could result in a *"loss of aquifer pressure water levels within the coal measures may have impact on existing bores and wells in the hardrock coal measures depending upon location and local recharge mechanisms".* This is discussed further in Section 6.3.

4.4 Cumulative impacts

The MER (2000) modelling included a scenario where mining that was approved at the Mount Pleasant mine was included in the model. The Mount Pleasant mine was represented in the model as active when Dartbrook commenced mining the Kayuga Seam in 2003. The modelling indicated the potential for drawdown to be enhanced by cumulative impacts to the south of Dartbrook mine in proximity to Mt Pleasant mine. MER (2000) concluded that whilst there was potential for a cumulative impact, the influence on the predicted groundwater inflow to the Dartbrook mine was small with seepage reducing by less than 2%.

The only other foreseeable project in the region is the West Muswellbrook Project which is a proposed open cut mine located immediately adjacent to the western margin of Dartbrook mine. The West Muswellbrook Project proposes to extract coal from seams stratigraphically higher than those targeted by Dartbrook, with the Blakefield Seam being proposed as the basal target seam. Mining at West Muswellbrook is planned to commence in the north and will progress southwards over a planned 30 year period. A Conditional Gateway Certificate for the West Muswellbrook Project was issued in May 2015, however no further progress has occurred to date. This project is unlikely to commence during the period which Dartbrook mine is seeking a five year extension as an EIS has not been submitted.

Other operating mines in the region are Bengalla mine, located 7 km south of Dartbrook, and Mangoola mine, 15 km south-west. Both mines are located at a distance where the zones of drawdown will not overlap and therefore significant cumulative impacts will not occur.

It is therefore concluded that whilst the approved impacts are based on a relatively old numerical model, the main cumulative impacts, which could occur due to Mt Pleasant mine have be represented. Whilst it is logical there are now changes to the Mt Pleasant mine plan, the MER (2000) work does identify the potential for a cumulative impact between the mines, a logical conclusion considered they are appro mine common coal seams.

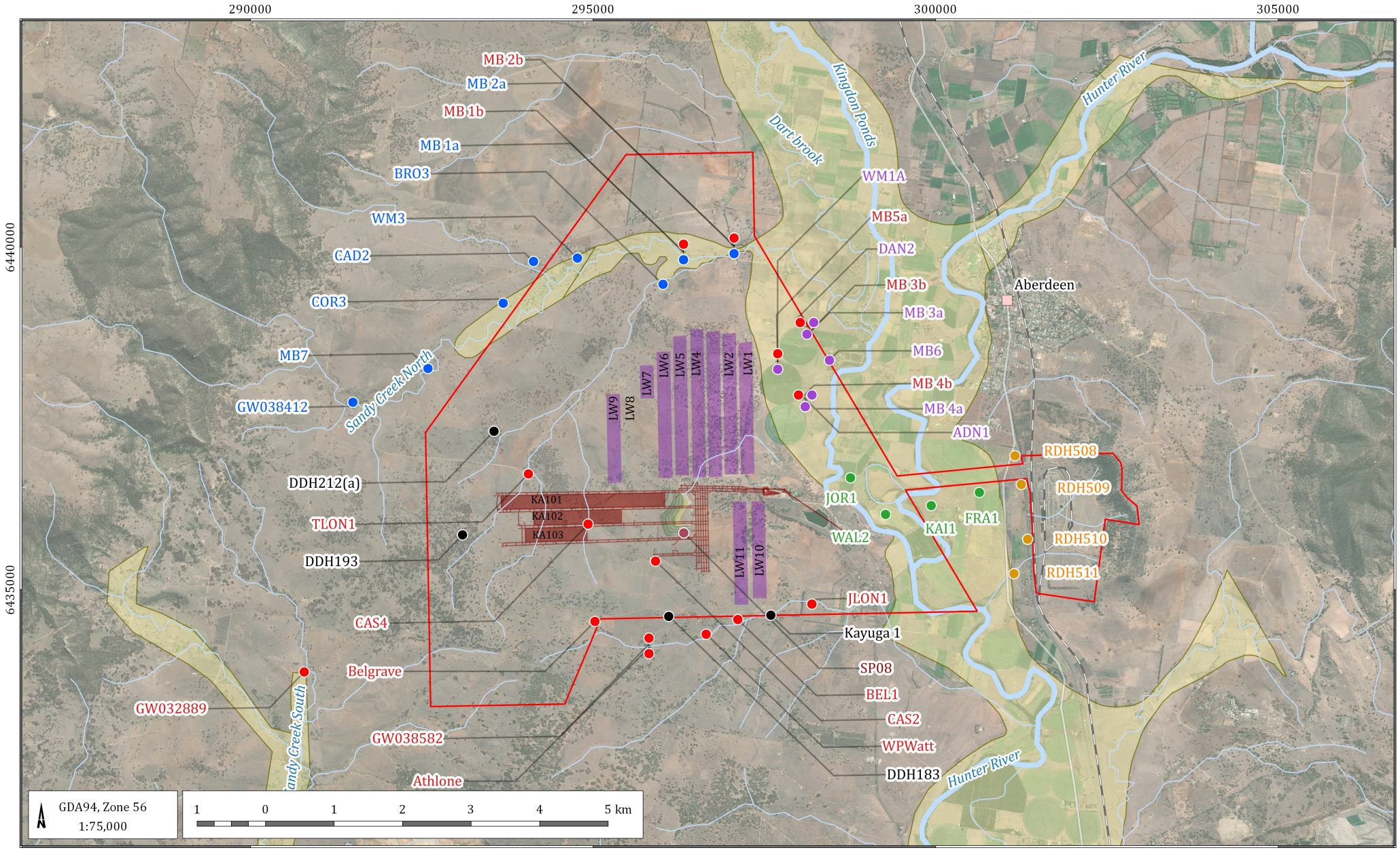
4.5 Post mining impacts

The MER (2000) model was also used to simulate the post mining recovery in water levels within the groundwater system. The report notes the rebound in groundwater levels occurs very slowly and a new equilibrium water level was not reached within the 100 year period that was modelled. This is a common prediction in coal mining settings where groundwater inflow rates are relatively low, and long time periods are required to refill the voids left by the collapsed mine workings. Whilst contemporary groundwater assessments typically provide more information on the period of time for the groundwater regime to reach a new equilibrium, the prediction of incomplete recovery at 100 years is considered plausible based on experience at other mines.

5 Review of groundwater monitoring data

5.1 Groundwater monitoring network

A network of monitoring bores is used to monitor groundwater levels and quality at Dartbrook Mine. The locations of the monitoring sites and the geological unit monitored in shown in Figure 5.1. The groundwater monitoring bore network is designed to measure depressurisation of the coal measures strata created by mine dewatering and drawdown within the alluvium. Groundwater monitoring data was last reviewed by AGE (2018) as part of the annual review and is compared to model predictions in the sections below.



LEGEND

- Populated place
- Mining Authorisation
- Alluvium (Source: 1:250k Singleton Geology Sheet modified after AGE (2007))
- Completed Kayuga Seam Workings
- Extracted Wynn Seam Longwall Panels
- Drainage/creek
- Roman road dyke and SP08
- Hunter River Alluvial Bores
- Regolith Shallow Bedrock Bores
- Sandy Creek Alluvial Bores
- CHPP/REA Monitoring Bores
- Coal Seam Bores
- Dartbrook Alluvial Bores

Dartbrook MOD7 (G1730N)

Groundwater monitoring network

DATE
02/07/2020

FIGURE No:
5.1

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5.2 Groundwater levels

The Dartbrook mine has groundwater monitoring datasets that cover some 20 years and provide an excellent dataset to evaluate the nature of impacts from mining. The general trends evident in the monitoring can be grouped into:

- *Areas to the east where no impact are evident.* Groundwater levels have not declined significantly to the east of the mining areas within the alluvium or overburden. This outcome aligns with the general predictions from the numerical model developed by MER (2000).
- *Strata overlying the mining areas that have declined and not recovered*. Groundwater level trends in bores screened in the overburden directly above the Kayuga longwall panels show groundwater levels decreased in response to mining between 2004 and 2006. Unlike the overburden south-east of the mine area, groundwater levels in the overburden over the Kayuga longwall panels have not recovered post mining as pumping maintains water levels within the Wynn Seam mining area at a level below the pre-mining potentiometric surface.
- *Coal seams outside the mining footprint that show limited drawdown and some recovery.* Decreasing groundwater levels in the coal seams, due to mine-related depressurisation, have been less than that predicted. This is due in part to predictions having been modelled for a 20-year mining period, which did not occur due to the mine being placed in care and maintenance in 2007. Groundwater levels within the coal seam bores have recovered to varying degrees since the cessation of mining and have stabilised at a new equilibrium in response to continued pumping from the Wynn Seam during care and maintenance.

The sections below present water level monitoring data and discuss these trends further.

5.2.1 Quaternary alluvium

Figure 5.2 below shows groundwater levels measured in three monitoring bores installed within the Dartbrook alluvium. The bores are located adjacent to completed Wynn Seam panels and have water level data available over most of the mine life. The cumulative rainfall departure (CRD) for the area is also included on the figure. The CRD is a summation of the monthly departure of rainfall from the long-term average monthly rainfall. A rising trend in the CRD indicates periods of above long-term average rainfall, whilst a falling slope indicates periods when rainfall is below long-term average. Groundwater level trends in aquifers with rainfall as the primary recharge source are commonly correlated with the CRD. This relationship can be used to assess if a decline in groundwater levels is related to climatic conditions, or due to other factors such as over-exploitation or mining.

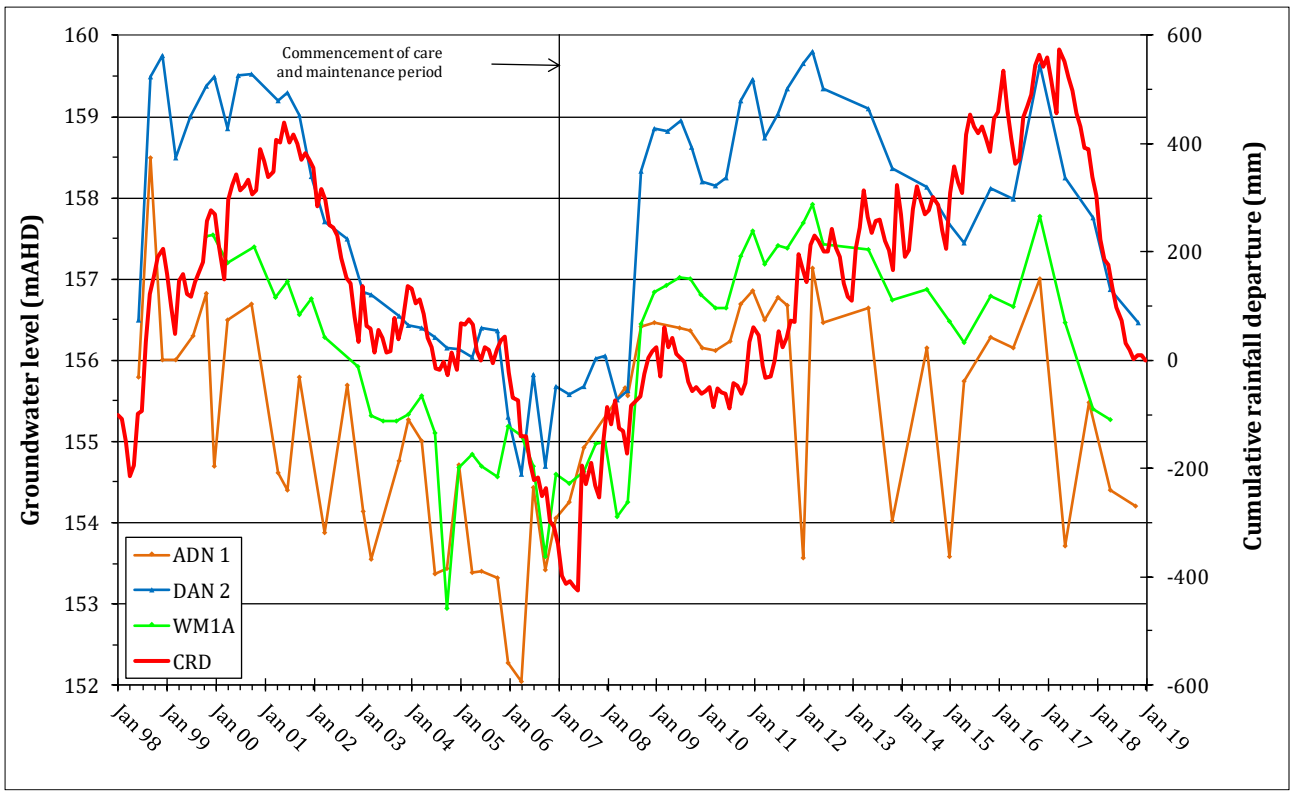


Figure 5.2 Groundwater levels in Darbrook alluvium

Figure 5.2 shows groundwater levels trends within the Dartbook allvium adjacent to the completed mining area are correlated with climatic conditions as indicated by the CRD. Where a decline in groundwater level occurs in an alluvial bore, it can be attributed to below average rainfall during the Millennium drought from mid-2001 to mid-2007 and not mining. This is confirmed by a rise in groundwater levels as a result of above average rainfall from mid-2007 to mid-2009 and again during 2010 to 2012 and a subsequent decline in groundwater levels from late 2016 aligned with a decline in rainfall.

The end of the Millennium drought coincidentally corresponded with the mine entering the care and maintenance period, but within continued dewatering from the Wynn Seam. This continued dewatering has had no detectable impact on the groundwater levels within the alluvium.

The groundwater monitoring data within the Dartbrook alluvium, that covers some 20 years confirms the conclusion reached by MER (2000) using numerical modelling that "*existing bores and wells in the alluvial lands will remain unaffected by depressurisation within the coal measures*" was a valid conclusion based on the modelling conducted.

5.2.2 Permian strata

Three monitoring bores are located in Permian strata overlying the Kayuga Seam in proximity to the completed longwall panels. These bores provide information on the residual impact from completed mining activities. CAS4 is screened in the shallow overburden immediately above completed panels in the Kayuga Seam. Bores TLON1 and CAS2 also intersect the overburden and are located approximately 300 m north and south of the panels, respectively (Figure 5.1). The Kayuga Seam panels in this area were mined between 2004 and 2006. Groundwater level trends are compared to the CRD in Figure 5.3.

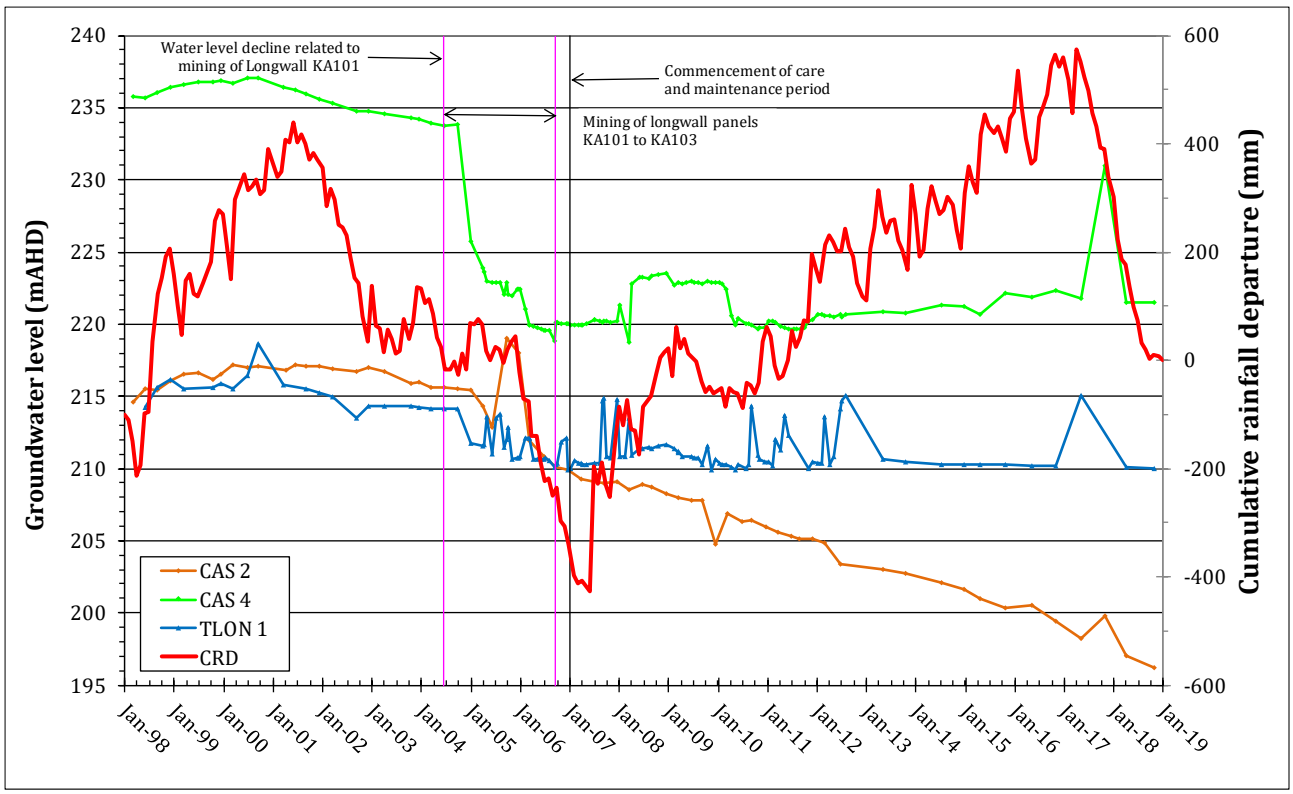


Figure 5.3 Monitoring bores overlying completed Kayuga Seam longwall panels

Figure 5.3 shows within the overburden water levels are less correlated with climatic conditions as indicated by the CRD. There is limited response to the above average rainfall conditions that occurred after the end of the Millennium drought, and a decline in water levels due to the underlying longwall mining is clear. Groundwater levels in the overburden over the Kayuga longwall panels have not recovered after mining of the Kayuga Seam was completed.

Since the mine entered care and maintenance the groundwater levels have stabilised in CAS4 and TLON1, while they have continued to decline in CAS2. The groundwater level trends for CAS4 and TLON1 are clearly due to subsidence and associated strata cracking. The level of water level decline is generally aligned with predictions by MER (2000). The continued decline in groundwater levels at CAS2 is likely to be related to the position of the bores between the Kayuga Seam and Wynn Seam longwall panels and the predicted connective cracking. MER (2000) considered a hydraulic connection between the Kayuga Seam goaf and the overburden up to 100 m above the coal seams was likely. This distance approximately corresponds with the depth of CAS2.

5.2.3 Permian coal seams

Figure 5.4 shows groundwater levels of bores screened within coal seams at the mine. It can be seen that during mining of the Kayuga Seam the groundwater levels in all coal seam bores slightly declined. Following the commencement of care and maintenance the groundwater levels in all coal seam bores have remained stable or gradually recovered.

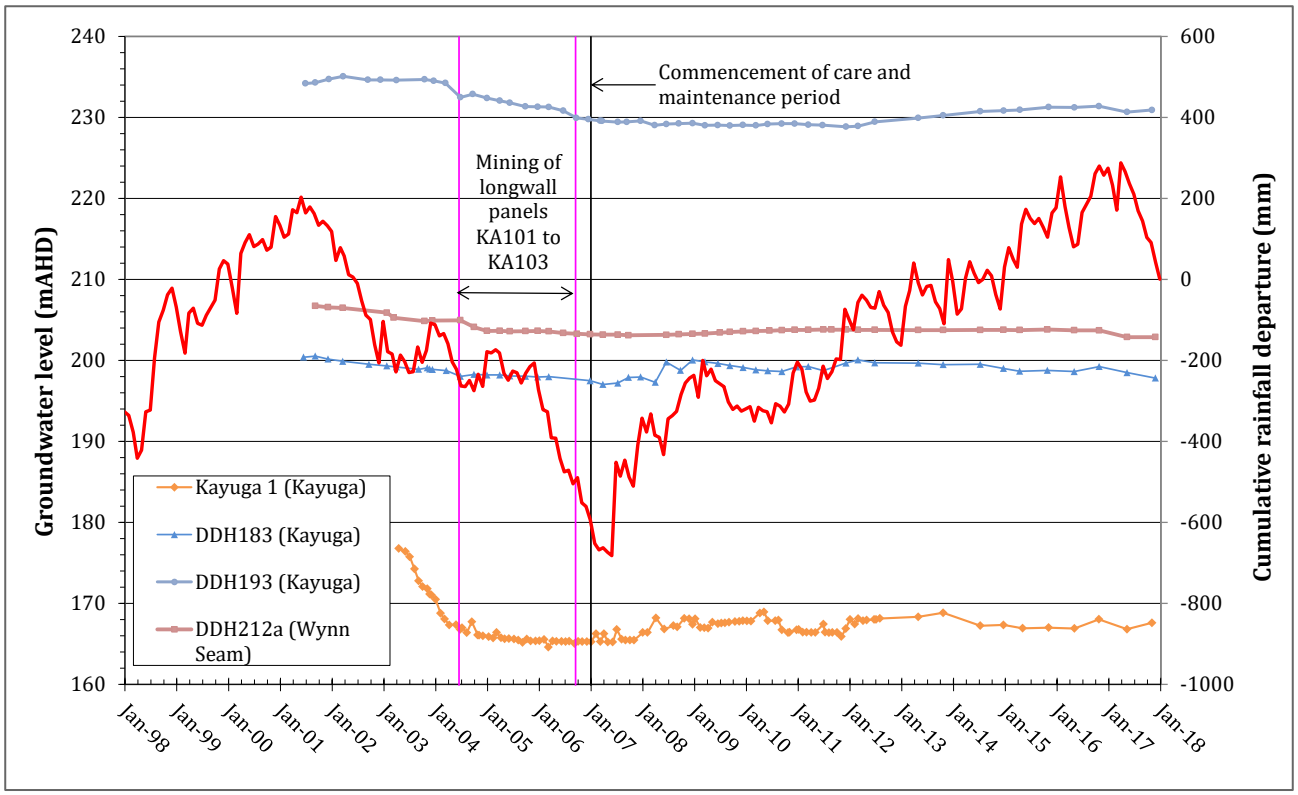


Figure 5.4 Groundwater levels – coal seam bores

6 Impact of revised MOD7

This section considers the impact of longwall mining restarting and continuing for an additional five years as proposed for the revised MOD7. Groundwater modelling was not conducted for the revised MOD7, rather an opinion is provided on the potential for significant changes to impacts beyond what is already approved based on review of the previously accepted numerical modelling and available groundwater monitoring data.

When considering the potential impacts of the revised MOD7 it has been assumed that the mine plan modelled by MER (2000) cannot practically be mined in five years if MOD7 were to be approved. For the purposes of this assessment it is assumed that mining will recommence in the Kayuga Seam and progress through the remaining approved longwall panels in the order represented in the numerical model by MER (2000) including the Mt Arthur Seam panels. That is, mining will progress to the south (panels KA104 to KA112), before relocating to the northern Kayuga panels (KA113 to KA120), and finishing with the three panels in the Mt Arthur Seam. The MER (2000) numerical model represents this mining being undertaken over a period of about 16 years, and therefore it is highly likely only a portion of the approved Kayuga Seam could be mined within the five year extension being sought as part of the revised MOD7 if the rate of mining is the same. It has therefore been assumed that mining will not be possible within the Piercefield Seam and will not be undertaken.

The impact of the revised MOD7 could differ from the impact of approved mining because of changes to the footprint of mining and the time period of active mining. The influence of these two mechanisms on potential impacts is discussed in the sections below. For the purposes of this discussion it is assumed based on the discussion in previous sections that the general nature of impacts has been previously identified by the MER (2000) numerical model.

6.1 Impact of change in footprint

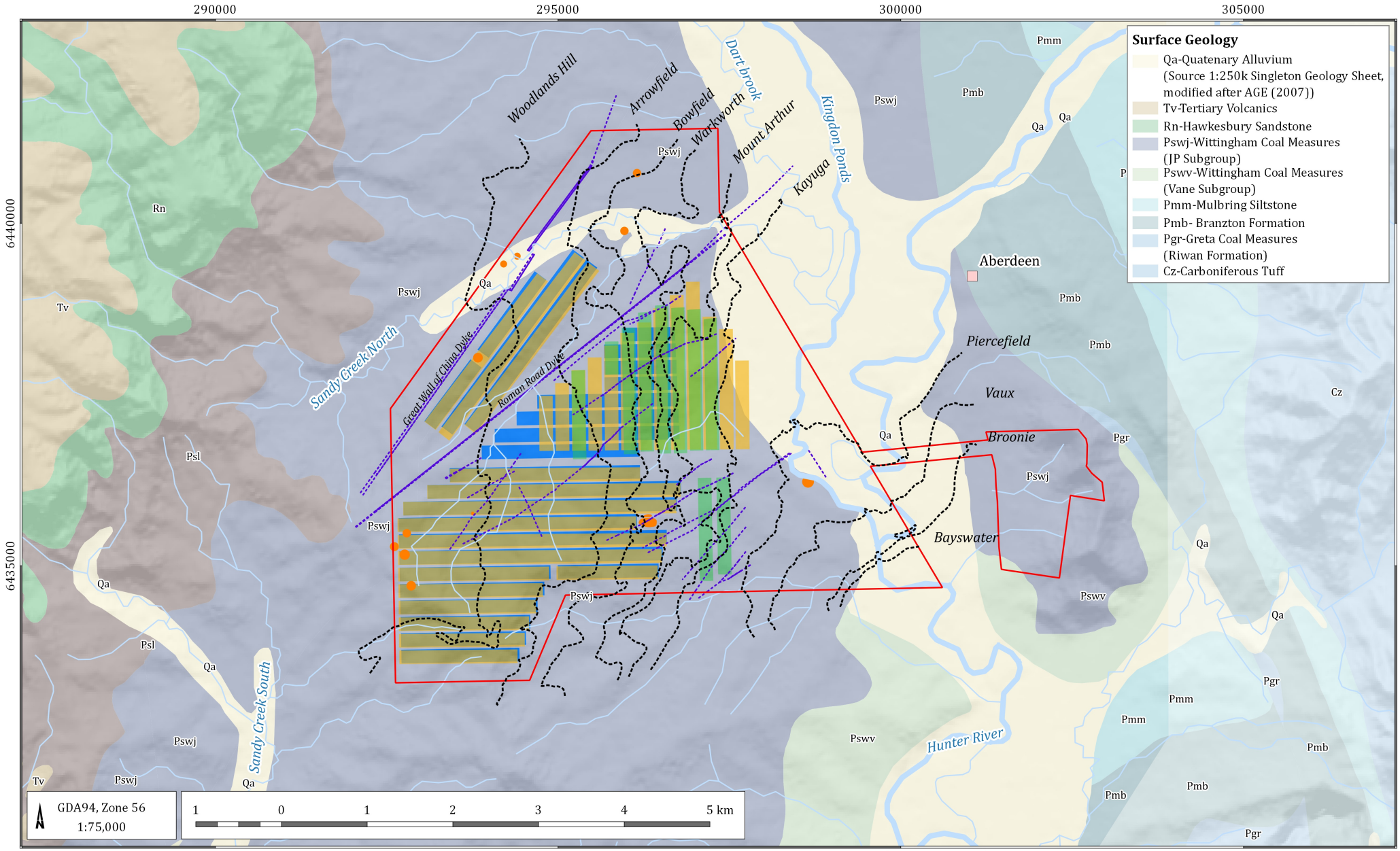
As discussed above for the purposes of this assessment it has been assumed that mining will occur in the Kayuga Seam only. Not mining the Piercefield Seam as part of MOD7 will reduce the magnitude of impacts compared with the approved mining for two reasons. Firstly, the total approved footprint of mining will be reduced, and secondly a direct connection with the alluvial aquifer through the subcrop under the base of the alluvium will not be made.

Figure 6.1 shows where the coal seams subcrop under the alluvial aquifer. It shows that the subcrop for the Piercefield Seam crosses the alluvial aquifer and passes under Dart Brook and the Hunter River east of the mining area. Approved mining of the Piercefield Seam is in relatively close proximity to the alluvium and would depressurise groundwater within the Piercefield Seam.

The drawdown generated by mining the Piercefield Seam would propagate through the coal seam gradually reducing with distance towards the subcrop, which is the connection with the alluvial aquifer. This mining would therefore influence the transfer of water and potentially promote some connectivity with the alluvial aquifer. If the Piercefield Seam is not mined as part of the revised MOD7 this connectivity and associated impact will not occur. In addition, removing the Piercefield Seam longwall panels also reduces the footprint of mining compared to that currently approved, which would result in a reduced zone of drawdown and reduced water take. Because the volume of coal removed by mining would also be reduced the time required for groundwater inflow to flood the mine workings and for the system to rebound to a new equilibrium post mining would be reduced for the revised MOD7.

As noted previously the MER (2000) numerical model represents remaining mining within the Kayuga seam being undertaken over a period of about 16 years. Given the revised MOD7 is only five years, it is highly likely only a portion of the approved Kayuga Seam could be mined within the extension period being sought. If the Kayuga Seam mining were to progress southwards in the order assumed by MER (2000) then it is possible the mining to the north of the completed Kayuga Seam panels would not occur in the available time. If this were to occur it would also further serve to reduce the impacts of MOD7 compared with the approved impacts because the area to the north of the completed panels within the Kayuga Seam is closer to the alluvium and the subcrop connection with alluvial aquifer (Figure 6.1). Mining the Kayuga lonwall panels in closer proximity to the alluvium would generate steeper hydraulic gradients which would result in an increase inflow and drawdown. This is evident in the model predictions presented by MER (2000) which show an increase in groundwater inflow to the Kayuga Seam longwall panels when mining moves to the north in the area closer to the alluvial aquifer.

The removal of the Piercefield Seam, and also the likely reduced footprint within the Kayuga Seam is expected to result in impacts which are less than already approved due to net reductions in footprint and connectivity with the alluvial aquifer.



LEGEND

- Populated place
- Mining Authorisation
- Approved Wynn Seam Longwall Panels
- Approved Piercefield Longwall Panels
- Approved Kayuga and Mt Arthur Seam Longwall Panels
- Seam subcrop
- Dykes
- Drainage/Creek
- Plug

Dartbrook Bord & Pillar MOD (G1730H)

Seam subcrop

DATE
02/07/2020

FIGURE No:
6.1

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6.2 Impact of change in mining time period

When groundwater flows into excavations at rates that exceed the rate an aquifer can replenish, a zone of drawdown occurs around the excavation. The zone of drawdown expands outwards with time until it is sufficiently large and draws in the same volume of water that is draining into the excavation. Therefore, in theory, increasing the time of active mining at Dartbrook mine would result in the zone of drawdown expanding and the volume of groundwater intercepted increasing due to the revised MOD7.

However, there are a number of factors that mean the additional time period may not result in impacts that exceed those already approved. MER (2000) simulated the approved mining within the Kayuga and Piercefield seams occurring over a period of 20 years. The revised MOD7 proposes an extension of five years, which in theory would allow up to 25 years of active mining. However, removing the Piercefield Seam longwall panels from the revised MOD7 effectively removes 3.5 years of mining from the project represented by MER (2000), meaning the net extension associated with MOD7 is only about 1.5 years duration.

In addition to this the mine has been in care and maintenance since 2007, with monitoring indicating the groundwater levels within the alluvium are not detectably affected, and the water levels within the coal seams around the mining footprint have reached a new equilibrium level in response to ongoing dewatering and are not continuing to decline. The net effect of this is that there has been limited detectable impact from mining outside the mine footprint since about 2014 when a new equilibrium water level became evident at the coal seam monitoring sites. This is over the mine footprint where monitoring bores are recording slow continuing decline. When considering the area surrounding the mine it could be argued after 2014 there has been limited additional impact from approved mining, and therefore there has only been about 10 years during which a notable impact has occurred from 2003 to 2014. This conclusion does not considerer the influence of the Hunter Tunnel that is not proposed to be changed and therefore not considered in this assessment.

Therefore, whilst increasing periods of mining would theoretically be expected to result in an increased impact , when the care and maintenance period is considered, along with reducing the mining footprint the net effect is the potential less impact than is already approved.

6.3 Impact of private water bores

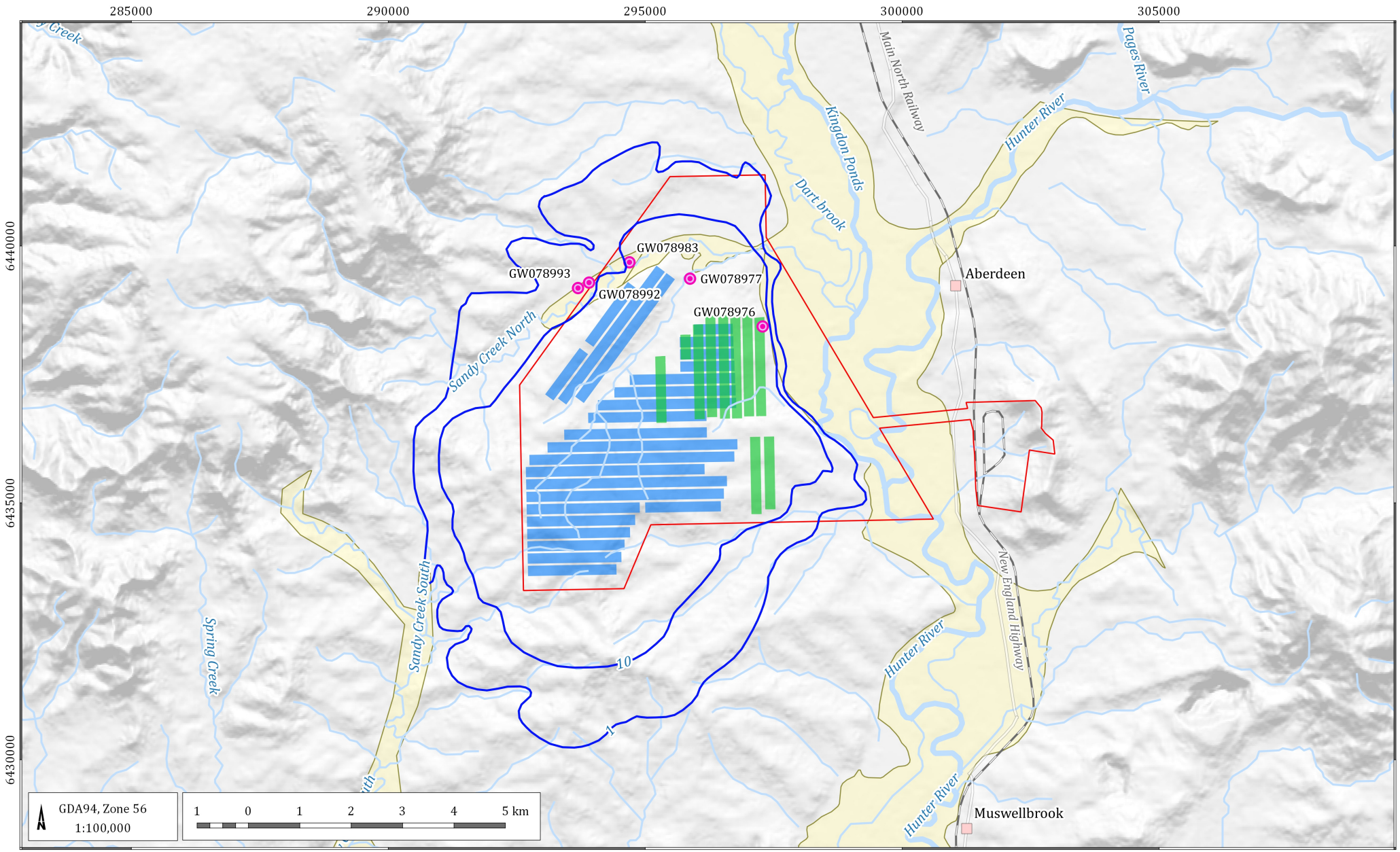
The 1 m and 10 m drawdown contours presented in MER (2000) are shown on Figure 6.2, along with private water supply bores surveyed during a bore census conducted in 2018. Details on the private bores are provided in Table 6.1. Figure 6.2 shows that there are five bores within the 1 m predicted drawdown limit, three of which use windmills to extract groundwater. The 1 m contour was georeferenced and digitised from the MER (2000) report.

As discussed in previous sections, not mining the Piercefield Seam would be expected to reduce the overall net impact on the groundwater regime generated by MOD7, compared to approved mining. The net reduction in drawdown at the private water bores from not mining the Piercefield could be negligible, as this seam is deeper and underlies the Kayuga which it is assumed will be mined as part of MOD7. Therefore, it is considered the potential for impact at the identified private bores remains if the revised MOD7 is approved and longwall mining of the remaining Kayuga Seam panels is undertaken.

The MER (2000) numerical modelling indicated the potential for predicted drawdown impacts on some privately owned registered bores within the Permian strata, to trigger the Aquifer Interference Policy (AIP) Level 2 threshold of the minimal impact considerations as the predicted drawdown is greater than 2 m from baseline conditions (Figure 6.2). Make good provisions will be required with private landholders if the revised MOD7 is approved.

Table 6.1 Privately owned bores with approved 1 m drawdown limit

Station name	Bore type	Lot no.	Depth bore (mbgl)	Water level (mbgl)
GW078977	Windmill	183//DP750951	19.03	6.65
GW078976	Windmill	189//DP750951	No access available	No access available
GW078993	Windmill	181//DP750951	13.46	5.97
GW078992	Agricultural well	181//DP750951	7.39	6.16
GW078983	Wooden Well	178//DP750951	4.71	1.98



LEGEND

- Populated place
- Mining Authorisation
- Alluvium (Source: 1:250k Singleton Geology Sheet,modified after AGE (2007))
- Approved Wynn Seam Longwall Panels
- Approved Kayuga and Mt Arthur Seam Longwall Panels
- Rail
- Drainage/creek
- Approved drawdown (m)
- Private water supply bores

Dartbrook Bord & Pillar MOD (G1730H)

Approved drawdown from MER (2000)

DATE
02/07/2020

FIGURE No:
6.2

G:\Projects\G1730N.Dartbrook MOD7\3_GIS\Workspaces\001_Deliverable1\06.02_G1730N_Approved drawdown from MER (2000).qgs

6.4 Aquifer interference policy

6.4.1 Water take and licensing

The AIP (NOW, 2012) states that "*all water taken by aquifer interference activities, regardless of quality, needs to be accounted for within the extraction limits defined by the water sharing plans. A water licence is required under the Water Management Act 2000 ……."* The AIP states that a WAL is required for the aquifer interference activity regardless of whether water is taken directly for consumptive use or incidentally. In all cases, separate access licences are required to account for the take from all individual water sources.

Three Water Sharing Plans are used to manage aquifers and surface waters in the area of the Dartbrook mine, namely the:

- *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 (North Coast Fractured and Porous Rock WSP);*
- *Water Sharing Plan for the Hunter Regulated River Water Source 2016 (Hunter Regulated WSP); and*
- *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 (Hunter Unregulated WSP).*

The Water Access Licences (WALs) AQC currently hold, and can be used to account for water take are summarised in Table 6.2.

Table 6.2 Summary of WALs currently held by AQC

Water sharing plan	Water source	Licence category	Total share component
North Coast Fractured and Porous Rock WSP	Sydney Basin – North Coast Groundwater Source	aquifer	180
Hunter Regulated WSP	Hunter Regulated River Water Source (Zone 1a)	regulated river	3,071.8
Hunter Unregulated WSP	Muswellbrook	aquifer	Basic rights
	Dart Brook	unregulated river	85
		aquifer	950
	Hunter Regulated River Alluvial	aquifer	1,249

AQC currently hold 180 units from the *Sydney Basin – North Coast Groundwater Source*, which covers groundwater stored within the Permian coal measures strata. The numerical modelling by MER (2000) indicated groundwater inflow would gradually rise over the mine life reaching 180 ML/year when mining of the Kayuga Seam commenced, and peaking at about 584 ML/year at year 20.

The numerical model was calibrated by adjusting properties to produce groundwater inflows aligned with the rates observed during mining of the Wynn Seam. Given the numerical model was calibrated to groundwater inflow it is considered to provide a plausible guide on the volume of groundwater that could be intercepted by the revised MOD7. If all the remaining longwall panels within the Kayuga Seam are mined as part of MOD7 then AQC will need to obtain additional units from within the *Sydney Basin – North Coast Groundwater Source* to account for water taken. Alternatively, if MOD7 is approved and during active mining groundwater inflows are observed to be less than predicted by MER (2000) it

will be necessary to update the groundwater model to validate the lower inflows and reconsider licensing requirements.

The numerical model indicated that the drawdown around the mine will reduce groundwater flow to the alluvium by about 36.5 ML/year. AQC hold 950 units from the Dart Brook Water Source and 1,249 units from the Hunter Regulated River Alluvial Water Source. The small indirect water take due to the revised MOD7 can be readily accounted for by water licences already held by AQC.

The MER (2000) numerical model does not indicate if there is an indirect water take from the Hunter River, however given the limited take from the alluvial aquifer (36.5 ML/year), it is considered any indirect take is very limited and easily accounted for as AQC hold 3,071.8 units from the regulated river.

6.4.2 Drawdown, water quality and receptor impacts

In addition to the volumetric water licensing considerations, the AIP requires details of potential:

- water level, quality, or pressure drawdown impacts on nearby water users who are exercising their right to take water under a basic landholder right;
- water level, quality, or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources;
- water level, quality, or pressure drawdown impacts on groundwater dependent ecosystems;
- increased saline or contaminated water inflows to aquifers and highly connected river systems;
- to cause or enhance hydraulic connection between aquifers; and
- for river bank instability, or high wall instability or failure to occur.

In particular, the AIP describes minimal impact considerations for aquifer interference activities based upon whether the water source is highly productive or less productive and whether the water source is alluvial or porous/fractured rock in nature. A "highly productive" groundwater source is defined by the AIP as a groundwater source which has been declared in regulations and datasets, based on the following criteria:

- has a Total Dissolved Solids (TDS) concentration less than 1,500 mg/L; and
- contains water supply works that can yield water at a rate greater than 5 L/s.

Highly productive groundwater sources are further grouped by geology into alluvial, coastal sands, porous rock, and fractured rock. "Less productive" groundwater sources are all other aquifers that do not satisfy the "highly productive" criteria for yield and water quality.

The alluvial groundwater systems occurring in the Project Boundary associated with Sandy Creek, Dart Brook, and the Hunter River have been identified by DoI Water as "highly productive". The Permian coal measures (porous and fractured rock) are categorised as "less productive".

The AIP defines the Minimal Impact Considerations for "highly productive" and "less productive" groundwater sources. There are two levels of minimal impact considerations specified in the AIP. If the predicted impacts are less than the threshold level specified by the Level 1 minimal impact considerations, then these impacts are acceptable under the AIP. Where the predicted impacts are greater than the Level 1 minimal impact considerations, then additional studies are required to fully assess and manage these predicted impacts. If this assessment shows that the predicted impacts do not prevent the long-term viability of the relevant water-dependent asset, then the impacts will be considered to be acceptable.

Table 6.3 and Table 6.4 discuss the potential impacts associated with the revised MOD7 compared with the Level 1 minimal impact considerations from the AIP.

Table 6.3 Summary of preliminary assessment and AIP considerations - alluvium

Water sharing plan: Hunter Unregulated and Alluvial Water Sources	
Aquifer	Alluvial aquifer (Hunter Unregulated and Alluvial Water Sources)
Category	Highly Productive

Level 1: Minimal Impact Consideration	***Assessment***
<u>Water table</u> Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan **or** A maximum of a 2 m decline cumulatively at any water supply work.	At the time of writing, there was no Culturally Significant Sites or high priority GDEs located within the study area according to Hunter Unregulated and Alluvial Water Sources WSP. Hence there are no known risks to such sites at this time. Groundwater level drawdown resulting from the approved operations and MOD7 is not predicted to exceed 2 m at any water supply work within the highly productive alluvial aquifers. **Level 1 minimal impact consideration classification**
<u>Water quality</u> Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity.	Mining is predicted to induce leakage within the alluvium due to depressurisation of the Permian coal measures. The reduction of saline groundwater flow from the Permian to the alluvium will likely improve the salinity within the alluvium. Therefore, the beneficial use category is not predicted to be affected, nor is salinity expected to increase. After cessation of mining the mine workings will fill with groundwater. There is no evaporative concentration of salts in underground mines and therefore no significant mechanism to promote degradation of surface water or groundwater quality outside the mined area is present. **Level 1 minimal impact consideration classification**

Table 6.4 Summary of preliminary assessment and AIP considerations Permian coal measures

Water sharing plan: North Coast Fractured and Porous Rock Groundwater Sources	
Aquifer	Permian (Sydney Basin) Porous rock - North Coast Groundwater Source
Category	Less Productive
Level 1: Minimal Impact Consideration	***Preliminary assessment***
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40 m from any: (a) high priority groundwater dependent ecosystem; or (b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan **or**	At the time of writing, there were no Culturally Significant Sites or high priority GDEs located in the study area according to the North Coast Fractured and Porous Rock Groundwater Sources WSP. Hence there are no known risks to such sites at this time.
A maximum of a 2 m decline cumulatively at any water supply work.	Groundwater level drawdown resulting from the approved operations and MOD7 is predicted to exceed 2 m at water supply works within the less productive Permian strata. **Level 2 minimal impact consideration classification – make good provisions apply.** AQC has previously completed a bore census to understand the use of the bores which have been predicted to be affected as a result of the approved operations and MOD7. IF MOD7 is approved further work will be conducted in consultation with the private landholder to confirm the make good provisions.
Water pressure A cumulative pressure head decline of not more than a 2 m decline, at any water supply work	Groundwater level drawdown resulting from the approved operations and MOD7 is predicted to exceed 2 m at water supply works within the less productive Permian strata. **Level 2 minimal impact consideration classification – make good provisions apply.** AQC has previously completed a bore census to understand the use of the bores which have been predicted to be affected as a result of the approved operations and MOD7. IF MOD7 is approved further work will be conducted in consultation with the private landholder to confirm the make good provisions.

Water sharing plan: North Coast Fractured and Porous Rock Groundwater Sources	
Water quality	
Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity	Mining is predicted to induce leakage within the alluvium due to depressurisation of the Permian coal measures. The reduction of saline groundwater flow from the Permian to the alluvium will likely improve the salinity within the alluvium. Therefore, the beneficial use category is not predicted to be affected, nor is salinity expected to increase. Post mining the mines will fill with groundwater. There is no evaporative concentration of salts in underground mines and therefore no significant mechanism to promote degradation of surface water or groundwater quality outside the mined area is present. **Level 1 minimal impact consideration classification**

7 Summary and conclusions

The objective of the consultancy engagement was to provide an opinion on the likely magnitude of groundwater impacts generated by a revised MOD 7, compared with the currently approved impacts associated with longwall mining. The objective was not to determine the absolute impacts on groundwater associated with MOD7, but rather to determine if there could be significant changes to the nature of impacts beyond what is already approved.

When considering the potential impacts of the revised MOD7 it has been assumed that the mine plan modelled by MER (2000) cannot practically be mined in the remaining duration of DA 231-7-2000. For the purposes of this assessment it is assumed that mining will recommence in the Kayuga Seam and progress through the remaining approved longwall panels in the order represented in the numerical model by MER (2000). It has also been assumed that mining will not be undertaken within the Piercefield Seam.

The review of the numerical model concluded there were aspects of the model setup, calibration and reporting that are not at a standard expected of contemporary groundwater models prepared for the NSW mining industry. However, this is not unexpected, and as the work was undertaken at a time when there was limited guidance on expectations for numerical models in the public domain. Whilst the model is not consistent with contemporary standards, groundwater monitoring which has been conducted at Dartbrook for up to 20 years has indicated the general predictions of the model are appropriate, and the general nature of impacts for the entire mine life remain plausible.

It is considered unlikely that the impact associated with a revised MOD7 will be greater than approved impacts as the mining footprint and timing is reduced by removal of the Piercefield Seam It is also considered highly unlikely the proposed five year extension will allow sufficient time to mine the remaining Kayuga Seam longwall panels which would further serve to reduce the impact of MOD7 compared with the already approved impacts.

To comply with the AIP that was released after the mine was approved will require make good agreements for five private water bores and obtaining further water entitlements from the *Sydney Basin – North Coast Groundwater Source*. The existing groundwater monitoring network has been well maintained and should serve to assess the impact of further mining at Dartbrook Mine.

8 References

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APPENDIX E
Social Response

DARTBROOK MINE
MODIFICATION 7

SOCIAL RESPONSE

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20 July 2020

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ABBREVIATIONS

Term	Description
ABS	Australian Bureau of Statistics
ACHMP	Aboriginal Cultural Heritage Management Plan
AGE	Australasian Groundwater and Environmental Consultants
AIP	NSW Aquifer Interference Policy
AQC	AQC Dartbrook Management Pty Ltd
BSAL	Biophysical Strategic Agricultural Land
CHPP	Coal Handling and Preparation Plant
CIC	Critical Industry Cluster
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
EA	Environmental Assessment
Equine CIC	Equine Critical Industry Cluster
EP&A Act	*Environmental Planning and Assessment Act 1979*
ERP	Estimated Resident Population
ha	Hectares
HTBA	Hunter Thoroughbred Breeders Association Inc
IPC	Independent Planning Commission
km^2	Square kilometres
LEC	Land and Environment Court
LEP	Local Environmental Plan
LGA	Local Government Area
MB	Mesh Block
MER	Mackie Environmental Research
MSC	Muswellbrook Shire Council
Mt	Million tonnes
Mtpa	Million tonnes per annum
NSW	New South Wales
REA	Rejects Emplacement Area
ROM	Run of Mine
SA2	Statistical Area Level 2
SAI	Social Area of Influence
SIA	Social Impact Assessment
TRA	Tourism Research Australia
The Proponent	AQC Dartbrook Management Pty Ltd

Term	Description
PSMP	Property Subsidence Management Plan
UCL	Urban Centre and Locality
UHS	Upper Hunter Shire
UHSC	Upper Hunter Shire Council
VLAMP	NSW Voluntary Land Acquisition and Mitigation Policy
VPA	Voluntary Planning Agreement
WAL	Water Access Licence

DARTBROOK MINE MODIFICATION 7
SOCIAL RESPONSE

for
Sparke Helmore Lawyers

1 INTRODUCTION

Hansen Bailey was commissioned by Sparke Helmore Lawyers to respond to contentions raised by the Independent Planning Commission (IPC) in their determination of the Dartbrook Mine Modification 7 application (the Modification).

1.1 BACKGROUND

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of New South Wales. Dartbrook Mine is the subject of Development Consent DA 231-7-2000 granted under the *Environmental Planning and Assessment Act 1979* (EP&A Act). DA 231-7-2000 (and its subsequent modifications) authorise the operation of an underground longwall mine and ancillary surface infrastructure.

In February 2018, AQC sought a further modification to DA 231-7-2000 (the Modification) to enable an alternative method of underground mining (bord and pillar mining), an alternative coal clearance system (truck haulage of run of mine [ROM] coal) and a five year extension to the approval duration. The impacts of these activities were assessed in the *Dartbrook Mine Modification 7 Environmental Assessment* (Hansen Bailey, 2018) (MOD7 EA) and additional supporting information.

The IPC determined the Modification application in August 2018 by approving the alternative mining method and coal clearance system, but refusing the five year extension to the approval duration. The IPC's determination is currently the subject of Class 1 proceedings in the Land and Environment Court (LEC).

The IPC refused the time extension component of the Modification largely on the ground that the potential impacts of the approved longwall mining during the additional five years had not been adequately assessed. Specifically, the IPC has contended that the Social Impact Assessment (SIA) prepared for the Modification did not adequately assesses the extension of the existing approval (DA 231-7-2000) for an additional five years. The SIA undertaken for the Modification assumed a construction workforce of 26 personnel and an operational workforce of 99 personnel. This operational workforce was related to the proposed bord and pillar mining activities.

1.1.1 Revised Modification Description

The Modification originally consisted of the following components:

- Bord and pillar mining activities within the Kayuga Seam (as an alternative to the approved longwall mining activities);
- An alternative method of delivering ROM coal from the mine workings to the East Site (i.e. an alternative coal clearance system); and
- Extending the approval period under DA 231-7-2000 by five years (until 5 December 2027) (the Extension Period).

In light of the IPC's decision and AQC's ensuing consideration of its position, the scope of the Modification has been altered in the following respects:

- Extraction of up to 37.4 million tonnes (Mt) of ROM coal using bord & pillar and/or longwall mining methods between 2021 and 2027 (inclusive). All mining will occur within the currently approved mining footprint and maximum production rate of 6 million tonnes per annum (Mtpa);
- During the five year extension period it is to be assumed that 30 Mt of ROM Coal resulting in 22.5 Mt of product coal will be produced;
- Delivery of ROM coal from the mine workings to the East Site using the Hunter Tunnel (i.e. truck haulage of coal is no longer proposed);
- Use of the existing Coal Handling and Preparation Plant (CHPP) at the East Site to wash all ROM coal extracted (including washing of coal extracted through bord & pillar mining);
- Disposal of rejects and tailings using the already approved methods;
- No new surface infrastructure (i.e. the shaft facility adjacent to the Western Access Road is no longer proposed); and
- Operational workforce of up to 292 personnel, consistent with the employment during previously approved longwall mining operations.

1.2 PURPOSE AND SCOPE

This report responds specifically to the contentions of the IPC with respect to social issues. The assessment has been commissioned by Sparke Helmore Lawyers for consideration by the LEC as part of a Class 1 merits appeal to a previous IPC determination of a Modification Application in which a proposed five year extension of mining operations was not approved.

The scope of the report is to:

- Present a desktop analysis of the population, industry and employment, and land use changes (trends) in the local area since DA 231-7-2000 was approved.
- Assess the potential impacts of the additional five years of mine life (the Extension Period) on the Equine Critical Industry Cluster (Equine CIC).
- Consider the agricultural production from AQC's land holdings and the flow-on socio-economic benefits. AQC owns a substantial area of highly productive agricultural land and water licences that enable agricultural enterprises to be conducted concurrently with underground mining operations.
- Assess the potential social impacts of the Extension Period based on revised modification description presented in Section 1.1.1 and the changes in the local area described in Section 2.

1.3 DOCUMENT STRUCTURE

The report is structured as follows:

- **Section 1** – Introduction - provides the background to the Modification and describes the purpose and scope of the report.
- **Section 2** – Land Use Considerations – responds to the issues raised by the IPC with respect to changing land use, culture and values in the area proximate to the Dartbrook Mine.
- **Section 3** – Equine CIC Considerations - describes the equine industry proximate to the Dartbrook Mine, considers the potential impacts of the Modification on land identified as Equine CIC and the surrounding equine industry.
- **Section 4** – Presents the outcomes of an assessment of potential social impacts associated with the Extension Period.
- **Section 5** – Presents the references list.

1.4 REPORT LIMITATIONS

The report has been prepared based on a desktop assessment only. No detailed analysis of historical development assessment information (e.g. development approvals) has been undertaken to inform the assessment. Land zoning plans associated with superseded Regional Plans (i.e. Hunter Regional Environmental Plan 1989) or Local Environment Plans (LEPs) (i.e. e.g. Muswellbrook LEP 1985) were not available for review. Where possible, zoning and land use Information has been drawn from a review of approval documents for surrounding land developments.

There are also data limitations. Within this report, Australian Bureau of Statistics (ABS) Census data is used to describe trends in population, demography, industry growth and industry sector employment between 2001 and 2016. However, changes in ABS geographical boundaries during this period (primarily between the 2006 ABS Census and the 2011 ABS Census) makes it difficult to compare data across the approximate 20-year period. Further, where ABS census data is relied on, trends are based only on data up to and including the 2016 census period. Statistical data for the horse breeding industry located in the Upper Hunter Shire (UHS) and Muswellbrook Shire Local Government Areas (LGAs) is also limited.

2 DEMOGRAPHIC, INDUSTRY SECTOR AND LAND USE CHANGE

2.1 INTRODUCTION

This section presents an analysis of the changes that have occurred in the area surrounding Dartbrook Mine since the granting of DA 231-7-2000 with reference to the following indicators:

- Population change and forecast population growth (Section 2.2);
- Building approvals (Section 2.2);
- Housing market conditions (Section 2.32.2);
- Industry sector employment (Section 2.4); and
- Changes in surrounding land use and land use designation (Section 2.5).

This section includes a summary of the potential implications of changes in the local area for the period from 2023-2027 (Extension Period). It also provides further information regarding the local issues and perceptions prevalent in the LGAs of UHS and Muswellbrook to support the later assessment of social impacts of the Extension Period.

The information presented in this section informs the assessment of social impacts of the Extension Period presented in **Section 4**.

The IPC contends that the social impact for Modification 7:

> *(i) did not take into account the changes in the areas surrounding the Project site (particularly, growth in residential use, tourism and agriculture, especially the equine industry) since mining activities were approved at Dartbrook under the Approval*

The discussion presented in the following section demonstrates that the local area i.e. the area proximate to the Dartbrook Mine has not experienced substantial change via growth in residential use, tourism and agriculture since the granting of DA 231-7-2000. It does demonstrate the growth in the surrounding mining industry and associated land use in the local area. The potential social impacts of the Extension Period are unlikely to be substantially different to that assessed as part of the approval of DA 231-7-2000.

2.2 POPULATION, HOUSEHOLD AND DWELLING CHANGES

2.2.1 Overview

Population, household and dwelling trend data and forecasts for the LGAs of UHS and Muswellbrook has been reviewed to inform an understanding of the scale of population growth and residential land use change in the LGAs of UHS and Muswellbrook.

Data has primarily been drawn from the Australia Bureau of Statistics (ABS), specifically the 2006, 2011 and 2016 Census. Availability of data pre 2006 is limited due to changes in ABS geographical area boundaries, notably LGA boundaries.

2.2.2 Summary Findings

In summary, the data analysis presented in the following sections for the period 2001-2019 shows:

- Steady, but small population growth in the Muswellbrook LGA, with the majority of growth concentrated in the Muswellbrook Statistical Area Level 2 (SA2) and principally the regional centre of Muswellbrook. Between 2001 and 2019 the population of the Muswellbrook LGA increased by 8.5% (1,278 persons) or an annual average population increase of 0.5%.
- Steady, but small population growth in the UHS LGA, with the majority of this growth located outside the regional centre of Scone. Between 2001 and 2019 the population of the UHS LGA increased by 5.5% (750 persons) equal to an annual average population increase of 0.3%.
- Population decline (2.3% or 334 persons) in the UHS LGA between 2013 and 2019.

Analysis of population data for Aberdeen Urban Centre and Locality (UCL) shows an increase in population of 186 people (10.9% or an annual average increase of 0.7%) and an increase in dwelling counts of 164 (23.7% on average ~ 50 additional dwellings each inter census period) in the 15 years to 2016.

Based on ABS Mesh Block (MB) data, between 2011 and 2016 the population of the area within and surrounding the Dartbrook Mine Mining Authorities Boundary (Mining Authorities Boundary) increased by 27.5% (82 persons) and dwelling counts increased by 23.6% (33 dwelling units). The majority of this growth has occurred in the south eastern area of Aberdeen township and areas to the north and east of the Mining Authorities Boundary (i.e. north of Halls Road).

With respect to forecast population and dwelling growth:

- The population of UHS LGA is projected to decrease by approximately 7% to an estimated 13,200 people by 2036. Household and implied dwelling projections are generally in line with the projected changes in population (DPIE, 2020b) i.e. minimal.
- The population of Muswellbrook LGA is projected to increase by approximately 11% to 18,186 by 2036 (DPIE, 2020b) with a corresponding increase in dwelling numbers. However, the percentage change in population and dwelling numbers in Muswellbrook LGA to 2036 is projected to be smaller than for NSW.

2.2.3 Population Growth

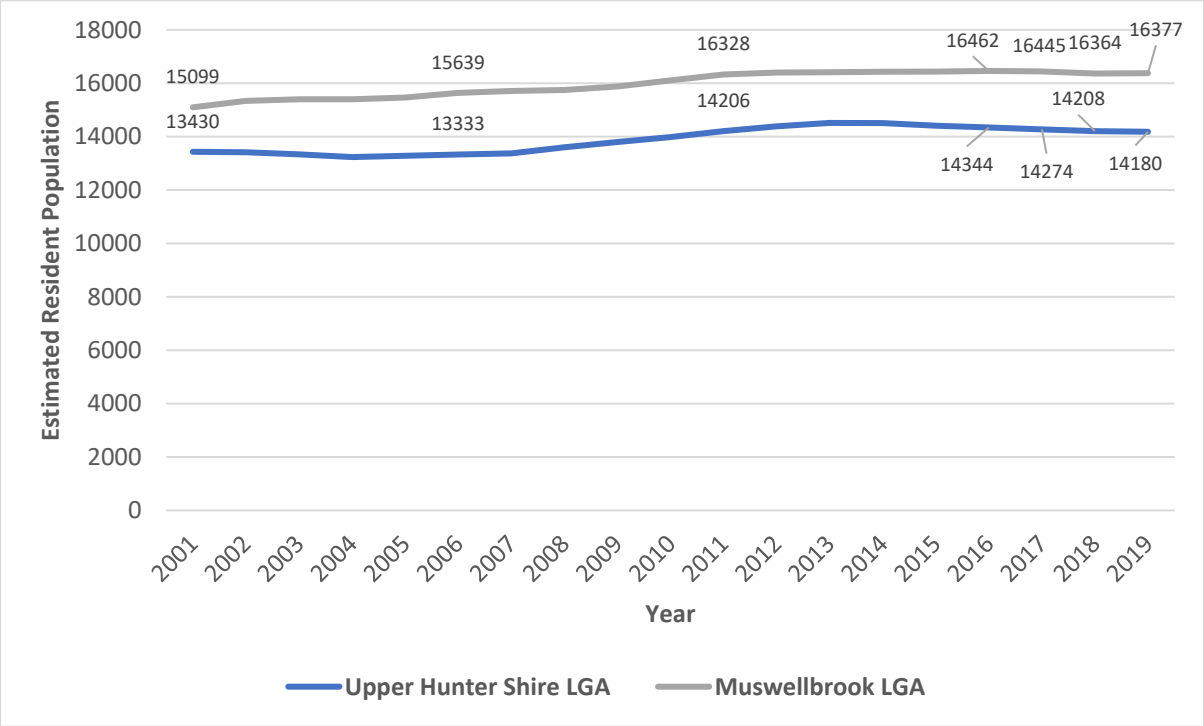
Local Government

The regional area for the Dartbrook Mine is defined as the Muswellbrook and UHS LGAs. Muswellbrook LGA has an area of 3,402 square kilometres (km^2) and had an Estimated Resident Population (ERP) in 2019 of 16,377 (ABS, 2020a). The UHS LGA has an area of 8,096 km^2 and had an ERP of 14,180 persons in 2019 (ABS, 2020a).

Graph 1 shows the population growth experienced in Muswellbrook and UHS LGAs between 2001 and 2019. Graph 1 shows a steady, but small increase in population across both LGAs. Between 2001 and 2019 the population of UHS LGA increased by 5.5% (750) compared to 8.5% (1,278) in Muswellbrook LGA and 23.9% across NSW. Population growth in Muswellbrook LGA has fluctuated from a low of 0% in 2004 to a high of 2.1% in 2012.

Within Muswellbrook LGA, the Muswellbrook and Denman urban areas have been the primary clusters of the population growth with an estimated 70% of the total population residing in Muswellbrook (MSC, 2017b).

Graph 1
Population Growth 2001-2019 – Muswellbrook, UHS LGAs



Source: (ABS, 2020a)

Nearby Communities

Muswellbrook and Scone

Analysis of population growth from 2001 to 2019 (ABS, 2020b) in the smaller areas of Muswellbrook SA2 (which includes the urban area of Muswellbrook) and Scone SA2 (which includes the urban area of Scone but excludes Aberdeen) shows:

- Steady population growth in Muswellbrook SA2. The population of Muswellbrook SA2 increased by 10.2% (1,150) between 2001 and 2019.
- Steady population growth in Scone SA2 between 2001 and 2013 (peaking at 6,215) followed by population decline to a low of 5,783 in 2019. Between 2001 and 2019 the population of Scone SA2 increased by 7.3% (395).

The majority of population growth in Muswellbrook SA2 occurred in the ten years from 2001 to 2011. Between 2011 and 2019 the population of Muswellbrook SA2 increased by just 150 people (1.3%).

The analysis of population growth in Scone SA2 suggests the majority of population growth in the UHS LGA has occurred outside of the key regional centre of Scone. Conversely the majority of growth in Muswellbrook LGA has occurred within the Muswellbrook SA2, likely within the regional centre of Muswellbrook.

Aberdeen Township

The township of Aberdeen is the closest township to the Dartbrook Mine, located 4.5 km north-west of Dartbrook Mine. The existing Dartbrook CHPP is located 1.3 km from the southernmost extent of Aberdeen and 2.3 km from the town centre. In 2016 Aberdeen UCL had an ERP of 1,894 persons, representing approximately 13.2% of the population of the UHS LGA (ABS, 2020b) (Table 1).

Table 1 presents population data for the Aberdeen UCL for the ABS census periods of 2001 (ABS, 2002), 2006 (ABS, 2007), 2011 (ABS, 2012b) and 2016 (ABS, 2017a). This data has been analysed to understand population change in the Aberdeen township during the period to which DA 231-7-2000 has applied.

Table 1 shows:

- The population of Aberdeen UCL increased by approximately 10.9% between 2001 and 2016 with a corresponding 23.7% increase in the number of private dwellings.
- The highest rate of inter census population growth occurred between 2001 and 2006 (4.9% or 83 persons) i.e. immediately following the granting of DA 231-7-2000.
- Fluctuations in the number of families residing in Aberdeen.

- The rate of population growth in Aberdeen UCL between 2006 and 2016 was approximately 5.8% (103), slightly less than the rate of population growth experienced across the broader UHS LGA (ABS, 2007; ABS, 2017a).

The population and dwelling increases experienced in Aberdeen UCL between 2011 and 2016 are likely associated with the subdivision of land by the UHS Council in 2011 and the release of this land for residential development. This is evidenced in the analysis of MB Data (see later discussion) which shows a significant increase in population and dwelling counts in the locality of the subdivision (Perth Street, Aberdeen). A desktop review of residential dwelling approvals on the UHS website also shows a prevalence of residential dwelling approvals in Aberdeen during this period.

Table 1
Selected Statistics for Aberdeen UCL 2001-2016

Aberdeen UCL	2001	2006	2011	2016	Change 2001-2006
Population	1708	1,791	1837	1,894	186 (10.9%)
Private Dwellings	692	746	799	856	164 (23.6%)
Families	474	497	515	499	25 (8.3%)
Median Age	na	37	36	37	na

Source: (ABS, 2002; ABS, 2007; ABS, 2012b; ABS, 2017a)

Population Within and Adjoining Dartbrook Mine

- ABS MB data has been used to understand changes in population and dwelling numbers proximate to the Dartbrook Mine Mining Authorities Boundary. MBs are small areas for which the ABS produces only a population count and dwelling count.

Table 2 presents MB data for the area within and adjoining the Mining Authorities Boundary. The selected MBs cover an area of approximately 135 km^2. In 2016 all land within the selected MBs (with the exception of two small MB areas [equal to 1 km^2]) were categorised as primary production land (ABS, 2017b) consistent with the corresponding LEP land use zonings. Land classifications were not included in the 2011 MB data.

Table 2 shows an increase in both population and dwelling numbers in the subject MB areas between 2011 and 2016. During this period the population of the combined MB areas increased by 27.5% (82 persons). Significant increases in population and dwelling counts have occurred in areas to the north and west and outside of the Mining Authorities Boundary and in the urban footprint of Aberdeen.

Between 2011 and 2016 the most significant population changes occurred in the following MBs:

- MB 10789070000 (2011/2016) – population increase of 86% (31) and dwelling increase of 106% (16). This MB includes land to the north and west of the Mining Authorities Boundary but excludes land within the Mining Authorities Boundary.
- MB 10788201000 (2011) and MB 11205392000 (2016) – significant increase in both population and dwellings. This MB is designated residential and generally align with the south eastern portion of Aberdeen township adjoining AQC owned land, and includes Perth Street. The population and dwelling increases are related to the subdivision of land along Perth Street for residential development.
- MB 10789060000 (2011/2016) – population increase of 29 and dwelling increase of 5. This MB is located to the immediate west of Aberdeen and the Hunter River and includes the majority of the Mining Authorities Boundary that is located within the UHS LGA.
- MB 11204480100 (2016) – population decline of 19 and an increase of 4 dwellings. This MB is located west of the New England Highway and Hunter River and includes the majority of the Mining Authorities Boundary that is located within the Muswellbrook LGA It includes the township of Kayuga. Land associated with the Mt Pleasant Mine is also located within this MB. The population decline in this area is likely associated with the acquisitions and or population movements for the Mt Pleasant Mine.

Table 2
Mesh Block Data 2011 and 2016

2011 ABS Census			**2016 ABS Census**			
Mesh Block	**Dwelling**	**Person**	**Mesh Block**	**Area (km^2)**	**Dwelling**	**Person**
10789060000	9	14	10789060000	21.07	14	43
10531460000	5	10	10531460000	25.34	10	8
10531450000	23	60	11204480100	21.51	30	48
10531440000	3	7				
10531430000	0	0				
10529860000	10	16	11204486900	16.24	10	21
11014880000	0	0	11014880000	0.09	0	0
10788350000	72	151	11205103800	8.66	51	114
			11205393600	5.49	9	25
10788201000	3	4	11205392000	0.90	18	54
10789070000	15	36	10789070000	36.07	31	67
Total	**140**	**298**		**135.37**	**173**	**380**

Source: (ABS, 2012; ABS, 2017b)

Notes: 2011 and 2016 Mesh Block references are listed in order of alignment e.g. 10789060000 in 2011 is the same area as 10789060000 in 2016.

2.2.4 Population, Dwelling and Household Forecasts

The NSW Government released population, household, and implied dwelling projections for LGAs in NSW in 2019. Table 3 presents projections to 2036 for the LGAs of interest and NSW. The population of Muswellbrook LGA is projected to increase by approximately 11% to 18,186 by 2036 (DPIE, 2020b). The population of UHS LGA is projected to decrease by approximately 7% to an estimated 13,200 people by 2036 (DPIE, 2020b). Household and implied dwelling projections are generally in line with the projected changes in population.

Population Projections

The NSW Department of Planning, Industry and Environment (DPIE) 2019 population projections for Muswellbrook LGA indicate that the:

- Population of Muswellbrook LGA is estimated to increase by 1,900 people between 2016 and 2041, from 16,450 to 18,350. Muswellbrook's population growth will be driven largely by natural increase.
- Working age population (aged 15-64) is estimated to remain stable, moving from 10,650 in 2016 to 10,600 in 2041 – a change of 50.
- Number of children aged 14 and under is estimated to change by 300 children, from 3,800 in 2016 to 3,500 in 2041.
- Number of people aged 65 and over is estimated to increase from 2,000 in 2016 to 4,300 by 2041 - a change of 2,300 (DPIE, 2020a).

The DPIE 2019 population projections for UHS LGA indicate that the:

- Population of UHS LGA is estimated to decrease by 1,650 people between 2016 and 2041, from 14,350 to 12,700. There is predicted to be a continued movement of young families out of the area.
- Working age population (aged 15-64) is estimated to decrease by 8,800 in 2016 to 7,000 in 2041 – a change of 1,800.
- Number of children aged 14 and under is estimated to change by 1,000 children, from 3,050 in 2016 to 2,050 in 2041.
- Number of people aged 65 and over is estimated to increase from 2,550 in 2016 to 3,700 by 2041 - a change of 1,150 (DPIE, 2020c).

Table 3
Population Projections for the Regional Area

Geographic Area	2016	2026	2036	Change (%) 2016-2036
Population Projections				
Muswellbrook LGA	16,462	17,578	18,186	10.5
UHS LGA	14,344	13,948	13,200	-8.0
NSW	7,732,858	9,011,010	10,077,964	30.3
Household Projections				
Muswellbrook LGA	6,452	7,256	7,796	20.8
UHS LGA	5,820	5,958	5,864	1.0
NSW	2,903,516	3,443,630	3,910,857	34.7
Implied Dwelling Projections				
Muswellbrook LGA	7,563	8,085	8,505	12.5
UHS LGA	6,710	6,813	6,869	2.4
NSW	3,200,831	3,510,142	3,783,939	18.2

Source: (DPIE, 2020b)

Household Projections

The DPIE 2019 household projections indicate that the:

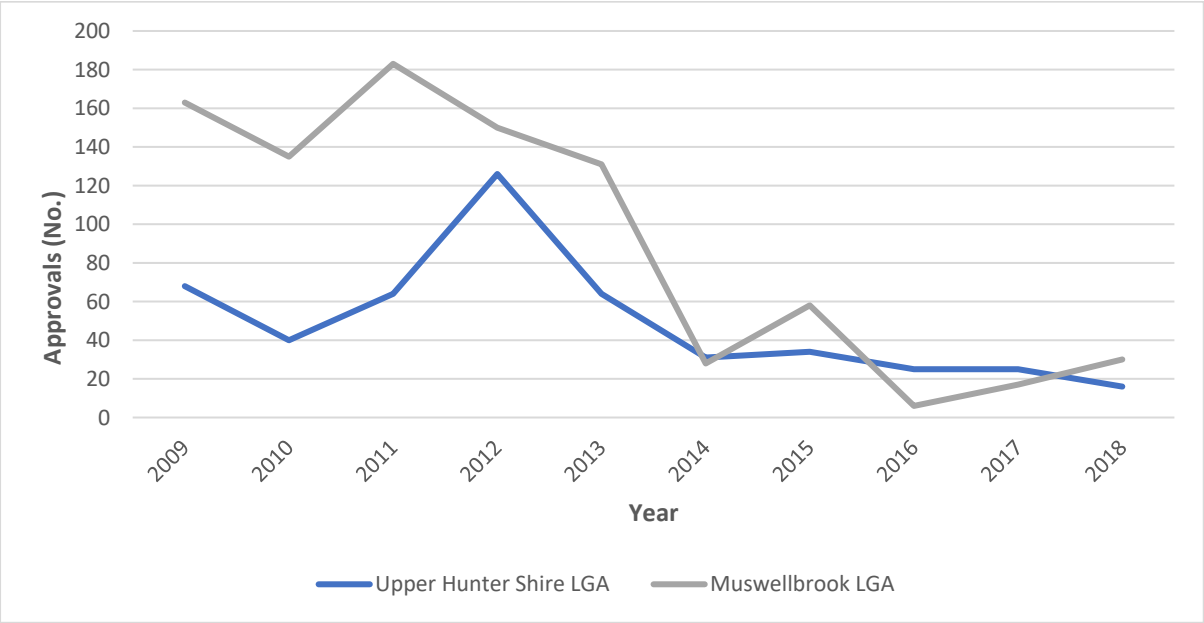
- Number of households in the UHS LGA is projected to experience negligible increase between 2016 and 2036. This aligns with the forecast population decline.
- Population and household growth forecast in UHS LGA points to relatively minimal change (2.4%) in the number of dwellings in the LGA, suggesting limited future growth in the key centre of Scone or the small community of Aberdeen.
- Number of households in the Muswellbrook LGA is forecast to increase by 20.8%, less than the forecast growth across NSW between 2016 and 2036.
- Dwelling projections for Muswellbrook LGA show an increase of 12.5% between 2016 and 2036, less than the 18.2% growth anticipated across NSW for the same period (DPIE, 2020b).

2.2.5 Building Approvals

Building approvals data can provide an indication of population growth and the expansion of urban areas. Residential building approvals data from REMPLAN (2020a; 2020b) was reviewed. Graph 2 presents the number of residential building approvals (e.g. detached houses, townhouses and flats) between 2009 and 2018 for the LGAs of UHS and Muswellbrook. Graph 2 shows similar residential approval trends across both LGAs of interest

suggesting common influencing factors. The sharp increase in approvals from 2010 and peak in 2011/2012 aligns with small but sustained population growth in both LGAs and corresponding expansion in the surrounding mining industry which would have generated demand both directly and indirectly for additional residential accommodation (rental and purchase).

Graph 2
Residential Building Approvals – 2009-2018



Source: (REMPLAN, 2020a; REMPLAN, 2020b)

Between 2009 and 2018 in Muswellbrook LGA, residential building approvals peaked in 2011 (183 approvals), with an associated value of approximately $43 M (REMPLAN, 2020a). From 2013, the number of annual residential building approvals dropped substantially, to a low of six approvals in 2016.

In the UHS LGA, residential building approvals (126 approvals) peaked in 2012, with an associated value of approximately $33.9 M (REMPLAN, 2020b). Graph 2 shows that the number of residential building approvals in the UHS LGA were consistently lower than Muswellbrook LGA between 2009 and 2013, after which residential approvals in both LGAs declined to a similar number. In 2018, Muswellbrook LGA and UHS LGA had similar residential building approval values, at $8.6 M, and $8 M respectively (REMPLAN, 2020a; REMPLAN, 2020b).

2.3 HOUSING MARKET CHARACTERISTICS

This section provides an analysis of changes in the housing market (rental and purchase) in the three primary residential areas nearby the Dartbrook Mine. These residential areas are defined by their postcodes and are:

- Aberdeen 2336;
- Muswelbrook 2333; and
- Scone 2337.

2.3.1 Existing Housing Availability

Housing market data available through Residex Pty Ltd and accessed 9 July 2020 shows that there were:

- 12 properties for sale in Aberdeen and seven recorded property sales in the last three months (Residex Pty Ltd, 2020a);
- 124 properties for sale in Muswellbrook, and an estimated 71 sales in the last three months (Residex Pty Ltd, 2020b); and
- 47 properties for sale in Scone, and an estimated 37 sales in the last three months (Residex Pty Ltd, 2020c).

2.3.2 Median House Prices

Graph 3 shows the median house prices for the Aberdeen, Muswellbrook, and Scone postcode areas (based on non-ABS suburb areas), between 2011 and 2020. The information is drawn from Residex Pty Ltd (2020a; 2020b; 2020c). Graph 3 indicates that the median house price in Scone between 2011 and 2020 has been consistently higher than Muswellbrook and Aberdeen. Graph 3 shows a similar trend in median house prices across all three areas of interest. The low point in house prices in Muswellbrook and Aberdeen in 2016 is likely attributable to the closure of Drayton Mine which employed a significant number of people who resided in both the Muswellbrook and UHS LGAs.

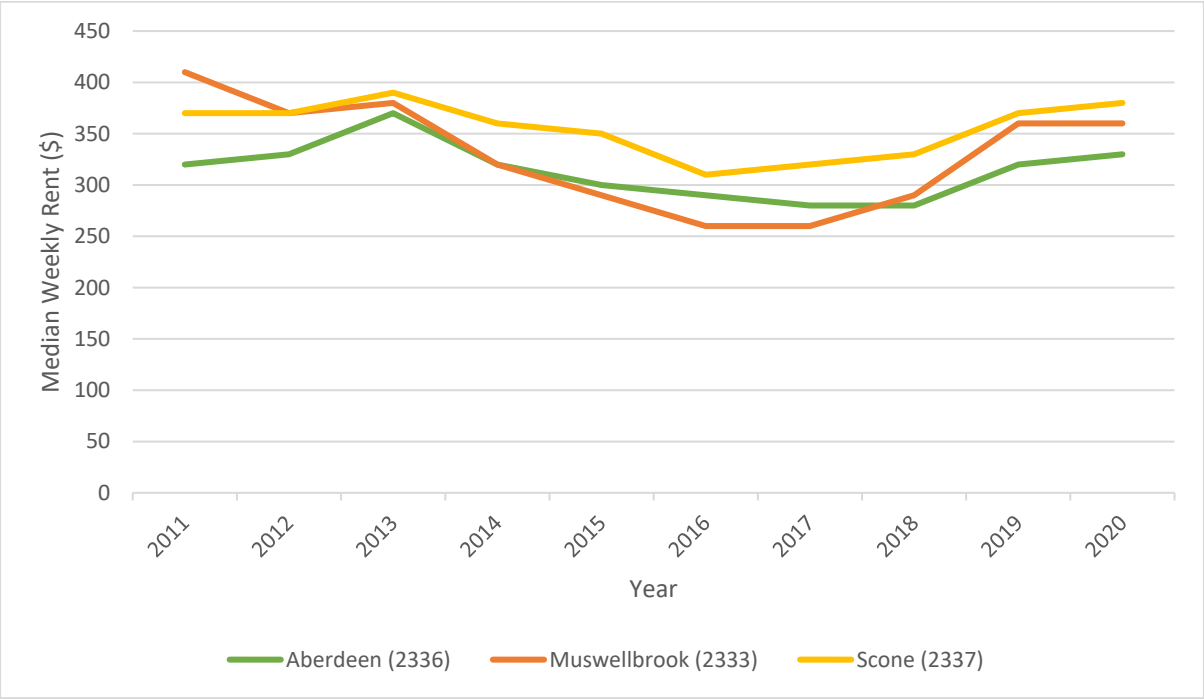
Graph 3
Median House Prices – 2011-2020

Source: (Residex Pty Ltd, 2020a; Residex Pty Ltd, 2020b; Residex Pty Ltd, 2020c)

2.3.3 Median Rent

Graph 4 shows median weekly rental prices for houses in the Aberdeen, Muswellbrook, and Scone areas (based on non-ABS suburb areas), between 2011 and 2020. The information is drawn from Residex Pty Ltd (2020a; 2020b; 2020c). All three suburbs experienced a similar drop in median rent between 2013 and 2018 suggesting the market in all three centres is influenced by similar factors, likely the corresponding decline in the mining industry sector from 2013. Of the areas of interest Muswellbrook has experienced the highest variability in median rental prices, with median rent peaking at $410 in 2011, dropping to a low of $260 in 2016 and 2017. Similar to the trends in housing market price, of the areas of interest Scone experienced the highest median rent for the majority of the period between 2011 and 2020. The steady increase in weekly rent from 2017 in Muswellbrook may be attributed to the construction of the Mt Pleasant Mine and the commencement of operations.

Graph 4
Median Weekly Rent – 2011-2020



Source: (Residex Pty Ltd, 2020a; Residex Pty Ltd, 2020b; Residex Pty Ltd, 2020c)

2.4 INDUSTRY SECTOR CHANGES

This section presents a summary of trends in the industry sectors of Mining, Agriculture and Tourism with reference to industry sector employment and output.

2.4.1 Summary Findings

Major industries in the Muswellbrook LGA are coal mining, power generation, equine, viticulture, grazing and livestock. Muswellbrook is the main centre for power generation capacity in NSW and is also the largest concentration of open cut mining in NSW (MSC, 2017a).

The UHS LGA is a predominantly rural area and encompasses a total land area of about 8,000 km^2, of which a large proportion is National Park and nature reserves. Most of the rural area is used for grazing, dairy farming, horse studs and general farming (UHS, 2020). The predominant industry in UHS is agriculture.

The Muswellbrook LGA, along with its neighbouring Councils in the Upper Hunter, has entered a transition period with structural changes impacting on the traditional power generation and mining industries while at the same time there are new emerging technologies and growth opportunities in agribusiness.

Analysis of industry sector employment and output shows:

- With respect to LGA labour markets:
  - Fluctuating labour force size (particularly since 2013) and moderate unemployment in the LGAs of Muswellbrook and UHS;
- With respect to the Mining industry sector:
  - Of the LGAs of interest, Mining industry sector jobs are concentrated in the Muswellbrook LGA.
  - In both Muswellbrook and UHS LGAs, the number of residents employed in the Coal Mining industry has increased significantly (in the case of UHS LGA by almost 50%) in the 10 years from 2006 to 2016.
  - Between 2011 and 2016 Both LGAs of interest experienced negligible change in the number of jobs in the Mining industry sector.
- With respect to the Agricultural industry sector:
  - The agricultural industry is the dominant employment and output sector in the UHS LGA compared to Muswellbrook LGA where mining is the dominant employment and output sector.
  - An overall decline in the proportion of the working age population employed in the Agricultural industry in UHS and Muswellbrook LGAs between 2006 and 2016.
- With respect to Horse Breeding industry (a subsector of the Agricultural Industry):
  - Increased employment (5.9%) in the horse breeding industry sector in UHS LGA between 2011 and 2016 with a corresponding contraction in industry sector employment in Muswelbrook LGA, Hunter Region and NSW;
  - Contraction in employment and output in the Hunter Region thoroughbred breeding industry between 2014 and 2017;
- With respect to the Tourism industry:
  - Contractions in tourism related industry sectors between 2011 and 2016 in both the Muswellbrook and UHS LGAs;
  - Negligible change in the number of accommodation establishments and room occupancy rates across both LGAs;

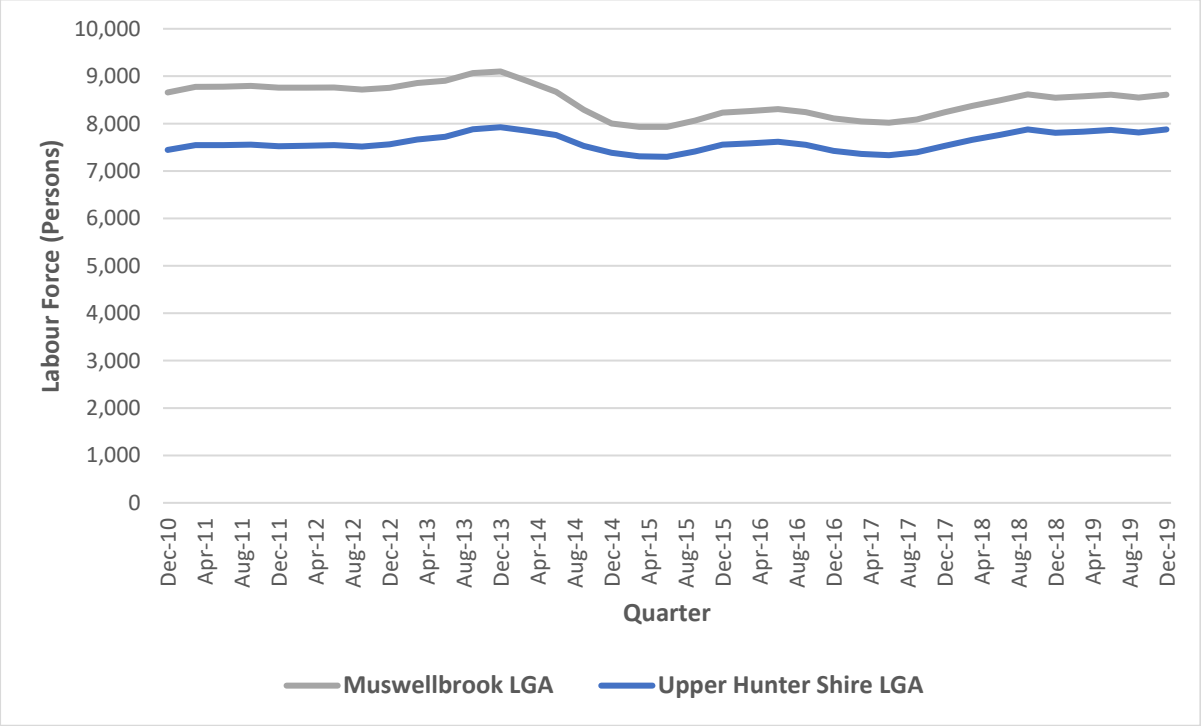
2.4.2 Key Labour Force Characteristics

Labour Force Size

At December 2019 the labour force size in the LGAs of UHS and Muswellbrook was 4,453 persons and 7,876 persons respectively (DESE, 2020). An analysis of labour force data from 2010 to 2019 (Graph 5) shows that the labour force in both LGAs fluctuated significantly. This is likely associated with changes in the surrounding mining industry. Between 2010 and 2019, the labour force of UHS LGA increased by 5.8% (DESE, 2020) peaking at 7,924 in December 2013. Muswellbrook LGA shows a similar pattern in labour force size, however, the LGA has experienced a net (0.5%) decrease to a labour force of 8,610 between 2010 and 2019. Labour

force decline in the Muswellbrook LGA in more recent years can be attributed to the closure of the Drayton South Mine in 2016. Similar to UHS LGA, the size of the labour force peaked in 2013 at 9,100. This aligns with a period of sustained output and expansion in the surrounding mining industry.

Graph 5
Labour Force – 2010-2019



Source: (DESE, 2020)

In Aberdeen, the labour force grew by approximately 0.5% between 2006 and 2016, to a total of 869 (ABS, 2007; ABS, 2017a). Between 2011 and 2016, the labour force size decreased by approximately 5.1% (ABS, 2012b).

Predicted Labour Force Growth

According to the Hunter Regional Plan 2036¸ employment in Muswellbrook LGA is anticipated to increase from 11,364 in 2016 to 13,551 in 2036 (an increase of 19%) (DP&E, 2016). Employment in UHS LGA is also anticipated to increase from 5,948 in 2016 to 7,143 in 2036 (an increase of 20%) (DP&E, 2016).

Unemployment

Both Muswellbrook LGA and UHS LGA experienced a steady increase in unemployment from 2013, consistent with the downturn in the regional mining industry. Unemployment peaked in December 2015 for both LGAs with a high of 6.8% in the UHS LGA, and 13.5% in Muswellbrook LGA (DESE, 2020). The significantly higher unemployment rate in Muswellbrook LGA reflects the shire's historically strong reliance on the resource sector for employment and the resulting sensitivity to recent changes in the sector.

Since late 2016, unemployment rates in the UHS LGA have fluctuated between 2.8% and 3.8% (DESE, 2020). Since December 2016 the unemployment rate in Muswellbrook LGA has remained relatively stable, albeit still high and varying between 6.3% and 7.8%. Unemployment rates in both LGAs of interest remain higher than the period prior to 2013.

2.4.3 Industry Sector Employment and Output

This section presents employment and economic output data for the Mining Industry (coal mining), Agricultural and Tourism for the period 2006-2016 (subject to data availability).

Mining Industry

Muswellbrook LGA is the major focus of coal mining in the Upper Hunter Region, with the largest concentration of open cut mining operations and the second highest rate of coal extraction in NSW (REMPLAN, 2020a). Employment in the Coal Mining industry is significant in Muswellbrook LGA. In comparison, the UHS LGA has no operating coal mines and a significantly smaller proportion of the LGA labour force is employed in Coal Mining.

Resident Employment

Table 4 presents data on employment in the Coal Mining industry in the LGAs of interest for the period 2006 to 2016 based on usual resident population. In both Muswellbrook and UHS LGAs, the number of residents employed in the Coal Mining industry has increased significantly (in the case of UHS LGA by almost 50%) in the 10 years from 2006 to 2016 (ABS, 2007; ABS, 2017a). This shows that the mining sector continues to be a strong employment sector across both LGAs.

Table 4
ABS Industry of Employment – Coal Mining*

Indicator	Muswellbrook LGA			UHS LGA		
	2006	2011	2016	2006	2011	2016
People employed in Coal Mining	928	1,367	1,351	367	602	689
Percentage of labour force employed in Coal Mining (%)	13.8	18.5	20.3	8.9	9.2	11.0

Source: (ABS, 2012b; ABS, 2017a; ABS, 2007)

**Some values may have been adjusted to avoid release of confidential data. This may have a significant impact on the calculated percentages* (ABS, 2017a).

Total Industry Sector Jobs

The Mining industry is the largest employment sector in Muswellbrook LGA. With respect to total mining jobs in the LGAs of interest, in 2016, the Mining industry sector accounted for 31.2% (3,120) of all jobs in the Muswellbrook LGA, and 0.5% (26) of all jobs in the UHS LGA (REMPLAN, 2020a; REMPLAN, 2020b). Between 2011 and 2016 Mining industry sector employment in the Muswellbrook LGA experienced a negligible increase, however this masks

the significant labour market fluctuations that occurred between 2011 and 2016 which were directly associated with the growth and contraction of the Coal Mining industry sector. Between 2011 and 2016 Mining industry sector employment in UHS LGA declined. The biggest job growth during this period in both LGAs occurred in the Education and Training industry sector and the Health Care and Social Assistance industry sector (REMPLAN, 2020b; REMPLAN, 2020a).

Analysis of Mining industry sector employment data for the Hunter Region shows considerable fluctuation in industry sector employment and output consistent with the contraction and growth in the regional Coal Mining industry sector. During the period 2016 to 2018, the Coal Mining industry sector in the Hunter Region contracted with a corresponding reduction in workforce numbers. Based on media coverage (Australian Mining, 2016; Anglo American, 2016; Sydney Morning Herald, 2016) there have been an estimated 716 reported job cuts in the Hunter Region since 2016. Some of these job cuts have been offset by the commencement of construction at the Mt Pleasant Mine in late November 2016, and the subsequent commencement of mining operations in 2018.

Industry Sector Output

The Mining industry is Muswellbrook LGA's largest output generating industry sector, supporting an estimated annual output of $3.9 billion, representing 56.4% of total output in 2016. In comparison, the Mining industry sector of the UHS LGA generated $23.6 M (1.6%) in annual output compared with the highest performing sector, the Agricultural industry sector which generated $499.5 M in output.

Agriculture

The Agriculture, Forestry and Fishing industry (Agriculture industry) is the fourth largest employer in the Muswellbrook LGA (representing 6.9% of resident jobs) and the largest in the UHS LGA (representing 18.7% resident jobs) (ABS, 2017a).

Resident Employment

Employment in the Agricultural industry– which includes the Horse Farming and Viticulture industries, decreased by approximately 6% in UHS LGA between 2006 and 2016, but remains the largest industry in the LGA. Employment in the Agricultural industry increased by over 18% in Muswellbrook LGA over this period.

Between 2006 and 2016 the proportion of the resident working age population employed in the Agricultural industry in both LGAs declined from 10% to 6.9% in Muswellbrook LGA and 20.3% to 18.7% in UHS LGA (MSC, 2016) in parallel with a corresponding increase in mining industry sector employment.

Table 5 presents the changes in employment in the Agricultural industry compared to the Mining industry in the LGAs of interest between 2006 and 2016 based on place of usual residence.

Table 5
Industry of Employment – Mining and Agriculture*

Geographic Area	Industry	Year		Change	
		2006	2016	No.	%
Muswellbrook LGA	Agricultural	395	467	72	18.2
	Mining	976	1,474	498	51.0
UHS LGA	Agriculture	1,257	1,179	-78	-6.2
	Mining	446	733	287	64.3
NSW	Agriculture	78,659	72,625	-6,034	-7.7
	Mining	20,314	31,736	11,422	56.2

Source: (ABS, 2007; ABS, 2017a)
**Some values may have been adjusted to avoid release of confidential data. This may have a significant impact on the calculated percentages* (ABS, 2017a).

Total Industry Sector Jobs

Table 6 presents the changes in employment in the Agricultural industry and sub sectors of Horse Farming and Viticulture in the LGAs of interest between 2011 and 2016 based on place of work and reflects the number of jobs in the industry sector in the respective LGA.

Between 2011 and 2016 the number of jobs in the Agricultural industry sector in:

- UHS LGA increased from 1,178 to 1,215; and
- Muswellbrook LGA declined from 507 to 494.

Table 6
Industry of Employment (Place of Work) – 2011-2016*

Geographic Area	Industry of Employment		
	Agriculture, Forestry and Fishing	Horse Farming	Viticulture
2011			
Muswellbrook LGA	507	175	18
UHS LGA	1,178	389	0
Hunter Valley exc Newcastle SA4	3,378	649	190
NSW	68,885	1,658	1,246

Geographic Area	Industry of Employment		
	Agriculture, Forestry and Fishing	Horse Farming	Viticulture
2016			
Muswellbrook LGA	494	218	14
UHS LGA	1,215	402	3
Hunter Valley exc Newcastle SA4	3,508	712	172
NSW	73,132	1,523	1,013

Source: (ABS, 2012b; ABS, 2017a)

**Some values may have been adjusted to avoid release of confidential data. This may have a significant impact on the calculated percentages* (ABS, 2017a)*. Data is based on ABS Census data and may show slight data variations compared to employment sector data derived from REMPLAN.*

Horse Farming

Muswellbrook and UHS LGAs are important locations for the equine industries, particularly thoroughbred breeding. The UHS LGA in particular is nationally recognised as the "Horse capital of Australia". The Hunter Valley's thoroughbred industry is further globally recognised as an International Centre of Thoroughbred Breeding Excellence.

Although equine related land use and enterprises in the UHS and Muswellbeook LGAs contribute to the economy and identify of these areas, comprehensive information on economic value is not readily available.

In 2014, IER (2014) estimated total value added generated by the thoroughbred breeding industry in the Hunter Region at $564.4 M with 1,013 breeding staff. In 2019 AgriFutures Australia released a report detailing the economic impact of the thoroughbred breeding industry in Australia and at a regional level (Hardy G and Limoli P, 2019). The total value added from thoroughbred breeding in the Hunter Valley in 2016-17 was estimated at $503.9 M, representing the majority of total value added generated by thoroughbred breeding in NSW. AgriFutures Australia estimates 1,808 direct jobs are generated by the thoroughbred breeding industry in the Hunter Valley. This data suggests some contraction in industry output and employment between 2014 and 2017. Earlier output and employment data was unavailable for this report.

Limited equine industry economic data is available for the LGAs of UHS and Muswellbrook. An indication of employment trends across the Horse Breeding sector can be gleamed from analyses of ABS Census data at the LGA level. Horse Farming is a subcategory of the broader Agricultural industry previously discussed. This industry category encompasses the thoroughbred breeding industry and other horse farming activities. Table 7 presents the changes in employment in the horse farming industry in the LGAs of interest between 2006 and 2016 based on place of usual residence.

Table 7
Industry of Employment – Horse Farming*

Geographic Area	Year		Change	
	2006	2016	No.	%
Muswellbrook LGA	204	199	-5	-2.5
UHS LGA	357	378	21	5.9
Hunter Region[1]	690	689	-1	-0.1
NSW	1,567	1,516	-51	-3.3

Source: (ABS, 2007; ABS, 2017a)
**Some values may have been adjusted to avoid release of confidential data. This may have a significant impact on the calculated percentages* (ABS, 2017a).
[1]Hunter Statistical Division (SD) assessed for 2006 data, Hunter Valley exc Newcastle Statistical Area Level 4 (SA4) assessed for 2016 data. Hunter SD encompasses a larger area including Newcastle and a portion of Mid North Coast SA4.

Table 7 indicates a small decline between 2006 and 2016 in employment in the Horse Farming industry in the Muswellbrook LGA, Hunter Region or NSW. UHS LGA experienced a 5.9% increase in employment in the Horse Farming industry between 2006 and 2016. Employment in Horse Farming in Muswellbrook LGA and UHS LGA represented approximately 38% of employment across the Horse Farming industry in NSW in 2016.

It is understood that the equine industry extends to employment in specialist equine training, racing, medical and research occupations (DPI, 2013a) which are not necessarily captured in the ABS Horse Farming industry category.

With respect to total jobs, ABS data (Table 6) shows a small increase in employment in the equine industry in both LGAs of interest between 2011 and 2016.

Viticulture

With over 150 years of grape growing history, the Hunter Region is known as the oldest wine making region in Australia (DPI, 2013b). While only producing around 2% of Australian wine, there is an emphasis on the production of premier, award winning wines that are renowned both nationally and internationally (DPI, 2013b). According to the NSW Department of Primary Industries (DPI), in 2010 the Hunter Region produced over 25 million litres of wine, with a value of over $210 M (DPI, 2013b).

Grape Growing (Viticulture) is a subcategory of the broader Agricultural industry previously discussed. Table 8 presents the changes in employment in the Viticulture industry in the Muswellbrook and Upper Hunter LGAs, as well as the broader Hunter Region, between 2006 and 2016 based on place of usual residence.

Table 8 shows that employment in the Viticulture industry substantially decreased across all areas of interest between 2006 and 2016. Of the areas of interest, Muswellbrook LGA experienced the most significant decline in Viticulture industry employment (86%). Employment in the Viticulture industry is low in the LGAs of interest, particularly in UHS LGA where there were fewer than 10 persons employed between 2006 and 2016.

Table 8
Industry of Employment – Viticulture*

Geographic Area	Number of People		Change	
	2006	2016	No.	%
Muswellbrook LGA	57	8	-49	-86.0
UHS LGA	7	4	-3	-42.9
Hunter Region[1]	282	172	-110	-39.0
NSW	1,843	919	-924	-50.1

Source: (ABS, 2007) (ABS, 2017a)
**Some values may have been adjusted to avoid release of confidential data. This may have a significant impact on the calculated percentages* (ABS, 2017a).
[1]Hunter Statistical Division (SD) assessed for 2006 data, Hunter Valley exc Newcastle Statistical Area Level 4 (SA4) assessed for 2016 data. Hunter SD encompasses a larger area including Newcastle and a portion of Mid North Coast SA4.

With respect to jobs in the Viticulture industry sector, ABS data (Table 6) shows a:

- Small decline in employment between 2011 and 2016 in Muswellbrook LGA; and
- Small growth in employment between 2011 and 2016 in the UHS LGA.

Tourism

Sector Employment

Tourism Research Australia (TRA) (2019) released LGA tourism profiles for 2018. In 2018, there were 124 tourism businesses recorded in Muswellbrook LGA, and 167 in UHS LGA (TRA, 2019).

Tourism supports approximately 364 jobs (3.6% of total employment) in Muswellbrook LGA, and 310 jobs (5.9% of total employment) in UHS LGA (REMPLAN, 2020a; REMPLAN, 2020b). In comparison, tourism across NSW supports approximately 6.1% of total employment in the State.

The largest tourism sub-sector in Muswellbrook is Accommodation & Food Services, with approximately 209 jobs supported by tourist expenditure. The largest sub-sector in Upper Hunter is also Accommodation & Food Services with 174 jobs supported by tourist expenditure.

The tourism sector described above is an amalgamation of activities across various industry sectors such as retail, accommodation, cafes & restaurants, cultural & recreational services. Analysis of trends in these activities for the period 2011-2016 shows contraction in a number of tourism related industry sectors across both the UHS and Muswellbrook LGAs. In the Muswellbrook LGA this is likely associated with the corresponding significant contraction in the mining industry sector.

Between 2011 and 2016 the UHS LGA experienced:

- A decline of 8.1% in the number of jobs in the retail trade sector (505 in 2011 to 464 in 2016;
- A decline of 8.1% in the number of jobs in the accommodation and food services industry (420 in 2011 to 386 in 2016); and
- A 4.2% increase in the number of jobs in the arts and recreation services (96 in 2011 to 100 in 2016) ((REMPLAN, 2020b).

Between 2011 and 2016 the Muswellbrook LGA experienced a decline of:

- 12.5% in the number of jobs in the retail trade sector (780 in 2011 to 679 in 2016);
- 10.6% in the number of jobs in the accommodation and food services industry (565 in 2011 to 505 in 2016); and
- 4.3% in the number of jobs in the Arts and recreation services industry (70 in 2011 to 67 in 2016) (REMPLAN, 2020a).

Hunter Region Key Tourism Metrics

According to Regional NSW (Department of Premier and Cabinet, 2018) tourism injected nearly $3.0 billion into the Hunter Region in the year ending June 2019, with a 4.2% annual increase on average in visitor numbers since the year ending June 2010. No information is available regarding the specific destinations within the Hunter Region.

In 2019, the majority of visitors to the Hunter Region came for the purpose of visiting friends and relatives (41%). An additional 38% of visitors came for a holiday while 16% came for business purposes. The number of visitors to Regional NSW grew by 41.2% from June 2014 to June 2019, or 7.1% per year in compound annual growth terms.

Table 9 shows key tourism metrics for selected NSW Tourism regions, including the Hunter Region for the period 2017-2019 based on data available through STR (STR, 2018; STR, 2019a; STR, 2019b). There are 13 Tourism Regions in NSW. Table 9 shows marginal fluctuations in occupancy rates across all areas of interest between 2017 and 2019. It also shows an increase in the number of accommodation establishments and room numbers across the Hunter Region between 2017 and 2019. Analysis of all 13 Tourism Regions in NSW shows that room occupancy rates in the Hunter Region are relatively high.

Table 9
Accommodation Data for Selected Tourism Regions – Year End June

NSW Tourism Regions	Establishments (No.)			Rooms (No.)			Room Occupancy Rate (%)		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Hunter	152	164	167	6,507	6,741	7,063	65.7	67.9	67.2
Sydney	388	406	411	40,490	42,967	43,835	85.3	84.9	83.4
Central Coast	49	49	49	2,094	2,084	2,074	66.5	67.6	66.1
North Coast	303	323	323	9,797	10,220	10,255	62.1	62.5	65.7
Riverina	68	68	68	2,203	2,226	2,229	64.0	67.4	68.1
NSW	1721	1,784	1,793	84,386	87,957	89,289	79.0	79.0	78.0

Source: (STR, 2018; STR, 2019a; STR, 2019b)

LGA Level Tourism Metrics

Key tourism metrics collected by TRA were not available for the Muswellbrook LGA. However TRA data for the UHS LGA shows a total of 259,000 visitors to the LGA in 2018 with a total spend of $46 M (TRA, 2019).

There are multiple short-term accommodation listings in the LGAs of UHS and Muswellbrook. Analysis of establishment numbers and room occupancy rates from 2013 shows little increase in either Muswellbrook LGA or UHS LGA. Table 10 shows the number of accommodation establishments with 15 or more rooms in the LGAs of interest and NSW in September Quarter 2013 and June Quarter 2016. Table 10 shows little change in the supply of tourist accommodation (or 15 or more rooms) between 2013 and 2016. There are also numerous short-term accommodation options available through AirBnB and Stayz.

Table 10
Short Term Accommodation Provision – Year End June

Geographic Area	Establishments (No.)		Rooms (No.)		Room Occupancy Rate (%)	
	2013[1]	2016	2013	2016	2013	2016
Muswellbrook LGA	9	8	256	227	51.8	40.6
UHS LGA	8	8	164	164	52.8	51.9
Regional NSW	1,102	1,110	na	38,453	na	79.5
NSW	1,385	1,424	na	75,235	62.9	68.3

Source: (Destination NSW, 2020)
[1]*September Quarter.*

2.5 LAND USE ANALYSIS

This section provides a brief summary of the key changes in land use surrounding Dartnrook Mine since the granting of DA 231-7-2000 with reference to land zoning and significant land use change.

2.5.1 Summary Findings

The findings of the land use analysis show that since the granting of DA 231-7-2000:

- Limited material changes have occurred in land zoning adjoining and proximate to the Dartbrook Mine in the LGAs of UHS or Muswellbrook. Rural land zonings remain the dominant land use zoning proximate to the mine site.
- The locations of Equine and Viticulture Critical Industry Clusters (CIC) and Biophysical Strategic Agricultural Land (BSAL) have been mapped across both the UHS and Muswellbrook LGAs, including across areas located within the Mining Authorities Boundary for the Dartbrook Mine.
- The UHSC has articulated strong opposition to coal and coal seam gas activities with the release in 2015 of a *Position Statement – Coal and Coal Seam Gas Activities* (UHSC, 2015).
- The most significant land use change in the area proximate to the Mining Authorities Boundary is the commencement of operations at the adjoining Mt Pleasant Mine.
- At a regional level the most significant land use changes relate to the expansion in the coal mining industry with the approval of new mining operations (i.e. Mangoola Mine and the significant expansions to existing operations e.g. Bengalla Mine and Mt Arthur Mine).
- There has been limited change in the amount of land designated for future residential development in the UHS LGA and particularly in Aberdeen township. Residential subdivision and associated residential development has occurred in Aberdeen, however this additional development has equated to approximately 10-12 houses per year based on ABS census data for the Aberdeen UCL.
- Muswellbrook continues to develop and grow as a regional centre to support the surrounding mining, power generation, agriculture and viticulture industries. This growth includes significant growth in the residential environment of Muswellbrook in line with the expansion of the surrounding coal mining industry.

Submissions in opposition to the Modification note the growth of the Hunter Valley equine industry since the granting of DA 231-7-2000. Analysis of mining industry information indicates that the reported growth in the Hunter Valley equine industry has occurred in parallel with the operation of existing mines and expansions in operations, particularly in the Muswellbrook area. This would suggest that existing mining operations (including Dartbrook Mine) have not restricted the growth of the equine industry.

2.5.2 Land Zoning

The zoning of land within and adjoining the Dartbrook Mine for the period 2000 to 2020 was reviewed to inform an understanding of land use changes in the area surrounding the Dartbrook Mine since the granting of DA 231-7-2000.

The Mining Authorities Boundary for Dartbrook Mine straddles the LGAs of Muswellbrook and UHS. At the time DA 231-7-2000 was granted land use zoning within and adjoining the Mining Authorities Boundary was controlled by the provisions of either the:

- *Muswellbrook Local Environment Plan 1985* (Muswellbrook LEP 1985); or
- *Scone Local Environment Plan 1986* (Scone LEP 1986).

The Muswellbrook LEP 1985 has since been replaced by the *Muswellbrook Shire Local Environment Plan 2009* (Muswellbrook LEP 2009). The Scone LEP 1986 has been replaced by the *Upper Hunter Shire Local Environment Plan 2013* (UHS LEP 2013).

Table 11 summarises the applicable land zonings for land within and outside the Mining Authorities Boundary since the granting of DA 231-7-2000. Table 11 confirms that there has been little change in the land use intent for land within and adjoining the Mining Authorities Boundary for the period 2000-2020. Rural land zonings and associated rural land uses remain the dominant land use proximate to the Dartbrook Mine.

When the Muswellbrook LEP 2009 was gazetted a substantial amount of land in Muswellbrook and Denman (a significant distance from Dartbrook Mine) was rezoned to R1 General Residential and R5 Large Lot Residential as Urban Release Areas to meet the projected future housing demands of the LGA.

The existing mining landscape within the LGAs of Muswellbrook and UHS is predominately covered by the RU1 Primary Production Zone with some areas zoned E3 Environmental Management.

Since 2009 the Muswellbrook LEP has been amended several times, in order to ensure that the LEP remains current and is able to respond appropriately to emerging development trends to achieve desired development outcomes. In 2017 MSC released the Muswellbrook LEP 2009 Review Discussion Paper (MSC, 2017a). The MSC highlights the need for a review of the Muswellbrook LEP 2009 in light of the introduction of the Hunter Regional Plan 2036 (DP&E, 2016). The Review will inform amendments to the Muswellbrook LEP 2009 and its accompanying Development Control Plan.

Table 11
Summary of Land Zonings

Instrument	Description of Zoning
Superseded Planning Instruments	
Muswellbrook LEP 1985	Land within and adjoining the Dartbrook Mine, where located within the Muswellbrook LGA was zoned Rural 1(a) and Environmental Protection General (Alluvial Area) 7 (L1)[1].
Scone LEP 1986	Land within and adjoining the Dartbrook Mine, where located within Scone Shire was zoned Rural 1(a)[1].
Current Planning Instruments	
Muswellbrook LEP 2009	The majority of land proximate to the Dartbrook Mine is designated as RU1 – Primary Production land, with the remainder primarily designated as E3 – Environmental Management land.
UHS LEP 2013	Land within and adjoining the Dartbrook Mine is currently designated as RU4 – Primary Production Small Lots.

[1]Zoning information has been drawn from the zoning maps included in the *Dartbrook Extended Environmental Impact Statement* (EIS) (HLA Envirosciences Pty Limited, 2000).

2.5.3 Local Land Use and Land Use Change

Existing Land Use

The Upper Hunter region has a long history of agricultural and industrial land uses. The agricultural and industrial activities primarily include grazing, dairying, thoroughbred activities and coal mining.

Mining activities are prevalent in the region surrounding the Dartbrook Mine and include the Mount Pleasant Mine, Bengalla Mine, Muswellbrook Colliery, Mt Arthur Coal Mine, Mangoola Coal Mine and West Muswellbrook Project (see Figure 1). The Mount Pleasant Mine (owned by MACH Energy) is an approved open cut coal mine located immediately south of Dartbrook Mine (see Figure 5). The Development Consent for Mount Pleasant Mine (DA 92/97) prescribes rights to acquisition of and/or rights to mitigation of land in the vicinity of Dartbrook Mine. There are no operational mines in the UHS LGA.

The township of Aberdeen, located to the north-west of Dartbrook Mine, is within the UHS LGA. The UHS LGA is dominated by agricultural land uses including cattle, pig, poultry, sheep and crop production. The UHS LGA is also the largest producer of thoroughbred horses in Australia.

<u>Kayuga Locality</u>

The gazetted locality of Kayuga is immediately south-east of the Proposed Bord and Pillar Mining Area and within the Mining Authorities Boundary. The majority of land in this locality is

owned by the proponent. Eight private residences (owned by seven landowners) currently remain within Kayuga. Six of these landowners are entitled to acquisition and the other landowner is entitled to mitigation, upon request to
MACH Energy.

Biophysical Strategic Agricultural Land and Critical Industry Clusters

As shown in Figure 3, the Mining Authorities Boundary includes areas of land that are mapped as BSAL and Equine CIC land under *State Environmental Planning Policy (Mining, Petroleum Production and Extraction Industries) 2007* (Mining SEPP). The BSAL in the vicinity of Dartbrook Mine includes the alluvial sediments of the Hunter River, Sandy Creek and Dart Brook. The Approved Kayuga Seam Mining Area does not underlie any land mapped as BSAL (see Figure 3).

Equine CIC and Equine Activities

Small parcels of land mapped as Equine CIC are located within the Mining Authorities Boundary. Figure 3 shows the distribution of horse facilities around Dartbrook Mine. The nearest thoroughbred breeding stud to the Dartbrook Mine is the Kelvinside Stud owned by Godolphin Australia and located on Rouchel Road in Aberdeen. Kelvinside Stud is located on Rouchel Road to the north-east of the Dartbrook Mine. The nearest boundary of the Kelvinside Stud is located approximately 1.2 km from the East Site (where the existing surface infrastructure is located). Godolphin Australia purchased Kelvinside Stud in 2003 (Godolphin, 2018) and since this time has developed the property into a world-class racehorse breeding facility. In 2008, Godolphin Australia also purchased the Woodlands Stud at Denman. The Kelvinside and Woodlands properties operate as one integrated operation (Godolphin, 2018).

Whilst the Kelvinside property predates the granting of DA 231-7-2000 (Kelvinside Homestead was built in 1898) (Godolphin, 2018), it is notable that the purchase of the establishment by Godolphin Australia occurred post granting of DA 231-7-2000 and prior to the commencement of the Dartbrook Mine care and maintenance period.

Brooklyn Lodge thoroughbred facility (Newgate Stud) is located nearby Kelvinside Stud approximately 5 km north-east of the Mining Authorities Boundary. Brooklyn Lodge (Newgate Stud) is also located to the north east of Dartbrook Mine proximate to Kelvinside Stud. Newgate purchased Brooklyn Stud in 2013 (Newgate, n.d.).

There are a number of other studs located to the far north and north east of the Mining Authorities Boundary (a distance of more than 5 km). There are also studs located a significant distance south of the Mining Authorities Boundary. Other thoroughbred breeding establishments in the Upper Hunter include Glastonbury Farm, Dalmore and Darley Kelvinside.

Viticulture Industry

Viticulture CIC is mapped across the LGAs of UHS and Muswellbrook. There is no mapped Viticulture CIC located within Dartbrook Mine, however an area of Viticulture CIC is mapped to the south of Dartbrook Mine.

Major viticulture establishments in the surrounding area include Hollydene, James Estate Wines, Small Forest, and Two Rivers. These establishments are all located near to the locality of Denman, more than 20 km away from the Dartbrook Mine. Tilse's Apple Truck Cider, and St Albans Scone Pty Ltd are located north of Dartbrook Mine near.

Local Land Use Change

Google Earth imagery from 2002 to 2020 was reviewed to identify key land use changes in the local area since the granting of DA 231-7-2000.

At the time of granting of DA 23-7-2000, the dominant land uses within an approximate 2 km radius of the Mining Authorities Boundary were:

- Residential; and
- Agriculture – grazing, dairy farming, and horse breeding.

As of 1 July 2020, the dominant land uses remain the same as in 2000 with the addition of open-cut mining (Mt Pleasant Mine).

Residential

Residential land uses proximate to the Mining Authorities Boundary continue to be concentrated in the township of Aberdeen to the north-east of Dartbrook Mine. The existing Dartbrook CHPP is located at the East Site, 1.3 km from the southernmost extent of Aberdeen and 2.3 km from the town centre. Recent (2011-2020) residential growth in Aberdeen has been concentrated in the south eastern area of the township around Perth Street. In 2011 the Upper Hunter Shire Council (UHSC) subdivided land along Perth Street and released the land for residential development.

Agriculture - Grazing and Dairy Farming

Agricultural land uses to the north, east and west of the Mining Authorities Boundary have changed little in the period since the granting of DA 231-7-2000. Grazing remains the dominant land use within and adjoining the Mining Authorities Boundary. The Hunter and Dartbrook River flats continue to be a focus of agricultural activities, in particular dairy farming. However, areas of agricultural land use previously located on land to the south of the Mining Authorities Boundary within the Mt Pleasant Mining Lease have been displaced due to the construction and operation of the Mt Pleasant Mine.

The Garoka Dairy operates under a lease arrangement with AQC. Since the granting of DA 231-7-2000 Garoka Dairy has undergone significant infrastructure improvements which have supported expanded production. The operational area of Garoka Dairy covers an estimated 350 hectares (ha) with most of the land located along the Hunter and Dart brook flats.

Since the granting of DA 231-7-2000 areas of Equine CIC and BSAL have been mapped within and adjoining the Mining Authorities Boundary. There is 254,900 ha of Equine CIC land mapped in the UHS LGA. This includes extensive areas to the north and east of Aberdeen (Figure 3). Approximately 286 ha of Equine CIC (0.1% of all mapped Equine CIC) is located within the Mining Authorities Boundary. Of this 286 ha, an estimated 154 ha is located within the approved Kayuga Seam Mining Area and would be subject to the effects of subsidence.

The potentially affected Equine CIC within the Mining Authorities Boundary is not currently used for equine industry activities and is understood to have not been used for equine activity since the Equine CIC designation was introduced.

Agriculture - Horse Breeding

Figure 3 shows the distribution of horse facilities around Dartbrook Mine. The largest concentration of horse breeding land uses in the local area continues to be located in the UHS LGA north of Aberdeen.

City Plan Services (2016) reports that in 1982 there were approximately 20 stud horse breeders in the Scone Shire. Estimates from NSW Department of Planning (Department of Planning, 2005) suggest that in 2005 there were over 70 horse studs located within the two former Shires of Murrundi and Scone, *concentrated on the alluvial lands associated with the Pages River between Murrundi and Blandford and around Segenhoe, in the Middle Brook and Dart Brook valleys and north east of Aberdeen on the Hunter River* (City Plan Services, 2016).

The most recent data show there were 119 studs in the UHS LGA in 2006. Mapped Equine CIC includes a substantial part of the centre of the UHS LGA aligning with the alluvial areas described above.

Further information on regional equine activity is provided in Section 2.5.4.

Mining Activities

Since the granting of DA 231-7-2000 the most significant land use change in the 2 km radius of Dartbrook Mine is the construction and commencement of operations at Mt Pleasant Mine. Mt Pleasant Mine is an open cut mining operation. The Mt Pleasant Mining Lease Boundary adjoins the southern boundary of the Dartbrook Mine Mining Authorities Boundary. Mt Pleasant Mine was granted development consent in 1999 however construction did not commence until November 2016. Mt Pleasant has been granted a six-year extension to its planning approval which takes mining out to 2026.

2.5.4 Regional Land Use and Land Use Change

Residential Development

At a regional level residential growth has occurred primarily in the urban area of Muswellbrook and to a lesser extent in Aberdeen and Scone. This growth is reflected in the population and dwelling count increases discussed in Section 2.2.3

Mining Activity

There are no operating coal mines in the UHS. Mining industry activity in the Muswellbrook LGA has increased significantly (as evidenced in industry sector employment and economic output, and a review of aerial imagery) since the granting of DA 231-7-2000. There are currently six operating coal mines in the Muswellbrook LGA (Table 12). Dartbrook Mine is the most northern mine in the Muswellbrook LGA and one of few underground mines approved for operations in the Muswellbrook LGA.

The expansion in mining activity has occurred in the areas to the far south and west of Dartbrook Mine and to the south of the regional centre of Muswellbrook. Whilst the effects of this expansion in mining have been experienced across all LGAs of the Hunter Valley (due to employment, workforce demands and economic output), these effects have been somewhat less in the communities of Aberdeen and Scone due to geographical distance from the mining areas.

Table 12
Operating Coal Mines in Muswellbrook LGA

Operating Mines	Mining Type	Approval
Bengalla Mine	Open Cut	Approved in 1996. Bengalla Mine is approved to produce up to 15 Mtpa of ROM coal until 28 February 2039 under Development Consent (SSD-5170), as modified.
Liddell Mine	Open Cut	Approved 1950s and scheduled to close in 2028.
Mangoola Mine	Open Cut	Approved 2007. Mangoola Coal is approved to mine up to 13.5 Mtpa of ROM coal for 21 years under Project Approval (06_0014), as modified.
Mount Arthur Mine	Open Cut	Approved 2000. The Mt Arthur Coal Mine is approved to mine up to 32 Mtpa of ROM coal until 30 June 2026 under Project Approval (09_0062), as modified.
Muswellbrook Mine	Open Cut	Approved 1944 and consented to carry out mining operations to 2022, producing a maximum of 2 Mtpa of product coal.
Mt Pleasant	Open Cut	Approved 1999 and approved to mine up to 10.5 Mtpa ROM coal until 2026 under DA 92/97, (as modified).

Source: (MSC, 2017a; Just Add Lime, 2020)

Equine Land Uses

Equine related land uses and enterprises are prevalent across the Hunter Region, with high concentrations in the Upper Hunter and specifically in the UHS LGA (as previously discussed). The most prevalent equine land use and enterprise in the region is thoroughbred breeding (as discussed in Section 2.4) .The Equine industry data from the NSW Government (IER Pty Ltd, 2014) confirms that the Hunter Valley region is the dominant thoroughbred industry region in NSW, and home to 27.5% of all thoroughbred stud breeders in Regional NSW and 22.9% of all thoroughbred stud breeders in NSW (IER Pty Ltd, 2014).

In 2014 in the Hunter Region there were:

- 470 thoroughbred breeders employing 1,013 people; and
- 85 registered thoroughbred stallions and sires representing 40% of NSW stock (IER Pty Ltd, 2014).

There is limited data available at the LGA level on the number of studs. Research suggests that within the Upper Hunter Region the greatest concentration of studs and stud horses is in the Muswellbrook and UHS LGAs. In 2011 an estimated 86 thoroughbred horse studs were located in the Upper Hunter area (Howey, 2017a). There is little detailed information on changes in the number of studs (thoroughbred or other) since 2000. According to Howey (2017b), between 2000 and 2006 the Hunter Valley Research Foundation conducted biennial surveys of owners and managers of horse studs in the Upper Hunter. The results of these surveys have not been reviewed, however with respect to the number of thoroughbred studs in the Upper Hunter, Howey (2017b) reports that:

> *"The current* [2006] *research findings reflect an increase in the number of studs since the initial survey conducted in 2000. Both the number of studs contacted and the number of studs participating has grown, with the majority of the increase being located in the Upper Hunter Shire."*

There were 77 Upper Hunter thoroughbred studs identified for the 2006 survey and 65 studs identified for the 2000 survey (Howey, 2017b). However, Howey (2017b) comments that survey limitations suggest the number of studs recorded in 2000 may have been an underestimation.

Viticulture

The Hunter region is Australia's oldest wine-making region and "the economic value and cultural significance of viticulture and wine tourism are essential components of the region's identity and economy" (DPI, 2013b). Limited data is available for the LGAs of interest from which to judge the presence and or change in viticulture land use in the regional area.

Wine Australia (2020) producers data for defined wine growing regions. Dartbrook Mine is located within the Hunter Region of the Hunter Valley Zone. Within the Hunter Region there are three primary Sub Regions: Upper Hunter Valley, Pokolbin and Broke Fordwich. The Dartbrook Mine is located within the Upper Hunter Valley Sub Region. The majority of vineyards in the Hunter Region are densely concentrated around Cessnock in the Pokolbin and Broke Fordwich Sub Regions (Wine Australia, 2020). Within the Upper Hunter Valley Sub Region vineyards are small scattering of vineyards occurs to the south and west of Muswellbrook, principally nearby the township of Denman. Based on existing Wine Australia (2020) vineyard mapping there are no vineyards proximate to Dartbrook Mine or around Aberdeen. An indication of the number of vineyards in the Hunter Region can be gleamed from the results of the National Vintage Survey (Wine Australia, 2020). In 2020, there were 23 respondents from the Hunter Region to the National Vintage Survey. This suggests there were at least 23 vineyards in the Hunter Region crushing more than 1,000 tonnes of grapes.

An analysis of trends in the Australian wine making industry and ABS data provides an indication of likely changes in the viticulture industry in the LGAs of interest and the broader Hunter Region.

ABS Census Data

In the Hunter Region, there were 279 businesses in the Viticulture industry recorded in 2008-09, and 1,469 across NSW. Since 2008-09, there has been a 57.3% decrease in Viticulture businesses in the Hunter Region, and a 49.5% decrease in Viticulture businesses across NSW.

Table 13 presents the total vineyard area, weight of grape production for winemaking, and number of Viticulture businesses from 1998 to 2018-19 for the Hunter Region and NSW. In the Hunter Region, there were 279 businesses in the Viticulture industry recorded in 2008-09, and 1,469 across NSW. Since 2008-09, there has been a 57.3% decrease in Viticulture businesses in the Hunter Region, and a 49.5% decrease in Viticulture businesses across NSW.

Table 13 suggests that some expansion of the Viticulture industry occurred between 1998 and 2006, with increases in vineyard area and grape production for wine making in the Hunter Region and across NSW. However, between 2006 and 2014-15 there was a substantial drop in both total area and production in the Hunter Region. From 2014-15 to 2018-19, there was a further drop in total vineyard area, but an increase in production, suggesting increased rationalisation.

Data from ACCC (2019) shows that of the top 32 growing regions across Australia the Hunter Region had the lowest production yield (measured as average tonnes per hectare).

In the Hunter Region, there were 279 businesses in the Viticulture industry recorded in 2008-09 (ABS, 2009), and 1,469 across NSW. Since 2008-09, there has been a 57.3% decrease in Viticulture businesses in the Hunter Region, and a 49.5% decrease in Viticulture businesses across NSW.

Table 13
Grapes for Wine Production

Geographic Area	Year			
	1998	**2006**	**2014-15**	**2018-19**
Total Area (ha)				
Hunter Region[1]	3,593	4,390	2,376	1,969
NSW	21,887	40,198	34,024	31,565
Production (t)				
Hunter Region	18,998	24,945	7,516	10,196
NSW	174,468	473,580	495,789	478,700
Agricultural Businesses (No.)				
Hunter Region	-	-	156	119
NSW	-	-	965	742

Source: (ABS, 1998; ABS, 2007; ABS, 2015; ABS, 2020)
[1]Defined as "Hunter Valley Principal Grape Producing Region" in 1998, "Hunter Valley Geographical Indication" in 2006, "Hunter Valley Geographical Indication Zone" in 2014-15, and as "Hunter Valley exc Newcastle Statistical Area Level 4" in 2018-19.

2.6 LOCAL ISSUES AND COMMUNITY PERCEPTIONS

This section provides a high level overview of the different values and perceptions of the communities of the LGAs of UHS and Muswellbrook and a summary of the key issues and trends evident in the LGAs. This information informs the social impact assessment of the Extension Period.

2.6.1 Muswellbrook LGA

The Muswellbrook LEP 2009 Review Discussion Paper (MSC, 2017a) describes the Muswellbrook and larger Upper Hunter district as going through a time of significant change.

> *"AGL has notified its intentions to close both major coal fired power generators – Liddell and Bayswater in 2022 and 2035 respectively. Over the next 12 years, three of the six operating coal mines will close. There are new approved mining operations likely to commence, and it is likely that others will be proposed, and existing operations modified." (p. 4)*

The Muswellbrook LEP 2009 Review Discussion Paper (MSC, 2017a) acknowledges the dominance of coal mining industry in the community and the benefits that have accrued i.e. jobs, investment. However, it describes other industries as feeling threatened by mining sector dominance and cites the importance of other industries such as the thoroughbred industry and viticulture industry.

The Muswellbrook LEP 2009 Review Discussion Paper (MSC, 2017a) described the economy as being “unstable” because it is so reliant on the coal and electricity sectors, and a downturn in these industries and associated loss of jobs would have a major impact on the economy. However it also describes the local economy as relatively diverse in its scope (equine, agriculture, viticulture, power generation, mining and government services) (MSC, 2017a).

Community Perceptions

In May 2019, Muswellbrook Shire Council (MSC) commissioned Jetty Research to conduct a random and statistically valid telephone survey of over 500 adult residents living within the LGA. Residents were asked (in an unprompted question) what they believed to be the major challenges for the future of the Muswellbrook Shire.

Economic diversification was the more frequently mentioned challenge (22%) (Jetty Research, 2019). This was followed by job security/unemployment (11%), future of the coal industry (9%), impact of mining (9%) and more retail/entertainment (6%) (Jetty Research, 2019). Housing affordability was 2%. A wide range of other challenges were mentioned including roads, rates, infrastructure, facilities for young and old people, drug use and communication with rate payers (Jetty Research, 2019).

Residents were also asked to consider major opportunities for the future.

> *While a fifth of residents were unsure of future opportunities, a large proportion of those who were able to identify opportunities focussed on energy (with 19% seeing opportunity in coal mining and 7% in renewable energy). Some 18% were vaguer in mentioning opportunities for more business and jobs and 10% in tourism* (Jetty Research, 2019).

Residents were also asked, in an unprompted question, if they had seen anything outside of the region that could work well locally or improve the quality of life of residents. Almost three quarters of survey participants responded to the question.

> *Responses were varied with equal proportions mentioning town beautification, more facilities for children/youth and more retail/attract businesses (13%). Community events/festivals, attracting tourist and better roads/the bypass were also mentioned (by 8%, 6% and 5% respectively.* (Jetty Research, 2019).

Three percent of respondents to the question identified the removal of coal dust from the air.

Local Issues and Trends

The MSC Community Strategic Plan (2017-2027) (MSC, 2016), identifies a non-exhaustive list of local issues and mega-trends, which are replicated in Table 14.

Table 14
Summary of Local Issues and Trends

Issue	Description
Local economic prosperity issues	Structural decline or uncertainty in the thermal coal industry, associated job losses, and the need to diversify the Shire's economic base. A rising middle class – particularly in south east Asia, and an associated growing demand for agricultural products. The growth of the knowledge, creativity, and digital economy and a reshaping labour market. The continued growth of the services sector and the concentration of services in Regional centres. A growing visitor economy. The movement from a linear to a circular economy.
Local cultural vitality issues	A variety of opportunities for cultural participation. Opportunity to experience high quality national and international arts and culture.
Local community infrastructure issues	Integrated footpath and cycleways. Improved accessibility to Council's facilities. Maintain and expand infrastructure to support Muswellbrook achieve Regional Centre status. Ageing Water and Wastewater Infrastructure.
Local community leadership issues	Community consultation and participation in council planning. Workforce and asset management. Business Improvement.
Local social equity issues	An aging population and changing retirement patterns. Social disadvantage and social exclusion – particularly in Muswellbrook South. Early childhood education and social advantage. Improving local liveability and amenity. Easily accessible venues to appreciate and participate in arts and culture.
Local environmental sustainability issues	Climate change. Loss/re-establishment/rehabilitation of native vegetation and vegetation connectivity. Poor riparian environments and poor public access to waterways.

Source: (MSC, 2016)

2.6.2 Upper Hunter Shire LGA

The UHSC Community Strategic Plan 2027 (UHSC, ud), describes residents' enjoyment of living in the Shire because of its relaxed, healthy rural lifestyle, the community spirit, environment, affordable living and access to other places. In the future, people would like the UHS to maintain its rural, beautiful environment, and country lifestyle; to remain quiet, but with improved roads, facilities, services and economy (UHSC, ud).

Community Perceptions

In 2013, 2015 and 2017, UHSC commissioned Micromex Research to conduct a random telephone survey of between 400 and 450 adult residents living within the LGA.

In 2013 survey participants were asked (in an unprompted question) about the things they value about living in the UHS. The *rural atmosphere and lifestyle* and the *sense of community* were identified by respondents as the most valued attributes. Participants were also asked to identify the biggest issues facing the UHS in the next 5 years (from 2013). *Road maintenance* was the highest response (17%) followed by *coal mining* (14%) and *rail crossings* (12%) (Micromex Research, 2013).

In 2017 survey participants were asked to rate their quality of life living in the UHS. More than 60% of respondents rated their quality of life as very good or excellent. Similar to the 2013 survey, participants were asked (in an unprompted question) about the things they value about living in the UHS. *Community spirit/network, friendly people* was identified by 27% of respondents and *atmosphere – peace and quiet/relaxed/rural living* identified by 20% of respondents (Micromex Research, 2018).

Participants were also asked to identify the biggest issues facing the UHS in the next 5 years (from 2017). Thirty per cent of respondents cited the *effects/completion of the bypass* [Scone Bypass] and *Maintenance of Roads* as the biggest issue. The *Economy/lack of investment and funding/financial management of Council* and was raised by 10% of respondents, *Maintenance/lack of infrastructure, services and facilities to cater for the growing population* was raised by a further 10% and *mining/pollution* by another 10% of respondents (Micromex Research, 2018).

2.6.3 Regional Perceptions

The Hunter Research Foundation (HRF) Wellbeing Watch research program, developed in 2006 provides an indication of the health and wellbeing of the regional community. The latest survey was conducted in 2016 and involved a cross sectional telephone survey of 649 Hunter residents. The findings of the 2016 survey showed that the average level of wellbeing for the Hunter as a whole remained stable (Hunter Research Foundation, 2016).

The following findings of the survey were highlighted for further consideration:

- Average wellbeing for residents in the Upper Hunter was slightly lower than for residents in the Lower Hunter.
- One-fifth experienced a decline in job security and levels of unemployment continue to increase. Declining job security and unemployment have a negative impact on wellbeing and detrimental effects on communities.
- Decreasing household incomes were reported with one-fifth reporting being worse off than a year ago. This has resulted in a decreased ability to raise money in an emergency and more than a quarter of households experiencing a shortage of money to meet everyday needs.
- Satisfaction with local neighbourhoods has declined since 2009 including the provision of natural environments which encourage residents to spend time outdoors and impacts on wellbeing.
- A related concern is the reduction of sporting or recreational activities due to changes in household financial situations.
- Negative impacts from development and noise in local areas continue to be associated with lower wellbeing (Hunter Research Foundation, 2016).

3 EQUINE CRITICAL INDUSTRY CLUSTER CONSIDERATIONS

3.1 INTRODUCTION

This section presents an analysis of the potential impacts of Dartbrook Mine (as approved) on mapped areas of Equine CIC. The IPC contends that:

> *(ii) the social impact on the Equine Critical Industry Cluster (Equine CIC) was not considered, given that areas of ECIC land overlap the mining lease, and the proximity of the mine to thoroughbred industry enterprises;*

The assessment presented below considers the potential impacts of longwall mining rather than bord and pillar. This is because bord and pillar mining will not result in perceptible subsidence and therefore have no impact on the land mapped as Equine CIC. The approved longwall mining therefore represents a worst-case scenario.

This section draws on the information presented in Section 2 and the findings of the following technical assessments:

- *Dartbrook Mine Modification 7 – Air Quality Assessment* (ERM, 2020);
- *Dartbrook Modification 7 – Acoustic Assessment* (Bridges Acoustics, 2020); and
- *Dartbrook Mine – Revised Mod7 – Groundwater Assessment* (AGE Consultants Pty Ltd, 2020)

3.2 CONSIDERATION OF IPC CONTENTIONS

3.2.1 Critical Industry Clusters

Critical Industry Clusters (CICs) are defined as concentrations of highly productive industries within a region that are related to each other, contribute to the identity of that region and provide significant employment opportunities (DPIE, 2018). CICs were introduced under the *State Environmental Planning Policy (Mining, Petroleum Production and Extraction Industries) 2007*.

The Equine CIC is mapped based on a combination of factors (including location, infrastructure, heritage and natural resources), to protect high quality agricultural land critical to the persistence of equine industries from the impacts of coal seam gas and mining activities (DP&I, 2012).

3.2.2 Mapped Equine Critical Industry Cluster

The mapped Equine CIC covers approximately 254,900 ha (less than 10%) of the Upper Hunter region (calculated by Hansen Bailey using DP&E Mapping). Approximately 286 ha of mapped Equine CIC is located within the south-western extent of the Approved Kayuga Seam Mining Area. Of this, approximately 154 ha is located above the Kayuga Seam Mining Area and may be subject to subsidence from future longwall mining activity. The area of Equine CIC that may be mined beneath is considered negligible on a regional scale. The area in question was mapped as Equine CIC at a time when it was already approved to be mined beneath.

3.2.3 Current use of Mapped Equine Critical Industry Cluster

The 154 ha of Equine CIC located above the Approved Kayuga Seam Mining Area is under private freehold ownership, is not currently used for Equine CIC related activities and has not been used for Equine CIC related activities since the introduction of the Equine CIC designation.

3.2.4 Surrounding Equine Industry Activities

The distribution of equine industry operations proximate to the site is described in Section 2.5.3 and shown on Figure 3.

The nearest thoroughbred stud to Dartbrook Mine is Kelvinside Stud. The nearest boundary of the Kelvinside Stud is located approximately 1.2 km from the East Site (where the existing surface infrastructure is located). Other thoroughbred studs and broodmare farms are located to the north, north-east and north-west of Kelvinside more than 5 km from the Mining Authorities Boundary.

3.2.5 Equine Industry Sector Concerns

In submissions to the IPC and DPIE, the Hunter Thoroughbred Breeders Association Inc (HTBA) and Godolphin (Godolphin, 2018; HTBA, 2018; HTBA, 2019a) raised a number of concerns in relation to the Modification, including:

- Potential impacts of the project on mapped Equine CIC;
- Livelihood impacts associated with any project induced changes in water accessibility;
- Potential cumulative air quality impacts of the project; and
- Potential impacts of the project on the reputation and image of the Upper Hunter thoroughbred breeding industry.

Previous government inquiries (Planning Assessment Commission and IPC) have recognised that the Equine CIC is highly sensitive to potential mining impacts. This sensitivity relates to its image. The equine industry seeks to maintain an image that has been described by HTBA as:

> *"…clean, green, bucolic, rural idyll designed to reassure investors of the safe, healthy and caring environment the stud farms provide for their horses."* (HTBA, 2019b, p. 4)

The HTBA considers 'reputation' to be paramount in the horse business because of the inherent risks associated with horse breeding.

3.2.6 Assessment of Potential Impacts

Direct Impacts to Equine CIC Land

An area of mapped Equine CIC is located within the south-western extent of the Approved Kayuga Seam Mining Area. At this location, the minimum depth to the Kayuga Seam is approximately 170 m. Mining of the Kayuga Seam directly beneath this area of Equine CIC may result in deformations of ground surface (such as cracking and formation of humps). Such deformations are able to be remediated (as required) to avoid impacts to the values that supported the land's designation as Equine CIC. Surface deformations and will be managed in accordance with the Extraction Plan that will be prepared in accordance with DA 231-7-2000. The impact of mine subsidence on land use has a much reduced effect compared to direct disturbance of the land.

AQC will prepare an Extraction Plan prior to the commencement of longwall mining. A series of Property Subsidence Management Plans (PSMPs) will be prepared in consultation with private landholders prior to mining beneath their property. The Extraction Plan will include a subsidence monitoring program, as well as a contingency plan to manage any greater than expected subsidence effects (if they occur).

Given that impacts to the land surface (if they occur) are able to be remediated, subsidence will not result in the displacement of any existing Equine CIC activity. Further, it is highly unlikely that the predicted impacts to Equine CIC within the Mining Authorities Boundary will impact the sustainability and growth of the existing surrounding equine industry.

Impacts to Surrounding Equine Industry

The following potential impacts of the Extension Period on the surrounding equine industry are considered below:

- Changes to the character and amenity of the local area that may affect the reputation and image of the equine industry with resulting impacts on equine industry livelihood; and

- Changes in access to groundwater that may affect equine industry livelihood.

Character and Amenity

The Extension Period will not result in a discernible alteration to the landscape which forms the backdrop within which existing equine industries operate. No additional surface infrastructure is proposed as part of the Extension Period. Subsidence impacts will not detract from the character and amenity of the surrounding landscape. AQC has committed to not mining the Piercefield Seam within the approved period. Therefore the subsidence impacts of the Extension Period are anticipated to be within those approved under DA 231-7-2000 (Byrnes Geotechnical Pty Ltd, 2020). Actual impacts may be less because only a subset of the approved mining activities can be conducted within the remaining duration of DA 231-7-2000. Extraction Plan(s) will be prepared for all longwall mining areas prior to the commencement of mining. The Extraction Plans will provide a detailed assessment process describing how the performance measures for natural and built features would be achieved and the management and/or mitigation measures to be applied.

The Extension Period will have no impact on the buffer that already exists between the Dartbrook Mine and Darley Kelvinside or the Mount Pleasant Mine and Darley Kelvinside.

The noise and air quality assessments have confirmed that noise and dust emissions during the Extension Period are not significantly different to the impacts already approved under DA 231-7-2000.

The Air Quality Assessment (ERM, 2020) has considered the air quality impacts of the existing approval for longwall mining being fully operational, in addition to the proposed modification, in the context of changes in background air quality since the granting of DA 231-7-2000. The findings of the Air Quality Assessment (ERM, 2020) show that:

- The Extension Period would comply with all annual air quality criteria including cumulative emissions; and
- The incremental contribution of the Extension Period to cumulative air quality is small compared to other sources.

Potential air quality impacts of the Extension Period will be managed through:

- Preparation of an Air Quality and Greenhouse Gas Management Plan;
- Sealing of the haul route for trucks carrying rejects;
- Minimising the exposed area of the Rejects Emplacement Area (REA) through progressive rehabilitation;
- Establishing dust fences adjacent to exposed areas of the REA; and
- Continuation of all existing controls such as shielded conveyors and water sprays.

With respect to noise, AQC proposes the following additional noise controls at the East Site:

- Upgrading elevated conveyors with additional shielding and low noise idlers;
- Refurbishment of coal reclaimers with lower noise components;
- Construction of a noise barrier north of the CHPP;
- Upgrading building cladding on the north and western facades of the CHPP; and
- Avoiding reject emplacement near the southern limit of the reject emplacement area (REA) at night time and/or unfavourable weather conditions.

Taking into consideration these additional noise mitigation measures, findings of the Noise Assessment (Bridges Acoustics, 2020, p. 9) show:

- Calculated noise levels at closest receivers are predicted to meet the existing Development Consent noise criteria at all except for three privately owned receivers. Receivers 303 and 422, located west of the New England Highway south of Dartbrook Mine's East Site, are predicted to receive a noise level that is 1 decibel over the noise criteria during the night period under noise enhancing weather conditions. As the NSW *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) regards a 1 decibel exceedance of a noise criterion to represent a negligible impact, and as these residences are subject to significant traffic noise from the adjacent New England Highway during all time periods, the predicted noise levels at these residences are considered acceptable. Receiver 391 is predicted to experience noise levels up to 1 decibel above the criteria; however, this receiver is already entitled to acquisition by the Mt Pleasant Mine; and
- Cumulative noise levels, including noise from Dartbrook Mine and from other major sources of industrial noise in the area such as Mt Pleasant Mine, are predicted to exceed relevant cumulative noise criteria at four residences within Kayuga Village. Cumulative noise levels at these receivers are primarily affected by Mt Pleasant Mine noise, and all are subject to acquisition by Mt Pleasant Mine. Dartbrook Mine's contribution to cumulative noise levels is therefore considered acceptable to all receivers.

Based on the findings of the noise assessment the noise levels associated with the Extension Period are able to be managed consistent with regulatory expectations.

In conclusion, the recommencement of longwall mining operations for the Extension Period is unlikely to adversely impact the reputation and image of the surrounding equine industry. The consequence of any unlikely impact is predicted to be minor and of low significance for the following reasons:

- The Extension Period will not result in a discernible alteration to the landscape which forms the backdrop within which existing equine industries operate;
- The predicted changes in existing noise and air quality conditions are minor and therefore:
  - Unlikely to be discernible to nearby equine industry operators; and
  - Unlikely to detract from the existing character and amenity of the local area upon which the reputation of the equine industry is reliant.

Access to Water

The Modification does not seek to alter any aspects of the approved longwall mining. The potential groundwater impacts of the approved longwall mining were assessed by Mackie Environmental Research (MER) (2000) using a numerical groundwater model. A review of the MER (2000) assessment was conducted by Australasian Groundwater and Environmental Consultants (AGE) to advise whether the predictions of the model are likely to remain accurate.

AGE (2020) assessed the impacts of the Extension Period and assumed that mining will recommence in the Kayuga seam and progress through the remaining approved longwall panels in the order represented in the numerical model by MER (2000) including the Mt Arthur seam panels. This reflects an assumption that the mine plan modelled by MER (2000) cannot practically be mined in five years if the Modification were to be approved.

The impact of the Modification may be different from the impacts approved under DA 231-7-2000 because the actual footprint of mining and period of active mining will be less than anticipated by the approval. AGE (2020) considers it:

- Unlikely that the impact associated with the Modification will be greater than impacts approved under DA 231-7-2000 as the mining footprint and timing is reduced by removal of the Piercefield seam.
- Highly unlikely the proposed Extension Period will allow sufficient time to mine the remaining Kayuga seam longwall panels which would further serve to reduce the impact of the Modification compared with the already approved impacts.

MER (2000) identified five private water supply bores within the predicted drawdown limit. AGE (2020) considers that the potential for impact at the identified private bores remains if the Extension Period is approved and longwall mining of the remaining Kayuga seam panels is undertaken. Since the granting of DA 231-7-2000 the NSW Government has introduced the *Aquifer Interference Policy* (AIP) (New South Wales Office of Water, 2012). Make good provisions (as directed by the AIP) will be required (in consultation with private landholders) if mining results in any reduction in the landholder's groundwater supply.

With respect to water take and licensing AQC hold 950 units from the Dart Brook Water Source (aquifer) and 1,249 units from the Hunter Regulated River Alluvial Water Source. AGE (2020) considers that the small indirect take from alluvial aquifers due to the Extension Period can be readily accounted for by water licences already held by AQC. Further, given the limited take from the alluvial aquifer, AGE (2020) considers that incidental take from streamflow will be very limited and accounted for as AQC hold 3,071.8 units from the regulated river.

With respect to the surrounding equine industry, and considering the findings of AGE (2020) AQC will not require any further water licences. As such, the Modification will not adversely impact existing and future water security for the surrounding existing equine industry and therefore the existing and future livelihood of the industry.

The existing groundwater monitoring network at Dartbrook Mine has been well maintained and should serve to assess the impact of the Extension Period should it be approved. AQC will also update the Dartbrook Site Water Management Plan to include contemporary water performance measures.

4 ASSESSMENT OF SOCIAL IMPACTS

4.1 INTRODUCTION

This section presents the findings of a desktop social impact assessment of Dartbrook Modification 7, specifically the proposed extension of operations for a further five years until 2027. The SIA responds to the IPC assessment findings in relation to the Dartbrook Modification 7 development application. The IPC contends that the social impact has not adequately assessed the extension of the project.

> *(iii) no assessment has been conducted on the social and economic impact of Mod 7 in its entirety for the further five year period until 2027, as the social impacts of the Project were assessed against the mine in care and maintenance mode, or against the mine during longwall operation*

4.2 PROJECT DESCRIPTION

The SIA has assessed the impacts of the project based on the following assumptions:

- The mine is operating pursuant to its current development consent but that the coal resource authorised for extraction will not have been completely extracted by 5 December 2022. This involves an assumption that all necessary mining equipment is in place and the existing washery is operating in accordance with its approval;
- The workforce authorised by the development consent is employed at the mine. Dartbrook Mine has approval to employ up to 292 operational personnel (employees and contractors);
- There is no construction period associated with the Modification;
- During the five year extension period, it is to be assumed that 30 Mt of ROM Coal resulting in 22.5 Mt of product coal will be produced (i.e. 6 Mt of ROM coal per year consistent with current approval); and
- Voluntary planning agreements (VPAs) will be entered into with MSC and UHSC consistent with Appendix 5 of DA 231-7-2000 (as modified by the determination of MOD7).

4.3 SOCIAL AREA OF INFLUENCE

The Social Area of Influence (SAI) of the Dartbrook Mine extends beyond the boundary of the existing Dartbrook Mine to the communities and LGAs that may experience changes to social conditions. The SAI is defined in Table 15.

Table 15
SIA Study Area Definition

SIA Study Area Components	Description
Local Area	The local area is generally defined by the ABS Census boundaries of the Kayuga, Dartbrook and Aberdeen State Suburbs.
Regional Area	The regional area is defined as the Muswellbrook and UHS LGAs. The primary communities of interest are Aberdeen, Scone and Muswellbrook

4.4 IMPACT AND OPPORTUNITIES ASSESSMENT

This section considers the potential social impacts associated with the Extension Period.

4.4.1 Scoping of Impact and Opportunities

Scoping of potential social and opportunities of the Extension Period has been undertaken to ensure the SIA focusses on material social impacts and opportunities.

Identification of Material Issues

The operations approved under DA 231-7-2000 would be unchanged for the Extension Period. There would be no change in the size of the approved operational workforce or to the approved coal production rate. There would also be no change in the area of land affected by longwall mining.

There would be no material alteration to the social impacts approved under DA 231-7-2000 and associated with the:

- Workforce i.e. regional population effects associated with the operation of the mine. This includes demand for housing and community services and facilities in neighbouring communities;
- Mine access arrangements and project traffic generation;
- Changes in visual amenity due to the operation of Dartbrook Mine; and
- Damage to or removal of items of Indigenous or non-Indigenous heritage. A range of heritage sites have previously been identified within, or proximal to the mining areas. Management of these sites will be undertaken in accordance with existing approved management measures.

A number of amenity and land use changes have occurred in the local area since granting of DA 231-7-2000 that may have a material effect on the scale and magnitude of the social impacts considered as part of DA 231-7-2000. These changes have been discussed in Section 2 and in summary are:

- The introduction of Equine CIC and BSAL mapping within the Mining Authorities Boundary;
- Significant expansion in the mining industry in the Muswellbrook LGA including the commencement of operations at Mt Pleasant Mine and at Mangoola Mine;
- Intensification of horse breeding activity in the LGAs of UHS and Muswellbrook;
- Residential growth in the nearby community of Aberdeen and further away in Muswellbrook; and
- Population growth in the rural areas proximate to Dartbrook Mine.

Based on the existing experiences of stakeholders residing proximate to the Dartbrook Mine and the changes in the local area, the primary components of the Extension Period likely to give rise to material social impacts (positive and negative) are:

- Longwall mining beneath land designated as Equine CIC;
- Ongoing AQC agricultural operations;
- Continuation of employment opportunities;
- Operation of the CHPP;
- Rail operations and the transportation of coal;
- Mine local spend (i.e. economic stimulus); and
- Community contributions.

The assessment of social impacts therefore considers the following potential adverse impacts of the Extension Period:

- Impacts on rural and residential amenity including the use and enjoyment of private property;
- Impacts on human health and wellbeing;
- Impacts to personal and property rights including.
  - Property acquisition;
  - Property values;
  - Agricultural livelihoods (including equine and dairy operations); and
  - Land capability i.e. Equine CIC.
- Impacts on nearby communities including community character and cohesion; and
- Impacts on other industry sectors e.g. the tourism and horse breeding industries.

The SIA also considers the following potential positive impacts of the Extension Period:

- Economic opportunities;
- Benefits to health and wellbeing through employment and local supply opportunities; and
- Ongoing benefits of AQC's agricultural operations.

The SIA draws on the findings of technical assessments undertaken to inform the assessment of impacts associated with the Extension Period. The potential noise and air quality impacts associated with the Extension Period are described in the Acoustics Assessment and the Air Quality Assessment which have been prepared separate to this SIA.

Affected Communities

The people likely to experience the impact of the Extension Period are the same as those currently experiencing impacts of the existing Dartbrook Mine and neighbouring mine operations e.g. the Mt Pleasant Operation. Table 16 presents a summary of the different social groups likely to be affected by the Extension Period.

Table 16
Stakeholder Groups likely to be Affected by an extension to Mine Life

Stakeholder	Operational Components						
	Underground Mining	AQC Agricultural operations	Mine Workforce	CHPP Operation	Rail/Coal Transport	Community Contributions	Mine Local Spend
AQC Leaseholders	✓	✓					
Private landowners within the mine site	✓	✓		✓	✓		
Near neighbours	✓			✓	✓	✓	
Aboriginal stakeholders	✓		✓				
Nearby towns and villages:							
Aberdeen Village	✓		✓	✓	✓		
Scone			✓				
Muswellbrook			✓	✓	✓		
Singleton			✓		✓		
UHS Council	✓		✓	✓	✓	✓	✓
Muswellbrook Shire Council	✓		✓	✓	✓	✓	✓
Community service providers			✓	✓	✓	✓	✓
Surrounding Industry:							
Thoroughbred Breeding	✓			✓			
Agricultural	✓	✓		✓			
Tourism	✓	✓		✓			
AQC workforce and families		✓	✓				✓
AQC suppliers	✓	✓	✓	✓	✓		✓

4.4.2 Impact Assessment Outcomes

This section presents the potential impacts and opportunities of the Extension Period and assesses the significance of the identified impacts and opportunities. Assessment of impact significance has been undertaken generally in accordance with the NSW SIA Guideline (DP&E, 2017). Table 17 and Table 18 describe the measures for impact probability and consequence respectively.

Table 17
Probability of Occurrence

Rating	Description
Almost Certain	Very likely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly.
Likely	Likely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly.
Possible	Possible to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly.
Unlikely	Unlikely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly.
Rare	Very unlikely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly.

Source: DP&E (2017)

Table 18
Consequence of the Potential Social Impact

Rating	Description
Minimal	• Local, small-scale, easily reversible change on social characteristics or values of the communities of interest.
Minor	• Isolated issues or complaints that can be resolved via routine site procedures • Short-term recoverable changes to social characteristics and values of the communities of interest. • Minor social harm.
Moderate	• Medium-term recoverable changes to social characteristics and values of the communities of interest.
Major	• Repeated incidents or community complaints that require significant adjustment to overall site level and business level procedures. • Long-term recoverable changes to social characteristics and values of the communities of interest.
Catastrophic	• Significant, widespread, and enduring community issue or dissent. • Irreversible changes to social characteristics and values of the communities of interest.

Source: DP&E (2017)

Table 19 presents the risk ranking matrix that has been used to determine the significance of potential social impacts.

Table 19
Risk Ranking Matrix

			Consequence Level				
			1	2	3	4	5
			Minimal	Minor	Moderate	Major	Catastrophic
Likelihood Level	A	Almost Certain	A1	A2	A3	A4	A5
	B	Likely	B1	B2	B3	B4	B5
	C	Possible	C1	C2	C3	C4	C5
	D	Unlikely	D1	D2	D3	D4	D5
	E	Rare	E1	E2	E3	E4	E5
Social Risk Rating							
	Low		Moderate		High		Significant

Source: DP&E (2017)

Table 20 presents the assessment of social impacts and opportunities.

Table 20
Impact and Opportunities Assessment

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
Impact Area – Way of Life - Employment and Business Opportunities					
Continuation of employment opportunities (maximum of 192 direct and 100 contract) for an additional five years. Support for the financial security and wellbeing of project employees and their families.	Project employees, contractors and family members Job seekers interested in mining industry employment	A2 (Positive)	AQC would implement employment and contracting strategies for the project that support the participation of workers from within the UHS and Muswellbrook LGAs.	A3 (Positive)	Provision of employment for up to 292 people for an additional five years is a significant benefit to household wellbeing, particularly given the current unemployment rate in the UHS and Muswellbrook LGAs and the cumulative impacts of both drought and COVID 19. The project would also support the continuation of indirect employment opportunities through its supply arrangements and through its contribution to the continuation of the Garoka Dairy operation.
Impact Area - Community – Character, Identity and Sense of Place					
The potential of the Extension Period to adversely impact the character and identity of the local area.	Near neighbours including Aberdeen Community Visitors UHS Residents	C2	AQC proposes additional controls at the East Site to minimise potential noise and dust emissions during operations. These additional controls will also minimise impacts of the Extension Period on the rural character and identity of the immediate locality. The project is an underground mining operation. Any impacts to valued Equine CIC land will be remediated. AQC will continue to support the ongoing operation of the Garoka Dairy, which strongly benefits the character and identity of the local area.	D2	The continuation of operations at Dartbrook Mine is consistent with the long standing identity of Muswellbrook LGA as a mining community. As an existing and underground mine the continuation of operations at Dartbrook Mine will not detract from the rural character of the immediate area. The Extension Period will not require any material changes to existing and long standing surface infrastructure on the project site that may affect the existing visual amenity and character of the local area.

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
					The extension period will not result in the displacement of any existing equine operations or adversely impact the operations of equine facilities proximate to the site. The area of Equine CIC present on the site and temporarily impacted by the project represents a negligible amount of the total Equine CIC in the Hunter Region.
The potential for subsidence impacts to detract from the rural character of the local area.	Near neighbours including Aberdeen Community Visitors UHS Residents	D2	Preparation of Extraction Plans for underground mining.	E1	Surface deformations and will be managed in accordance with the Extraction Plan that will be prepared in accordance with DA 231-7-2000. The impact of mine subsidence on land use has a much reduced effect compared to direct disturbance of the land. The area of land potentially affected by subsidence will be less than that approved in DA 231-7-2000 due to the smaller mining footprint resulting from the Extension Period.
Potential impacts on local heritage connections (Indigenous and Non-Indigenous).	Indigenous and Non-Indigenous people with connection to the land		Review and update the existing Dartbrook Mine Aboriginal Cultural Heritage Management Plan (ACHMP).		The project site does not include any items listed on the State Heritage Register or known historic archaeology. There is an approved ACHMP for the site. The project does not involve the destruction or disturbance of items or areas of Indigenous and Non-Indigenous heritage beyond that already approved under DA 231-7-2000.
Impact Area - Community – Sense of Community					

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
Existing residents who experience dissatisfaction with changes in amenity conditions may seek to relocate away from the area.	Near neighbours and resident of Aberdeen	C2	Implementation of additional controls at the East Site will reduce potential noise and air emissions minimising any change in the existing cumulative environment. No additional property acquisitions beyond those already approved under DA 231-7-2000.	D2	The Extension Period will not result in the direct displacement of any existing residents. It is also unlikely that the Extension Period on its own (given the minor scale of potential change) would influence any decision by existing residents to move from the area. The surrounding existing open cut mining operations are likely to have a greater influence on any resident's decision to move out of the local area due to dissatisfaction with surrounding environment.
Impact Area - Access to Services and Infrastructure – Local and Regional Infrastructure					
The potential of the Extension Period to adversely impact access to services and infrastructure including housing is low. The Extension Period would see a continuation of workforce related impacts as currently approved under DA 231-7-2000.	Workforce Service providers Communities of UHS and Muswellbrook LGAs	D1	AQC will continue to make financial contributions to the UHSC and MSC in accordance with Voluntary Planning Agreements to be entered into with these councils.	D1	Funding from the VPAs will compensate for demands on the social infrastructure network (although these impacts are predicted to be negligible) due to the Extension Period.
Impact Area - Health and Wellbeing - Health					

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
Access to continued employment will support the health of project personnel and their families by enabling income security and maintaining social connections. The wellbeing of business owners who supply the project will also be supported.	Project employees, contractors and family members Suppliers and their families	A3 (Positive)	Positive impacts. No further mitigation required.	A3 (Positive)	NA
The Extension Period has the potential to exacerbate landowner fears in relation to water security. Whilst agricultural operations in the vicinity of the Mining Authorities Boundary have experienced little change since the granting of DA 231-7-2000, the significant drought experienced in recent years has exacerbated landowner fears in relation to water security.	Nearby agricultural operations	C3	AQC holds sufficient Water Access Licences (WALs) to account for all water that may be taken for mine operations and for the continued operation of existing AQC owned agricultural activities e.g. the Garoka Dairy. The majority of water made available through the WALs held by AQC provides for the operation of the Garoka Dairy and not mining activity. The continued operation of the Garoka Dairy is of significant benefit to the surrounding agricultural industry and UHS economy.	C2	The Extension Period will not impact water security for existing agricultural operations. No changes are proposed to operations that may necessitate a requirement for additional water allocation beyond that approved under DA 231-7-2000. The predicted impacts of the Extension Period on nearby agricultural operations with respect to surface water and groundwater impacts are not materially different to those impacts which have already been addressed through DA 231-7-2000 as modified. Water Sharing Plans enacted under the NSW *Water Management Act 2000* impose limits on the total share components that can be issued for different types of licences. These limits ensure that sufficient water is reserved for different purposes, including stock and domestic purposes. This ensures that the

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
					availability of water for third parties will not be adversely affected.
Impact Area - Health and Wellbeing – Community Investment					
The Extension Period will ensure finance is available to support projects and infrastructure investment.	MSC and UHSC Residents of Muswellbrook and UHS LGAs	C3 (Positive)	AQC would continue to make development contributions consistent with DA 231-7-2000.	A3 (Positive)	AQCs commitment to community enhancement in the Dartbrook Mine SAI would be maintained for the Extension Period and would continue to facilitate community benefits at local and regional levels.
Impact Area - Personal and Property Rights – Rail and CHPP noise					
The Extension Period will prolong the air quality and noise impacts associated with operation of Dartbrook Mine as approved under DA 231-7-2000. Noise and dust emissions associated with the operation of the CHPP, rail and coal load-out facility would add to the existing cumulative environment and may be experienced as a minor change in amenity for rural residences	Rural residences proximate to the East Site	A2	AQC will update its Air Quality and Noise Management Plans in consultation with the relevant regulatory authorities. AQC proposes the following additional controls at the East Site: Noise mitigation measures: • Upgrading conveyors with additional shielding and low noise idlers; • Refurbishment of coal reclaimers with lower noise components; • Construction of a noise barrier north of the CHPP and additional cladding of the washery building; and • Avoiding reject emplacement near the southern limit of the Rejects Emplacement	B2	The Extension Period does not involve any material alterations to the infrastructure at the East Site, however various refurbishments are proposed to facilitate best practice air quality and noise management. The Extension Period is not expected to result in any exceedances of the acquisition criteria under the VLAMP for changes in either noise or air quality. The outcomes of the Noise Assessment show minor noise exceedances (less than 2 dB at three private residences (303, 391, 422) south of the Mining Authorities Boundary. One residence is already entitled to acquisition upon request from the neighbouring Mt Pleasant Mine.

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
proximate to the East Site.			Area (REA) at night time and/or unfavourable weather conditions. Dust mitigation measures: • Sealing of the haul route for trucks carrying rejects; • Minimise the exposed area of the REA through progressive rehabilitation; and • Establishing dust fences adjacent to exposed areas of the REA.		Dartbrook Mine is an underground operation. The impacts will be short-term in nature as AQC is seeking only a five-year extension to DA 231-7-2000.
The Extension Period will prolong the air quality and noise impacts associated with operation of Dartbrook Mine as approved under DA 231-7-2000. Noise and dust emissions associated with the operation of the CHPP, rail and coal load-out facility would add to the existing cumulative environment and may be experienced as a minor change in amenity for residences in nearby communities.	Aberdeen township	B2	AQC will update its Air Quality and Noise Management Plans in consultation with the relevant regulatory authorities. AQC proposes the following additional controls at the East Site: Noise mitigation measures: • Upgrading conveyors with additional shielding and low noise idlers; • Refurbishment of coal reclaimers with lower noise components; • Construction of a noise barrier north of the CHPP and additional cladding of the washery building; and • Avoiding reject emplacement near the southern limit of the Rejects Emplacement Area (REA) at night time and/or unfavourable weather conditions. Dust mitigation measures: • Sealing of the haul route for trucks carrying rejects;	B1	The Extension Period does not involve any material alterations to the infrastructure at the East Site, however various refurbishments are proposed to facilitate best practice air quality and noise management. The Extension Period is not expected to result in any exceedances of the acquisition criteria under the VLAMP for changes in either noise or air quality. The outcomes of the Noise Assessment show minor noise exceedances (less than 2 dB at three private residences (303, 391, 422) south of the Mining Authorities Boundary. One residence is already entitled to acquisition upon request from the neighbouring Mt Pleasant Mine. Dartbrook Mine is an underground operation. The impacts will be short-term in nature as AQC is seeking only a five-year extension to DA 231-7-2000.

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
			• Minimise the exposed area of the REA through progressive rehabilitation; and • Establishing dust fences adjacent to exposed areas of the REA.		
Impact Area - Personal and Property Rights – Land Capability (Equine CIC)					
Impacts on the potential future use of land mapped as Equine CIC due to project activities e.g. subsidence.	Land owner Equine industry	C2	Bord and pillar mining is proposed beneath areas of Equine CIC. AQC, in consultation with the landholder, will prepare a PSMP for each private landholding. The Extraction Plan will include a subsidence monitoring program, as well as a contingency plan to manage any greater than expected subsidence effects (if they occur).	D1	The Equine CIC land has no recent history of equine use. Subsidence impacts will be localised and able to be remediated. As such, subsidence will not result in the displacement of any existing Equine CIC activity. The area of Equine CIC land potentially affected is small in the context of the Upper Hunter Equine CIC. The predicted impacts to Equine CIC within the Mining Authorities Boundary will not impact the sustainability and growth of the existing surrounding equine industry. Subsidence will not affect the characteristics of the land that informed its designation as Equine CIC land.
Impact Area - Personal and Property Rights – Agricultural Livelihood (Water Security)					
Potential impacts on the livelihood of nearby Agricultural enterprises (equine, viticulture, agriculture) due to changes in water security.	Nearby Agricultural operators	D3	AQC holds sufficient WALs to account for all water that may be taken for mine operations and for the continued operation of existing AQC owned agricultural activities e.g. the Garoka Dairy.	D2	The Extension Period will not impact water security for existing agricultural operations. No changes are proposed to operations that may necessitate a requirement for additional water allocation beyond that approved under DA 231-7-2000. The predicted impacts of the Extension Period on nearby agricultural operations with respect to surface water and groundwater impacts are not materially

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
					different to those impacts which have already been addressed through DA 231-7-2000 as modified. Water Sharing Plans enacted under the NSW *Water Management Act 2000* impose limits on the total share components that can be issued for different types of licences. These limits ensure that sufficient water is reserved for different purposes, including stock and domestic purposes. This ensures that the availability of water for third parties will not be adversely affected.
Impact Area - Personal and Property Rights – Agricultural Livelihood					
The Extension Period will support the continued operation of the Garoka Dairy on land leased from AQC. The Garoka Dairy is valued for its economic contribution to the agricultural industry and its contribution to the character and identity of the surrounding landscape.	Garoka Dairy leaseholders Agricultural industry Visitors	A4 (Positive)	AQC has made a commitment to maintain the agricultural productivity of its land holdings including the operation of the Garoka Dairy.	A4 (Positive)	The Garoka Dairy commenced operation on mine owned land approximately 19 years ago. Since acquiring Dartbrook Mine, AQC has made significant financial investments in the Garoka Dairy, thereby paving the way for the use of additional new technology into the future.
Impact Area - Personal and Property Rights – Property Values					

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
The Extension Period may exacerbate existing resident fears in relation to property values. This can be attributed in part to the cumulative growth in the mining industry in the Hunter Valley, growth in rural residential population and residential growth in Aberdeen.	Nearby private landowners Aberdeen residents	C3	Implementation of additional noise and dust controls at the East Site will minimise potential noise and dust emissions during operations.	C2	Dartbrook Mine is an existing mine. Neighbouring property values will have already adjusted to the presence of the mine and the presence of other more recent mining operations e.g. Mt Pleasant Mine. The Extension Period is unlikely to give rise to any significant changes in the approved noise and dust emissions that may have a material effect on property values.
Impact Area - Way of life – Industry Sector Operations - Agriculture					
The Extension Period has some potential to result in reduced land capability, displacement of existing agricultural land uses and indirect impacts on the economy of the agricultural industry in the UHS and Muswellbrook LGA. Since the granting of DA 231-7-2000, BSAL and Equine CIC have been mapped within the Mining Authorities Boundary.	Existing agricultural operations within the Mining Authorities Boundary Broader Agricultural industry sector in the UHS and Muswellbrook LGAs	C2	No longwall mining is proposed in areas of BSAL. Bord and Pillar mining is proposed beneath Equine CIC areas which will significantly reduce the effects of subsidence. Only a small area of Equine CIC will be impacted by subsidence. Any subsidence impacts within the Equine CIC area will be localised and able to be remediated. No equine activities will be displaced by the Extension Period. A PSMP will be prepared for each private landholding.	D1	The predicted impacts of subsidence on agricultural land are not materially different to the impacts approved under DA 231-7-2000. Land within the longwall mining area is predominantly used for grazing.

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
The potential of the Extension Period to directly or indirectly impact the existing equine industry in the UHS and Muswellbrook LGAs due to cumulative noise and dust emissions.	Equine Industry enterprise operators, employees and customers	C2	Implementation of additional noise and dust controls at the East Site will minimise potential noise and dust emissions during operations.	D2	The predicted noise and air quality impacts of the Extension Period are not significantly different to the impacts approved under DA 231-7-2000. The predicted impacts of the Extension Period on nearby agricultural operations with respect to surface water and groundwater impacts are not materially different to those impacts which have already been addressed through DA 231-7-2000 as modified. The Extension Period will not result in any displacement of existing equine activities and will therefore have negligible impact on the operation of the broader equine industry in the Upper Hunter.
The potential for the Extension Period to detract from the attractiveness of the local area as a tourist destination.	Visitors to the local area Business operators including accommodation providers	D2	Implementation of additional noise and dust controls at the East Site will minimise potential noise and dust emissions during operations.	D1	Dartbrook Mine is an existing underground mining operation. Some changes have occurred in the tourism sector of the Hunter Valley since the granting of DA 231-7-2000. The Extension Period does not involve any changes to surface infrastructure that would have a material impact on the attractiveness of the local area. The Extension Period will not result in any additional material changes in the surroundings that may further detract from the attractiveness of the location as a tourist destination.
Impact Area - Cumulative Impacts – Health and Wellbeing					

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
Residents who are already affected by cumulative noise and dust issues in the local area have experienced stress. Expansion in the Hunter Region mining industry (particularly an increase in open cut operations) has resulted in elevated concerns amongst residents in relation to health and wellbeing. These concerns are expected to continue and be exacerbated by the Extension Period.	Near neighbours Aberdeen Community Residents of the broader UHS and Muswellbrook LGAs	A3	AQC proposes additional controls at the East Site to minimise potential noise and dust emissions during operations. AQC would provide regular updates to affected residents and ongoing engagement with residents, if required. AQC would proactively manage mining operations during unfavourable weather conditions.	B1	Dartbrook Mine is an underground operation. Noise and dust emissions from the operation are largely associated with the East Site where the main surface infrastructure is located. The dust model predicts that the Extension Period will comply with all annual air quality criteria, under both an incremental and cumulative basis. The contribution of the Extension Period to the cumulative noise and air environment in the local and regional area is minimal in the context of surrounding open cut operations.
Impact Area - Cumulative Impacts – Equine Industry Operations					
Equine industry operators hold existing concerns regarding the cumulative impacts of mining in the Upper Hunter on the health and wellbeing of valued equine stock.	Existing equine industry operators in the Upper Hunter	D3	AQC proposes additional controls at the East Site to minimise potential noise and dust emissions during operations.	D2	Dartbrook Mine is an underground operation. Noise and dust emissions from the operation are largely associated with the East Site where the main surface infrastructure is located. The dust model predicts that the Extension Period will comply with all annual air quality criteria, under both an incremental and cumulative basis. The contribution of the Extension Period to the cumulative noise and air environment in

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
					the local and regional area is minimal in the context of surrounding open cut operations.
Equine industry operators hold existing concerns regarding the cumulative impacts of mining in the Upper Hunter on the reputation and image of the Thoroughbred Breeding industry. There is concern that the Extension Period may have a cumulative adverse impact on the attractiveness of the Upper Hunter Thoroughbred Breeding industry.	Existing equine industry operators in the Upper Hunter	D2	AQC proposes additional controls at the East Site to minimise potential noise and dust emissions during operations.	D1	Dartbrook Mine is an underground operation. Noise and dust emissions from the operation are largely associated with the East Site where the main surface infrastructure is located. The Extension Period will result in no significant changes to the surrounding landscape that may detract from the visual character of the locality and adversely impact the locations attractiveness as a horse breeding location.
Impact Area - Cumulative Impacts – Character					
The potential cumulative impact of the Extension Period on the attractiveness of local area as a tourist destination.	Business operators and Visitors	D2	AQC proposes additional controls at the East Site to minimise potential noise and dust emissions during operations. AQC would provide regular updates to affected residents and ongoing engagement with residents, if required.	D1	Dartbrook Mine is an underground operation. The Extension Period will result in no significant changes to the surrounding landscape that may detract from the visual character of the locality and adversely impact the locations attractiveness as a tourist destination. The contribution of the Extension Period to the cumulative noise and air environment in

Potential Social Impact / Benefit Considered	Affected Stakeholders	Unmitigated Risk	Mitigation Measures	Residual Risk	Rationale for Residual Risk Ranking
			AQC would proactively manage mining operations during unfavourable weather conditions.		the local and regional area is minimal in the context of surrounding open cut operations. The Extension Period will not place additional demands on short-term accommodation that may in term reduce the attractiveness of the location as a tourist destination.

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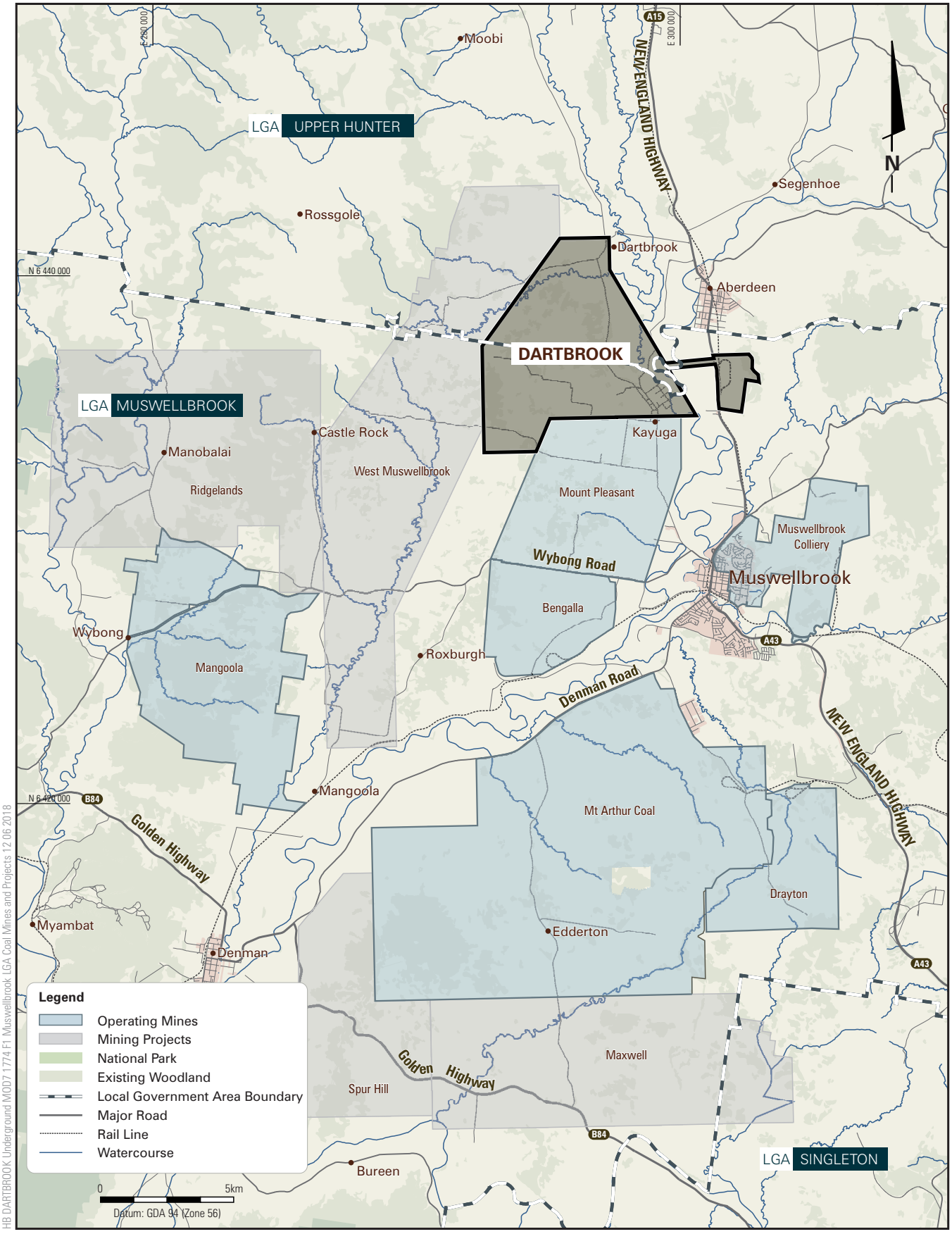
for
HANSEN BAILEY

Bronwyn Pressland
Principal Social Planner

James Bailey
Director

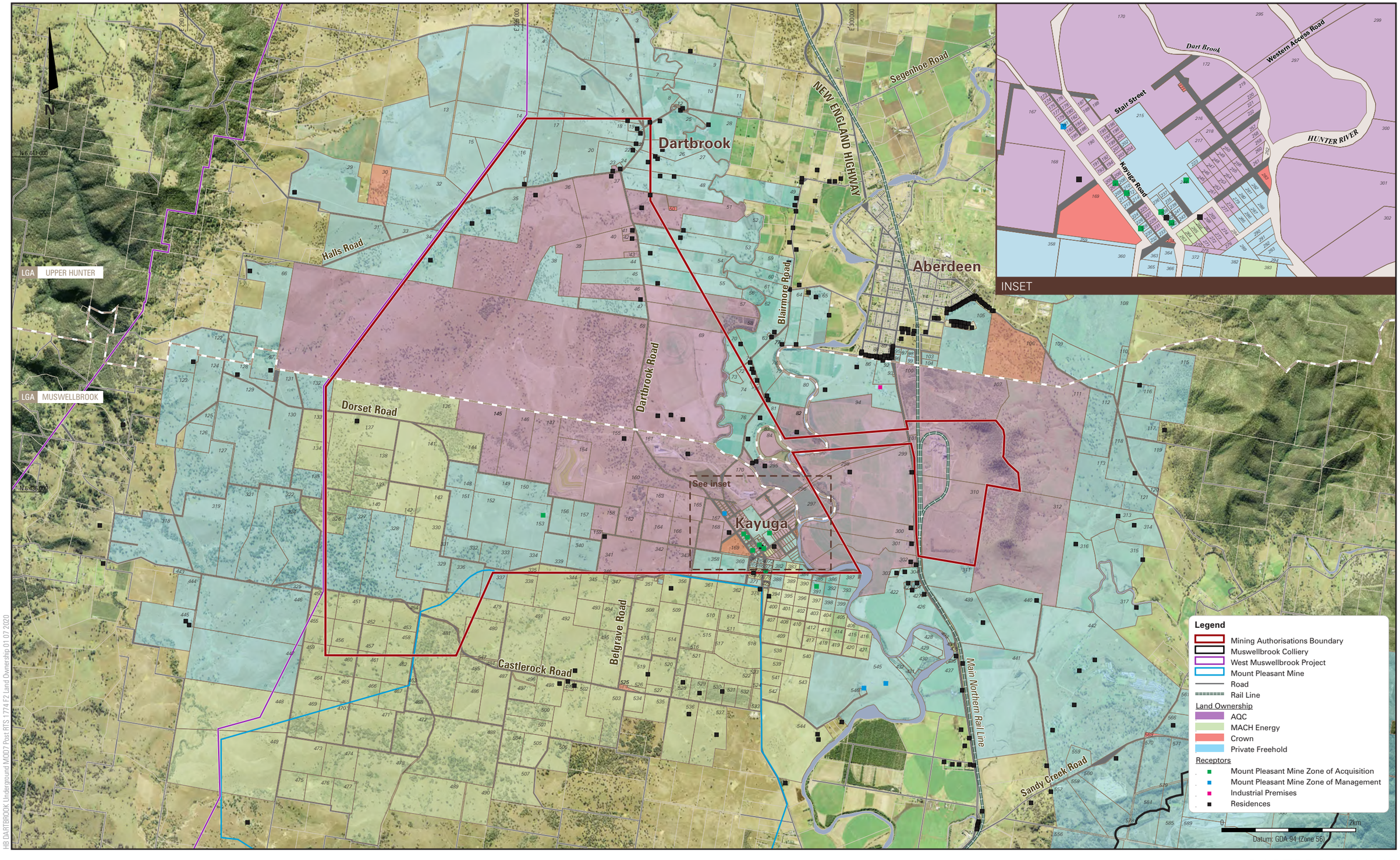
FIGURES



DARTBROOK MINE

Regional Locality

FIGURE 1



HB DARTBROOK Underground MOD7 Post RTS 1774 F2 Land Ownership 01 07 2020

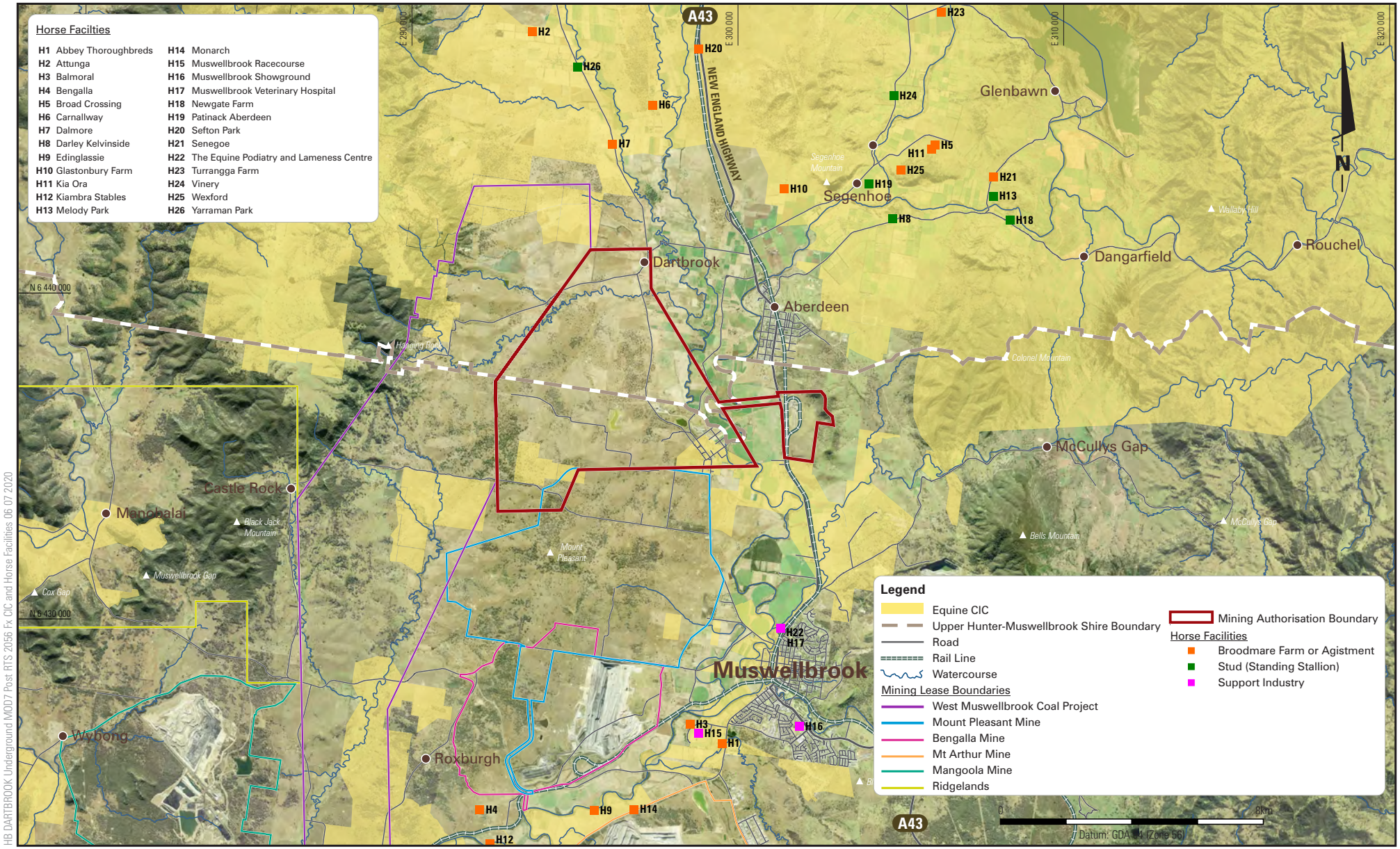
Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Australian Pacific Coal

DARTBROOK MINE

Land Ownership

FIGURE 2



HB DARTBROOK Underground MOD7 Post RTS 2056 Fx CIC and Horse Facilities 06 07 2020

DARTBROOK MINE

Equine CIC and Horse Facilities

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Australian Pacific Coal

FIGURE 3

APPENDIX F
Economic Impact Assessment

Dartbrook
Modification 7
Economic Impact Assessment

Prepared for

AQC Dartbrook Management Pty Limited

By

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July 2020

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EXECUTIVE SUMMARY

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of NSW. The Dartbrook Mine is the subject of Development Consent DA 231-7-2000 and its subsequent modifications.

A proposal for a further modification to the Consent to enable an alternative method of underground mining (bord and pillar mining) at a rate of up to 1 Mtpa, an alternative coal clearance system (truck haulage of the ROM coal) and a five-year extension to the approval duration, was approved by the Independent Planning Commission (IPC), except for the five-year extension to the approval period. The IPC's determination is currently the subject of Class 1 proceedings in the Land and Environment Court (LEC).

The IPC's refusal of the time extension component of the Modification is largely on the grounds that the potential impacts of the approved longwall mining during the additional five-years had not been assessed. Consequently, Gillespie Economics was engaged to act as an independent expert to undertake an Economic Impact Assessment of the Modification.

From an economic perspective there are two important aspects of the Modification that can be considered:

- its economic efficiency (i.e. consideration of the economic costs and benefits of the Modification) which is evaluated using cost benefit analysis (CBA); and
- its effects on the local economy, which is evaluated using local effects analysis (LEA) and input-output (IO)analysis.

A CBA of the Modification indicated that it would have net production benefits to Australia of $500M (relative to the economic base case) and $509M (relative to the legal base case). Net production benefits to NSW are estimated at $247M (relative to the economic base case) and $229M (relative to the legal base case).

Provided the residual environmental, social and cultural impacts of the Modification that accrue to Australia and NSW are considered to be valued at less than the level of net production benefits, the Modification can be considered to provide an improvement in economic efficiency and hence is justified on economic grounds.

Instead of leaving the environmental, cultural and social impacts unquantified, an exercise was undertaken to quantify them. Most impacts were considered to be immaterial from an aggregate economic efficiency perspective. The main quantifiable environmental impacts of the Modification, which have not already been incorporated into the estimate of net production benefits, relate to the opportunity cost of water access licences (WALs) and the impacts of greenhouse gas (GHG) emissions. The opportunity cost of WALs are estimated at $7M. GHG impacts to Australia and NSW are estimated at $0.1M and $0.03M, respectively, relative to the economic base case, and $0.07M and $0.02M, respectively, relative to the legal base case. These economic costs are considerable less than the estimated net production benefits of the Modification.

Overall, the Modification is estimated to have net social benefits to both Australia and NSW relative to both the economic base case and legal base case, and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Modification CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $240M (relative to the economic base case) and $222M (relative to the economic base case) for the Modification to be questionable from an NSW economic efficiency perspective.

The local economy comprises Singleton, Muswellbrook and Upper Hunter Shire Local Government Areas. The Modification will provide direct economic activity, including jobs, to the local economy, and indirect economic activity to the local area via both wage and non-wage expenditure. A summary of local economic effects of the Modification is provided in Table ES1.

Table ES1 - Summary of Effects on the Local Community (Excluding AQC)

Local Effects	**Direct Total**	**Direct Already Resident in the Local Area**	**Net**
Employment FTE	196	156	58
Income ($M)	23	19	5
Non-labour expenditure in the Local Area	96		
Regional Impacts	**Direct**	**Flow-on**	**Total**
Output ($M)	424	153	577
Value-added ($M)	199	78	276
Income ($M)	19	30	49
Employment	196	424	620
Other Local Economic Impacts			
Contraction in other sectors	No material impact*		
Displaced activities	No material impact*		
Wage rise impacts	No material impact*		
Housing impacts	No material impact*		
Local Environmental Impacts			
Greenhouse gas emissions	$0.0002M		
Operational noise	Modelled 1 dBA exceedance of criteria at three residences during the night only – exceedences of 0-2dBA are not discernible		
Air quality	Modelled cumulative 24-hour PM10 criteria exceeded one day per year at 7 private residences – can be avoided by modifying mining operations when weather conditions are unfavourable		
Subsidence	Any subsidence damage caused by active mining compensated by AQC		

1 INTRODUCTION

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of New South Wales. The Dartbrook Mine is the subject of Development Consent DA 231-7-2000 and its subsequent modifications. These enable production of 6 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal production until December 2022, using longwall mining methods.

In February 2018, AQC sought a further modification to the Consent to enable an alternative method of underground mining (bord and pillar mining), an alternative coal clearance system (truck haulage of the ROM coal) and a five-year extension to the approval duration.

This was approved by the Independent Planning Commission (IPC), except for the five-year extension to the approval period. The IPC's determination is currently the subject of Class 1 proceedings in the Land and Environment Court (LEC).

Under current approvals, underground mining of up to 6 Mtpa of ROM coal mining until December 2022 is approved. However, the Mine is in care and maintenance, and with the approval time limited to 2022 it is not economic to commence any mining.

The IPC's refusal of the time extension component of the Modification is largely on the grounds that the potential impacts of the approved longwall mining during the additional five-years had not been assessed. Consequently, Gillespie Economics was engaged to act as an independent expert to undertake an Economic Assessment of a revised Modification that comprises:

- extraction of up to 37.4 Mt of ROM coal using bord and pillar and/or longwall mining methods between 2021 and 2027 (inclusive). All mining will occur within the currently approved mining footprint and maximum production rate of 6 Mtpa.
- during the five-year extension period an assumed 30 Mt of ROM coal resulting in 22.5 Mt of product coal being produced.
- delivery of ROM coal from the mine workings to the East Site using the Hunter Tunnel i.e. truck haulage is no longer proposed.
- use of the existing Coal Handling and Preparation Plant (CHPP) at the East Site to wash all ROM coal extracted.
- no new surface infrastructure.
- an operational workforce of up to 292 personnel.

Consistent with the NSW Government (2015) *Guideline for the economic assessment of mining and coal seam gas proposals*, two types of economic assessment of the Modification are required:

- a cost benefit analysis (CBA) which is the primary way that economists evaluate the net benefits of projects and policies, provide economic justification for a project and address the public interest;

- a local effects analysis (LEA) to assess the impacts of the Modification in the locality, specifically:

    - effects relating to local employment;
    - effects relating to non-labour project expenditure; and
    - environmental and social impacts on the local community.

Economic analysis tools such as CBA and LEA are not mechanised decision-making tools, but rather a means of analysis that provides useful information for decision-makers to consider alongside the performance of a project in meeting other government goals and objectives.

2 COST BENEFIT ANALYSIS

2.1 Introduction

CBA of the Modification involves the following key steps:

- identification of the "with" and "without" Modification scenarios;
- identification and valuation of the incremental benefits and costs;
- consolidation of value estimates using discounting to account for temporal differences;
- application of decision criteria;
- sensitivity testing;
- consideration of non-quantified benefits and costs; and
- consideration of the distribution of costs and benefits.

What follows is a CBA of the Modification based on the production schedule proposed by AQC, and financial, technical and environmental advice provided by AQC and its specialist consultants. An explanation of CBA is provided in Attachment 1.

2.2 Identification of the "Without" Modification Scenarios

A starting point for CBA is to establish the "without" Modification scenario for the land impacted by the Modification. This becomes the base case against which to assess the potential economic, social and environmental impacts of changes due to the Modification.

Two base cases can be identified:

- The economic base case - the continued care and maintenance of the Dartbrook Mine with decommissioning at the end of current approvals in December 2022. The existing approval allows mining of up to 6 Mtpa of ROM coal mining until December 2022. However, the Mine is in care and maintenance, and with the approval time limited to 2022, it is not economic to commence any mining.

- The legal base case – approved mining of 6 Mtpa, with decommissioning at the end of current approvals in December 2022. While it is not economic to commence any mining, the proponent has an approval that allows it to mine at 6 Mtpa. Essentially, under this base case, it is assumed that mining is occurring in accordance with the existing approval. Under this assumption, capital costs required to commence mining under the existing approval i.e. noise attenuation, mining equipment, upgrade of coal washing plant etc. would already have been spent.

2.3 Identification of the "With" Modification Scenario

"With" the proposed Modification, mining of 6 Mtpa of ROM, with up to 1.5 Mtpa sourced from bord and pillar mining, would be permitted until December 2027, with all mining occur within the currently approved mining footprint.

Table 2.1 provides the ROM production schedules for the two base cases, the "with" Modification scenario, and the incremental production schedules.

Table 2.1 – Run-of-Mine Production Schedules (Mtpa)

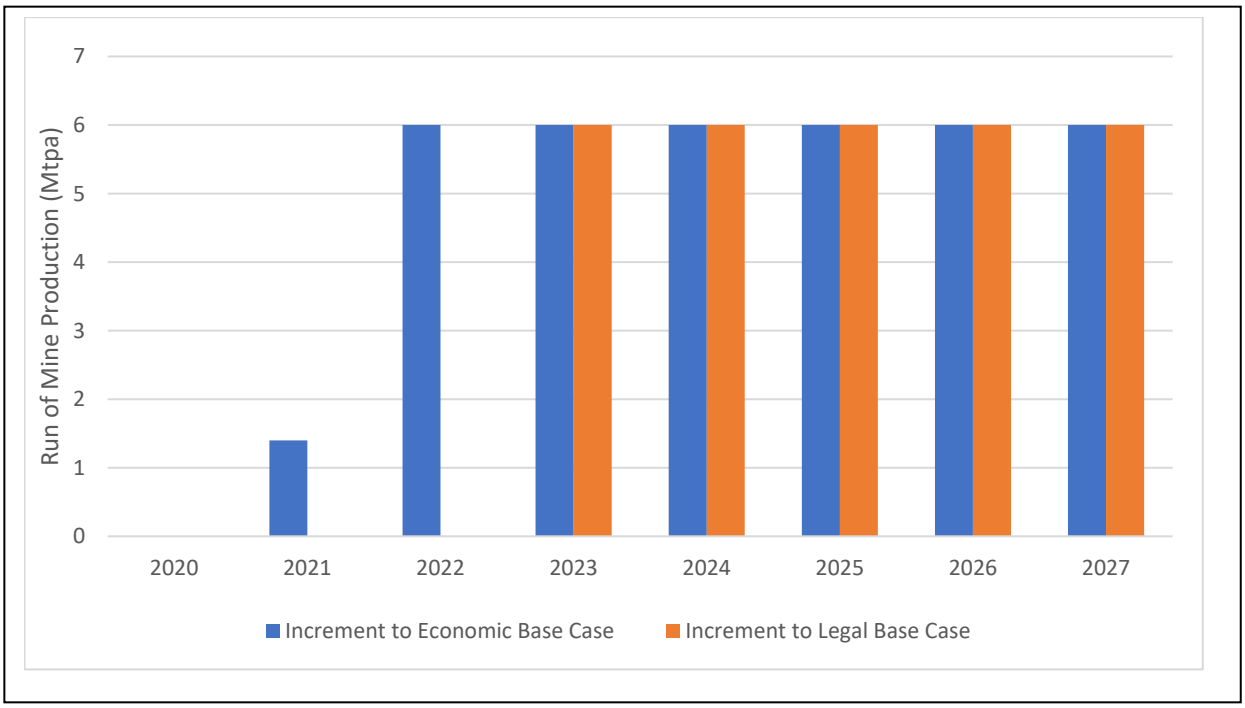
	2020	2021	2022	2023	2024	2025	2026	2027	Total
Economic Base Case	0	0	0						**0**
Legal Base Case	0	6	6						**12**
With Modification Scenario	0	1.4	6	6	6	6	6	6	**37.4**
Increment to Economic Base Case	0	1.4	6	6	6	6	6	6	**37.4**
Increment to Legal Base Case	0	0	0	6	6	6	6	6	**30**

Compared to the economic base case, the "with" Modification scenario would permit incremental mining of up to 37.4 Mt of ROM coal using bord and pillar and/or longwall mining methods between 2021 and 2027 (inclusive). This is because approval of an extended mine life allows for mining to ramp up from care and maintenance to 6 Mtpa during the time-period of the existing approval and then continuation of this level of production during the extended mine life.

Compared to the legal base case, the five-year extension period would enable mining of 30 Mt of ROM coal. This is because the legal base case assumes mining is already at the approved level of 6 Mtpa of ROM.

Figure 2.1 illustrates the incremental production of the Modification relative to the two base cases.

Figure 2.1 – Incremental Production from the Modification Relative to Different "Without" Modification Scenarios



2.4 Identification of Benefits and Costs

Relative to the base cases, or "without" Modification scenarios, the Modification may have the potential incremental economic benefit and cost categories shown in Table 2.2.

It should be noted that the potential externality costs, listed in Table 2.2, are only economic costs to the extent that they affect individual and community wellbeing through direct use of resources by individuals or non-use. If the potential impacts are mitigated to the extent where community wellbeing is insignificantly affected, then no external economic costs arise.

Table 2.2 - Potential Incremental Economic Benefits and Costs of the Modification

Category	Costs	Benefits
Production	• Opportunity cost of land • Opportunity cost of capital • Development costs • Operating costs, including administration, mining, ore processing, transportation, mitigation measures and offsets (but excluding royalties) • Decommissioning costs at cessation of the Modification	• Avoided care and maintenance costs • Avoided decommissioning and rehabilitation costs in 2022 • Sale value of coal • Residual value of capital and land at the cessation of the Modification
Externalities	• Greenhouse gas generation • Operational noise impacts • Road transport impacts • Air quality impacts • Groundwater impacts • Surface water impacts • Subsidence impacts • Biodiversity impacts • Aboriginal heritage impacts • Historic heritage impacts • Visual impacts • Agriculture impacts • Net public infrastructure costs • Loss of surplus to other industries	• Wage benefits to employment • Economic benefits to existing landholders • Economic benefits to suppliers

Framed in another but equivalent way the potential incremental costs and benefits of the Modification are as per Table 2.3.

Table 2.3 - Alternative Frame of Potential Economic Benefits and Costs of the Modification

Costs	Benefits
Direct costs	***Direct benefits***
Nil	Net production benefits • *Royalties* • *Company tax* • *Net producer surplus*
Indirect costs	***Indirect benefits***
Net environmental, social, cultural and transport related costs	Wage benefits to employment
Net public infrastructure costs	Economic benefits to existing landholders
Loss of surplus to other industries	Economic benefits to suppliers

The magnitude of costs and benefits varies depending on whether the Modification is compared to the economic base case or the legal base case.

2.5 Quantification/Valuation of Benefits and Costs

Consistent with NSW Government (2015), the CBA was undertaken in 2020 real values, with discounting at 7 percent (%) and sensitivity testing at 4% and 10%.

The analysis period is eight years, coinciding with the proposed life of the Modification. Any impacts that occur after this period are included in the final year of the analysis as a terminal value.

Where competitive market prices are available, they have generally been used as an indicator of economic values. Environmental, cultural and social impacts have initially been left unquantified and interpreted using the threshold value method.[1]

An attempt has also been made to estimate environmental, cultural and social impacts using market data and benefit transfer[2] and incorporate them into an estimate of the net social benefit of the Modification. This estimated net social benefit of the Modification provides another threshold value that any residual or non-quantified economic costs would need to exceed to make the Modification questionable from an economic efficiency perspective.

2.5.1 Production Costs and Benefits[3]

Economic Costs

Opportunity Cost of Land and Capital

Under both base case scenarios, the Dartbrook Mine would be decommissioned in 2022 and residual land and capital value would be realised.

With the Modification the Mine life would be extended to 2027 and hence there would be an opportunity cost of continuing to use the land and capital equipment at Dartbrook Mine. This opportunity cost is estimated at $25M for land and $10M for capital equipment.

Capital Cost of the Modification

Compared to the economic base case, the Modification would require additional capital expenditure primarily associated with:

- purchasing a longwall miner,
- refurbishment of the coal clearance system for transferring ROM coal to the East Site (i.e. Hunter Tunnel)
- recommissioning of the wash plant;
- the implementation of noise control measures at Dartbrook Coal Handling and Preparation Plant

This cost is estimated at $202M over a two-year period, followed by $5M per year in sustaining capital.

[1]The threshold value method uses the value of quantified net production benefits as the amount that unquantified environmental, social and cultural costs would need to exceed to make a project questionable from an economic efficiency perspective.
[2] Benefit transfer refers to transferring economic values that have been determined for other study sites.
[3] All values reported in this section are undiscounted unless specified.

Compared to the legal base case, the $202M of capital expenditure would not be required since this capital expenditure would be required under the base case in order to operate the mine at 6Mtpa. Incremental capital costs would only relate to the $5M per year in sustaining capital.

Annual Operating Costs of the Modification

Compared to the economic base case, operating costs of the Modification are associated with seven years of mining, ramping up from 1.4 Mtpa in 2021 to 6 Mtpa in 2022 and then an additional 5-years production at 6 Mtpa. Compared to the legal base case incremental production is only associated with an additional 5-years of production from 2023.

Operating costs are associated with:

- Pit top costs;
- CHPP and coal handling;
- Overheads;
- Rail;
- Port; and
- Marketing.

The incremental operating costs of the Modification (excluding royalties) at 6 Mtpa are in the order of $250M per annum. While royalties are a cost to AQC they are part of the overall net production benefit of the mining activity that is redistributed by government. Royalties are therefore not included in the calculation of the resource costs of operating the Modification.

Depreciation has also been omitted from the estimation of operating costs since depreciation is an accounting means of allocating the cost of a capital asset over the years of its estimated useful life. The economic capital costs are included in the years in which they occur.

Decommissioning and Rehabilitation Costs

With the Modification decommissioning and rehabilitation of the surface infrastructure would occur in 2027 at an estimated cost of $9M.

Economic Benefits

Avoided Costs of Care and Maintenance

Under the economic base case, the Dartbrook Mine will continue in Care and Maintenance until 2022 at an estimated annual cost of $5.5M. With the Modification these costs are avoided, as they form part of operating costs associated with mining and ancillary activities.

No such benefit accrues when comparing the Modification to legal base case.

Avoided Decommissioning and Rehabilitation Costs

Without the Modification, in 2022 the existing consent will expire and the Dartbrook Mine would be decommissioned and rehabilitated, at an estimated cost of $9M. With the Modification these costs in 2022 are not incurred.

Revenues

Compared to either base case, the Modification will result in additional revenues. Compared to the legal base case these relate to 5 years of production at 6 Mtpa. Compared to the economic base case there are two additional years of production in 2021 and 2022.

Revenues were estimated based on:

- saleable tonne yield of 75%;
- USD/t for Newcastle thermal coal as per the average KPMG Coal Price Forecasts based on various research and databases and broker reports (the Contributors) (KPMG, 2020) – refer to Table 2.4;
- conversion of nominal forecasts to real values assuming a 2% pa inflation rate;
- AUD:USD exchange rate as per the average KPMG exchange rate forecast based on various Contributors (KPMG, 2020) – refer to Table 2.5

Table 2.4 – Newcastle Thermal Coal (USD/t Nominal)

Year ended 31 December	Reporting date	2020	2021	2022	2023	2024	LT (2020)
Contributor 1	23-Apr-20	55.0	n/a	n/a	n/a	n/a	n/a
Contributor 2	23-Apr-20	59.0	61.0	70.0	75.0	75.0	n/a
Contributor 3	15-Apr-20	66.2	72.0	80.0	74.9	76.7	70.0
Contributor 4	9-Apr-20	62.9	67.2	n/a	n/a	n/a	n/a
Contributor 8	6-Apr-20	66.0	65.0	66.0	67.0	70.0	77.0
Contributor 10	1-Apr-20	68.0	69.0	n/a	n/a	n/a	67.0
Contributor 11	1-Apr-20	77.7	66.8	62.8	63.5	62.5	56.6
Contributor 12	1-Apr-20	71.0	72.0	n/a	n/a	n/a	75.0
Contributor 13	27-Mar-20	65.0	70.0	75.0	75.0	78.0	70.0
Contributor 14	24-Mar-20	65.0	68.0	71.0	66.0	68.0	56.0
Contributor 15	24-Mar-20	63.0	68.0	72.0	75.0	75.0	65.5
Contributor 16	23-Mar-20	75.0	85.0	90.0	n/a	n/a	90.0
Contributor 17	18-Mar-20	66.0	69.0	75.0	76.0	n/a	75.0
Contributor 19	16-Mar-20	58.0	66.0	70.0	70.0	65.0	65.0
Contributor 20	11-Mar-20	67.8	65.0	n/a	n/a	n/a	n/a
Low		**55.0**	**61.0**	**62.8**	**63.5**	**62.5**	**56.0**
High		**77.7**	**85.0**	**90.0**	**76.0**	**78.0**	**90.0**
Average		**65.7**	**68.9**	**73.2**	**71.4**	**71.3**	**69.7**
Median		**66.0**	**68.0**	**71.5**	**74.9**	**72.5**	**70.0**

Source: KMPG (2020), p. 3.

Table 2.5 – AUD:USD Exchange Rate

Year ended 31 December	Reporting date	2020	2021	2022	2023	2024	LT (2020)
Contributor 2	6-Mar-20	0.69	0.72	0.78	0.77	0.77	n/a
Contributor 3	5-Apr-20	0.64	0.68	n/a	n/a	n/a	0.73
Contributor 4	9-Apr-20	0.59	0.58	0.61	0.64	0.69	n/a
Contributor 5	8-Apr-20	0.70	0.71	0.71	0.71	0.71	0.71
Contributor 6	7-Apr-20	0.63	0.66	0.71	0.74	0.78	0.81
Contributor 7	6-Apr-20	0.73	0.77	0.75	0.75	0.75	0.75
Contributor 8	6-Apr-20	0.61	0.67	0.70	0.72	0.73	0.74
Contributor 10	1-Apr-20	0.63	0.61	n/a	n/a	n/a	0.74
Contributor 11	1-Apr-20	0.63	0.66	0.70	0.75	0.75	0.75
Contributor 12	8-Apr-20	0.66	0.65	n/a	n/a	n/a	n/a
Contributor 13	27-Mar-20	0.62	0.70	0.71	0.73	0.74	0.75
Contributor 14	24-Mar-20	0.55	0.63	0.68	0.69	0.70	0.75
Contributor 15	24-Mar-20	0.65	0.70	0.70	0.70	0.70	0.71
Contributor 16	23-Mar-20	0.67	0.69	0.71	n/a	n/a	0.75
Contributor 17	18-Mar-20	0.70	0.72	0.75	0.75	n/a	0.75
Contributor 18	18-Mar-20	0.65	0.65	0.72	0.77	0.77	n/a
Contributor 19	16-Mar-20	0.61	0.66	0.69	0.69	0.69	0.69
Contributor 20	30-Mar-20	0.60	0.68	n/a	n/a	n/a	n/a
Low		**0.55**	**0.58**	**0.61**	**0.64**	**0.69**	**0.69**
High		**0.73**	**0.77**	**0.78**	**0.77**	**0.78**	**0.81**
Average		**0.64**	**0.67**	**0.71**	**0.72**	**0.73**	**0.74**
Median		**0.64**	**0.68**	**0.71**	**0.73**	**0.74**	**0.75**

Source: KMPG (2020), p. 4.

Based on this approach, the USD/t and AUD/t price assumptions are summarised in Table 2.6.

Table 2.6 – Central Price Assumptions

	2020	2021	2022	2023	2024	LT Real 2020
Average USD//t Nominal	$65.70	$68.90	$73.20	$71.40	$71.30	$69.70
Average USD//t Real	$65.70	$67.55	$70.36	$67.28	$65.87	$69.70
FX	0.64	0.67	0.71	0.72	0.73	0.74
Real AUD/t	**$102.66**	**$100.82**	**$99.10**	**$93.45**	**$90.23**	**$94.19**

There is obviously considerable uncertainty around future coal prices in USD and the AUD/USD exchange rate and hence the value of incremental revenue has been subjected to sensitivity analysis (Section 2.8).

Residual Value at End of the Evaluation Period

At the end of the Modification, the land and capital equipment required for the Modification would have some residual value that could be realised by sale. This is estimated at $25M for land and $10M for capital equipment.

2.5.2 External Costs and Benefits

Greenhouse Gases

Only the costs and benefits associated with the Modification for which approval is sought i.e. continued mining and rail of product coal to the port of Newcastle for sale to the export market, are relevant to a CBA of the Modification.

NSW Government (2018) *Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* confirm that only Scope 1 and Scope 2 GHG emissions of a project should be included, consistent with the accounting framework under the *UN Framework Convention on Climate Change*.

The potential incremental Scope 1 and Scope 2 GHG emissions associated with the Modification have been estimated at 1.6M t CO_2-e and 1.2 Mt CO_2-e, relative to the economic base case and legal base case, respectively.

To place an economic value on CO2-e emissions, a shadow price of CO2-e is required. An average of three shadow prices was used, the Forecast European Union Emission Allowance Units price, the Australian Treasury Clean Energy Future Policy Scenario and the US Environmental Protection Agency (EPA) Social Cost of Carbon. However, these represent the global damage cost of carbon (i.e. the cost of carbon emissions to the population of the whole world).

Consistent with the Guidelines (NSW Government 2015), the focus of this CBA of mining projects is on costs and benefits to the population of NSW. Accordingly, the Technical Notes (NSW Government, 2018) identify that the global social damage cost estimates of Scope 1 and 2 GHG emissions of the Modification therefore need to be apportioned to **NSW only.**

In the absence of any studies that have focused on the social damage cost of carbon emissions to Australian and then NSW residents, some means of apportioning global damage costs is required. For the purpose of the Economic Impact Assessment, apportionment has been undertaken using Australia's share of the global population (around 0.3%) and NSW's share of the Australian population (32%).

On this basis, the present value (at 7% discount rate) of the cost of the Modification GHG emissions to Australia and NSW is estimated at $0.1M and $0.03M respectively, relative to the economic base case, and $0.07M and $0.02M respectively, relative to the legal base case.

Scope 3 emissions are associated with the overseas burning of coal from the Modification to generate electricity. From an economic perspective, costs associated with Scope 3 emissions would be part of a CBA of a different project i.e. an electricity generation project, with its own set of costs and benefits, including the benefits of electricity in a developing country. Some of these costs of electricity generation in a developing country i.e. Scope 3 emissions, would accrue to NSW. Scope 3 emissions associated with the burning of Modification coal overseas are estimated at 113Mt of CO2-e, relative to the economic base case, and 90 Mt of CO2-e, relative to the legal base case. Using the same apportionment of global damage costs of carbon as outlined above, the present value (at 7% discount rate) of Scope 3 emissions on NSW would be $2.24M, relative to the economic base case, and $1.75M relative to the legal base case.

Operational Noise

There are no noise impacts associated with activities that occur underground, including coal extraction and delivery via the Hunter Tunnel. Noise generating activities will take place primarily at the East Site. The following controls will be implemented to minimise noise associated with surface activities:

- Upgrading conveyors with additional shielding and low noise idlers;
- Refurbishment of coal reclaimers with lower noise components;
- Construction of a noise barrier north of the CHPP;
- Additional cladding of the washery building; and
- Avoiding reject emplacement near the southern limit of the reject emplacement area (REA) at night-time and/or unfavourable weather conditions.

Noise modelling was undertaken to assess the potential acoustic impacts of all approved and proposed activities at Dartbrook Mine. The modelling predicts that the Modification will comply with the intrusive noise criteria under the Development Consent (DA 231-7-2000) at all private residences, except for three residences to the south (303, 422 and 391). Under worst case meteorological conditions, these three residences may experience exceedances of up to 1 dBA during the night period only. The Voluntary Land Acquisition and Mitigation Policy (VLAMP) states that exceedances of 0-2 dBA are not discernible to the average listener, and therefore do not give rise to any acquisition or mitigation requirements. It should be noted that residence 391 is currently entitled to acquisition by Mount Pleasant Mine.

Consequently, there are no material economic impacts for inclusion in the analysis.

Road Transport

The operational workforce for the Modification is expected to be 196 full-time equivalent personnel, although DA 231-7-2000 authorises an operational workforce of up to 292 personnel. Dartbrook Mine personnel will primarily access the site via the New England Highway and Western Access Road. Traffic movements associated with the operational workforce will be negligible compared to the background traffic volumes on the New England Highway. The Western Access Road is a private road owned by AQC and is primarily used for access to Dartbrook Mine. Therefore, the numbers of vehicles utilising the New England Highway / Western Access Road intersection will be relatively low, and the performance of the intersection is expected to be good.

There will be no transportation of coal along public or private roads.

Consequently, there are no material economic impacts for inclusion in the analysis.

Air Quality

There are no dust emissions associated with underground mining or transportation of coal via the Hunter Tunnel. Dust emissions will occur primarily as a result of activities at the East Site. The following dust controls will be implemented to minimise emissions due to surface activities:

- Shielded conveyors and enclosed transfer points;
- Water sprays on all coal and reject stockpiles;
- Sealing of the haul route for trucks carrying rejects;
- Minimise the exposed area of the REA through progressive rehabilitation; and
- Establishing dust fences adjacent to exposed areas of the REA.

Dust dispersion modelling was conducted to predict TSP, PM10 and PM2.5 concentrations at private residences. The Modification is expected to satisfy all air quality criteria with the exception of the cumulative 24-hour PM10 criterion. Seven private residences are predicted to experience one day above the criterion of 50 µg/m3. Under the VLAMP, the acquisition criteria for 24-hour PM10 is based on incremental impact (i.e. from the development alone). The incremental impact due to Dartbrook Mine is predicted to be less than 1 µg/m3 and therefore falls well below the acquisition criterion. Therefore, the Modification does not exceed any criteria prescribed by the VLAMP.

The modelled exceedances of the cumulative 24-hour PM10 criterion would only occur under highly unfavourable weather conditions. Mining activities can be modified on these days so as to avoid any impacts.

Consequently, in economic terms the residual impacts after management are not likely to be material.

Groundwater

Groundwater monitoring data indicates that the Hunter Tunnel typically receives approximately 156 ML/year of inflows. This component of the groundwater inflow is primarily sourced from the Hunter River alluvial aquifer, which is the subject of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009.

The impacts of longwall mining on groundwater resources were modelled by Mackie Environmental Research (MER, 2000). This model predicted that depressurisation of the coal measures could result in downward leakage from the alluvial aquifer of approximately 0.1 ML/day (36.5 ML/year). AQC hold sufficient Water Access Licences (WALs) from the Hunter Unregulated and Alluvial Water Sources to account for both inflows to the Hunter Tunnel and induced leakage from the Hunter River alluvial aquifer. However, there is an opportunity cost associated with holding these WALs. This opportunity cost is assumed to be in the order of $2,000/ML.

MER (2000) predicted that the rate of inflow to the mine workings from the North Coast Fractured and Porous Rock Groundwater Sources will increase to 1.6 ML/day at the completion of the approved mining. The actual inflow will be less than this maximum because only a fraction of the approved mining can be completed within the remaining project duration. AQC will require 584 ML of WAL from the North Coast Fractured and Porous Rock Groundwater Sources 2009. There is an opportunity cost with holding this, assumed to be in the order of $800 per ML, based on market trades in similar deep groundwater aquifers in NSW.[4]

Combined the opportunity cost of holding groundwater licences is estimated at $1M.

Surface Water

Mine water and sediment laden runoff will be reused wherever possible to satisfy operational water demands. There is a large volume of water stored in the Wynn Seam goaf that can be used to for non-potable uses such as dust suppression and coal processing. Raw water will only be sourced from the Hunter River where recycled mine water is not sufficient to meet operational demands. AQC's water licences enable the taking of up to 3,053.8 ML/year from the Hunter River (assuming maximum available water determination). The maximum allocation is not expected to be required for the proposed mining activities. Nevertheless, there is an opportunity cost of holding these licences which is assumed to be in the order of $2,000/ML i.e. $6M.

[4] No market trade information was available for the *North Coast Fractured and Porous Rock Groundwater Sources*.

If inflows to the water management system exceed the operational water demand, the surplus can either be stored in the Wynn Seam goaf or passively released from site (using the Evaporation Ponds). Discharges under the Hunter River Salinity Trading Scheme will only be undertaken where other management strategies are insufficient.

Subsidence

Subsidence from the Modification may potentially impact surface infrastructure located above the underground workings. Infrastructure above the underground workings includes one private residence and one residence owned by MACH Energy (Mount Pleasant Mine). No listed heritage items are located above the mine.

Recent reforms to the Mine Subsidence Compensation Act 1961 will see claims for subsidence damage caused by active mining compensated by the mine operator responsible. This will be managed by Subsidence Advisory NSW. Claims will be independently assessed by a new panel of expert assessors, and mine operators will be required to compensate property owners accordingly. In this way, any externality costs will be internalised into AQC's operating costs.

Subsidence costs would reduce the estimated company tax and net production benefits of the Modification. However, any impacts are unlikely to be material in nature.

Biodiversity

The Modification will operate within the existing mine footprint and hence will have no incremental impacts on biodiversity. Consequently, there are no material economic impacts for inclusion in the CBA.

Aboriginal Heritage

The Modification will operate within the existing mine footprint and hence will have no incremental impacts on Aboriginal heritage. Consequently, there are no material economic impacts for inclusion in the CBA.

Historical Heritage

The Modification will operate within the existing mine footprint and hence will have no incremental impacts on historic heritage sites. Hence, there are no material economic impacts for inclusion in the CBA.

Visual Impacts

Given that there will be no additional surface infrastructure, the Modification will maintain the existing visual profile of the Dartbrook Mine. These are not considered to be material.

Agriculture

There are no agricultural impacts of the Modification.

Net Public Infrastructure Impacts

No additional infrastructure is required for the Modification. Potential impacts of the Modification on existing infrastructure include the use of utilities. This will be paid for by user fees which are included in

the Modification operating costs. Consequently, no net infrastructure costs to government are envisaged from the Modification.

Loss of Surplus to Other Industries

No loss of surplus to other industries will occur as a result of the Modification.

Market Benefits to Workers

Employment at Dartbrook under the economic base case (care and maintenance) is estimated at 11 people until 2022. Under the Modification employment would ramp up to 196 in 2022 and be maintained until 2027.

Under the legal base case, employment would be at 292 until 2022. The Modification would extend employment at this level for a further 5 years.

Relative to both base cases, there would be (at least) an additional 196 jobs for an additional 5-years.

In standard CBA, the wages associated with employment are considered an economic cost of production with this cost included in the calculation of net production benefits (producer surplus). This approach assumes labour markets clear, with no involuntary unemployment i.e. full employment, and no other distortions (Bartik, 2012). However, where there is involuntary unemployment a project may result in a wage benefit to workers. Workers who transfer to the mining sector and earn higher wages are in effect increasing their productivity. The value of their output for given work hours is increasing i.e. the marginal value product of labour. The real benefit for the worker is the difference between the wage that workers are paid in mining and their minimum reservation wage (i.e. the minimum wage they would accept) for working in the mining sector (which reflects their relative occupational preference) (NSW Government, 2012, p. 7).

The Guideline (NSW Government, 2015) identifies that an appropriate starting assumption is that workers do not receive a wage premium, even if they will earn more money in the mining sector, because:

- If workers are already in the mining sector, it is not generally the case that one mine will pay significantly more than other mines for doing a similar job in similar conditions;
- A mine may need to offer higher wages to compensate for more physically demanding work, tougher conditions etc. and so the higher wages is offset by the more cost of the more demanding work; and
- Higher wages may be required to relocate to a less desirable location.

However, the NSW Guidelines (2015) goes on to say that:

"*Although a zero wage premium is a useful starting assumption, the appropriateness of this assumption must be assessed on a case by case basis. This is because* ***benefits to workers can be one of the major economic benefits from a project.*** *If a proponent considers that a project will generate positive benefits for workers, the economic assessment should clearly explain the reasons for this conclusion and present evidence in support of the valuation that has been adopted.*"

The fundamental justification for inclusion of wage benefits from the Modification in the CBA is that the NSW economy is not currently at full employment and is unlikely to be at full employment during the life of the Modification. Consequently, it is unlikely to simply employ people from the mining sector at their existing wage rate. A mining project can directly employ people from unemployment pool, new entrants to the labour force or already employed people e.g. in mining, agriculture, construction, manufacturing etc. All these potential sources of labour are reflected on the labour supply curve for a

project. The labour supply curve represents the lowest wage rate (allowing for risks and disutility) at which workers would be willing to accept a job in the mining sector. The labour supply curve is upward sloping. For those people at the margin, say those already employed in the mining sector, their reservation wage is likely to be similar to the wage that they receive in the new project. However, for infra-marginal labour there would be a wage benefit, with a larger wage benefits to people sourced from the involuntary unemployment pool i.e. lower down the labour supply curve. The wage benefit for otherwise unemployment people can be even greater when search and retraining costs, scarring, stigma and physical and mental health effects of unemployment are taken into account (Haveman and Weimer 2015). For people already employed in other sectors the direct wage benefit would likely be between those of the unemployed and those already in the mining sector. However, even the direct wage benefit for those employed from the mining sector or other sectors but may be larger than the estimated direct wage benefits, due to job chain effects and occupational upgrading i.e. where a person is employed from another job, which creates a vacant job for others to upgrade their employment, which creates a further vacancy to be filled, and so on (Bartik, 2012). With job chain effects what is important is not the reservation wage of those immediately hired by the project, but the reservation wage of those at the end of the job chain (Bartik, 2012).

Furthermore, it is not clear that any wage premium can be explained away by compensation for mining jobs being more physically demanding or requiring relocation to a less desirable area. Source sectors for the Modification labour are likely to include agriculture, manufacturing, transport and construction etc, where physically demanding work is common place. The Hunter Valley is also a highly desirable place to live and hence wage premiums for relocation are likely to be minimal.

Notwithstanding, any estimation of the potential economic value of employment from the Modification requires a number of assumptions such as what proportion of the Modification workforce would otherwise be unemployed or underemployed, the duration of time that this would occur and the opportunity cost of labour in an unemployed or underemployed state (i.e. the reservation wage rate). Estimates of wage premium benefits are likely to be sensitive to these assumptions.

Some indication of the potential magnitude of these benefits can be gained by making a number of assumptions. Following the general approach of Streeting and Hamilton (1991)[5] if it were assumed that 10% of the maximum direct workforce of the Modification[6] (29 out of a total of 292 jobs) would otherwise be unemployed for three years and that the reservation wage for these people was $48,000[7] compared to a mining wage of $120,000, then the market employment benefit in terms of income would be $3M present value, at a 7% discount rate, for both base cases. Values at alternate discount rates and percentages of unemployed are provided in the following table. These calculations exclude any consideration of search and retraining costs, scarring, stigma and physical and mental health effects of unemployment (Haveman and Weimer 2015).

[5] Streeting and Hamilton (1991) *An Economic Analysis of the Forests of South-Eastern Australia*, Resource Assessment Commission, Research Paper Number 5.

[6] All sourced from NSW.

[7] As estimated by the unemployment benefits plus income tax payable on a mining wage, following the reservation wage rate approach used by Streeting and Hamilton (1991).

Table 2.7 - Potential Economic Benefits to Workers ($M @ 7% discount rate)

	Economic Base Case	Legal Base Case
% Unemployed for 3 years		
Scenario 1 - 5% UE	2	2
Scenario 2 - 10% UE	3	3
Scenario 3 - 15% UE	5	5
Wage premium benefit for Rest of Employment		
Scenario 1 – 95%	22	19
Scenario 2 – 90%	21	18
Scenario 3 – 85%	20	17
Total Wage Benefit		
Scenario 1	24	21
Scenario 2	24	21
Scenario 3	25	22

*Differences in values between base cases relate to wage benefits occurring two years earlier with the economic base case.

This estimate makes no allowance for the wage benefits to already employed workers and job chain effects. Assuming, the remaining workers, after job chain effects, are evenly located along the labour supply curve, the average wage in NSW ($65,200[8]) gives an indication of a potential average reservation wage. Further, assuming a 10% increase in average reservation wage is required to reflect any disutility in the mining sector, and that these wage benefits are only obtained for 3 years, then the additional wage benefits associated with the 90% of workers who would otherwise be employed in other jobs is estimated at $21M and $18M (present value, at a 7% discount rate) for the economic base case and legal base case, respectively. Values at alternate discount rates and percentages of already employed people are provided in the Table 2.7.

Based on these assumptions the potential market-based benefits of employment are in the order of $24M and $21M (present value at 7% discount rate) for the economic base case and legal base case, respectively. However, it is recognized that there may be differing opinions around the inclusion and estimation of wage benefits in CBA and hence the results of the CBA are reported both with and without the inclusion of these benefits.

Economic Benefits to Existing Landholders

Payments by the proponent for the purchase of land, that exceed the opportunity cost of the land, are an economic benefit to the landholder. However, no additional land needs to be purchased for the Modification and hence no additional benefits accrue to landholders. While historic land purchase costs may have been in excess of opportunity costs these can be considered "sunk" and do not vary with or without the Modification.

Economic Benefits to Suppliers

The focus of CBA is generally on primary costs and benefits i.e. first round impacts. Secondary net benefits that accrue to firms that sell to or buy from a project are ignored. This is because in a competitive market, all resources are assumed to be fully employed, and so increases in the production of goods and services required as inputs to the project will withdraw labour and raw materials from other industries. The additional net benefits (surpluses) to suppliers to the Modification will be offset by

[8] Average NSW personal income in 2016-17 (ABS Estimates of Personal Income for Small Areas, 2011-2017).

decreases in net benefits in other industries and so there is no net secondary benefit to the economy as a whole.

However, where the economy is not at full employment some benefits to suppliers may accrue. It is estimated that the Modification will result in average annual additional non-labour operating costs of $213M when operating at 6 Mtpa of ROM. Based on ratios for the Coal Mining Sector in the National Input-Output table and NSW Input-Output table, 85% and 66% of non-labour coal mining expenditure is captured within the National and NSW economies, respectively. Assuming a ratio of producer surplus to output of 20%[9] for industries supplying non-labour inputs, the indirect economic benefits to Australian and NSW suppliers would be in the order of $158M and $123M (present value at 7% discount rate), respectively, when comparing the Modification to the economic base case. When comparing the Modification to the legal base case, the indirect economic benefits to Australian and NSW suppliers would be in the order of $119M and $92M (present value at 7% discount rate).

It is recognised that there may be differing opinions around the inclusion and estimation of economic benefits to suppliers in CBA and hence the results of the CBA are reported both with and without the inclusion of these benefits.

2.6 Consolidation of Value Estimates

2.6.1 Net Production Benefits

The present value of production costs and benefits, using a 7% discount rate, is provided in Table 2.8.

The Modification is estimated to have global net production benefits of $552M (present value at 7% discount rate), relative to the economic base case and $549M (present value at 7% discount rate) relative to the legal base case.

AQC is estimated to be 90% Australian owned and third-party royalties are payable to an overseas company. Hence, the components of the net production benefits that accrue to Australia are government royalties, company tax (assuming a 30% company tax rate) and 90% of the residual net production benefits. On this basis, the net production benefits of the Modification that accrue to Australia are estimated at $500M (present value at 7% discount rate), relative to the economic base case and $509M (present value at 7% discount rate) relative to the legal base case.

The net production benefits can be further apportioned to NSW by assuming that company tax benefits and residual net production benefit accrue to NSW based on its population share and that all government royalties accrue to NSW. On this basis, the net production benefits of the Modification that accrue to NSW are estimated at $247M (present value at 7% discount rate), relative to the economic base case and $229M (present value at 7% discount rate) relative to the legal base case.

The estimated net production benefits that accrue to Australia and NSW can be used as a minimum threshold value or reference value against which the relative value of the residual environmental impacts of the Modification, after mitigation, may be assessed. This threshold value is the opportunity cost to society of not proceeding with the Modification. It is a minimum threshold value as it does not include potential wage benefits and benefits to suppliers.

Provided the value of the residual environmental impacts of the Modification, to Australian and NSW households, after mitigation, do not exceed the respective net production threshold values, then the Modification will have net benefits to the Australian and NSW communities.

[9] For all intermediate sectors in the NSW economy the ratio of gross operating surplus to output is 21%.

Table 2.8 - Net Production Benefits of the Modification ($M Present Values at 7% Discount Rate)

	Economic Base Case	Legal Base Case
Costs		
Opportunity cost of land	$20	$20
Opportunity cost of capital equipment	$8	$8
Capital costs, including noise attenuation	$189	$17
Operating cost (ex royalties)	$1,111	$824
Environmental monitoring and management costs for noise and dust to meet contemporary expectations	$11	$7
Decommissioning and rehab costs at cessation of Modification	$5	$5
Sub-total	***$1,345***	***$882***
Benefits		
Avoided Cost of Care and Maintenance	$9	$0
Avoided decommissioning and rehab costs in 2022	$7	$7
Revenue	$1,860	$1,403
Residual value of land	$15	$15
Residual value of capital equipment	$6	$6
Sub-total	***$1,897***	***$1,431***
Global Net Production Benefits	**$552**	**$549**
Royalties to NSW Govt	$129	$97
Royalties to third party	$24	$10
Company Tax	$120	$139
Residual Net Production Benefits to AQC	$280	$303
Global Net Production Benefits	**$552**	**$549**
Royalties to NSW Govt	$129	$97
Royalties to third party	$0	$0
Company Tax	$120	$139
Residual Net Production Benefits to AQC	$252	$273
Australian Net Production Benefits	**$500**	**$509**
Royalties to NSW Govt	$129	$97
Royalties to third party	$0	$0
Company Tax	$38	$44
Residual Net Production Benefits to AQC	$81	$87
NSW Net Production Benefits	**$247**	**$229**

2.6.2 Externalities

Instead of leaving the analysis as a threshold value exercise, an attempt has been made to qualitatively consider and where possible quantify the main environmental, cultural and social impacts of the Modification. Table 2.9 summarised the results of the consideration of externalities in Section 2.5.2.

Table 2.9 – Externality Impacts of the Modification (Present Values at 7% Discount Rate)

	Economic Base Case		Legal Base Case	
Benefits	**Australia**	**NSW**	**Australia**	**NSW**
Wage benefits to employment	$24	$24	$21	$21
Economic benefits to existing landholders	$0	$0	$0	$0
Economic benefits to suppliers	$158	$123	$119	$92
Sub-total	$183	$147	$140	$114
Costs				
Greenhouse gas emissions (Scope 1 and 2)	$0.10	$0.03	$0.07	$0.02
Operational noise	No material impact*			
Road transport	No material impact*			
Air quality	No material impact*			
Groundwater	$1			
Surface water	$6			
Subsidence	Any subsidence damage caused by active mining compensated by AQC			
Biodiversity	No material impact*			
Aboriginal heritage	No material impact*			
Historic heritage	No material impact*			
Visual	No material impact*			
Agriculture	No material impact*			
Net public infrastructure costs	No material impact*			

*Wage benefits are constant between geographic scopes as all employment is assumed to be sourced from NSW. Wage benefits differ between base cases due to benefits for the economic base case commencing earlier.

** Economic benefits to suppliers are higher in the economic base case due to two additional years of production.

From Section 2.5.2 it is evident that the main potential impacts of the Modification are internalised into the production costs of the Modification through mitigation measures, ownership of land and water allocations. Other costs not already included in the production costs of the Modification are associated with opportunity cost of WALs and greenhouse gas costs, although from Table 2.9 it is evident that these impacts to Australia and NSW are small or immaterial.

2.6.3 Net Social Benefits to Australia and NSW

The main decision criterion for assessing the economic desirability of a project to society is its net present value (NPV). NPV is the present value of benefits less the present value of costs. A positive NPV indicates that it would be desirable from an economic perspective for society to allocate resources to the project, because the community as a whole would obtain net benefits from the project.

The results from Table 2.8 and Table 2.9 are combined in Table 2.10 to estimate the net social benefits of the Modification to Australia and NSW, relative to both the economic base case and legal base case. Results are reported with and without the inclusion of wage benefits and benefits to suppliers, around which there is likely to be some debate.

Table 2.10– Net Social Benefits of the Modification (present value @ 7% discount rate)

	Economic Base Case		Legal Base Case	
Benefits	**Australia**	**NSW**	**Australia**	**NSW**
Net Production Benefits				
Royalties to Government	$129	$129	$97	$97
Company Tax	$120	$38	$139	$44
Residual Net Production Benefits	$252	$81	$273	$87
Sub-total	***$500***	***$247***	***$509***	***$229***
Other Benefits				
Wage benefits to employment	$24	$24	$21	$21
Economic benefits to existing landholders	$0	$0	$0	$0
Economic benefits to suppliers	$158	$123	$119	$92
Sub-total	***$183***	***$147***	***$140***	***$114***
Total Benefits	**$683**	**$395**	**$649**	**$342**
Costs				
Greenhouse gas emissions (Scope 1 and 2)	$0.10	$0.03	$0.07	$0.02
Operational noise	No material impact*			
Road transport	No material impact*			
Air quality	No material impact*			
Groundwater	$1			
Surface water	$6			
Subsidence	Any subsidence damage caused by active mining compensated by AQC			
Biodiversity	No material impact*			
Aboriginal heritage	No material impact*			
Historic heritage	No material impact*			
Visual	No material impact*			
Agriculture	No material impact*			
Net public infrastructure costs	No material impact*			
Sub-total	***$7***	***$7***	***$7***	***$7***
Net Social Benefits - excluding other benefits	**$493**	**$240**	**$502**	**$222**
Net Social Benefits - including other benefits	**$676**	**$388**	**$642**	**$335**

Overall, the Modification is estimated to have net social benefits to both Australia and NSW relative to both the economic base case and legal base case, and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Modification CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $240M (relative to the economic base case) and $222M (relative to the economic base case) for the Modification to be questionable from an NSW economic efficiency perspective.

2.7 Distribution of NSW Costs and Benefits

CBA is primarily concerned with the single objective of economic efficiency. CBA and welfare economics provide no guidance on what is a fair, equitable or preferable distribution of costs and benefits. Nevertheless, CBA can provide qualitative and quantitative information for the decision-maker on how economic efficiency costs and benefits are distributed.

The costs and benefits of the Modification to NSW are potentially distributed among a range of stakeholders as identified in Table 2.11.

Table 2.11 - Incidence of NSW Costs and Benefits

BENEFITS AND COSTS	INCIDENCE OF COSTS AND BENEFITS	ECONOMIC BASE CASE ($M)	LEGAL BASE CASE ($M)
Share of Net Production Benefits			
Net producer surplus	AQC and its NSW shareholders	$129	$97
Royalties	NSW Government and NSW households	$38	$44
Company tax	NSW Government and NSW households	$81	$87
Additional benefits			
Wage benefits to employment	Some of the local and NSW labour force	$24	$21
Economic benefits to existing landholders	Local landholders who sell land required for the Modification including buffer land	$0	$0
Economic benefits to suppliers	Regional and State suppliers of inputs to production	$123	$92
Environmental, social and cultural costs*			
Greenhouse gas emissions (Scope 1 and 2)	Local and NSW households	$0.03	$0.02
Operational noise	Adjoining landholders	No material impact*	
Road transport	Local residents	No material impact*	
Air quality	Adjoining landholders	No material impact*	
Groundwater	AQC via WAL purchases	$1	
Surface water	AQC via WAL purchases	$6	
Subsidence	AQC and adjoining landholders	Any subsidence damage caused by active mining compensated by AQC	
Biodiversity	Local and NSW households	No material impact*	
Aboriginal heritage	Aboriginal people and other local and NSW households	No material impact*	
Historic heritage	Local and NSW households	No material impact*	
Visual amenity	Adjoining landholders and motorists on the New England Highway	No material impact*	
Agriculture	AQC	No material impact*	
Net public infrastructure costs	NSW Government and NSW households	No material impact*	
Loss of surplus to other industries	Not applicable	No material impact*	

* NSW regulations require many impacts to be borne by the proponent via mitigation, offset and compensation. Where these measures perfectly mitigate, offset or compensate then no residual impacts occur and all impacts are borne by the proponent. This table identifies who bears residual impacts where mitigation, offset and compensation is imperfect.

2.8 Risk and Sensitivity Analysis

The main areas of environmental risks associated with mining projects relate to:

- the financial viability of a project from unexpected downturns in prices and any consequent environmental impacts from premature cessation of operations;
- ecological risk associated with whether the biodiversity offsets will adequately compensate for the direct ecological impacts; and
- other environmental, social and cultural impact estimations and required mitigation measures.

The NSW DPIE has previously identified that the financial viability of projects is a risk assumed by the project owners. Nevertheless, it should be noted that it is highly unlikely that AQC would invest in the Modification if it were not financially viable. However, any risk that the Modification may commence and then cease operation for financial reasons leaving unmet rehabilitation liabilities is mitigated by the fact that AQC is required to pay a rehabilitation security deposit to the NSW DPIE – Division of Resources and Energy (DPIE-DRE) as the holder of a mining authority under the Mining Act. This security deposit is held by DPIE-DRE to ensure that the legal obligations in relation to rehabilitation and safety of the site can be met following mine closure. If rehabilitation obligations are not met to the satisfaction of the Minister, then the security funds would be used by DPIE-DRE to meet the relevant requirements.

The provision of biodiversity offsets can be associated with a number risks. However, no biodiversity values will be impacted by the Modification and hence no risks with regard to biodiversity and offsets arise.

There is some risk associated with the estimation of environmental, social and cultural impacts of the Modification and the level of mitigation measures proposed. However, it should be noted that impacts have generally been assessed based on the maximum annual levels of production and hence are likely to be overstated. Ongoing monitoring will ensure that appropriate mitigation measures are implemented as required.

The net present value of the Modification to NSW (presented in Table 2.10) is based on a range of assumptions around which there is some level of uncertainty. Uncertainty in a CBA can be dealt with through changing the values of critical variables in the analysis (James and Gillespie 2002) to determine the effect on the NPV[10].

In this sensitivity analysis, the CBA results for NSW, relative to the legal base case, were tested for changes to the following variables at a 4%, 7% and 10% discount rate:

- opportunity cost of land;
- opportunity cost of capital;
- operating costs;
- capital costs;
- decommissioning and rehabilitation costs;
- revenue;
- residual value of land;
- residual value of capital;
- greenhouse gas costs;

[10] Quantitative risk analysis could also potentially be undertaken. However, this requires information on the probability distributions for input variables in the analysis. This information is not available and so the sensitivity testing is limited to uncertainty analysis.

- groundwater costs; and
- surface water costs.

Results are reported in Tables 2.12. What this analysis indicates is that CBA is most sensitive to changes in revenue (reflecting production levels, the value of coal in USD and the USD/ AUD exchange rate) and to a lesser extent operating costs. This is because changes in revenue directly impact royalties which is the main component of net production benefits to NSW and net producer surplus. Changes in revenue also impact company tax estimates and residual net production benefits, only a component of which accrues to NSW. Changes in operating costs do not impact royalties but do impact the estimates of company tax and residual net production benefits.

The sensitivity analysis indicated that the CBA results are not sensitive to changes in capital costs, or environmental costs that have not already been internalised into production costs, such as greenhouse gas, groundwater and surface water costs. Since mitigation, offset and compensation costs are a small component of the capital and operating costs of the Modification, it is unlikely that large changes in these cost levels would have any significant impact on the CBA results.

Under all scenarios examined, the Modification, relative to the legal base case, has net social benefits to NSW. Given the similar net social benefits of the Modification, relative to the economic base case, the same results would apply.

Table 2.12 - NSW CBA Sensitivity Testing (Present Value $M) Legal Base Case excluding Other Benefits

	4% Discount Rate	7% Discount Rate	10% Discount Rate
CENTRAL ANALYSIS	**$265**	**$222**	**$187**
INCREASE – 20%			
Opportunity cost of land	$263	$221	$186
Opportunity cost of capital	$264	$221	$186
Operating costs	$207	$173	$145
Capital costs	$264	$221	$186
Decommissioning and rehabilitation costs	$264	$221	$186
Avoided decommissioning and rehabilitation costs	$265	$222	$187
Revenue	$380	$319	$270
Residual value of land	$266	$223	$187
Residual value of capital	$265	$222	$187
Greenhouse gas costs	$265	$222	$187
Groundwater costs	$265	$222	$187
Surface water costs	$263	$220	$185

	4% Discount Rate	7% Discount Rate	10% Discount Rate
DECREASE – 20%			
Opportunity cost of land	$266	$223	$188
Opportunity cost of capital	$265	$222	$187
Operating costs	$323	$271	$228
Capital costs	$266	$223	$188
Decommissioning and rehabilitation costs	$265	$222	$187
Avoided decommissioning and rehabilitation costs	$264	$221	$186
Revenue	$149	$124	$104
Residual value of land	$264	$221	$186
Residual value of capital	$264	$221	$186
Greenhouse gas costs	$265	$222	$187
Groundwater costs	$265	$222	$187
Surface water costs	$266	$223	$188

3 LOCAL EFFECTS ANALYSIS

3.1 Introduction

The CBA in Section 2 is concerned with whether the incremental benefits of the Modification exceed the incremental costs and therefore whether the community would, in aggregate, be better off 'with' the Modification compared to 'without' it. This section examines local effects. It focuses on the operational phase of the Modification.

The local area is defined as the LGAs of Singleton, Muswellbrook and Upper Hunter, within which the Modification is located and is the region considered likely to be main source of labour and non-labour inputs for the Modification.

3.2 Direct Effects Related to Employment of Existing Residents Only

The Modification will provide an estimated 196 direct jobs when operating at 6 Mtpa. Eighty percent (156) of these are assumed to already reside in the local area,[11] with the remainder commuting from outside the local area.

Assuming that those that already reside in the local area are already employed and that job vacancies created by these people filling the mining positions remain unfilled (i.e. no job chain effects), the incremental disposable wages accruing to the region is $5.1M per annum when the Modification is operating at 6 Mtpa. This is equivalent to 58 direct full time equivalent (FTE) mining jobs. This is a minimum estimate as it assumes full employment in the region and hence the jobs from which people come to fill the mining jobs remain vacant.

Table 3.1 - Analysis of Net Income Increase and FTE Job Increase Assuming No Job Backfilling

Attribute	No.
a) Direct incremental employment	196
Number that already reside in the region	156
b) Average net income in mining	$87,653
c) Average net income in other industries*	$54,997
d) Average increase in net income per job (b-c)	$32,656
e) Increase in net income per year due to direct employment	$5,107,466
f) FTE (e/b)	58

*This information is not available from the ABS and hence average income across all sectors is used.

3.3 Direct Effects Related to Non-Labour Expenditure

The total annual non-labour expenditure (operating costs of the Modification after subtraction of wages) is $209M.

However, not all of this expenditure will accrue to the local area. From a 2016 input-output table of the local area economy developed by Gillespie Economics, approximately 46% i.e. $96M pa of non-labour expenditure is estimated to accrue to the local area.

[11] ABS 2016 Census of Population and Housing indicates that 78% of people working in the coal mining sector in Muswellbrook LGA, reside in the Local Area (Singleton, Muswellbrook and Upper Hunter LGAs).

3.4 Second Round and Flow-On Effects

The expenditure by employees, who reside in the region, and non-labour expenditure that is captured by the local area, provides flow-on economic activity to the local economy.

A recent study by Lawrence Consulting (2020) for the NSW Minerals Council confirms the existence of substantial flow-on effects from mining operations in the Hunter region but does not report multipliers.

Recognised methods for assessing second round and flow-on effects such as input-output analysis (but also computable general equilibrium analysis), do not utilise direct effects of employment and income effects as calculated above in accordance with the Guidelines (NSW Government, 2015). Instead they use the total employment working in the region, with total wages (rather than net additional wages to existing employed people) divided between those who live in the region and those who reside outside the region. They do utilise estimates of non-labour expenditure, however multiplier effects are not estimate in terms on non-labour expenditure but in terms of how this and labour expenditure contribute to the local area economy in terms of direct and indirect output, value-added, income and employment. This type of assessment is reported in the following section.

3.5 Regional Economic Impact Assessment

Standard regional economic impact assessment using input-output analysis, is not restricted to a focus on the existing labour force in the local area and does not assume an absence of job chain effects. The presence of job chain effects in a region, means that to the extent that jobs from which people come, to fill the mining jobs, are themselves filled and their jobs are also filled until the lowest paid jobs are filled by people from unemployment, new labour force participants, then new wages in the region will approximate the total incremental wages associated with the mining project. Refer to Attachment 2.

In this framework, the Modification will provide the following annual direct and indirect annual effects to the local economy:

- $577M in output;
- $276M in value-added;
- $49M in gross wages; and
- 620 jobs.

Table 3.2 – Gross Annual Direct and Indirect Regional Economic Impacts of the Modification

Indicator	Direct Impacts	Production Induced Flow-ons	Consumption Induced Flow-ons	Total Flow-ons	Total Impacts
Output ($M)	424	125	28	153	577
Type IIA Multiplier	*1.00*	*0.30*	*0.07*	*0.36*	*1.36*
Value Added ($M)	199	61	16	78	276
Type IIA Multiplier	*1.00*	*0.31*	*0.08*	*0.39*	*1.39*
Income ($M)	19	24	6	30	49
Type IIA Multiplier	*1.00*	*1.29*	*0.33*	*1.62*	*2.62*
Employment (No.)	196	313	111	424	620
Type IIA Multiplier	*1.00*	*1.60*	*0.57*	*2.17*	*3.17*

3.6 Effects on Other Industries

3.6.1 Regional Economic Impacts of Displaced Agriculture

No agricultural activities will be displaced as a result of the Modification.

3.6.2 Other Wage Impacts

In the short-run, increased regional demand for labour as a result of the Modification (relative to the "without Modification" scenario) could potentially result in some increased pressure on wages in other sectors of the economy. The magnitude and duration of this upward wages pressure would depend on the level of demand for labour, the availability of labour resources in the region and the availability and mobility of labour from outside the region. However, given the scale of the Modification and the availability of labour inside and outside the region, wage impacts are not likely to be significant. Where upward pressure on regional wages occurs, it represents an economic transfer between employers and owners of skills and would in turn attract skilled labour to the region leading to future downward pressure on wages.

3.6.3 Housing Impacts

The Modification is not expected to result in any substantial in-migration of workers and their families and consequently the impact on housing prices is expected to be negligible.

3.7 Environmental and Social Impacts on the Local Community (Externalities)

The distribution of costs and benefits of the Modification are summarised in Table 2.11. The main potential effects on the local community (excluding to AQC) are noise criteria exceedances under worst case meteorological conditions that would not be discernible, minor GHG emission impacts, modelled cumulative 24-hour PM10 criteria exceedances one day per year at 7 private residences (that can be avoided by modifying mining operations when weather conditions are unfavourable) and potential subsidence impacts for two residences which would be remedied by AQC in accordance with recent reforms to the Mine Subsidence Compensation Act 1961.

3.8 Summary of Local Effects

A summary of local effects of the Modification is provided in Table 3.3.

Table 3.3 - Summary of Effects on the Local Community (Excluding AQC)

Local Effects	**Direct Total**	**Direct Already Resident in the Local Area**	**Net**
Employment FTE	196	156	58
Income ($M)	23	19	5
Non-labour expenditure in the Local Area	96		
Regional Impacts	**Direct**	**Flow-on**	**Total**
Output ($M)	424	153	577
Value-added ($M)	199	78	276
Income ($M)	19	30	49
Employment	196	424	620
Other Local Economic Impacts			
Contraction in other sectors	No material impact*		
Displaced activities	No material impact*		
Wage rise impacts	No material impact*		
Housing impacts	No material impact*		
Local Environmental Impacts			
Greenhouse gas emissions (Scope 1 and 2)	$0.0002M[1]		
Operational noise	Modelled 1 dBA exceedance of criteria at three residences during the night only – exceedences of 0-2dBA are not discernible		
Air quality	Modelled cumulative 24-hour PM10 criteria exceeded one day per year at 7 private residences – can be avoided by modifying mining operations when weather conditions are unfavourable		
Subsidence	Any subsidence damage caused by active mining compensated by AQC		

[1] The Hunter Region population is 0.7% of the NSW population. NSW GHG impact have been apportioned accordingly.

4 CONCLUSION

A CBA of the Modification indicated that it would have net production benefits to Australia of $500M (relative to the economic base case) and $509M (relative to the legal base case). Net production benefits to NSW are estimated at $247M (relative to the economic base case) and $229M (relative to the legal base case).

Provided the residual environmental, social and cultural impacts of the Modification that accrue to Australia and NSW are considered to be valued at less than the level of net production benefits, the Modification can be considered to provide an improvement in economic efficiency and hence is justified on economic grounds.

Instead of leaving the environmental, cultural and social impacts unquantified, an exercise was undertaken to quantify them. Most impacts were considered to be immaterial from an aggregate economic efficiency perspective. The main quantifiable environmental impacts of the Modification, which have not already been incorporated into the estimate of net production benefits, relate to the opportunity cost of water access licences (WALs) and the impacts of greenhouse gas (GHG) emissions. The opportunity cost of WALs are estimated at $7M. GHG impacts to Australia and NSW are estimated at $0.1M and $0.03M, respectively, relative to the economic base case, and $0.07M and $0.02M, respectively, relative to the legal base case. These economic costs are considerable less than the estimated net production benefits of the Modification.

Overall, the Modification is estimated to have net social benefits to both Australia and NSW relative to both the economic base case and legal base case, and hence is desirable and justified from an economic efficiency perspective.

While the major environmental, cultural and social impacts have been quantified and included in the Modification CBA, any other residual environmental, cultural or social impacts that remain unquantified would need to be valued at greater than $240M (relative to the economic base case) and $222M (relative to the economic base case) for the Modification to be questionable from an NSW economic efficiency perspective.

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ATTACHMENT 1 - COST BENEFIT ANALYSIS

Introduction to CBA

Cost Benefit Analysis (CBA) has its theoretical underpinnings in neoclassical welfare economics. Applications in New South Wales (NSW) are guided by these theoretical foundations as well as the NSW Treasury (2017). CBA applications within the NSW environmental assessment framework are further guided by the NSW Government (2015) *Guidelines for the economic assessment of mining and coal seam gas projects* and the *NSW Government (2018) Technical Notes supporting the Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*.

CBA is concerned with a single objective of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and governments i.e. economic efficiency. It provides a comparison of the present value of aggregate benefits to society, as a result of a project, policy or program, with the present value of the aggregate costs. These costs and benefits are defined and valued based on the microeconomic underpinnings of CBA. In particular, it is the values held by individuals in the society that are relevant, including both financial and non-financial values. Provided the present value of aggregate benefits to society exceed the present value of aggregate costs (i.e. a net present value of greater than zero), the project is considered to improve the well-being of society and hence is desirable from an economic efficiency perspective.

While CBA can provide qualitative and quantitative information on how costs and benefits are distributed, welfare economics and CBA are explicitly neutral on intra and intergenerational distribution of costs and benefits. There is no welfare criterion in economics for determining what constitutes a fair and equitable distribution of costs and benefits. Judgements about equity are subjective and are therefore left to decision-makers.

Similarly, CBA does not address other objectives of the EP&A Act and governments. Decision-makers therefore need to consider the economic efficiency implications of a project, as indicated by CBA, alongside the performance of a project in meeting other conflicting goals and objectives of the EP&A Act and government.

Definition of Society

CBA includes the consideration of costs and benefits to all members of society i.e. consumers, producers and the broader society as represented by the government.

As a tool of investment appraisal for the public sector, CBA can potentially be applied across different definitions of society such as a local area, state, nation or the world. However, most applications of CBA are performed at the national level. This national focus extends the analysis beyond that which is strictly relevant to a NSW government planning authority. However, the interconnected nature of the Australian economy and society creates significant spill-overs between States. These include transfers between States associated with the tax system and the movement of resources over state boundaries.

Nevertheless, "where major impacts spill over national borders, then CBA should be undertaken from the global as well as the national perspective" (Boardman *et al.,* 2001). For mining projects, impacts that spill over national borders include greenhouse gas costs and producer surplus benefits to foreign owners.

CBA at a sub-national perspective is not recommended as it results in a range of costs and benefits from a project being excluded, making CBA a less valuable tool for decision-makers (Boardman *et al*., 2001).

CBAs of mining projects are therefore often undertaken from a global perspective i.e. including all the costs and benefits of a project, no matter who they accrue to, and then truncated to assess whether there are net benefits to Australia. A consideration of the distribution of costs and benefits can then be undertaken to identify the benefits and costs that accrue to NSW and other regions.

However, a project is considered to improve the well-being of society if it results in net benefits to the nation, even if it results in net costs to the local area.

Definition of the Project Scope

The definition of the project for which approval is being sought has important implications for the identification of the costs and benefits of a project. Even when a CBA is undertaken from a global perspective and includes costs and benefits of a project that accrue outside the national border, only the costs and benefits associated with the defined project are relevant. For coal mining projects, typically only the costs and benefits from mining the coal and delivering it to Port or domestic users, are relevant.

Coal is an intermediate good i.e. it is an input to other production processes such as production of electricity and steel making. However, these other production processes themselves require approval and, in CBA, would be assessed as separate projects.

Net Production Benefits

CBA of mining proposals invariably involves a trade-off between:

- the net production (producer surplus) benefits of a project; and
- the environmental, social and cultural impacts (most of which are costs of mining but some of which may be benefits).

Net production benefits can be estimated based on market data on the projected financial[12] value of coal less the capital and operating costs of projects, including opportunity costs of capital and land already in the ownership of mining companies. This is normally commercial in confidence data provided by the proponent. Production costs and benefits over time are discounted to a present value.

Environmental, Social and Cultural Impacts

The consideration of non-market impacts in CBA relies on the assessment of other experts contributing information on the biophysical impacts. The environmental impact assessment process results in detailed (non-monetary) consideration of the environmental, social and cultural impacts of a project and the proposed means of mitigating the impacts.

At its simplest level, CBA may summarise the consequences of the environmental, social and cultural impacts of a project (based on the assessments in the relevant assessment document), for people's well-being. These qualitatively described impacts can then be considered alongside the quantified net production benefits, providing important information to the decision-maker about the economic efficiency trade-offs involved with a project.

These environmental, social and cultural impacts generally fall into three categories, those which:

- can be readily identified, measured in physical terms and valued in monetary terms;

[12] In limited cases the financial value may not reflect the economic value and therefore it is necessary to determine a shadow price for the coal.

- can be identified and measured in physical terms but cannot easily be valued in money terms; and
- are known to exist but cannot be precisely identified, measured or value (NSW Treasury, 2007).

Impacts in the first and second category can potentially be valued in monetary terms using benefit transfer or, subject to available resources, primary non-market valuation methods. Benefit transfer involves using information on the physical magnitude of impacts and applying per unit value estimates obtained from non-market valuation studies undertaken in other contexts.

Primary non-market valuation methods include choice modelling and the contingent valuation method where a sample of the community is surveyed to ascertain their willingness to pay to avoid a unit change in the level of a biophysical attribute. Other methods include the property valuation approach where changes in environmental quality may result in changes in property value.

In attempting to value the impacts of a project on the well-being of people there is also the practical principle of materiality. Only those impacts which are likely to have a material bearing on the decision need to be considered in CBA (NSW Government, 2012).

Where benefits and costs cannot be quantified these items should be included in the analysis in a qualitative manner (NSW Treasury, 2007).

Consideration of Net Social Benefits

The consideration of the net social benefits of a project combines the value estimate of net production benefits and the qualitative and quantitative estimates of the environmental, social and cultural impacts.

In combining these considerations, it should be noted that the estimates of net production benefits of a project generally include accounting for costs aimed at mitigating, offsetting or compensating for the main environmental, social and cultural impacts. This includes the costs of purchasing properties adversely affected by noise and dust, providing mitigation measures for properties moderately impacted by noise and dust, the costs of providing ecological offsets and the cost of purchasing groundwater and surface water entitlements in the water market etc. Including these costs effectively internalises the respective and otherwise, non-monetary environmental, social and cultural costs. To avoid double counting of impacts, only residual impacts, after mitigation, offset and compensation, require additional consideration.

Even when no quantitative valuation is undertaken of the environmental, social and cultural impacts of a project, the threshold value approach can be utilised to inform the decision-maker of the economic efficiency trade-offs. The estimated net production benefits of a project provides the threshold value that the non-quantified environmental, social and cultural impacts of a project (based on the assessments in the relevant assessment document), after mitigation, offset and compensation by the proponent, would need to exceed for them to outweigh the net production benefits.

Where the main environmental, social and cultural impacts of a project are valued in monetary terms, stronger conclusions can be drawn about the economic efficiency of a project i.e. the well-being of society.

Any other residual environmental, cultural or social costs that remain unquantified in the analysis[13] can also be considered using the threshold value approach. The costs of these unquantified environmental,

[13] Including potential impacts that were unknown at the time of the preparation of the relevant assessment document or arise during the Environmental Impact Assessment process due to differences in technical opinions.

cultural and social impacts would need to be valued by society at greater than the quantified net social benefit of a project to make it questionable from an economic efficiency perspective.

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ATTACHMENT 2 – COMPARISON OF INPUT-OUTPUT ANALYSIS AND THE LEA METHOD

IO analysis begins with identification of the direct gross regional economic activity footprint of a project for the region. If a project provides 100 jobs at the mine site then all these jobs are counted in IO analysis as a direct effect i.e. direct employment in the region, because the jobs are located in the region. All income paid to employment is also included as it is generated in the economy and IO tables are based on place of work. However, in assessment of the impacts of a project on the regional economy only the income of employees living in the region are counted as direct income effects since it is only wages expenditure of those living in the region that flows through the regional economy. In IO analysis, if 40% of a project's jobs are filled by people who already reside in the region then the **total** wages of these people is counted as a direct regional income effect of the project. Similarly, if 40% of the new jobs are taken by people who migrate into the region this is also counted as direct income for the region, as it is income that will accrue to people living in the region even though they are new residents. In impact assessment using IO analysis, the income of those residing outside the region is excluded as most of their income will be taken home after shift and spent where they live or elsewhere.

These direct employment and income effects for the region are those **associated** with the project i.e. the gross footprint, rather than specifically an assessment of **incremental** effects. This is partly because assessment of incremental effects becomes highly contentious and difficult. However, as will be shown below, these gross direct effects associated with a project can also be a reasonable approximation of incremental effects when "job chain" effects are considered.

However, first is a comparison between how IO analysis treats direct employment and income effects (as explained above) and that in the NSW (2015) guideline.

The guideline splits labour into those ordinarily resident in the region and those not ordinarily resident in the locality. For those ordinarily resident in the region the guideline suggests calculation of incremental income as the difference between a mining (including quarrying) income and the average level of income in other industries in the region. Incremental direct employment is then calculated by dividing this incremental income by the average wage in mining.

The guideline ignores workers who migrate into the region to work. However, using the rationale of the guideline, workers who migrate into the region to take jobs in a project provide a greater level of incremental income and spending in the region than those to take jobs in a project and who already reside in the region. The entire wage of those migrating into the region is additive to regional income in comparison to wage increments for those already residing in the region.

Table 1 provides an example of incremental wages using the guideline method and when income from those migrating into the region is counted. If only the incremental wages of those who already reside in the region are counted the incremental impact is $1.4M in annual wages. However, if the incremental wages to the region from those who migrate into the region are included, this increases to $5.4M.

Table 1 - Incremental Income when Immigrating Workforce is Included

Categories of Workers	Direct Empl	Current Wages @$65k	New Wages @$100k	Incremental New Wages for Workers	Incremental New Wages to the Region
Already Live in Region	40	2,600,000	4,000,000	1,400,000	1,400,000
Migrate into Region to Live	40	2,600,000	4,000,000	1,400,000	4,000,000
Commute from outside	20	1,300,000	2,000,000	700,000	0
Total Direct Empl	**100**	**6,500,000**	**10,000,000**	**3,500,000**	**5,400,000**

Even for those already living in the region who are already employed, the incremental income estimated using the guideline will substantially understate additional regional income effects. This is because new jobs in a region create a chain of job opportunities (referred to in the literature as the "job chain" - see Persky et al, 2004 What are jobs worth?, Employment Research Vol. 11 , p. 3).

An already employed person in the region moving into a mining (including quarrying) job, creates a job vacancy, which can be filled by those in the region (already employed, unemployed or attracted into the labour force) or by in-migration. Where this job is filled by those already employed in the region this in turn creates another vacancy etc. Following the entire chain through, the cumulative increase in wages to a region would approach the wages of the total direct mining jobs. It would only be discounted if the chain ends with employment of those from local residents in the unemployment pool (who are receiving an allowance and hence already are spending income in the region), if jobs remain unfilled or if jobs are filled by a commuter workforce. The latter is less likely for lower paying jobs down the job chain. In periods of higher unemployment rates, jobs along the job chain remaining unfilled is unlikely. If the chain ends with in-migrating employment or employment of those in the region that are new to the workforce then the incremental wages is equal to the total wages of the new jobs.

Table 2 demonstrates the "job chain" effect in relation to 40 new mining jobs filled by already employed local workers. It shows that the total annual wages of the new mining jobs is $4M. Under the job chain approach where all jobs are backfilled including ultimately by 40 local residents from the unemployment pool the incremental wages to the region are $3.5M. If some of these jobs filled from the unemployment pool are ultimately filled by in-migration the difference between the incremental wages to the region and the total annual mining jobs wages will lessen.

The guideline does not take account of the "job chain" effect and essentially assumes that the previous jobs of "job movers" in the region remain vacant for the life of the Project.

Incorporation of consideration of the "job chain" effect means that the direct incremental income to a region approximates that assumed in IO analysis (i.e. the gross footprint of economic activity estimated using IO analysis is also an indicator of the net effect).

Table 2 - Demonstration of the Job Chain Effect for 40 Jobs Filled by Locals Who are Already Employed in the Region

	Total wages	Increment Wages Gain to Region
1. New mining wage for 40 workers @$100k	$4,000,000	$1,400,000 (1-2)
2. Current Wages for 40 workers @$65k	$2,600,000	$1,000,000 (2-3)
3. Wage of people filling above 40 positions @$40k	$1,600,000	$800,000 (3-4)
4. Wage of people filling above 40 positions @$20k	$800,000	$ 255,664 (4-5)
5. Wages of the unemployed filling above 40 positions (Newstart - single no children)	$544,336	
Total		**$3,455,664**

DARTBROOK MINE
MODIFICATION 7

RESPONSE TO SUBMISSIONS RECEIVED FOLLOWING NOTIFICATION OF THE PROPONENT'S RESPONSE TO CONTENTIONS

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LIST OF APPENDICES

1 INTRODUCTION

This section provides a background to the Modification and explains the purpose of the document.

1.1 BACKGROUND

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of New South Wales (NSW). Dartbrook Mine is authorised by Development Consent DA 231-7-2000 granted under the *Environmental Planning and Assessment Act 1979* (EP&A Act). DA 231-7-2000 was granted on 28 August 2001 and has been modified on six occasions. Modification 7 is the subject of this report.

DA 231-7-2000 allows for underground longwall mining and associated surface activities to be carried out until 5 December 2022. No mining activities have been conducted since Dartbrook Mine was placed under care and maintenance by the previous owner in December 2006.

AQC is seeking a further modification to DA 231-7-2000 that will facilitate the recommencement of mining operations at Dartbrook Mine.

1.2 APPLICATION HISTORY

The modification application was made under the former Section 75W of the EP&A Act on 28 February 2018. The application originally sought approval for the following activities in addition to the approved activities included under DA 231-7-2000 (the Original Modification):

- The option of conducting bord and pillar mining of part of the Kayuga Coal Seam (as an alternative to the approved longwall mining);
- The option of using an alternative coal clearance system to transport run of mine (ROM) coal from the underground mine workings to the East Site; and
- Extending the approval period under DA 231-7-2000 by 5 years (until 5 December 2027).

The modification application was supported by the *Dartbrook Mine Modification 7 Environmental Assessment* (Hansen Bailey, 2018a) (EA). The EA included experts' reports on the key environmental planning issues relevant to the Modification.

Following consultations and amendments, the EA was accepted by the then Department of Planning and Environment (DP&E) and placed on public exhibition from 28 June to 25 July 2018. During the public exhibition period, a total of 54 submissions were received from regulatory authorities, special interest groups, private enterprises and individuals. The Office of Environment and Heritage (OEH) and Resources Regulator provided submissions after the specified submissions period. Issues raised in submissions were addressed in the *Dartbrook Mine Modification 7 Response to Submissions* (Hansen Bailey, 2018b) (RTS).

Having regard to the EA, RTS, public submissions and advice from other government agencies, DP&E published its Assessment Report on 23 January 2019, which concluded that:

> *"On balance, the Department considers that the modification's benefit would outweigh its costs and that the modification would improve the overall viability of the mine by enabling underground mining operations to recommence, thereby allowing its potential social and economic benefits to be realised. Importantly, many of the modification's impacts are reduced in comparison to the existing consent".*

Appendix G of the Assessment Report (Draft Consolidated Consent) recommended conditions of consent to manage the impacts of the Original Modification.

On 25 January 2019, the Original Modification was referred to the Independent Planning Commission (IPC) for determination. The IPC held a public meeting on 9 April 2019 to allow interested parties to express their views. A total of 45 speakers presented at the public meeting including 5 speakers in support and 40 speakers in opposition.

The IPC determined the application on 9 August 2019 by approving the bord and pillar mining option and alternative coal clearance system, but refusing the 5 year extension of the approval.

The application is currently the subject of Class 1 proceedings in the NSW Land and Environment Court (LEC). The Respondent filed a Statement of Issues and Contentions, which outlined the matters that required further assessment. The proponent has prepared a Response to Contentions which addresses these contentions. The Response to Contentions was placed on public exhibition from 13 August to 11 September 2020.

1.3 OVERVIEW OF SUBMISSIONS

A total of 65 submissions were received during public exhibition of the proponent's Response to Contentions. Submissions were received from Muswellbrook Shire Council (MSC), Upper Hunter Shire Council (UHSC), five special interest groups (SIGs) and 58 individuals.

The five SIGs that made Submissions were:

- Lock the Gate Alliance;
- Hunter Communities Network;
- People for Heritage (Upper Hunter) Inc;
- Hunter Thoroughbred Breeders Association (HTBA); and
- Friends of the Upper Hunter Inc (FotUH).

HTBA and FotUH have attached their earlier submissions to the IPC in 2019. Issues raised in submissions to the IPC were addressed in the proponent's *'Submission to the Independent Planning Commission'* (Hansen Bailey, 2019). Issues that have previously been addressed have not been revisited in this document.

Appendix A lists the matters raised in each of the submissions.

1.4 MINING INDUSTRY CONTEXT

The NSW Minerals Council conducts an annual survey to identify the actual expenditure of its members throughout NSW by region. In the 2018/2019 financial year, twenty-eight mining companies participated in the survey. These companies alone added $13.7B of actual value to the NSW economy, an increase of $300M from the previous year.

The number of direct mining jobs provided by these mining companies increased by nearly 500 to 25,844 over the same period.

The $13.7 billion of direct mining spending in NSW in the last financial year included over $3 billion spent on wages and salaries, as well as $8.9 billion for goods and services purchased from over 7,000 mining supplier businesses in Sydney and across regional NSW.

These companies also provided $105 million in community contributions and payments to local governments, and $2.3 billion was paid to the NSW Government through taxes (including royalties).

The mining industry survey participants made an actual contribution to the Hunter Region of $5.4 billion in direct spending through:

- A total workforce of 13,347 full time equivalent (FTE) personnel, including 3,338 contract workers whose place of work was in the region;
- $1.4 billion in wages and salaries to 10,010 direct full-time employees (not including contractors);
- $4.0 billion in purchases of goods and services from 3,282 local businesses (including contractors);
- $4.0 million in contributions to 397 community organisations; and
- $55.0 million in payments to local governments.

Indirect contributions from the mining industry for the same period in the Hunter Region generated:

- $7.2 billion in additional supply chain goods and services purchases; and
- $3.5 billion in wages and salaries associated with 58,288 additional jobs supported in this region.

The total economic contribution in this region (direct, indirect and induced) during 2018/19 period from the survey participants amounted to:

- $11.2 billion in supplying business purchases;
- $4.8 billion in total wages and salaries paid to workers;
- $11.5 billion in value added, or 22.8% of total GRP in this region ($50.2 billion); and
- 68,297 full-time equivalent jobs, or 19.1% of the entire workforce in this region.

1.5 DOCUMENT PURPOSE AND STRUCTURE

This document responds to the relevant issues raised in the 65 submissions received during the public exhibition of the Response to Contentions.

This document is structured as follows:

- **Section 2** addresses the jurisdictional issues raised about the modification application;
- **Section 3** addresses the other relevant issues raised in the submissions from MSC and UHSC; and
- **Section 4** addresses the relevant issues raised by SIGs and members of the public.

2 RESPONSE TO JURISDICTIONAL MATTERS RAISED

UHSC made a submission raising a jurisdictional issue about whether AQC's application must be accompanied by a 'gateway certificate' under Clause 20 of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (Transitional Regulation).

MSC made a submission raising a jurisdictional issue about whether the adjustments to the application made in response to contentions raised by the Minister in Land and Environment Court proceedings 2019/00346483 (Proceedings) change the application to such an extent as to constitute a fresh application that is incapable of being dealt with by the LEC in the current proceedings. This issue was also raised by UHSC.

Appendix B contains legal advice from Sparke Helmore Lawyers addressing these two jurisdictional issues. In summary:

- The application was not required to be accompanied by a gateway certificate because Clause 20 of Schedule 2 of the Transitional Regulation does not apply to the application. This is because the proposed modification is entirely within the area of the existing mining leases held by AQC; and
- There is no substantial change to the underlying Section 75W application brought about by the Response to Contentions and no basis for MSC's contention that the factors it has identified have resulted in a fresh application that is beyond the LEC's power to consider.

3 RESPONSES TO REGULATORY SUBMISSIONS

3.1 MUSWELLBROOK SHIRE COUNCIL

3.1.1 Mine Closure Plan

Issue

MSC noted that a Mine Closure Plan is required to be prepared in respect of Dartbrook Mine.

Response

Condition 2.1(e) of DA 231-7-2000 requires that:

> *"At least two years prior to the cessation of mining operations the Applicant shall investigate, determine and report, taking account of the potential community benefits, on a final strategy for the future use of the mine site, weirs, dams and any other infrastructure in consultation".*

The proponent is currently preparing a Mine Closure Plan in accordance with this requirement. The draft Mine Closure Plan will be submitted to the relevant regulatory authorities (including MSC) for comment.

3.1.2 Other Matters

MSC made statements in relation to the application process, including the current proceedings in the LEC. These issues are addressed in **Section 2**.

3.2 UPPER HUNTER SHIRE COUNCIL

3.2.1 Economics

Issue

UHSC's submission refers to the 'Resources and Energy Quarterly: June 2020´ (REQ) prepared by the Office of the Chief Economist. UHSC quotes extracts from the REQ which predict a decline in thermal coal export revenue for the 2019-20 and 2020-21 financial years. The REQ also discusses factors that may contribute to a decline in China's thermal coal imports until 2021.

Response

UHSC's discussion of the REQ is limited to the predicted decline in China's thermal coal demand from 2018-2021. This limited analysis of the REQ is erroneous for two reasons:

- Coal production associated with the Revised Modification will not commence until 2021 (at the earliest); and
- China accounts for only a fraction of Australia's thermal coal exports.

UHSC has extrapolated the medium-term trend in China's thermal coal demand to conclude that demand for Australian coal will continue to decline. This conclusion is inconsistent with the REQ, which forecasts that Australia's thermal coal exports will increase from 208 Mt in 2018 to 225 Mt in 2021. The June 2020 edition of the REQ limits its discussion to the period up to 2021. The previous edition (March 2020) includes forecasts and projections out to 2025. The demand for Australia thermal coal exports is expected to increase until 2022 and remain stable until 2025.

The March 2020 REQ forecasts a decline in thermal coal prices from 2019 to 2021, as contended by UHSC. However, this decline does not mean that future mining will not yield economic benefits. The March 2020 REQ predicted that coal prices will partially recover after 2021. The Chief Economist predicts that coal prices during the period 2021-2025 will be in the range of 67 to 77 USD/tonne (expressed in 2020 USD).

An economic impact assessment of the Revised Modification was included as Appendix F of the Response to Contentions. The economic impact assessment included a cost-benefit analysis (CBA) conducted in accordance with the '*Guideline for the economic assessment of mining and coal seam gas proposals'* (NSW Government, 2015). The CBA assumed coal prices in the range of 67.55 to 70.36 USD/t (KPMG, 2020), which is similar to the values predicted by the March 2020 REQ. Therefore, the coal prices assumed in the CBA are consistent with current market forecasts.

The CBA determined that the Revised Modification will provide net social benefits to NSW of $222M to $240M. The CBA was subjected to sensitivity analysis, which determined that even if revenues are decreased by 20%, the Revised Modification will generate significant net social benefits to NSW. The actual net benefits realised through mining in the region are reflected in the NSW Minerals Council's Annual Expenditure Survey (see **Section 1.4**).

3.2.2 Other Matters

UHSC made statements about the application process, including the current proceedings in the LEC. These issues are addressed in **Section 2**.

4 RESPONSES TO PUBLIC SUBMISSIONS

This section responds to the issues raised in public submissions on the RTC.

4.1 AIR QUALITY

4.1.1 Regional Air Quality

Issue

Several stakeholders raised concerns about air quality in the Upper Hunter, particularly given the elevated dust levels recorded in recent years.

Stakeholders

SIG1, SIG2, SIG4, P2, P3, P4, P6, P10, P14, P17, P18, P21, P23, P24, P25, P26, P27, P29, P30, P34, P36, P38, P39, P42, P44, P46, P47, P51, P55, P56, P57

Response

The potential air quality impacts of the Revised Modification were assessed using dust dispersion modelling techniques as specified in the Approved Methods (**NSW EPA, 2016**). The results of the modelling were discussed in Section 3.1 and Appendix A of the Response to Contentions. The Revised Modification is predicted to comply with the regulatory air quality criteria, except for some minor exceedances of the cumulative 24-hour average PM_{10} criterion (discussed in **Section 4.1.2**).

The air quality assessment demonstrated that the Revised Modification is a minor contributor to cumulative dust levels. Nevertheless, the proponent has committed to best practice dust management measures which will be implemented through an Air Quality and Greenhouse Gas Management Plan.

The results of the dust dispersion model indicate that under representative climatic conditions, the cumulative impacts of the Revised Modification can be managed to comply with the relevant air quality criteria.

Elevated dust concentrations recorded in recent years are attributed to the severe drought conditions experienced in the region. Dartbrook Mine (an underground mine) has been in care and maintenance and therefore did not contribute to the dust concentrations recorded in recent years.

4.1.2 Exceedances of 24-hr PM_{10} criterion

Issue

One stakeholder raised concern regarding the predicted exceedances of the 24-hour PM_{10} criterion on a cumulative basis.

Stakeholders

SIG1

Response

Cumulative 24-hour PM_{10} concentrations were calculated by adding the modelled impacts of the Revised Modification and neighbouring Mount Pleasant Mine (MTP) to the daily background PM_{10} concentrations recorded in 2014 (the representative year). This assessment determined that exceedances of the cumulative criterion coincided with natural events (such as bushfires and regional dust storms). In 2014, there were two days where the criterion (50 µg/m^3) was exceeded primarily due to natural events. There was a third day in 2014 where the background concentration was 48.7 µg/m^3, due primarily to a large fire to the west of the site. Given that the background concentration on this day was marginally less than the criterion, this day was considered in the cumulative 24-hour average PM_{10} assessment. When the modelled contributions of the Revised Modification and MTP are added, the criterion is predicted to be exceeded at seven residences (29, 66, 67, 122, 128, 445A and 445B). The maximum contribution of the Revised Modification is modelled at 0.54 µg/m^3, which represents approximately 1% of the cumulative concentration. This increment will not perceivably alter the air quality impacts on days where extreme natural events occur.

The seven residences that are predicted to experience an additional 24-hour exceedance are located to the west of Dartbrook Mine. These are some of the furthest receivers from the dust sources associated with Dartbrook Mine. The fact that closer receivers are not expected to experience exceedances of this criterion suggests that the predicted exceedances to the west of Dartbrook Mine are predominantly due to activities unrelated to Dartbrook Mine.

The assessment of 24-hour average PM_{10} concentrations is undertaken to inform the day-to-day management of a development. This assessment has shown that further dust mitigation measures should be implemented on days where background levels are elevated. Proactive management of the above-ground activities that have the potential to cause the generation of dust will be addressed in the Air Quality and Greenhouse Gas Management Plan. Dust emissions from these activities are readily controllable due to the well-defined and largely static locations that these activities occupy.

4.1.3 Assumed Background $PM_{2.5}$ Concentration

Issue

One submission noted that the assumed background level for Aberdeen (7.6 µg/m^3) is less than the average annual $PM_{2.5}$ concentration at Muswellbrook (9.1 µg/m^3) over the past six years. This submission questioned the methodology used to calculate the background $PM_{2.5}$ concentration at Aberdeen, asserting that different sources contribute to PM_{10} and $PM_{2.5}$.

Stakeholders

SIG1

Response

The Department of Planning, Industry and Environment's (DPIE) dust monitoring station at Aberdeen measures PM_{10} concentrations but not $PM_{2.5}$ concentrations. In the absence of $PM_{2.5}$ monitoring data, it was necessary to estimate the background $PM_{2.5}$ concentration at Aberdeen. The background level was calculated by adjusting the measured PM_{10} concentration at Aberdeen using percentage of $PM_{2.5}$ in PM_{10} measured at Muswellbrook.

The submission is correct in its assertion that different dust generating activities have different contributions to $PM_{2.5}$ and PM_{10} levels. However, the purpose of applying the $PM_{2.5}/PM_{10}$ is to estimate the background $PM_{2.5}$ from all sources, rather than isolating particular sources. Given that Muswellbrook and Aberdeen are in close proximity and have similar land use characteristics, the percentage of $PM_{2.5}$ in PM_{10} is unlikely to differ substantially between the two townships. In the absence of direct $PM_{2.5}$ monitoring data, the adopted methodology is appropriate for estimating the background $PM_{2.5}$ concentration at Aberdeen. In fact, it is likely that the percentage of $PM_{2.5}$ in PM_{10} will be higher in Muswellbrook than in Aberdeen due to its larger population and numbers of urban sources. Therefore, the assumed background $PM_{2.5}$ concentration for Aberdeen is likely to be conservative.

4.1.4 Basis for Cumulative Assessment

Issue

One submission noted that the air quality assessment utilised background dust concentrations from 2014, which was prior to commencement of the Mount Pleasant Mine (MTP).

Stakeholders

SIG1

Response

The submission is correct in identifying that MTP was not operating in 2014. For this reason, MTP was specifically included in the dust dispersion model so that its contribution to cumulative dust concentrations was assessed. The modelling of MTP's emissions was based on the maximum emissions predicted by the '*Mount Pleasant Operation Mine Optimisation Modification: Air Quality and Greenhouse Gas Assessment'* (TAS, 2017). By adopting this approach, the cumulative assessment effectively assumes that MTP is operating at its maximum approved production rate at the same time as the Revised Modification. The adopted approach is more conservative than using background concentrations measured since the commencement of MTP, given that MTP is not currently operating at its maximum production rate. Therefore, the cumulative assessment reflects the worst-case impacts of the Revised Modification and MTP.

4.2 GREENHOUSE GAS

4.2.1 Fugitive Emissions

Issue

Some submissions raised concerns regarding fugitive emissions of greenhouse gases (particularly methane).

Stakeholders

SIG2, P2, P4, P15, P18, P22, P34, P39, P42,

Response

Fugitive emissions were included in the calculation of Scope 1 emissions associated with the Revised Modification. The estimated Scope 1 emissions are presented in Appendix A of the Response to Contentions.

4.2.2 Climate Change

Issue

Several submissions raised concerns regarding the contribution of the Revised Modification to anthropogenic climate change. Some submissions asserted that the Revised Modification is inconsistent with the NSW Government's 'Net Zero Plan Stage 1: 2020-2030'. One submission referred to the 'carbon budget approach' which indicates an urgent need to control GHG emissions.

Stakeholders

SIG1, SIG4, SIG5, P2, P3, P4, P6, P13, P14, P17, P18, P22, P23, P24, P25, P26, P27, P29, P33, P34, P39, P42, P43, P44, P51, P55, P56, P57

Response

Australia has recognised the risk posed by anthropogenic climate change and is taking measures to reduce its emissions. In 2019, Australia added more than 2.2 GW of energy generating capacity from renewable sources, including record growth of the wind energy sector. Australia's installed wind capacity has grown from 1,840.1 MW in 2010 to 6,279.4 MW. Similarly, Australia's large-scale solar capacity has increased exponentially from 2012 to 2019 (Clean Energy Council, 2020). Clearly, Australia is in the process of transitioning from fossil fuels to alternative energy sources.

In 2019, renewable energy sources accounted for 24% of Australia's electricity production (Clean Energy Council, 2020). Although the contribution of renewable sources to total electricity generation will continue to increase, there remains a need for thermal coal to form part of the energy mix (particularly in developing countries) in the short to medium term. The Revised Modification proposes mining until the end of 2027. Australia and its trade partners will continue to rely (at least partly) on thermal coal to meet their energy needs during this timeframe.

The potential greenhouse gas (GHG) emissions associated with the Revised Modification were discussed in Section 3.3 and Appendix A of the Response to Contentions. It should be noted that only the predicted Scope 1 and 2 emissions are attributable to Australia. Product coal will primarily be exported and as such, the predicted Scope 3 emissions will be incurred by the end users' countries. It is envisaged that product coal will be exported to countries that are parties to the Paris Agreement. These countries will be responsible for managing their GHG emissions in accordance with their Nationally Determined Contribution under the Paris Agreement.

When considering the contribution of the Dartbrook Mine to GHG emissions, it is important to keep in mind that the modification involves the extraction of coal that has already been authorised for extraction.

4.3 ACOUSTICS

4.3.1 Noise

Issue

Some submissions raised concerns regarding noise emissions from the East Site.

Stakeholders

SIG2, SIG4, P22, P44, P46, P47, P51, P56, P57

Response

The noise model developed for the Revised Modification included all above-ground noise sources including the coal handling and preparation plant (CHPP), rail loading facility and reject emplacement area. The noise model predicted that the Revised Modification will comply with the noise criteria under DA 231-7-2000 at all private residences except for three receivers (303, 391 and 422) located to the south. The Revised Modification will comply with the prescribed noise criteria for locations in Aberdeen.

Under worst case meteorological conditions, Receivers 303, 391 and 422 may experience noise levels up to 1 dBA above the relevant criteria. Table 1 of the '*Voluntary Land Acquisition and Mitigation Plan'* (VLAMP) explains that exceedances of 0-2 dBA are considered negligible and would "*not be discernible to the average listener and therefore would not warrant receiver based treatments or controls*" (NSW Government, 2018). Notwithstanding, the Noise Management Plan will include proactive management measures to minimise the risk of noise exceedances during adverse conditions.

The potential noise impacts of the Revised Modification are discussed in Section 3.2 and Appendix B of the Response to Contentions.

4.3.2 Vibration

Issue

One submission expressed concern about vibration levels in Aberdeen.

Stakeholders

P22

Response

The Revised Modification does not involve blasting and will not result in any discernible vibration from any source at any private receivers.

4.4 SUBSIDENCE

4.4.1 Impacts on Streams

Issue

One submission raised the issue of subsidence impacts on streams.

Stakeholders

P22

Response

The Approved Mining Area is sited such that there will be no longwall mining beneath the main channels of the Hunter River, Dart Brook or Sandy Creek. As such, these streams are not expected to experience subsidence impacts such as streambed cracking or changes in gradient. The ephemeral tributaries of Sandy Creek are the only streams that may experience subsidence impacts. The Extraction Plan that is required by DA 231-7-2000 will include remediation measures for subsidence impacts to streams. Given that impacts to major streams will be avoided and impacts to minor streams are able to be remediated, the Revised Modification can be undertaken in accordance with the performance measures specified in DA 231-7-2000.

4.5 SURFACE WATER

4.5.1 Water Security

Issue

Some submissions requested further details on the water requirements of the Revised Modification and expressed concern about availability of water in the Hunter River.

Stakeholders

SIG4, P1, P19, P24, P56

Response

Dartbrook Mine passively makes water through groundwater inflows (including inflows to the Hunter Tunnel) and rainfall runoff captured by its dams. Inflows to the water management system will be reused to satisfy operational water demands wherever possible. External water resources (i.e. raw water from the Hunter River) will only be relied upon when there is a shortfall.

The proponent currently holds Water Access Licences (WALs) with a total share component of 3,053.8 units in the Hunter Regulated River Water Source. Dartbrook Mine has historically operated without needing to extract significant quantities of water from the Hunter River. The proponent's current WALs are expected to be sufficient for the remainder of the mine life. Therefore, the Revised Modification will not have any additional impacts on the Hunter River water source.

4.5.2 Stream Water Quality

Issue

Some submissions raised the potential impacts on stream water quality due to offsite discharges.

Stakeholders

P22, P47, P55,

Response

The water management system at Dartbrook Mine is described in Section 3.2.8 of the EA. During wet periods, water is pumped from mine water dams to the Wynn Seam goaf in order to maintain sufficient freeboard. This reduces the risk of overflows (uncontrolled discharges) from these dams. There is approximately 2,915 ML of storage capacity in the Wynn Seam goaf. When required, the storage volume in the Wynn Seam goaf can be managed by pumping water to the Evaporation Ponds. Passive release of water through evaporation has historically been effective at maintaining sufficient capacity in the water management system to accommodate inflows to the site. The five year extension of mining will provide an avenue for the productive reuse of water currently being stored in the Wynn Seam goaf. Use of this water for operational purposes (such as dust suppression and coal beneficiation) will further reduce the likelihood of needing to discharge water off-site.

4.5.3 Flooding

Issue

One submission raised concerns related to flooding of the surrounding watercourses.

Stakeholders

P13

Response

UHSC commissioned the '*Aberdeen Flood Study'* (WMAwater, 2013), which modelled the flood regime of the Hunter River in the vicinity of Aberdeen. The West Site and East Site infrastructure are located outside of the flood extent of the Hunter River and Dart Brook under a 100 year average recurrence interval (ARI) storm event. Therefore, the Revised Modification will not be affected by flooding of the Hunter River or Dart Brook.

4.6 GROUNDWATER

4.6.1 Impacts on Aquifers

Issue

Some submissions raised concerns in relation to impacts on the Hunter River alluvial aquifer.

Stakeholders

SIG1, SIG4, P43, P51

Response

Groundwater modelling was undertaken by Mackie Environmental Research (MER, 2000) to predict the drawdown that may result from the approved mining activities. The drawdown predicted by MER includes the effects of mining in the Piercefield Seam, which is not included in the Revised Modification. As such, the impacts of the Revised Modification will be less than the predictions of the MER model.

The MER model predicted seepage from the alluvial aquifer in the order of 0.1 ML/day. This rate of seepage is orders of magnitude less than the rate of rainfall recharge. Accordingly, MER concluded that "*existing bores and wells in the alluvial lands will remain unaffected by depressurisation in the coal measures*". Monitoring data collected since 1998 indicates that there has been no observable drawdown of the alluvium in the vicinity of Dartbrook Mine.

One submission asserted that the 10 m drawdown contour intersects the Hunter River alluvium. The drawdown contours predicted by the MER model were presented in Figure 6.2 of Appendix D of the Response to Contentions. The 10 m drawdown contour intersects the alluvial sediments of Sandy Creek, which is a tributary of the Hunter River. Neither the 10 m nor the 1 m drawdown contour intersects the Hunter River alluvium.

4.6.2 Water Licensing

Issue

Some submissions asserted that the proponent does not hold sufficient WALs to account for the groundwater take predicted for the Revised Modification.

Stakeholders

SIG1, P43, P51

Response

The maximum seepage from the Hunter River alluvium due to the approved mining activities was predicted to be 0.1 ML/day. The proponent currently holds WALs with a total share component of 1,249 units in the Hunter Regulated River Alluvial Water Source. These WALs are more than sufficient to account for the predicted take from the Hunter River alluvial aquifer.

The groundwater model predicted that mine inflows would peak at 584 ML/year at the end of the approved longwall mining. This maximum inflow rate will not occur as it is not possible to complete all of the approved longwall mining within the remaining mine life.

The water monitoring program at Dartbrook Mine includes monitoring of volumes pumped into and out of the Wynn Seam goaf. This water balance can be used to calculate the inflows from the Permian groundwater system. The proponent currently holds WALs with a total share component of 180 units in the Sydney Basin – North Coast Groundwater Source. If the water balance indicates that take from the Permian groundwater system is greater than 180 ML/year, the proponent will obtain further WALs in the relevant water source. There is currently 82,000 units allocated to this water source. Units are able to be traded between interested parties.

4.6.3 Private Bores

Issue

Some submissions asserted that the predicted impacts on private bores will exceed the minimal impact considerations prescribed by the Aquifer Interference Policy.

Stakeholders

SIG1, SIG4, P2, P21

Response

Potential impacts on private groundwater bores were discussed in Section 6.3 of Appendix D of the Response to Contentions. AGE (2020) identified five private bores that may experience more than 2 m of drawdown, which is the threshold prescribed by the Aquifer Interference Policy (AIP). However, exceedance of this threshold does not preclude mining. Rather, the AIP states that *"If more than 2m decline cumulatively at any water supply work then make good provisions should apply".* If a landowner reports loss of bore yield, an investigation will be undertaken to determine if the loss is due to activities at Dartbrook Mine. In the unlikely event that the loss is caused by Dartbrook Mine, the proponent will re-establish or replace the landowner's water supply in consultation with that landowner. Therefore, the proponent will 'make good' any loss of bore yield in accordance with the AIP.

4.6.4 Hunter Tunnel Inflows

Issue

Some submissions asserted that seepage into the Hunter Tunnel was not addressed in the EA. One submission suggested that the use of Evaporation Ponds is evidence of mine inflows being greater than predicted by the groundwater model.

Stakeholders

SIG2, P40

Response

Seepage into the Hunter Tunnel was addressed in Section 8.3.3 of the EA. The proponent holds WALs with a total share component of 1,249 units in the Hunter Regulated River Alluvial Water Source. These WALs are more than sufficient to account for the rates of seepage that have historically been observed.

Evaporation Ponds facilitate the passive release of water through evaporation, and therefore provide an alternative to offsite discharges. The Evaporation Ponds are an integral part of Dartbrook Mine's water management system, which has successfully minimised the need for offsite discharges. The Evaporation Ponds are not a contingency measure, as suggested by this submission.

4.7 ECOLOGY

4.7.1 Impact on Habitat

Issue

One submission raised concerns in relation to impacts on animal habitat.

Stakeholders

P44

Response

The Revised Modification does not seek approval for the construction of any additional infrastructure above or below ground that that would result in any disturbance beyond that of the approved development. The surface infrastructure required for future operations is already in place. Future disturbance will be limited to the approved reject emplacement area, which is located on grassland that provides low biodiversity value and the impacts of subsidence that will be far less than that currently approved.

4.7.2 Rehabilitation

Issue

One submission suggested that the proponent will not properly rehabilitate the site due to its financial position.

Stakeholders

P33

Response

In NSW, holders of mining leases are required to lodge a security deposit. The security deposit is not released until the lease holder has satisfactorily completed their obligations under the conditions of the lease, which includes rehabilitation of the site. If required, the security deposit can be used to fund rehabilitation or other environmental management works. AQC has lodged the appropriately calculated security deposits required under its mining leases (CL386, ML1456 and ML1497).

4.8 SOCIAL

4.8.1 Cumulative Social Impact Assessment

Issue

Some submissions requested an assessment of cumulative social impacts including health, quality of life, amenity, housing affordability and labour market dynamics.

Stakeholders

SIG1, SIG5

Response

An assessment of all relevant social impacts was presented in Section 4 of the Social Response (Appendix E of the Response to Contentions).

4.8.2 Health and Wellbeing

Issue

Some submissions questioned the conclusion that the Revised Modification will have a positive effect on health and wellbeing.

Stakeholders

SIG1, SIG3

Response

The Hunter Research Foundation (2016) conducted a survey of 649 residents of the Hunter to evaluate the health and wellbeing of the regional community. This survey found that unemployment and loss of job security had a detrimental impact on residents' wellbeing. The Revised Modification will improve job security in the local area by generating new employment opportunities. The expenditure and increased household income generated by the Revised Modification will also stimulate the local economy, which will benefit local business owners. Therefore, the economic benefits of the Revised Modification will have a positive impact on health and wellbeing.

Hunter Research Foundation (2016) also found that impacts of development (such as noise) can have a negative impact on wellbeing. Dust and noise modelling have demonstrated that with the implementation of best practice environmental controls, the Revised Modification will generally comply with regulatory air quality and noise standards. Exceedances of air quality criteria will be limited to isolated exceedances of the cumulative 24-hour PM_{10} criteria on days where the background air quality is influenced by extreme natural events (as discussed in **Section 4.1.2**). Noise exceedances are predicted to be limited to negligible exceedances (as defined in the VLAMP) of noise criteria at three residences (as discussed in **Section 4.3.1**).

The dust and noise emissions of the Revised Modification have been considered when assessing its impact on health and wellbeing. However, the predicted exceedances are negligible in magnitude and affect only a small number of residences during worst-case meteorological conditions. The negative social impact of these exceedances is outweighed by the positive impact of the Revised Modification on job security.

The outcomes of the Hunter Research Foundation (2016) study are discussed further in Section 2.6.3 of Appendix E of the Response to Contentions.

4.8.3 Housing Affordability

Issue

Some submissions raised concerns regarding potential effects on housing affordability.

Stakeholders

SIG1, P3, P4, P18, P24, P27, P39, P44

Response

Trends in housing and rental prices for Muswellbrook, Aberdeen and Scone were discussed in Section 2.3 of the Social Response (Appendix E of the Response to Contentions). In the past decade, median house prices in Muswellbrook and Aberdeen peaked in 2013, whilst Scone reached its peak in 2014. Median house prices then declined in all three townships until 2016. House prices in Muswellbrook, Aberdeen and Scone have increased since 2016, albeit not returning to the peak values in 2013/14.

A similar trend has occurred in the rental market, with a decline in median rent prices from the early part of the decade until 2016), followed by partial recovery since 2016.

The decline in housing and rental prices from 2013/14 to 2016 coincided with the closure of the Drayton Mine, which employed a significant number of persons residing in Muswellbrook and Aberdeen. The recovery in prices since 2016 coincided with the construction phase and commencement of operations at MTP. The trends observed over the past decade indicate a correlation between size of the labour force and housing prices.

The size of the labour force in the Muswellbrook and Upper Hunter LGAs peaked in 2013. The peak labour forces for the Muswellbrook and Upper Hunter LGAs were 9,100 and 7,923, respectively. The maximum operational workforce for the Revised Modification is expected to be 192 FTE personnel. Even with the addition of these jobs, the labour force for the Muswellbrook and Upper Hunter LGAs will be less than the historical peak. As a result, housing and rental prices are expected to remain within recently experienced ranges.

4.8.4 Lack of Economic Benefit

Issue

One submission asserted that the Muswellbrook LGA is 'on the cusp of the lowest quintile for social disadvantage' and cited higher than average rates of crime and domestic violence. This stakeholder concluded that the economic benefits of mining have not been passed onto the Muswellbrook community.

Stakeholders

SIG1

Response

This submission cites statistics from the '*Mangoola Coal Continued Operations Project: Social Impact Assessment'* (Umwelt, 2019) (Mangoola SIA). Table 5.15 of the Mangoola SIA shows the ranking of the Muswellbrook LGA based on different crime indicators. The lower the ranking, the higher the rate of that crime. For example, a ranking of 5 for 'break and enter' indicates that Muswellbrook LGA has the fifth highest rate of break and enter offences in the state.

Table 5.15 of the Mangoola SIA presents the crime rankings for the Muswellbrook LGA between 2013 and 2017. Although different trends are apparent for different categories of crime, the ranking of the LGA was generally worse in 2015/16 than in 2013 (i.e. crime rate worsened from 2013 to 2016). In particular, the LGA's ranking significantly worsened in the following categories:

- Assault (non-domestic violence);
- Sexual offences;
- Steal from a retail store; and
- Malicious damage to property.

The increase in crime rates from 2013 to 2015/16 correlates with the increase in local unemployment during the same period. Table 5.15 of the Mangoola SIA also shows that in a number of crime categories, the ranking of Muswellbrook LGA improves from 2016 to 2017. Although this does not represent a long-term trend, it suggests that the recovering employment rate from 2016 onwards may influence crime rates.

Whilst the submission cites statistics that suggest social disadvantage, it has not considered trends and possible drivers of those trends. The trends evident in the data from 2013 to 2017 suggests that there is a correlation between social disadvantage and unemployment. The Revised Modification will generate jobs in the Muswellbrook LGA, which will help to alleviate social disadvantage.

The economic benefits generated by the mining industry in NSW are outlined in **Section 1.4**. This demonstrates that mining generates socio-economic benefits for both the local community and wider NSW community.

4.8.5 Suitability of Data

Issue

One submission criticised the data relied upon for the preparation of the Social Response (Appendix E of the Response to Contentions). This stakeholder asserted that the data was out of date, and that community engagement should have been undertaken to obtain 'real-time data'.

Stakeholders

SIG5

Response

The submission noted that *"Much of the desktop data referenced in the Social Response is more than 10 years old, with much of the more recent data referenced being at least four years old (e.g. 2016 ABS data)".* The Social Response was prepared to address the Minister's contention that changes in the surrounding area since the grant of DA 231-7-2000 have not been considered. Given that the purpose of the desktop review is to establish the local conditions from 2001 to 2020, it is appropriate to use data from this period. Australian Bureau of Statistics (ABS) data from 2016 is referred to extensively because this represents the most recent census. ABS census data is reliable because it reflects conditions at the population level.

In addition to ABS data, the Social Response considered surveys commissioned by MSC (2019), UHSC (2013, 2015 and 2017) and the Hunter Research Foundation (2016). Surveys that are commissioned by local governments or independent organisations are more likely to provide a representative and impartial indication of community perceptions than consultation programs undertaken by mining proponents.

4.8.6 Impacts of Changes to the Modification

Issue

One submission asserted that the socio-economic impacts of the changes to the scope of the Modification had not been assessed in the Social Response.

Stakeholders

SIG5

Response

This submission asserted that the Social Response did not assess the impacts of quadrupling coal production, truck movements and reclamation of rehabilitated land for re-establishment of the CHPP. The Revised Modification does not propose any change to the coal production rate, as DA 231-7-2000 currently authorises the production of up to 6 Mtpa of ROM coal. Truck haulage of coal (which was previously described in the EA) is no longer proposed to be undertaken. Instead, all ROM coal will be transported to the CHPP using the Hunter Tunnel. The CHPP is already in place and re-commissioning its infrastructure will not involve any further disturbance. As such, there will be no reclamation of rehabilitated land (as was contended by this submission).

4.9 ECONOMICS

4.9.1 Thermal Coal Price

Issue

Some submissions questioned the economic benefit of the Revised Modification given recent declines in thermal coal prices.

Stakeholders

SIG2, SIG4, P2, P3, P4, P10, P11, P18, P54

Response

An economic impact assessment of the Revised Modification was conducted in accordance with the '*Guideline for The Economic Assessment of Mining and Coal Seam Gas Proposals'* (NSW Government, 2015). This assessment was provided in Appendix F of the Response to Contentions.

The economic impact assessment was conducted using coal prices forecasted by KPMG (2020). The adopted coal prices represent the predicted average values for the period 2021 to 2024. Long-term averages provide a better indication of a development's economic benefits than short-term fluctuations, such as the recent decline in coal prices referenced by some submissions.

It should be further noted that fluctuations in coal price are more relevant to company profitability than the socio-economic benefits to society of a development. This is particularly the case with this development, where the vast majority of environmental costs associated with the operation of the mine have already been incurred (with a bond in place with the NSW Government to cover the cost of the rehabilitation of the mine site), whilst only very few socio-economic benefits can be realised without the mine operating.

4.9.2 Labour Market Dynamics

Issue

Some submissions raised concerns about the risk of labour shortages in other industries. One submission referred to the Local Effects Analysis' assumption that all 156 local hires will be diverted from other occupations.

Stakeholders

SIG1, SIG3, P22, P26

Response

The Local Effects Analysis (LEA) was conducted in accordance with the '*Guideline for the economic assessment of mining and coal seam gas proposals'* (NSW Government, 2015). This Guideline stipulates that the LEA should assume full employment within the local economy. That is, the LEA must assume that mining personnel are recruited from other jobs, and that the vacancies created by the new development are unfilled (i.e. no job chain effects). This assumption clearly does not reflect the actual conditions in the local area. Rather, it is a theoretical exercise used to calculate the minimum local benefits that may accrue from a development.

Since 2016, the unemployment rate in the Muswellbrook LGA has fluctuated between 6.3% and 7.8% (DESE, 2020). This is substantially higher than the NSW average (excluding 2020 values which are affected by COVID-19), which indicates that the workforce for the Revised Modification can be filled without significantly drawing upon workers in other jobs.

4.10 LAND USE

4.10.1 Impacts on Agriculture

Issue

Several submissions expressed concerns in relation to potential impacts on the local agricultural industry, such as impacts to land and water supplies. These submissions raised the UHSC's focus on agriculture rather than mining.

Stakeholders

P1, P3, P4, P9, P10, P11, P13, P14, P17, P20, P21, P22, P23, P24, P25, P26, P27, P29, P34, P35, P36, P37, P39, P42, P43, P48, P50, P52, P56, P57

Response

Given that the surface infrastructure required for mining operations is already in place, the Revised Modification will not involve any land disturbance beyond that of the approved development.

Underground mining generally does not preclude agricultural activities on the overlying land. The land overlying the Approved Mining Area was used for agricultural purposes during previous longwall mining, and continues to be used for those purposes.

The approved longwall mining may result in subsidence impacts such as surface cracking and bulging, and localised ponding of ephemeral streams. Impacts of this nature are able to be remediated and as such, will not render the land unsuitable for agricultural use. A protocol to remediate subsidence impacts (if they occur) will be included in the Extraction Plan to be prepared prior to further longwall mining. The potential subsidence impacts of the Revised Modification are discussed further in Appendix C of the Response to Contentions.

The iconic Garoka Dairy has historically successfully operated on part of its landholding. The operation of the diary will not be affected by the Revised Modification.

Given that there will be no loss of agricultural land through disturbance or subsidence, the Revised Modification will not affect the local agricultural industry.

Impacts of the Revised Modification on water supplies are discussed in **Section 4.5.1**. The proponent's WALs are more than sufficient to account for potential future take from the Hunter River. As such, the Revised Modification will not affect the availability of water for agricultural purposes.

4.10.2 Impacts on Tourism

Issue

Several submissions raised concerns about potential impacts to the local tourism industry, which is a focus of the UHSC.

Stakeholders

P3, P4, P11, P14, P21, P22, P23, P24, P25, P27, P29, P30, P34, P39, P48

Response

The tourism value of an area is linked to its visual amenity. The surface infrastructure required for mining operations is extant with no additional infrastructure proposed for the Revised Modification. Truck haulage of coal and construction of a new shaft facility (as described in the EA) are no longer proposed. Therefore, the Revised Modification does not involve any activities that will affect the visual amenity of the area.

4.10.3 Strategic Agricultural Land

Issue

Some submissions raised concerns about mining in the vicinity of mapped Strategic Agricultural Land.

Stakeholders

SIG4, SIG5, P47

Response

The Revised Modification will not involve any disturbance of SAL.

The Approved Mining Area is located directly beneath an area of Equine Critical Industry Cluster (ECIC) and west of an area of Biophysical Strategic Agricultural Land (BSAL). The potential subsidence impacts on ECIC and BSAL were assessed in Appendix C of the Response to Contentions. The approved longwall mining activities in the Kayuga Seam are sufficiently offset from areas of mapped BSAL to avoid inducing surface deformations in those areas. Longwall mining beneath ECIC may result in surface cracking and bulging. Impacts of this nature are able to be readily remediated and as such, will not preclude the use of the land for equine purposes.

4.10.4 Decline in Thermal Coal Demand

Issue

Some submissions asserted that the Revised Modification is inconsistent with the NSW Government's 'Strategic Statement on Coal Exploration and Mining in NSW', which recognises a global decline in future demand for thermal coal.

Stakeholders

SIG2, P18

Response

The '*Strategic Statement on Coal Exploration and Mining in NSW*' (NSW Government, 2020) (Strategic Statement) states that:

> *"Many countries around the world have begun a transition away from fossil fuels to low carbon sources of energy to meet commitments under the Paris Agreement. This will ultimately lead to the global phasing out of coal in electricity generation (thermal coal), but will take some decades to complete".*

Whilst the submissions refer to the end objective of replacing fossil fuels with renewable energy sources, the timeframe for this transition has not been acknowledged. The transition to renewable energy sources is a gradual process that will occur over decades. The long timeframe is due to the significant infrastructure required to satisfy NSW's energy demand using alternative sources. The Strategic Statement predicts that the demand for thermal coal will be sustained for at least two decades. The Revised Modification proposes mining until December 2027. Therefore, demand for thermal coal will persist throughout the duration of the Revised Modification.

4.10.5 Hunter Regional Plan

Issue

Some submissions asserted that the Revised Modification is inconsistent with the goals of the NSW Government's 'Hunter Regional Plan 2036'.

Stakeholders

P9, P20, P37, P50, P52

Response

The '*Hunter Regional Plan 2036'* (NSW Government, 2016) (HRP) sets the aspirational goal of developing the Hunter region into "*the leading regional economy in Australia*". The HRP recognises that the Hunter region will experience a transformation of its power generation industry. As explained in **Section 4.10.4**, the transition from fossil fuels to renewable energy sources is a gradual process, and there will be demand for both coal and other energy sources during the timeframe of the Revised Modification. The HRP confirms the ongoing need for a variety of energy resources through the following action:

> *"Identify the land and infrastructure requirements to develop the Hunter's coal and alternative energy resources".*

The Revised Modification is therefore consistent with the HRP.

4.11 MISCELLANEOUS

4.11.1 Scope of the Modification

Issue

One submission asserted that the impacts of longwall mining and coal washing have not been adequately assessed.

Stakeholders

SIG4

Response

The impacts of the Revised Modification were assessed in the Response to Contentions. The subsidence and groundwater impacts assessments (Appendices C and D of the Response to Contentions) considered the full impacts of mining the approved longwall panels, except for the Piercefield Seam longwall panels (which have been removed from the Revised Modification).

The air quality and acoustic impact assessments assumed extraction and processing of ROM coal at the maximum production rate of 6 Mtpa. Therefore, the worst-case impacts of operating the CHPP have been assessed.

4.11.2 Visual

Issue

Some submissions expressed concern that the Revised Modification will result in 'visual pollution'.

Stakeholders

SIG4, P51

Response

The surface infrastructure required for mining operations is in place and no additional infrastructure is required to be constructed for the Revised Modification. Truck haulage of coal and construction of a new shaft facility (as described in the EA) are no longer proposed. Therefore, the Revised Modification does not involve any activities that will affect the visual amenity of the area.

4.11.3 Mine Safety

Issue

Some submissions raised concerns regarding the safety of Dartbrook Mine.

Stakeholders

SIG2, SIG4, P1, P15, P18, P22, P36, P42, P45, P51

Response

Mine safety is a very important issue. In NSW, there are a number of specific statutes that comprehensively regulate safety issues in the underground mining industry. The principal statutes are the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*. These laws support the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2017* and provide additional provisions for work health and safety issues unique to mine sites. The NSW Resources Regulator has been established to regulate safety issues in the mining industry. There is a comprehensive system of mine safety that applies to all NSW mines and that system will apply appropriate safety controls to the operation of the Dartbrook Mine. For this reason, mine safety at Dartbrook Mine is satisfactorily addressed – a position demonstrated by the fact that the Minister no longer raises a mine safety contention in the proceedings.

4.11.4 Hunter Tunnel

Issue

Some stakeholders inferred that the reason for the originally proposed alternative coal clearance system was because the Hunter Tunnel was in poor condition.

Stakeholders

SIG2, P9, P20, P37, P50, P52

Response

The justification for the alternative coal clearance system (i.e. truck haulage of ROM coal) was provided in Section 4.8.3 of the EA.

Recommissioning the Hunter Tunnel will involve the installation of a new conveyor system along its full length. At the time of preparing the EA, reinstating the conveyor was a less economically efficient option than overland transportation of ROM coal. The reason for proposing an alternative coal clearance system was not because of the Hunter Tunnel's physical condition.

AQC has re-considered its options for the coal clearance system, having regard to revised economic factors, environmental constraints and stakeholder concerns. Re-commissioning of the Hunter Tunnel is now the proponent's preferred approach. The underground conveyor has the advantage of not generating any dust, noise or visual impacts and therefore will not negatively impact upon the equine and racing industry.

4.11.5 Target Seam

Issue

One submission requested clarification of the following statement in Section 2.2.1 of the Response to Contentions:

> *"There is approximately 61.8 Mt of ROM coal remaining in the Kayuga and Mt Arthur Seams that is approved to be extracted. Given that the indicative maximum production for the Revised Modification is 37.4 Mt of ROM coal (see Table 1), all mining during the Extension Period is likely to occur within this horizon".*

Stakeholders

SIG1

Response

As explained in Section 1.3 of the Response to Contentions, the proponent will accept a condition restricting mining of the Piercefield Seam (notwithstanding that it is authorised for extraction). As a consequence, mining operations will be limited to the Kayuga and Mt Arthur Seams. This constraint is significant because it reduces the potential subsidence and groundwater impacts of the Revised Modification to that well below what is currently approved.

The purpose of the statement quoted from Section 2.2.1 of the Response to Contentions is to demonstrate that the coal resources approved to be extracted from the Kayuga and Mt Arthur Seams are sufficient to sustain the mining activities included in the Revised Modification. The fact that the approved coal resource (61.8 Mt) is greater than the maximum production projected for the Revised Modification (37.4 Mt) does not imply that mining will continue beyond the duration of DA 231-7-2000.

4.11.6 Open Cut Mining

Issue

Some stakeholders asserted that the Revised Modification is merely a precursor to open cut mining and that impacts of future open cut mining should be considered.

Stakeholders

SIG3, P21, P22, P34, P36, P45

Response

AQC periodically publishes issues of its *'Dartbrook Newsletter'*, which is distributed to local landowners and businesses. Issues 1 to 6 of the newspaper informed the community that AQC was conducting a Pre-feasibility Study into potential open cut mining and had the intention of making a Development Application in the future. AQC has no current plans for open cut mining, as evidenced by its decision not to lodge a Development Application in respect of open cut mining. Arguments related to open cut mining at Dartbrook Mine are not relevant to the assessment of the Revised Modification.

4.11.7 Land Sales and the Status of AQC

Issue

Some submissions expressed concern about AQC offering land and water licences associated with Dartbrook Mine for sale. Some submissions have also raised issues about the financial stability of AQC.

Stakeholders

SIG4, SIG5

Response

AQC has recently been exploring the potential sale of some of its surface land holdings. It is important to note that AQC has not yet sold any land or water licences and does not propose to engage in any real estate or water transactions that would be prejudicial to the ongoing operation of Dartbrook Mine. In the event that there are surface lands or water entitlements sold, those transactions will take place in a manner that preserves AQC's ability to successfully undertake the Revised Modification. The Dartbrook Mine is an underground operation and the principal property law entitlement to carry out the proposed mining activities is contained in the mining leases that AQC holds. The *Mining Act 1992* makes provision for the management of the relationship between the owner of the surface lands and the operator of an underground mine. It is not unusual for underground mining projects to take place below surface lands owned by third parties.

AQC has assessed whether it can feasibly conduct the mining operation without owning some of the surface lands that it currently owns. AQC has determined that it is possible for the mine to co-exist with farming operations undertaken by third parties on some of the surface lands. This demonstrates that the potential impact of the Revised Modification on the overlying land is very minor. The presence of the mine does not impose any material or unmanageable constraint on the farming operations that take place on the surface.

Australian Pacific Coal Ltd, the parent company of the applicant, is a publicly company listed on the Australian Stock Exchange and is subject to the disclosure obligations and other duties imposed by the Corporations Law. Whilst the financial position of AQC is not a relevant consideration in a planning application, it does have access to the necessary resources to carry out the Revised Modification if approved on terms acceptable to AQC.

The determination of the modification application must focus on the development – not the developer. The financial circumstances of AQC are irrelevant to the determination of the current application.

* * *

For
HANSEN BAILEY

Andrew Wu
Senior Environmental Engineer

James Bailey
Director

5 ABBREVIATIONS

Term	Definition
ABS	Australian Bureau of Statistics
AIP	Aquifer Interference Policy
AQC	AQC Dartbrook Management Pty Limited
ARI	Average Recurrence Interval
BSAL	Biophysical Strategic Agricultural Land
CBA	Cost-Benefit Analysis
CHPP	Coal Handling and Preparation Plant
dBA	The sound pressure level, expressed as decibels and scaled on the '*A-weighted'* scale
DP&E	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Industry and Environment
EA	Environmental Assessment
ECIC	Equine Critical Industry Cluster
EP&A Act	*Environmental Planning and Assessment Act 1979*
FotUH	Friends of the Upper Hunter Inc
FTE	Full-time equivalent
GHG	Greenhouse Gas
HRP	Hunter Regional Plan
HTBA	Hunter Thoroughbred Breeders Association
IPC	Independent Planning Commission
LEA	Local Effects Analysis
LEC	NSW Land and Environment Court
LGA	Local Government Area
ML	Megalitre
MSC	Muswellbrook Shire Council
Mt	Million tonnes
MTP	Mount Pleasant Mine
Mtpa	Million tonnes per annum
OEH	NSW Office of Environment and Heritage
PM	Particulate Matter
PM_{10}	Particulate Matter with a diameter less than 10 µm
$PM_{2.5}$	Particulate Matter with a diameter less than 2.5 µm
ROM	Run of Mine
RTS	Response to Submissions
SIG	Special Interest Group
Transitional Regulation	*Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*
UHSC	Upper Hunter Shire Council
VLAMP	Voluntary Land Acquisition and Mitigation Policy
WAL	Water Access Licence

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APPENDIX A
Table of Submissions

Stakeholder	ID	General	Air Quality	Greenhouse Gas	Acoustics	Subsidence	Surface Water	Groundwater	Ecology	Social	Economics	Land Use Compatibility	Visual	Safety	Proposed Activities	Open Cut Mining	Mine Closure Planning	Jurisdictional Matters
Upper Hunter Shire Council	UHSC										•							•
Singleton Shire Council	SSC																•	•
Lock the Gate Alliance	SIG1		•	•			•	•		•					•			
Hunter Communities Network	SIG2		•	•	•			•			•			•	•			
People for Heritage (Upper Hunter) Inc	SIG3									•						•		
Upper Hunter Thoroughbred Breeders Association	SIG4		•	•	•		•	•			•	•	•	•	•			
Friends of the Upper Hunter Inc	SIG5									•		•						
Heath Justin	P1						•					•		•				
John Shiel	P2		•	•				•			•			•				
Anita Lawrence	P3		•	•						•	•	•						
AnneMarie McLaughlin	P4		•	•						•	•	•		•				
Barbara Wood	P5	•																
Bernard Levy	P6		•	•														
Catherine Clifford	P7																	
Frederick and Pamela Moses	P8	•																
Hilton Carrigan	P9											•			•			
Janet Fenwick	P10		•								•	•						
Jason Connor	P11	•	•	•						•	•	•						
Jeff Chait	P12	•																
Joanne van Hees	P13			•			•					•						
Louise Broomfield	P14		•	•								•						
Patricia Collins	P15			•										•				
Peter Elliott	P16	•																
Richard Abbott	P17		•	•								•						
Robert McLaughlin	P18		•	•						•	•	•		•				
Steven Pratley	P19						•											
Tom Carrigan	P20											•			•			

Ben Hodges	P21		•					•				•				•		
Beverley Atkinson	P22			•	•	•	•			•		•		•		•		
Elizabeth Honey	P23		•	•								•						
Pauline Williams	P24		•	•			•			•		•						
Sharyn Munro	P25		•	•								•						
Tayah Clout	P26		•	•						•		•						
Virginia Thomas	P27		•	•						•		•						
Leonard Langford	P28	•																
Sue Abbott	P29		•	•								•						
Sue Adams	P30		•									•						
Wendy Balneaves	P31	•																
Wendy Perry	P32	•																
Wendy Wales	P33			•							•							
Alison Hodges	P34		•	•								•				•		
David Abbott	P35											•						
Hilary Nicol	P36		•									•		•		•		
Jessica Carrigan	P37											•			•			
Keith Thompson	P38		•															
Martin Cousins	P39		•	•						•		•						
Peter Hodges	P40													•				
Pip Abbott	P41		•															
Ruth Hardy	P42		•	•								•		•				
Brian Crooks	P43			•				•				•						
Carlie Brown	P44		•		•				•	•								
Graham and Helen Walker	P45													•		•		
Raymond and Joan Nash	P46		•		•											•		
Cecilia Thompson	P47		•		•		•					•				•		
Jen Tomasetti	P48											•						
Joy Ashford	P49		•															
Peter Carrigan	P50											•			•			
Prue Robertson	P51		•	•	•			•					•	•				
Sarah Carrigan	P52											•			•			
Angus Robertson	P53	•																
Catherine Russell	P54										•							
David Smith	P55		•	•			•											

Georgina Goninan	P56		•	•	•		•					•						
Susannah White	P57		•	•	•							•						
Trevor Woolley	P58	•																

APPENDIX B
Legal Advice

7 October 2020

David Conry
AQC Dartbrook Management Pty Ltd
PO Box 16330
City East QLD 4002

Dear David

Dartbrook Mod 7 – Jurisdictional Issues Raised in Submissions
Our ref: APM/AUS142-00041

1. Your instructions

1.1 AQC Dartbrook Management Pty Ltd (**AQC**) requires advice about:

(a) Whether its application to modify DA 231-7-2000 (**Mod 7 application**) must be accompanied by a 'gateway certificate' under clause 20 of Schedule 2 (**Clause 20**) of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (**Transitional Regulation**)?; and

(b) Whether adjustments made to the Mod 7 application in response to contentions raised by the Minister in Land and Environment Court proceedings No. 2019/00346483 (**Proceedings**) change the application to such an extent that it constitutes a fresh application that is incapable of being dealt with by the Court in the Proceedings?

2. Summary

2.1 The consequence of the proposed development all being within the existing mining leases is that the development proposed in the Mod 7 application does not fall within the concept of 'mining or petroleum development' for the purposes of Clause 20. For that reason, Clause 20 does not apply to the Mod 7 application and no gateway certificate is required to accompany the Mod 7 application.

2.2 Comparing the request as originally made to that which is reflected in the Response to Contentions filed by AQC in the Proceedings (**Response to Contentions**), there is nothing that is substantially different to the application made nor anything that changes the nature of the application. The Response to Contentions is directed at providing additional material to support the request as made or addressing how the application might be determined in response to the contentions raised in the Proceedings. For that reason, there is no substantial change to the underlying Mod 7 application brought about by the 'Response to Contentions and no basis for the contention raised by Muswellbrook Shire Council (**MSC**) that the factors it has identified have resulted in a fresh application that is beyond the Court's power to consider.

3. Background

3.1 AQC has commenced the Proceedings appealing against the determination of the Mod 7 application by the Independent Planning Commission (**IPC**) (as the delegate of the Minister for Planning and Public Spaces (**Minister**)).

3.2 The IPC, which is conducting the Proceedings on behalf of the Minister, has filed a Statement of Facts and Contentions which identifies the contentions which the Minister says support the IPC's determination of the Mod 7 application on 9 August 2019.

3.3 As part of the Court's conciliation process, AQC has provided a 'Response to Contentions' which contains material addressing the contentions raised by the IPC in the Proceedings (**Response to Contentions**). The Response to Contentions contains further environmental studies and adjusts aspects of the Mod 7 application to address contentions that have been raised. In particular, the Response to Contentions indicates that AQC will no longer require modification of the coal clearance system associated with the project and that it would accept a condition restriction mining in the Piercefield seam.

3.4 On 4 September 2020 the IPC publicly notified the Response to Contentions. Approximately 65 submissions were received. In particular:

(a) The submission received from the Upper Hunter Shire Council (**UHSC**) raises a jurisdictional issue about whether the Mod 7 application must be accompanied by a 'gateway certificate' under Clause 20, and

(b) The submission received from MSC raises a jurisdictional issue about whether the further environmental studies and other adjustments to the Mod 7 application contained in the Response to Contentions has changed the Mod 7 application to such an extent that it is a new application which the Court has no power to determine.

3.5 The purpose of this advice is to address the jurisdictional issues raised by UHSC and MSC.

4. Requirement for a 'gateway certificate'

4.1 The Mod 7 application is a modification application made under the former section 75W of the *Environmental Planning & Assessment Act 1979* (**EPA Act**) under the former clause 8J(8) of the *Environmental Planning and Assessment Regulation 2000* (**EPA Regulation**). By virtue of clause 3BA(3) of Schedule 2 of the Transitional Regulation, the Mod 7 application continues to be treated as a modification application under the former section 75W of the EPA Act.

4.2 Section 5.1.3 of the environmental assessment prepared for the Mod 7 application states that "*Clause 20 of Schedule 6A of the EPA Act applies to modification applications made under section 75W of the Act, including modifications referred to in clause 8J(8) …*"

4.3 The provisions in clause 20 of Schedule 6A of the EPA Act have since been (in effect) transferred to Clause 20 following the commencement of the *Environmental Planning and Assessment Amendment Act 2017*.

4.4 Clause 20 applies to the '*modification of certain approved projects and development consents relating to mining or petroleum development on strategic agricultural land*.' The full text of Clause 20 is set out in **Annexure A** to this advice.

4.5 Clause 20(4) of Schedule 2 of the Transitional Regulation requires a modification application **to which the clause applies** to be accompanied by a current gateway certificate or site verification certificate. The question which arises from Clause 20(4) is whether Clause 20 'applies' to the Mod 7 application.

4.6 Clause 20(1) identifies the applications to which Clause 20 applies and provides (our emphasis added):

> (1) This clause applies to the following requests and applications—

(a) a request to modify an approved project,

(b) an application for the modification of a development consent referred to in clause 8J(8) of the Environmental Planning and Assessment Regulation 2000,

but only if the request or application relates to **mining or petroleum development** on the following land—

(c) land shown on the Strategic Agricultural Land Map,

(d) any other land that is the subject of a site verification certificate.

4.7 The Mod 7 application involves an application under the former clause 8J(8) of the EPA Regulation and involves land shown on the Strategic Agricultural Land Map. The question that determines whether Clause 20 applies to Mod 7 is therefore whether the application "relates to mining or petroleum development" as that expression is defined in Clause 20.

4.8 Clause 20(2)-(3) of Schedule 2 relevantly provides (our emphasis added):

"(2) In this clause, **mining or petroleum development means**:

(a) development specified in clause 5 of Schedule 1 to *State Environmental Planning Policy (Major Development) 2005* (as in force immediately before the repeal of that Schedule), but only if:

(i) **a mining lease under the Mining Act 1992 is required to be issued** to enable the development to be carried out under the modified approval or consent **because**:

(A) **the development is proposed to be carried out outside the mining area of an existing mining lease**, or

(B) **there is no current mining lease in relation to the proposed development**, or

…

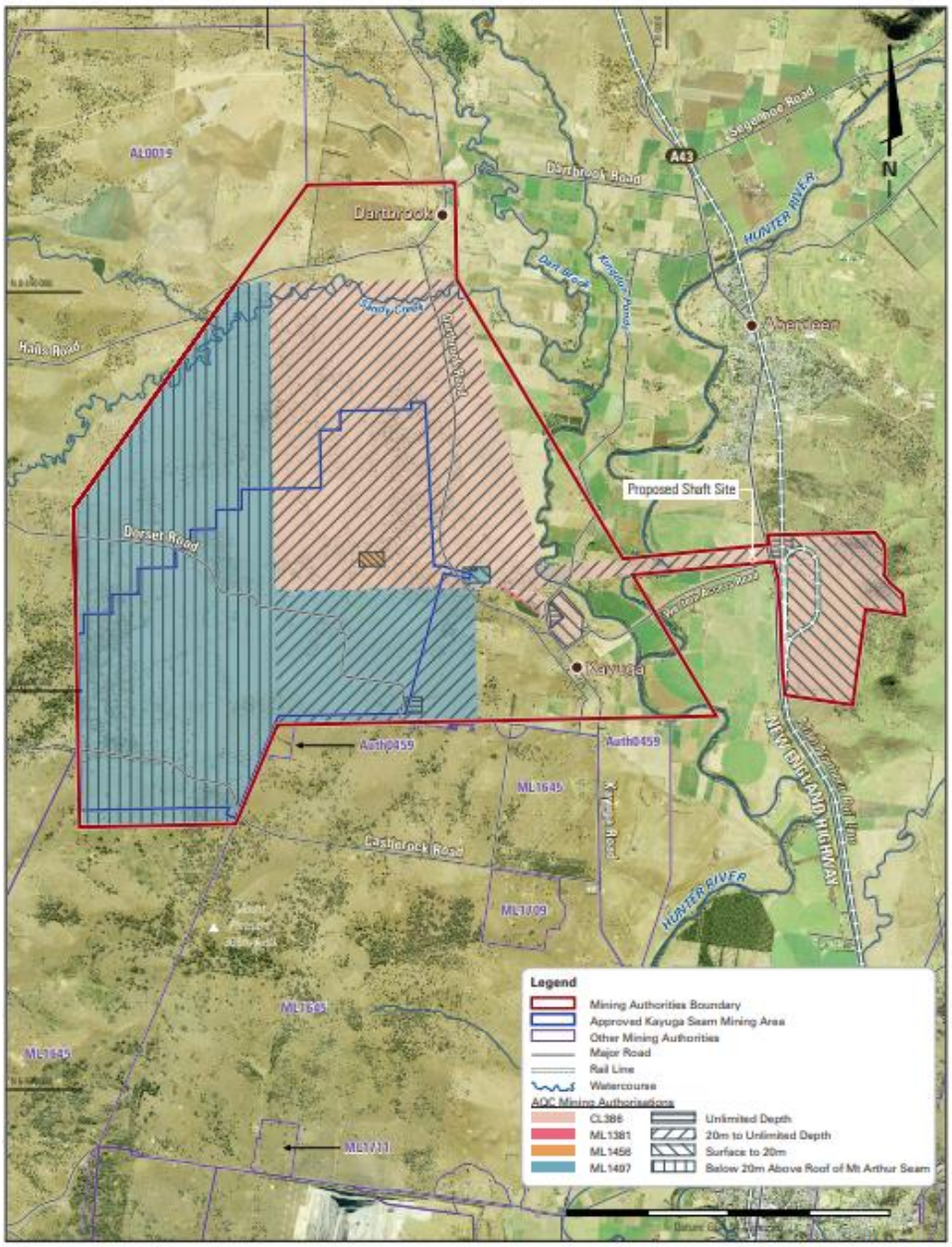
4.9 The Mod 7 application does involve development specified in former clause 5 of Schedule 1 to *State Environmental Planning Policy (Major Development) 2005* as it involves "development for the purpose of mining that … is coal … mining".

4.10 The question which then arises is whether a mining lease under the *Mining Act 1992* (**Mining Act**) is required to be issued to enable the development to be carried out under the modified consent because:

(a) The development is proposed to be carried out outside the mining area of an existing mining lease, or

(b) There is no current mining lease in relation to the proposed development.

4.11 AQC holds CL386, ML1381, ML1456 and ML1497. Details of the land to which each of the mining authorities applies is set out below (Figure 17 from the Mod 7 EA):



DARTBROOK MINE

Mining Titles

Hansen Bailey | Australian Pacific Coal

FIGURE 17

4.12 The mining leases held by AQC all have different expiry dates. Some of the smaller mining leases are presently the subject of renewal applications but continue to apply (see s117 of the Mining Act). The two larger mining leases, ML 1497 and CL 386, expire on 5 December 2022 and 19 December 2033 respectively and therefore remain in place.

4.13 The development proposed as part of the Mod 7 application is all within the mining area[1] of the existing mining leases. There are also current mining leases 'in relation to the proposed development'.

[1] "mining area" is defined in the Transitional Regulation as having the same meaning as in the Mining Act. In the Mining Act "mining area" is defined as "land the subject of a mining lease"

4.14 The consequence of the proposed development all being within the existing mining leases is that the development proposed in the Mod 7 application does not fall within the concept of 'mining or petroleum development' for the purpose of Clause 20. For that reason, Clause 20 does not apply to the Mod 7 application and no gateway certificate is required to accompany the Mod 7 application.

4.15 It has been suggested in the submission from UHSC that the fact that ML1497 expires on 5 December 2022 means that "*a mining lease would be required to be issued to enable the development to be carried out*". That submission is legally wrong for the following reasons:

(a) The Mod 7 application is not limited to the proposed extension of time during which mining operations may be carried out (see condition 1.2(a) of DA231-07-2000) but also seeks approval for an alternative mining method (bord and pillar mining). The proposed mining is all within the area of the existing mining leases. The relevant part of Clause 20 is concerned with the "area" where the mining is to take place – not the duration over which it will take place, and

(b) The expiry of ML1497 does not require a mining lease to be issued as suggested by the submission. It does, however, require the existing mining leases to be renewed if mining operations that require a mining lease are to continue beyond 5 December 2022.

4.16 There is a material difference between renewing a mining lease and granting (or issuing) a mining lease.

4.17 Division 1 of Part 7 of the Mining Act deals with renewal of mining leases. Section 113 of the Mining Act entitles the holder of a mining lease to apply for renewal of a mining lease. Section 114 provides the Minister with power to renew the mining lease for a period of up to 21 years. AQC has lodged an application to renew two of the relevant mining leases. Under section 117 of the Mining Act, if the application for renewal is not finally dealt with before the date the mining lease would otherwise cease to have effect then it continues to have effect in relation to the land to which the application relates until it is finally disposed of. An application to renew ML 1497 can be made at any time up until 4 December 2021 (see section 113(2) of the Mining Act).

4.18 Part 5 of the Mining Act deals with the granting a mining lease. It contains a prescriptive procedure for the grant of a mining lease and contains limitations on who can apply and the circumstances in which a mining lease can be granted (particularly where the mineral involved is coal). For example, an application for a new mining lease for coal:

(a) can only be made by the holder of (relevantly) an existing exploration licence for coal (which can only be obtained through competitive selection or over an area adjacent to an existing mining operation under the "operational allocation" provisions of the Mining Act);

(b) cannot be granted over (or within prescribed distances of) dwelling houses, gardens and significant improvements;

(c) is subject to rights of landholders to object to the grant of the mining lease on grounds related to significant improvements and agricultural land;

(d) is subject to completion of a native title process (or demonstrating that native title has been extinguished in the proposed mining lease area) before the mining lease can be granted; and

(e) attracts various fees and charges on both application for and grant of the mining lease (including an application fee of $10,000, per hectare fee on grant and provision of a security deposit on grant).

None of the above matters are engaged in respect of a renewal application for a mining lease.[2]

4.19 The exercise by the Minister of the power to renew a mining lease under Division 1 of Part 7 of the Mining Act is entirely different to the power to grant a mining lease under Part 5 of the Mining Act. The relevant part of Clause 20 applies where the development proposed in the modification application requires a mining lease to be 'issued'. In its context the word 'issued' is used to describe a requirement for a mining lease to be 'issued' over land that is not currently the subject of an existing mining lease. It is not a reference to the renewal of an already existing mining lease under Division 1 of Part 7 of the Mining Act.

4.20 This conclusion is consistent with the procedural regime in the Mining Act described above and the language of Clause 20 and the *Strategic Regional Land Use Policy – Guidelines for Gateway Applicants* issued by the Department of Planning (as it was). It follows that because the expiry of ML1497 does not require a mining lease to be 'issued' but rather renewed, the relevant part of Clause 20 does not apply to the Mod 7 application.

4.21 For the above reasons, there is no jurisdictional impediment to the determination of the Mod 7 application arising from the absence of a 'gateway certificate' as suggested by UHSC.

5. Do the adjustments made to the Mod 7 by the Response to Contentions constitute a fresh application?

5.1 MSC has made a submission suggesting that the modification described in the Response to Contentions is so different from the application currently before the Court that it is, as a matter of fact and degree, a fresh application. As a result, MSC submits that AQC's 'revised modification falls beyond the limits of the amendment power' with the consequence that it submits the Court does not have power to determine the application in its revised form.

5.2 The factors said to support MSC's submission are:

(a) The revised modification relies on several new documents which the Council says are, in effect, new environmental assessments;

(b) That AQC no longer seeks to revise the coal clearance system (which MSC says changes the essence of the application); and

(c) That AQC is now prepared to accept a condition restricting mining in the Piercefield seam (which the Council effectively says fundamentally changes the application).

5.3 Similar issues have been raised by UHSC in its submission (see at page 7).

5.4 The starting point for consideration of this issue is the former section 75W of the EPA Act which relevantly provided as follows:

> **75W Modification of Minister's approval**
> (1) In this section:
> ***Minister's approval*** means an approval to carry out a project under this Part, and includes an approval of a concept plan.

[2] Except for the standard application fee which incorporates a lower flat fee than for a new application and potential revision of the security deposit based on a rehabilitation cost estimate.

> ***modification of approval*** means changing the terms of a Minister's approval, including:
> (a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and
> (b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.
>
> (2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.
> (3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.
> (4) The Minister may modify the approval (with or without conditions) or disapprove of the modification……

5.5 Section 75W(2) contains a jurisdictional precondition that the proponent has made a request to the Minister to modify the development consent. There is no question that has occurred in this case.

5.6 Where the Minister receives a request under section 75W(2) the Director-General is then given a discretionary power under section 75W(3) to notify the proponent of any environmental assessment requirements.

5.7 Upon receiving a request under section 75W(2) the Minister may under section 75W(4) modify the approval with or without conditions or disapprove the modification.

5.8 The Proceedings currently involve redetermination of the Mod 7application by the Court. The Minister, as part of those proceedings, has raised a number of contentions about why the Court should determine the Mod 7 application in the same way that the IPC, as the delegate of the Minister did.

5.9 In response to the contentions raised by the Minister, AQC, through the Response to Contentions, has:

(a) Provided additional environmental assessment material that the Minister contended was either absent or insufficient in the request lodged;

(b) Indicated it will not require the modification required to implement a new coal clearance system; and

(c) Indicated that it would accept a condition restricting mining in the Piercefield seam to limit the environmental impacts associated with the extension of the period during which mining operations are authorised.

5.10 MSC contends that the above response to the Minister's contentions converts the Mod 7 application into a new application that is beyond the Court's power to consider. The MSC's contention is wrong for the following reasons:

(a) Properly understood, the Response to Contentions does not change the underlying Mod 7 application. It merely provides additional information required by the Minister (which could otherwise have been provided as evidence in the Proceedings) and puts forward a basis for determination that AQC is prepared to accept;

(b) Even if the Response to Contentions involved some change the only jurisdictional preconditions to modifying the approval is the making of a request under the former section 75W(2). The Minister has a broad scope to modify the consent after such a request is made (see *Barrick Australia Ltd v Williams (2009)* 168 LGERA 43);

(c) Even if what is set out in the Response to Contentions does involve an amendment of the Mod 7 application, such an amendment is available. While there is no express power to amend an application made under the former section 75W of the EPA Act or any case that addresses the question specifically, the principles applying to the amendment of modification applications under the EPA Act were considered by Justice Craig in *Jaimee Pty Ltd v Council of the City of Sydney* [2010] NSWLEC 245 (***Jaimee***). The principles that flow from that case are:

(i) An authority conferred by statute is construed as authorising everything which can fairly be regarded as incidental to or consequential upon the authority itself (citing *Johns v Australian Securities Commission* (1993) 178 CLR 408 (***Johns***));

(ii) The scope of a statutory power is ascertained by the character of the statute and the nature of the provisions it contains. When the exercise of power is left to the discretion of some person, the scope for implementing the power is fettered only by the necessity to maintain consistency with the purpose or purposes of the legislation (citing *Johns*);

(iii) It would be inconsistent with the sensible application of provisions that required the consent authority to notify an application for modification and to consider the submissions received as a result of the notification to be unable to seek a meaningful response from the applicant (*Jaimee* at [28]); and

(iv) Even where there is no express power to amend an application it is 'manifestly convenient that such a power exist' (*Jaimee* at [29] – [30])

5.11 For the above reasons, there is power to amend the Mod 7 application in the scheme of the EPA Act. The question which then arises is the scope of that power. The scope of the power to amend an application was considered by Justice Lloyd in *Waite v Blacktown City Council* [2004] NSWLEC 157 where His Honour said:

> The Court has no jurisdiction to entertain an original application. The Court cannot entertain an amendment which converts what was before the council into a fresh application. Therefore if amendments convert the original concept into something substantially different from the original development application, the Court does not have the power to consider it. It also follows that the comparison must be between the development application as originally made and the amendments that are now sought.

5.12 Comparing the request as originally made to that which is reflected in the Response to Contentions, there is nothing that is substantially different to the application made nor anything that changes the nature of the application. The Response to Contentions is directed at providing additional material to support the request as made or addressing how the application might be determined in response to the contentions raised. For that reason, there is no substantial change to the underlying Mod 7 application brought about by the Response to Contentions and no basis for MSC's contention that the factors it has identified have resulted in a fresh application that is beyond the Court's power to consider.

Yours faithfully

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Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017

Current version for 1 December 2019 to date (accessed 7 October 2020 at 12:23)

Schedule 2 Transferred transitional arrangements on repeal of Part 3A —former Schedule 6A to the Act

1 Definitions and application

(1) In this Schedule—

environmental assessment requirements means—

(a) environmental assessment requirements for approval to carry out a project, or for approval of a concept plan for a project, notified to the proponent of the project under Part 3A (as modified from time to time under that Part), or

(b) environmental assessment requirements adopted by the Secretary as environmental assessment requirements for approval to carry out a project, or for approval of a concept plan for a project, under clause 8J of the *Environmental Planning and Assessment Regulation 2000*,

but does not include draft environmental assessment requirements.

Part 3A project or concept plan application means an application under Part 3A for approval to carry out a project (or part of a project) or for approval of a concept plan for a project.

relevant Part 3A repeal date means—

(a) the date on which Part 3A was repealed, except as provided by paragraph (b), or

(b) in the case of a project to which clause 17(1) of *State Environmental Planning Policy (Major Development) 2005* applies—8 April 2011.

transitional Part 3A project—see clause 2.

(2) Words and expressions used in this Schedule have the same meaning as they had in Part 3A immediately before its repeal.

(3) This Schedule applies, on and from the commencement of this Schedule, with the amendments made by the *Environmental Planning and Assessment Further Amendment (Part 3A Repeal) Regulation 2011*.

(4) After the commencement of Schedule 13 to the *Environmental Planning and Assessment Amendment Act 2017*, a reference in this Schedule to a provision of the Act that has been renumbered or relocated by that Act is taken to be a reference to the renumbered or relocated provision (unless the context or subject-matter otherwise indicates or requires).

(5) In subclause (4)—

relocated includes repealed and re-enacted, with or without modification.

2 Transitional Part 3A projects

(1) The following are, subject to this Schedule, ***transitional Part 3A projects***—

(a) an approved project (whether approved before or after the repeal of Part 3A),

(b) a project that is the subject of an approved concept plan (whether approved before or after the repeal of Part 3A),

(c) a project for which environmental assessment requirements for approval to carry out the project, or for approval of a concept plan for the project, were last notified or adopted within 2 years before the relevant Part 3A repeal date (unless the environmental assessment is not duly submitted on or before 30 November 2012 or on or before such later day as the Secretary may allow by notice in writing to the proponent),

(d) a project for which an environmental assessment (whether for approval to carry out the project or for approval of a concept plan for the project) was duly submitted before the relevant Part 3A repeal date.

(2) Environmental assessment requirements referred to in subclause (1)(c) do not include environmental assessment requirements determined under section 75P(1)(a).

(3) If the environmental assessment requirements referred to in subclause (1)(c) are expressed to expire at a particular time, those requirements continue and do not expire at that time.

(4) A part of a project is a transitional Part 3A project if that part of the project meets the criteria under this clause for a transitional Part 3A project even though the whole project does not meet those criteria.

(5) A transitional Part 3A project extends to the project as varied by changes to the Part 3A project or concept plan application, to the concept plan approval or to the project approval,

whether made before or after the repeal of Part 3A.

(6) Development is not a transitional Part 3A project if it ceased to be a project to which Part 3A applies before the repeal of Part 3A or if it ceases to be such a project after that repeal in accordance with the provisions of or continued by this Schedule.

(7) The repeal, on the commencement of this Schedule, of provisions of the *State Environmental Planning Policy (Major Development) 2005* that declared development as projects to which Part 3A applied (or as critical infrastructure projects) does not affect the operation of this Schedule.

(8) (Repealed)

2A Public interest consideration for Part 3A projects

(1) To avoid doubt, it is declared that the Minister is authorised (and is taken always to have been authorised) to take the public interest into account when deciding whether or not to approve the carrying out of a project or to give approval for a concept plan under Part 3A, before or after the repeal of that Part.

(2) It does not matter whether the Secretary's report on the project did or did not give consideration to or make any recommendation about the public interest or any particular aspect of the public interest.

3 Continuation of Part 3A—transitional Part 3A projects

(1) Part 3A of the Act (as in force immediately before the repeal of that Part and as modified under this Schedule after that repeal) continues to apply to and in respect of a transitional Part 3A project.

(2) For that purpose—

(a) any State environmental planning policy or other instrument made under or for the purposes of Part 3A, as in force on the repeal of that Part and as amended after that repeal, continues to apply to and in respect of a transitional Part 3A project, and

(b) declarations, orders, directions, determinations or other decisions with respect to a transitional Part 3A project continue to have effect and may continue to be made under Part 3A (including for the purpose of the application or continued application of Part 4 or 5 or other provisions of the Act in relation to the project).

Editorial note—

For orders under former sec 75B, declarations under former sec 75C, or orders or declarations in relation to those sections under this paragraph, see the Historical notes at the end of the Act.

(2A) To avoid doubt, on and after the repeal of Part 3A of the Act—

(a) Part 4 of the Act does not operate to require development consent by the Minister or other consent authority, and

(b) Part 5.1 of the Act does not operate to require the approval of the Minister,

for any project, or for any part of a project, that is a transitional Part 3A project and that is an approved project (whether approved before or after the repeal of Part 3A).

(3) This clause is subject to the other provisions of this Schedule.

3A Projects that cease to be dealt with under Part 3A

(1) Approval cannot be granted for the carrying out of a transitional Part 3A project if the development concerned is a transitional Part 3A project only because it is the subject of—

(a) an approved concept plan, or

(b) environmental assessment requirements for approval of a concept plan, or

(c) an environmental assessment for approval of a concept plan.

However, approval may be granted to such a project if it is to be granted under section 75P(1)(c) when the concept plan is approved (but not if it is to be granted when the concept plan is modified).

(2) An application under Part 3A for approval to carry out such a project cannot be lodged or dealt with.

(3) This clause does not prevent the determination of an application for approval of a concept plan.

3B Provisions applying with respect to approval of concept plans

(1) This clause applies to development (other than an approved project) for which a concept plan has been approved under Part 3A, before or after the repeal of Part 3A, and so applies whether or not the project or any stage of the project is or was a transitional Part 3A project.

(2) After the repeal of Part 3A, the following provisions apply to any such development (whether or not a determination was made under section 75P(1)(b) when the concept plan was approved)—

(a) if Part 4 applies to the carrying out of the development, the development is taken to be development that may be carried out with development consent under Part 4 (despite anything to the contrary in an environmental planning instrument),

(b) if Part 5 applies to the carrying out of the development, the development is taken to be development that may be carried out without development consent under Part 4 (despite anything to the contrary in an environmental planning instrument),

(c) any development standard that is within the terms of the approval of the concept plan has effect,

(d) a consent authority must not grant consent under Part 4 for the development unless it is satisfied that the development is generally consistent with the terms of the approval of the concept plan,

(e) a consent authority may grant consent under Part 4 for the development without complying with any requirement under any environmental planning instrument relating to a master plan,

(f) the provisions of any environmental planning instrument or any development control plan do not have effect to the extent to which they are inconsistent with the terms of the approval of the concept plan,

(g) this clause applies instead of section 75P(2), but any direction, order or determination made under section 75P(2) in connection with the concept plan continues to have effect.

(3) If a determination was not made under section 75P(1)(b) in relation to the project (or any stage of the project) when any such concept plan was approved and the project (or that stage) can no longer be approved under Part 3A, Part 4 is taken to apply to the carrying out of the development in relation to the project (or that stage) for the purposes of subclause (2) (unless an environmental planning instrument provides that it is development that may be carried out without development consent or it is exempt development).

(4) For the purposes of determining whether development to which Part 4 applies is State significant development, a provision of this clause that permits the development to be carried out with development consent under Part 4 is taken to be a provision of an environmental planning instrument.

(5) This clause does not apply to development that is State significant infrastructure.

(6) The amendments made to this Schedule by the *Environmental Planning and Assessment Amendment (Transitional) Regulation 2016* extend to things done before the commencement of those amendments.

3BA Winding-up of transitional Part 3A modification provisions on cut-off date of 1 March 2018 and other provisions relating to modifications

(1) For the purposes of this clause, the ***cut-off date*** is 1 March 2018.

(2) An approved project or a concept plan cannot be modified under section 75W on or after the cut-off date, except as provided by this clause.

(3) Subclause (2) does not apply if the request to modify the approved project or concept plan under section 75W was lodged before the cut-off date. Accordingly, the provisions of this

Schedule relating to a modification made pursuant to such a request continue to apply.

(4) A request to modify an approved project or concept plan under section 75W that may be dealt with because of subclause (3) cannot be dealt with under section 75W if—

(a) the request has not been determined by 1 September 2018, and

(b) the Secretary is of the opinion that insufficient information has been provided to deal with the request and notifies the person who made the request that it will not be dealt with under section 75W.

(5) A concept plan may continue to be modified under section 75W pursuant to a request lodged on or after the cut-off date (whether or not the project is or has ceased to be a transitional Part 3A project), but only if the Minister is satisfied that—

(a) the proposed modification is to correct a minor error, misdescription or miscalculation, or

(b) the proposed modification is of minimal environmental impact, or

(c) the project to which the concept plan as modified relates is substantially the same as the project to which the concept plan currently relates (including any modifications previously made under section 75W).

(6) In the application of section 4.55(1A) or (2) or 4.56(1) of the Act to the following development, the consent authority need only be satisfied that the development to which the consent as modified relates is substantially the same development as the development authorised by the consent (as last modified under section 75W)—

(a) development that was previously a transitional Part 3A project and whose approval was modified under section 75W,

(b) development that was taken to be an approved project pursuant to clause 8J of the *Environmental Planning and Assessment Regulation 2000* and whose consent was modified under section 75W.

(7) To avoid doubt, subclause (2)—

(a) applies whether the project remains or has ceased to be a transitional Part 3A project, and

(b) extends to a modification under section 75W in relation to a development consent that is taken to be an approved project pursuant to clause 8J of the *Environmental Planning and Assessment Regulation 2000*.

3C Modification of concept plans

(1) Section 75W continues to apply (subject to clause 3BA) for the purpose of the modification of a concept plan approved before or after the repeal of Part 3A, whether or not the project or any stage of the project is or was a transitional Part 3A project.

(2) This clause applies despite anything to the contrary in this Schedule (other than provisions relating to approval for the carrying out of a project or stage of a project that is given in connection with an approval to modify a concept plan).

3D Modification of environmental assessment provisions—sections 75H and 75I

For the purposes of the application of Part 3A to a transitional Part 3A project—

(a) section 75H(3) is taken not to require the Secretary to accept an environmental assessment before making an environmental assessment publicly available in accordance with that subsection, and

(b) section 75I(2)(g) does not apply to or in respect of a transitional Part 3A project, and

(c) the Minister is not required to consider a statement relating to compliance with environmental assessment requirements for the purposes of section 75J(2)(a) or 75O(2)(a).

Note—

Section 75N applies sections 75H and 75I to approval for a concept plan for a project in the same way as they apply with respect to an approval to carry out a project.

3E Time limits for proponents to comply with environmental assessment requirements

(1) If the Secretary requires a proponent to make a submission under section 75H(6), the proponent must comply with that requirement—

(a) in relation to a response under section 75H(6)(a)—within 30 days, or

(b) in relation to a preferred project report referred to in section 75H(6)(b)—within 60 days, or

(c) in relation to a revised statement of commitments referred to in section 75H(6)(c)—within 60 days,

after being notified of that requirement, or within such other period as the Secretary notifies in writing from time to time to the proponent.

(2) If the proponent fails to make a submission within a period specified in this clause, to avoid doubt, the Minister may approve or disapprove the carrying out of a project (under section 75J) or may give or refuse to give approval for a concept plan (under section 75O).

(3) If the Secretary has notified a proponent of a requirement under section 75H(6) before the commencement of this clause, this clause applies to that requirement as if the period

specified in relation to the requirement commences on the date of the commencement of this clause.

(4) This clause does not affect the operation of clause 8D of the *Environmental Planning and Assessment Regulation 2000*.

4 Construing references to Part 3A

(1) A reference in the Act (other than this Schedule) or in any other Act or in any instrument made under an Act to Part 3A or to a provision of that Part is to be construed as a reference to that Part or that provision as continued by this Schedule.

(2) Without limiting subclause (1), on and from the commencement of this subclause, a reference in clause 6 of either of the Redfern–Waterloo contributions plans to a project to which Part 3A of the EP&A Act applies is taken to include a reference to State significant development.

(3) The Redfern–Waterloo contributions plans, as taken to be amended by subclause (2), apply to development for which a development application was made but not determined before the commencement of that subclause in the same way as they apply to development for which an application is made after that commencement.

(4) In this clause—

Redfern–Waterloo contributions plans means the following plans preserved under clause 18 of Schedule 6 to the *Growth Centres (Development Corporations) Act 1974*—

(a) the *Redfern–Waterloo Authority Contributions Plan 2006*,

(b) the *Redfern–Waterloo Authority Affordable Housing Contributions Plan 2006—Redfern–Waterloo Authority Operational Area*.

5 Part 3A projects that become State significant infrastructure

(1) Specified development on specified land that was a project (or a specified class of development that were projects) to which Part 3A applied immediately before its repeal may be declared to be State significant infrastructure by an order of the Minister (published in the Gazette).

(2) Any such development may be declared to be State significant infrastructure whether or not the development is a transitional Part 3A project. On the making of the declaration it ceases to be a transitional Part 3A project.

(3) Despite anything to the contrary in any environmental planning instrument, any such development that is declared to be State significant infrastructure is taken to be development that may be carried out without development consent under Part 4.

(4) For the purposes of Part 5.1 of the Act in its application to any such development—

(a) a concept plan approved under Part 3A in relation to the development (whether before or after the repeal of Part 3A) is taken to be an approval (and the concept proposals) for a staged infrastructure application under Division 3 of Part 5.1, and

(b) any approval under Part 3A to carry out development is taken to be approval under Division 5.2 for the carrying out of that development, and

(c) any environmental assessment requirements, any statement of environmental assessment, any public exhibition, any response to submissions, any preferred project report by a proponent or any other action under Part 3A in relation to the development is taken to be environmental assessment requirements, an environmental impact statement, public exhibition, a response to submissions, a preferred infrastructure report by a proponent or other action taken under the corresponding provisions of Part 5.1, unless the Secretary directs that any such action be taken again under Part 5.1.

(4A) Despite subclause (4), a request to modify an approved project or concept plan under section 75W that, by operation of clause 3BA(4), cannot be dealt with under that section is not taken to be an action taken under a provision of Part 5.1.

(5) If a single proposed development comprises development that is only partly State significant infrastructure declared under this clause, the remainder of the development (except so much of the remainder of the development as is State significant development or as the Secretary determines is not sufficiently related to the State significant infrastructure)—

(a) may be carried out without development consent under Part 4 of the Act, and

(b) is also declared to be State significant infrastructure for the purposes of the Act.

(6) State significant infrastructure declared under this clause is taken to be State significant infrastructure declared under section 115U(4).

(7) An approved project (whether approved before or after the repeal of Part 3A) that is State significant infrastructure declared under this clause and that is also declared to be a critical infrastructure project is taken to be critical State significant infrastructure declared under section 5.13 of the Act.

5A Additional provision relating to modification of approvals for North West Rail Link development

(1) This clause applies to modification request no MP06_0157 MOD 1 to modify the staged infrastructure approval (dated 6 May 2008) relating to the North West Rail Link development and to any subsequent modification requests to modify that approval.

Note—

The North West Rail Link development is declared to be State significant infrastructure by the operation of clause 5 of this Schedule and Schedule 4 to the *State Environmental Planning Policy (State and Regional Development) 2011*. The concept plan approved under Part 3A in relation to the development is taken to be an approval for a staged infrastructure application (see clause 5(4)(a) of this Schedule).

(2) Section 115ZI applies to a modification request to which this clause applies as if that request were a request to modify a Minister's approval within the meaning of that section.

(3) Any actions taken before the commencement of this clause with respect to any modification request to which this clause applies have effect for the purposes of the application of section 115ZI to the request.

(4) This clause is in addition to clause 5.

5B Postponing the lapsing of approval to carry out State significant infrastructure

(1) This clause applies to development that was a transitional Part 3A project and that has been declared to be State significant infrastructure by an order under clause 5.

(2) A condition that causes the approval for the development to lapse on a day (the ***original lapsing day***) does not have effect and the approval instead lapses on the day specified in subclause (3) if—

(a) a request has been duly made to the Minister to modify the approval to specify a later day on which the approval will lapse (a ***relevant modification request***), and

(b) the relevant modification request is made before the original lapsing day and the request has not been determined on or before that day.

(3) The approval lapses 12 months after the relevant modification request is made unless before the end of that period—

(a) the relevant modification request is refused or withdrawn, in which case the approval lapses on the day on which the refusal or withdrawal occurs, or

(b) the relevant modification request is granted, in which case the approval lapses on the day specified in the modified approval.

(4) This clause extends to a relevant modification request that was duly made before the commencement of this clause.

(5) If a relevant modification request was made before the commencement of this clause and was not determined before the approval lapsed, the approval is revived for the purposes of the application of this clause and of any other request made before that commencement in relation to the approval. In that case, the period of 12 months referred to in subclause (3) is taken to be the 12 months after the commencement of this clause.

6 Part 3A projects that become State significant development

(1) Specified development on specified land that was a project (or a specified class of development that were projects) to which Part 3A applied immediately before its repeal may be declared to be State significant development by an order of the Minister (published in the Gazette).

(2) Any such development may be declared to be State significant development whether or not the development is a transitional Part 3A project. On the making of the declaration it ceases to be a transitional Part 3A project.

(3) For the purposes of Part 4 in its application to any such development—

(a) any approval under Part 3A to carry out part of the development is taken to be a development consent under Part 4 for the carrying out of that part of the development, and

(b) any environmental assessment requirements, any statement of environmental assessment, any public exhibition, any response to submissions by a proponent or any other action under Part 3A in relation to the development are taken to be environmental assessment requirements, an environmental impact statement, public exhibition, a response to submissions by an applicant or other action taken under the corresponding provisions of Part 4, unless the Secretary directs that any such action be taken again under Part 4.

(3A) Despite subclause (3), a request to modify an approved project or concept plan under section 75W that, by operation of clause 3BA(4), cannot be dealt with under that section is not taken to be an action taken under a provision of Part 4.

(4) If a single proposed development comprises development that is only partly State significant development declared under this clause, the remainder of the development is also declared to be State significant development (except so much of the remainder of the development as the Secretary determines is not sufficiently related to the State significant development).

(5) State significant development declared under this clause is taken to be State significant development declared under section 89C(3).

7, 8 (Repealed)

9 Compensation not payable

(1) Compensation is not payable by or on behalf of the State—

(a) because of the enactment, making or operation of any of the following—

(i) the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011*,

(ii) *State Environmental Planning Policy (Major Development) Amendment 2011* or any other environmental planning instrument, regulation or decision relating to the

removal of any project from the operation of Part 3A (whether made before or after the commencement of this clause), or

(b) because of any consequence of any such enactment, making or operation, or

(c) because of any statement or conduct relating to any such enactment, making or operation, or

(d) because of any other statement or conduct relating to the repeal or proposed repeal of Part 3A (including the termination of consideration of any application or proposal under that Part in anticipation of its repeal).

(2) This clause extends to statements, conduct and any other matter occurring before the commencement of this clause.

(3) In this clause—

compensation includes damages or any other form of monetary compensation.

conduct includes any act or omission, whether unconscionable, misleading, deceptive or otherwise.

statement includes a representation of any kind—

(a) whether made verbally or in writing, and

(b) whether negligent, false, misleading or otherwise.

the State means the Crown within the meaning of the *Crown Proceedings Act 1988* or an officer, employee or agent of the Crown.

10 (Repealed)

11 Lapsing of Part 3A approvals

(1) An approval for carrying out a transitional Part 3A project lapses on the day that is 5 years after the repeal of Part 3A unless—

(a) the project is physically commenced (within the meaning of section 95) on or before that day on the land to which the approval relates, or

(b) the approval of the project is subject to a condition in force under section 75Y that provides for the approval to lapse on an earlier or later day.

(2) Despite subclause (1), an approval for carrying out a transitional Part 3A project that authorises the use of any land, building or work does not lapse if that use is actually commenced before the date on which the approval would otherwise lapse.

(3) The approval of a concept plan for a transitional Part 3A project lapses on the day that is 5 years after the repeal of Part 3A unless—

(a) any part of the project is physically commenced (within the meaning of section 95) on or before that day, in accordance with an approval or development consent, on the land to which the approval or consent relates, or

(b) the approval of the concept plan is subject to a condition in force under section 75Y that provides for the approval to lapse on an earlier or later day.

11A Requests to extend date that Part 3A approval lapses

(1) This clause applies to an approval for carrying out, or an approval of a concept plan for, a transitional Part 3A project in respect of which a request has been duly made to the Minister to extend the date on which the approval would otherwise lapse (a ***relevant modification request***). This clause extends to any such request that was duly made before the commencement of this clause.

(2) If a relevant modification request is made before the date on which the approval would otherwise lapse and the request has not been determined before that date, the approval does not lapse on that date but continues in force until—

(a) the request is determined or withdrawn, or

(b) the date that is 12 months after the request was made,

whichever first occurs.

(3) If a relevant modification request is determined and the date on which the approval would otherwise lapse is extended, the approval continues in force in accordance with the determination despite subclause (2).

(4) If a relevant modification request was made before the commencement of this clause and was not determined before the approval lapsed, the approval is revived for the purposes of the application of this clause and of any other request made before that commencement in relation to the approval. In that case, the period of 12 months referred to in subclause (2)(b) is taken to be the period of 12 months after the commencement of this clause.

12 Continuing application of Part 3A to modifications of certain development consents

Section 75W of Part 3A continues to apply (subject to clause 3BA) to modifications of the development consents referred to in clause 8J(8) of the *Environmental Planning and Assessment Regulation 2000*, and so applies whether an application for modification is made before or after the commencement of this clause.

13 Application of amendments to existing development applications

The amendments made to the Act by Schedule 1.2[16], [18], [19], [25] and [26] to the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* do not apply to or in respect of a development application lodged on or before the commencement of the amendment concerned.

14 Joint regional planning panels and matters previously determined by such panels

Section 23G(4A), as inserted by Schedule 1.5[2] to the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011*, does not apply to proceedings commenced by or against a joint regional planning panel before the commencement of that amendment.

15 Matters determined by joint regional planning panels

(1) If—

(a) a development application was made but not determined before the commencement of Schedule 4A and a regional panel was exercising the consent authority functions of the council when the application was made, and

(b) the regional panel ceased to exercise those functions on the commencement of that Schedule,

the council may exercise those functions.

(2) An application (whether made before or after the commencement of Schedule 4A) for modification of a development application for development for which a regional panel ceased to exercise the consent authority functions of a council on that commencement is to be determined by that council.

(3) Despite subclause (1), the applicable regional panel continues to exercise the consent authority functions of a council for the following development applications (but not for the modification of those development applications)—

(a) a development application for development that has a capital investment value of more than $10 million if the development application was made, but not determined by the panel, before the commencement of Schedule 4A,

(b) a development application for development referred to in clause 13B(1)(f) of the *State Environmental Planning Policy (Major Development) 2005*, if the development application was made, but not determined by the panel, before the commencement of Schedule 4A,

(c) the first stage of a staged development application for development referred to in clause 13G of the *State Environmental Planning Policy (Major Development) 2005*, if the development application was made, but not determined by the panel, before the commencement of Schedule 4A.

16 Sydney Opera House—continuation of heritage provisions

If development in connection with the Opera House is declared to be State significant development or State significant infrastructure, clause 90 of Schedule 6 continues to apply as if references in that clause to provisions of Part 3A were references to the corresponding provisions relating to State significant development or State significant infrastructure.

17 Planning Assessment Commission

(1) The amendments made to section 23D of the Act by Schedule 1.4 to the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* do not affect any review under that section that was requested by the Minister before the commencement of those amendments.

(2) The amendment made to clause 5(3) of Schedule 3 to the Act by Schedule 1.4[7] to the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* extends to persons who were appointed as members before the commencement of that amendment.

18 Joint Regional Planning Panels

The amendment made to clause 2 of Schedule 4 to the Act by Schedule 1.5[4] to the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* does not apply to or in respect of the appointment or reappointment of a person who was the chairperson of a regional panel immediately before the commencement of that amendment.

19 Existing development applications not to be determined by regional panels

(1) This clause applies to a development application for development if—

(a) the development application was made before 1 July 2009 and not finally determined before the commencement of Schedule 4A, and

(b) the development is development specified in Schedule 4A.

(2) A development application to which this clause applies is to be dealt with as if it were for development not specified in Schedule 4A.

(3) This clause applies to the determination of a development application before the commencement of this clause.

20 Modification of certain approved projects and development consents relating to mining or petroleum development on strategic agricultural land

(1) **Application of clause** This clause applies to the following requests and applications—

(a) a request to modify an approved project,

(b) an application for the modification of a development consent referred to in clause 8J(8) of the *Environmental Planning and Assessment Regulation 2000*,

but only if the request or application relates to mining or petroleum development on the following land—

(c) land shown on the Strategic Agricultural Land Map,

(d) any other land that is the subject of a site verification certificate.

(2) **Meaning of "mining or petroleum development"** In this clause, ***mining or petroleum development*** means—

(a) development specified in clause 5 of Schedule 1 to *State Environmental Planning Policy (Major Development) 2005* (as in force immediately before the repeal of that Schedule), but only if—

(i) a mining lease under the *Mining Act 1992* is required to be issued to enable the development to be carried out under the modified approval or consent because—

(A) the development is proposed to be carried out outside the mining area of an existing mining lease, or

(B) there is no current mining lease in relation to the proposed development, or

(ii) the development is for the purposes of extracting a bulk sample as part of resource appraisal or a trial of a mine comprising the extraction of more than 20,000 tonnes of coal or of any mineral ore, or

(b) development specified in clause 6 of Schedule 1 to *State Environmental Planning Policy (Major Development) 2005* (as in force immediately before the repeal of that Schedule), but only if a production lease under the *Petroleum (Onshore) Act 1991* is required to be issued to enable the development to be carried out under the modified approval or consent because—

(i) the development is proposed to be carried out outside the area of an existing production lease, or

(ii) there is no current production lease in relation to the proposed development, or

(c) development specified in clause 6(2) of Schedule 1 to *State Environmental Planning Policy (State and Regional Development) 2011*.

(3) However, ***mining or petroleum development*** does not include development carried out on land that is outside—

(a) the mining area of a mining lease or proposed mining lease, or

(b) the area of a production lease or proposed production lease.

(4) **Request or application to which this clause applies to be accompanied by gateway certificate or site verification certificate** A request or application to which this clause applies must be accompanied by—

(a) in relation to land shown on the Strategic Agricultural Land Map as critical industry cluster land—a current gateway certificate in respect of the proposed development to be carried out under the modified approval or consent, or

(b) in relation to any other land—

(i) a current gateway certificate in respect of the proposed development to be carried out under the modified approval or consent or

(ii) a site verification certificate that certifies that the land concerned is not biophysical strategic agricultural land.

(5) **Part 4AA of Mining, Petroleum Production and Extractive Industries SEPP applies to requests and applications to which this clause applies** Part 4AA (Mining and petroleum development on strategic agricultural land) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (other than Divisions 1, 2 and 5) applies (with all necessary changes) to a request or application to which this clause applies as if it were an application for development consent.

(6) **Assessment of requests and applications to which this clause applies** Before determining a request or application to which this clause applies that is accompanied by a gateway certificate, the Minister must—

(a) refer the request or application to the Minister for Primary Industries for advice regarding the impact of the proposed development on water resources, and

(b) if the request or application is accompanied by an unconditional gateway certificate issued by operation of clause 17I(3) of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (as applied by this clause), refer the request or application to the Gateway Panel for advice, and

(c) consider—

(i) any recommendations set out in the certificate, and

(ii) any written advice provided by the Minister for Primary Industries in response to a referral under paragraph (a), and

(iii) any written advice provided by the Gateway Panel in response to a referral under paragraph (b), and

(iv) any written advice of the IES Committee provided to the Gateway Panel under clause 17G(1) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (as applied by this clause).

(7) In determining a request or application to which this clause applies that is accompanied by a gateway certificate, the Minister must consider whether any recommendations set out in the certificate have or have not been addressed and if addressed, the manner in which those recommendations have been addressed.

(8) The Minister for Primary Industries, when providing advice under this clause on the impact of the proposed development on water resources, must have regard to—

(a) the minimal impact considerations set out in the document entitled *Aquifer Interference Policy* published by the NSW Office of Water, Department of Primary Industries dated September 2012, and

(b) the other provisions of that Policy.

(9) **Miscellaneous provisions** For the avoidance of doubt, a site verification certificate or a gateway certificate may be issued for the purposes of this clause with respect to the part of land or the part of the proposed development to which the modification relates (rather than the whole of the land or the whole development to which the approval or consent relates).

(10) This clause does not apply to or with respect to a request or application that was made but not determined on or before 10 September 2012.

(10A) In addition to subclause (10), this clause does not apply to or with respect to a request or application if—

(a) the land to which the request or application relates was not shown (whether in whole or in part) on the *Strategic Agricultural Land Map* before 28 January 2014, and

(b) the request or application was made, but not determined, on or before 3 October 2013.

(10B) However, the Minister or the Secretary, in dealing with a request or application referred to in subclause (10) or (10A), may seek the advice of the Gateway Panel.

(11) Words and expressions used in this clause have the same meanings as they have in *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

21 Transitional arrangements for certain declared light rail projects

(1) To avoid doubt, development that is an activity under Part 5 of the Act because of the operation of section 104P(3) of the *Transport Administration Act 1988* may be declared to be State significant infrastructure or critical State significant infrastructure.

(2) If any such development has been declared to be State significant infrastructure or critical State significant infrastructure, section 104P(3) of that Act does not apply to the extent that it provides that TfNSW is the determining authority for the development.

(3) Except as provided by subclause (2), the declaration of any such development as State significant infrastructure or critical State significant infrastructure does not affect the application of section 104P of that Act to the development.

22 Continuation of enforcement arrangements in relation to Part 3A approvals

(1) In this clause—

Part 3A approval means an approval for a transitional Part 3A project, whether granted before or after the repeal of Part 3A.

(2) A person who contravenes or fails to comply with section 75D of the Act is guilty of an offence. The maximum penalty applicable to the offence is the same maximum penalty that applies to an offence in connection with the carrying out of State significant infrastructure in contravention of an approval under Division 5.2 of the Act.

(3) Division 9.3 of, and Schedule 5 to, the Act apply to a Part 3A approval in the same way as they apply to an approval for State significant infrastructure.

Note—

A development control order in connection with State significant infrastructure may be given only by the Minister or the Planning Secretary (see section 9.35(2) of the Act).

9 October 2020

Sparke Helmore Lawyers
Level 7, Honeysuckle Drive
Newcastle NSW 2300

Attention: Alan McKelvey

Dear Alan,

Supplement to Response to Submissions Received Following Notification of Proponent's Response to Contentions

1 BACKGROUND

AQC Dartbrook Management Pty Limited (AQC) is the proprietor of the Dartbrook Mine, located in the Upper Hunter Valley of New South Wales. AQC has made an application to modify its Development Consent (DA 231-7-2000) in order to facilitate the Revised Modification, as described in the *Dartbrook Mine Modification 7 Response to Contentions* (Hansen Bailey, 2020).

AQC is considering the sale of some of its lands and Water Access Licences (WALs). Sparke Helmore Lawyers has sought Hansen Bailey's advice on the potential air quality, acoustic and water supply implications of selling these sales (if executed).

The lands that have been listed for sale include the following properties:

- Garoka Dairy;
- Kayuga Homestead Farm;
- Browns Mountain;
- Ladino Park;
- Byfield;
- Redrock;
- Kelly's Block; and
- Woodlands.

A plan showing the relevant properties is included at **Annexure A**.

Should the properties be sold, the residences located on these properties (the Subject Residences) would become 'privately owned' and therefore warrant an assessment of potential air quality and acoustic impacts. Potential impacts to the Subject Residences (listed in **Table 1**) have been evaluated against the criteria outlined in the *'Voluntary Land Acquisition and Mitigation Criteria'* (NSW Government, 2018) (VLAMP).

This advice should be read in conjunction with the '*Response to Submissions Received Following Notification of the Proponent's Response to Contentions'* (Hansen Bailey, 2020) (RTS).

2 ACOUSTIC IMPACTS

The potential noise impacts of the Revised Modification were assessed in the *Dartbrook Modification 7 Acoustic Assessment* (Bridges Acoustics 2020), which was included as Appendix B of the Response to Contentions. Potential impacts to the Subject Residences were assessed based on the noise levels and contours predicted by the noise model.

Six of the residences on the Garoka Dairy property (299A, 299B, 300, 301, 302 and 304) are categorised as East Site Receivers. The other four residences on the Garoka Dairy property (82, 85, 295A and 295B) and residences on all the other properties are categorised as West Site Receivers. Condition 6.4.1(a) of DA 231-7-2000 prescribes different noise criteria for East Site Receivers and West Site Receivers. There are no residences located on the Browns Mountain property.

The predicted impacts on the Subject Residences are outlined in **Table 1**. Two receptors (299B and 301) are predicted to experience worst-case noise levels that exceed the relevant noise criterion by more than 5 dBA. The VLAMP characterises exceedances of more than 5 dBA as significant impacts and recommends both mitigation measures and voluntary land acquisition rights be applied.

Three receptors (300, 302 and 304) are predicted to experience worst-case noise levels that exceed the relevant criterion by 3-5 dBA. The VLAMP characterises exceedances of 3-5 dBA as moderate impacts and recommends that mitigation measures be applied.

The VLAMP explains that "*Negotiated agreements are private contracts between applicants and landowners and are the preferred mechanism for managing any exceedances of the relevant assessment criteria*". If a negotiated agreement is in place, potential exceedances will be managed in accordance with the conditions of the agreement rather than through mitigation and acquisition obligations under the Development Consent. It is recommended that a negotiated agreement in accordance with the VLAMP be made a condition of the sale of these lands.

The Kayuga Homestead (receptor 69A) is located near the Kayuga Entry and may be affected by noise. Activities at the Kayuga Entry may include the movement of personnel and equipment into the underground drift. These activities are approved under DA 231-7-2000 and are not being modified by the present application. Whilst these impacts are not associated with the Revised Modification, it is recommended that a negotiated agreement in accordance with the VLAMP be a condition of purchase for the Kayuga Homestead Farm.

The remaining Subject Residences are not expected to experience noise exceedances as a result of the Revised Modification.

Table 1
Predicted Impacts to Subject Residences

Property	Residences	Air Quality Impacts	Noise Impacts
Browns Mountain	Nil	N/A	N/A
Garoka Dairy	82	No exceedances	No exceedances
	85	No exceedances	No exceedances
	295A	No exceedances	No exceedances
	295B	No exceedances	No exceedances
	299A	No exceedances	No exceedances
	299B	No exceedances	Exceedance of night time criterion by 8 dBA. This constitutes a significant impact and warrants acquisition.
	300	No exceedances	Exceedance of night time criterion by 5 dBA. This constitutes a moderate impact and warrants mitigation.
	301	No exceedances	Exceedance of night time criterion by 6 dBA. This constitutes a significant impact and warrants acquisition.
	302	No exceedances	Exceedance of night time criterion by 4 dBA. This constitutes a moderate impact and warrants mitigation.
	304	No exceedances	Exceedance of night time criterion by 3 dBA. This constitutes a moderate impact and warrants mitigation.
Kayuga Homestead Farm	69A	No exceedances	No
	69B	No exceedances	No
	69C	No exceedances	No
	69D	No exceedances	No
Ladino Park	46	No exceedances	No
Byfield	41	No exceedances	No
	42	No exceedances	No
Redrock	51A	No exceedances	No
	51B	No exceedances	No
Kelly's Block	37	No exceedances	No
Woodlands	36	No exceedances	No

3 AIR QUALITY IMPACTS

The potential air quality impacts of the Revised Modification were assessed in the *Dartbrook Mine Modification 7 Air Quality Assessment* (ERM, 2020), which was included as Appendix A of the Response to Contentions. Potential impacts on the Subject Residences were determined using the air quality contours generated by the dust dispersion model.

As indicated in **Table 1**, the Revised Modification is not expected to result in any exceedances of the air quality criteria (as prescribed by the VLAMP) at the Subject Residences.

As per the explanation in **Section 2**, a negotiated agreement should be a condition of the sale of the Kayuga Homestead Farm.

4 WATER LICENSING

AQC currently holds WALs assigned to the following Water Sharing Plans (WSPs) enacted under the *Water Management Act 2000* (WM Act):

- *Water Sharing Plan for the Hunter Regulated River Water Source 2016* (Hunter Regulated WSP);
- *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (Hunter Unregulated WSP); and
- *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2009* (North Coast Groundwater WSP).

Table 2 outlines the water entitlements that AQC currently holds, has listed for sale and would have remaining (if the sales are executed).

Table 2
Proponent's Water Licences

WSP	Water Source	Licence Category	Total Share Component (units)		
			Current	Offered for Sale	Remaining
Hunter Regulated	Hunter Regulated River Water Source	Regulated River (General Security)	2,793	2,793	0
		Regulated River (High Security)	6	6	0
		Supplementary Water	254.8	254.8	0
Hunter Unregulated and Alluvial	Dartbrook Water Source	Aquifer	950	622	328
		Unregulated River	85	85	0
	Hunter River Alluvial Water Source	Aquifer	1,249	0	1,249
North Coast Groundwater	Sydney Basin-North Coast Groundwater Source	Aquifer	180	0	180

As shown in **Table 2**, AQC is considering selling all of its WALs assigned to the Hunter Regulated River Water source. Dartbrook Mine passively receives water through seepage into the Hunter Tunnel and surface runoff into its dams. This water is pumped into the Wynn Seam Goaf for storage. There is approximately 2,915 ML of water stored in the Wynn Seam goaf. This water will be used preferentially for operational purposes such as dust suppression and coal beneficiation.

The annual operational water demand (assuming production at the maximum rate of 6 million tonnes per annum) is estimated at 500 ML/year. This total includes 200 ML/year for dust suppression at the East Site, 10 ML/year for dust suppression at the West Site, 240 ML/year for washing of coal (40 L per tonne of coal) plus an allowance for other minor activities. Given that the Revised Modification involves (at most) six years of production at the maximum approved rate, the stored water in the Wynn Seam Goaf and passive inflows will be sufficient to satisfy operational water demands. It is therefore not necessary for AQC to retain its entitlement to extract water from the Hunter River Regulated Water Source to operate the mine as proposed in the Modification 7 application.

AQC will retain its WALs assigned to the Hunter River Alluvial Water Source. AQC's current entitlement of 1,249 units will be sufficient to account for inflows to the Hunter Tunnel (generally around 180 ML/year) and seepage induced by further underground mining (predicted by the model to be 0.1 ML/day).

AQC is also able to sell its Unregulated River WALs assigned to the Dartbrook Water Source without giving rise to any operational issues at the mine. The dams at Dartbrook Mine capture runoff from within the plan area of the Dartbrook Water Source. Clean water runoff is diverted around the disturbed and hardstand areas at Dartbrook Mine by diversion drains and dams. The sediment and mine water dams at the site only capture dirty runoff. These dams meet the definition of 'excluded works' under Schedule 1 of the *Water Management (General) Regulation 2000*. As such, WALs are not required to account for water captured by these dams.

AQC will retain its WALs assigned to the Sydney Basin-North Coast Groundwater Source. These WALs are required to account for its take from the Permian aquifer (see discussion in Section 4.6.2 of the RTS).

AQC will not require all of its current water entitlements to undertake mining operations as proposed by the Revised Modification. The volumes of water currently stored at the site are expected to be sufficient to satisfy future operational demand. In the unlikely event that there is a shortfall, external water can be sourced from the Hunter River alluvial aquifer (Hunter River Alluvial Water Source). As such, AQC's entitlement to take surface water from the Hunter River is not required for mining operations and could be better used for other land uses. AQC's proposal to sell part of its water entitlements will make more water available for other land uses.

5 CONCLUSION

The proposed sale of land at Dartbrook Mine may result in a number of residences being re-classified as private receptors. As discussed in **Section 2**, five receptors may experience noise exceedances due to the Revised Modification and one receptor may be affected by existing activities. In accordance with the VLAMP, it is recommended that negotiated agreements be entered into with any prospective owners of (at least) Receptors 69A, 299B, 300, 301, 302 and 304.

AQC's proposal to sell part of its water entitlements will not affect its ability to undertake the Revised Modification in accordance with the WM Act.

If you have any questions in relation to this letter, please contact myself or Andrew Wu on 02 6575 2000.

Yours faithfully
HANSEN BAILEY

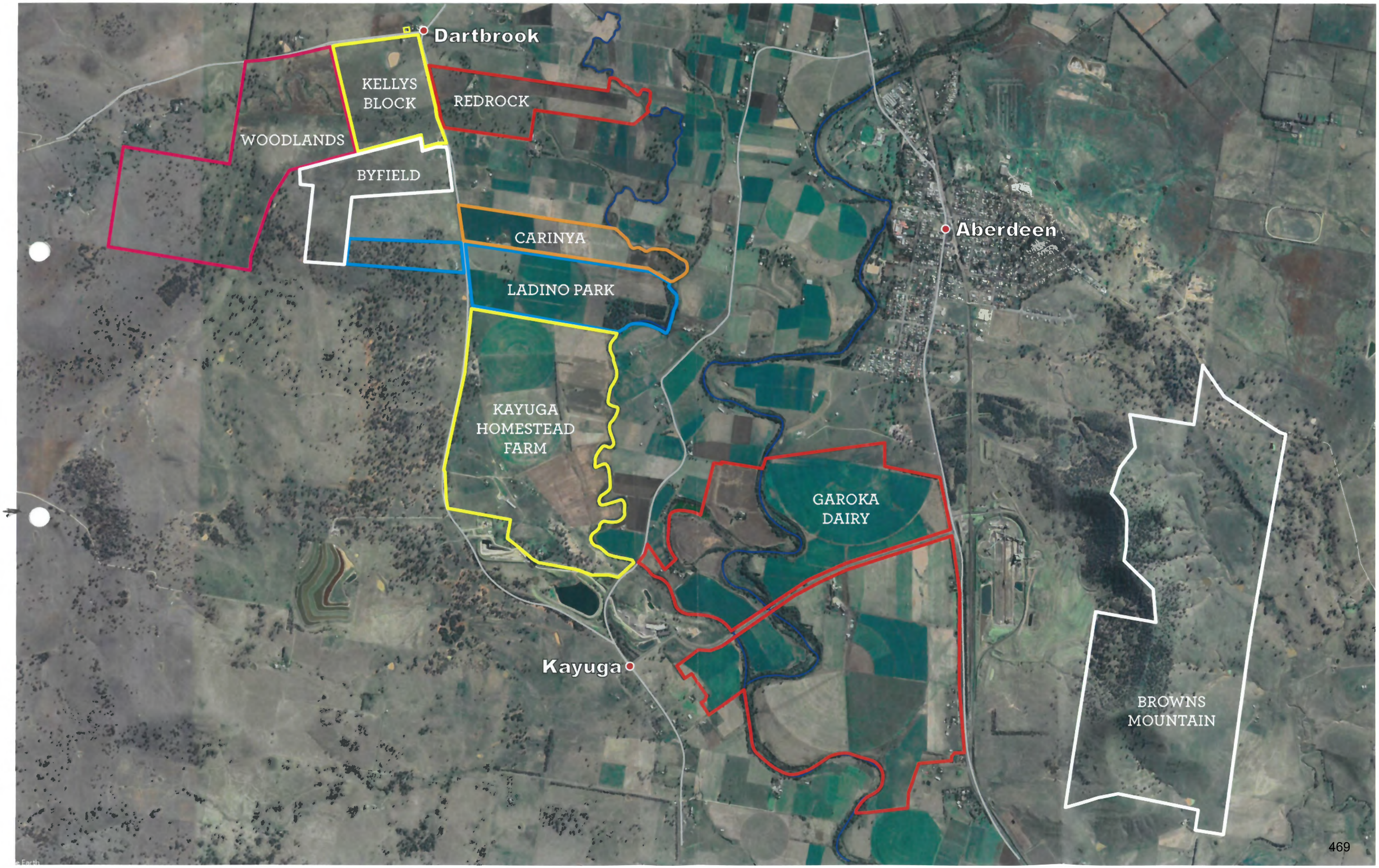
James Bailey
Director

Attached: Annexure A - Map of properties being considered for sale

Annexure A

Aberdeen Dairies & Dartbrook Farms

Aberdeen / Scone, NSW



AQC Dartbrook Management Pty Ltd v Minister for Planning and Public Spaces
LEC Matter No. 2019/346483

Jurisdictional Prerequisites

The parties are satisfied that the following jurisdictional prerequisites are satisfied for the reasons outlined in the table below:

Jurisdictional Prerequisite	Satisfaction
Environmental Planning and Assessment Act 1979 **(EPA Act)**	
Section 75W - Modification of Minister's approval. The proponent may request the Minister to modify the Minister's approval for a project (including an approval of a concept plan). Section 75W(3) provides that the Director-General (now Secretary) may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.	DA231-7-2000 (**Consent**) was granted by the (then) Minister for Urban Affairs & Planning on 28 August 2001 under s76A(9) and s80 of the EPA Act (as it then was). The parties agree that DA231-7-2000 has been physically commenced and has not lapsed. The Applicant's request to modify the Consent under s75W of the EPA Act (as it was) made on 28 February 2018 (**Mod 7 Application**). At the time the Mod 7 Application was lodged the EPA Act contained Schedule 6A which provided transitional arrangements consequent on the repeal of the former Part 3A of the EPA Act. Clause 12 of Schedule 6A provided for the continuing application of Part 3A to modification of certain development consents. Clause 12 provided that s75W continued to apply to modifications of the development consents referred to in clause 8J(8) of the EPA Regulation and so applied whether an application is made before or after the commencement of the clause. At the time the Mod 7 Application was lodged the *Environmental Planning and Assessment Regulation 2000* (**EPA Regulation**) contained cl8J(8). Clause 8J(8), which was authorized by provisions of the EPA Act, provided that development consents granted by the Minister under Part 4 of the EPA Act prior to 1 August 2005 '*are taken to be approvals under Part 3A of the Act and section 75W applies to any modification of such a consent*'. For the above reasons, at the time the Mod 7 Application was lodged, s75W (as it then was) was an available modification pathway.

Jurisdictional Prerequisite	Satisfaction
	The Secretary has not notified the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister under s75W(3). The *Environmental Planning and Assessment Amendment Act 2017* commenced on 1 March 2018. The provisions of Schedule 6A were, in effect, transferred into Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (**EPA Transitional Regulation**). By virtue of cl3BA(3) of the Transitional Regulation, the Mod 7 Application continues to be treated as a modification application under the former s75W of the EPA Act. The former s75W(5) of the EPA Act (as it was) included a right appeal for an applicant who was dissatisfied with the determination of a request under s75W. By operation of cl8E(4) of the EPA Transitional Regulation any appeal was required to be commenced within 3 months of the Independent Planning Commission's (**IPC**) determination of the Mod 7 Application (that is, by 9 November 2019). These Class 1 proceedings were commenced on 4 November 2019, within the prescribed appeal period. The only jurisdictional preconditions to the determination of the Mod 7 Application arising from s75W itself are the making of the request and the consent authority, in this case the Court, being satisfied that the request falls within the scope of the section (see *Barrick Australia Ltd v Williams* (2009) 168 LGERA 437 at [38]. The parties agree that the request has been made and that it falls within the scope of s75W.
Consent authority can require a planning agreement to be entered into as a condition of a development consent	In accordance with the above, clause 8J(8) (now in Schedule 4 of the EPA Transitional Regulation) provides that, for the purposes of modification, the Consent is taken to be an approval under Part 3A of the Act and section 75W of the EPA Act applies. Consequently, for the purposes of modification: (a) The Consent is therefore taken to be an approved project and will be a "transitional Part 3A project" under clause 2 of Schedule 2 of the EPA Transitional Regulation.

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	(b) Part 3A continues to apply to and in respect of a transitional Part 3A Project (clause 3 of Schedule 2 of the EPA Transitional Regulation). (c) Section 75R(4) in Part 3A provides that "Divisions 6 and 6A of Part 4 apply to projects (and the giving of approval for the carrying out of projects under this Part) in the same way as they apply to development and the granting of consent to the carrying out of development under Part, subject to any necessary modifications and any modifications prescribed by the regulations. Division 6 of Part 4 previously contained provisions for development contributions, including sections 93F to 93L concerning planning agreements. In accordance with clause 4A of the EPA Transitional Regulation, the reference to those provisions is taken to be a reference to the provisions in Division 7.1 of Part 7, including sections 7.4 to 7.10 concerning planning agreements. Section 7.7 of the EPA Act (relevantly) provides that "a consent authority can require a planning agreement to be entered into as a condition of a development consent, but only if it requires a planning agreement that is in the terms of an offer made by the developer in connection with the development application". The Applicant has made an offer to enter into a planning agreement in accordance with the terms set out in Appendix 5 of the proposed modified conditions of development consent. The consent authority (in this case the Court) is therefore authorised to impose a condition requiring a planning agreement to be entered into on those terms. To the extent that section 7.7 requires the offer to made in connection with a development application, an offer made as part of a modification application satisfies that requirement (see *Progress & Securities Building Pty Limited v Burwood Council & Anor (No 2)* [2008] NSWLEC 135 at [21] and [22]).
Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017 (**EPA Transitional Regulation**)	
Gateway Certificate – Clause 20 of the EPA Transitional Regulation	Schedule 2, cl 20 of the EPA Transitional Regulation applies to the '*modification of certain approved projects and development consents relating to mining or petroleum development on strategic agricultural land*.' Clause 20(4) of Schedule 2 of the Transitional Regulation requires a modification application **to which the clause applies** to be accompanied by a current gateway certificate or site verification certificate. The

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	jurisdictional question which arises from Clause 20(4) is whether Clause 20 'applies' to the Mod 7 application. Clause 20(1) identifies the applications to which Clause 20 applies and provides (our emphasis added): (1) This clause applies to the following requests and applications— (a) a request to modify an approved project, (b) an application for the modification of a development consent referred to in clause 8J(8) of the Environmental Planning and Assessment Regulation 2000, **but only if** the request or application relates to **mining or petroleum development** on the following land— (c) land shown on the Strategic Agricultural Land Map, (d) any other land that is the subject of a site verification certificate. The Mod 7 application involves an application under the former clause 8J(8) of the EPA Regulation and involves land shown on the Strategic Agricultural Land Map. The question that determines whether Clause 20 applies to Mod 7 is therefore whether the application "relates to mining or petroleum development" as that expression is defined in Clause 20. Clause 20(2)-(3) of Schedule 2 relevantly provides (our emphasis added): "(2) In this clause, **mining or petroleum development means**: (a) development specified in clause 5 of Schedule 1 to *State Environmental Planning Policy (Major Development) 2005* (as in force immediately before the repeal of that Schedule), but only if: (i) **a mining lease under the Mining Act 1992 is required to be issued** to enable the development to be carried out under the modified approval or consent **because**: (A) **the development is proposed to be carried out outside the mining area of an existing mining lease**, or

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	(B) **there is no current mining lease in relation to the proposed development**, or …" The Mod 7 application does involve development specified in former clause 5 of Schedule 1 to *State Environmental Planning Policy (Major Development) 2005* as it involves "development for the purpose of mining that … is coal … mining". Schedule 2, cl 20(2)(b) does not apply. The question which then arises is whether a mining lease under the *Mining Act 1992* (**Mining Act**) is required to be issued to enable the development to be carried out under the modified consent because: 1. The development is proposed to be carried out outside the mining area of an existing mining lease, or 2. There is no current mining lease in relation to the proposed development. The Applicant holds CL386, ML1381, ML1456 and ML1497. The parties agree the development proposed by the Mod 7 Application is all within the mining area of the existing mining leases. There are also current mining leases 'in relation to the proposed development'. The parties agree that the consequence of the proposed development all being within the existing mining leases is that the development proposed in the Mod 7 Application does not fall within the concept of '*mining or petroleum development*' for the purpose of Clause 20. For that reason, Clause 20 does not apply to the Mod 7 Application and the parties agree that no gateway certificate is required to accompany the Mod 7 application.
Other	
Application considered by the Court must not be a "new application"	Upon receiving a request under section 75W(2) the Minister may, under section 75W(4), modify the approval with or without conditions or disapprove the modification. The Proceedings currently involve redetermination of the Mod 7 Application by the Court. The Minister, as part of the proceedings, has raised contentions about why the Court should determine the Mod 7 Application in the same way that the IPC, as the delegate of the Minister, did.

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	In response to the contentions raised by the Minister, the Applicant, through the Response to Contentions, has: (a) Provided additional environmental assessment material that the Minister contended was either absent or insufficient in the material lodged with the request; (b) Indicated it will not require the modification required to implement a new coal clearance system; and (c) Indicated that it would accept a condition restricting mining in the Piercefield seam to limit the environmental impacts associated with the extension of the period during which mining operations are authorised. The parties agree there is power to amend the Mod 7 Application in the scheme of the EPA Act because: (a) An authority conferred by statute is construed as authorising everything which can fairly be regarded as incidental to or consequential upon the authority itself (citing *Johns v Australian Securities Commission* (1993) 178 CLR 408 (***Johns***)); (b) The scope of a statutory power is ascertained by the character of the statute and the nature of the provisions it contains. When the exercise of power is left to the discretion of some person, the scope for implementing the power is fettered only by the necessity to maintain consistency with the purpose or purposes of the legislation (citing *Johns*); (c) It would be inconsistent with the sensible application of provisions that required the consent authority to notify an application for modification and to consider the submissions received as a result of the notification to be unable to seek a meaningful response from the applicant (*Jaimee Pty Ltd v Council of the City of Sydney* [2010] NSWLEC 245 (***Jaimee***) at [28]); and (d) Even where there is no express power to amend an application it is 'manifestly convenient that such a power exist' (*Jaimee* at [29] – [30]) The parties agree that the amendment brought about by the Response to Contentions is within the amendment power. Comparing the request as originally made to that which is reflected in the Response to Contentions, there is nothing that is substantially different to the application made nor anything that changes the nature of the application. The Response to Contentions provides additional material to support the request as made, or addresses how the application might be determined in response to the contentions raised. For that reason, there is no substantial change to the underlying Mod 7 Application brought about

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	by the Response to Contentions such that it could be said that it falls outside the concept of modification under s75W and it is within the Court's power to consider the application as amended by the Response to Contentions. The parties note the Response to Contentions has been publicly notified and that the application has not changed in any way since that notification.