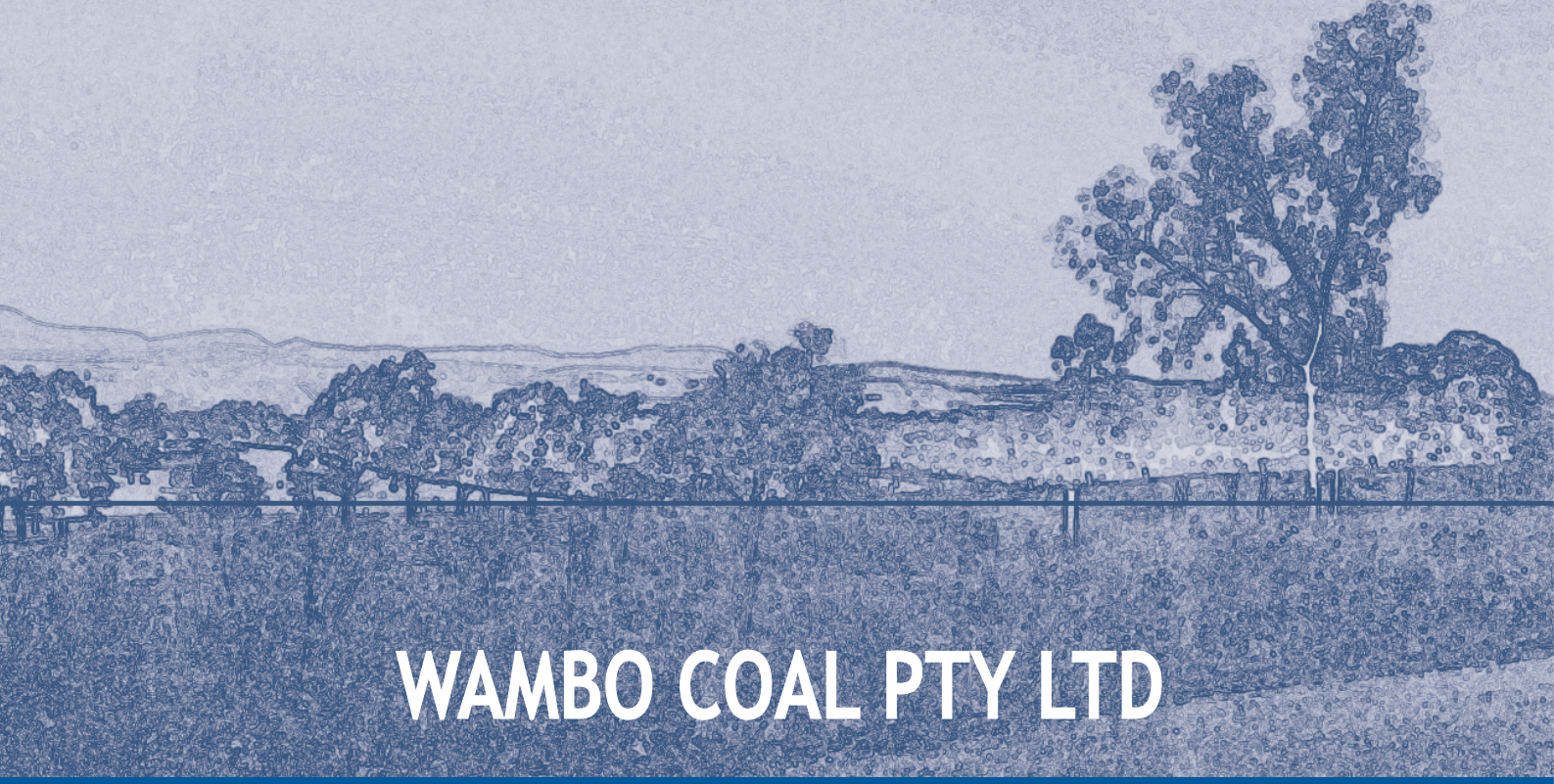


WAMBO COAL PTY LTD

NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

ATTACHMENT 1
STATUTORY REQUIREMENTS

Peabody ENERGY

Attachment 1
Statutory Requirements

This Attachment outlines relevant statutory and guideline requirements and provides the relevant section of the Extraction Plan where the requirements are addressed. This Attachment considers the statutory instruments and guidelines in **Table A1-1**.

Table A1-1
Relevant Statutory Instruments and Guidelines

Statutory Instrument or Guideline	Attachment 1 Reference
Development Consent (DA 305-7-2003)	Table A1-2
Draft *Guidelines for the Preparation of Extraction Plans Required under Conditions of Development Consents, Project Approvals and Mining Lease Conditions for Underground Coal Mining* (Version 5) (Draft Extraction Plan Guidelines) (DP&E and DRE, 2015)	Table A1-3
Mining Lease Conditions	Table A1-4
Approval of Application for Longwalls 7 and 8 under Section 60 of the *Heritage Act, 1977* for Extension of Underground Longwall Mining into the Wambo Homestead Curtilage (2012/S60/30)	Table A1-5
Approval of Application for Longwalls 9 and 10 under Section 60 of the *Heritage Act, 1977* (2013/S60/30) as modified under Section 65A of the *Heritage Act, 1977* (2013/S65A/16)	Table A1-6

Table A1-2
Development Consent DA 305-7-2003 Requirements

<table>
<tr><th>Condition Number (Schedule 4)</th><th>Condition</th><th>Document Reference/Comment</th></tr>
<tr><td colspan="3">Performance Measures – Natural and Heritage Features, etc</td></tr>
<tr><td>22.</td><td>The Applicant shall ensure that the development does not cause any exceedances of the performance measures in Table 14A, to the satisfaction of the Secretary.

Table 14A: Subsidence Impact Performance Measures
<table>
<tr><td colspan="2">Water</td></tr>
<tr><td>Wollombi Brook</td><td>Negligible impact.
Controlled release of excess site water only in accordance with EPL requirements</td></tr>
<tr><td colspan="2">Biodiversity</td></tr>
<tr><td>Wollemi National Park</td><td>Negligible subsidence impacts.
Negligible environmental consequences</td></tr>
<tr><td>Warkworth Sands Woodland Community</td><td>Minor cracking and ponding of the land surface or other impact.
Negligible environmental consequences</td></tr>
<tr><td>White Box, Yellow Box, Blakely’s Red Gum Woodland/Grassy White Box Woodland Community</td><td>Minor cracking and ponding of the land surface or other impact.
Negligible environmental consequences</td></tr>
<tr><td>Other threatened species, populations or communities</td><td>Minor cracking and ponding of the land surface or other impact.
Negligible environmental consequences</td></tr>
<tr><td colspan="2">Heritage</td></tr>
<tr><td>Wambo Homestead Complex</td><td>Negligible impact on heritage values, unless approval has been granted by the Heritage Branch and/or the Minister</td></tr>
</table></td><td>This Extraction Plan has been developed to meet the subsidence impact performance measures.

Section 3.1 and Appendix A (Water Management Plan)

Section 3.3 and Appendix C (Biodiversity Management Plan)

Section 3.4 and Appendix D (Heritage Management Plan)</td></tr>
</table>

Table A1-2 (Continued)
Development Consent DA 305-7-2003 Requirements

<table>
<tr><th>Condition Number (Schedule 4)</th><th>Condition</th><th>Document Reference/Comment</th></tr>
<tr><td colspan="3">Performance Measures – Built Features</td></tr>
<tr><td>22A.</td><td>The Applicant shall ensure that the development does not cause any exceedances of the performance measures in Table 14B, to the satisfaction of the DRE.

Table 14B: Subsidence Impact Performance Measures
<table><tr><td colspan="2">Built Features</td></tr><tr><td>All built features</td><td>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.</td></tr><tr><td colspan="2">Public Safety</td></tr><tr><td>Public Safety</td><td>No additional risk</td></tr></table></td><td>This Extraction Plan has been developed to meet the subsidence impact performance measures.

Section 3.5 and Appendix E (Built Features Management Plan)

Section 3.6 and Appendix F (Public Safety Management Plan)</td></tr>
<tr><td>22B.</td><td>Any dispute between the Applicant and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 14B is to be settled by DRE. DRE may seek the advice of the MSB on the matter. Any decision by DRE shall be final and not subject to further dispute resolution under this consent.</td><td>The Longwalls 8 to 10A Application Area is located entirely within WCPL-owned land.
All built features are to be managed in accordance with Section 3.5 and the Built Features Management Plan (Appendix E).</td></tr>
</table>

Table A1-2 (Continued)
Development Consent DA 305-7-2003 Requirements

Condition Number (Schedule 4)	Condition	Document Reference/Comment
Extraction Plan		
22C.	The Applicant shall prepare and implement an Extraction Plan for the second workings within each seam to be mined to the satisfaction of the Secretary. Each Extraction Plan must: (a) be prepared by a team of suitably qualified and experienced persons whose appointment has been endorsed by the Secretary;	Section 1.1 and Attachment 2
	(b) be approved by the Secretary before the Applicant carries out any of the second workings covered by the plan;	This Application
	(c) include detailed plans of the proposed first and second workings and any associated surface development;	Section 1.3 and Appendix G (Coal Resource Recovery Plan)
	(d) include detailed performance indicators for each of the performance measures in Tables 14A and 14B;	Section 3 and Appendices A, C, D, E and F
	(e) provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this consent;	Section 2.1 and Reports 1 to 4
	(f) describe the measures that would be implemented to ensure compliance with the performance measures in Tables 14A and 14B, and manage or remediate any impacts and/or environmental consequences;	Section 3 and Appendices A to F, H and I
	(g) include the following to the satisfaction of DRE: • a coal resource recovery plan that demonstrates effective recovery of the available resource;	Appendix G (Coal Resource Recovery Plan)
	• a subsidence monitoring program to: – provide data to assist with the management of the risks associated with subsidence; – validate the subsidence predictions; and – analyse the relationship between the subsidence effects and impacts under the plan and any ensuing environmental consequences;	Section 3.8 and Appendix H (Subsidence Monitoring Program)

Table A1-2 (Continued)
Development Consent DA 305-7-2003 Requirements

Condition Number (Schedule 4)	Condition	Document Reference/Comment
22C. (Cont.)	• a Built Features Management Plan to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which: – addresses in appropriate detail all items of public infrastructure and all classes of other built features; and – has been prepared following appropriate consultation with the owner/s of potentially affected feature/s;	Section 3.5 and Appendix E (Built Features Management Plan) and component plans
	• a Public Safety Management Plan to ensure public safety in the mining area; and	Section 3.6 and Appendix F (Public Safety Management Plan)
	• appropriate revisions to the Rehabilitation Management Plan required under condition 40A; and	The Rehabilitation Management Plan is provided in Appendix I. WCPL will prepare a revised Mining Operations Plan (MOP) for the Wambo Coal Mine that will address the requirements of a Rehabilitation Management Plan. The revised MOP will be prepared in consultation with the DRE and submitted prior to September 2015.
	(h) include a: • Water Management Plan, which has been prepared in consultation with EPA and NOW, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on surface water resources, groundwater resources and flooding, and which includes: – surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality; – a program to monitor and report groundwater inflows to underground workings; and – a program to manage and monitor impacts on groundwater bores on privately-owned land;	Section 3.1 and Appendix A (Water Management Plan) The Environment Protection Authority and the NSW Office of Water have been provided with a copy of previous versions of the Water Management Plan on four previous occasions. The Environment Protection Authority and the NSW Office of Water have not provided comment on any previous version of the Water Management Plan The Environment Protection Authority and the NSW Office of Water were consulted extensively as part of the North Wambo Longwall 10A Modification EA.

Table A1-2 (Continued)
Development Consent DA 305-7-2003 Requirements

Condition Number (Schedule 4)	Condition	Document Reference/Comment
22C. (Cont.)	• Biodiversity Management Plan, which has been prepared in consultation with the OEH, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on flora and fauna;	Section 3.3 and Appendix C (Biodiversity Management Plan) A draft of the revised Biodiversity Management Plan was provided to the Office of Environment and Heritage on 12 March 2015.
	• Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general;	Section 3.2 and Appendix B (Land Management Plan) There are no 'affected public authorities' relevant to the Longwalls 8 to 10A Application Area, therefore the Land Management Plan was not distributed for comment.
	• Heritage Management Plan, which has been prepared in consultation with OEH and relevant stakeholders for Aboriginal and non-Aboriginal heritage, to manage the potential environmental consequences of the proposed second workings on heritage sites or values; and	Section 3.4 and Appendix D (Heritage Management Plan) A draft of the revised Heritage Management Plan was provided to the Office of Environment and Heritage and the Heritage Branch on 12 March 2015.
	(i) include a program to collect sufficient baseline data for future Extraction Plans.	Attachment 3
22D.	The Applicant shall ensure that the management plans required under condition 22C(h) above include: (a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this consent; (b) a detailed description of the measures that would be implemented to remediate predicted impacts; and (c) a contingency plan that expressly provides for adaptive management.	Appendices A, B, C and D

Table A1-2 (Continued)
Development Consent DA 305-7-2003 Requirements

Condition Number (Schedule 4)	Condition	Document Reference/Comment
First Workings		
22E.	The applicant may carry out first workings within the underground mining area, other than in accordance with an approved extraction plan, provided that DRE 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.	Request lodged on 12 July 2013 for confirmation that the Division of Resources and Energy is satisfied that the first workings for Longwalls 9 and 10 are designed to remain stable and non-subsiding in the long term, except insofar as they may be impacted by approved second workings. Confirmation from the Division of Resources and Energy provided on 6 September 2013 that the proposed first workings satisfy the requirements of Condition 22E, Schedule 4 of the Development Consent (DA 305-7-2003), subject to the Mine Manager undertaking adequate monitoring of the stability of the first workings and implementing appropriate ground support of the roadways in accordance with the results of the monitoring. Request lodged on 15 May 2015 for confirmation that the Division of Resources and Energy is satisfied that the first workings for Longwall 10A are designed to remain stable and non-subsiding in the long term, except insofar as they may be impacted by approved second workings. Confirmation from the Division of Resources and Energy provided on 26 May 2015 that the proposed first workings satisfy the requirements of Condition 22E, Schedule 4 of the Development Consent (DA 305-7-2003), subject to the Mine Manager undertaking adequate monitoring of the stability of the first workings and implementing appropriate ground support of the roadways in accordance with the results of the monitoring. The above monitoring requirements are undertaken in accordance with the Strata Failure Management Plan.

Table A1-2 (Continued)
Development Consent DA 305-7-2003 Requirements

Condition Number (Schedule 4)	Condition	Document Reference/Comment
Wambo Homestead Complex – Section 60 Approval		
57	An application under section 60 of the Heritage Act must be submitted to and approved by the Heritage Council prior to the commencement of any development on land within the State Heritage Register listing boundary for the Wambo Homestead Complex. In this regard a mine management plan shall be required to accompany the application which demonstrates that the proposed underground mining shall not have adverse heritage impacts on the WHC due to land subsidence.	An application under section 60 of the *Heritage Act, 1977* for mining within the curtilage of the Wambo Homestead Complex for Longwalls 7 and 8 was approved on 12 September 2012 (2012/S60/30). Approval for the mining of Longwalls 9 and 10 was granted on 5 June 2013 (2013/S60/30) and modified under section 65A of the *Heritage Act, 1977* on 16 July 2013. Longwall 10A is not located with the State Heritage Register listing boundary for the Wambo Homestead Complex. The Wambo Homestead Complex Mine Management Plan is an attachment of the Heritage Management Plan (Appendix D).

Table A1-3
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
Structure		

-	The high-level structure for the required elements of an Extraction Plan should be as follows:
	• Title block;
	• Development of the Plan;
	• Overview;
	• Body, comprising six key component plans:
	  - Water Management Plan;
	  - Land Management Plan;
	  - Biodiversity Management Plan;
	  - Built Features Management Plan;
	  - Heritage Management Plan; and
	  - Public Safety Management Plan.
	• Subsidence Monitoring Program;
	• Implementation;
	• Graphical plans; and
	• Attachments.
		The Extraction Plan has been structured as follows:
		• Overview and Summary of Commitments.
		• Section 1 – Overview of the Extraction Plan.
		• Section 2 – Development of the Extraction Plan.
		• Section 3 – Subsidence Management and Monitoring.
		Summarises the monitoring and management measures in the component management plans.
		Section 3.8 provides an overview of subsidence monitoring.
		• Section 4 – Implementation.
		• Section 5 – References.
		• Section 6 – Abbreviations, Acronyms and Glossary.
		• Attachments 1 to 5.
		• Appendices A to I (component management plans).
		Graphical plans are provided in Appendix G (Coal Resource Recovery Plan).
		• Technical Reports 1 to 4.

Table A1-3
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
Title Block		
1	A title block should be included at the beginning of the Extraction Plan, which contains the: • name of the applicant company; • name of mine; • development consent and mining lease reference numbers; • Extraction Plan title, date and reference number; • the signature(s) of person(s) taking responsibility for the accuracy and comprehensiveness of the information contained within the plan, including an authorised representative of the lease holder and the mine manager (for the purposes of relevant safety legislation).	Document Control page.
Development		
2	Most importantly, this section should address consultation ***undertaken by the mine with affected agencies and other key stakeholders***, such as the owners and/or operators of both publicly and privately-owned infrastructure and the mine's Community Consultative Committee.	Section 2.3
	Mines are encouraged to provide draft copies of the Extraction Plan and/or some of its component plans (see section 3 below) to key regulators for review and feedback.	Table 10
	Owners of both publicly and privately-owned infrastructure that may be impacted by subsidence should also be consulted.	Section 2.3.3 All assets within the Longwalls 8 to 10A Application Area are WCPL-owned.
	Landowners (whether public or private) may also need to be consulted.	The Longwalls 8 to 10A Application Area is located entirely within WCPL-owned land.
	Where conditions of consent *require* consultation with affected agencies, then evidence of the mine's consultative process should be appended to the Extraction Plan, or else provided separately. This evidence should address who was consulted and when, and whether and to what degree their feedback has been incorporated into the Plan.	Attachment 2

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
2 (Cont.)	This section should also describe the ***process of reviewing and updating the predictions of subsidence effects, subsidence impacts and environmental consequences*** used in previous environmental impact assessment or environmental management plan documentation relied upon by the mine (eg the predictions in any previous Environmental Assessment or Environmental Impact Statement and/or the predictions in any previous Extraction Plan or SMP). Essentially, this sub-section should provide assurance that previous predictions either remain current (perhaps because this is the first Extraction Plan to be approved following grant of development consent), or that they have been recently revised to take into account monitoring undertaken since the last set of predictions were developed in detail. For guidance, all predictions of subsidence effects, subsidence impacts and environmental consequences should normally take into account the monitored results of the last complete longwall extraction, or all results of monitoring more than six months prior to the date of submission in the case of other types of extraction panels.	Section 2.1 and Technical Reports 1, 2 and 3
Overview		
3	The overview section is an essential introduction to the Extraction Plan. It should accurately describe:	
	• mine planning and design, including:	Section 1.3
	- area covered by the Plan and proposed mine layout, described in both text and figures and/or graphical plans. The Plans should also describe and depict all key landscape features, heritage sites and environmental values;	Section 1.1 and Figures 2 and 3
	- area of underground mining domains (both extracted and approved) for the mine as a whole, showing in context the area covered by the Plan and proposed mine layout, described in text, figures and graphical plans;	Figures 2, 3 and 6
	- all key proposed mining parameters (described in text, figures and graphical plans) such as proposed mining methods, seam thickness, panel and void widths, chain pillar width, mining height, depth of cover, mining rate, extraction stages and sequencing, resource recovery;	Table 2 and Figure 6 Further detail is provided in the Coal Resource Recovery Plan (Appendix G)

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
3 (Cont.)	- all key existing mining parameters (described in text, figures and graphical plans) such as existing workings (including abandoned workings), whether in the proposed extraction seam or in overlying or underlying seams, and the distribution, geometry and stability of significant voids, standing pillars or remnants which may interact with any proposed workings; and	Section 1.3.1 and Coal Resource Recovery Plan (Appendix G)
	- any special features such as proposed and/or existing multi-seam mining, unusual roof and/or floor conditions, and any conditions that may cause elevated or abnormal subsidence or the formation of sinkholes;	Section 1.3.1 and Coal Resource Recovery Plan (Appendix G)
	• subsidence predictions, including:	
	- all key currently-predicted subsidence parameters (for each proposed longwall or other extraction panel) in both text and figures and/or plans; such as vertical subsidence, tilts, compressive and tensile strains, upsidence and valley closure, relevant far-field movements, including (where relevant) the timing and duration of these parameters;	Section 1.4
	• performance objectives and other regulatory requirements, including:	
	- what is required to be achieved by the Applicant under the conditions of development consent that establish the requirement for the Extraction Plan and other relevant conditions, including all performance measures listed in the consent; and	Table 5
	- what is required to be achieved by the Applicant under other regulatory requirements, including the mining lease, relevant safety legislation, environment protection licence and other required approvals, and limitations and other key requirements of these statutes and approvals;	Section 1.5 and this Attachment
	• subsidence management, strategies and measures, ie the means by which the requirements of the conditions of consent and other approvals and statutes are going to be achieved by the Applicant, through:	Section 1.6
	- selection of mine design elements and best practice methods (ie avoidance and mitigation strategies);	Further detail is provided in Sections 1.6.1 and 1.6.2
	- remediation strategies and measures proposed to be implemented in response to predicted subsidence impacts and/or environmental consequences;	Further detail is provided in Sections 3.1 to 3.7

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
3 (Cont.)	- monitoring of subsidence effects, subsidence impacts and environmental consequences (including plans showing all proposed monitoring points); - adaptive management to avoid repetition of any unpredicted subsidence impacts and/or environmental consequences, including capacity to detect early warning of and respond to deviations from required performance measures; and - procedures for investigations of incidents (including all exceedances of performance measures) and appropriate response; and - procedures for quality assurance and review of the management system.	Further detail is provided in Section 3.8 Further detail is provided in Section 4.1 Further detail is provided in Section 4.1.2 Further detail is provided in Sections 4.1 to 4.5
Key Component Plans		
4	The main body of the Extraction Plan primarily comprises a set of six key component plans. It is appropriate that these are presented in a particular order, even if some of the later plans deserve a particular priority due to local circumstances (eg the Built Features or Heritage Management Plans). The preferred order for these component plans is as follows: • Water Management Plan; • Land Management Plan; • Biodiversity Management Plan; • Heritage Management Plan; • Built Features Management Plan; and • Public Safety Management Plan.	Section 3 summarises the monitoring and management measures in the following component management plans: • Appendix A – Water Management Plan; • Appendix B – Land Management Plan; • Appendix C – Biodiversity Management Plan; • Appendix D – Heritage Management Plan; • Appendix E – Built Features Management Plan; and • Appendix F – Public Safety Management Plan.

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
4 (Cont.)	Each of these key component plans should follow the structure of: • overview of all landscape features, heritage sites, environmental values, built features or other values to be managed under the component plan;	Table 2 and Section 1.1 of Appendix A, Section 1.1 of Appendix B, Section 1.1 of Appendix C, Section 1.1 of Appendix D, Sections 1.1 and 2 of Appendix E and Section 1.1 of Appendix F
	• setting out all performance measures included in the development consent relevant to the features or values to be managed under the component plan;	Section 2 of Appendix A, Section 2 of Appendix C, Section 2 of Appendix D, Section 3 of Appendix E and Section 2 of Appendix F
	• setting out clear objectives to ensure the delivery of the performance measures and all other relevant statutory requirements (including relevant safety legislation);	Section 2 of Appendix A, Section 2 of Appendix C, Section 2 of Appendix D, Section 3 of Appendix E and Section 2 of Appendix F
	• proposing performance indicators to establish compliance with these performance measures and statutory requirements;	Section 5 of Appendix A, Section 4 of Appendix C, Section 4 of Appendix D, Attachments 1, 2 and 3 of Appendix E and Section 6 of Appendix F
	• describing the landscape features, heritage sites and environmental values to be managed under the component plan, and their significance. It should be noted that a full description of such features, sites and values would commonly have been provided and considered in a recent environmental impact assessment. Consequently, this section can be relatively brief, and focus on the presentation of appropriate figures and/or graphical plans;	Table 2 and Section 3 of Appendix A, Section 3 of Appendix B, Table 2 and Section 3 of Appendix C, Table 2 and Section 3 of Appendix D, Table 1 of Appendix E and Section 3 of Appendix F
	• fully describing all currently-predicted subsidence impacts and environmental consequences relevant to the features, sites and values to be managed under the component plan;	Section 3 of Appendix A, Section 3 of Appendix B, Section 3 of Appendix C, Section 3 of Appendix D, Section 5 and Attachments 1, 2 and 3 of Appendix E and Section 3 of Appendix F
	• fully describing all measures planned to remediate these impacts and/or consequences, including any measures proposed to ensure that impacts and/or consequences comply with performance measures and/or the Applicant's commitments;	Section 4 of Appendix A, Section 5 of Appendix B, Table 2 of Appendix D and Attachments 1, 2 and 3 of Appendix E
	• describing the existing baseline monitoring network and the current baseline monitoring results, including pre-subsidence photographic surveys of key landscape features and key heritage sites which may be subject to significant subsidence impacts (such as significant watercourses, swamps and Aboriginal heritage sites);	Table 2 of Appendix A, Table 3 of Appendix B, Table 2 of Appendix C and Table 2 of Appendix D

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
4 (Cont.)	• fully describing the proposed monitoring of subsidence impacts and environmental consequences;	Section 3 and Table 2 of Appendix A, Section 4 of Appendix B, Section 3 and Table 2 of Appendix C, Section 3 and Table 2 of Appendix D, Attachments 1, 2 and 3 of Appendix E and Section 4 of Appendix F
	• describing the proposed monitoring of the success of remediation measures following implementation;	Section 5 of Appendix A, Section 6 of Appendix B, Table 2 of Appendix D and Attachments 1, 2 and 3 of Appendix D
	• fully describing adaptive management proposed to avoid repetition of unpredicted subsidence impacts and/or environmental consequences;	Section 5 of Appendix A, Section 6 of Appendix B, Section 4 of Appendix C, Section 4 of Appendix D, Attachments 1, 2 and 3 of Appendix E and Section 6 of Appendix F
	• fully describing contingency plans proposed to prevent, mitigate or remediate subsidence impacts and/or environmental consequences which substantially exceed predictions or which exceed performance measures;	Sections 5 and 6 of Appendix A, Section 7 of Appendix B, Sections 4 and 5 of Appendix C, Sections 4 and 5 of Appendix D, Attachments 1, 2 and 3 of Appendix E and Section 7 of Appendix F
	• listing responsibilities for implementation of the plan; and	Section 4 of Appendix A, Section 8 of Appendix B, Attachment 2 of Appendix C, Section 6 of Appendix D, Attachments 1, 2 and 3 of Appendix E and Section 8 of Appendix F
	• an attached Trigger, Action, Response Plan (effectively a tabular summary of most of the above).	Attachment 1 of Appendices A, B, C, D, F and Attachments 1, 2 and 3 of Appendix E
	All six key component plans should give appropriate consideration to risk assessment and risk management. This is particularly the case for Public Safety Management Plans and Built Features Management Plans. These two plans should include: • the results of risk assessment conducted by a competent person in accordance with relevant standards and guidelines; • description of the investigation and analysis methods used in determining the risk control measures and procedures, carried out by a competent person; • description of all risk control measures and procedures, including a statement of the feasibility to manage identified risks; and • a proposed program for implementation of the proposed risk control measures and procedures.	Technical Report 4 and reflected in Appendices A to F Technical Report 4, Section 6 of Appendix E and Section 3 of Appendix F

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
4 (Cont.)	The Public Safety Management Plan must address all potential safety hazards to the public. The scope of the Plan should include management of health and safety risks due to: • potential subsidence impacts on built features; • potential instability of cliff formations or steep slopes caused by subsidence; • deformations or fracturing of any land caused by subsidence, and • any other impacts of subsidence. This Plan should address management measures such as: • monitoring of areas posing safety risks; • erection of warning signs and possible entry or use restrictions; • backfilling of surface cracks and/or re-profiling of humps and swales on tracks and roads; • infilling of pot holes; • securing of potentially unstable structures and rock masses; • identification of potential flood-related impacts that may pose a risk to public safety; and • provision of regular updates regarding mining progress to the community where management of public safety is a significant issue.	Sections 1.1 and 3 of Appendix F Section 4 of Appendix F Section 5 of Appendix F Section 4 of Appendix F and Appendix B Section 4 of Appendix F and Appendix B Not applicable Not applicable Not applicable (WCPL-owned land)
	It may be appropriate that owners of either land or infrastructure are compensated in some manner for damage, disturbance, access requirements or other inconvenience associated with mining and mine subsidence. Such compensation may reflect the requirements of the *Mine Subsidence Compensation Act 1961*, Part 13 of the *Mining Act 1992* and/or conditions of development consent.	The Longwalls 8 to 10A Application Area is located entirely within WCPL-owned land. All assets within the Longwalls 8 to 10A Application Area are WCPL-owned.

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
Subsidence Monitoring Program		
5	The key component plans should be followed by a Subsidence Monitoring Program.	Section 3.8 and Appendix H (Subsidence Monitoring Program)
	This program should address two purposes. The first is to set out the program for monitoring the *subsidence effects* associated with the proposed coal extraction.	Section 3 of Appendix H
	The second is to summarise and consolidate the various environmental monitoring programs presented in each of the key component plans.	Section 4 of Appendix H
	Subsidence Effects Monitoring Program	
	The Subsidence Effects Monitoring Program must provide sufficient information on subsidence effects to fully support implementation of the Extraction Plan. It should have clearly stated objective(s) and address the following:	
	• proposed subsidence monitoring activities (individually specified);	Section 3 and Table 1 of Appendix H
	• information or subsidence parameters to be obtained from each monitoring activity;	Table 1 of Appendix H
	• proposed locations and/or extents where each monitoring activity will be undertaken, in particular, the proposed layout and/or locations of instrumentation, monitoring points or inspections (including graphical plans);	Table 1 and Attachment 1 of Appendix H
	• proposed timing, frequency and duration of each monitoring activity;	Table 1 of Appendix H
	• proposed monitoring methods, technologies, industry standards (eg ICSM Standards (SP1) Version 2.0) or Codes of Practice to be applied in undertaking each monitoring activity;	Table 1 of Appendix H
	• proposed measures and procedures for quality assurance and competence of personnel undertaking monitoring activities;	Section 3 of Appendix H
	• proposed procedures to record monitoring results;	Section 3.3 of Appendix H
	• proposed reporting monitoring results, including the frequency of reporting. The primary recipient of reports is DRE, and required reporting frequency will depend on the significance of features which are subject to risk of subsidence impact and consequence, and the scale of that risk; and	Section 3.3 of Appendix H
	• capacity of the program to detect early warning of deviations from the defined performance measures and associated performance indicators.	Section 3 of Appendix H

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
5 (Cont.)	*Environmental Monitoring Program Summary* The Subsidence Effects Monitoring Program must summarise and consolidate the various monitoring programs presented in each of the key component plans, including the Built Features and Public Safety Management Plans. These environmental monitoring programs should be directed towards *monitoring the subsidence impacts and environmental consequences* of mine subsidence. It should contain figures showing the monitoring sites for each of the various monitoring programs, as well as a consolidated figure or figures showing all monitoring sites. It should be noted that the purpose of this summary is not to repeat the monitoring programs which are in themselves important elements of each of the key component plans. Instead the purpose is to present a consolidated overview of the six monitoring programs, enabling ready review of the overall monitoring program. As such, clear figures and tabulated information are critical.	Section 4 of Appendix H and Section 3.8 Figure 1 and 2 of Appendix H
Implementation		
6	This section of the Extraction Plan should address all key elements of how the plan is going to be implemented, including reporting, regular review and key responsibilities. This section should follow the structure set out below: • Reporting Framework; • Review of the Extraction Plan; • Review of other Management Plans; and • Key Responsibilities.	Section 4 has been structured as follows: • Section 4.1 – Adaptive Management and Contingency Response. • Section 4.2 – Reporting Framework. • Section 4.3 – Review of the Extraction Plan. • Section 4.4 – Review of Other Management Plans. • Section 4.5 – Key Responsibilities.

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
6 (Cont.)	The ***reporting framework*** is a critical section of the Extraction Plan. DPE and DRE both consider that there is value in developing and applying a standard reporting framework for all mines which are operating under an Extraction Plan approved after 30 September 2014. The required elements of this framework are: • incident reporting, following any occasion of incident, in accordance with the conditions of consent and/or environment protection licence and/or any requirements in the TARP(s); • bi-monthly subsidence impact reporting, following regular monthly inspections, but only if any new impact is identified. Impacts should be clearly distinguished between those which are within predictions, those which exceed predictions but remain within performance measures and/or performance indicators, and those which exceed performance measures and/or performance indicators. Impact reporting must include a full description, location identification using aerial photos with longwall layout superimposed, good photos of the impact, and preliminary characterisation of the impact in accordance with the relevant TARP(s); • six-monthly reporting of all impacts and environmental monitoring results, including: - a comprehensive summary of all impacts, including a revised characterisation according to the relevant TARP(s); - any proposed actions resulting from Triggers being met in the TARP, or other actions; - assessment of compliance with all relevant performance measures and indicators; - a comprehensive summary of all quantitative and qualitative environmental monitoring results, including landscape monitoring, water quality data, water flow and pool level data, piezometer readings, etc; and • Annual Review (or Annual Environmental Management Report) reporting, to be based on each two successive six-monthly reports of impacts and environmental monitoring results. A summary of subsidence effects monitoring results should also be included. DPE and/or DRE may agree to a lesser frequency for the bi-monthly and six-monthly reporting set out above, where subsidence impacts and environmental consequences at the mine are relatively rare and benign in character. This section of the Extraction Plan should also set out, clearly and in tabular fashion, which agencies will receive copies of each of the types of reports discussed above. The means of submission should also be set out. DPE and DRE's preferred method of submission for all reports provided at less than annual frequency is by email.	Table 24 presents the proposed reporting framework for Longwalls 8 to 10A.

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
6 (Cont.)	Processes for the future review of the Extraction Plan should also be set out in detail. Such reviews should take place in the following circumstances: • as required under consent conditions (see below); • where unpredicted subsidence impacts and/or environmental consequences have required the implementation of contingency plans; and • when preparing a following Extraction Plan.	Section 4.3
	Where unpredicted subsidence impacts and/or environmental consequences have occurred, adaptive management requires the implementation of previously approved processes to consider and implement measures to prevent their re-occurrence. However, in certain circumstances (ie where the exceedances are particularly significant and/or are continuing to occur), adaptive management may require a more fundamental review of the Extraction Plan. The Extraction Plan should set out the circumstances in which it is considered that the Plan itself (or any of its key elements) would be reviewed.	Section 4.1.2
	Development of an Extraction Plan may require ***review of other management plans***. For example, conditions of consent regarding Extraction Plans require that the Extraction Plan include any consequential revisions for the mine's Rehabilitation Management Plan. Other plans may also need to be reviewed (eg management plans applying more broadly to the whole minesite, such as DRE's Mine Operations Plan). This section of the Extraction Plan should set out the process for such review, but not the proposed revisions themselves. The proposed revisions should be separately forwarded, as a proposed amendment to the relevant plan.	The Rehabilitation Management Plan has not been revised for the Extraction Plan (Section 3.7). Other management plans proposed to be reviewed to incorporate Longwalls 8 to 10A are identified in Section 4.4.
	The Implementation section of the plan should also set out in detail who is responsible for implementing its various requirements (**key responsibilities**). This sub-section should clearly identify which officers of the Applicant (or consultancy) have key responsibility for ensuring the implementation of the overall Extraction Plan, its key component plans and other elements, who has responsibility for incident and other reporting, who is responsible for decisions to activate TARPs, who is responsible for various elements of the plan's future review, etc.	Section 4.5

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
Graphical Plans		
7	The following plans are required as part of the application. Plan 1 Plan 5 Plan 2 Plan 6 Plan 3 Plan 7 Plan 4	Plans 1 to 7 in Coal Resource Recovery Plan (Appendix G)
	Notes to all Plans: (i) While the plans need not be in the exact format set out above, all the requested information must be supplied. (ii) All plans need to be clear, uncluttered and legible. (iii) All plans should be of the same scale and size and cover the same area so that they can be compared to assess surface and underground features. (iv) A copy of coloured aerial photography of the Extraction Plan application area and its immediate surroundings with an outline of existing and proposed workings should be included, where available. Aerial photography of an adequate scale to show significant surface features should be used. (v) The preferred sheet size is A0. The plans should be contained within a border. There should be a title block on the plans containing: • name of the Applicant; • name of mine; • Extraction Plan title; • graphical plan title and reference number; • scale; • date of last revision; and • Mine Manager's signature and date of signing to testify to the Manager's acceptance of the information shown on the plans.	Plans 1 to 7 in Coal Resource Recovery Plan (Appendix G)

Table A1-3 (Continued)
Requirements of the Draft Extraction Plan Guideline

Guideline Section	Requirement	Document Reference/Comment
Attachments to the Extraction Plan		
8	Any required Coal Resource Recovery Plan should also be included as an attachment.	Coal Resource Recovery Plan (Appendix G)
	Extraction Plans are also required to include details of a program to collect sufficient baseline data for any necessary future Extraction Plans. Details regarding the program to gather baseline data to support future plans should also be included as an attachment.	Attachment 3

Table A1-4
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
Mining Lease 1402		
7	The lease holder shall not interfere in any way with any fences on or adjacent to the subject area unless with the prior written approval of the owner thereof or the Minister and subject to such conditions as the Minister may stipulate.	Appendix B (Land Management Plan) All fences within the Longwalls 8 to 10A Application Area are WCPL-owned.
8	The lease holder shall observe any instruction given or which may be given by the Minister with a view to minimising or preventing public inconvenience or damage to public or private property.	Appendix E (Built Features Management Plan) All assets within the Longwalls 8 to 10A Application Area are WCPL-owned.
11	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder.	Appendix I (Rehabilitation Management Plan)
13	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder.	Appendix I (Rehabilitation Management Plan)
16	The lease holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse or catchment area or any undue interference to fish or their environment and shall observe any instruction given or which may be given by the Minister with a view to preventing or minimising the contamination, pollution, erosion or siltation of any river stream, creek, tributary, lake, dam, reservoir, watercourse or catchment area or any undue interference to fish or their environment.	Appendix A (Water Management Plan), Appendix B (Land Management Plan) and Appendix C (Biodiversity Management Plan)
17	If so directed by the Minister, the lease holder shall ensure that operations are carried out in such manner so as to minimise disturbance to flora and fauna within the subject area.	Appendix B (Land Management Plan) and Appendix C (Biodiversity Management Plan)
20	The lease holder shall conduct operations in such a manner as to not cause or aggravate soil erosion and the lease holder shall observe and perform any instructions given or which may be given by the Minister with a view to minimising or preventing soil erosion.	Appendix B (Land Management Plan) and Appendix I (Rehabilitation Management Plan)

Table A1-4 (Continued)
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
22	In the event of operations being conducted on the surface of any road, track or firetrail traversing the subject area or in the event of such operations causing damage to or interference with any such road, track or firetrail the lease holder, at his own expense, shall if directed to do so by the Minister provide to the satisfaction of the Minister an alternate road, track or firetrail in a position as required by the Minister and shall allow free and uninterrupted access along such alternate road, track or firetrail and, if required to do so by the Minister, the lease holder shall upon completion of operations rehabilitate the surface of the original road, track or firetrail to a condition satisfactory to the Minister.	Appendix B (Land Management Plan) and Appendix E (Built Features Management Plan) All roads and tracks within the Longwalls 8 to 10A Application Area are WCPL-owned.
23	(d) In the event of operations interfering with or damaging any trigonometrical station, Permanent Mark or State Surface Mark (under the Survey Co-ordination Act, 1949) erected on or near the subject area, or if required to do so by the Minister, the lease holder shall relocate any such trigonometrical station, Permanent Mark or State Surface Mark (under the Survey Co-ordination Act, 1949) to the satisfaction of, and in a position required by, the Department of Conservation and Land Management, the Land Information Centre, Bathurst and the Minister and, if required to do so by the Minister, and subject to such conditions as the Minister may impose, the lease holder, upon completion of operations shall relocate any such trigonometrical station, Permanent Mark or State Surface Mark (under the Survey Co-ordination Act, 1949) to its original position.	There are no active trigonometrical stations, Permanent Marks or State Surface Marks within the Longwalls 8 to 10A Application Area. There are state survey control marks located more than 1.5 km from the longwalls. Any far-field movements to survey control marks would be managed in accordance with this condition.
24	The lease holder shall as far as is practicable so conduct operations as not to interfere with or impair the stability or efficiency of any transmission line, communication line or pipeline traversing the surface or the excepted surface of the subject area and shall comply with any direction given or which may be given by the Minister in this regard.	Appendix E (Built Features Management Plan) All assets within the Longwalls 8 to 10A Application Area are WCPL-owned.
25	The lease holder shall not knowingly destroy, deface any aboriginal place or relic within the subject area except in accordance with an authority issued under the National Parks and Wildlife Act, 1974, and shall take every precaution in drilling, excavating or disturbing the land against any such destruction, defacement or damage.	Appendix D (Heritage Management Plan)

Table A1-4 (Continued)
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
Mining Lease 1594		
4	(b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.	This Application
	(c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.	Technical Report 4 and Appendices A to F
	(d) The lease holder must notify the Secretary within 48 hours of any: (i) incident caused by subsidence which has a potential to expose any person to health and safety risks; (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing: A. built features; B. public safety; or C. subsidence monitoring.	Section 4.2
12	Operations must be carried out in a manner that ensures the safety of persons or stock in the vicinity of the operations. All drill holes shafts and excavations must be appropriately protected, to the satisfaction of the Director General, to ensure that access to them by persons and stock is restricted. Abandoned shafts and excavations opened up or used by the lease landholder must be filled in or otherwise rendered safe to a standard acceptable to the Director-General.	Appendix F (Public Safety Management Plan)
13	(a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with the Mining Operations Plan so that:- • there is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion. • the state of the land is compatible with the surrounding land and land-use requirements. • the landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land.	Appendix I (Rehabilitation Management Plan)

Table A1-4 (Continued)
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
13 (cont.)	• in cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density. • the land does not pose a threat to public safety. (b) Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.	Appendix I (Rehabilitation Management Plan) Appendix F (Public Safety Management Plan) Appendix B (Land Management Plan) and Appendix I (Rehabilitation Management Plan)
16	Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard.	Appendix A (Water Management Plan) and Appendix B (Land Management Plan)
17	Operations must not interfere with or impair the stability or efficiency of any transmission line, communication line, pipeline or any other utility on the lease area without prior written approval of the Director-General and subject to any conditions he may stipulate.	Appendix E (Built Features Management Plan) All assets within the Longwalls 8 to 10A Application Area are WCPL-owned.
18	(a) Activities on the lease must not interfere with or damage fences without the prior written approval of the owner thereof or the Minister and subject to any conditions the Minister may stipulate.	Appendix B (Land Management Plan) All fences within the Longwalls 8 to 10A Application Area are WCPL-owned.
19	(a) Operations must not affect any road unless in accordance with an accepted Mining Operations Plan or with the prior written approval of the Director-General and subject to any conditions he may stipulate.	Appendix B (Land Management Plan) and Appendix E (Built Features Management Plan) All roads and tracks within the Longwalls 8 to 10A Application Area are WCPL-owned.
27	(A) Notwithstanding any Mining Operations Plan, the leaseholder mush not mine within any part of the lease area which is within the notification area of the **Wambo Tailings Dam** without the prior written approval of the Minister and subject to any conditions that he may stipulate.	The Longwalls 8 to 10A Application Area extends into the Notification Area of the Wambo Tailings Dam (North East Tailings Dam) (NA-56). WCPL prepared and submitted an application for mining within the North East Tailings Dam Notification Area to the Dams Safety Committee prior to mining within this area (Appendix E).

Table A1-4 (Continued)
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
Annexure A (12/11/2013)	(a) Notwithstanding any Mining Operations Plan, the leaseholder must not mine within any part of the lease area which is within the notification area of the **Wambo South Water Dam** without the prior written approval of the Minister and subject to any conditions that he may stipulate.	The Longwalls 8 to 10A Application Area extends into the Notification Area of the Wambo South Water Dam (NA-235). WCPL's application to extract Longwall 8 and develop gate roads for Longwalls 9 and 10 within the Wambo South Water Dam Notification Area (Application WAMBO-04) was endorsed at the DSC meeting in October 2013. WCPL's application to extract Longwalls 9 and 10 and develop gate roads for Longwall 10A within the Wambo South Water Dam Notification Area (Application WAMBO-05) was endorsed at the DSC meeting in August 2014. The PDMP addresses the recommendations of the DSC in relation to the application. WCPL will require the approval of the Minister for Mineral Resources prior to secondary extraction of Longwall 10A within the Wambo South Water Dam Notification Area.
Consolidated Coal Lease 743		
7	Disturbed land must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the Director-General.	Appendix I (Rehabilitation Management Plan)
8	(b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.	This Application
	(c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.	Technical Report 4 and Appendices A to F

Table A1-4 (Continued)
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
8 (cont.)	(d) The lease holder must notify the Secretary within 48 hours of any: (i) incident caused by subsidence which has a potential to expose any person to health and safety risks; (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing: A. built features; B. public safety; or C. subsidence monitoring.	Section 4.2
16	Operations must be carried out in a manner that ensures the safety of persons or stock in the vicinity of the operations. All drill holes shafts and excavations must be appropriately protected, to the satisfaction of the Director-General, to ensure that access to them by persons and stock is restricted. Abandoned shafts and excavations opened up or used by the lease landholder must be filled in or otherwise rendered safe to a standard acceptable to the Director-General.	Appendix F (Public Safety Management Plan)
18	Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard.	Appendix A (Water Management Plan) and Appendix B (Land Management Plan)
19	Operations must not interfere with or impair the stability or efficiency of any transmission line, communication line, pipeline or any other utility on the lease area without prior written approval of the Director-General and subject to any conditions he may stipulate.	Appendix E (Built Features Management Plan) All assets within the Longwalls 8 to 10A Application Area are WCPL-owned.
20	(a)Activities on the lease must not interfere with or damage fences without the prior written approval of the ow	Appendix B (Land Management Plan) All fences within the Longwalls 8 to 10A Application Area are WCPL-owned.

Table A1-4 (Continued)
Mining Lease Requirements

Condition Number	Condition	Document Reference/Comment
21	(a) Operations must not affect any road unless in accordance with an accepted Mining Operations Plan or with the prior written approval of the Director-General and subject to any conditions he may stipulate.	Appendix B (Land Management Plan) and Appendix E (Built Features Management Plan) All roads and tracks within the Longwalls 8 to 10A Application Area are WCPL-owned.
29	(a) Notwithstanding any Mining Operations Plan, the leaseholder must not mine within any part of the lease area which is within the notification area of the **Wambo Tailings Dam and United Colliery Tailings 2 Dam** without the prior written approval of the Minister and subject to any conditions that he may stipulate.	The Longwalls 8 to 10A Application Area extends into the Notification Area of the Wambo Tailings Dam (North East Tailings Dam) (NA-56). WCPL has prepared and submitted an application for mining within the North East Tailings Dam Notification Area to the Dams Safety Committee prior to mining within this area (Appendix E).
Annexure A (12/11/2013)	(a) Notwithstanding any Mining Operations Plan, the leaseholder must not mine within any part of the lease area which is within the notification area of the **Wambo South Water Dam** without the prior written approval of the Minister and subject to any conditions that he may stipulate.	The Longwalls 8 to 10A Application Area extends into the Notification Area of the Wambo South Water Dam (NA-235). WCPL's application to extract Longwall 8 and develop gate roads for Longwalls 9 and 10 within the Wambo South Water Dam Notification Area (Application WAMBO-04) was endorsed at the DSC meeting in October 2013. WCPL's application to extract Longwalls 9 and 10 and develop gate roads for Longwall 10A within the Wambo South Water Dam Notification Area (Application WAMBO-05) was endorsed at the DSC meeting in August 2014. The PDMP addresses the recommendations of the DSC in relation to the application. WCPL will require the approval of the Minister for Mineral Resources prior to secondary extraction of Longwall 10A within the Wambo South Water Dam Notification Area.

Table A1-5
Requirements of the Approval of Application for Longwalls 7 and 8 under Section 60 of the Heritage Act, 1977 (2012/S60/30)

Condition Number	Condition	Document Reference/Comment
1	A conservation management plan (CMP) for the Wambo Homestead Complex (WHC) is to be prepared for Endorsement by the Heritage Council of NSW or its Delegate within 12 months of the date of this consent. The CMP is to include priority/programmed/staged work schedules with active measures to arrest decay, to repair and to preserve all remaining original fabric during the related mining process, after the expected subsidence from that mining process and when a future use is determined. The objective must be to ensure that the WHC remains in a conserved state that would keep it available for future adaptive re-use at a viable cost after the conclusion of active mining operations.	The Conservation Management Plan (CMP) for the Wambo Homestead Complex will be revised separately in accordance with this condition and Condition 58 of the Development Consent (DA 305-7-2003).
2	The conservation policies and an interpretation strategy contained in the Conservation Management Plan are to be implemented in accordance with a timetable to be contained in the CMP and approved by Heritage Council of NSW or its Delegate.	To be implemented through the CMP.
3	A suitably qualified and experienced oral history consultant is to be engaged by the applicant to undertake an oral history of the Wambo Homestead Complex having regard to the strong associations of members of the local community and past owners with the site. The oral history is to be provided to the Heritage Council of NSW or its Delegate within 24 months of the date of this consent.	To be implemented through the CMP.
4	In circumstances where safe access to the Wambo Homestead Complex is able to be provided, opportunities are to be offered to the local community to visit the site during and after its conservation. This should be considered as part of the Interpretation strategy which is to be included in the Conservation Management Plan.	To be implemented through the CMP.
5	The impact management and remediation strategies for the Wambo Homestead Complex Buildings recommended in the specialist reports which accompanied the S60 Application are to be implemented in conjunction with the longwall mining of NW LW 7 and 8 approved under this consent. Other measures to be incorporated as part of the work must include the installation of stress/strain/ movement gauges linked to an appropriate recording and monitoring system.	The Wambo Homestead Complex Mine Management Plan (WHCMMP) is a component of the Heritage Management Plan (Appendix D).

Table A1-5 (Continued)
Requirements of the Approval of Application for Longwalls 7 and 8 under Section 60 of the Heritage Act, 1977 (2012/S60/30)

Condition Number	Condition	Document Reference/Comment
6	Mitigation measures should be carried out in accordance with the recommendations made in the following documents: • Mine Management Plan: Underground Mining in the Vicinity of Wambo Homestead Complex, Report prepared for Wambo Coal Pty Ltd, by Godden Mackay Logan, July 2012 • Subsidence Data Review and Impact Assessment for Longwalls 7 to 10 at North Wambo Underground Mine, Warkworth. DITTON GEOTECHNICAL SERVICES Report no. NWU-001/4 for Peabody Energy Australia Pty Ltd. Date: 23 May 2012. A copy of these specific recommendations is appended as a Schedule to this consent. The Applicant is required to obtain an additional peer review of the recommended monitoring measures by an appropriately qualified geotechnical consultant. That review is to be submitted within 3 months from date of consent for review by the Heritage Council or its Delegate. Subject to the findings of the peer review, additional mitigation measures may need to be implemented / installed at the WHC to the satisfaction of the Heritage Council or its Delegate.	The WHCMMP is a component of the Heritage Management Plan (Appendix D). A peer review of the recommended monitoring measures was conducted by Mine Subsidence Engineering Consultants (MSEC). These recommendations have been incorporated in the Extraction Plan.
7	A suitably qualified heritage consultant is to regularly monitor the current bracing and protective works, to supervise any interim works during the mining activity as well as to supervise subsequent works to ensure the site is protected in accordance with the above documents.	Refer to Section 5.2 of the WHCMMP.
8	The nominated heritage consultant shall: undertake on site heritage inductions, inspect removal works and the addition of new elements to minimise impacts on significant fabric and views and manage the implementation of the conditions of approval.	This will continue to be implemented by WCPL.
9	The nominated heritage consultant shall submit a report to the Heritage Council or its Delegate within 3 months of the completion of each stage of the works. The reports shall confirm that all the works have been completed in accordance with the approved documents and conditions of this approval. An additional detailed report also to be submitted to the Heritage Council or its Delegate is to be prepared 2 years after the conclusion of the longwall mining to assess whether any additional subsidence impacts have been sustained by the WHC due to any reason including, but not limited to, any collapse of overlying strata into the goaf. If so, any identified impacts are to be made good through specific remedial work completed to the satisfaction of the Heritage Council or its Delegate.	Reporting will be conducted as required by this condition.

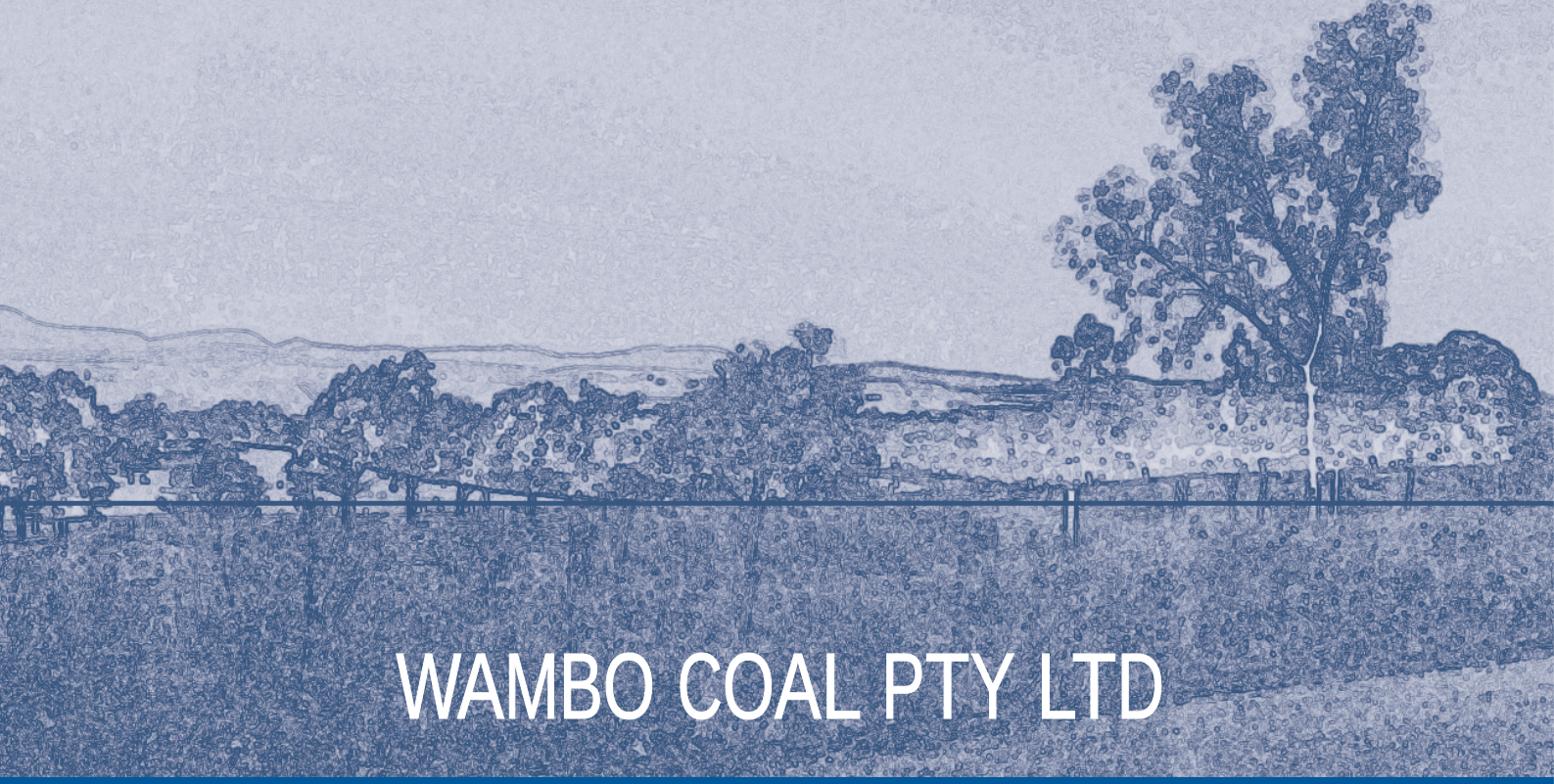
Table A1-5 (Continued)
Requirements of the Approval of Application for Longwalls 7 and 8 under Section 60 of the Heritage Act, 1977 (2012/S60/30)[1]

Condition Number	Condition	Document Reference/Comment
10	Significant built elements at the Wambo Homestead Complex are to be adequately protected during the works from potential damage. Protection systems must ensure heritage fabric is not damaged or removed.	This will continue to be implemented by WCPL.
11	Concerning non-indigenous archaeology, where mitigation works such as drainage require excavation or other ground disturbance, those works are to be monitored by an appropriately qualified historical archaeologist. A brief assessment and methodology for the works, which includes final reporting, must be approved by the Heritage Council of NSW or its Delegate before any excavation works are commenced. In the event that substantial intact archaeological deposits or 'relics' are discovered, work must cease immediately in the affected area(s) and the Heritage Council must be contacted for advice. Additional assessment and approval may be required prior to works continuing in the affected area(s) based on the nature of the discovery.	This will continue to be implemented by WCPL.
12	This approval shall be void if the activity to which it refers is not physically commenced within five years after the date of the approval or within the period of consent specified in any relevant development consent granted under the *Environmental Planning and Assessment Act, 1979*, whichever occurs first.	Secondary extraction of Longwall 7 commenced in May 2013.

1 As modified under Section 65A of the *Heritage Act, 1977* (2013/S65A/16).

Table A1-6
Requirements of the Approval of Application for Longwalls 9 and 10 under Section 60 of the Heritage Act, 1977 (2013/S60/30)

Condition Number	Condition	Document Reference/Comment
1	All works are to be carried out in accordance with the following documentation: • Main Access to Longwalls 9 and 10 in the Vicinity of Wambo Homestead Complex, Heritage Impact Statement, Report prepared for Wambo Coal Pty Ltd, by Godden Mackay Logan, April 2013: • Predicted Subsidence for the Wambo Homestead Complex Curtilage due to the Extraction of Longwalls 9 and 10 in the Wambo Seam, Mine Subsidence Engineering Consultants, Letter report prepared for Wambo Coal Pty Ltd, April 2013 (included as Appendix A to the GML report). • Mine Management Plan: Underground Mining in the Vicinity of Wambo Homestead Complex, Report prepared for Wambo Coal Pty Ltd, by Godden Mackay Logan, July 2012. • Subsidence Data Review and Impact Assessment for Longwalls 7 and 8 at North Wambo Underground Mine, Warkworth. DITTON GEOTECHNICAL SERVICES Report no. NWU-001/4 for Peabody Energy Australia Pty Ltd. Date: 23 May 2012. • North Wambo Underground Mine — Longwalls 7 and 8 Peer Review of Subsidence Monitoring Measures at the Wambo Homestead Complex, Mine Subsidence Engineering Consultants, Letter report prepared for Wambo Coal Pty Ltd, October, 2012.	The WHCMMP is a component of the Heritage Management Plan (Appendix D).
2	Prior to the commencement of subsidence inducing mining of Longwalls 9 and 10 Wambo Coal Pty Ltd shall submit a brief report to the Heritage Council or its Delegate which confirms that all the works associated with impact management and remediation strategies for the Wambo Homestead Complex Buildings for the longwall mining of NW LW 7 and 8 under the previously issued consent for application 2012/S60/30 have been implemented (or will be implemented during or post subsidence if applicable).	Extraction of Longwall commenced in August 2014. The DP&E Compliance Branch (as delegate for the Heritage Council) regularly undertakes inspections of the works associated with impact management and remediation strategies for the Wambo Homestead Complex Buildings.
3	This approval shall be void if the activity to which it refers is not physically commenced within five years after the date of the approval or within the period of consent specified in any relevant development consent granted under the Environmental Planning and Assessment Act, 1979, whichever occurs first.	Extraction of Longwall commenced in August 2014.



WAMBO COAL PTY LTD

NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

ATTACHMENT 2
RELEVANT CONSULTATION RECORDS

Peabody ENERGY

Major Projects Assessment
Mining & Industry Projects

Contact: Howard Reed
Phone: 9228 6308
Fax: 9228 6466
Email: howard.reed@planning.nsw.gov.au

10/16005

Troy Favell
Environment and Community Manager
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

Dear Mr Favell

Wambo Coal Mine - Appointment of suitably qualified and experienced persons

I refer to your letter dated 19 September 2012 seeking the Director-General's endorsement for a proposed team of experts to review and prepare the Wambo Mine Extraction Plan/Subsidence Management Plan for the North Wambo Underground Longwalls 7 and 8.

The Department has reviewed your request and I advise that the proposed team of experts in your letter has been endorsed by the Director-General as required by Condition 22C, Schedule 4 of Development Consent DA 305-7-2003.

If you require further information please contact me on the details above.

Yours sincerely

Howard Reed 20.9.12
Howard Reed
Manager - Mining Projects
As the Director General's Nominee

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Funerals

PB SINCE 1927

Eric William MEYN

Of High Street Singleton
On 27 September 2012
At the Maitland Hospital
Aged 92 years.

Dearly loved husband of Shirley, much loved father of Kevin and Sue, Susan, Peter (dec), grandfather to Sarah, Lucy, Emma and Martin.

A Funeral mass will be held in St Patrick's Catholic Church Singleton at 10.00am Wednesday 3rd October 2012. Thence for private burial.

RSL members are respectfully invited to attend and wear their medals.

Partridge Bros Singleton
FDA of NSW
6572 2917
www.partridgebrothers.com.au

SINGSTOCK Thomas William

Of Kelso Street
Singleton
Passed away at
John Hunter Hospital
28th September 2012
Aged 70 years

Dear husband of Betty and loved father of Dean and Scott, father-in-law and grandfather to their families.

Family and friends of Tom are warmly invited to attend his Funeral to be held in the Chapel of St Patricks Crematorium, Nulkaba, Cessnock, Thursday 4th October 2012 commencing at 11.00am.

Returned service men and women are invited to attend.

In the care of
Chapmans funerals
Singleton
6572 1089
A.F.D.A.

In Memoriam

GORDAN MANNING

(4-10-10)

Those who mean the most to us are never really gone. For in our thoughts and in our hearts their memory still lives on.

Your Loving Family

Margaret DIGBY

3.5.1941 - 4.10.2011

If roses grow in Heaven,
Please pick a bunch for me.
Place them in my Mother's arms,
And tell her they are from me.
Tell her I love her and miss her,
And when she turns to smile,
Place a kiss upon her cheek,
And hold her awhile
Because remembering her is easy,
I do it every day.
But there is an ache within my heart.
That will never go away.

Love Karleen, Pete,
Tracy, Gregg & Lucia,
Graeme & Cassey

In Memoriam

MICHAEL GREGORY WILKES
21/4/48 - 3/10/05

In loving memory of my husband.

You gave me many things in life, Gifts both great and small, but most of all you gave me LOVE; the greatest gift of all

Your loving wife Trish & Families xx

For Sale

SCREENED GYPSUM

From Muswellbrook. Limited quantity available now.
Ph Jim for analysis and quote
on 0428 689 102
or 6541 2198
or email: warren@robbos.net

Motor Vehicles

TOYOTA LANDCRUISER 2006

Turbo diesel RV 189,000kms, too many extras to list. Tamworth vehicle. Rego (BEP18X). $44,000. Phone 0418 203 096.

Boats Marine

BOATING LICENCE COURSE & JET SKI

In Singleton
Friday, 5th October.
Limited places available.
Ph. 9524 5678

Pets

HOW TO AVOID A $165 FINE

Did you know it is illegal to advertise the sale, purchase or transfer of ownership of any dog or cat which has not been microchipped according to the Companion Animals Act 1998.

Legal Notices

IN THE SUPREME COURT OF NEW SOUTH WALES EQUITY DIVISION - PROBATE LIST. After 14 days from publication of this notice an application for Probate of the Will dated 22 October 2010 of GAVIN RICHARDS late of Singleton Heights, will be made by Gavin Ross Richards, Susan Gay Mackintosh and Anne Kathryn Threlfo. Creditors are required to send particulars of their claims upon his Estate to; Cragg Braye and Thornton, Solicitors, PO Box 166, SINGLETON 2330 Ph: (02) 6572 1166 Ref: KF:JN:91652.

Notices

NOTICE TO CLASSIFIED ADVERTISERS

All classified display and classified semi display advertising is sold in whole centimetre and column units. Classified line advertisements are charged on the total number of lines. A minimum number of lines may be required.

The full 'Terms and Conditions of Advertising' of The Singleton Argus are available from our office or by phoning (02) 6572 2611

Notices

xstrata coal

Ravensworth Surface Operations Public Notice

Ravensworth Surface Operations wish to advise that Lemington Road will be closed on **Wednesday 3rd October, Thursday 4th October and Friday 5th October 2012** for the purpose of blasting.

The road will be closed between 1.7km south of the New England Hwy and a further 2.8km west along Lemington Rd and is likely to be closed for 15 minutes between 10:00am and 5:00pm depending on Environmental conditions. Roadside signs will display the date and approximate time of the closure.

Ravensworth operation apologise for any inconvenience caused. For further information contact Environmental & Community Coordinator at the mine on 6570 0700.

Notices

INTEGRA COAL

NORTH OPEN CUT
Public Notice

Integra Coal wish to advise that Stony Creek Road may be closed between **Monday to Saturday, between 9:00am and 5:00pm,** for the purpose of blasting, depending on environmental and/or operational circumstances. The duration of the closure is expected to be approximately 20 minutes.

For more detail contact the Integra Coal Hotline or see the blast notification board situated on Stony Creek Road. Integra Coal apologise for any inconvenience.

Notices

PUBLIC NOTICE
WAMBO COAL MINE

Wambo Coal Pty Ltd (WCPL) (ACN: 000 668 057) owns and operates the Wambo Coal Mine, an open cut and underground mining operation located approximately 15km west of Singleton in the Hunter Valley, NSW.

WCPL is currently developing an Extraction Plan/Subsidence Management Plan for Longwalls 7 and 8 for the North Wambo Underground Mine at the Wambo Coal Mine. The Extraction Plan/Subsidence Managment Plan will be operated in accordance with the Development Consent DA 305-7-2003 and the *Guidelines for Applications for Subsidence Management Plan Approvals* (NSW Department of Mineral Resources, 2003).

Any parties interested in being consulted in regard to the Extraction Plan/Subsidence Managemnt Plan should register their interest by **5:00pm 19 October 2012**. Contact details are as follows:

Troy Favell

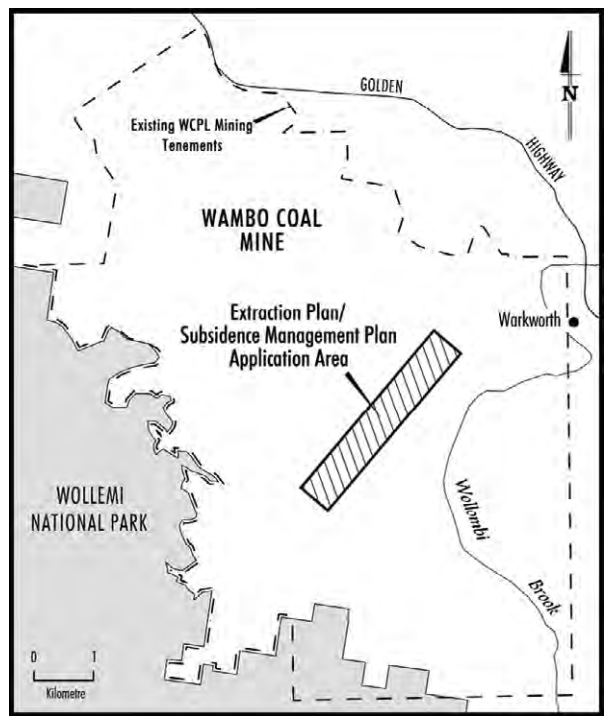
Manager Environment and Community

PMB1, Singleton NSW 2330

Phone: (02) 6570 2209

Fax: (02) 6570 2290

Email: tfavell@peabodyenergy.com



Peabody ENERGY

Notices

Environmental Planning and Assessment Act 1979 (NSW)
National Parks and Wildlife Act 1972 (NSW) – Section 90

Wambo Coal Pty Ltd (WCPL) owns and operates the Wambo Coal Mine, located approximately 15 kilometres west of Singleton in the Hunter Valley, New South Wales (NSW).

WCPL proposes to lodge a request with the Minister for Planning and Infrastructure under the *Environmental Planning & Assessment Act 1979* (NSW) and the *Environmental Planning and Assessment Regulation 2000* (NSW) (Section 75W Application Process) to modify Development Consent (DA 305 7 2003) for the Wambo Coal Mine, which was granted by the then Minister for Planning on 4 February 2004. The proposed modification is an extension/relocation of the approved Arrowfield and Bowfield Underground Mine longwall panels and extension of the mine life by approximately six years. The proposed modification is referred to as the South Wambo Underground Mine Extension.

As part of the Section 75W Application Process, WCPL will be preparing an Aboriginal Cultural Heritage Impact Assessment, and therefore may seek an Aboriginal Heritage Impact Permit (AHIP) under section 90 of the *National Parks and Wildlife Act 1974* (NSW) to move and/or destroy Aboriginal objects. The subject area of the proposed modification and any such application is depicted as the "Area of Interest" as shown on the enclosed plan.

In accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010) WCPL is required to conduct community consultation with the relevant Aboriginal people, the purpose of which is to assist WCPL in the preparation of its application for an AHIP under Part 6 of the *National Parks and Wildlife Act 1974* (NSW) and to assist the Director General of the NSW Office of Environment and Heritage in his or her consideration and determination of the application.

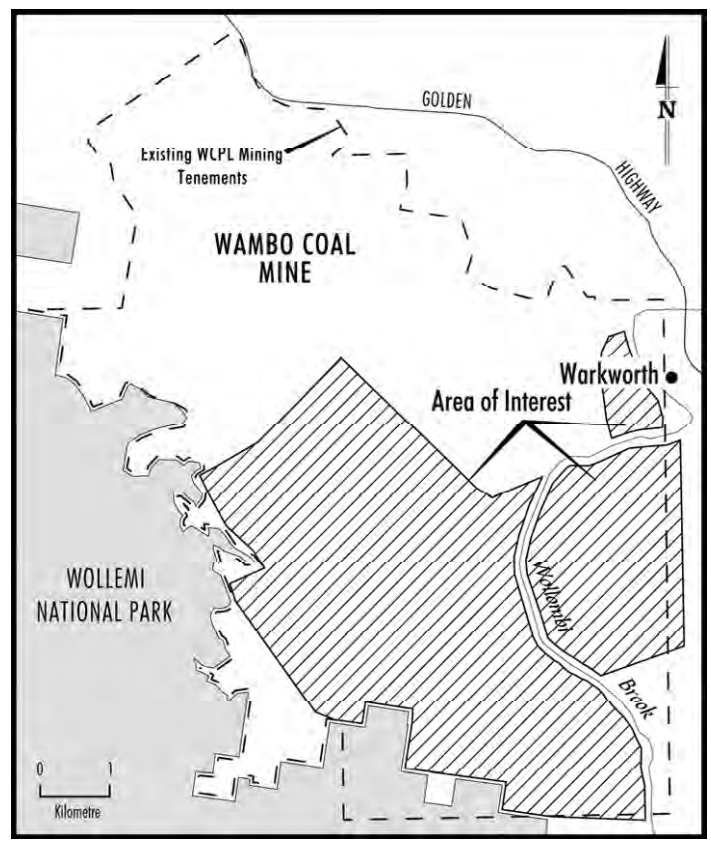
Also in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010), WCPL invites by the way of this public notice any Aboriginal persons or groups who hold cultural knowledge relevant to determining the significance of Aboriginal object(s) and/or place(s) in the "Area of Interest" to register an interest in a process of community consultation with WCPL regarding the South Wambo Underground Mine Extension by **5:00 pm 17 October 2012.**

WCPL advises that the details of any Aboriginal person or group who registers an interest in accordance with this notice will be forwarded to the Office of Environment and Heritage and Wanaruah Local Aboriginal Land Council in accordance with Section 4.1.5 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010), unless they specify that they do not want their details released.

Please note that any opportunities for employment would be separate to the consultation process.

Contact details are as follows:

Troy Favell
Environment and Community Manager
Wambo Coal Pty. Ltd.
PMB1, Singleton NSW 2330
Telephone: (02) 6570 2209
Facsimile: (02) 6570 2290
Email: tfavell@peabodyenergy.com



Hospitality

CHEF

Are you over the City life?
Chef for Nth NSW popular eatery. Must have passion & dedication for creating rustic favourites with a modern twist. Above all a team player who is balanced & loves their craft. Catering also for weddings & functions up to 150, 5 lunches 1-2 nights. Wage package $65K for the right person. Email CV: **home@maviseskitchen.com.au**

CHEF. Perm. position in busy hotel restaurant. Excellent team. Good conds. Blues Point Hotel, McMahons Point. 9955 2675

CHEF/COOK

Mon-Fri., day work. Reliable, motivated, exp. Ambar Cafe Bar, Shop 14, Level 7, MLC Centre, Martin Place. Fax 9344 4747 or phone 0425 250 855

CHEF required to join a team of happy professional chefs at a busy brasserie near Liverpool. FT position. Leon 0418 169 466

Jamie's Italian

CHEFS WANTED!
Want to work with the freshest produce & and learn the ethos of Jamie Oliver? We want talented Chefs with a passion for rustic Italian food. Great $$$ & exceptional training provided!
Call 0449 257 502 or careers@jamiesitalian.com.au

MILESTONE

CHEF

- Milestone Hotel
- Dubbo NSW

The Milestone Hotel is a premium hotel located in the CBD of Dubbo NSW.

Dubbo is home to more than 40,000 people and the world famous tourist attraction, Taronga Western Plains Zoo. It is a diverse inland city offering a very comfortable and affordable lifestyle.

The Milestone Hotel has a very busy bistro and function market and we are seeking a well experienced, competent, full time Chef to lead our team.

Salary and relocation costas are negotiable. Please forward resume including full details of qualifications.

Joanne Blair
kayora@iinet.com.au
mycareer.com.au/8629335

CHEFS

Four in Hand

2 hatted restaurant in Paddington requires Chef de Partie, Apprentice & Bistro Chef.
Call Bret 0406 876 044.

COOK busy cafe St. Ives Village. 2 years minimum experience. P/T or F/T. Day shift only .
0414 356 629.

COOK/CHEF experienced in Italian kitchen. Haberfield.
Ph. 0406 040 411.

COOK/KITCHENHAND
Experience only for busy espresso bar in city. Mon-Fri, 45hrs p/w. Call 9232 0422.

COUNTERHAND. 7 day sea-food shop, wkend work involved, hrs neg for rest of week. Top money for top applicant. Drummoyne. Full/part time.
0418 566 666

Duty Manager

for Grumpys Hotel, Hurlstone Park. Casual or permanent position avail for experienced manager. This position includes late night work including Friday & Saturday nights 11pm-7.30am. Email resume to:
jack@grumpyshotel.com.au

HEAD CHEF

Experienced Head Chef required for the Bay Hotel Motel, Bonnells Bay. Email resume to:
pete@bayhotelmotel.com
or phone 4973 3177

KITCHEN HAND. Must have some experience in prep work, salads & cleaning. Drummoyne Full/part time. 0418 566 666

KITCHENHAND experienced for Italian restaurant, Five Dock area.Evenings. 9713 8733.

Reservations & Private Dining Room Co-ordinator
Rockpool on George, Neil Perry's three hat flag ship restaurant, is seeking an experienced Reservations & Private Dining Room Co-ordinator. Full Time. Email CV to lauren@rockpool.com

SANDWICH HAND
Only experienced. Mon-Fri. Fulltime or part-time
Ph: 0421 377 297

SANDWICH HAND exp'd, well presented, fluent english, long term employment, loc resident pref'd, busy city cafe. Mon-Fri 7am start. **Call 0498 397 739**

Legal

LEGAL SECRETARY - Full Time Personal Injury Law Firm in CBD. Formal training and/or experience essential. Competency in MS Office and excellent keyboard, communication and organisational skills. Ability to speak any of the Balkan languages an advantage. Good remuneration package. Please fax resume to 02 9283 8511 or email mbell@martinbell.com

CRINITI'S

Chefs/Cooks

Experienced Chefs/Cooks required for Crinitis Restaurant, Woolloomooloo. Please send CV's to careers@crinitis.com.au or contact 02 8868 3503

Family Law/Generalist Solicitor

The Western NSW Community Legal Centre seeks applications for a solicitor or law graduate to work in our legal practice at our Dubbo office but, will also be required to travel widely within the Orana and Western regions of the State.
The successful applicant will provide legal advice to clients primarily in Family Law and but will extend to other areas of law including Employment, Discrimination, Victims Compensation, Family Law, Consumer Law, Civil Claims and Environmental Issues.
Communication skills are of the utmost importance as the Centre is committed to Social Justice issues affecting people of Western NSW and prepares submissions to assist government and organisations develop policies that address these issues. The solicitor will also be required to deliver Community Legal Education workshops to members of the community.
The applicant must also demonstrate an understanding of the operations and philosophies of Community Legal Centres. A friendly team of easy-going but highly committed workers staff the office.
The position is for 35 hours per week to 30 June 2013. At 1 July 2013 the position will become a part-time Family Law solicitor position. The salary for the position is in accordance with the SCHADS Level 5 or 6 depending on experience and admission status. An attractive fringe benefits package is available.

All applicants **must** obtain an information package containing the selection criteria by contacting 02 6884 9422. To be considered for this position, applicants **must** clearly address each of the questions in the selection criteria individually.
Closing Date: 19 October 2012.

TWU Carrying Australia

Head of Legal/Legal Counsel

The Transport Worker's Union of Australia (TWU) is a leading industry trade union representing employees and owner-drivers in road transport, freight logistics, airlines, waste management, oil and gas, passenger vehicles and other industries.

We are currently recruiting a Head of Legal/Legal Counsel to play a key role across a number of ground-breaking campaigns.

We are seeking expressions of interest from experienced lawyers who want to lead a team in one of Australia's leading campaigning Trade Unions, which is committed to improving the lives of transport workers, their families and communities.

Reporting to the Chief of Staff, your responsibilities will include:
- Devising and implementing the Union's legal strategy.
- Providing legal advice to the National Secretary and other elected officials.
- Devising and implementing negotiation strategies.
- Providing legal advice to the campaign teams of the Unions.
- Devising and implementing processes to assist state branches in their legal work.
- Devising and implementing processes to ensure coordination and continuous improvement of state and national industrial agreements.
- Coordinating the legal and industrial team, providing mentoring, supervision and staff development.

This is a senior role in the Union, and requires an experienced industrial lawyer who has demonstrated advocacy skills and is interested in coordinating a department in a fast paced political environment.

The successful candidate must demonstrate a commitment to labour values.

The successful candidate will be based in our National Office in Sydney.

To apply, submit your Curriculum Vitae and a cover letter demonstrating your suitability for the role to **dermot.ryan@twu.com.au**

IG5431607AB-290912

Marketing, PR, Media and Arts

HKETO
Government of the HKSAR

PUBLIC RELATIONS OFFICER

(2-year contract for immediate commencement)

$68,676 to $76,644 p.a. depending on experience and skills + superannuation
End of contract gratuity at 5% of the total basic salary on satisfactory completion

Reporting to the Head of Public Relations, the Public Relations Officer will mainly be responsible for helping to extend our overall public relations reach in Australia and New Zealand through strong writing, communication and event co-ordination skills, along with utilising their strong social media skills to continue to build on our various social media profiles. This is very much a hands on position that needs a committed person who is used to working to often very hard deadlines. The successful candidate would also be looking to professionally grow and use their well-grounded public relations skills to help identify and develop various collaborations between Hong Kong, Australia and New Zealand.

Please visit **www.hketosydney.gov.hk** for details of the position, requirements, application procedures and other general information on the Hong Kong Economic & Trade Office.

Application closes on 25 October 2012.

Enquiries: recruitment@hketosydney.gov.hk

G5408580AB-280912

Sales and Retail

FLORIST

Exp'd, 3-5 yrs, hardworking, reliable for busy shop in Leichhardt. Min. 25 hrs pw. Night closes & Sat. shifts req'd.
9572 7399 or 0405 828 205

FRUIT SHOP ASSISTANT
No experience required. Kingsgrove shop, next to station. Call Jack 0419 798 228.

SALES ASSISTANT

Required for modern retail jewellery store. Min 5 years retail experience required. Flexible hours available. Bankstown area.
Ph Vera 9708 0088
Email CV: tarick@kdor.com.au

SALESPERSON

Needed to work in fishing and hunting store located in Western Sydney. Must have experience in fishing. Must be well presented and willing to work weekends. Part time position but may go to permanent. Ring 9623 9743 or email hookedtv@bigpond.com

MASTERCARD or VISA
If you are a casual advertiser with Herald Classifieds you are welcome to prepay your Ad. by MasterCard or Visa. Just tell our Sales Adviser when you phone:
Herald Classifieds 13 25 35.

SALES MANAGER

A long established wholesaler in Auburn is looking for an energetic sales manager to assist with regional distributors, the buyers of supermarket as well as on the road sales. You will be responsible for presenting the products, communicating the customers' requirement with the purchasing staff, updating the market trend.
We are looking for applicants with an ability in providing a strong customer services, flexibility in working attitude and a willingness to learn the products in detail. Experience in sales to supermarket will be an advantage.
A competitive salary package will be offered for this position with the opportunity to progress in future. Please submit your resume with 2 referees to

zico.com@verizon.net
mycareer.com.au/8639034

Sydney City TOYOTA

Fleet Sales

★ Rare opportunity to join the strongest Fleet Sales Department in NSW
★ Represent a trusted brand from one of the most reputable dealers

We are in search of a top performer to hit the ground running in the strongest Fleet Sales Department in NSW! Candidates of interest must have an impressive track record in fleet sales, excellent rapport building and customer service skills. This is an exceptionally rare opportunity to become part of our high performing Fleet team. Do not delay, apply now and be prepared to drive your future forward!
Email your resume to jessicalloricco@sydneycitytoyota.com.au

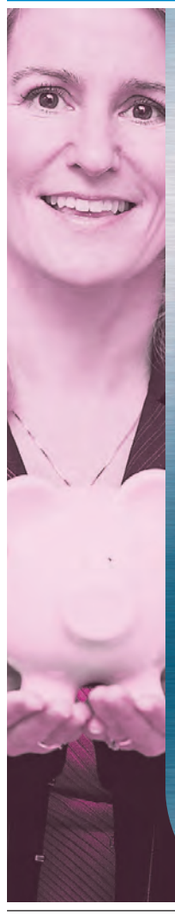
Your Ad Is Noticed

When you use 14pt type.

It emphasizes the important aspects of your advertisement and draws the attention of your target audience.

13 25 35

Sales and Retail



Account Executive - Direct Business

Fairfax Media

* A member of the Fairfax Publishing Group

Work for a market leader!

A great **work/life balance** within a great team environment!

Up to 12 months fixed-term contract.

Fairfax Media, Australia's leading Media Company in print and online is seeking energetic and self motivated Account Executives on fixed term contracts of up to 12 months to join the Direct Business Outbound Sales team within the Marketplaces division.

The Marketplaces division at Fairfax Media includes all digital transactional and classified advertising businesses in print and online. The classifieds businesses include MyCareer, Domain and Drive which are fully integrated with print. The digital transaction businesses encompass the leading web businesses RSVP, Stayz/Occupancy, APM, InvestSmart, Commerce Australia, TenderLink and OMG.

As a valuable member of this lively and spirited Outbound sales team, you will be utilising your outstanding relationship building and communication skills to source new opportunities and develop key customer relationships through outbound cold calling and account management within a telephone based environment.

Working business hours from Monday to Friday, you will be exposed to various sales campaigns that will provide you with the autonomy to generate new business through a variety of channels. Your well developed sales skills coupled with excellent problem solving skills will be integral to sourcing and customising solutions to meet client needs.

Your proven ability to meet tight deadlines as well as attention to detail will be necessary for success in this role. Operating in this team focussed environment will give you the opportunity to participate in process improvements as part of the continuous improvement cycle. In return you will be rewarded with a competitive salary & excellent incentives.

Based in a prime water-front location conveniently located within the media hub of Pyrmont, Fairfax Media offers benefits including onsite gym membership, subsidised childcare, access to discounted accommodation amongst many other benefits.

Interested applicants are invited to apply online at http://careers.fairfax.com.au quoting reference number 835580 by Friday 5th October 2012.

Fairfax is an equal opportunity employer.

G5410995AB-210912

INTERNAL TRADE SALES

★Leading Building Supply Business
★Trade Focused
★Great Team Environment

A Port Macquarie timber, plasterboard & building supply merchant is seeking experienced salespeople for two internal Trade Sales positions.
The successful applicants will have an extensive background in sales, with an understanding of building supplies and product applications.
Excellent communication, literacy & computer skils are a must.
Email applications to:

resumes@fastplast.com.au
mycareer.com.au/8629531

Training and Career Services

CERTIFICATE IV IN CELEBRANCY Course - commences 25 October. City location. Phone: 9440 3666

CERTIFICATE IV in Training and Assessment. Course commences 23 October - classroom or online. 9440 3666

DENTAL ASSISTANT jobs avail. Dental Assistant and Dental Radiograph courses and certificates. Auneca 8677 8740.

Trades and Services Positions

A1 offset printer

Must be experienced in A1 speedmaster 102FP.

0416 183 321 or 0434 596 682
mycareer.com.au/8639159

Air Con Mechanic/Service Tech

- Good salary
- Company car, phone allowance & uniform supplied

Experience & qualification required.

renata@superiorair.com.au
Phone: (02) 9618 6611

mycareer.com.au/8628740

Blasters -Painters-Construction Labourers
Various sites in Sydney Metro
Please call 08 8240 4254

BRICKLAYERS
Start Wednesday
Killara Area
Ph: 0418 415 657

BRICKLAYERS. For commercial sites. Experienced block layers. Long runs. Wages only.
0427 855 911

BRICKLAYERS & LABOURERS wanted. Western Subs & City. Ongoing work for exp'd people. Ph. 0401 278 088

BRICKLAYERS wanted. Must have ABN and white card.
0413 614 783.

BUTCHER 3 a.m. to 1 p.m. Marrickville. Portion cutting. Good wages. Grant 9550 4311.

BUILDING

TRADES PERSON
Jack of all trades required for a remedial building company. Specialising in external facade repairs. Long term employment for the right applicant Above award. wages. Phone: 9666 8265
padbuild@bigpond.com

CABINETMAKER
Experienced Cabinetmaker required for shopfitting co. in Marrickville, to manufacture high end pieces. Installation experience and knowledge. Understanding of set outs and drawings. Own tools and OH&S card. Drivers lic. preferred.
Ph **8595 6111** M-F 9am-5pm.

CARPENTER - 3RD/4TH YEAR
Must have own transport.
Immediate start.
Ring Jason 0408 600 527

DETAILERS wanted only people with full experience. Large detailing shop. 6 days per week. Phone 0418 221 761

Excavator Operators

Experienced with necessary tickets, attractive pay, lots of overtime.
Please call 02 9755 2777
gghossayn@ghossayn.com.au

FENCER
Lap and Cap Fencing. Min 5 yrs exp. Own transport, tools & green card. To work in Lidcombe and Kellyville. **Ph. 4721 2566**

Foreperson

Required for pipeline construction projects throughout QLD/NSW. Apply via "Careers"
www.mcfadyengroup.com.au

FORMWORK CARPENTERS
Required for a major Formwork Company. Experience & Tickets essential. Please call Martin on 0419 494 144 or apply at 24 Grove St Dulwich Hill.
between 9.00am to 5.00pm

GARDENING Crew support wanted. Casual basis. Small gardening company in North Shore. Must be fit & reliable. Experience pref. Drivers lic essential. Send cv to
alisonsgardeningangels@hotmail.com

GLAZIER with qualifications required with experience in frameless shower screens.
Call John 0418 967 232

HR & HC Tipper Truck Driver Wanted

- 1 X HR Driver
- 1 X HC Driver
- RTA Printout Required

Drivers for Tipper Truck Demolition Co. Knowledge of Sydney Metro Area.

Send Resume to
info@sccaust.com.au
Ph:95678858
mycareer.com.au/8628726

Motor Mechanic

3rd year required for busy workshop. Driver's licence. Wheel alignment an advantage.
Ravi 0421 698 135.

City of Ryde
Lifestyle and opportunity @ your doorstep

Groundskeeper x 2

- **Total Remuneration Package range: $43,214–$49,696 including super**
- **Participation in Rostered Day Off Scheme**
- **Ref No. 12/98**

Are you a competent and experienced Groundskeeper who has a good knowledge of turf care and maintenance? The successful applicants will possess a Certificate in greenkeeping or equivalent and the ability to undertake physically demanding work. Certificates in Construction Induction and Chemical application are essential for this position. Furthermore, good verbal and written communication skills along with the ability to work independently and as part of a team will ensure your success within this role. If this is the position for you, please view the Position Description and submit your application, addressing the criteria contained within.

Like to know more? Call Richie Griffiths on 9952 8164. Enquiries between 7am and 3pm Monday to Friday.

Closing date: Friday 12 October 2012.

How to apply: Click on Careers at www.ryde.nsw.gov.au. Applications must include the Application for Employment form and address the Selection Criteria as detailed on our website.

www.ryde.nsw.gov.au

Trades and Services Positions

PLASTERBOARD

SUB CONTRACTORS
required for a large volume project builder in the greater Sydney area. Must be able to fix, set, cornice and prepaint to a level 4 finish. Please text to 0407 009 014 or email your interest to: **plasterers@live.com**

Labourco

Shunters

Labourco is seeking qualified Shunters for work in the Sydney area. Essential Criteria:
- Shunter certification
- RISI or Rail Safety Worker card
- Drivers licence

To apply please send your resume in Microsoft word format only to: **wollongongjobs@labourco.com.au**
or fax to: (02) 4226 1472.

Security Installer

- Self Motivated
- Enthusiastic
- Reliable

Brighton Security Services Pty Ltd is a Security Company located in Annandale, established over 25 years.

We specialise in the installation, commissioning and servicing of high security and access control solutions for industrial, commercial and domestic clients

Duties include:
Identification and repair of faults on existing alarm and CCTV system
Installation of additional equipment to existing alarm systems
Installation of new alarm and CCTV systems
Commissioning alarm systems to our Back to Base Monitoring Centre
Connection of CCTV systems to allow for remote viewing

The Successful applicant must have:
Current Security Licence
Hold a current Drivers licence (Company Vehicle Supplied)
Knowledge of Concept and Challenger Systems

Please forward Resume to :
Rachael Smithies
Administration Manager
Email:
accounts@brightonsecurity.com
Ph: (02) 9518 7471
mycareer.com.au/8630875

Stone Mason

We are an Alexandria-based facility specialising in the manufacture of natural stone architectural features for commercial and residential projects.

We seek a motivated applicant to join us in a position with experience in fabrication and material finishing.

Applicants resumes to
resumes@artedomus.com

Only Successful applicants will be contacted.
mycareer.com.au/8631080

Storeman & Packer

required for a beverage company, Marrickville area. Monday to Friday, early starts. Heavy lifting, must be fit. Please email to:
mountaqua@hotmail.com

WATERPROOFERS. Honest, hard working, experienced. Send resume by 3 Oct to: office@pacificwaterproofing.com.au

WINDOW Fabricators & Installers req for busy window manufacturer. Must have exp & drivers licence. Pls email resume thewindowfactory@y7mail.com or call 0405 009 796

Qualified Hairdresser Required ASAP

- Part Time Approx 24hrs per week
- $400 per week
- Located in Castle Hill

We require a qualified hairdresser to join our busy hair salon. If you are reliable, hardworking and confident to work alone than email us today

Email
www.purelyglamorous.com.au
mycareer.com.au/8630933

NEW JOB SEARCH TOOLS
MY CAREER .com.au

Transport, Logistics and Aviation

DRIVER HR & MR for evening shifts. Morning & weekend shifts also avail. Waste industry. Resumes to Fax 9363 1860or info@sydneywaste.com. Further inquiries call 0416 299 208

Driver B-Double

- For local Sydney metro deliveries. Clean driving record

Ph from Tues. between 9-12.
02 4256 1544

Sydney Metro Courier Run

- One Tonne Vans Required

Day/Night contract drivers required with One Tonne Vans.

Swift Transport-9772 3670
info@swifttrans.com.au

DRIVER HR (Waste/Recycling company at Guildford).
We require an experienced, reliable & hardworking person. Must have refs & good driving record. $25 p/hr. Bobcat/excavator exp. an advantage.
Phe Bruce 0402 233 877

TAXI DRIVER TCS Priv M94 Mon-Fri & Sat-Sun & am/pm. New s'wagon, well est. owner. Kensington. 0412 17 27 67.

Truck Driver

For Tipper truck and Dog combination work and Semi Truck; HC Licence. min. 2 years experience with a good driving history. Immediate start on an attractive hourly rate.
Call: 02 9755 2777
gghossayn@ghossayn.com.au

LOCAL HC/MC DRIVERS

Jets Transport Express is the premium road transport provider to the aviation industry. We are the largest operator of trailers specifically designed to handle aircraft equipment. We currently have vacancies for Full time / Casual - Local HC Drivers who meet the following criteria:
- HC / MC licence & Forklift licence
- Able to work 7 day rotating roster (Morning/Afternoon shift)
- Have a "can do" attitude
- Able to work independently and as part of a team
- Use initiative, strong work ethic, reliable and honest

Applicants should be aware that a federal police check is conducted. Candidates must meet ASIC security clearance requirements along with a comprehensive medical assessment. Those that do not meet these criteria need not apply.
Applications should be made in writing via; email to
jets@jetstransport.com.au or www.jetstransport.com.au

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Canteen School Tender for 2013

Tenders are called for the licence of the School canteen for the year commencing 2013 and for a term of approximately 4 years. Annual school enrolments will be approximately 1260. General enquiries and request for a Tender **Information Package should be referred to:**
Suellen Lawrence,
Cheltenham Girls' High School
The Promenade
Cheltenham NSW 2119.
Telephone: 02 9876 4481
Tenders must be submitted in a sealed envelope marked:
"Confidential - School Canteen Tender" and sent to:
The Principal, Susan Bridge
Cheltenham Girls' High School
The Promenade,
Cheltenham NSW 2119
Tenders close at 3pm on Friday 12th October 2012.
A tender visit and briefing session is planned to be held on Tuesday 9th October at 9.30am at the school. All applicants must make themselves familiar with Clause 2 of the tender offer.

GANELLEN
BUILT ON EXPERIENCE

GANELLEN are currently tendering on the following project:
- Kiaora Lands Development - Woolworths, Double Bay

Subcontractors who have priced or would like to price the above mentioned project, please issue quotes / EOI to:
subcontractorenquiry@ganellen.com / Fax 9555 5600

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SUBCONTRACTORS and suppliers pricing:
- Caddens 49 ILU's
- Caddens Community Centre
- Campbelltown Toyota
- John Purcell House, Nowra
- Wesley College – Purser Wing

Forward your quotations to: estimatingnsw@midsonconstruction.com.au
Ph. 9672 6299 Fax 9672 6066

ICON SC

SUBCONTRACTORS pricing:
- Kiaora Lands Redevelopment, Double Bay

Please forward your quotation:
estimating@iconsc.com.au

FARINDON constructions

SUB-CONTRACTORS who have priced or wish to price these tenders:-
- Clinton's Toyota Campbelltown

Please forward your quotations to: (Fax) 9572 4090 or
Email: info@farindon.com.au

SUBCONTRACTORS/Suppliers who have priced:
- Cargo Lane: 123-129 Wyndham & 8-10 Brennan Street, Alexandria

Please forward your quotations to the successful tender **TQM** at:
info@tqmdc.com.au

WRIGHTSON Constructions
All trades tendering on
- **Clintons Toyota,** 25 Blaxland Rd., Campbelltown NSW

are requested to submit quotations to: info@wrightsonconstructions.com.au or contact Jason 0419 247 490. Closing date 4/10/2012

KEYSTONE PROJECTS GROUP Subcontractors and suppliers quoting for Kildare Catholic college(wagga wagga), Bankstown aged care are requested to submit their prices to keystone projects group Pty ltd. Ph: 9764 6311 or admin@keystoneprojectsgroup.com.au

PRICE steel cable trusses, purlins and roof sheeting shed, supply and fix Glenorie. 0419 226 016.

Australian Government
Department of Climate Change and Energy Efficiency

The Department of Climate Change and Energy Efficiency are establishing a panel of experts to provide technical services in the energy efficiency field, relating to the built environment, in the following areas:

- Policy and Strategic Advice;
- Technical Research and Analysis;
- Regulatory Impact Analysis;
- Program Evaluations; and
- Built Environment Energy Modelling, Rating, Compliance and Auditing.

Once established this panel will be in place for 5 years in total.

Tenders close on Friday 12 October 2012 at 2:00pm.

For details about this tender, including the response forms, visit: **www.tenders.gov.au** and refer to **RFT DCCEE005460-2012**

AG68924

PROBUILD

SUBCONTRACTORS
& Suppliers pricing:
- Netball Central

Please send quotations to:
Probuild Constructions (Aust)
85 McLachlan Avenue
Rushcutters Bay, NSW, 2011
Ph: 8259 0222 Fax: 8259 0233
e: nsw@probuild.com.au

SUBCONTRACTORS and Suppliers interested in quoting:
- St Benedict's Catholic College, Oran Park
- Katoomba Courthouse Upgrade
- 10 Townhouse Development, Caringbah

Please contact Marc Morabito Constructions – Fax 9894 2522
rosanna@morabito.com.au

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OFFICIAL RESULTS
Saturday 29 September 2012
Draw 3255

Lotto

Prize Winning Numbers 25 32 10 16 34 9 **Supplementaries** 40 44

Div	Prize Pool	Winners	Prize Value
1	$4,161,471.48	2	$2,080,735.74
2	$564,831.80	52	$10,862.15
3	$1,218,839.00	1,076	$1,132.75
4	$1,841,839.80	54,654	$33.70
5	$3,094,359.20	126,818	$24.40
6	$3,982,635.90	260,303	$15.30

DIVISION 1 WINNING ENTRIES: 2 X VIC
Strike Draw 3618 winning Numbers in Order Drawn: 25 32 10 16

OFFICIAL RESULTS
Saturday 29 September 2012
Draw 1418

CROMBIE POOLS

Prize Winning Numbers 5 9 16 25 34 36 **Supplementary** 11

Prize details subject to relevant Games Rules.
Official Results Hotline: 1900 956 886 *(55 cents per minute)
Higher rates Mobile & Public Phones. SMS Results Service
Text "Game Name" e.g. Lotto to 1975 6886 (75c)
SMS provided by Be. Interactive. SMS queries: 1800 653 344.
NSW Lotteries queries: 1300 363 444.

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NSW Lotteries

OFFICIAL RESULTS
$2 Draw 9758

Lucky Lotteries

Drawn at NSW Lotteries, Sydney Olympic Park on 2/10/2012

1st Prize of $100,000 – N° 146644
2nd Prize of $10,000 – N° 000602
3rd Prize of $5,000 – N° 034927

The Jackpot prize of $3,230,000 was not won by ticket N° 166661

Jackpot now stands at $3,335,000 in $2 Lottery Draw 9759

OFFICIAL RESULTS
Monday 1 October 2012
Draw 3178

Lotto

Prize Winning Numbers 18 44 23 5 7 43 **Supplementaries** 21 27

Div	Prize Pool	Winners	Prize Value
1	$1,000,000.00	0	$0.00
2	$42,412.30	7	$6,058.90
3	$65,971.60	131	$503.60
4	$183,921.50	7,507	$24.50
5	$254,459.40	22,321	$11.40
6	$395,795.40	55,356	$7.15

DIVISION 1: NO WINNING ENTRY
Strike Draw 3619 Winning Numbers in Order Drawn: 18 44 23 5

LOTTO $1 MILLION

Prize details subject to relevant Games Rules.
Official Results Hotline: 1900 956 886 *(55 cents per minute)
Higher rates Mobile & Public Phones. SMS Results Service
Text "Lotto" to 1975 6886 (75c)
SMS provided by Be. Interactive. SMS queries: 1800 653 344.
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The Sydney Morning Herald | The Sun-Herald

Company Notices

NOTICE OF WINDING UP ORDER
RE: **MJJ Group Pty Limited (In Liquidation) ACN: 135 356 115**
RE: **Zoek Pty Ltd (In Liquidation) ACN: 123 738 063**
On the 19/09/2012 the Federal Court of Australia, New South Wales District Registry in proceedings No. NSD 1138/2012 and NSD 1187/2012, respectively, ordered the winding up of the abovenamed companies and I was appointed as Liquidator of these companies.
Dated this Wednesday, 19 September 2012
Steven Nicols
Official Liquidator
C/- Nicols + Brien
Level 2, 350 Kent Street
Sydney NSW 2000
02 9299 2289
www.bankrupt.com.au

FORM 11 (Rule 5.11)
Notice of winding up order and of appointment of Liquidator
In the Supreme Court of New South Wales, Sydney Registry
IN THE MATTER OF
N P EXCAVATING PTY LTD
ACN 144 532 954
("the Company")
On 26 September 2012 the Supreme Court of New South Wales in Proceeding No. 254050 of 2012 ordered the Winding Up of the Company and I, Mr Michael Charles Hird, was appointed as Official Liquidator of the Company.
Dated 2nd of October 2012
N P Excavating Pty Ltd
(In Liquidation)
Michael Charles Hird
Official Liquidator
Moore Stephens Sydney Pty Ltd
Level 7, 20 Hunter Street
Sydney NSW 2000

FORM 11 Rule 5.11(3)
NOTICE OF WINDING-UP ORDER AND APPOINTMENT OF LIQUIDATOR
IN THE FEDERAL COURT OF AUSTRALIA
IN THE MATTER OF
PRIDUCT PTY. LTD.
(In Official Liquidation)
ACN 102 691 341
On 26 September 2012, the Federal Court of Australia in Proceeding No. 1254 of 2012 ordered the winding up of Priduct Pty. Ltd. and I was appointed Official Liquidator of the Company.
Dated 28th September 2012
Scott Newton, Official Liquidator
Shaw Gidley
Level 2, 75-77 Clarence Street
Port Macquarie NSW 2444
Phone: (02) 6580 0400
Fax: (02) 6580 0410

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Public Notices

CITY OF SYDNEY

DEVELOPMENT PROPOSAL
SITE: 145 Regent Street, Chippendale NSW 2008
APPLICANT: Tradition Furniture Co Pty Ltd
REF NO: D/2012/259
PROPOSAL: Demolition of existing 2-storey building and construction of a new 3-storey mixed use building comprising 1 ground floor commercial tenancy and 5 residential units.
The City of Sydney has received the above development application. As part of our assessment process, we are notifying surrounding neighbours and property owners to seek their views on the proposal.
The application is on public exhibition until 1 November 2012. During this time, you are welcome to make a submission on the proposal. You can view the full application at any of the following locations (although privacy restrictions exist for internal areas of residential buildings):
1. Online at the City's website www.cityofsydney.nsw.gov.au under 'Development' - Development Applications - Applications Exhibition List (Applications currently on Exhibition). The website contains all relevant details of the proposal, including plans, which can be downloaded if required, information on how to make a submission is also available. A submission can be made directly from the website.
2. In person at the following centres:
One Stop Shop
Level 2, Town Hall House
456 Kent Street, Sydney
Mon-Fri; 8am-6pm
Neighbourhood Service Centre Redfern
158 Redfern Street, Redfern
Mon-Fri; 9am-5pm
Sat; 9am-noon
Green Square Customer Service Centre
100 Joynton Avenue, Zetland
Mon-Fri; 10am-6pm
If you would like to speak directly to a Council planning officer about this development application, you can contact Peggy Wong on: 9265 9333 or email: dasubmissions@cityofsydney.nsw.gov.au

ONEPATH LIFE Insurance Company limited intends after 10 days to either issue replacement policies documents in place of or satisfies claims or requests that would result in the termination of the following Policy 4460499 owned by I.P.M. Pty Ltd Superannuation Fund on the life of John Cardamis declared Lost or Destroyed.

ONEPATH LIFE Insurance Company limited intends after 10 days to either issue replacement policies documents in place of or satisfies claims or requests that would result in the termination of the following Policy 5894191 owned byH W Frost Equipment Pty Ltd on the life of Michael Pultar declared Lost or Destroyed.

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PUBLIC NOTICE
WAMBO COAL MINE

Wambo Coal Pty Ltd (WCPL) (ACN: 000 668 057) owns and operates the Wambo Coal Mine, an open cut and underground mining operation located approximately 15 km west of Singleton in the Hunter Valley, NSW.

WCPL is currently developing an Extraction Plan/Subsidence Management Plan for Longwalls 7 and 8 for the North Wambo Underground Mine at the Wambo Coal Mine. The Extraction Plan/Subsidence Management Plan will be prepared in accordance with the Development Consent DA 305-7-2003 and the *Guidelines for Applications for Subsidence Management Plan Approvals* (NSW Department of Mineral Resources, 2003).

Any parties interested in being consulted in regard to the Extraction Plan/Subsidence Management Plan should register their interest by **5:00pm 19 October 2012.** Contact details are as follows:

Troy Favell
Manager Environment and Community
PMB1, Singleton NSW 2330
Phone: (02) 6570 2209
Fax: (02) 6570 2290
Email: tfavell@peabodyenergy.com

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WAMBO COAL PTY LTD
ABN: 13 000 668 057

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259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

31 October 2012

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

also via email: Howard.Reed@planning.nsw.gov.au

Attention: Mr Howard Reed, Manager Mining, Major Development Assessment

Dear Mr Reed

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – BIODIVERSITY MANAGEMENT PLAN

As you are aware, Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on flora and fauna, in consultation with the Department of Environment, Climate Change and Water (now the Office of Environment and Heritage) and the Department of Industry and Investment (now the Department of Trade and Investment, Regional Infrastructure and Services [Trade & Investment] and the Department of Primary Industries).

Please find enclosed the draft Biodiversity Management Plan that has been provided for consultation to the Office of Environment and Heritage, the Division of Resources and Energy within Trade & Investment, and the Fisheries Division of the Department of Primary Industries. Copies of this correspondence are enclosed for your records.

The Biodiversity Management Plan includes the existing approved Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL has kindly requested the above agencies provide any comments on the draft Biodiversity Management Plan by the 21 November 2012. WCPL will provide the Department of Planning & Infrastructure with the outcomes of any consultation with these agencies with the final Biodiversity Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning & Infrastructure on the draft Biodiversity Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

31/10/2012

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (4)

WAMBO COAL PTY LTD
ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

31 October 2012

Office of Environment and Heritage
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

also via email: info@environment.nsw.gov.au

Attention: Mr Richard Bath, Head Hunter Planning Unit, Conservation and Regulation, North East

Dear Mr Bath

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – BIODIVERSITY MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on flora and fauna, in consultation with the Department of Environment, Climate Change and Water (now the Office of Environment and Heritage).

Please find enclosed the draft Biodiversity Management Plan for the Office of Environment and Heritage's review and comment.

The Biodiversity Management Plan includes the existing approved Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL would be happy to meet with the Office of Environment and Heritage to present the approach we have taken to the draft Biodiversity Management Plan. Could you please advise a date and time that would be suitable to the Office of Environment and Heritage, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Biodiversity Management Plan to us by the 21 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy James 31/10/2012

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD
ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
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Fax + 61 (0) 2 6570 2290

31 October 2012

NSW Department of Primary Industries
Aquatic Habitat Protection Unit
Locked Bag 1
NELSON BAY NSW 2315

also via email: scott.carter@dpi.nsw.gov.au

Attention: Mr Scott Carter, Senior Conservation Manager, Central Region

Dear Mr Carter

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – BIODIVERSITY MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on flora and fauna, in consultation with the Department of Industry and Investment (now the Department of Trade and Investment, Regional Infrastructure and Services [Trade & Investment] and the Department of Primary Industries).

Please find enclosed the draft Biodiversity Management Plan for the Department of Primary Industries' review and comment.

The Biodiversity Management Plan includes the existing approved Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL would be happy to meet with the Fisheries Division of the Department of Primary Industries to present the approach we have taken to the draft Biodiversity Management Plan. Could you please advise a date and time that would be suitable to the Fisheries Division, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Biodiversity Management Plan to us by the 21 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

31/10/2012

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD
ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

31 October 2012

Division of Resources and Energy
Department of Trade and Investment, Regional Infrastructure and Services
Post Office Box 344
Hunter Region Mail Centre NSW 2310

also via email: julie.moloney@industry.nsw.gov.au

Attention: Ms Julie Moloney, Principal Adviser, Industry Coordination

Dear Ms Moloney

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – BIODIVERSITY MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on flora and fauna, in consultation with the Department of Industry and Investment (now the Department of Trade and Investment, Regional Infrastructure and Services [Trade & Investment] and the Department of Primary Industries).

Please find enclosed the draft Biodiversity Management Plan for the Trade & Investment's review and comment.

The Biodiversity Management Plan includes the existing approved Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL would be happy to meet with the Division of Resources and Energy (Trade & Investment) to present the approach we have taken to the draft Biodiversity Management Plan. Could you please advise a date and time that would be suitable to the Division of Resources and Energy, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Biodiversity Management Plan to us by the 21 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell 31/10/2012

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

2 November 2012

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

also via email: Howard.Reed@planning.nsw.gov.au

Attention: Mr Howard Reed, Manager Mining, Major Development Assessment

Dear Mr Reed

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – WATER MANAGEMENT PLAN

As you are aware, Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Water Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on surface water, groundwater and flooding, in consultation with the Department of Environment, Climate Change and Water (now the Environment Protection Authority) and the NSW Office of Water.

Please find enclosed the draft Water Management Plan that has been provided for consultation to the Environment Protection Authority and the NSW Office of Water. Copies of this correspondence are enclosed for your records.

The Water Management Plan includes the following existing approved programs/plans:

- The Surface Water Monitoring Program which was prepared in accordance with Condition 30(d) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Groundwater Monitoring Program which was prepared in accordance with Condition 30(e) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Surface and Groundwater Response Plan which was prepared in accordance with Condition 30(f) of Schedule 4 of the Development Consent (DA 305-7-2003).

The Water Management Plan also includes a revision of the North Wambo Creek Subsidence Response Strategy, which comprises part of the Surface and Groundwater Response Plan, to incorporate Longwalls 7 and 8.

WCPL has kindly requested the above agencies provide any comments on the draft Water Management Plan by the 23 November 2012. WCPL will provide the Department of Planning & Infrastructure with the outcomes of any consultation with these agencies with the final Water Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning & Infrastructure on the draft Water Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (3)

WAMBO COAL PTY LTD

ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

2 November 2012

Environment Protection Authority
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

also via email: info@environment.nsw.gov.au

Attention: Ms Karen Marler, Head Regional Operations Unit - Hunter

Dear Ms Marler

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – WATER MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Water Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on surface water, groundwater and flooding, in consultation with the Department of Environment, Climate Change and Water (now Environment Protection Authority and NSW Office of Water).

Please find enclosed the draft Water Management Plan for the Environment Protection Authority's review and comment.

The Water Management Plan includes the following existing approved programs/plans:

- The Surface Water Monitoring Program which was prepared in accordance with Condition 30(d) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Groundwater Monitoring Program which was prepared in accordance with Condition 30(e) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Surface and Groundwater Response Plan which was prepared in accordance with Condition 30(f) of Schedule 4 of the Development Consent (DA 305-7-2003).

The Water Management Plan also includes a revision of the North Wambo Creek Subsidence Response Strategy, which comprises part of the Surface and Groundwater Response Plan, to incorporate Longwalls 7 and 8.

WCPL would be happy to meet with the Environment Protection Authority to present the approach we have taken to the draft Water Management Plan. Could you please advise a date and time that would be suitable to the Environment Protection Authority, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Water Management Plan to us by the 23 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
PMB 1
Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

2 November 2012

NSW Office of Water
Department of Primary Industries
Post Office Box 2213
Dangar NSW 2309

also via email: Fergus.Hancock@water.nsw.gov.au

Attention: Mr Fergus Hancock, Mines Assessment and Planning

Dear Mr Hancock

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – WATER MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Water Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on surface water, groundwater and flooding, in consultation with the NSW Office of Water.

Please find enclosed the draft Water Management Plan for the NSW Office of Water's review and comment.

The Water Management Plan includes the following existing approved programs/plans:

- The Surface Water Monitoring Program which was prepared in accordance with Condition 30(d) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Groundwater Monitoring Program which was prepared in accordance with Condition 30(e) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Surface and Groundwater Response Plan which was prepared in accordance with Condition 30(f) of Schedule 4 of the Development Consent (DA 305-7-2003).

The Water Management Plan also includes a revision of the North Wambo Creek Subsidence Response Strategy, which comprises part of the Surface and Groundwater Response Plan, to incorporate Longwalls 7 and 8.

WCPL would be happy to meet with the NSW Office of Water to present the approach we have taken to the draft Water Management Plan. Could you please advise a date and time that would be suitable to the NSW Office of Water, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Water Management Plan to us by the 23 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

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5 November 2012

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

also via email: Howard.Reed@planning.nsw.gov.au

Attention: Mr Howard Reed, Manager Mining, Major Development Assessment

Dear Mr Reed

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – HERITAGE MANAGEMENT PLAN

As you are aware, Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on heritage sites and values, in consultation with the Department of Environment, Climate Change and Water (now the NSW Office of Environment and Heritage), the Heritage Branch (Office of Environment and Heritage) and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

Please find enclosed the draft Heritage Management Plan that has been provided for consultation to the Office of Environment and Heritage and the Heritage Branch. Copies of this correspondence are enclosed for your records.

The Heritage Management Plan includes the following existing approved programs/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Program which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

The Wambo Coal Mine Salvage and Management Program was prepared in consultation with the relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

The application made under section 60 of the *Heritage Act,1977* went on public exhibition and was subject to review by non-Aboriginal stakeholders.

WCPL has kindly requested the Office of Environment and Heritage and the Heritage Branch provide any comments on the draft Heritage Management Plan by the 23 November 2012. WCPL will provide the Department of Planning & Infrastructure with the outcomes of any consultation with these agencies with the final Heritage Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning & Infrastructure on the draft Heritage Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (3)

WAMBO COAL PTY LTD

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5 November 2012

Office of Environment and Heritage
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

via email: info@environment.nsw.gov.au

Attention: Mr Richard Bath, Head Hunter Planning Unit, Conservation and Regulation, North East

Dear Mr Bath

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – HERITAGE MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on heritage sites and values, in consultation with the Department of Environment, Climate Change and Water (now NSW Office of Environment and Heritage), the Heritage Branch, and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

Please find enclosed the draft Heritage Management Plan for the Office of Environment and Heritage's review and comment.

The Heritage Management Plan includes the following existing approved programs/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Program which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

The Wambo Coal Mine Salvage and Management Program was prepared in consultation with relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Park and Wildlife Act, 1974*.

WCPL would be happy to meet with the Office of Environment and Heritage to present the approach we have taken to the draft Heritage Management Plan. Could you please advise a date and time that would be suitable to the Office of Environment and Heritage, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Heritage Management Plan to us by the 23 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

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5 November 2012

Heritage Branch
Office of Environment and Heritage
Department of Premier and Cabinet
Locked Bag 5020
Newcastle NSW 2124

also via email: Vincent.Sicari@heritage.nsw.gov.au

Attention: Vincent Sicari, Manager, Conservation Team

Dear Mr Sicari

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – HERITAGE MANAGEMENT PLAN

Wambo Coal Pty Limited (WCPL) is currently preparing an Extraction Plan/Subsidence Management Plan (Extraction Plan/SMP) for Longwalls 7 and 8 at the North Wambo Underground Mine. The North Wambo Underground Mine is a component of the approved Wambo Coal Mine.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 and 8 on heritage sites and values, in consultation with the Department of Environment, Climate Change and Water (now the NSW Office of Environment and Heritage), the Heritage Branch, and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

Please find enclosed the draft Heritage Management Plan for the Heritage Branch's review and comment.

The Heritage Management Plan includes the following existing approved programs/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Program which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

The application made under section 60 of the *Heritage Act, 1977* went on public exhibition and was subject to review by non-Aboriginal stakeholders.

WCPL would be happy to meet with the Heritage Branch to present the approach we have taken to the draft Heritage Management Plan. Could you please advise a date and time that would be suitable to the Heritage Branch, at your earliest convenience.

It would be appreciated if you would kindly provide any comments on the draft Heritage Management Plan to us by the 23 November 2012. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Siobhan Lavelle, Heritage Branch, Office of Environment and Heritage, via email: Siobhan.Lavelle@heritage.nsw.gov.au

Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

NSW GOVERNMENT | Department of Primary Industries

Our ref: OUT12/28912

Troy Favell
Wambo Coal
PMB 1
SINGLETON NSW 2330

Dear Sir,

Re: North Wambo Underground Mine Longwalls 7 and 8 – Biodiversity Management Plan.

Thank you for your letter dated 31 October 2012 requesting comment from NSW Department of Primary Industries (Fisheries) on the above plan.

NSW DPI is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, NSW DPI ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (namely the aquatic habitat protection and threatened species provisions in Parts 7 and 7A of the Act, respectively), and the associated *Policy and Guidelines for Aquatic habitat Management and Fish Conservation (1999)*. In addition, NSW DPI is responsible for ensuring the sustainable management of commercial and recreational fishing in NSW.

The information provided in the document does not significantly vary from the Department perspective on the habitat effected and the proposed management and contingency measures proposed are adequate.

NSW DPI has reviewed this proposal in light of these provisions and has no objections.

If you require any further information please contact me on (02) 4916 3931.

Yours sincerely,

Scott Carter
Senior Conservation Manager, Aquatic Habitat Protection Unit

7 November 2012

Fisheries NSW
Port Stephens Fisheries Institute
Locked Bag 1, NELSON BAY NSW 2315
Tel: 02 4982 1232 Fax: 02 4982 1304
ABN 72 189 919 072 www.industry.nsw.gov.au

NSW EPA

Our reference: DOC12/46590, LIC08/239-04
Contact: Karen Marler 02 4908 6803

Mr Troy Favell
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

-9 NOV 2012

Dear Mr Favell

Wambo Coal Water Management Plan

Thank you for forwarding the subject plan for our records.

The Environment Protection Authority (EPA) encourages the development of such plans to ensure that proponents have determined how they will meet their statutory obligations and designated environmental objectives. However, the EPA does not review these documents as our role is to set environmental objectives for environmental management, not to be directly involved in the development of strategies to achieve those objectives.

Should you have any questions please phone me on 02 4908 6803.

Yours sincerely

KAREN MARLER
Head Regional Operations Unit – Hunter
Environment Protection Authority

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117 Bull Street, Newcastle West NSW 2302
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NSW GOVERNMENT | Trade & Investment Resources & Energy

26 November 2012

Mr Troy Favell
Environment and Community Manager
Wambo Coal Pty Ltd
Private Mailbag 8
Singleton NSW 2330

Dear Mr Favell,

APPROVAL OF BIODIVERSITY MANAGEMENT PLAN FOR LONGWALLS 7 AND 8, WAMBO COAL PTY LTD

On 1 November 2012 the NSW Trade & Investment - Division of Resources and Energy (DRE) received a copy of the report titled '*North Wambo Underground Mine: Biodiversity Management Plan Longwalls 7 and 8 - October 2012*' (BMP). This report was prepared and submitted in accordance with the requirements of Project Approval DA 305-7-2003.

As you'll already be aware a meeting was held on 23/11/12 between DRE and Wambo Coal Pty Ltd where various matters, including the BMP as well as the North Wambo Underground Mining Operations Plan were discussed.

As discussed during the above mentioned meeting DRE has assessed the BMP and has no objection to the performance and contingency measures detailed within the BMP.

DRE will also provide comment on the Subsidence Management Plans for longwalls 7 and 8 once received, taking into account the commitments and performance measures of the BMP.

If you have any queries, please contact the undersigned on 4931 6429.

Yours sincerely

MICHAEL HOWAT
Regional Environmental Officer
Environmental Sustainability Unit

PO Box 344 Hunter Region Mail Centre NSW 2310
516 High St MAITLAND NSW 2320
Tel: 02 4931 6422 Fax: 02 4931 6793
www.industry.nsw.gov.au
ABN 72189919072

NSW GOVERNMENT | Office of Environment & Heritage

Your reference: DA 305-7-2003
Our reference: DOC12/46417; FIL12/3168
Contact: Nick Pulver, 6659 8225

Mr Troy Favell
Environment and Community Manager
Wambo Coal Pty Limited
PMB 1
SINGLETON NSW 2330

Dear Mr Favell

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 AND 8 – HERITAGE MANAGEMENT PLAN

I refer to your correspondence dated 5 November 2012, regarding the draft Heritage Management Plan which has been prepared for Longwalls 7 and 8 at the North Wambo Underground Mine.

The Office of Environment and Heritage (OEH) understands that Development Consent No. 305-7-2003 (DA) was determined by the Minister for Planning on 4 February 2004 in accordance with the provisions of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). On 28 February 2011, the Minister for Planning approved a modification to the existing DA in accordance with the provisions of Section 75W of the EP&A Act.

Condition 22C(h) of Schedule 4 of the modified DA required Wambo Coal Pty Ltd to prepare a Heritage Management Plan in consultation with the former Department of Environment Climate Change and Water (now OEH). A review of the draft Heritage Management Plan has been undertaken by OEH and the following comments are provided.

Summary

OEH is concerned with the brief nature and limited details provided in the Heritage Management Plan regarding the management of the Aboriginal cultural heritage values of the Longwalls 7 and 8 project area. The Heritage Management Plan should be a stand alone document which provides an overview of the project history and heritage values to appropriately inform decisions for all stakeholders and detail procedures for the future management of the Aboriginal cultural heritage values of the project area.

Aboriginal Cultural Heritage Values

OEH acknowledges the significance of the local environment to the local Aboriginal community. OEH notes the existence of numerous registered Aboriginal sites in the project area including artefact scatters, camp sites and isolated finds. It is therefore expected that the Heritage Management Plan would provide a map or figure detailing the location of each site within the project area (e.g. within Figure 3). OEH recommends the draft plan is amended accordingly to address this matter.

It is also recommended that the Heritage Management Plan provide further details regarding the known Aboriginal site in the project area with appropriate details concerning their nature, significance, extent,

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scale of likely impact and any description of measures that would be implemented to remediate predicted impacts (refer to Condition 22D (b) of DA).

Management of Aboriginal Cultural Heritage

Table 2 of the Heritage Management Plan refers to Section 3 of Attachment A for further details regarding the likely/possible management of the Aboriginal sites located within the Longwall 7 and 8 project area. It is also noted that the management strategy for each Aboriginal site located within the project area has not been provided in the attachment. Only a summary of strategies has been provided. As discussed previously, the plan should accurately detail the proposed management of each Aboriginal site located within the project area. It is recommended that the plan is amended accordingly. Further, any variations to the management strategies following field experience should only be made with the support of the Aboriginal stakeholders.

Section 3.2.2 of the Heritage Management Plan refers to a 'Consent to Destroy' approved in accordance with the requirements of Section 90 of the *National Parks and Wildlife Act 1974* (NPW Act). However, further details regarding the consent have not been provided in the draft plan, including the approval number, the date the approval was issued, timeframe, a map of the approval area, details of the consultation process with Aboriginal stakeholders, a list of approved sites to destroy/to investigate/to protect, a progress report of any actions undertaken to date by Wambo Coal in accordance with the approval, details of when the approval expires, etc. These details are important to all stakeholders, are relevant in the management planning process and provide the legislative mechanism for Wambo Coal to lawfully impact or harm the Aboriginal sites located within the project area. It is therefore recommended that the plan is amended accordingly to include specific details of the Section 90 approval process and any relevant actions undertaken to date specific to the project area.

OEH also notes that following any management actions undertaken at each site, the proponent is required to formally submit an Aboriginal Site Impact Recording Form to OEH in a timely manner and in accordance with the provisions of Section 89A of the NPW Act for registration in the Aboriginal Heritage Information Management System (AHIMS). The final plan should detail this legislative requirement.

OEH notes that there is also a possibility that currently undetected cultural material may be present within the project area in those areas where Aboriginal objects have not been previously identified. It is therefore expected that Wambo Coal would detail appropriate assessment strategies in the plan to address this possibility. However, the draft plan has not included any procedures in the event that additional Aboriginal objects/sites are identified during any subsequent development or monitoring activities. It is recommended that the final plan addresses this matter.

Section 3.5 of Attachment 3 and Table 2 of the plan indicates that any Aboriginal objects salvaged from the project area will be the subject of a Care Agreement issued by the former Department of Environment and Conservation. Details of the commencement of the Care Agreement process, the applicant's details and the timeliness of any issued agreement for the broader Wambo Coal project area have not been provided in the plan. It is recommended that this matter is clarified in the final plan.

Aboriginal Community Consultation

Effective heritage management requires knowledge of values or cultural significance. An understanding of what makes a place culturally significant and why, enables appropriate decisions to be made about the management of that place. OEH recognises and acknowledges that Aboriginal people are the primary source of information about the value of their heritage and how this is best protected and conserved and must have an active role in any Aboriginal cultural heritage planning process.

Condition 22C(h) requires Wambo Coal to consult with relevant Aboriginal stakeholders in the development of the Heritage Management Plan. However, the draft plan does not include any evidence that Wambo Coal has consulted with the local Aboriginal community in the development of the plan. The lack of

evidence of consultation with the Aboriginal stakeholders concerns OEH and demonstrates that the consultation process for the plan is incomplete.

In order to address this matter, it is strongly recommended that consultation is implemented with the local Aboriginal community regarding the development of the Heritage Management Plan. Evidence of consultation should be provided in the final plan.

OEH has developed the '*Aboriginal cultural heritage consultation requirements for proponents 2010*' to assist proponents with consultation with the Aboriginal community. While these guidelines are aimed at proponents seeking an Aboriginal Heritage Impact Permit under the NPW Act, the guidelines provide a useful reference to guide broader community consultation during the development of Aboriginal cultural heritage management strategies.

OEH also encourages the proponent to maintain continuous consultation processes with the community for the entire life of the Wambo Coal project and for all Aboriginal cultural heritage matters associated with the project areas, including Longwalls 7 and 8. As a general rule, gaps in the consultation process of six months or more will not constitute a continuous consultation process. Where a proponent envisages a gap of more than six months it is recommended that Aboriginal stakeholders are regularly informed of any progress.

In Section 6 of the draft plan, it is noted that Aboriginal stakeholders have not been included in the list of roles and responsibilities for the management of Aboriginal cultural heritage values associated with the project area. As discussed above, the management of Aboriginal cultural heritage can only be implemented with the involvement of Aboriginal people. It is therefore recommended that this section is amended to include the role and responsibilities of Aboriginal stakeholders.

Legislative Requirements

The importance of protecting Aboriginal cultural heritage is reflected in the provisions of the NPW Act. OEH notes that the requirements of the NPW Act are applicable to this project area. It is therefore strongly recommended that the appropriate provisions of the NPW Act are detailed in the final Heritage Management Plan.

Minor Editorial Matters

Please note that a capital 'A' is used for all references to the term '*Aboriginal*'. For example, refer to Table 2 and Section 3.2.1 of the draft plan.

Further advice regarding Aboriginal cultural heritage can be found on OEH's web-site at: www.environment.nsw.gov.au/cultureandheritage.htm.

Conclusion

OEH has no additional concerns with the draft Heritage Management Plan and recommends that the above matters are addressed by Wambo Coal prior to the finalisation of the plan. If you would like to discuss any of the above matters, please contact Mr Nick Pulver, on 6659 8225.

Yours sincerely

30 NOV 2012

RICHARD BATH
Head – Hunter Planning Unit
Regional Operations

Major Projects Assessment
Mining Projects
Contact: David Mooney
Phone: (02) 9228 2040
Fax: (02) 9228 6466
Email: david.mooney@planning.nsw.gov.au

Mr Troy Favell
Environment & Community Manager
Wambo Coal Pty Ltd
Private Mail Bag 1
SINGLETON NSW 2330

Dear Mr Favell

North Wambo Underground Mine
Longwalls 7 and 8 Extraction Plan

The Department has completed its review of the Extraction Plan for Longwalls 7 and 8, including the supplementary content for section 1.6.2 and new Attachment 6 included in your letter dated 2 May 2013. The Department notes, in particular, that Wambo Coal Pty Ltd (WCPL) has committed to:

- prepare and submit a "Grouting Options Paper" by 30 August 2013; and
- reach agreement with the Department and DRE on the extent of grouting in the Homestead Mine workings prior to the commencement of second workings in Longwall 8.

The Director-General is satisfied that the Extraction Plan, as modified by the supplementary content for section 1.6.2 and new Attachment 6, complies with Condition 22C of Schedule 4 of Development Consent 305-7-2003, on the basis that WCPL fulfils its commitment to secure the Department's agreement on the extent of additional grouting in the Homestead Mine workings prior to the commencement of second workings in Longwall 8. Approval is therefore granted for the extraction of Longwall 7 under the Plan, with approval of the extraction of Longwall 8 to remain contingent on a satisfactory agreement on the extent of grouting.

The Department notes that your letter states that there is "no material risk of pot hole or chimney failure at the base of the alluvium at depths of cover greater than 110m". The Department has examined WCPL's additional technical report (DgS, 23 May 2012) and notes that the report focuses on the depth of cover necessary to avoid sinkhole expression *at the surface*, in order to prevent sinkholes affecting heritage values within the Wambo Homestead Complex. In the Department's view, the report does not fully assess the depth of cover necessary to avoid impacts to groundwater where sinkhole development intercepts the base of the alluvium, but where it does not fully propagate to the surface (ie all calculations in Figures 41a – 41c include the value "*s*"). Further, and more importantly, it is not based on a reasonable minimisation of the risk of connective cracking at the base of the alluvium (as against actual goafing) caused by collapses within the Whybrow Seam workings, which is the Department's aim.

Therefore, the Department requests that serious consideration is given in the Grouting Options Paper to extending the grouting program to fill *all* parts of the Homestead Mine workings that are directly beneath any part of the bed and the alluvium of North Wambo Creek, irrespective of depth of cover. The Department considers that this would be a limited extension to what is already an extensive grouting program. However, it does recognise that particular surface environmental constraints may inhibit the complete fulfilment of this aim.

Please feel welcome to telephone Mr David Mooney, Senior Planner, on 9228 2040 should you wish to discuss these matters.

Yours sincerely,

Howard Reed 16.5.13
Howard Reed
Manager Mining Projects
As the Director General's nominee

NSW GOVERNMENT | Trade & Investment Resources & Energy

OUT13/12202
File No 10/27

Mr Michael Alexander
Manager – Projects and Technical Services
Wambo Coal Mine
Private Mail Bag 1
SINGLETON NSW 2330

Dear Michael

North Wambo Underground Mine Subsidence Management Plan
Longwall 7 only

With reference to your application dated 19 December 2012, I the delegate for the Director General of the Department of Trade and Investment, Regional Infrastructure and Services NSW, have approved the Subsidence Management Plan for Longwall 7 only.

The conditions of approval and Approved Plan showing the extent of the approval are attached. The Approved Plan is Drawing No. 0882 Revision No. A-28/11/2012 titled North Wambo Underground Mine Subsidence Management Plan – Longwall 7 & 8 "SMP Approved Plan", signed by the Manager of Mining Engineering on 18 December 2012.

It should be noted that this Approval does not constitute an approval under the previous Section 138 of the Coal Mines Regulation Act 1982 or current Clause 88 of the Coal Mines Health and Safety Regulation 2006. Operators must comply with the requirements of Section 138 or Clause 88 before extracting any pillars from the first workings or longwall or other extraction systems.

If you have any further inquiries do not hesitate to contact Mr Paul Langley, Subsidence Executive Officer on 4931 6448 or paul.langley@industry.nsw.gov.au.

Yours sincerely

B.W. Mullard

22/5/13

Brad Mullard
Executive Director, Mineral Resources
Under delegation for the Director General

Mineral Resources – Office of the Executive Director
516 High Street MAITLAND NSW 2320 Australia
PO Box 344 Hunter Region Mail Centre NSW 2310 Australia
Tel: +612 4931 6422 Fax: +612 4931 6793 www.resources.nsw.gov.au ABN: 72 189 919 072

Subsidence Management Plan Approval

The Director General, Department of Trade and Investment, Regional Infrastructure and Services, NSW, having considered the likely environmental impacts of the mining operations identified in the Project Description specified in Schedule 1 and having had regard to the principles of ecologically sustainable development as defined in the *Protection of the Environment Administration Act 1991*, hereby approves the Subsidence Management Plan identified in Schedule 1 for the purposes of the SMP Condition that became effective on 18 March 2004 in CCL 743, ML 1402 & ML 1594 subject to the conditions set out in Schedule 2.

This Approval only authorises the underground mining operations identified in the Project Description for the Period and Area identified in Schedule 1. Obligations under this Approval regarding rehabilitation, monitoring and impact management continue to apply after the expiry of this period unless otherwise notified in writing by the Director General.

These conditions are required to:
- ensure optimal mineral resource recovery;
- prevent, minimise, manage and/or offset adverse impacts;
- provide for the ongoing environmental management of the project;
- ensure the area disturbed by mining is appropriately rehabilitated.

The rights and duties of a Leaseholder are those prescribed by the *Mining Act 1992*, subject to the terms and conditions of the Lease which include a requirement to carry out operations in accordance with the Subsidence Management Plan conditionally approved by this Approval. This Subsidence Management Plan Approval does not override any obligation on the Leaseholder to comply with the requirements of other legislation and regulatory instruments unless specifically provided in the Mining Act or other legislation or regulatory instruments.

Note: *This Approval does not constitute an approval under Section 138 of the Coal Mines Regulation Act 1982 or clause 88 of the Coal Mines Health and Safety Regulation 2006.*

SIGNED

B. W. Mullard

Brad Mullard
Executive Director, Mineral Resources
Under delegation for the Director General

22 MAY 2013
Date of Approval

File No: 10/27

SCHEDULE 1
Description of Approved Activity

Project Description:	North Wambo Underground Mine Longwall 7 only
Subsidence Management Plan:	North Wambo Underground Mine Extraction Plan Longwalls 7 & 8 dated December 2012, and any supplementary supporting information provided to the Department.
Seam:	Wambo Seam
Approved Period of Mining:	Date of Approval to 31 May 2018, or the expiry/cancellation of CCL 743, ML 1402 & ML 1594 whichever occurs first.

SCHEDULE 2

Definitions

Activity	The proposed mining described in the SMP
AEMR	Annual Environmental Management Report
Application Area	The area identified within the SMP
Bore	Any bore or well connected or proposed to be connected with sources of sub-surface water, and used or proposed to be used or capable of being used to obtain supplies of such water
Cliffs	Continuous rock face, including overhangs, having a minimum height of 10 metres and a minimum slope of 2 to 1, i.e. having a minimum angle to the horizontal of 63°
Council	Singleton Shire Council
Department	Department of Trade and Investment, Regional Infrastructure & Services,
Director, Environmental Sustainability and Land Use	Director, Environmental Sustainability and Land Use of the Department
Director General	Director General of the Department, or delegate
Director, Mine Safety Operations	Director, Mine Safety Operations of the Department
DP&I	Department of Planning and Infrastructure
Environment	includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings
Inspector of Coal Mines	Inspector of Coal Mines of the Department
Leaseholder	The leaseholder of CCL 743, ML 1402 & ML 1594
Longwall Mining	The extraction of the longwall panels covered by the SMP
MSB	Mine Subsidence Board
NOW	Department of Trade and Investment, Department of Primary Industries – NSW Office of Water
OEH	NSW Department of Premier and Cabinet, Office of Environment & Heritage
Principal Subsidence Engineer	Principal Subsidence Engineer of the Department
Proposed Mining	The extraction of coal from the proposed panels specified in Schedule 1.
PSMP	Property Subsidence Management Plan
SCA	Sydney Catchment Authority
SMP	Subsidence Management Plan, titled North Wambo Underground Mine Extraction Plan Longwalls 7 & 8 dated December 2012 and supplementary supporting information provided to the Department.
SMP Approved Plan	Plan No. 0882 Rev No. A-28/11/2012 titled North Wambo Underground Mine Subsidence Management Plan – Longwall 7 & 8 "SMP Approved Plan", signed by the Manager of Mining Engineering on 18 December 2012 and approved by the Director General.
Subsidence Impacts	Direct or indirect impacts resulting from subsidence from the proposed mining
Subsidence	Movement and/or deformation of the ground surface or subsurface strata as a direct and/or indirect result of the Longwall Mining

Conditions

Limits on Approval

1. The Leaseholder must carry out the activity strictly in accordance with the SMP Approved Plan.

2. The Leaseholder must carry out the activity generally in accordance with the SMP and subject to the conditions of this Approval.

   In the event of any inconsistency between the conditions of this Approval and the SMP, the conditions of this Approval prevail to the extent of any inconsistency.

3. Where this Approval requires actions to be undertaken by the Leaseholder, including remediation of subsidence impacts, the obligation continues until the Director General notifies the Leaseholder that the action has been completed to his or her satisfaction.

4. The Director General may vary the conditions of this Approval by notice in writing.

5. The Director General may, at his or her discretion, suspend or revoke this Approval if:
   a) the Leaseholder fails to adhere to any condition of the Approval; or
   b) the head of any other government authority requests suspension or revocation on the basis of the Leaseholder's non-compliance, or potential non-compliance, with legislation administered by that agency in relation to this Approval.

General Obligation to Minimise Harm to the Environment

6. The Leaseholder must implement the SMP (as amended by the conditions of this Approval) and carry out any additional practicable measures necessary to prevent any harm to the environment that may result from the construction, operation, or rehabilitation of the activity. Where prevention can not be achieved the leaseholder is to demonstrate minimisation of harm to the environment that may result from the construction, operation, or rehabilitation of the activity.

Notification of Approval

7. The Proponent must give notice of this SMP approval within 30 days to the DP&I, NOW, OEH, Council, MSB, the local Aboriginal Land Council/s, the owners/operators of any infrastructure, and landowners in the application area and any other relevant government agencies or stakeholders that the Director General's approval of the SMP has been granted.

Implementation of Approval

8. Any plans, programmes, reports or strategies required as a condition of this Approval must be developed having regard to any guidelines adopted by the Director General for the purpose of subsidence management and mine rehabilitation.

9. The Leaseholder must implement any plan, programme or strategy required and approved pursuant to this Approval.

   Note: *The Leaseholder may, at any time, submit an amended plan, programme or strategy for approval. Once approved, the amended plan, programme or strategy must be implemented, however, up until the date of approval, the Leaseholder must continue to implement the previously approved plan, programme or strategy.*

10. Any modifications to plans, programmes or strategies already approved for the purposes of the conditions of this Approval must have regard to the matters set out in condition 8. Amended plans, programmes or strategies submitted for approval must be accompanied by all relevant supporting documentation to assist in the assessment of the amendment or modification.

Note: *This condition relates to plans, programmes and strategies required by the conditions of this Approval – it does not apply to variations to the SMP or the SMP Approved Plan which must be done in accordance with the requirements of the Mining Act, the conditions of title and the variation procedures identified in the SMP guidelines.*

Directions

11. The Leaseholder must comply with any written direction given by the Director General, Director Environmental Sustainability & Land Use, Director Mine Safety Operations or Principal Subsidence Engineer relating to:
    a) the implementation of any aspect of the SMP or an approved plan, programme or strategy;
    b) assessing or reviewing the adequacy, effectiveness, or coverage of any approved plan, programme or strategy or any aspect of the SMP;
    c) the type, timing and/or location of monitoring of baseline conditions, subsidence or subsidence impacts;
    d) any reporting requirement under this Approval;
    e) the carrying out of works to address subsidence impacts; and/or
    f) the carrying out of any studies or investigations related to subsidence or subsidence impacts and the reporting of any findings or conclusions.

    The obligations under this condition prevail over any other obligation under this Approval.

    Note: *Compliance with a written direction will not operate as a defence to a breach of any obligation under this Approval that occurred prior to the Direction being given.*

Subsidence Monitoring Programme

12. The Leaseholder must submit to the Principal Subsidence Engineer for approval a subsidence monitoring programme for the longwall panels which are the subject of this Approval. This programme must include:
    a) inspection regimes;
    b) layout of monitoring points;
    c) parameters to be measured;
    d) monitoring methods and accuracy;
    e) timing and frequencies of surveys and inspections;
    f) recording and reporting of monitoring results.

    The Leaseholder must not commence longwall mining prior to the subsidence monitoring programme being approved.

    Note: *The programme should be submitted to the Principal Subsidence Engineer at least 30 days prior to the expected commencement of operations to enable sufficient time for the assessment of the programme. The Principal Subsidence Engineer may require the provision of further information to assist in the assessment of the programme or a resubmission of the programme if it is considered inadequate. Complex issues or the need for additional information or a resubmission of the programme may require a longer assessment period.*

13. The Leaseholder must submit to the Director Environmental Sustainability & Land Use for approval an Environmental Management Plan (EMP) for the panels which are the subject of this Approval. This plan must address subsidence impacts on:
    a) surface and groundwater (quality and quantity);
    b) flora and fauna
    c) archaeological sites; and
    d) any other significant environmental features that may be effected by subsidence resulting from the proposed longwall extraction

The leaseholder must not operate other than in accordance with an Environmental Management Plan (EMP) approved by the Director Environmental Sustainability & Land Use. This plan must address subsidence impacts above and must include:

a) a detailed monitoring programme;
b) trigger levels for subsidence impacts that require actions and responses;
c) the procedures that would be followed in the event that the monitoring indicates an exceedance of trigger levels;
d) measures to mitigate, remediate and/or compensate any identified impacts including grouting operations in the overlying seam;
e) a protocol for the notification of identified exceedances of the trigger levels; and
f) a contingency plan.

This plan must be prepared in consultation with relevant landholders and government agencies.

The Leaseholder must not cause subsidence impacts prior to the Environmental Management Plan being approved.

The EMP must be developed in sufficient time to allow two years data to be collected prior to extraction commencing, unless otherwise authorised by the Director Environmental Sustainability & Land Use.

Note: *The plan should be submitted to the Director Environmental Sustainability & Land Use at least 30 days prior to the expected commencement of operations to enable sufficient time for the assessment of the plan. The Director Environmental Sustainability & Land Use may require the provision of further information to assist in the assessment of the plan or a resubmission of the plan if it is considered inadequate. Complex issues or the need for additional information or a resubmission of the plan may require a longer assessment period.*

Infrastructure and Property Management

14. The Leaseholder must submit to the Director Mine Safety Operations for approval management plans for the following infrastructure that may be affected by subsidence. These plans must be developed in consultation with:

a) the owners/operators of the infrastructure; and
b) any Government Agency with a regulatory role for the infrastructure.

The Leaseholder must not cause any subsidence impacts to any of the infrastructure listed below prior to the management plans for the said infrastructure being approved:

i) Electricity Transmission Lines, and;
ii) Any infrastructure items that may be required by the Director Mine Safety Operations

Public Safety

15 The Leaseholder must prepare and implement a public safety management plan to ensure public safety in any structures, houses and surface areas that may be affected by subsidence, to the satisfaction of the Director, Mine Safety Operations.

The plan must include, but not be limited to:

a) identification of any areas, man-made structures, facilities and infrastructure, which are hazardous or could become hazardous due to subsidence impacts;
b) regular monitoring of areas or infrastructure/structures posing safety risks
c) regular monitoring of stability of any areas with cliff formations and/or steep slopes that may be affected by subsidence
d) measures to prevent, mitigate and promptly remediate hazards and safety risks referred to in (a) above;
e) erection of warning signs;
f) entry restrictions;
g) backfilling of dangerous surface cracks;

i) provision of timely notification of proposed mining progress to the community and any other relevant stakeholders where management of public safety is required.

The Leaseholder must not cause subsidence impacts prior to the Public Safety Management Plan being approved.

Incident and Ongoing Management Reporting

16 The Leaseholder must, within 24 hours of becoming aware of the occurrence, notify:
- i. the Principal Subsidence Engineer;
- ii. Director, Environmental Sustainability & Land Use;
- iii. The Mine Subsidence Board;
- iv. NSW Office of Water;
- v. the operators of all infrastructure as listed in condition 14; and
- vi. other relevant stakeholders and any Government Agency with a regulatory role if they request such notification, of the following:
  - a) Any significant unpredicted and/or higher-than-predicted subsidence and/or abnormalities in the development of subsidence;
  - b) Any exceedance of predicted impacts on groundwater resources and/or the natural environment that may have been caused (whether partly or wholly) by subsidence;
  - c) Any observed subsidence impacts adverse to the serviceability and/or safety of infrastructure and other built structures that may be affected by longwall mining;
  - d) Any significant subsidence-induced cracking and/or ground deformations observed in any surface areas within the SMP application area;

Note: *Under Condition 11, the Leaseholder can be directed to, among other things, prepare a report on an incident reported under this condition. A report on the details of the incident, including likely or known causes, response action and proposed response measures will generally be required for incidents that involve material property or environmental damage or have the potential to cause such damage.*

Status Report

17 The Leaseholder must prepare and maintain a Subsidence Management Status Report which must include but not be limited to:
- a) the current face position of the panel being extracted;
- b) a summary of any subsidence management actions undertaken by the Leaseholder in the period subsequent to the last regular submission of the Status Report;
- c) a summary of any comments, advice and feedback from consultation with stakeholders in relation to the implementation of this Approval (including the preparation, implementation and review of plans, programmes, reports or strategies required by this approval) undertaken or received in the period subsequent to the last regular submission of the Status Report and a summary of the Leaseholder's response to the comments, advice and feedback given by the stakeholders;
- d) a summary of the observed and/or reported subsidence impacts, incidents, service difficulties, community complaints, and any other relevant information reported to the Leaseholder in the period subsequent to the last regular submission of the Status Report and *a* summary of the Leaseholder's response to these impacts, incidents, service difficulties and complaints;
- e) a summary of subsidence development based on monitoring information compared with any defined triggers and/or the predicted subsidence to facilitate early detection of potential subsidence impacts;
- f) a summary of the adequacy, quality and effectiveness of the implemented management processes based on the monitoring and consultation information summarised above; and
- g) *a* statement regarding any additional and/or outstanding management actions to be undertaken or the need for early responses or emergency procedures to ensure adequate management of any potential subsidence impacts due to longwall mining.

The Subsidence Management Status Report must be updated at least every 14 days to reflect any changes in the information required to be included in the Report. The Status Report must be regularly submitted to the Principal Subsidence Engineer, NSW Office of Water, OEH and each operator of infrastructure referred to in condition 14 every four (4) months from the date of this Approval. In addition, the Status Report (as updated from time to time) must be provided, upon request, to the Mine Subsidence Board, the Director of Environmental Sustainability & Land Use, the Principal Subsidence Engineer, owners/operators of any infrastructure within the application area and any other relevant stakeholders.

End of Panel Report

18 Within 4 months of the completion of each longwall panel, an end of panel report must be submitted to the Director General. The end of panel report must:
   a) include a summary of the subsidence and environmental monitoring results for the applicable longwall panel;
   b) include an analysis of these monitoring results against the relevant;
      - impact assessment criteria;
      - monitoring results from previous panels; and
      - predictions in the SMP;
   c) identify any trends in the monitoring results over the life of the activity; and
   d) describe what actions were taken to ensure adequate management of any potential subsidence impacts due to longwall mining.

Access to Information

19 Within 3 months of the submission of an End of Panel Report (as required by Condition 18) or the approval of a plan, programme or strategy required under this Approval or the SMP (or any subsequent revision of these documents), the Leaseholder must, to the satisfaction of the Director General:

   a) provide a copy of these document/s to all relevant agencies;
   b) ensure that a copy of the relevant documents is made publicly available at the Leaseholder's regional office; and
   c) put a copy of the relevant document/s on the Leaseholder's website.

   Note: *Relevant agencies currently include MSB, OEH, NOW and DP&I.*

Survey Marks

20 At the completion of subsidence, or otherwise as required by the Land and Property Management Authority , the functionality of any survey marks affected by subsidence must be fully restored to the satisfaction of the Land and Property Management Authority.

Water Supply

21 In the event of interruptions to potable water supplies (water quality and/or quantity) due to subsidence impacts on water supply systems and/or sources caused by longwall mining, the Leaseholder must provide, without delay, water supplies of equivalent quality and quantity to locations convenient to those affected within the SMP Application Area until such time that the affected water supply systems and/or sources are restored.

File No: 10/27

Manager of Mining Engineering
North Wambo Pty Ltd
PMB 1
SINGLETON NSW 2330

Dear Sir,

Re: North Wambo Underground Mine Longwall Panel 7 – Subsidence Monitoring Programme

I refer to North Wambo Underground Mine's proposed subsidence monitoring programme for Longwall Panel 7, as outlined within the document entitled "Wambo Coal Pty Ltd North Wambo Underground Mine Extraction Plan Longwalls 7 and 8 Appendix H Subsidence Monitoring Program" Revision B, received by e-mail from Registered Mine Surveyor, North Wambo Underground on 14 March 2013.

Pursuant to Condition 12 of Director General's approval of North Wambo Underground Mine SMP for Longwall 7 only (File No 10/27 dated 22 May 2013), the abovementioned subsidence monitoring programme is approved, subject to the following conditions:

1. This approval applies to monitoring and inspections associated with the development of surface subsidence arising from extraction of Longwall Panel 7 only;
2. The layout of monitoring points, parameters to be measured, inspection regimes, monitoring methods and accuracies, timing and frequencies of surveys and inspections must be consistent with the subsidence monitoring programme noted above;
3. Notwithstanding Point 2 above:
   a. The leaseholder must comply with the monitoring requirements of the Dam Safety Committee;
   b. Coordinate and strain surveys conducted must aim to achieve at least the following accuracies:
      i. Strain bay distances: ± 2mm;
      ii. Coordinates: ± 10mm;
   c. Coordinate (xy) and level (z) results must be provided as Map Grid of Australia (MGA) coordinates and Australian Height Datum (AHD) levels;
4. Monitoring or inspections must not be discontinued, monitoring points must not be removed or the approved monitoring programme modified without the approval of the Principal Subsidence Engineer;
5. Monitoring points proposed within the subsidence monitoring programme noted above must be installed and initial surveys conducted, prior to any potential influence of subsidence arising from extraction of the subject longwall panel;
6. Monitoring points noted as disturbed or destroyed must be re-established promptly, where it is reasonable and practical to do so. Details of any monitoring points that are re-established must be provided with subsequent monitoring results;

Mine Safety Operations
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HUNTER REGION MAIL CENTRE NSW 2310
Tel: 02 4931 6644
Fax: 02 4931 6790
www.industry.nsw.gov.au

7 The results of monitoring must be submitted in digital (Excel) format to the Principal Subsidence Engineer within one week of monitoring, or by request;

8 Any required and/or necessary approvals must be obtained from relevant government departments prior to clearing of vegetation and/or installation of proposed monitoring points.

Yours faithfully,

Dr Gang Li
Principal Subsidence Engineer

22 May 2013

Trade & Investment
Resources & Energy

OUT13/12957
File No 10/27

Mr Michael Alexander
Manager – Projects and Technical Services
Wambo Coal Mine
Private Mail Bag 1
SINGLETON NSW 2330

Dear Michael

Environment Management Plan Approval
Condition 13 of North Wambo Underground Longwall 7 SMP

I refer to the following management plans submitted by the leaseholder within the North Wambo Underground Mine Extraction Plan Longwalls 7 and 8:

i. *Water Management Plan – North Wambo Underground Mine Longwalls 7 and 8 WMP LW7-8 Rev C, dated December 2012;*
ii. *Land Management Plan - North Wambo Underground Mine Longwalls 7 and 8 LMP LW7-8 Rev B dated December 2012;*
iii. *Biodiversity Management Plan - North Wambo Underground Mine Longwalls 7 and 8, BMP LW7-8 Rev C dated December 2012;*
iv. *Heritage Management Plan - North Wambo Underground Mine Longwalls 7 and 8 HMP LW7-8 Rev C dated December 2012;*
v. *Wambo Coal – Rehabilitation Management Plan EMP025 Rev 0 dated December 2012.*

Pursuant to Condition 13 of the Director General's approval of the Subsidence Management Plan for Longwall 7 (File No. 10/27, dated 22 May 2013), I hereby approve the aforementioned management plans, on an interim basis, subject to the following conditions:

1. This approval will cease to have effect when the grouting of the homestead workings commence; and,

2. The leaseholder shall conduct works and any response actions (such as monitoring or management actions) in accordance with the commitments of the approved Extraction Plan and associated management plans for the site.

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516 High St MAITLAND NSW 2320
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ABN 72189919072

In order for the Department to consider an extension of this approval beyond the imposed time limit, the leaseholder must submit a revised Environmental Management Plan in time for consideration and approval, prior to the limiting event occurring.

The revision should be prepared to ensure compliance with Condition 13 of the Subsidence Management Plan approval and must include measures to mitigate, remediate and/or compensate any identified impacts including impacts caused by grouting operations in the overlying seam.

If you have any further enquiries do not hesitate to contact Mr Paul Langley, Subsidence Executive Officer on 02 4931 6448.

Yours sincerely

24/5/2013

Steve Barry
A/Director Environmental Sustainability Unit

Trade & Investment
Resources & Energy

OUT13/12626
File: 10/27

Mr Michael Alexander
Manager – Projects and Technical Services
Wambo Coal Mine
Private Mail Bag 1
SINGLETON NSW 2330

Dear Michael

Public Safety Management Plan Approval
Condition 15 of North Wambo Underground Mine Longwall 7 SMP

I refer to the following management plan submitted by the leaseholder:

Public Safety Management Plan – North Wambo Underground Mine Longwalls 1 to 8, Document No. WA-MIN-MP-628 (PSMP LW1-8), Rev. B, December 2012.

Pursuant to Condition 15 of the Director General's approval of SMP (Subsidence Management Plan) for Longwall 7 (File No. 10/27 dated 22 May 2013), I hereby approve the aforementioned management plan subject to the following conditions:

1. This approval ceases to have force and effect when Longwall 7 extraction reaches Chainage 700; and
2. All risk management measures and procedures as detailed in the management plan listed above must be implemented and fully complied with by the Leaseholder.

If you have any further enquiries do not hesitate to contact Mr Paul Langley, Subsidence Executive Officer on 02 4931 6448.

Yours sincerely

23.05.2013

Rob Regan
Director of Mine Safety Operations

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NSW GOVERNMENT | Planning & Infrastructure

Development Assessment Systems and Approvals
Mining Projects
Contact: Matthew Sprott
Phone: (02) 9228 2054
Fax: (02) 9228 6466
Email: matthew.sprott@planning.nsw.gov.au

Mr Troy Favell
Environment & Community Manager
Wambo Coal Pty Ltd
Private Mail Bag 1
SINGLETON NSW 2330

Dear Mr Favell

North Wambo Underground Mine
Revised Grouting Options Paper

I refer to the Department's letter to you dated 16 May 2013, requesting a revised Grouting Options Paper for the North Wambo Underground Mine, as part of the Extraction Plan for Longwalls 7 and 8.

I thank you for providing the revised Grouting Options Paper, dated 28 August 2013, including the technical review by Ditton Technical Services dated 26 August 2013 and the report by Outotec Pty Limited dated 25 August 2013.

The Department has carefully reviewed these documents and considers that the proposal to include a further nine grouting boreholes in Zone 1A would stabilise the Homestead workings and provide adequate protection to North Wambo Creek and its associated alluvium.

The Department also notes that grouting would not be undertaken in the North Wambo Creek riparian zone, as no Homestead workings are located in this area, and that the coal barrier between Longwall 08A and 08B would provide protection to the southern bank of the creek and associated alluvium.

The Department considers that the revised grouting program would reduce the risk of impacts to the alluvium from mining Longwall 8A to as low as practicable.

The Director-General has accordingly approved the revised Grouting Options Paper. The Director-General has also approved the extraction of Longwall 08, in accordance with the Department's advice of 16 May 2013.

Should you wish to discuss the matter further, please contact Matthew Sprott.

Yours sincerely,

Howard Reed 29.9.13
Howard Reed
Manager Mining Projects
As the Director General's nominee

Trade & Investment
Resources & Energy

OUT13/30392
File No 10/27

Mr Michael Alexander
Manager – Projects and Technical Services
Wambo Coal Mine
Private Mail Bag 1
SINGLETON NSW 2330

Dear Michael

North Wambo Underground Mine Longwall 8
Subsidence Management Plan approval

With reference to your application dated 19 December 2012, I the delegate for the Director General of the Department of Trade and Investment, Regional Infrastructure and Services NSW (delegation dated 17 November 2010), have approved the Subsidence Management Plan for Longwall 8.

The conditions of approval and Approved Plan showing the extent of the approval are attached. The Approved Plan is Drawing No.0882b Revision No. B-17/9/2013 titled North Wambo Underground Mine Subsidence Management Plan – Longwall 8 "SMP Approved Plan", signed by the Manager of Mining Engineering on 3 October 2013.

It should be noted that this Approval does not constitute an approval under the previous Section 138 of the Coal Mines Regulation Act 1982 or current Clause 88 of the Coal Mines Health and Safety Regulation 2006. Operators must comply with the requirements of Section 138 or Clause 88 before extracting any pillars from the first workings or longwall or other extraction systems.

If you have any further inquiries do not hesitate to contact Mr Paul Langley, Subsidence Executive Officer on 4931 6448 or paul.langley@industry.nsw.gov.au.

Yours sincerely

18/10/13

Brad Mullard
Executive Director, Mineral Resources
Under delegation for the Director General

Mineral Resources – Office of the Executive Director
516 High Street MAITLAND NSW 2320 Australia
PO Box 344 Hunter Region Mail Centre NSW 2310 Australia
Tel: +612 4931 6422 Fax: +612 4931 6793 www.resources.nsw.gov.au ABN: 72 189 919 072

Subsidence Management Plan Approval

The Director General, Department of Trade and Investment, Regional Infrastructure and Services, NSW, having considered the likely environmental impacts of the mining operations identified in the Project Description specified in Schedule 1 and having had regard to the principles of ecologically sustainable development as defined in the *Protection of the Environment Administration Act 1991*, hereby approves the Subsidence Management Plan identified in Schedule 1 for the purposes of the SMP Condition that became effective on 18 March 2004 in CCL 743, ML 1402 & ML 1594 subject to the conditions set out in Schedule 2.

This Approval only authorises the underground mining operations identified in the Project Description for the Period and Area identified in Schedule 1. Obligations under this Approval regarding rehabilitation, monitoring and impact management continue to apply after the expiry of this period unless otherwise notified in writing by the Director General.

These conditions are required to:
- ensure optimal mineral resource recovery;
- prevent, minimise, manage and/or offset adverse impacts;
- provide for the ongoing environmental management of the project;
- ensure the area disturbed by mining is appropriately rehabilitated.

The rights and duties of a Leaseholder are those prescribed by the *Mining Act 1992*, subject to the terms and conditions of the Lease which include a requirement to carry out operations in accordance with the Subsidence Management Plan conditionally approved by this Approval. This Subsidence Management Plan Approval does not override any obligation on the Leaseholder to comply with the requirements of other legislation and regulatory instruments unless specifically provided in the Mining Act or other legislation or regulatory instruments.

Note: *This Approval does not constitute an approval under Section 138 of the Coal Mines Regulation Act 1982 or clause 88 of the Coal Mines Health and Safety Regulation 2006.*

SIGNED

Brad Mullard
Executive Director, Mineral Resources
Under delegation for the Director General

Date of Approval 18 October 2013 **File No**: 10/27 **Reference:** OUT13/30399

SCHEDULE 1
Description of Approved Activity

Project Description:	North Wambo Underground Mine Longwall 8 only
Subsidence Management Plan:	North Wambo Underground Mine Extraction Plan Longwalls 7 & 8 dated December 2012, and any supplementary supporting information provided to the Department.
Seam:	Wambo Seam
Approved Period of Mining:	Date of Approval to 31 October 2020 or the expiry/cancellation of CCL 743, ML 1402 & ML 1594 whichever occurs first.

SCHEDULE 2

Definitions

Activity	The proposed mining described in the SMP
AEMR	Annual Environmental Management Report
Application Area	The area identified within the SMP
Bore	Any bore or well connected or proposed to be connected with sources of sub-surface water, and used or proposed to be used or capable of being used to obtain supplies of such water
Cliffs	Continuous rock face, including overhangs, having a minimum height of 10 metres and a minimum slope of 2 to 1, i.e. having a minimum angle to the horizontal of 63°
Council	Singleton Shire Council
Department	Department of Trade and Investment, Regional Infrastructure & Services,
Director, Environmental Sustainability	Director, Environmental Sustainability of the Department
Director General	Director General of the Department, or delegate
Director, Mine Safety Operations	Director, Mine Safety Operations of the Department
DP&I	Department of Planning and Infrastructure
Environment	includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings
Inspector of Coal Mines	Inspector of Coal Mines of the Department
Leaseholder	The leaseholder of CCL 743, ML 1402 & ML 1594
Longwall Mining	The extraction of the longwall panels covered by the SMP
MSB	Mine Subsidence Board
NOW	Department of Trade and Investment, Department of Primary Industries – NSW Office of Water
OEH	NSW Department of Premier and Cabinet, Office of Environment & Heritage
Principal Subsidence Engineer	Principal Subsidence Engineer of the Department
Proposed Mining	The extraction of coal from the proposed panels specified in Schedule 1.
PSMP	Property Subsidence Management Plan
SCA	Sydney Catchment Authority
SMP	Subsidence Management Plan, titled North Wambo Underground Mine Extraction Plan Longwalls 7 & 8 dated December 2012 and supplementary supporting information provided to the Department.
SMP Approved Plan	Plan No. 0882b Rev No. B-17/9/2013 titled North Wambo Underground Mine Subsidence Management Plan – Longwall 8 "SMP Approved Plan", signed by the Manager of Mining Engineering on 3 October 2013 and approved by the Director General.
Subsidence Impacts	Direct or indirect impacts resulting from subsidence from the proposed mining
Subsidence	Movement and/or deformation of the ground surface or subsurface strata as a direct and/or indirect result of the Longwall Mining

Conditions

Limits on Approval

1. The Leaseholder must carry out the activity strictly in accordance with the SMP Approved Plan.

2. The Leaseholder must carry out the activity generally in accordance with the SMP and subject to the conditions of this Approval.

   In the event of any inconsistency between the conditions of this Approval and the SMP, the conditions of this Approval prevail to the extent of any inconsistency.

3. Where this Approval requires actions to be undertaken by the Leaseholder, including remediation of subsidence impacts, the obligation continues until the Director General notifies the Leaseholder that the action has been completed to his or her satisfaction.

4. The Director General may vary the conditions of this Approval by notice in writing.

5. The Director General may, at his or her discretion, suspend or revoke this Approval if:
   a) the Leaseholder fails to adhere to any condition of the Approval; or
   b) the head of any other government authority requests suspension or revocation on the basis of the Leaseholder's non-compliance, or potential non-compliance, with legislation administered by that agency in relation to this Approval.

General Obligation to Minimise Harm to the Environment

6. The Leaseholder must implement the SMP (as amended by the conditions of this Approval) and carry out any additional practicable measures necessary to prevent any harm to the environment that may result from the construction, operation, or rehabilitation of the activity. Where prevention can not be achieved the leaseholder is to demonstrate minimisation of harm to the environment that may result from the construction, operation, or rehabilitation of the activity.

Notification of Approval

7. The Proponent must give notice of this SMP approval within 30 days to the DP&I, NOW, OEH, Council, MSB, the local Aboriginal Land Council/s, the owners/operators of any infrastructure, and landowners in the application area and any other relevant government agencies or stakeholders that the Director General's approval of the SMP has been granted.

Implementation of Approval

8. Any plans, programmes, reports or strategies required as a condition of this Approval must be developed having regard to any guidelines adopted by the Director General for the purpose of subsidence management and mine rehabilitation.

9. The Leaseholder must implement any plan, programme or strategy required and approved pursuant to this Approval.

   Note: *The Leaseholder may, at any time, submit an amended plan, programme or strategy for approval. Once approved, the amended plan, programme or strategy must be implemented, however, up until the date of approval, the Leaseholder must continue to implement the previously approved plan, programme or strategy.*

10. Any modifications to plans, programmes or strategies already approved for the purposes of the conditions of this Approval must have regard to the matters set out in condition 8. Amended plans, programmes or strategies submitted for approval must be accompanied by all relevant supporting documentation to assist in the assessment of the amendment or modification.

Note: *This condition relates to plans, programmes and strategies required by the conditions of this Approval – it does not apply to variations to the SMP or the SMP Approved Plan which must be done in accordance with the requirements of the Mining Act, the conditions of title and the variation procedures identified in the SMP guidelines.*

Directions

11. The Leaseholder must comply with any written direction given by the Director General, Director Environmental Sustainability, Director Mine Safety Operations or Principal Subsidence Engineer relating to:
    a) the implementation of any aspect of the SMP or an approved plan, programme or strategy;
    b) assessing or reviewing the adequacy, effectiveness, or coverage of any approved plan, programme or strategy or any aspect of the SMP;
    c) the type, timing and/or location of monitoring of baseline conditions, subsidence or subsidence impacts;
    d) any reporting requirement under this Approval;
    e) the carrying out of works to address subsidence impacts; and/or
    f) the carrying out of any studies or investigations related to subsidence or subsidence impacts and the reporting of any findings or conclusions.

    The obligations under this condition prevail over any other obligation under this Approval.

    Note: *Compliance with a written direction will not operate as a defence to a breach of any obligation under this Approval that occurred prior to the Direction being given.*

Subsidence Monitoring Programme

12. The Leaseholder must submit to the Principal Subsidence Engineer for approval a subsidence monitoring programme for the longwall panels which are the subject of this Approval. This programme must include:
    a) inspection regimes;
    b) layout of monitoring points;
    c) parameters to be measured;
    d) monitoring methods and accuracy;
    e) timing and frequencies of surveys and inspections;
    f) recording and reporting of monitoring results.

    The Leaseholder must not commence longwall mining prior to the subsidence monitoring programme being approved.

    Note: *The programme should be submitted to the Principal Subsidence Engineer at least 30 days prior to the expected commencement of operations to enable sufficient time for the assessment of the programme. The Principal Subsidence Engineer may require the provision of further information to assist in the assessment of the programme or a resubmission of the programme if it is considered inadequate. Complex issues or the need for additional information or a resubmission of the programme may require a longer assessment period.*

13. The Leaseholder must submit to the Director Environmental Sustainability for approval an Environmental Management Plan (EMP) for the panels which are the subject of this Approval. This plan must address subsidence impacts on:
    a) surface and groundwater (quality and quantity);
    b) flora and fauna
    c) archaeological sites; and
    d) any other significant environmental features that may be effected by subsidence resulting from the proposed longwall extraction

The leaseholder must not operate other than in accordance with an Environmental Management Plan (EMP) approved by the Director Environmental Sustainability. This plan must address subsidence impacts above and must include:

a) a detailed monitoring programme;
b) trigger levels for subsidence impacts that require actions and responses;
c) the procedures that would be followed in the event that the monitoring indicates an exceedance of trigger levels;
d) measures to mitigate, remediate and/or compensate any identified impacts including grouting operations in the overlying seam;
e) a protocol for the notification of identified exceedances of the trigger levels; and
f) a contingency plan.

This plan must be prepared in consultation with relevant landholders and government agencies.

The Leaseholder must not cause subsidence impacts prior to the Environmental Management Plan being approved.

The EMP must be developed in sufficient time to allow two years data to be collected prior to extraction commencing, unless otherwise authorised by the Director Environmental Sustainability.

Note: *The plan should be submitted to the Director Environmental Sustainability at least 30 days prior to the expected commencement of operations to enable sufficient time for the assessment of the plan. The Director Environmental Sustainability may require the provision of further information to assist in the assessment of the plan or a resubmission of the plan if it is considered inadequate. Complex issues or the need for additional information or a resubmission of the plan may require a longer assessment period.*

Infrastructure and Property Management

14. The Leaseholder must submit to the Director Mine Safety Operations for approval management plans for the following infrastructure that may be affected by subsidence. These plans must be developed in consultation with:

a) the owners/operators of the infrastructure; and
b) any Government Agency with a regulatory role for the infrastructure.

The Leaseholder must not cause any subsidence impacts to any of the infrastructure listed below prior to the management plans for the said infrastructure being approved:

i) Electricity Transmission Lines, and;
ii) Any infrastructure items that may be required by the Director Mine Safety Operations

Public Safety

15 The Leaseholder must prepare and implement a public safety management plan to ensure public safety in any structures, houses and surface areas that may be affected by subsidence, to the satisfaction of the Director, Mine Safety Operations.

The plan must include, but not be limited to:

a) identification of any areas, man-made structures, facilities and infrastructure, which are hazardous or could become hazardous due to subsidence impacts;
b) regular monitoring of areas or infrastructure/structures posing safety risks
c) regular monitoring of stability of any areas with cliff formations and/or steep slopes that may be affected by subsidence
d) measures to prevent, mitigate and promptly remediate hazards and safety risks referred to in (a) above;
e) erection of warning signs;
f) entry restrictions;
g) backfilling of dangerous surface cracks;
h) securing of unstable built structures or rockmass where required and appropriate; and

i) provision of timely notification of proposed mining progress to the community and any other relevant stakeholders where management of public safety is required.

The Leaseholder must not cause subsidence impacts prior to the Public Safety Management Plan being approved.

Incident and Ongoing Management Reporting

16 The Leaseholder must, within 24 hours of becoming aware of the occurrence, notify:
i. the Principal Subsidence Engineer;
ii. Director, Environmental Sustainability;
iii. The Mine Subsidence Board;
iv. NSW Office of Water;
v. the operators of all infrastructure as listed in condition 14; and
vi. other relevant stakeholders and any Government Agency with a regulatory role if they request such notification, of the following:
a) Any significant unpredicted and/or higher-than-predicted subsidence and/or abnormalities in the development of subsidence;
b) Any exceedance of predicted impacts on groundwater resources and/or the natural environment that may have been caused (whether partly or wholly) by subsidence;
c) Any observed subsidence impacts adverse to the serviceability and/or safety of infrastructure and other built structures that may be affected by longwall mining;
d) Any significant subsidence-induced cracking and/or ground deformations observed in any surface areas within the SMP application area;

Note: *Under Condition 11, the Leaseholder can be directed to, among other things, prepare a report on an incident reported under this condition. A report on the details of the incident, including likely or known causes, response action and proposed response measures will generally be required for incidents that involve material property or environmental damage or have the potential to cause such damage.*

Status Report

17 The Leaseholder must prepare and maintain a Subsidence Management Status Report which must include but not be limited to:
a) the current face position of the panel being extracted;
b) a summary of any subsidence management actions undertaken by the Leaseholder in the period subsequent to the last regular submission of the Status Report;
c) a summary of any comments, advice and feedback from consultation with stakeholders in relation to the implementation of this Approval (including the preparation, implementation and review of plans, programmes, reports or strategies required by this approval) undertaken or received in the period subsequent to the last regular submission of the Status Report and a summary of the Leaseholder's response to the comments, advice and feedback given by the stakeholders;
d) a summary of the observed and/or reported subsidence impacts, incidents, service difficulties, community complaints, and any other relevant information reported to the Leaseholder in the period subsequent to the last regular submission of the Status Report and a summary of the Leaseholder's response to these impacts, incidents, service difficulties and complaints;
e) a summary of subsidence development based on monitoring information compared with any defined triggers and/or the predicted subsidence to facilitate early detection of potential subsidence impacts;
f) a summary of the adequacy, quality and effectiveness of the implemented management processes based on the monitoring and consultation information summarised above; and
g) a statement regarding any additional and/or outstanding management actions to be undertaken or the need for early responses or emergency procedures to ensure adequate management of any potential subsidence impacts due to longwall mining.

The Subsidence Management Status Report must be updated at least every 14 days to reflect any changes in the information required to be included in the Report. The Status Report must be regularly submitted to the Principal Subsidence Engineer, NSW Office of Water, OEH and each operator of infrastructure referred to in condition 14 every four (4) months from the date of this Approval. In addition, the Status Report (as updated from time to time) must be provided, upon request, to the Mine Subsidence Board, the Director of Environmental Sustainability, the Principal Subsidence Engineer, owners/operators of any infrastructure within the application area and any other relevant stakeholders.

End of Panel Report

18 Within 4 months of the completion of each longwall panel, an end of panel report must be submitted to the Director General. The end of panel report must:
   a) include a summary of the subsidence and environmental monitoring results for the applicable longwall panel;
   b) include an analysis of these monitoring results against the relevant;
      - impact assessment criteria;
      - monitoring results from previous panels; and
      - predictions in the SMP;
   c) identify any trends in the monitoring results over the life of the activity; and
   d) describe what actions were taken to ensure adequate management of any potential subsidence impacts due to longwall mining.

Access to Information

19 Within 3 months of the submission of an End of Panel Report (as required by Condition 18) or the approval of a plan, programme or strategy required under this Approval or the SMP (or any subsequent revision of these documents), the Leaseholder must, to the satisfaction of the Director General:

   a) provide a copy of these document/s to all relevant agencies;
   b) ensure that a copy of the relevant documents is made publicly available at the Leaseholder's regional office; and
   c) put a copy of the relevant document/s on the Leaseholder's website.

   Note: *Relevant agencies currently include MSB, OEH, NOW and DP&I.*

Survey Marks

20 At the completion of subsidence, or otherwise as required by the Land and Property Management Authority , the functionality of any survey marks affected by subsidence must be fully restored to the satisfaction of the Land and Property Management Authority.

Water Supply

21 In the event of interruptions to potable water supplies (water quality and/or quantity) due to subsidence impacts on water supply systems and/or sources caused by longwall mining, the Leaseholder must provide, without delay, water supplies of equivalent quality and quantity to locations convenient to those affected within the SMP Application Area until such time that the affected water supply systems and/or sources are restored.

The Singleton Argus CLASSIFIEDS buyandsell
Phone 6572 2611 Fax 6572 2795

PUBLIC NOTICES

COAL & ALLIED
Managed by Rio Tinto Coal Australia

PUBLIC NOTICE

Mount Thorley Warkworth wishes to advise that **CHARLTON ROAD** will be closed on **Monday 14th October and Wednesday 16th October** between the Putty Road intersection and the Cobcroft Road intersection at approximately 12:30pm for the purposes of blasting. Closure is likely to be for 10mins. An alternate route is available via the Putty & Broke Roads. For updated blast times please phone free call 1800 099 669.

Mount Thorley Warkworth apologises for any inconvenience caused. For further information contact the drill & blast engineer at the mine on 6570 1334.

xstrata coal

Ravensworth Open Cut Public Notice

Ravensworth Open Cut wish to advise that **LEMINGTON ROAD** will be closed on **Saturday 12th October, Monday 14th October and Tuesday 15th October 2013** for the purpose of blasting.

The road will be closed South West of the New England Highway along Lemington Rd and is likely to be closed for 15 minutes between 10.00am and 5.00pm depending on Environmental conditions. Roadside signs will display the date and approximate time of the closure.

Ravensworth Open Cut apologise for any inconvenience caused. For further information please contact the Environment & Community Coordinator at the mine on 6570 0700.

PUBLIC NOTICES

COAL & ALLIED
Managed by Rio Tinto Coal Australia

PUBLIC NOTICE

Mount Thorley Warkworth wishes to advise that the **PUTTY ROAD** will be closed on **Monday 14th October and Wednesday 16th October** between the Jerrys Plains Road intersection and the Wallaby Scrub Road Intersection at approximately 1.00pm for the purposes of blasting. Closure is likely to be for 10 minutes. An alternate route is available via the Jerrys Plains Road and the Wallaby Scrub Road. For updated blast times please phone free call 1800 099 669.

Mount Thorley Warkworth apologises for any inconvenience caused. For further information contact the drill and blast engineer at the mine on 6570 1334.

COAL & ALLIED
Managed by Rio Tinto Coal Australia

PUBLIC NOTICE

Mount Thorley Warkworth wishes to advise of the following road closures on **Monday 14th October and Wednesday 16th October** for the purposes of blasting. Closure will occur between 9am and 5pm depending upon environmental conditions and will be for approximately 10 minutes.

These road closures will affect the intersection of Putty Road with Charlton and Wallaby Scrub Roads. Through traffic will not be possible while the intersection is closed.

PUTTY ROAD will be closed between the Jerrys Plains Road (Golden Hwy) and to a point 400m West of Charlton Road.

CHARLTON ROAD will be closed between Putty Road and Cobcroft Road.

WALLABY SCRUB ROAD will be closed between Putty Road and to a point 600m North of Putty Road.

For updated blast times please phone free call 1800 099 669. Mount Thorley Warkworth apologises for any inconvenience caused.

TO LET

CARAVAN, with annex, small rent plus domestic duties suite middle aged non smoking female Phone 0423525792.

Shed to rent in Main Street, Muswellbrook, behind Shell Service Station. Approx. 80 sq mtr, $125p/w. Ring Rodney
0402 063 052

HOUSES AND LAND

ABERDEEN 3 b/r cottage, air, cond, double carport, under cover BBQ area, large shed, fully fenced block. $245,000neg.
No Agents. 0418 445 172

POSITIONS VACANT

Mushroom Composters P/L
LOADER OPERATOR
Casual position
2 days per week
Must have own transport & valid driving license, farming background preferred.
Resumes to:
Production Manager
PO Box 706
Singleton NSW 2330
Tel: 6574 6466
Tue - Fri 8am - 3pm

POSITIONS VACANT

PAINTERS

Well established painting company in the Upper Hunter is looking for tradesman painters.
Own ABN own vehicle
Phone Adam 0447 819 213

ADVERTISERS PLEASE NOTE
Much hardship and difficulty is caused to job-seekers by misleading advertising placed in the employment columns.
Our Positions Vacant columns are reserved for advertisements which carry a **specific** and **genuine** offer of employment.
Ads for 'Business Opportunities', 'Commission Only', training courses and employment services should be submitted under those headings.
Placing misleading ads is an offence against the Trade Practices Act and State/Territory Fair Trading Acts and all advertisements are subject to the publisher's approval. For advice contact the Australian Competition and Consumer Commission or local consumer affairs agency.

Totally Hair Singleton
2 FULLY QUALIFIED SENIOR HAIRDRESSERS
Casual position available for the right applicants.
20 - 30 hrs per week
Email resume to:
totallyhair1@yahoo.com
02 6572 3245

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1st Yr or 2nd Yr APPRENTICE CHEF

Join an award winning team at Emersons Cafe & Restaurant at Lovedale.

Must be dedicated. Please contact 4930 7029 or email resume to: emersons atpokolbin@gmail.com

POSITIONS VACANT

EXPERIENCED FITTER/MECHANIC

Required by professional Upper Hunter Earthmover to undertake workshop reparis and onsite field servicing. Attractive package for the right person. Phone Warren 0427 412 190 or email resume to warren@robbos.net

POSITIONS VACANT

REAL ESTATE TRAINEESHIP

An exciting opportunity has become available for a self motivated individual to join our busy team and undertake a traineeship in Certificate III in Property Services.

This Traineeship is a full time role for 12 months including registered training to meet this qualification.

You will need to have excellent communication skills along with a pleasant phone manner and be competent with Microsoft Office and hold a current drivers license.

Please send your resume to:
The Manager
Ray White Singleton
P O Box 1, SINGLETON NSW 2330
Applications close October 25, 2013

Ray White Singleton

POSITIONS VACANT

Peabody ENERGY

PUBLIC NOTICE
WAMBO COAL MINE

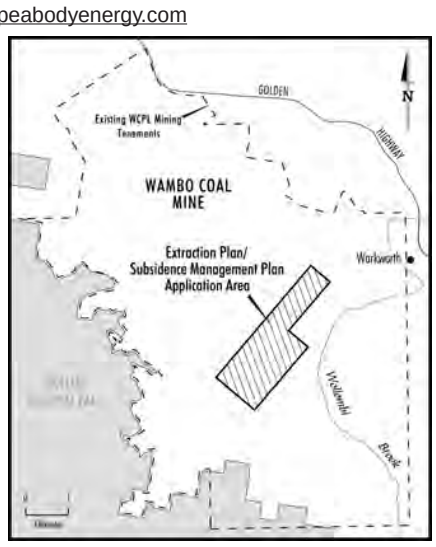
Wambo Coal Pty Ltd (WCPL) (ACN: 000 668 057) owns and operates the Wambo Coal Mine, an open cut and underground mining operation located approximately 15 km west of Singleton in the Hunter Valley, NSW.

WCPL is currently revising the Extraction Plan for the North Wambo Underground Mine at the Wambo Coal Mine. The revised Extraction Plan will include two additional longwalls (Longwalls 9 and 10) to reflect approval of a modification of the Wambo Development Consent DA 305-7-2003 (MOD 13).

The Extraction Plan will be prepared in accordance with the Development Consent DA 305-7-2003 and the *Guidelines for Applications for Subsidence Management Plan Approvals* (NSW Department of Mineral Resources, 2003).

Any parties interested in being consulted in regard to the Extraction Plan should register their interest by **5:00 pm 25 October 2013**. Contact details are as follows:

Troy Favell
Manager Environment and Community
PMB1, Singleton NSW 2330
Phone: (02) 6570 2209
Fax: (02) 6570 2290
Email: tfavell@peabodyenergy.com



POSITIONS VACANT

MICKALA MINING SERVICES MMS

MICKALA MINING SERVICES HAS THE FOLLOWING POSITION AVAILABLE:

• Auto Electrician

Mickala Mining Services (MMS) is a Coal Mining Support Company providing high level expertise and support to the mining industry. MMS prides itself on supplying resources and products of the highest quality.

MMS is seeking an experienced Auto Electrician with high standards to fulfill the above role. Applicants with a positive attitude and willingness to go the extra step are encouraged to apply. Above award wages will be on offer.

Applicants must have current Trades Certificate, drivers license. Experience on heavy mining equipment, lighting plants and generators is desirable.

Applicants are to forward cover letter and resume to:
adminnsw@mickalaservices.com.au
or PO Box 229 Muswellbrook NSW 2333

Ashleigh Thoroughbreds
HORSE PERSON

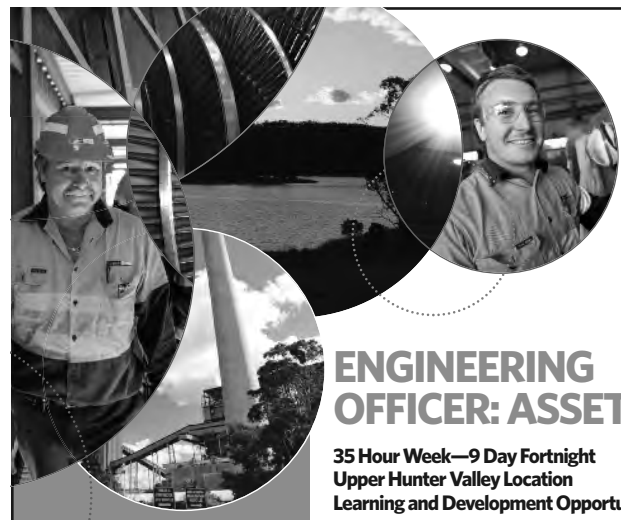
There is a full time position available for an enthusiastic person to specialise in yearling preparation, and to attend the major sales. Attention to detail and a kind way with young horses would be required. As we are a small operation the successful applicant would be able to help with the day to day running of the farm, including handling foals which are taught to lead from birth and mare work etc.

Ashleigh is situated in Parkville on Cressfield Road, which is a fifteen minute drive north of Scone. A modern fully furnished unit is supplied in Scone and will be available in November

Good working conditions and wages apply and the property can be viewed on our website.

Please contact - sengab@bigpond.com
Ph - 0410588200

POSITIONS VACANT



ENGINEERING OFFICER: ASSETS

35 Hour Week—9 Day Fortnight
Upper Hunter Valley Location
Learning and Development Opportunities

Working in a team environment at Bayswater and Liddell Power Stations, you will be a key contributor to driving asset management excellence, for one of Australia's largest producer of electricity.

Developing and implementing asset management strategies across a diverse portfolio of assets, key duties include assessment of plant condition and performance; analysing and developing innovative solutions to issues; development of preventative maintenance routines, scoping technical packages of work; providing specialist technical advice and assisting with upgrades and capital improvements.

To be successful you will have:
- Safety and environment as core values
- A Degree, Diploma or Trade Certificate (with relevant experience) in, Mechanical or Mechatronics Engineering
- A background in asset management and or reliability engineering
- Experience in an industrial, process or manufacturing environment
- Proven analytical and problem-solving skills
- Ability to plan, organise and coordinate
- Working knowledge of Microsoft Office and other information systems including the use of SAP

For further information contact:
Jillian Smith

Telephone:
02 6542 1644

Applications close:
Monday 21 October 2013

To apply:
visit the Careers section of our website
www.macgen.com.au/careers

Powering Our Community

Macquarie Generation

www.macgen.com.au

Building Materials and Suppliers

RECYCLED
Roof tiles, oregon wood, sandstack bricks, bldg stones. Ring IAN **0410 208 677**

FILL ACCEPTED (VENM only)
HOLTS KURNELL
Phone 9923 1645

SANDSTONE WANTED Hammered rock & boulders, tip free. Glenorie Quarry, all types sandstone for sale. 0418 261 676

Furniture and Furnishings

LOUNGE
3 seater, black leather, 1/2 years old. Very good condition. $855 ONO. Ph: 0401 716 583

Garage Sales

ANNUAL SPRING SALE Saturday October 12 from 9am - 3pm. All Saints Church, 85 Ocean St Woollahra. Quality clothes, accessories, children's items, books, and much more. Affordable prices. Refreshments available. Undercover if raining.

SATURDAY, 8AM - 2PM.
Big Sale. Bric-a-Brac.
St. Luke's Presbyterian Church, 28 Lord St. Roseville

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ALWAYS BUYING
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Pre-decimal coins & banknotes, 1966 50c silver rounds,
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AUCTIONS or Outright Sale for Stamps, Coins and Banknotes. Expert advice. Best prices. Absolute integrity.
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BUYING 1966 50c coins. All Australian pre-decimal silver coins, proof & UNC set, gold sovereigns, $200 coins etc. Banknotes, especially pre-decimal, tokens, war medals, badges. Stamps, covers, postcards. Top prices or auction. I.S. Wright 9264 7555
262 Castlereagh St., Sydney

Apartments and Flats to Rent North

CAMMERAY North $600 pw Fully furn & equipped 1 b.r penthouse, entertaining tce. Amazing views. Lease neg.
MOSMAN BAY $1000 pw spectacular city & harbour views, fully furn, 2 BR penthouse apt. 0411 508 070

NEUTRAL BAY 2 bed + study 2 bath, balc, sec. pool superb loc, sec u/c 2 car spc. No Pets/ Smoking $750pw Ph. 9953 1714

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Phone 0413 135 253

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ASHFIELD. Luxurious rooms from $200 p.w. Luxury living at its finest. Ph: 0410 587 497.

Houses East and Inner City

SURRY HILLS $740 PW 25 Ann Street, bright sunny 2 bedroom + attic, renovated + garden, inspect Sat 12 Oct, 11.30 - 12.30. Ph 0412 174 835

Commercial and Industrial Investment Property

PROSPECT INVESTMENT
400 Sqm, leased factory space, clean and tidy, good tenant til 3/15 + option perfect for SMSF
$495,000
Ph Mark 0412 231 940.

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CROWS NEST / Naremburn. Entire semi cottage as offices. 6 rooms. Part of commercial bldg. Parking $499+ p/w 9976 2202

MONA VALE OFFICE
High exposure, pittwater road frontage, 100sqm + 26sqm balcony, kitchen, bathroom and pool, reversible a/c, $850 pw + gst. Ph **0419 423 856**

SHOP FOR RENT Watsons Bay 55 sqm retail space w/ security parking & lock up storage. **$28,600** Neg. **0425 296 627**

Businesses for Sale & Wanted

DENTAL PRACTICE
Rockdale
Call for appointment
Great location
Great Exposure
Brand new fit out
3 dental rooms
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Office

Call us on 0418408216 Or 0418460141

LIQUOR STORE CCoast Established high margin store , growth area, easy operation. Nett profit >$135K. $300K + SAV David 0403153588

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LOWEST prices: plates, leases, cars. Reducible interest rates. 37 years service to the Taxi Industry. Phone Barry on 9221 2053 or 9918 7195 weekends and A.H.

General Auctions

Coastal Auctions
UNIT 4, 6 ENTERPRISE CLOSE
4322 9333
Auction Sunday starts 10.30 am. Deceased Estate collection of Baker light/ Floor radios and Grammer Phones. Approx 300 + old coins. General furniture, white goods, etc. View full listing and photos.
www.coastalantiques.com.au

Administration and Office Support

SYDNEY Fleet Repairs req a
General Manager
to it's Waitara Operation. Panel shop experience essential. This is in autonomous role, reporting directly to the general manager. Auto Quote Experience is an advantage. Negotiable remuneration package, with a fully maintained company car. Please send your resume to
bshelton@sydneyfleetrepairs.com.au

Domestic Service Appointments

HOUSEKEEPER required for busy North Sydney home, regular duties. References req.
Phone 0400 696 233.

Engineering, Manufacturing and Mining

Printer Offset
Experienced tradesperson required for Castle Hill printer to operate late model Komori 5 colour. Off street parking, Attractive salary, 12 hour shifts.

Email julian@lesterprinting.com.au or phone Lester Printing on 9899 4011 or 0418 686 235
mycareer.com.au/9024419

Health Appointments

EN
Private GP practice in Kogarah seeking PT EN who is a highly motivated team player. Computer skills essential as will also be assisting with data entry. Ability to administer medication desired but not essential.

Email one page resume: kristelplatt@hotmail.com

Hospitality

Chef Central Coast
Full time chef @ Gennaros italian restauran, wyong, must have experience in italian cusine as well as ausralian , do long hours or split shift and mus have atleast cerificate 3 in cookery or preferable certificate 4.

Gennaros@outlook.com
mycareer.com.au/9025240

CHEF - PIZZA MAKER
Waiter Person
Experienced, Miranda, NSW
0423 841 531/0420 974 729

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TOMORROW'S LEADERS
Years 11 & 12. English (stand, adv, ext. 1 and 2), Math gen (2, 3, 4 units). business studies Legal studies, Economics, ANC. History, Civics, Chemistry
Years 7 – 10 . math and English. Accelerated math, opp. class and selective school prep.
Ph. 0411 276 411

Trades and Services Positions

AUTOMATIC TRANSMISSION SPECIALIST wanted must be hard working, self motivated, able to work unsupervised, good wage to the right person, no time wasters please. Ph 0421 698 135

BRICKIES LABOURER. Experienced, own transport, ABN, & Long run.
Ph. 0414 767 983.

BRICKLAYERS Parramatta area, must have own transport and be reliable. Top $$$. 0435 818 322

BRICKLAYERS & LABOURERS Needed experience required. Immediate start **0414 686 371**.

BRICKLAYERS and LABOURERS Experienced. Immediate start. Sydney metro. Call Degaulle on 0415 907 161.

LANDSCAPER Tools, ABN, Yute and experience essential. Sydney wide. **0437 809 169**

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TAXI Driver TCS M94 & M90 S/wgn. Plenty bookings, day Dbl factory new car, 1L do 5 kms C/o R'wick Bailee. 0410 686 102

Tenders General

ASPHALT
Machine or hand laid, profiling, roadbase, kerb. Free quotes.
Phone **9416 8455**

Asphalt/Profiling
Hand/machine laid Asphalt, road base. Free quotes.
02 9759 1642

BANKSTOWN CITY COUNCIL

T05-14 Design and Contruction of New Plant Shed
A mandatory site briefing will be held at 217 Bransgrove Road (Kelso Tip), Panania on Wednesday 16 October 2013 at 10am.
T19-14 Replacement of William Street Guard Rail
A mandatory site briefing will be held at the intersection of William Street and Glassop Street on Tuesday 22 October 2013 at 10.30am.
T21-14 Chapel Road Resurfacing
A mandatory site briefing will be held at the intersection of Chapel Road and Irvine Street on Tuesday 15 October 2013 at 10.30 am.
Electronic copies of the tender documents are available free of charge from https://tenders.nsw.gov.au/wsroc/
Tenders close at 2.30pm Tuesday 29 October 2013.
For enquiries please contact David Connelly on 02 9707 9589.

CONTRACTORS Pricing Dalwood House Enabling Works
-Demolition
-Electrical / Data
-Other
Please forward your quotation to **demac@netspace.net.au** or Fax **(02) 9580 1555.**

GOODMAN Property Services (Australia) Pty Ltd are calling for Expressions of Interest from Sydney Water accredited constructors (W2 Accreditation) to undertake **DN450 DICL Watermain Lead In Works** with an approximate length of **2.081kms** in the **Oakdale Area**. Constructors should register by emailing lyn@qalchek.com.au Expressions of Interest close on 21-10-13

LAHEY

SUBCONTRACTORS currently pricing:
★NSW Parliament House Level 9 Additions - Please fwd quotes by Tues 15th Oct.
★Wyong Hospital Urgent Care Centre & Emergency Department Short Stay Unit - Please fwd quotes by Tues 15th Oct.

SUBCONTRACTORS interested in pricing:
★Muswellbrook Hospital ED Redevelopment - Please fwd Expressions of Interests
★Penrith Court House Redevelopment - Please fwd Expressions of Interests

Submit EOI & quotes to:
LAHEY CONSTRUCTIONS
E: **estimating@lahey.com.au**
P: **02 6561 4800**
F: **1800 891 745**
www.laheyconstructions.com.au

apb britco MODULAR BUILDING INNOVATION

Subcontractors Needed
EOI sought from dynamic building companies with the relevant experience to manufacture / assemble steel frame modular buildings at our Western Sydney facility. Please send EOI's to tenders@apb.com.au

Public Notices

CONGRATULATIONS to the Winner of the Up for Grabs Competition, Tania Thompson The competition was conducted by Axcelerator Pty Ltd & WhiteStar Finance Pty Ltd Drawn on the 30th September 2013 at 88 Ricketts Road Mount Waverley Victoria

CITY OF SYDNEY 2030

DEVELOPMENT PROPOSAL
SITE: 91-93, 95-97 and 99-107 Riley Street, Darlinghurst NSW 2010,
APPLICANT: Dr Design (NSW) Pty Ltd
REF NO: D/2012/1557
PROPOSAL: Land and Environment Court Notification.
Notification of amended plans lodged with the Land Environment Court. The amended proposal seeks the amalgamation of separate allotments, demolition of three existing buildings, retention of the faade of one existing building and construction of a mixed use development including basement car parking, ground level commercial uses and residential apartments above. Amendments include reduction in the overall height from 13 to 9 storeys, reduction of the footprint of the Elliptical Tower, reconfiguration of common open space, deletion of the mezzanine level, reduction of basement car parking from three levels to two, reconfigured loading dock and deletion of pedestrian access from Stream Street.
The City of Sydney has received the above development application. As part of our assessment process, we are notifying surrounding neighbours and property owners to seek their views on the proposal.
The application is on public exhibition until 9 November 2013. During this time, you are welcome to make a submission on the proposal. You can view the full application at any of the following locations (although privacy restrictions exist for internal areas of residential buildings):
You can view the application at any of the following locations:
1. Online at the City's website www.cityofsydney.nsw.gov.au under 'Development' - Development Applications - On Exhibition. The website contains all relevant details of the proposal, including plans, which can be downloaded if required, information on how to make a submission is also available. A submission can be made directly from the website.
2. In person at the following centres:
One Stop Shop
Level 3, Town Hall House
456 Kent Street, Sydney
Mon to Fri 8am-6pm
Neighbourhood Service Centre
50-52 Darlinghurst Road, Kings Cross
Mon-Fri; 9am-5pm
Sat; 9am-noon
If you would like to speak directly to a Council planning officer about this development application, you can contact Rebecca Thompson on 9265 9333 or email: dasubmissions@cityofsydney.nsw.gov.au

ZURICH Financial Services Aust Ltd intends after (10) days to issue a special plan document to replace plan number **03355919** in the name of **Guy A Winship.**

Legal Notices
In The Supreme Court of New South Wales Equity Division

NOTICE OF INTENDED DISTRIBUTION OF ESTATE. Any person having any claim upon the Estate of **GORDON DENIS SHANAHAN** (IN THE WILL CALLED DENIS GORDON SHANAHAN) late of Figtree in the State of New South Wales, Retired, who died on 20 April 2013 must send particulars of their claim to the Administrator, William Joseph Shanahan care of PATON HOOKE LAWYERS PTY LIMITED, PO Box 770, Taree, 2430, DX 7010 Taree, within one calendar month from publication of this notice. After that time and after 6 months from the date of death of the deceased the Administrator intends to distribute the property in the Estate having regard only to the claims of which the legal representative had notice at the time of distribution. Letters of Administration with Will Annexed were granted in New South Wales on 3 October 2013.

NOTICE OF INTENDED DISTRIBUTION. ESTATE OF **ALBERT GEORGE TURNER**. NSW GRANT MADE 2 OCTOBER 2013. Any person having any claim upon the estate of **ALBERT GEORGE TURNER** late of Greystanes, in the State of New South Wales who died on 10 July 2013, must send particulars of the claim to the legal representative for the estate at care of Maclarens Lawyers, 232 Merrylands Rd, Merrylands NSW 2160, within 30 days from publication of this notice. After that time and after 6 months from the date of death of the deceased the legal representative intends to distribute the property in the estate having regard only to the claims of which the legal representative had notice at the time of distribution.

NOTICE OF INTENDED DISTRIBUTION. ESTATE OF **WILLIAM JAMES ROBSON-PEARCE**. NSW GRANT MADE 01/10/2013. Any person having any claim upon the estate of **WILLIAM JAMES ROBSON-PEARCE**, late of Rouchel who died on 18/02/2013 must send particulars of the claim to the legal representative, NSW Trustee and Guardian, at the address appearing below, within 30 days from publication of this notice. After that time (and after 6 months from the date of death of the deceased) NSW Trustee and Guardian intends to distribute the property in the estate having regard only to the claims of which NSW Trustee and Guardian had notice at the time of distribution. NSW Trustee and Guardian 158 King Street, Newcastle NSW 2300.

NOTICE OF INTENDED DISTRIBUTION OF ESTATE. Any person having any claim upon the Estate of **LAURENCE SYDNEY BRADEY** late of Riverwood, who died between 16 May 2013 and 18 May 2013 must send particulars of their claim to the Executors, Susan Louise Morgan and Megan Jane Howell c/- of WARREN & WARREN Solicitors, PO Box 749, Riverwood, NSW, 2210, Telephone: 9533 3966, Ref: FP:13157 within one calendar month from publication of this notice. After that time the Executors may distribute the assets of the Estate having regard only to the claims of which at the time of distribution they have notice. Probate was granted in New South Wales on 25 September 2013.

HERALD CLASSIFIEDS

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Public Notices

PUBLIC NOTICE
WAMBO COAL MINE

Peabody ENERGY

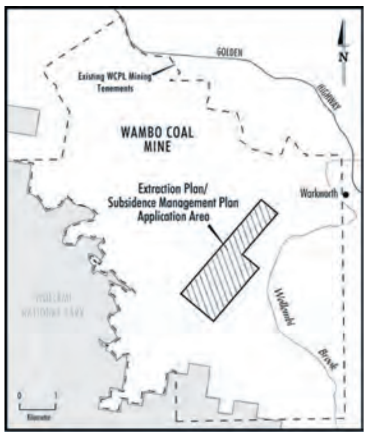
Wambo Coal Pty Ltd (WCPL) (ACN: 000 668 057) owns and operates the Wambo Coal Mine, an open cut and underground mining operation located approximately 15 km west of Singleton in the Hunter Valley, NSW.

WCPL is currently revising the Extraction Plan for the North Wambo Underground Mine at the Wambo Coal Mine. The revised Extraction Plan will include two additional longwalls (Longwalls 9 and 10) to reflect approval of a modification of the Wambo Development Consent DA 305-7-2003 (MOD 13).

The Extraction Plan will be prepared in accordance with the Development Consent DA 305-7-2003 and the *Guidelines for Applications for Subsidence Management Plan Approvals* (NSW Department of Mineral Resources, 2003).

Any parties interested in being consulted in regard to the Extraction Plan should register their interest by **5:00 pm 25 October 2013**. Contact details are as follows:

Troy Favell
Manager Environment and Community
PMB1, Singleton NSW 2330
Phone: (02) 6570 2209
Fax: (02) 6570 2290
Email: tfavell@peabodyenergy.com



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OFFICIAL RESULTS
$2 Jackpot Lottery Draw 9852

1st Prize of $100,000 – N° 191011
2nd Prize of $10,000 – N° 117185
3rd Prize of $5,000 – N° 154397

The Jackpot prize of $5,330,000 was not won by ticket Nº 027979

Jackpot now stands at $5,435,000 in $2 Jackpot Lottery Draw 9853

$5 Jackpot Lottery Draw 935

1st Prize of $200,000 – N° 026345
2nd Prize of $20,000 – N° 099934
3rd Prize of $5,000 – N° 170288

The Jackpot prize of $25,440,000 was not won by ticket Nº 128920

Jackpot now stands at $25,675,000 in $5 Jackpot Lottery Draw 936

OFFICIAL RESULTS
Wednesday 9 October 2013
Draw 3285

Monday & Wednesday Lotto

Prize Winning Numbers
34 10 22 31 16 28

Supplementaries
37 44

Div	Prize Pool	Winners	Prize Value
1	$1,000,000.00	2	$1,000,000.00
2	$45,275.25	15	$3,018.35
3	$70,429.80	246	$286.30
4	$196,348.80	8,688	$22.60
5	$271,546.60	19,123	$14.20
6	$422,153.50	36,709	$11.50

DIVISION 1: 1 x VIC, 1 x SA WINNING ENTRIES

Lotto Strike Draw 3779 Winning Numbers in order drawn
34 10 22 31

WEDNESDAY LOTTO $1 MILLION
Guaranteed for up to 2 Winners

Prize details subject to relevant Games Rules.
Official Results Hotline: 1900 956 886
(call charged 55 cents per minute. Mobile/pay phones extra).
SMS Results Service: Text "Wednesday Lotto" to 1975 6886
(sms costs 75c per message).
SMS provided by Be. Interactive. Helpdesk 1800 653 344.
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NSW Lotteries

Development Assessment Systems and Approvals
Mining and Industry Projects
Tel: (02) 9228 6587
Fax: (02) 9228 6466
Email: paul.freeman@planning.nsw.gov.au
23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

Mr Troy Favell
Environment and Community Manager
Wambo Coal Pty Limited
PMB 1
SINGLETON NSW 2330

Dear Mr Favell

Wambo Coal Mine (DA 305-7-2003)
Longwalls 9 & 10 Extraction Plan

I refer to your letters dated 30 August 2013, requesting the Director-General's approval of experts to prepare the Extraction Plan for Longwalls 9 and 10, and approval to not undertake an independent environmental audit, required under conditions 22C and 37 of schedule 4 of the consent for the mine respectively.

The Department has reviewed the information you have provided and considers that the recommended experts are suitably qualified and experienced to prepare the Extraction Plan. The Director-General has accordingly approved the following personnel to prepare the plan:

- Mr Joshua Hunt (Resource Strategies) – Extraction Plan preparation;
- Mr Arthur Waddington (Mine Subsidence Engineering Consultants) – Subsidence;
- Mr Lindsay Gilbert (Gilbert & Associates) – Surface Water;
- Dr Noel Merrick (HydroSimulations) – Groundwater;
- Ms Gillian Goode and Mr Darrell Rigby (RPS Australia) – Aboriginal cultural heritage; and
- Mr James Gleeson (Resource Strategies) Flora and Fauna.

Regarding the independent audit required prior to the approval of the Extraction Plan, the Department notes that much of the work required for the audit would be undertaken in preparing the Extraction Plan. It also notes that an independent environmental audit of the mine is due to be undertaken in June 2014. The Director-General concurs with the company's approach to this matter, and has approved the proposal to not undertake the audit for this Extraction Plan.

If you wish to discuss the matter further, please contact Paul Freeman.

Yours sincerely

Howard Reed 25·10·13
Howard Reed
Manager, Mining Projects
as the Director-General's nominee

WAMBO COAL PTY LTD

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259 Queen Street
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Fax + 61 (0) 2 6570 2290

18 December 2013

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Mr Howard Reed, Manager Mining, Major Development Assessment

also via email: Howard.Reed@planning.nsw.gov.au

Dear Howard,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – HERITAGE MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on heritage sites and values, in consultation with the NSW Office of Environment and Heritage, the Heritage Branch, and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

The Heritage Management Plan for Longwalls 7 to 10 is a revision of the Heritage Management Plan which was prepared for Longwalls 7 and 8, and which was previously provided for review by the Department of Planning and Infrastructure on 5 November 2012 and 18 December 2012.

Please find enclosed the draft Heritage Management Plan that has been provided for consultation to the Office of Environment and Heritage and the Heritage Branch. Copies of this correspondence are enclosed for your records.

The Heritage Management Plan includes the following existing approved programmes/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Programme which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

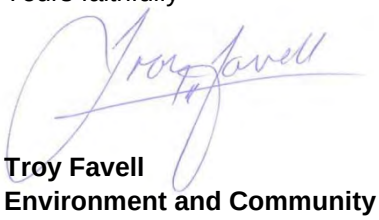
The Wambo Coal Mine Salvage and Management Programme was prepared in consultation with the relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

The initial application made under section 60 of the *Heritage Act, 1977* went on public exhibition and was subject to review by non-Aboriginal stakeholders in July 2012, to allow for the mining of Longwalls 7 and 8. A second application under section 60 of the *Heritage Act, 1997* was made in April 2013 to allow for undergrounding mining of Longwalls 9 and 10.

WCPL has kindly requested the Office of Environment and Heritage and the Heritage Branch provide any comments on the draft Heritage Management Plan by the 17 January 2014. WCPL will provide the Department of Planning and Infrastructure with the outcomes of any consultation with these agencies with the final Heritage Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning and Infrastructure on the draft Heritage Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully



Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (3)

WAMBO COAL PTY LTD

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18 December 2013

Office of Environment and Heritage
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

Attention: Mr Richard Bath, Head Hunter Planning Unit, Conservation and Regulation, North East

also via email: info@environment.nsw.gov.au

Dear Mr Bath,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – HERITAGE MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

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The initial application made under section 60 of the *Heritage Act, 1977* went on public exhibition and was subject to review by non-Aboriginal stakeholders in July 2012, to allow for the mining of Longwalls 7 and 8. A second application under section 60 of the *Heritage Act, 1997* was made in April 2013 to allow for undergrounding mining of Longwalls 9 and 10.

WCPL would be happy to meet with the Office of Environment and Heritage to present the approach we have taken to the Heritage Management Plan. Could you please advise a date and time that would be suitable to the Office of Environment and Heritage, at your earliest continence.

WCPL would appreciate if you would kindly provide any comments on the Heritage Management Plan to us by the 17 January 2014. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

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18 December 2013

Heritage Branch
Office of Environment and Heritage
Department of Premier and Cabinet
Locked Bag 5020
Parramatta NSW 2124

Attention: Vincent Sicari, Manager, Conservation Team

also via email: Vincent.Sicari@heritage.nsw.gov.au

Dear Mr Sicari,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – HERITAGE MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

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Please find enclosed the revised Heritage Management Plan that has been provided for the Heritage Branch's review and comment.

The Heritage Management Plan includes the following existing approved programmes/plans:

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The Wambo Coal Mine Salvage and Management Programme was prepared in consultation with the relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

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WCPL would be happy to meet with the Heritage Branch to present the approach we have taken to the Heritage Management Plan. Could you please advise a date and time that would be suitable to the Heritage Branch, at your earliest continence.

WCPL would appreciate if you would kindly provide any comments on the Heritage Management Plan to us by the 17 January 2014. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Siobhan Lavelle, Heritage Branch, Office of Environment and Heritage, via email: Siobhan.Lavelle@heritage.nsw.gov.au

Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

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18 December 2013

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Mr Howard Reed, Manager Mining, Major Development Assessment

also via email: Howard.Reed@planning.nsw.gov.au

Dear Howard,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – BIODIVERSITY MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on flora and fauna, in consultation with the NSW Office of Environment and Heritage.

The Biodiversity Management Plan for Longwalls 7 to 10 is a revision of the Biodiversity Management Plan which was prepared for Longwalls 7 and 8, and which was previously provided for review by the Department of Planning and Infrastructure on 1 November 2012 and 18 December 2012.

Please find enclosed the draft Biodiversity Management Plan that has been provided for consultation to the Office of Environment and Heritage. A copy of this correspondence is enclosed for your records.

The Biodiversity Management Plan includes the existing Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL has kindly requested the Office of Environment and Heritage provide any comments on the draft Biodiversity Management Plan by the 17 January 2014. WCPL will provide the Department of Planning and Infrastructure with the outcomes of any consultation with these agencies with the final Biodiversity Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning and Infrastructure on the draft Biodiversity Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (2)

WAMBO COAL PTY LTD

ABN: 13 000 668 057

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18 December 2013

Office of Environment and Heritage
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

Attention: Mr Richard Bath, Head Hunter Planning Unit, Conservation and Regulation, North East

also via email: info@environment.nsw.gov.au

Dear Mr Bath,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – BIODIVERSITY MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on flora and fauna, in consultation with the NSW Office of Environment and Heritage.

The Biodiversity Management Plan for Longwalls 7 to 10 is a revision of the Biodiversity Management Plan which was prepared for Longwalls 7 and 8, and which was previously provided for review by the Office of Environment and Heritage on 1 November 2012 and 18 December 2012.

Please find enclosed the revised Biodiversity Management Plan that has been provided for the Office of Environment and Heritage's review and comment.

The Biodiversity Management Plan includes the existing Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL would be happy to meet with the Office of Environment and Heritage to present the approach we have taken to the Biodiversity Management Plan. Could you please advise a date and time that would be suitable to the Office of Environment and Heritage, at your earliest continence.

WCPL would appreciate if you would kindly provide any comments on the Biodiversity Management Plan to us by the 17 January 2014. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

ABN: 13 000 668 057

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259 Queen Street
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10 January 2014

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Mr Howard Reed, Manager Mining, Major Development Assessment

also via email: Howard.Reed@planning.nsw.gov.au

Dear Howard,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – WATER MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

As you are aware, Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Water Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on surface water resources, groundwater resources and flooding, in consultation with the NSW Office of Water and the Environment Protection Authority.

Please find enclosed the draft Water Management Plan that has been provided for consultation to the NSW Office of Water and the Environment Protection Authority. A copy of this correspondence is enclosed for your records.

The Water Management Plan for Longwalls 7 to 10 is a revision of the Water Management Plan which was prepared for Longwalls 7 and 8, and which was previously provided for review by the Department of Planning and Infrastructure on 6 November 2012 and 18 December 2012.

The Water Management Plan includes the following existing approved programs/plans:

- The Surface Water Monitoring Program which was prepared in accordance with Condition 30(d) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Groundwater Monitoring Program which was prepared in accordance with Condition 30(e) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Surface and Groundwater Response Plan which was prepared in accordance with Condition 30(f) of Schedule 4 of the Development Consent (DA 305-7-2003).

The Water Management Plan also includes a revision of the North Wambo Creek Subsidence Response Strategy, which comprises part of the Surface and Groundwater Response Plan, to incorporate Longwalls 9 and 10.

WCPL has kindly requested the NSW Office of Water and the Environment Protection Authority provide any comments on the draft Water Management Plan by the 24 January 2014. WCPL will provide the Department of Planning and Infrastructure with the outcomes of any consultation with these agencies with the final Water Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning and Infrastructure on the draft Water Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (3)

WAMBO COAL PTY LTD

ABN: 13 000 668 057

Level 13, BOQ Centre
259 Queen Street
Brisbane, Queensland 4000
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Singleton, NSW 2330
Australia
Tel + 61 (0) 2 6570 2200
Fax + 61 (0) 2 6570 2290

10 January 2014

NSW Office of Water
PO Box 3720
Parramatta NSW 2124

Attention: Mr Mitchell Isaacs, Manager Strategic Stakeholder Liaison

also via email: mitchell.isaacs@water.nsw.gov.au

Dear Mr Isaacs,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – WATER MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Water Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on surface water resources, groundwater resources and flooding, in consultation with the NSW Office of Water.

Please find enclosed the revised Water Management Plan that has been provided for the Office of Water's review and comment.

The Water Management Plan for Longwalls 7 to 10 is a revision of the Water Management Plan which was prepared for Longwalls 7 and 8, and which was previously provided for review by the Office of Water on 6 November 2012.

The Water Management Plan includes the following existing approved programs/plans:

- The Surface Water Monitoring Program which was prepared in accordance with Condition 30(d) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Groundwater Monitoring Program which was prepared in accordance with Condition 30(e) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Surface and Groundwater Response Plan which was prepared in accordance with Condition 30(f) of Schedule 4 of the Development Consent (DA 305-7-2003).

The Water Management Plan also includes a revision of the North Wambo Creek Subsidence Response Strategy, which comprises part of the Surface and Groundwater Response Plan, to incorporate Longwalls 9 and 10.

WCPL would be happy to meet with the Office of Water to present the approach we have taken to the Water Management Plan. Could you please advise a date and time that would be suitable to the Office of Water, at your earliest convenience.

WCPL would appreciate if you would kindly provide any comments on the Water Management Plan to us by 24 January 2014. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

ABN: 13 000 668 057

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259 Queen Street
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10 January 2014

Environment Protection Authority
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

also via email: info@environment.nsw.gov.au

Attention: Mr Bill George, Senior Regional Operations Officer

Dear Mr George,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – WATER MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the recent North Wambo Underground Mine Modification (Modification 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Water Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on surface water resources, groundwater resources and flooding, in consultation with the Environment Protection Authority.

Please find enclosed the revised Water Management Plan that has been provided for the Environment Protection Authority's review and comment.

The Water Management Plan for Longwalls 7 to 10 is a revision of the Water Management Plan which was prepared for Longwalls 7 and 8, and which was previously provided for review by the Environment Protection Authority on 6 November 2012.

The Water Management Plan includes the following existing approved programs/plans:

- The Surface Water Monitoring Program which was prepared in accordance with Condition 30(d) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Groundwater Monitoring Program which was prepared in accordance with Condition 30(e) of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Surface and Groundwater Response Plan which was prepared in accordance with Condition 30(f) of Schedule 4 of the Development Consent (DA 305-7-2003).

The Water Management Plan also includes a revision of the North Wambo Creek Subsidence Response Strategy, which comprises part of the Surface and Groundwater Response Plan, to incorporate Longwalls 9 and 10.

WCPL would be happy to meet with the Environment Protection Authority to present the approach we have taken to the Water Management Plan. Could you please advise a date and time that would be suitable to the Environment Protection Authority, at your earliest convenience.

WCPL would appreciate if you would kindly provide any comments on the Water Management Plan to us by 24 January 2014. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Infrastructure for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure

WAMBO COAL PTY LTD

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18 December 2013

Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Attention: Mr David Kitto, Director, Major Project Assessment

also via email: David.Kitto@planning.nsw.gov.au

Dear David,

RE: NORTH WAMBO UNDERGROUND MINE – CHANGE IN TAKE-OFF POINTS FOR LONGWALLS 9 AND 10

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved via the recent North Wambo Underground Mine Modification (DA 305-7-2003 MOD 13) on 8 July 2013.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include the recently approved Longwalls 9 and 10 (Extraction Plan for Longwalls 7 to 10).

Following further geotechnical and mine planning investigations, WCPL has determined that the take-off points of Longwalls 9 and 10 can be moved closer to the main headings. This would extend the length of Longwalls 9 and 10 by 47.5 metres and 62.7 metres, respectively, and result in the recovery of additional coal without increasing the overall footprint of the development. Compared to the length of Longwalls 9 and 10 shown in the North Wambo Underground Mine Modification (1,701 m) this represents an increase in the length of Longwalls 9 and 10 by 2.8% and 3.7%, respectively, and an increase of less than 0.4% of the total length of longwalls at the North Wambo Underground Mine.

Enclosure 1 provides the layout of Longwalls 9 and 10 presented in the North Wambo Underground Mine Modification, and Enclosure 2 provides the layout of Longwalls 9 and 10 that is proposed to be presented in the Extraction Plan for Longwalls 7 to 10.

Due to the minor nature of the extension of the extracted area it is anticipated that there will be no additional impacts beyond those already approved in the recent Modification (DA 305-7-2003 MOD 13). WCPL therefore considers the proposed longwall layout would be generally in accordance with the Development Consent (DA 305-7-2003), as described further below.

WCPL is proposing to prepare the Extraction Plan for Longwalls 7 to 10 on the basis of the proposed layout of Longwalls 9 and 10. The Extraction Plan would include a detailed Subsidence Assessment and review of potential environmental consequences.

Consideration of Proposed Longwall Layout

A multi-disciplinary risk assessment workshop was conducted for the Extraction Plan for Longwalls 7 to 10. As part of the workshop, the proposed change to the layout of Longwalls 9 and 10 was specifically considered. The risk assessment concluded there would be no additional risk associated with the proposed layout beyond that already approved for the Wambo Coal Mine (Table 1).

Table 1
Comparison of Approved Impacts and Revised Impacts for Longwalls 9 and 10

Feature/Environmental Aspect	Approved Impacts	Potential Impacts Associated with Revised Longwalls 9 and 10 Layout[1]
Wambo Homestead Complex	No measureable subsidence from the Longwalls 9 and 10 in the curtilage of the Wambo Homestead Complex is predicted, and therefore no impact on heritage values would occur as a result of Longwalls 9 and 10.	No change. The main headings for Longwalls 9 and 10 would remain stable and non-subsiding. There would be no measurable subsidence from Longwalls 9 and 10 in the curtilage of the Wambo Homestead Complex.
North Wambo Creek and Associated Alluvium	North Wambo Creek and its associated alluvium are located outside the extent of Longwalls 9 and 10. This creek is not expected to experience any measurable tilts, curvatures or strains resulting from the extraction of Longwalls 9 and 10.	No change. North Wambo Creek and its associated alluvium would remain outside the 20 mm subsidence contour for the proposed layout of Longwalls 9 and 10.
Wollombi Brook	Wollombi Brook is located outside the extent of subsidence from Longwalls 9 and 10. Wollombi Brook is not expected to experience any measurable tilts, curvatures or strains.	No change. The mining of longwall panels will continue to be constrained by the subsidence exclusion zone limited to an angle of 26.5^{o} from the vertical to a 40 meter buffer from the Wollombi Brook high bank.
Aboriginal Cultural Heritage	Incremental subsidence from the Modification would result in a negligible to low additional risk to Aboriginal cultural heritage sites.	No change. No additional Aboriginal heritage sites would be potentially impacted by the proposed layout of Longwalls 9 and 10. Consent 2222 (which authorises the destruction of objects in the course of archaeological salvage) would continue to apply for the Longwalls 7 to 10 Application Area. Subsidence monitoring would continue.

[1] Mitigation measures, management and monitoring proposed for the recent Modification (DA 305-7-2003 MOD 13) would continue to apply for the revised layout of Longwalls 9 and 10.

In addition, WCPL considers the proposed layout of **Longwalls 9 and 10 can meet the subsidence impact performance measures** in Tables 14A and 14B of the Development Consent.

In consideration of the Wambo Coal Mine development as a whole, WCPL considers the minor extension of the extracted area of Longwalls 9 and 10 towards the currently approved main headings would remain generally in accordance with the Development Consent as Longwalls 9 and 10 would remain wholly within the approved footprint (i.e. no change in the location of first workings).

WCPL kindly requests the confirmation of the Department of Planning and Infrastructure that the proposed layout of Longwalls 9 and 10 would be generally in accordance with the Development Consent (DA 305-7-2003).

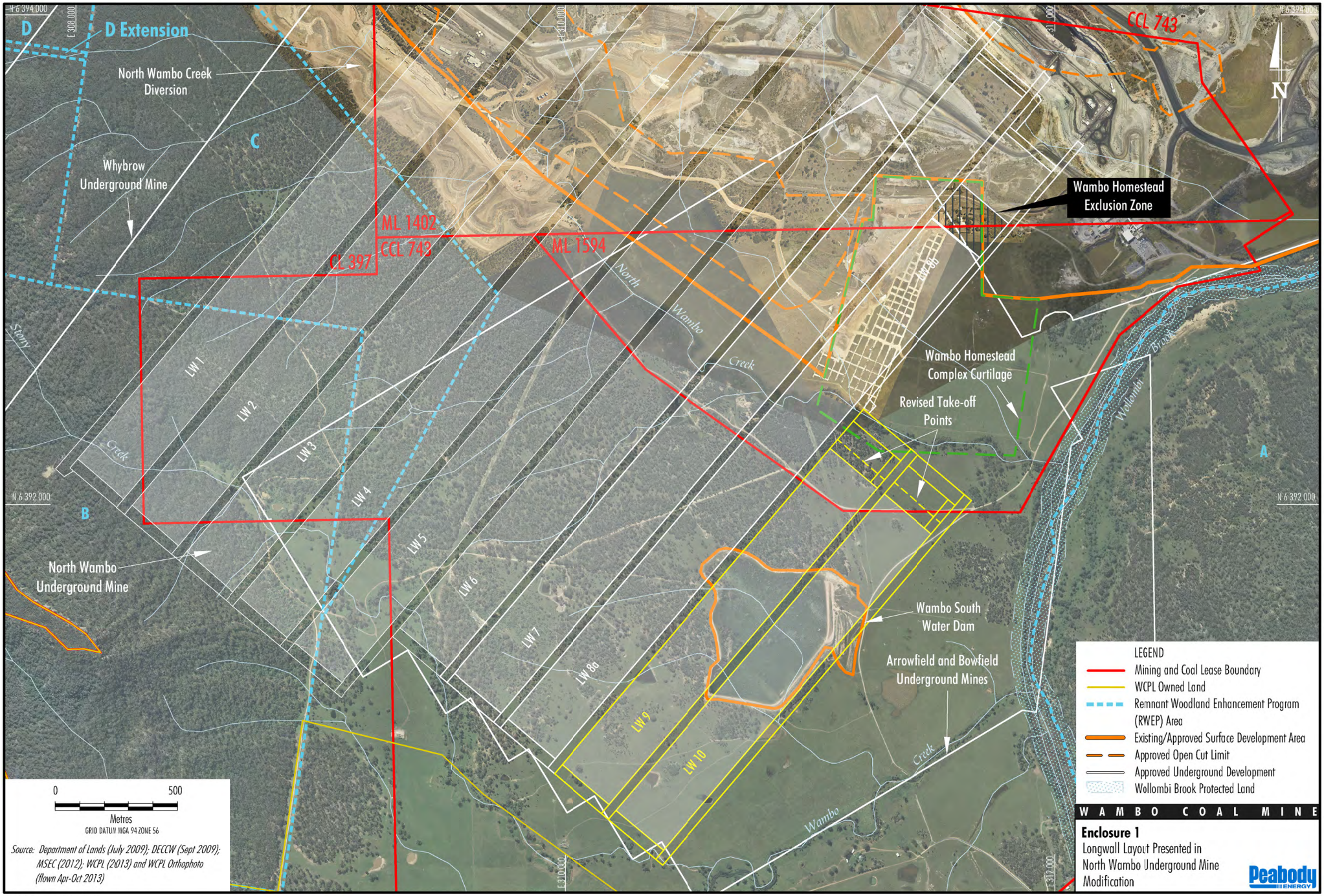
Please do not hesitate to contact the undersigned should you have any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (2)

cc: Mr Howard Reed, Manager Mining Project, Major Development Assessments, Department of Planning & Infrastructure



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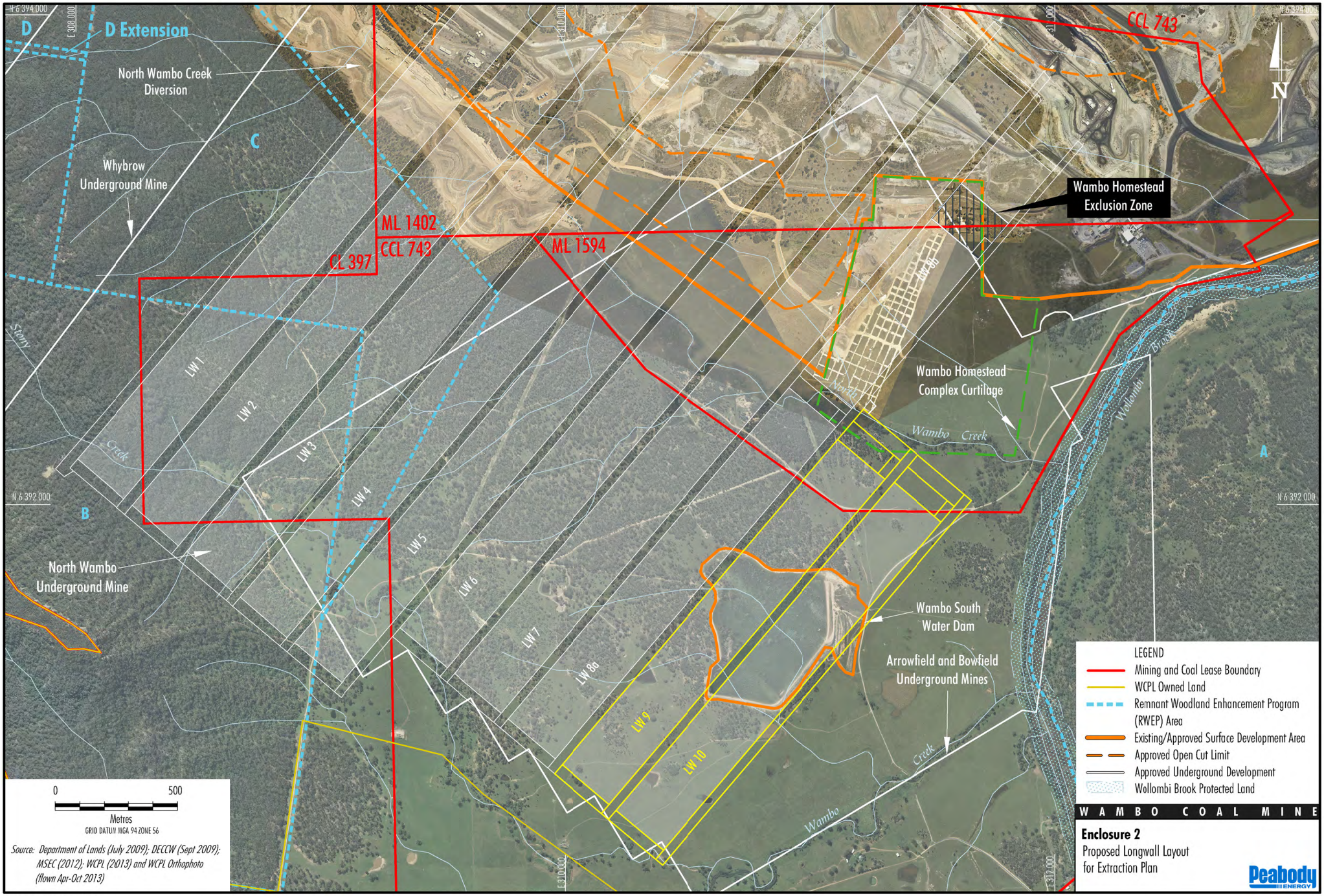

WAM-09-15_LetterDP&I_101A

Development Assessment Systems and Approvals
Mining Projects

Contact: Paul Freeman
Phone: 9228 6587
Fax: 9228 6466
Email: paul.freeman@planning.nsw.gov.au

Our ref: 10/16005

Mr Troy Favell
Environment and Community Manager
Wambo Coal Pty Limited
PMB 1
SINGLETON NSW 2330

Dear Mr Favell

North Wambo Underground Mine
Longwalls 9 & 10

I refer to your letter dated 18 December 2013, describing proposed extensions to longwalls 9 and 10 at the North Wambo Underground Mine, and asking whether these changes can be considered to be "generally in accordance" with the consent for the mine (DA 305-7-2003).

The Department has reviewed the information you have provided, noting that:

- the proposed extensions are of a minor nature;
- the proposed extensions are wholly within the approved mining footprint;
- the resulting impacts are unlikely to change over those approved under the consent; and
- the changes would be appropriately addressed in the revised LW 7-10 Extraction Plan.

On this basis, the Department accepts that the proposed changes to longwalls 9 and 10 are generally in accordance with DA 305-7-2003.

If you wish to discuss this matter further, please contact Paul Freeman.

Yours sincerely

Howard Reed 13-1-14

Howard Reed
Manager, Mining Projects
As the Director-General's nominee

NSW GOVERNMENT | Office of Environment & Heritage

Your reference: DA 305-7-2003
Our reference: DOC13/96239; FIL12/7057-02
Contact: Robert Gibson, 0418 790 099

Mr Troy Favell
Environment and Community Manager
Wambo Coal Pty Ltd
PMB 1
SINGLETON NSW 2330

Dear Mr Favell

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 – BIODIVERSITY MANAGEMENT PLAN (DA 305-7-2003 MOD 13)

Thank you for forwarding the above plan for our records. The Office of Environment and Heritage (OEH) encourages the development of such plans to ensure that proponents have determined how they will meet their statutory obligations and designated environmental objectives. We do not approve or endorse these documents as our role is to set environmental objectives for environmental/conservation management, not to be directly involved in the development of strategies to achieve those objectives, however, the following comments are provided for your consideration:

OEH notes that the biodiversity performance measures are based strongly on the predicted scale and nature of subsidence which are then assumed to have 'negligible environmental consequences' (Table 14A in approval DA 305-7-2003 MOD13). However, the way in which biological data is being collected, by observation rather than repeatable measurements and without the application of appropriate statistical analysis, suggests it will be very difficult, if not impossible, to measure any changes to endangered ecological communities caused by mine subsidence from Longwalls 7 to 10 unless and until any harm has already occurred. OEH notes that previous longwall mining of the North Wambo Underground Mine has created surface cracks (e.g. Plates 11 to 14 inclusive in the report by FloraSearch (2011) titled 'Montrose East Underground Modification – Flora Assessment') and was also predicted to cause ponding. Surface cracks and ponding can change drainage and soil moisture conditions, and this is likely to prevent some local species from recruiting (such as by reducing the duration or extent that the soil is wet that would otherwise trigger germination events); they can also kill existing plants (by waterlogging). This is one reason why 'Alteration of habitat following subsidence due to longwall mining' was listed as a Key Threatening Process under Schedule 3 of the *Threatened Species Conservation Act 1995*. Contrary to some statements in the Biodiversity Management Plan there are several places in the local area where native vegetation, including at least one endangered ecological community, have been harmed by the effects of mine subsidence; such as near Barnsley, Crangan Bay and Halekulani.

In addition, OEH is concerned that the proposed casual observations and periodic photography of cliff lines in the adjacent Wollemi National Park alone will not be able to detect any cliff line movement before any obvious cliff or rock falls, or tree deaths occur. OEH therefore recommends that Wambo Coal Pty Ltd considers the inclusion of regular and repeated measurements at appropriate locations in the monitoring programme.

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In summary OEH recommends that Wambo Coal Pty Ltd includes the collection of measurements as part of the monitoring program for the Biodiversity Management Plan for Longwalls 7 to 10; such as vegetation structure and composition data collected in quadrats in line with what is being done in the Remnant Woodland Enhancement Program (RWEP) areas. OEH further recommends that this data is analysed by appropriate statistical analysis in order to better enable the early identification of trends to be detected. This would enable adaptive management to be employed which could ensure that funds are most effectively spent to meet the objectives of the Biodiversity Management Plan for this project.

Please note that OEH is preparing a separate response on the Heritage Management Plan for this project that will be sent to you shortly.

If you require any further information regarding this matter please contact Robert Gibson, Regional Biodiversity Conservation Officer in this office on 0418 479 099.

Yours sincerely

A Killick 17 JAN 2014

ANNE KILLICK
A/Senior Team Leader Planning, Hunter Central Coast Region
Regional Operations

NSW GOVERNMENT | Office of Environment & Heritage

Your reference: HMP North Wambo Underground Mine Longwalls 7-10.
Our reference: DOC13 96232; FIL12/7057-02.
Contact: Nicole Davis, 4908 6825

Mr Troy Favell
Environmental and Community Manager
WAMBO COAL PTY LTD
PMB
SINGLETON NSW 2330

Dear Mr Favell

REVIEW OF WAMBO COAL PTY LTD, NORTH WAMBO UNDERGROUND MINE LONGWALLS 7 TO 10 - HERITAGE MANAGEMENT PLAN (DA 305-7-2003, MODIFICATION 13 – 8 JULY 2013)

Thank you for your correspondence to the Office of Environment and Heritage (OEH) on the 18 December 2013 regarding the preparation of the revised Heritage Management Plan for Wambo Coal Pty Ltd, North Wambo Underground Mine Longwalls 7 to 10, December 2013 (DA 305-7-2003, Modification 13, dated 8 July 2013).

Heritage Management Plans provide a useful tool for companies such as Wambo Coal Pty Ltd to use to help ensure that they meet the statutory requirements and that the management strategies for the protection of Aboriginal cultural heritage are clearly identified. OEH has reviewed the revised Heritage Management Plan' for 'North Wambo Underground Mine Longwalls 7 to 10' and is satisfied that the management measures proposed are adequate and appropriate given the nature of the archaeological record and the range of activities to be undertaken within operational footprint the North Wambo Underground Mine Longwalls 7 to 10.

If you require any further information regarding this matter please contact Nicole Davis, Archaeologist, on 4908 6825.

Yours sincerely

20 JAN 2014

RICHARD BATH
Senior Team Leader Planning, Hunter Central Coast Region
Regional Operations

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11 March 2015

Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

also via email: Mike.Young@planning.nsw.gov.au

Attention: Mr Mike Young, Manager Mining, Major Development Assessment

Dear Mr Young

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 8 to 10A – HERITAGE MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the North Wambo Underground Mine Modification (Modification 13) on 8 July 2013. Subsequently, the North Wambo Underground Mine Longwall 10A Modification (Modification 14) was lodged on 4 September 2014 to include an additional longwall (Longwall 10A). This application is pending a determination by the Department of Planning and Environment.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include Longwall 10A (Extraction Plan for Longwalls 8 to 10A), pending the approval of the North Wambo Underground Mine Longwall 10A Modification.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 8 to 10A on heritage sites and values, in consultation with the NSW Office of Environment and Heritage, the Heritage Branch, and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

The Heritage Management Plan for Longwalls 8 to 10A is a revision of the Heritage Management Plan which was prepared for Longwalls 7 to 10, and which was previously provided for review to the Department of Planning and Environment on 5 December 2013.

Please find enclosed the draft Heritage Management Plan that has been provided for consultation to the Office of Environment and Heritage and the Heritage Branch. Copies of this correspondence are enclosed for your records.

The Heritage Management Plan includes the following existing approved programs/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Programme which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

The Wambo Coal Mine Salvage and Management Program was prepared in consultation with the relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

The initial application made under section 60 of the *Heritage Act, 1977* went on public exhibition and was subject to review by stakeholders in July 2012, to allow for the mining of Longwalls 7 and 8. A second application under section 60 of the *Heritage Act, 1997* was made in April 2013 to allow for undergrounding mining of Longwalls 9 and 10. Longwall 10A (and its associated subsidence exclusion zone) is located entirely outside of the extent of the Wambo Homestead curtilage. Therefore, no application under section 60 of the *Heritage Act, 1997* will be made for Longwall 10A.

WCPL has kindly requested the Office of Environment and Heritage and the Heritage Branch provide any comments on the draft Heritage Management Plan by 8 April 2015. WCPL will provide the Department of Planning and Environment with the outcomes of any consultation with these agencies with the final Heritage Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning and Environment on the draft Heritage Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (3)

WAMBO COAL PTY LTD

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11 March 2015

Office of Environment and Heritage
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

Attention: Mr Richard Bath, Head Hunter Planning Unit, Conservation and Regulation, North East

also via email: Richard.Bath@environment.nsw.gov.au

Dear Mr Bath,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 8 TO 10A – HERITAGE MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the North Wambo Underground Mine Modification (Modification 13) on 8 July 2013. Subsequently, the North Wambo Underground Mine Longwall 10A Modification (Modification 14) was lodged on 4 September 2014 to include an additional longwall (Longwall 10A). This application is pending a determination by the Department of Planning and Environment.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include Longwall 10A (Extraction Plan for Longwalls 8 to 10A), pending the approval of the North Wambo Underground Mine Longwall 10A Modification.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 7 to 10 on heritage sites and values, in consultation with the NSW Office of Environment and Heritage, the Heritage Branch, and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

The Heritage Management Plan for Longwalls 8 to 10A is a revision of the Heritage Management Plan which was prepared for Longwalls 7 to 10, and which was previously provided for review to the Office of Environment and Heritage on 5 December 2013.

Please find enclosed the revised Heritage Management Plan that has been provided for the Office of Environment and Heritage's review and comment.

The Heritage Management Plan includes the following existing approved programmes/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Programme which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

The Wambo Coal Mine Salvage and Management Programme was prepared in consultation with the relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

The initial application made under section 60 of the *Heritage Act, 1977* went on public exhibition and was subject to review by stakeholders in July 2012, to allow for the mining of Longwalls 7 and 8. A second application under section 60 of the *Heritage Act, 1997* was made in April 2013 to allow for undergrounding mining of Longwalls 9 and 10. Longwall 10A (and its associated subsidence exclusion zone) is located entirely outside of the extent of the Wambo Homestead curtilage. Therefore, no application under section 60 of the *Heritage Act, 1997* will be made for Longwall 10A.

WCPL would be happy to meet with the Office of Environment and Heritage to present the approach we have taken to the Heritage Management Plan. Could you please advise a date and time that would be suitable to the Office of Environment and Heritage, at your earliest continence.

WCPL would appreciate if you would kindly provide any comments on the Heritage Management Plan to us by 8 April 2015. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Environment for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Mike Young, Manager Mining Project, Major Development Assessments, Department of Planning & Environment

WAMBO COAL PTY LTD

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11 March 2015

Heritage Branch
Office of Environment and Heritage
Department of Premier and Cabinet
Locked Bag 5020
Parramatta NSW 2124

also via email: Vincent.Sicari@heritage.nsw.gov.au

Attention: Vincent Sicari, Manager, Conservation Team

Dear Mr Sicari,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 8 TO 10A – HERITAGE MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the North Wambo Underground Mine Modification (Modification 13) on 8 July 2013. Subsequently, the North Wambo Underground Mine Longwall 10A Modification (Modification 14) was lodged on 4 September 2014 to include an additional longwall (Longwall 10A). This application is pending a determination by the Department of Planning and Environment.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include Longwall 10A (Extraction Plan for Longwalls 8 to 10A), pending the approval of the North Wambo Underground Mine Longwall 10A Modification.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Heritage Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 8 to 10A on heritage sites and values, in consultation with the NSW Office of Environment and Heritage, the Heritage Branch, and relevant stakeholders for Aboriginal and non-Aboriginal heritage.

The Heritage Management Plan for Longwalls 8 to 10A is a revision of the Heritage Management Plan which was prepared for Longwalls 7 to 10, and which was previously provided for review to the Heritage Branch on 5 December 2013.

Please find enclosed the revised Heritage Management Plan that has been provided for the Heritage Branch's review and comment.

The Heritage Management Plan includes the following existing approved programmes/plans:

- The Wambo Homestead Complex Mine Management Plan which was prepared in accordance with Condition 57 of Schedule 4 of the Development Consent (DA 305-7-2003).
- The Wambo Coal Mine Salvage and Management Programme which was prepared in accordance with Condition 52 of Schedule 4 of the Development Consent (DA 305-7-2003).

The Wambo Coal Mine Salvage and Management Programme was prepared in consultation with the relevant stakeholders for Aboriginal heritage as part of the application under sections 87 and 90 of the *National Parks and Wildlife Act, 1974*.

The initial application made under section 60 of the *Heritage Act, 1977* went on public exhibition and was subject to review by stakeholders in July 2012, to allow for the mining of Longwalls 7 and 8. A second application under section 60 of the *Heritage Act, 1997* was made in April 2013 to allow for undergrounding mining of Longwalls 9 and 10. Longwall 10A (and its associated subsidence exclusion zone) is located entirely outside of the extent of the Wambo Homestead curtilage. Therefore, no application under section 60 of the *Heritage Act, 1997* will be made for Longwall 10A.

WCPL would be happy to meet with the Heritage Branch to present the approach we have taken to the Heritage Management Plan. Could you please advise a date and time that would be suitable to the Heritage Branch, at your earliest continence.

WCPL would appreciate if you would kindly provide any comments on the Heritage Management Plan to us by the 8 April 2015. WCPL looks forward to your input and invite you to contact us with any queries.

I will provide a copy of this letter to the Department of Planning and Environment for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Siobhan Lavelle, Heritage Branch, Office of Environment and Heritage, via email: Siobhan.Lavelle@heritage.nsw.gov.au

Mr Mike Young, Manager Mining Project, Major Development Assessments, Department of Planning & Environment

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11 March 2015

Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

also via email: Mike.Young@planning.nsw.gov.au

Attention: Mr Mike Young, Manager Mining, Major Development Assessment

Dear Mr Young

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 8 to 10A – BIODIVERSITY MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the North Wambo Underground Mine Modification (Modification 13) on 8 July 2013. Subsequently, the North Wambo Underground Mine Longwall 10A Modification (Modification 14) was lodged on 4 September 2014 to include an additional longwall (Longwall 10A). This application is pending a determination by the Department of Planning and Environment.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include Longwall 10A (Extraction Plan for Longwalls 8 to 10A), pending the approval of the North Wambo Underground Mine Longwall 10A Modification.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 8 to 10A on flora and fauna, in consultation with the NSW Office of Environment and Heritage.

The Biodiversity Management Plan for Longwalls 8 to 10A is a revision of the Biodiversity Management Plan which was prepared for Longwalls 7 to 10, and which was previously provided for review to the Department of Planning and Environment on 18 December 2013.

Please find enclosed the draft Biodiversity Management Plan that has been provided for consultation to the Office of Environment and Heritage. A copy of this correspondence is enclosed for your records.

The Biodiversity Management Plan includes the existing Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL has kindly requested the Office of Environment and Heritage provide any comments on the draft Biodiversity Management Plan by 8 April 2015. WCPL will provide the Department of Planning and Environment with the outcomes of any consultation with these agencies with the final Biodiversity Management Plan for the Department's consideration.

WCPL would appreciate any input from the Department of Planning & Environment on the draft Biodiversity Management Plan during the consultation period and invites you to contact us with any queries.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (2)

WAMBO COAL PTY LTD

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11 March 2015

Office of Environment and Heritage
Department of Premier and Cabinet
Post Office Box 488G
Newcastle NSW 2300

Attention: Mr Richard Bath, Head Hunter Planning Unit, Conservation and Regulation, North East

also via email: Richard.Bath@environment.nsw.gov.au

Dear Mr Bath,

RE: NORTH WAMBO UNDERGROUND MINE LONGWALLS 8 TO 10A – BIODIVERSITY MANAGEMENT PLAN

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. Longwalls 9 and 10 were approved as a component of the North Wambo Underground Mine Modification (Modification 13) on 8 July 2013. Subsequently, the North Wambo Underground Mine Longwall 10A Modification (Modification 14) was lodged on 4 September 2014 to include an additional longwall (Longwall 10A). This application is pending a determination by the Department of Planning and Environment.

Wambo Coal Pty Limited (WCPL) is currently revising the Extraction Plan for the North Wambo Underground Mine to include Longwall 10A (Extraction Plan for Longwalls 8 to 10A), pending the approval of the North Wambo Underground Mine Longwall 10A Modification.

Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003) requires WCPL to prepare a Biodiversity Management Plan to manage the potential impacts and/or environmental consequences of Longwalls 8 to 10A on flora and fauna, in consultation with the NSW Office of Environment and Heritage.

The Biodiversity Management Plan for Longwalls 8 to 10A is a revision of the Biodiversity Management Plan which was prepared for Longwalls 7 to 10, and which was previously provided for review to the Office of Environment and Heritage on 18 December 2013.

Please find enclosed the revised Biodiversity Management Plan that has been provided for the Office of Environment and Heritage's review and comment.

The Biodiversity Management Plan includes the existing Flora and Fauna Management Plan which was prepared in accordance with Conditions 44 to 48 of Schedule 4 of the Development Consent (DA 305-7-2003).

WCPL would be happy to meet with the Office of Environment and Heritage to present the approach we have taken to the Biodiversity Management Plan. Could you please advise a date and time that would be suitable to the Office of Environment and Heritage, at your earliest continence.

WCPL would appreciate if you would kindly provide any comments on the Biodiversity Management Plan to us by 8 April 2015. WCPL looks forward to your input and invite you to contact us with any queries.

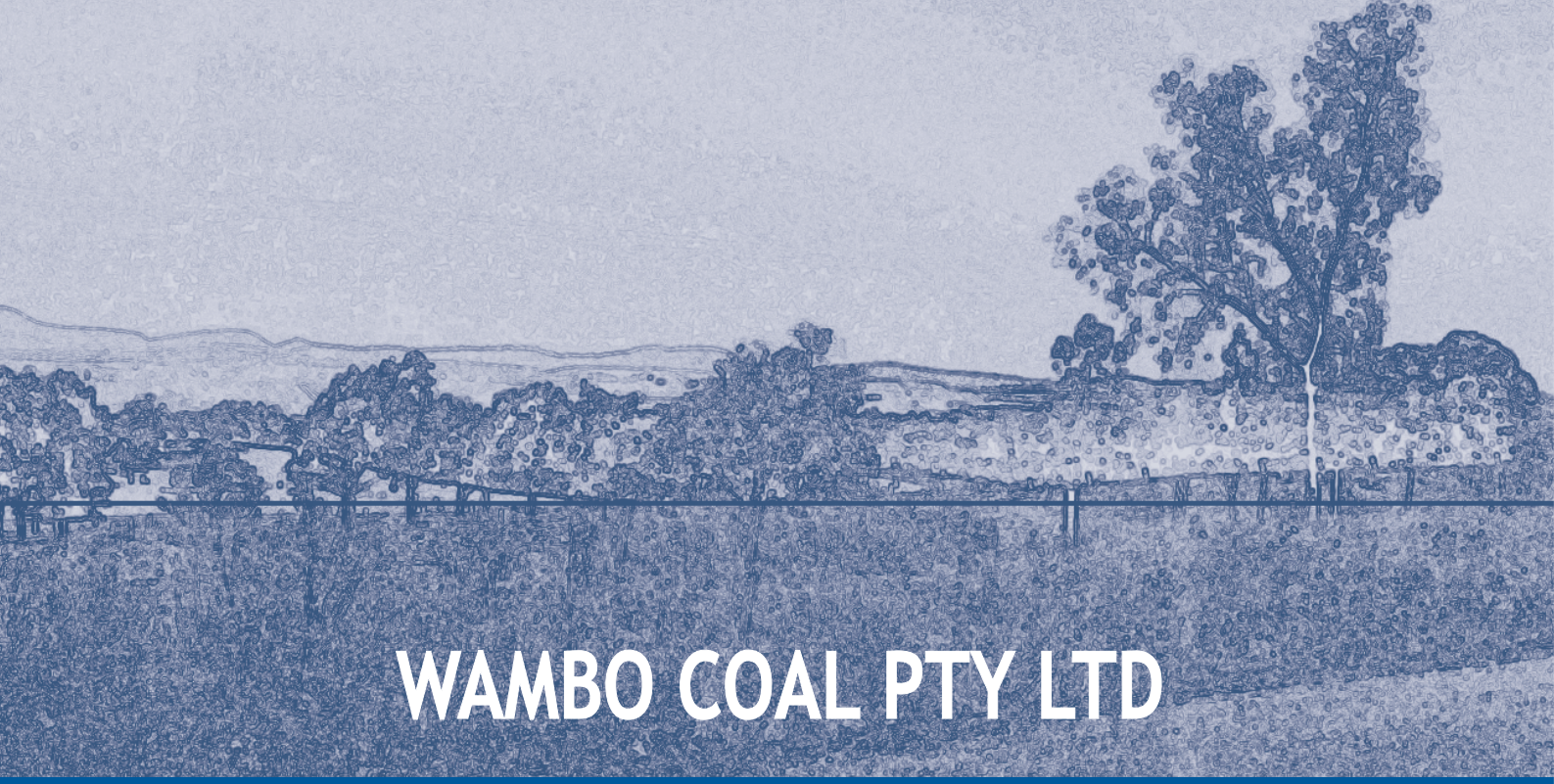
I will provide a copy of this letter to the Department of Planning and Environment for its information.

Yours faithfully

Troy Favell
Environment and Community Manager
WAMBO COAL PTY LTD

Enclosures (1)

cc: Mr Mike Young, Manager Mining Project, Major Development Assessments, Department of Planning & Environment



WAMBO COAL PTY LTD

NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

ATTACHMENT 3

PROGRAM TO COLLECT BASELINE DATA FOR FUTURE EXTRACTION PLANS

Peabody ENERGY

Attachment 3
Program to Collect Baseline Data for Future Extraction Plans

Approved future workings at the Wambo Coal Mine are described in the *Wambo Development Project Environmental Impact Statement* (WCPL, 2003) and include:

- Longwall mining within the Whybrow Seam (known as South Bates Underground Mine).
- Longwall mining within the Arrowfield and Bowfield Seams (known as South Wambo Underground Mine).

The approved future workings in the Whybrow Seam are located more than 2 km north-west of Longwalls 8 to 10A while the approved future workings in the Arrowfield and Bowfield Seams include workings underlying the North Wambo Underground Mine workings (**Figure 2** of the Extraction Plan).

WCPL currently plans to lodge an Extraction Plan for the South Bates Underground Mine (approved mining in the Whybrow Seam) in early 2015.

The monitoring proposed to be undertaken to collect baseline data for future Extraction Plans is summarised in **Table A3-1**. WCPL considers that the current monitoring is adequate to collect sufficient baseline data for use in future Extraction Plans.

Table A3-1
Program to Collect Baseline Data for Future Extraction Plans

Aspect of Future Extraction Plan	Proposed Monitoring
Subsidence	• Subsidence monitoring undertaken in accordance with the Subsidence Monitoring Program. • The subsidence monitoring data collected during extraction of Longwalls 8 to 10A will be used to validate revised subsidence predictions for future Extraction Plans. • It is considered that the proposed subsidence monitoring is adequate to collect sufficient subsidence data for use in future Extraction Plans.
Groundwater	• Groundwater monitoring (groundwater level and quality) undertaken in accordance with the GWMP and NWCSRS (**Figure 12** of the Extraction Plan), including sites G19 and G21 located above the future South Bates Underground Mine. • The groundwater monitoring data collected will be used to validate predicted environmental consequences on groundwater resources for future Extraction Plans. If this validation finds environmental consequences have exceeded those predicted, the groundwater monitoring data will be used to provide revised predictions of environmental consequences. • It is proposed to install a minimum of two additional groundwater monitoring sites in the vicinity of the future South Bates Underground Mine to supplement the existing groundwater data already collected for use in future Extraction Plans.

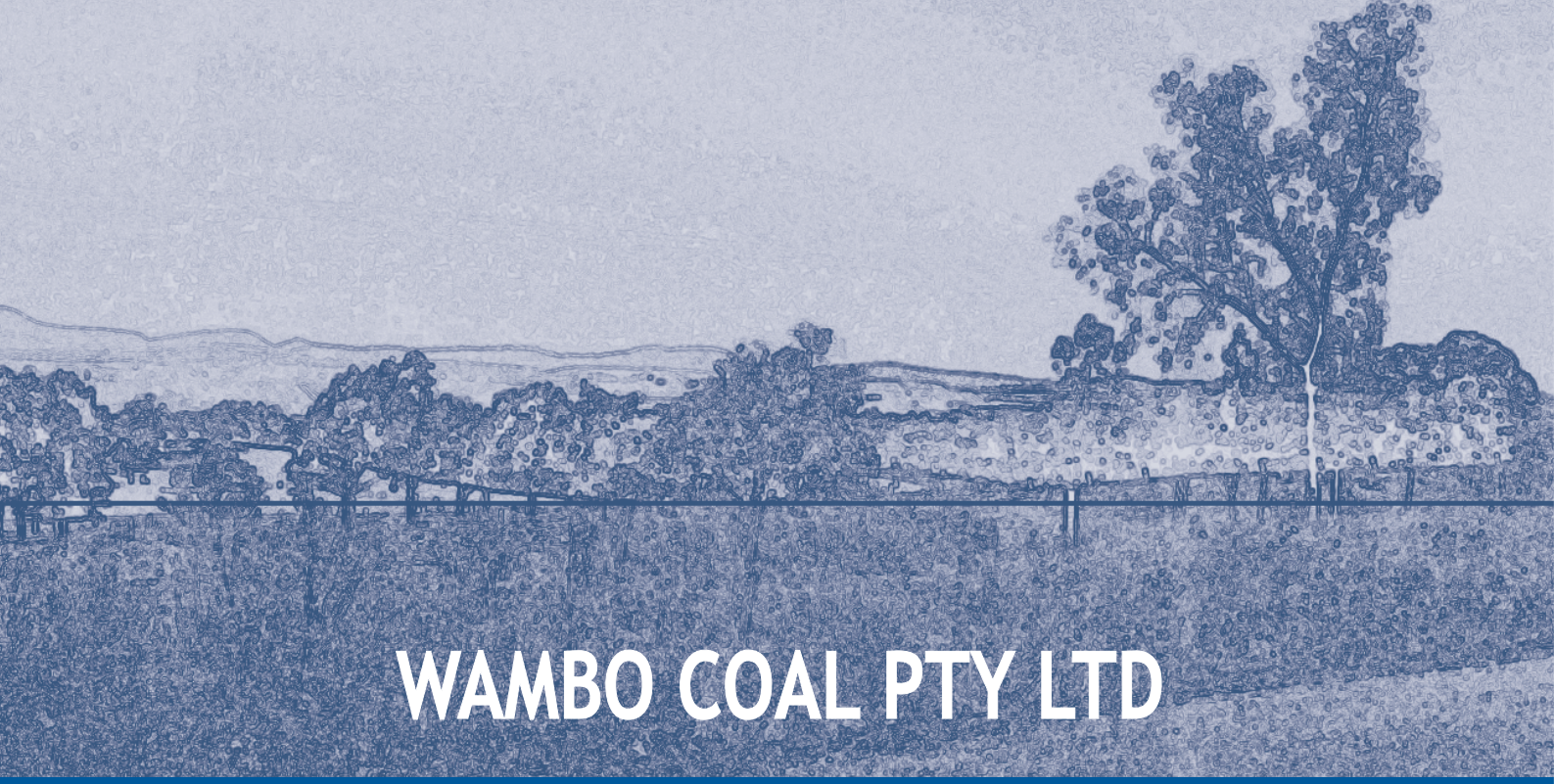
Table A3-1 (Continued)
Program to Collect Baseline Data for Future Extraction Plans

Aspect of Future Extraction Plan	Proposed Monitoring
Surface Water	• Surface water monitoring (flow, quality and bed and bank stability) undertaken in accordance with the SWMP (**Figure 12** of the Extraction Plan), including: – Surface water flow monitoring on North Wambo Creek (site FM2 located upstream and site FM3 located downstream of the future South Bates Underground Mine). – Surface water quality monitoring on North Wambo Creek (site SW47 located upstream and site SW27a located downstream of the future South Bates Underground Mine). – Bed and bank stability monitoring of the North Wambo Creek diversion (located above the future South Bates Underground Mine). • The surface water monitoring data collected will be used to validate predicted environmental consequences on surface water resources for future Extraction Plans. If this validation finds environmental consequences have exceeded those predicted, the surface water monitoring data will be used to provide revised predictions of environmental consequences. • It is considered that the proposed surface water monitoring is adequate to collect sufficient baseline surface water data for use in future Extraction Plans.
Land	• Monitoring of impacts to land in general in accordance with the LMP. • The monitoring conducted in accordance with the LMP will be used in the review of observed subsidence impacts for future Extraction Plans.

Table A3-1 (Continued)
Program to Collect Baseline Data for Future Extraction Plans

Aspect of Future Extraction Plan	Proposed Monitoring
Biodiversity	• Monitoring of biodiversity in accordance with the FFMP (**Figure 13** of the Extraction Plan), including: – Annual vegetation monitoring in the Remnant Woodland Enhancement Program areas (sites V6-B1c, V11-B1 and V11-B2 above the future South Bates Underground Mine with data from 2009). – Annual riparian monitoring (including transects along the North Wambo Creek diversion above the future South Bates Underground Mine). – Annual Bird Surveys including specific surveys for Swift Parrot and Regent Honeyeater (four monitoring sites above the future South Bates Underground Mine). • Biodiversity monitoring data collected will be used to validate predicted environmental consequences on biodiversity for future Extraction Plans. If this validation finds environmental consequences have exceeded those predicted, the monitoring data would be used to provide revised predictions of environmental consequences.
Aboriginal Heritage	• If required for future Extraction Plans, baseline data for Aboriginal heritage would be collected prior to disturbance in areas not previously disturbed. The baseline data collected would include photographic records, detailed information regarding the dimensions, composition and features and the occurrence of mining-induced impacts.
Non-Aboriginal Heritage	• The Wambo Homestead Complex is the only non-Aboriginal heritage site considered of heritage significance in accordance with the *NSW Heritage Manual*. Other non-Aboriginal heritage sites of significance identified in the Wambo Development Project EIS were not considered to be directly affected by the Wambo Coal Mine. • Monitoring of the Wambo Homestead Complex in accordance with the WHCMMP. • The monitoring and management measures presented in the WHCMMP are considered sufficient to ensure the heritage values of the Wambo Homestead Complex will not be adversely affected by subsidence resulting from extraction of Longwalls 8 to 10A. • The monitoring data collected in accordance with the WHCMMP would be used to validate the predicted impacts to the Wambo Homestead Complex for future Extraction Plans.

Note: GWMP refers to the Wambo Coal Pty Ltd Groundwater Monitoring Program.
NWCSRS refers to the North Wambo Creek Subsidence Response Strategy.
SWMP refers to the Wambo Coal Pty Ltd Surface Water Monitoring Program.
LMP refers to the Land Management Plan for Longwalls 8 to 10A.
FFMP refers to the Wambo Coal Pty Ltd Flora and Fauna Management Plan.
WHCMMP refers to the Wambo Homestead Complex Mine Management Plan



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NORTH WAMBO UNDERGROUND MINE

EXTRACTION PLAN
LONGWALLS 8 TO 10A

ATTACHMENT 4
KEY CONTACT REGISTER

Peabody ENERGY

Contact Details to be Reviewed Annually by Environment and Community Manager

Table A4-1
Emergency Contacts

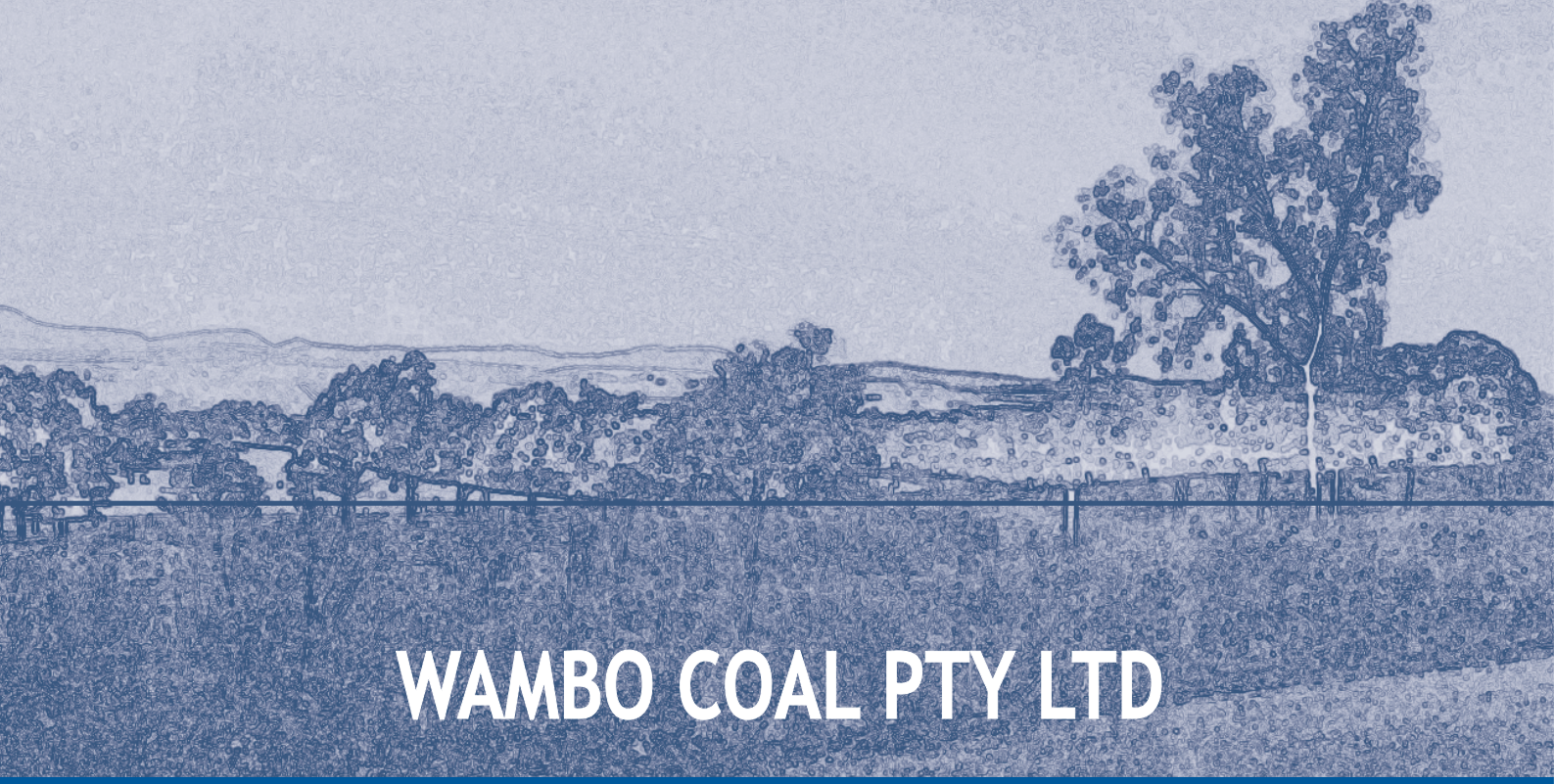
Organisation	Phone Number
Emergency Services (Police, Fire, Ambulance)	000
Environment Protection Authority	131 555
State Emergency Services	132 500
WorkCover Authority	13 10 50
Mine Subsidence Board (24 hour Emergency Service)	1800 248 083
Dams Safety Committee Executive Engineer (24 hour Emergency Contact)	(02) 9842 8070 0403 681 645
Ausgrid (24 hour Emergency Service)	13 13 88
Singleton Shire Council	(02) 6578 7290 (Mon-Fri) (02) 6572 1400 (After Hours)

Table A4-2
Internal WCPL Contact Details

Position	Contact Name	Phone Number	Mobile
Environment and Community Manager	TBA (24 hours)	(02) 6570 2209	0407 802 206
Health and Safety Manager	Peter Hafey (24 hours)	(02) 6570 2309	0488 417 230
General Manager	Ernest Johnson	(02) 6570 2330	
Underground Manager of Mining Engineering	Murray Wood		
Director: Technical Services and Projects	Micheal Alexander	(02) 6570 2361	
Community Hotline		(02) 6570 2245	
Control Room (24 hours)		(02) 6570 2240	

Table A4-3
Stakeholder Contact Details

Organisation	Position	Contact Name	Contact Phone Number/Email	Postal Address
Department of Planning & Environment	Manager, Mining Projects	Howard Reed	Howard.Reed@planning.nsw.gov.au	GPO Box 39 Sydney NSW 2001
Division of Resources and Energy, DTIRIS	Manager Northern Region, Environmental Sustainability Unit	Monique Meyer	monique.meyer@industry.nsw.gov.au	PO Box 344 Hunter Region MC NSW 2310
	Principal Subsidence Engineer	Paul Langley	paul.langley@industry.nsw.gov.au	
Mine Subsidence Board	Singleton District Office	Richard Pickles (Manager)	r.pickles@minesub.nsw.gov.au District Office – (02) 6572 4344	PO Box 488G Newcastle NSW 2300 PO Box 524 Singleton NSW 2330
Dams Safety Committee	Executive Engineer	Steve Knight	steve.knight@damsafety.nsw.gov.au	PO Box 3720 Parramatta NSW 2124
NSW Office of Water	Manager Strategic Stakeholder Liaison	Mitchell Isaacs	mitchell.isaacs@dpi.nsw.gov.au	PO Box 3720 Parramatta NSW 2124
Office of Environment and Heritage	Head Hunter Planning Unit	Richard Bath	info@environment.nsw.gov.au	PO Box 488G Newcastle NSW 2300
Environment Protection Authority	Senior Regional Operations Officer	Bill George		
Heritage Branch, OEH	Manager, Conservation Team	Vincent Sicari	Vincent.Sicari@heritage.nsw.gov.au	Locked Bag 5020 Parramatta NSW 2124
Singleton Shire Council	General Manager	Lindy Hyam	ssc@singleton.nsw.gov.au gm@singleton.nsw.gov.au	PO Box 314 Singleton NSW 2330



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EXTRACTION PLAN
LONGWALLS 8 TO 10A

ATTACHMENT 5
GROUTING OPTIONS PAPER

Peabody ENERGY

WAMBO COAL PTY LTD
NORTH WAMBO UNDERGROUND MINE

GROUTING OPTIONS PAPER
LONGWALL 08

PREPARED BY
WAMBO COAL PTY LTD

28 AUGUST 2013
Project No. WAM-09-15
Document No. 00538056 (Rev B)

DOCUMENT CONTROL

Document No.	00538056 (Rev B)
Title	Grouting Options Paper for North Wambo Underground Mine Longwall 08
General Description	A paper to consider grouting options for the Homestead Mine workings overlying the North Wambo Underground Mine Longwall 08
Key Support Documents	Attachment A - New Attachment 6 of Extraction Plan Attachment B - DGS Alluvium Impact Management Options Report NWU-001/7 Attachment C - Outotec Report: Zone 1A & 4 Minefill Potential (P228-L10-rev2)

Revisions

Rev No	Date	Description	By	Checked
A	09 August 2013	Draft for Submission	WCPL	Micheal Alexander
B	28 August 2013	Final for Submission	WCPL	Micheal Alexander

Approvals

	Name	Position	Signed	Date
Originator	M. Millgate	NWU Technical Services Superintendent		28/08/13
Checked	M. Alexander	Wambo Technical Services & Projects Manager		28.8.13
Confirmed	T.Favell	Wambo Environment and Community Manager		28/8/2013

The nominated Coordinator for this document is	Technical Services Superintendent

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1 INTRODUCTION

The Wambo Coal Mine is an open cut and underground coal mining operation located approximately 15 kilometres (km) west of Singleton, near the village of Warkworth, New South Wales (NSW). The Wambo Coal Mine is owned and operated by Wambo Coal Pty Limited (WCPL), a subsidiary of Peabody Energy Australia Pty Limited.

Development Consent DA 305-7-2003 for the Wambo Coal Mine was granted on 4 February 2004 by the then NSW Minister for Urban Affairs and Planning under Part 4 of the NSW *Environmental Planning and Assessment Act, 1974*.

The North Wambo Underground Mine is a component of the approved Wambo Coal Mine. The North Wambo Underground Mine commenced in 2005 and involves extraction of coal by longwall mining methods from the Wambo Seam within Mining Lease (ML) 1402, ML 1594, Coal Lease 397 and Consolidated Coal Lease 743.

Extraction Plan Approval from the Department of Planning and Infrastructure (DP&I) for Longwall 07 was granted on 16th May 2013, with approval of the extraction of Longwall 08 to remain contingent on a satisfactory agreement of grouting extents. Resolution of this requirement requires the preparation and submission of a "Grouting Options Paper" by WCPL by 30th August 2013 and agreement between the DP&I and the Division of Resources and Energy (DRE) on the extent of grouting in the Homestead Mine workings prior to the commencement of second workings in Longwall 08.

WCPL's application to modify the Wambo Development Consent DA 305-7-2003 for the extraction of two additional longwalls (Longwalls 09 & 10) within WCPL tenements at the North Wambo Underground Mine was submitted in December 2012. This modification was approved by the DP&I on the 8th July 2013 and the revised mine plan submitted is discussed herein.

1.1 PURPOSE AND SCOPE

The purpose of this report is to prepare a Grouting Options Paper for the proposed backfilling of the overlying Homestead workings in the Whybrow Seam for Longwall 08 at the North Wambo Underground Mine (GOP-LW08).

The report considers several grouting options and makes recommendations for the most suitable option and its extent to protect the alluvium associated with North Wambo Creek from pothole subsidence and direct hydraulic connection to the existing mine workings (**Figure 1**).

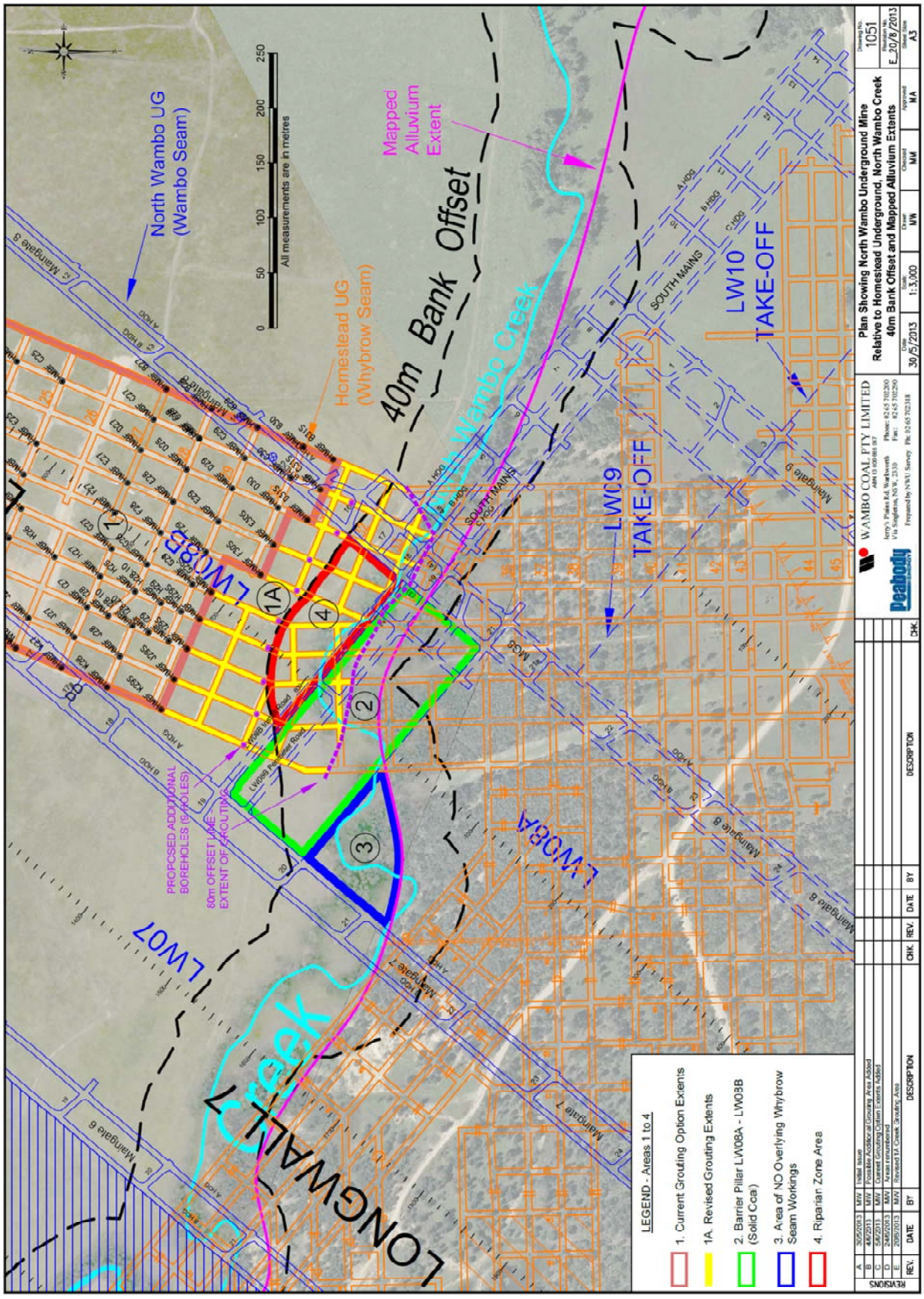

Figure 1 Grouting Options

2 TECHNICAL BACKGROUND

Wambo Coal Pty Limited (WCPL) considers there are two possible mechanisms that could create a direct hydraulic connection between the North Wambo Underground Mine and the North Wambo Creek alluvium (described further in Attachment A of this Paper):

1. Connective cracking from the Wambo Seam to the base of the alluvium due to subsidence development above Longwalls 7 and 8 (which was described and assessed in the *Wambo Development Project Environmental Impact Statement*).
2. Reduced competency of the Homestead Mine workings resulting in pot hole or chimney failure which interacts with the base of the alluvium.

The extent of the mapped alluvium is based on a transient electromagnetic survey conducted in July 2012 by Dr David Allen of Groundwater Imaging Pty Ltd. The survey was undertaken in order to identify the lateral extent of the Wollombi Brook alluvium and to distinguish between the alluvium of Wollombi Brook and that of Wambo Creek and North Wambo Creek. The survey was completed using a terraTEM towed transient electromagnetic device.

Towed transient electromagnetic devices are used to provide a quick and comprehensive picture of shallow groundwater resources by indicating the proportion of ions in solution (i.e. resistivity) in groundwater and rock at various depths. The resistivity profiles measured during the transient electromagnetic survey were used by Dr Allen to identify the extent of alluvium of the Wollombi Brook and North Wambo Creek.
WCPL implements the approved North Wambo Creek Subsidence Response Strategy that includes monitoring and trigger levels to identify potential connective cracking, and management measures that can be utilised should connective cracking be identified. A review of monitoring data conducted by Heritage Computing for the Extraction Plan concluded that the alluvium still maintains sufficient water and has not been dewatered by mining to date (Attachment A of this Paper).

WCPL has revised the North Wambo Creek Subsidence Response Strategy as part of the Extraction Plan to include additional monitoring sites in the vicinity of Longwalls 07 and 08.

Predicted heights of continuous cracking above Longwall 08 at the North Wambo Mine come to within 4m of the base of the alluvium in Area 1, but are 9 to 11m below Areas 4 and 1A respectively (Attachment B of this Paper).

WCPL has identified the risk of pot hole or chimney failure of the Homestead Mine workings above Longwalls 07 and 08 due to the presence of the Homestead Mine main headings at lower depths of cover than present above Longwalls 01 to 06.

WCPL has proposed to implement a grouting/bulk filling program to mitigate potential safety risks and environmental impacts. The grouting/bulk filling program would mitigate the potential for flooding due to chimney failure and pot hole development resulting from failure of remnant pillars within the Homestead Mine workings (i.e. the second mechanism described above). WCPL has implemented this program voluntarily at a budget cost of approximately $15.9 million.

The backfill material injected into the Whybrow Seam will act to fill void space within the workings and reduce the available space for collapsed roof material to bulk.

A geotechnical analysis by Ditton Geotechnical Services indicates that pot hole subsidence may extend to the surface for cover depths of 51m or less above the Whybrow Seam workings, based on the pot hole extending to the base of a depth of weathering (e.g. depth of alluvium) of 15 m. This height was initially assessed as 45m (Attachment A) but subsequent analysis has increased this height to 51m and is summarised in further detail in Attachment B of this Paper.

The interburden thickness between the Wambo and Whybrow Seams ranges from approximately 45 m to 55 m in areas 1-4.

WCPL notes the DP&I's recommendation that the grouting/bulk filling program is extended to include all Homestead Mine workings located above the North Wambo Underground Mine Longwalls 5, 6, 7 and 8, and below the North Wambo Creek alluvium. **Section 3** considers options for extension of the initial proposed program area.

3 GROUTING OPTIONS

3.1 INITIAL PROPOSED GROUTING EXTENTS

Figure 1 Area 1 shows the initial proposed extents of the Homestead Backfill Project as detailed in Attachment A of this Paper.

Temporary surface access roads have been constructed in this area and stockpiling and backfilling of fill material has commenced. The backfill for Longwall 07 is required to be completed by October 2013 (forecast for Longwall 07 to be at chainage 1300 m). The backfill for Longwall 08 is required to be completed by May 2015 (forecast for Longwall 08b to commence).

Attachment B contains further information regarding updated assessment of height of fracturing and connectivity to the alluvium for the different areas described in Figure 1. It describes as unlikely that the alluvium will be affected by connective cracking where Whybrow seam depth of cover to the alluvium is greater than 50 metres. Zone 1a & 4 has a cover depth of 50 to 60 metres. Notwithstanding WCPL has committed to assessing the DP&I's recommendation that the grouting/bulk filling program is extended to include all Homestead Mine workings located above the North Wambo Underground Mine and below the North Wambo Creek alluvium.

3.2 SOLID COAL BARRIER LONGWALL 08A-08B

The mine plan submitted for consideration for the Extraction Plan application for North Wambo Underground Longwalls 07-08 shows Longwall 08 at full length 2,908m.

Subsequently, WCPL applied to modify the approved Wambo Development Consent DA 305-7-2003 for the extraction of two additional longwalls (Longwalls 09 & 10) within WCPL tenements at the North Wambo Underground Mine (submitted in December 2012). This application was approved on the 8th July 2013 by the DP&I.

To allow for main headings to be driven to allow access to Longwalls 09 & 10, Longwall 08 will be required to be mined in two parts, Longwalls 08a and 08b. This allows for a solid coal barrier of 91.5m x 252.0m to remain intact between the two Longwall blocks and can be seen in Figure 1 as Area 2 (Barrier Pillar LW08A-LW08B [Solid Coal]). This area is partially within the mapped alluvium extent and partially within the 40m bank offset of North Wambo Creek. As there is no secondary extraction in this area, minimal subsidence effects are likely and therefore connective cracking and/or pothole or chimney failure is highly unlikely to occur.

3.3 AREA OF NO OVERLYING WHYBROW SEAM WORKINGS

Figure 1 Area 3 refers to portion of Longwall 08 that is within the northern end of Longwall 08b, within the mapped alluvium extent and within the 40m bank offset of North Wambo Creek. However, no overlying Whybrow seam workings are present; therefore no backfill or grouting may occur.

3.4 REVISED GROUTING EXTENTS

Figure 1 Area 1a shows the revised grouting extents for the Homestead backfill project beyond the extent of grouting shown in the Extraction Plan for Longwalls 07 and 08. Roads have already been constructed over this area to allow access for the bulk filling plant and a turning bay (Figure 2 – Backfill Plant).

Attachment C considers an extension option whereby fill will be put in place through an additional 9 boreholes and a material that flows downhill into voids of Area 4 ~80m without impacting the Riparian Zones identified in **Section 3.5**.

The fill option detailed in Attachment C allows Area 1a and 4 and parts of Area 2 to be filled from the 9 additional boreholes. Empirical data has been derived from the fill that has already taken place (see Attachment C) to confirm that effective fill of Area 4 can take place from the 9 additional bore holes. The boreholes have been positioned to allow for maximum practical fill to be placed without impacting the Riparian Zone described in **Section 3.5**.

Based on the cover depth range for Areas 4 and 1A of 50 to 60m, the proposal to grout the last 50-80m in Area 4 from boreholes in Area 1A is considered adequate in regards to the requirement to protect the alluvium from connective cracking through pot-hole development (see Attachment B).

Based on the requirement for additional infrastructure (9 boreholes and ongoing roadworks) and no impact on the Riparian Zone described in **Section 3.5**, the forecast costs are approximately $896,000. These costs are additional to those described in **Section 2**, and cover the fill of all of Area 1a and 4 as detailed in Attachment C. Whilst this will impact the viability of profitable mining of Longwall 08b, given the costs already borne by WCPL in developing this project, it is not considered to be cost prohibitive if determined to be an absolute requirement by the DP&I.

Figure 2 – Backfill Plant

Figure 3 shows the area between Area 1 and Area 2 i.e. Areas 1a & 4 (revised grouting extents).

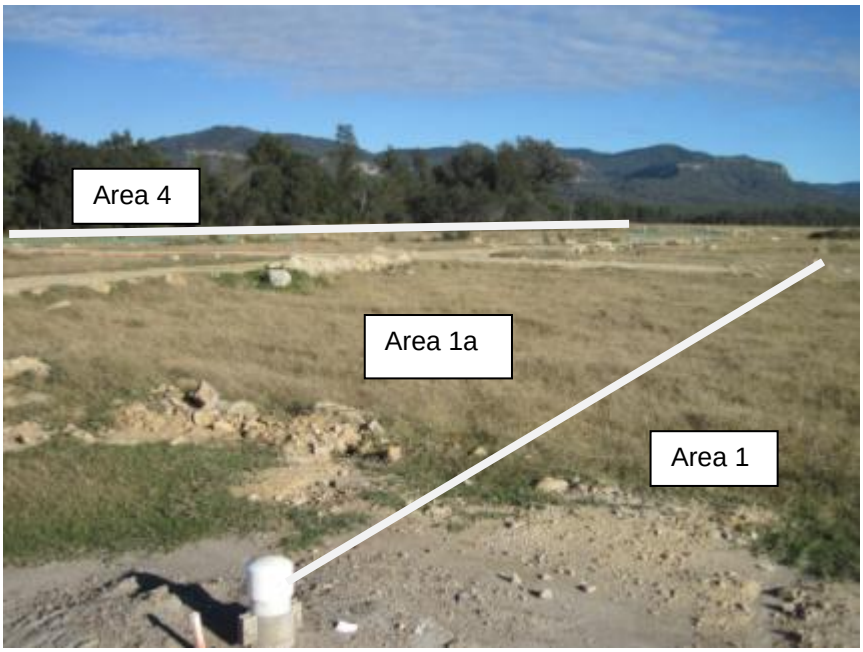

Figure 3 - Areas 1, 1a & 4 (Revised Grouting Extents)

3.5 RIPARIAN ZONES

3.5.1 North Wambo Creek

The riparian corridor (RC) of North Wambo Creek where both Longwall 08 and the former Homestead Workings overlap (see Figure 1), is generally characterised by a riparian over-storey (see Figure 5 & 6) consisting predominately of a strip of mature *Casuarina cunninghamiana*, eucalypt species and *Angophora floribunda* (WCPL, 2003). This section of the North Wambo Creek displays naturally deep eroding banks, up to four to five metres high, however the area is generally well stabilised by the riparian tree cover and grassed channel creek bed. The major soil type in this area is generally alluvial soils, which are characteristic of the other tributaries in the area including Wollombi Brook, Stony Creek and South Wambo Creek (WCPL, 2003).

The most recent riparian assessment undertaken in this section of the North Wambo Creek was completed in late 2012 by RPS Australia. The riparian monitoring in this location identified by transect 14N (see Figure 4), concluded this section of the North Wambo Creek was in good condition. In terms of surface stability the site scored highly, displaying stable topsoil, no mass movement, no sheet or gully erosion and no evidence of sedimentation. The historical bank erosion returned a moderate stream bank erosion score (RPS, 2012).

3.5.2 Riparian Corridor Considerations

In accordance with the NSW Office Water (NOW) *Guidelines for Riparian Corridors on Waterfront Land 2012,* the vegetated riparian zone (VRZ) for this applicable section of the North Wambo Creek has been determined at 40m as North Wambo Creek is a 4th order stream. In addition, as significant earth works would be undertaken “instream” if the grouting program were to occur within North Wambo Creek, WCPL have applied the generic 40m buffer from the highest creek bank, in accordance with NOW *Guidelines for Instream Works on Waterfront Land 2012.*

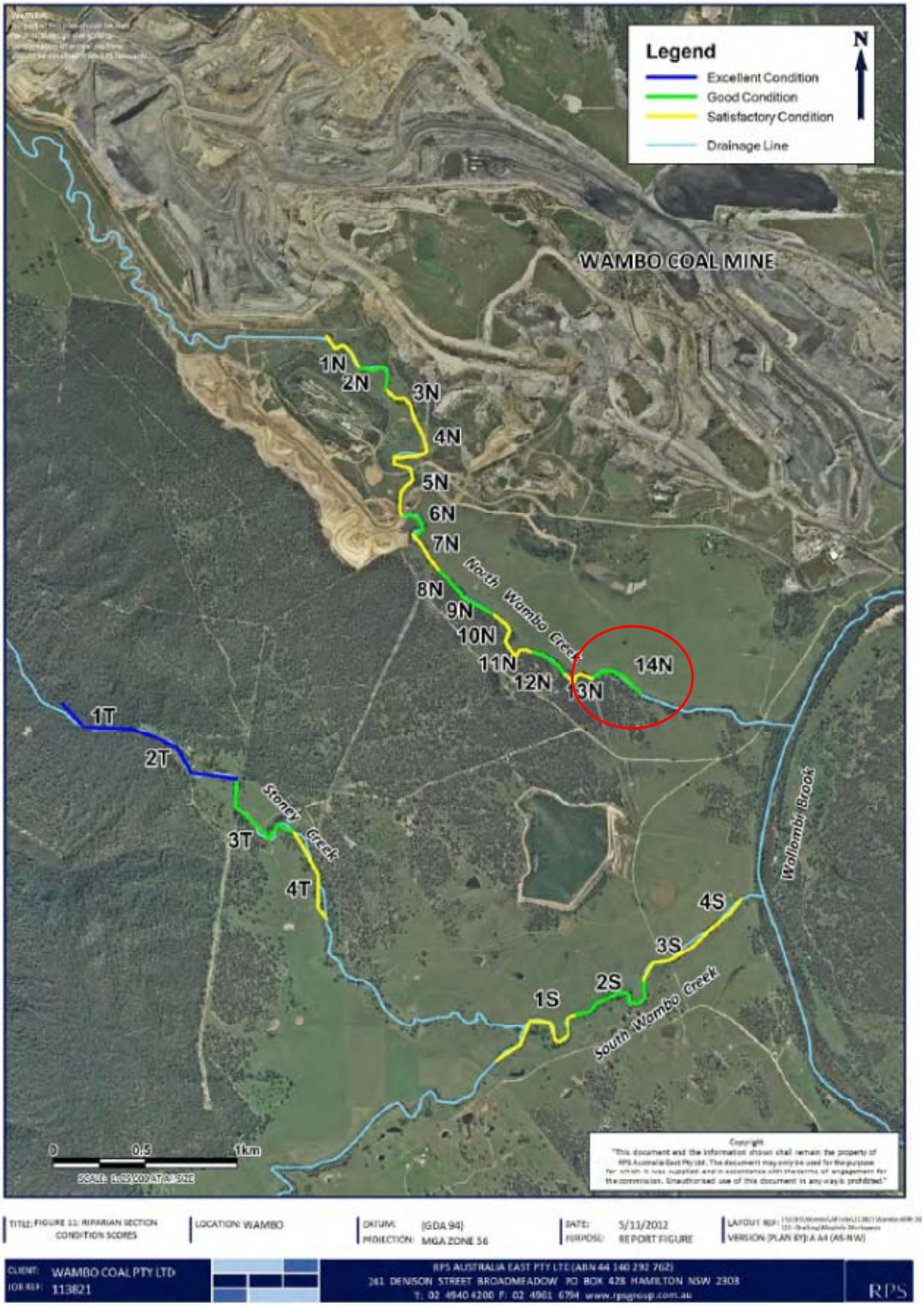

Figure 4 - 2012 Riparian Monitoring

Figure 5 – Riparian Zone Area (Area 4) looking East

Figure 6 – Riparian Zone Area (Area 4) looking West

3.5.3 Regulatory Approval

If WCPL were to proceed and extend the grouting/backfill program into Area 4, several regulatory considerations have been identified as both sites are located within the 40m RC (see Figure 1) of North Wambo Creek. To undertake civil works and land clearing within this riparian zone, WCPL would need to obtain:

- A Controlled Activity Permit under the *Water Management Act 2000*, from the NOW, including:
  - Preparation of a Review of Environmental Factors (REF) is required to support the Controlled Activity Permit Application.
  - A letter from the relevant consent authority confirming WCPL have Development Consent is required[1] to support the Controlled Activity Permit Application.
- Endorsement from the Environmental Protection Authority (EPA) NSW. As the disturbance required within the creek and the creek banks will be significant, Section 120 (Pollution to Waterways) of the *Protection of the Environment Operations Act 1997* (POEO Act), would need to be considered.
- Approval under the *Native Vegetation Act, 2003* as this activity may not be covered under by CCL743. WCPL would need to determine if clearing is authorised under the *Mining Act 1992*.

[1] The civil works required to prepare a 50m turning circle, creek bank access and stable pads for the grouting plant (see **Figure 2**) within the RC would be a significant and was not considered in the 2003 EIS or subsequent environmental assessments that accompanied their respective modification applications regarding DA 305-7-2003.

- WCPL would need to modify the approved Underground Mining Operations Plan (MOP), in accordance with the *Mining Act 1992*. Although the MOP considers the Backfill Project within the document, it does not include extending the program into the RC of the North Wambo Creek.

3.5.4 Land Clearing and Ground Preparation

Based on the current disturbance footprint required for the Homestead Backfill Project, the disturbance required to allow access by the grouting Backfill Plant into the North Wambo Creek creek bed area would be significant. The surface preparation would required importing large volumes of suitable fill material and compacted this material to allow the Backfill Plant safe access into and out of the creek and its immediate surrounds. In addition, an extensive tree clearing campaign would be required to develop these tracks and pads over the Homestead former workings to each grouting target site. The restoration works post-grouting would require removal of the fill material, re-installation of creek banks removed and re-stabilisation of the entire disturbed area. The approximate disturbance footprint for Area 4 is 0.85ha. The rehabilitation liability estimate (RCE) for this disturbance has not been considered in WCPL's RCE for the NWU MOP.

In total the development of infrastructure and subsequent rehabilitation in the Riparian Area (Area 4) for a comparable fill program as Area 1 and 1a is approximately $2,189,000. This additional cost would make the mining of Longwall 08b cost prohibitive culminating in the North Wambo operation ceasing at the end of Longwall 10.

3.5.5 Environmental Benefits

WCPL are of the opinion there are no environmental benefits if WCPL were to proceed with grouting sections of the former Homestead workings within Area 4 by direct fill methods, based on the large area of land that would be required to be disturbed and cleared within the RC of North Wambo Creek.

Some of the key risks associated with the proposed works include potential pollution to waterways as a result of sedimentation loss to North Wambo Creek during rainfall events, as these works will be undertaken with the creek itself. As described in **Section 3.5.1**, the current surface stability condition of the creek and the riparian zone at this location has been scored highly, displaying stable topsoil, no mass movement, no sheet or gully erosion and no evidence of sedimentation.

4 CONCLUSION

Extraction Plan Approval from the Department of Planning and Infrastructure (DP&I) for Longwall 07 was granted on 16th May 2013, with approval of the extraction of Longwall 08 to remain contingent on a satisfactory agreement of grouting extents. In accordance with this condition, WCPL has provided this "Longwall 08 Grouting Options Paper" for consideration by the DP&I and the DRE on the extent of grouting in the Homestead Mine workings (required prior to the commencement of second workings in Longwall 08).

This Grouting Options Paper has explored the costs and benefits of extending the current proposed bulk filling/grouting program including the following items:

- identification of extra areas of the Homestead Mine workings that may be available for grouting/bulk filling;
- detailed assessment of the probability of pot hole or chimney failure that interacts with the base of the alluvium occurring;
- outline of additional costs of bulk filling any extra areas and the impact on the overall economic viability of longwall extraction; and
- outline of logistical and access constraints associated with bulk filling Homestead Mine workings on the southern side of North Wambo Creek.

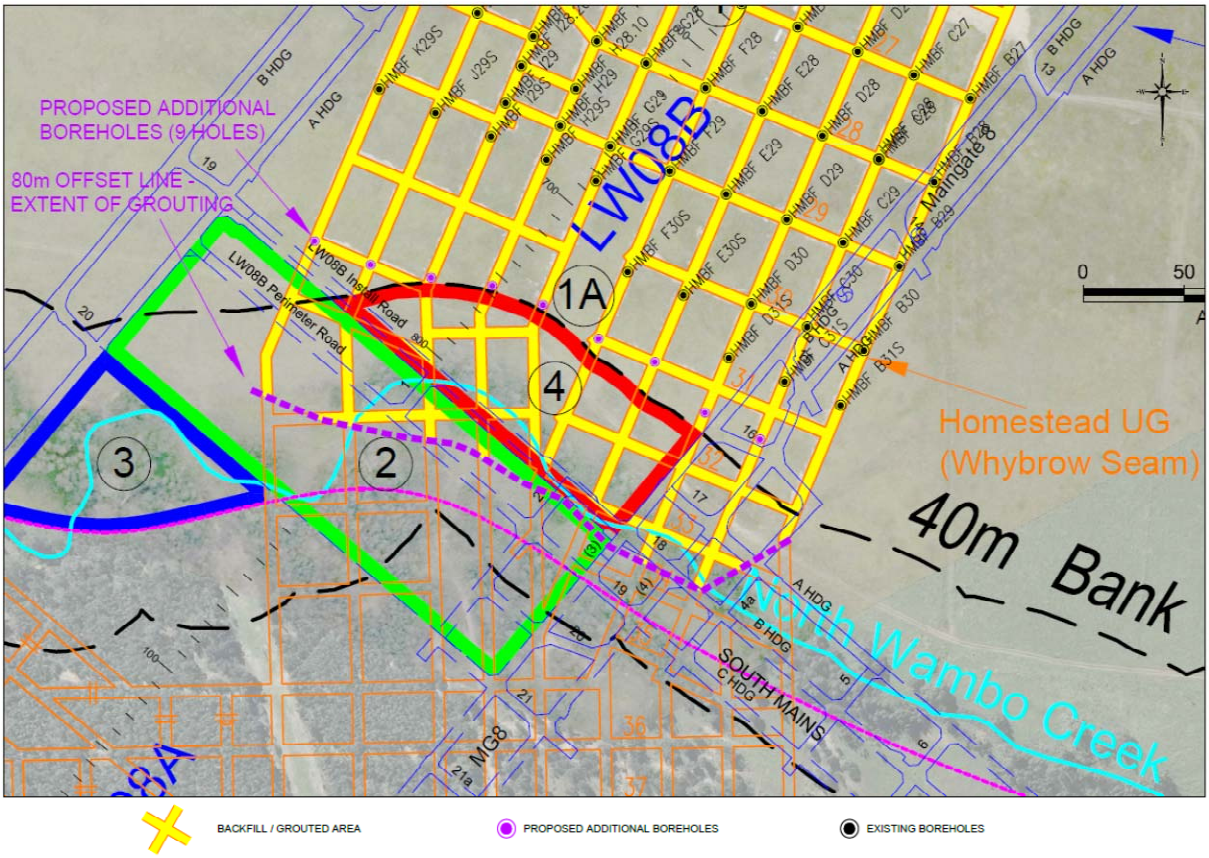

Figure 7 – Areas 1a-4 Illustrating proposed grouting extents

WCPL has reviewed several options for extension of the grouting limits associated with North Wambo Underground Longwall 08. It is the considered opinion of WCPL that the preferred grouting option for Longwall 08 is to extend grouting limits through an additional 9 boreholes and infrastructure as detailed in Figure 1 and Attachment C. This fulfils both the request of the DP&I as to extension of limits to minimise impacts on the alluvium of North Wambo Creek and also ensures the economic viability of extraction of Longwall 08. Figure 7 illustrates that the backfill project will fill as far as practicable all parts of the workings overlying Longwall 08b with significant overlap of the solid coal barrier shown as Area 2. Additionally it reduces surface disturbance of North Wambo Creek Riparian Corridor and lies within the current approved Mining Operations Plan for North Wambo Underground.

5 REFERENCES

RPS (2012) *2012 Annual Ecological Monitoring Report*. Prepared for Wambo Coal Pty Limited.

Wambo Coal Pty Limited (2003) *Wambo Development Project Environmental Impact Statement.*

ATTACHMENT A

NEW ATTACHMENT 6 OF EXTRACTION PLAN

Attachment 6
Bulk Fill of Previous Homestead Mine Workings

As described in **Section 1.6.2** of the Extraction Plan, bulk filling/grouting of the previous Homestead Mine workings is being undertaken primarily as a mitigation measure to minimise the potential for flooding due to chimney failure and pot hole development resulting from failure of remnant pillars within the Homestead Mine workings. In addition, grouting of some of the previous Homestead Mine workings is a requirement of Wambo Coal Pty Limited's (WCPL's) approval to mine within the curtilage of the Wambo Homestead Complex (WHC).

The method being undertaken is outlined below:

- Boreholes will be drilled from the surface into the Homestead Mine voids.
- Boreholes will be cased and capped for the duration of the project to reduce potential water inflow to the Homestead Mine voids.
- The seal and backfill material will be mixed and prepared at the surface.
- To ensure containment of the backfill a sealer material will be gravity fed into the Homestead Mine voids through the boreholes.
- After the mine is sealed, a low strength grout backfill mixture will be injected via the boreholes into the Homestead Mine voids.
- The backfill mixture will disperse within the Homestead Mine voids to a designated level.
- On completion the boreholes will be surveyed and assessed to ensure the relevant Homestead Mine voids are adequately filled and stabilised.

The following subsections provide additional information on:

- the potential for interaction to occur between the North Wambo Underground Mine and the North Wambo Creek alluvium;
- proposed measures to mitigate interaction between the North Wambo Underground Mine and the North Wambo Creek alluvium, including the effect of the bulk filling/grouting program;
- preparation of the Homestead Mine workings prior to the commencement of injection of seal and backfill material;
- composition of the seal and backfill material; and
- an assessment of the suitability of the material to mitigate pot hole and chimney failure.

Potential for Interaction with North Wambo Creek Alluvium

There is considered to be two possible mechanisms that could create a direct hydraulic connection between the North Wambo Underground Mine and the North Wambo Creek alluvium:

1. Connective cracking from the Wambo Seam to the base of the alluvium due to subsidence development above Longwalls 7 and 8.
2. Reduced competency of the Homestead Mine workings resulting in pot hole or chimney failure which interacts with the base of the alluvium.

These two mechanisms are described further below.

Potential for Connective Cracking to North Wambo Creek Alluvium

A discussion on approved groundwater impacts is provided in the Water Management Plan (**Appendix A** of the Extraction Plan) and the potential for connective cracking is summarised below.

Section 4.2.3 of the Wambo Development Project EIS concluded the North Wambo Underground Mine would have the following interaction with North Wambo Creek and the alluvium:

> *With mining of the Wambo Seam, cracking in the alluvials along North Wambo Creek would potentially occur along the sides of the panels, and in curvilinear fashion across the panels. Cracking in the underlying rocks may result in short-term drainage of groundwater out of the alluvials. These cracks would however be expected to in-fill quickly with sediment or close (Appendix O). The minimum depth of cover between North Wambo Creek and the Wambo Seam longwall panels is not expected to cause connection from the surface to the underground workings (Appendix O). Cracking is not expected to cause connection from the alluvials to the underground workings although there is some potential for connection in areas where geological structures exist (Appendix O).*

Monitoring data to date for Longwalls 1 to 4 has not identified continuous cracking and is generally consistent with the subsidence assessment prepared by Holt (2003) and the subsidence assessment review prepared by Holt (2005). Longwalls 1 to 4 have cover depths ranging from approximately 70 to 120 m.

A review of impacts to groundwater due to the extraction of longwalls at the North Wambo Underground Mine based on currently available records was undertaken by Heritage Computing (2012) and is provided as **Technical Report 2** of the Extraction Plan. This review concluded that no material impacts, in addition to those identified in the *Wambo Development Project Environmental Impact Statement* and *Wambo Development Project - Wambo Seam Underground Mine Modification Statement of Environmental Effects*, have occurred due to the extraction of longwalls at the North Wambo Underground Mine based on currently available records (Heritage Computing, 2012).

The review conducted by Heritage Computing (2012) included analysis of data from monitoring bores P5 and P6 located above Longwalls 1 and 2, respectively, at approximately 75 m depth of cover. Heritage Computing provided the following summary of monitoring data at bores P5 and P6:

> *Both hydrographs show a decline in water level during the passage of Longwall 1 and Longwall 2, when rainfall was close to average conditions. Following this decline these bores have recovered during wetter conditions. The decline is indicative of a mining effect on water level due probably to enhanced leakage of water from the alluvium to the underlying Permian rocks and it is noted that this mechanism is consistent with the potential impacts described in the Wambo Development Project EIS and the North Wambo SEE. Figure 2 shows that the water table at P5 and P6 still responds rapidly and with high amplitude to rainfall events. The alluvium still maintains sufficient water and has not been dewatered by mining.*

Heritage Computing (2012) concluded that the potential environmental consequences resulting from the extraction of Longwalls 7 and 8 would be consistent with the approved potential impacts (i.e. cracking is not expected to cause connection from the alluvium to the underground workings although there is some potential for connection in areas where geological structures exist).

The assessment of Ditton Geotechnical Services (DgS) (2012a) (**Technical Report 1** of the Extraction Plan) was generally consistent with Holt (2003) and Holt (2005).

Potential for Pot Hole or Chimney Failure that Interacts with North Wambo Creek Alluvium

The subsidence from Longwalls 7 and 8 has the potential to compromise the Homestead Mine headings in the Whybrow Seam and result in roof instability. Roof instability of the Homestead Mine workings could result in chimney failure or pot hole development.

The interburden thickness between the Wambo and Whybrow Seams ranges from approximately 45 m to 55 m (refer to Figure 29C of **Technical Report 1** of the Extraction Plan). The depth of weathered material based on drilling records is shown on Figure 11b of **Technical Report 1** of the Extraction Plan.

DgS has estimated the heights of maximum pot hole development based on the approach described in Canbulat and Ryder (2002)[2] that compares the available volume at seam level and inside the pot hole itself with the bulked volume of the collapsed roof material. The development of a pot hole depression at the surface has been assumed to occur if the pot hole extends up to the depth of weathering (e.g. the base of the alluvium).

The analysis by DgS indicates that pot hole subsidence may extend to the surface if the immediate mine workings roof collapses after undermining by Longwall 7 and 8 for cover depths of 45 m or less above the Whybrow Seam workings based on a depth of weathering of 15 m.

Measures to Mitigate Interaction with North Wambo Creek Alluvium

Monitoring and Mitigation Measures for Potential for Connective Cracking to North Wambo Creek Alluvium

WCPL implements the approved North Wambo Creek Subsidence Response Strategy that includes monitoring and trigger levels to identify potential connective cracking, and management measures that can be utilised should connective cracking be identified.

WCPL has revised the North Wambo Creek Subsidence Response Strategy as part of the Extraction Plan (**Attachment 5 of Appendix A** of the Extraction Plan) to include additional monitoring sites in the vicinity of Longwalls 7 and 8.

Effect of Bulk Fill on Potential Interactions with North Wambo Creek and Alluvium

WCPL proposes to undertake bulk filling/grouting of the Homestead Mine workings where the following conditions are satisfied:

- Homestead Mine workings in the Whybrow Seam are located above the North Wambo Underground Mine Longwalls 7 and 8;
- these workings are located beneath alluvium associated with the North Wambo Creek; and
- there is considered to be a material risk of chimney failure or pot hole development from the Whybrow Seam workings (conservatively 110 m depth of cover above the Wambo Seam based on the analysis by DgS summarised above).

The backfill material injected into the Whybrow Seam will act to fill void space within the workings and reduce the available space for collapsed roof material to bulk. Seals are constructed to create a barrier to contain the backfill material so that it is not displaced in the event of a roadway collapse.

The backfill material was selected based on the following parameters:

[2] Canbulat, I and Ryder, JA (2002) Prediction of Surface Subsidence and Sink Holes. Published in Proceedings of SANIRE Symposium, Re-defining the Boundaries. Vereeniging (September).

- the material would solidify in the void following injection; and
- the material would be resistant to any future *in situ* re-fluidisation from ground or surface water ingress.

The properties of the selected backfill material are described further below.

Preparation of Homestead Mine Workings for Bulk Filling/Grouting

The conditions of WCPL's approval under the *Coal Mine Health and Safety Regulation, 2006* for Longwalls 1 to 6 at the North Wambo Underground Mine require dewatering of the Whybrow Seam (Clause 5.3):

> *The Manager of Mining Engineering shall ensure that prior to a development road being driven in the Wambo Seam the immediate overlying workings in the Whybrow seam have been dewatered.*

The Homestead Mine workings in the Whybrow Seam that overly the North Wambo Underground Mine are dewatered via a series of boreholes to reduce the water level in the overlying workings to as low as reasonably practicable prior to mining (i.e. only residual water/mud remains).

The portion of the Homestead Mine workings that are proposed to be bulk filled are located up dip of workings with residual water and are therefore dry. WCPL's network of dewatering bores will maintain current water levels to continue to safely mine and comply with approval conditions.

Downhole cameras and water level dippers are used in boreholes drilled for the bulk filling to observe the condition of the Homestead Mine workings.

Composition of Backfill Material

WCPL sources backfill material from alluvial and clay material encountered in the open cut mining operations. A binder (e.g. cement) is added to the alluvial and clay material to achieve the desired properties.

To ensure containment of the backfill, a sealer material will be gravity fed into the Homestead Mine voids down dip of the bulk filled areas. These 'bulkhead' seals will be composed of wet cemented flyash. This mix is a standard product for bulkhead seals used in void stabilisation projects by the NSW Road and Maritime Services.

Suitability of Backfill Material

WCPL has commissioned a number of studies into the suitability and strength requirements of the backfill material, including:

- testwork to determine the minimum unconfined compressive strength (UCS) to result in backfill that is unlikely to be susceptible to "flow" liquefaction; and
- analysis of the ability of backfill material to provide adequate bearing resistance when subject to loading from a potential chimney failure (i.e. to avoid the potential for the fill to "heave" through bearing failure).

Based on the analysis conducted, WCPL have a conservative target UCS of the backfill material of 50 kiloPascals to meet the desired properties. This UCS is achieved through the addition of a binder (e.g. cement) to the backfill material if required.

ATTACHMENT B

DGS Alluvium Impact Management Options
Report NWU-001/7

Ditton Geotechnical Services Pty Ltd
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PO Box 5100 Kahibah NSW 2290

DgS
Ditton Geotechnical Services

26 August, 2013

Michael Millgate
Technical Services Superintendent
North Wambo Mine
Warkworth NSW 2330

Report No. NWU-001/7

Dear Michael,

Subject: Review of Proposed Grouting Options in the Homestead Mine Workings above Longwalls 7 and 8 and below North Wambo Creek at the North Wambo Mine, Warkworth

1.0 Introduction

North Wambo Underground Mine (NWU) is proposing to bulk fill part of the Homestead Mine's access headings in the Whybrow Seam with low strength grout prior to their undermining by LWs 7 and 8 in the Wambo Seam; see Areas 1 to 4 in **Drawing No. 1051_E** (dated 20/08/2013) attached.

The purpose of the grout is to minimise the potential for pot-hole or sink-hole subsidence occurring up to the North Wambo Creek alluvium due to any instability that may be caused by subsurface cracking and increased pillar stress in the Whybrow Seam workings from the proposed longwalls.

The purpose of this report is to review the adequacy of the proposed grouting program presented in the Extraction Plan for LWs 7 and 8 in regards to the following comments made by the Department of Planning & Infrastructure (DP&I) that the report submitted:

(i) did not fully assess "the depth of cover necessary [to the Whybrow Seam] to avoid impacts to groundwater where sinkhole development intersects the base of the alluvium", and

(ii) made comment that there is no material risk of pot-holes intersecting the base of the alluvium where cover depths to the Wambo Seam are > 110 m but was "not based on reasonable minimisation of the risk of connective cracking at the base of the alluvium" due to mine workings collapse in the Whybrow Seam.

This report therefore provides the above assessments requested by the DP&I on the likelihood of pot holes and connective cracking interacting with the base of the alluvium, with reference to the proposed grouting program options.

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2.0 Alluvium Location, Mining Geometry and Proposed Grouting Details

The surface alluvium along North Wambo Creek is approximately 10 m to 14 m deep above the proposed extraction limits of LWs 7 and 8; see **Figure 1**. The cover depth to the Whybrow Seam ranges from 50 m to 60 m at this location (see **Figure 2**) and from 100 m to 110 m over the Wambo Seam; see **Figure 3**.

The mine workings in the Whybrow Seam have roadway widths ranging from 5.5 m to 7.0 m (average of 6.25 m) and a pillar height of 2.9 m.

The previous proposal to grout down to a cover depth of 110 m extends to 35 cut-through and will require grouting equipment and vehicular access (and hence disturbance) to the riparian buffer zone along North Wambo Creek (Area 4 shown in **Drawing No. 1051_E**). It should be noted that the previous proposal did not include the barrier pillar in LW8 beneath 33 to 36 cut throughs where the cover depth ranges between 107 m and 110 m. The barrier pillar is required to provide access to LWs 9 and 10.

Based on the inclusion of the barrier pillar in the Wambo Seam, it is now proposed to grout the main headings in the Whybrow Seam from the surface to the limits of the 40 m buffer zone between 32 and 33 cut-throughs. It has been assessed by the mine and grouting contractor using the methods described in **Outotek, 2013** that it will still be possible to avoid access (and damage) to the riparian zone (Area 4) by pumping grout down nine boreholes along the limits of Area 1A from 31 to 32 cut throughs for distances of up to 80 m.

There are also two areas within the riparian zone as shown in **Drawing No.1051_E** that will not require grouting due to (i) the proposed barrier pillar in the Wambo Seam (Area 2) and (ii) the absence of Whybrow Seam workings (Area 3).

3.0 Assessment of Connective Cracking Potential to the Alluvium Due to LW8

3.1 Groundwater Monitoring Results

A review of surface piezometric data adjacent to North Wambo Creek in **SCT, 2009** indicates a 3 m to 4 m drop in the water table occurred above LWs 1 and 2 in piezometer P5 and P6. On-going monitoring results in presented in Annual Environmental Monitoring Report (**AEMR, 2012)** for these piezos indicate that groundwater levels were 5 m to 6 m below ground level after LW5, and have since been static over the reporting period.

The available results indicate that there has been interaction with the alluvium due to B-Zone strata dilations and discontinuous fracturing at locations with cover depths of 75 m above the Wambo Seam. The partial recovery of the groundwater table at these locations demonstrate that connective cracking has not occurred between the mine workings and the alluvium.

The groundwater monitoring bore installed above LW5 at GW18 appears to have remained dry since its installation before mining. The result is therefore inconclusive.

3.2 Height of Fracturing Predictions Above the Wambo Seam

The mean and Upper 95%C Confidence Limit values for the height of continuous cracking above the Wambo Seam has been assessed for LW8 based on an empirical model developed from a database of 29 cases at Australian mines (see **Attachment A**).

The equation for the continuous height of fracturing above supercritical panels with W/H>1.4 is presented below:

$$A = 0.356\,(1/\tan\theta)^{1.21} W'^{0.82}\, T^{0.40}\, t'^{-0.22} \quad +/- 0.1W' \quad (R^2=0.7)$$

where

θ = 19.29^o for W/H>1.4 and gives H'= H.

W' = Effective Panel Width = minimum of W and 1.4H.

T = Mining Height.

t' = Effective strata unit thickness = 10 m (based on best-fit values to data base of measured heights of continuous fracturing above supercritical longwalls).

+/- 0.1W' = error band limits for 95% Upper and 95% Lower Confidence Limits

The database includes the Homestead Mine's LW9/9A height of fracturing data, which resulted in surface to seam connectivity been the mine workings and (South) Wambo Creek in the 1990's. The depth of the alluvium and clay is estimated to be ~10 m at this location based on borehole log.

The height of fracture predictions for LW8 and the case study data for LW9 at the Homestead Mine are presented in **Table 1**.

Table 1 - Summary of Measured v. Predicted Height of Continuous Fracture A-Zones

Panel	Proposed Grouting Areas	Alluvium Depth (m)	Panel Width W (m)	Cover Depth H (m)	Mining Height T (m)	Predicted A (m) (Mean - U95%CL)	Height of Alluvium above Wambo Seam (m)	Depth to A-Zone Cracking Horizon Below Alluvium (m)	
								mean	U95%
Homestead Mine									
9	-	10	200	80	3.4	60 - 71	70	10	**-1**
North Wambo Underground Mine									
8	3	10	262	115	2.65	73 - 89	105	32	16
8	2	10	262	110	2.65	71 - 86	100	29	14
8	1A	11	262	105	2.65	68 - 83	94	26	11
8	4	12	262	100	2.65	65 - 79	88	23	9
8	1	14	262	95	2.65	63 - 76	81	18	5
8	1	10	262	80	2.65	54 - 66	70	16	4

M = mean value; U95 = Upper 95% Confidence Limit.
Bold - U95%CL values for A-Zone fracture height above the base of alluvium.
Shaded - Areas where grouting of Whybrow Workings proposed.

The predictions for the height of continuous fracturing are plotted with the height of the alluvium above the workings in **Figure 4**.

The results in **Table 1** indicate that the height of continuous fracturing may have extended to the base of the alluvium above LW9 at the Homestead Mine. Predicted heights of continuous cracking above LW8 at the North Wambo Mine come to within 4 m of the base of the alluvium above Area 1, but are 9 m to 11 m below Areas 4 and 1A respectively. The continuous fracturing below Areas 2 and 3 is estimated to be 14 m to 16 m below the base of the alluvium.

Reference to the investigation Borehole WA13 in **Figure 5** indicates the alluvium is likely to be underlain by 2 m of sandy clay in the Areas 1 to 4 (see **Figure 2** for its location). The interburden above the Whybrow Seam comprises 7 m to 11 m of thinly bedded siltstone overlying interbedded sandstone and siltstone with Ryder Seam Coal.

The apparent lack of direct connectivity between the alluvium and LWs 1 to 6 indicates that (i) the reduced mining height has probably contributed to the lower heights of fracturing compared to the Homestead Mine longwalls, and (ii) the presence of 7 m to 11 m of thinly bedded siltstones and 2 m of clay have probably reduced the depths of vertical surface zone cracking below the alluvium to < 3 m, due to shear deformation along bedding partings.

The interaction of the heights of cracking with the existing Whybrow Seam workings may increase the risk of a surface to workings connection occurring, and is further discussed in **Section 4**.

4.0 Pothole Subsidence Potential above Whybrow Seam Workings

4.1 Previous Mine Roof Instability

Several mine roof instabilities are known to have occurred after the development of the Homestead Mine's access headings (see **Figure 2**) as follows:

- Difficult mining conditions were encountered in wet and weak 'laminite' roof strata in-bye of 10 cut-through. Falls of 0.3 m to 0.5 m height occurred in unsupported roof were attributed to buckling of thin siltstone/sandstone beds under relatively high horizontal stress compared to low bedding parting strength.

  Several cored borehole drilling campaigns above the Whybrow Seam access headings indicate that the roof strata consists of weak, thinly bedded sandstone and siltstone with UCS values ranging from 15 to 25 MPa.

- Pot-hole development to the surface occurred above a 3-way intersection in 1 Heading at 13 Cut-through (circa 1978). Cover depth was approximately 18 m with an alluvium thickness of 9 m and weathered bedrock zone of 1 m, indicating a minimum caving height of 8 m to 9 m.

- Two roof falls to a height of 4.7 m occurred above 4-way intersections in 2 and 4 Heading respectively at 22 Cut-through (circa 1981). Cover depth was approximately 32 m with an alluvium thickness of 10 m and weathered bedrock zone of 2 m. Moderate groundwater inflows observed from the down-dip fall only; connection to alluvium was ruled out by water chemistry analysis.

- A pot-hole occurred above a 4-way intersection in the Ridge Pillar Extraction workings in the Whybrow Seam at 33 m cover depth when undermined by NWU2. The pot-hole occurred in fill outside the limits of the alluvium, however, it was probably of a similar thickness of 10 m to 15 m, suggesting a minimum caving height of 18 m to 24 m.

An estimate of the minimum cover depths required to control surface pot-hole development above the Homestead Mine Workings have been completed for 2-way, 3-way and 4-way intersections in **Section 4.2**.

4.2 Estimate of Pot-Hole Caving Heights

Based on the assumption that the overburden in the Whybrow Seam (without grout in the roadways) will completely collapse at seam level and create pot-hole failures up towards the surface, the maximum heights at which the pot-holes will choke themselves off at has been determined for the existing four-way, 3-way and 2-way intersections.

The heights of maximum pot-hole development were estimated using the approach described in **Canbulat and Ryder, 2002**, which compares the available volume at seam level and inside the pot-hole itself with the bulked volume of the collapsed roof material. The point where the two are equal allows the maximum height of the pot-hole (z) to be determined as follows:

$$z = 2V_{seam}/((\psi-1)\pi b^2)$$

where

V_{seam} = available volume for collapsed material at seam level;
ψ = the bulking factor for the collapsed roof material;
b = roadway width.

The V_{seam} values are dependent on the number of roadways connecting a given intersection type as follows:

- 4-way intersection: $V_{seam} = 2h^2b/\tan\alpha + b^2h$
- 3-way intersection: $V_{seam} = 1.5h^2b/\tan\alpha + b^2h$
- 2-way intersection: $V_{seam} = 1.0h^2b/\tan\alpha + b^2h$

where

h = height of mine workings; α = angle of repose for collapse roof material in mine workings.

The following input parameters have been assumed for the North Wambo mining area:

γ = 0.022 MPa/m
$\alpha = 26.5^o$ (2H:1V)
b = 6.25 m
h = 2.9 m
ψ = 1.2 - 1.3 (Note: **Hill, 1996** suggests this range of bulking factor values for caved sandy shales, shaley sandstone, coarse sandstone and coal).

The predictions of maximum heights of pot-hole failure above the three intersection type scenarios (i.e. 4-way, 3-way and 2-way) for a range of cover depths are presented in **Table 2**.

Table 2 - Summary of Predicted Maximum Pot-Hole Heights above the Whybrow Seam Workings

Intersection Type	Maximum Caving Height, z (m)		
	ψ=1.2 (Sandy shales)	**ψ=1.25 (Shaley sandstones)**	**ψ=1.3(course sandstones)**
4-way	26.4	21.1	17.6
3-way	22.1	17.7	14.7
2-way	17.8	14.3	11.9

The results of the analysis indicate a maximum caving height of 26.4 m could occur above the un-grouted 4-way intersections if subsided by LWs 7 and 8. Based on observed pot-hole

caving heights of 5 m to 24 m above the Whybrow Seam workings, the results in **Table 2** are considered to be reasonable.

4.3 Minimum Cover Depth above Un-grouted Workings in the Whybrow Seam

The development of a pot-hole at the surface has been assumed to occur if the pot-hole caving height, z, extends to within 5 m of the base of the alluvium, d (i.e. $z > H - d - 5$). The additional 5 m was based on the observation of unsupported roof collapse in the Homestead Headings of 4.7 m.

For a maximum caving height of 26.4 m, a minimum rock head thickness of 5 m, and alluvium thickness of 10 m to 14 m, the minimum cover depth required above un-grouted Whybrow Seam workings intersections ranges from 42 m to 46 m without the effects of LW8.

The predicted heights of continuous fracturing of 79 m to 83 m due to LW8 above the Wambo Seam infers that the immediate roof above the Whybrow Seam workings may be fractured and loosened for distances of 29 m to 30 m above the Homestead workings. The predicted heights of fracturing are 3 m to 4 m higher than the predicted pothole heights, and it is therefore assessed that the minimum depth of cover above the Whybrow Seam should be increased by 5 m to a range of 47 m to 51 m for determining the approximate limits of grouting.

5.0 Review of Proposed Grouting Program Adequacy

Reference to the proposed grouting plan options (dated 20/08/13) and **Figure 2** indicates the cover depths to the Whybrow Seam is < 50 m above Area 1 and ranges from 50 m to 60 m above Areas 4 and 1A.

It is therefore considered that Areas 4 and 1A should be grouted to 33 cut-through as shown in the Grouting Options **Drawing No. 1051_E** attached using the methods described in **Outotek, 2013** to provide a reasonable level of pot-hole risk protection to the alluvium.

Field measurements of grout heights achieved from several boreholes in Area 1 indicate that the proposed grouting from Area 1A will probably reduce the void heights in Area 4 from 2.9 m to a range of 1.5 m to 0.5 m for typical pumping distances of 50 m to 80 m from the injection borehole. The likely caving heights above the intersections for varying levels of grout are summarised in **Table 3**.

Table 3 - Caving Height Estimates above 4-Way Intersection for Likely Range of Grout Heights from Pumping Location

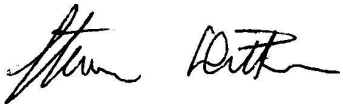
Location from Pumping Point	Mining Height (m)	Likely Void Height (m)	Likely Grout Height (m)	Maximum Caving Height (m)	Minimum Cover Depth*
<50	2.9	0.5 - 0.0	2.5 - 2.9	2.1 - 0.0	23
50 - 80	2.9	1.0	1.9	5.2	27
	2.9	1.5	1.4	9.4	31
	2.9	2.0	0.9	14.5	36
	2.9	2.5	0.4	20.7	42
>80	2.9	2.9	0.0	26.4	48

* - assuming a minimum depth of weathering includes 14 m of alluvium + 2 m clay + 5 m rock head

Based on the cover depth range for Areas 4 and 1A of 50 to 60 m, the proposal to grout the last 50 to 80 m in Area 4 from boreholes in Area 1A is considered adequate in regards to the requirement to protect the alluvium from connective cracking through pot-hole development.

As discussed earlier, grout will not be required in Areas 2 and 3 due to the inclusion of the barrier pillar in LW8 between 33 and 35 cut throughs and cover depths > 110 m above the Wambo Seam and > 60 m above the Whybrow Seam.

For and on behalf of
Ditton Geotechnical Services Pty Ltd



Steven Ditton
Principal Engineer
MIE (Aust) CPEng
M/N 342140

Attachments:

Grouting Options Plan (Drawing No. 1051_E - 20/08/2013)

Figures 1 to 6

Attachment A - Sub-Surface Fracturing Prediction Model Details

References:

ACARP, 2003. **ACARP Project No. C10023, Review of Industry Subsidence Data in Relation to the Impact of Significant Variations in Overburden Lithology and Initial Assessment of Sub-Surface Fracturing on Groundwater**, Ditton, S. and Frith, R.C. Strata Engineering Report No. 00-181-ACR/1 (Sep).

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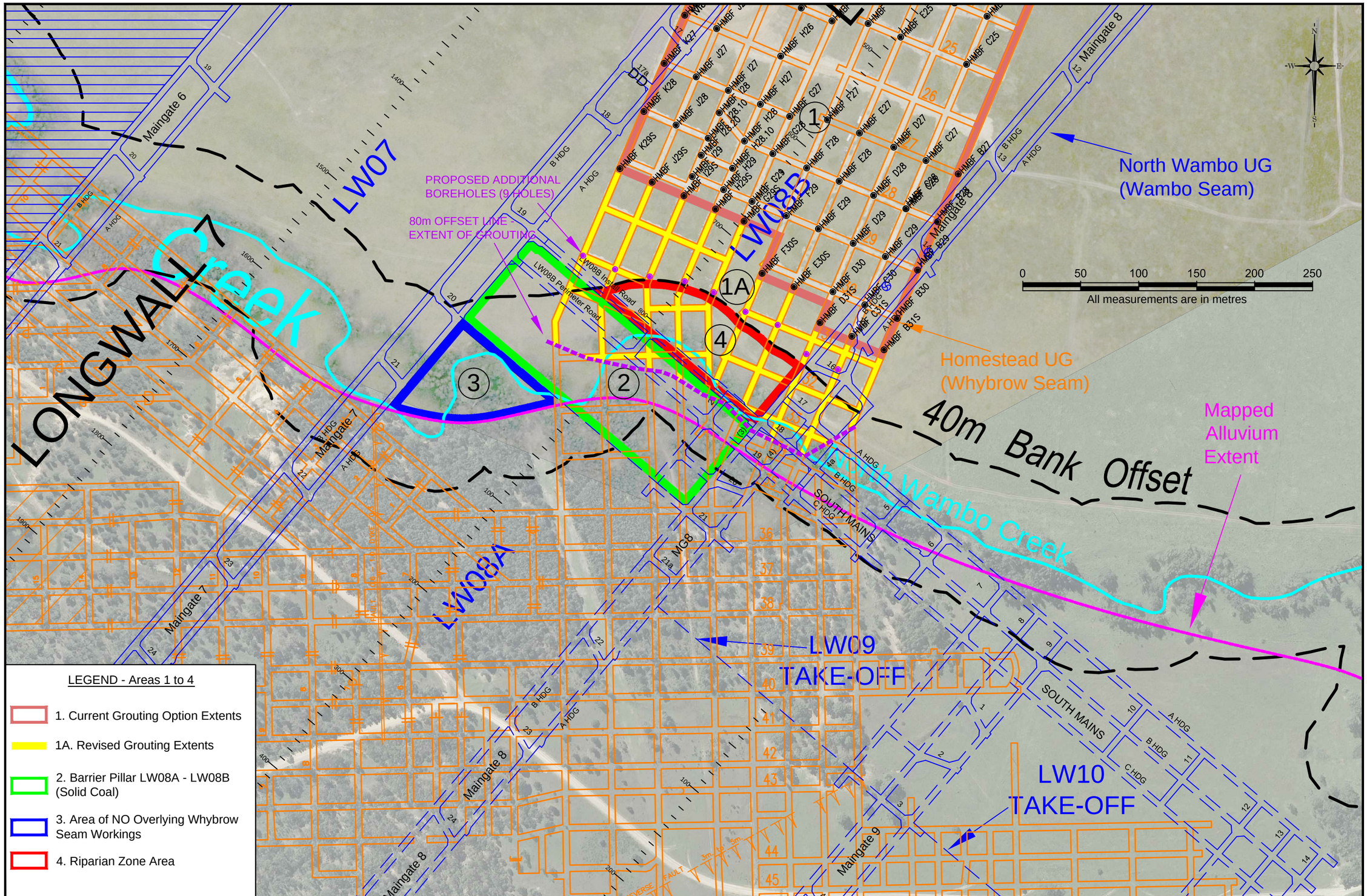

REVISIONS										
A	30/5/2013	MW	Initial Issue							
B	4/6/2013	MW	Possible Additional Grouting Area Added							
C	5/6/2013	MW	Current Grouting Option Extents Added							
D	24/6/2013	MW	Areas renumbered							
E	20/8/2013	MW	Revised 1A Creek Grouting Area							
REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.	

WAMBO COAL PTY LIMITED
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Jerry's Plains Rd, Warkworth
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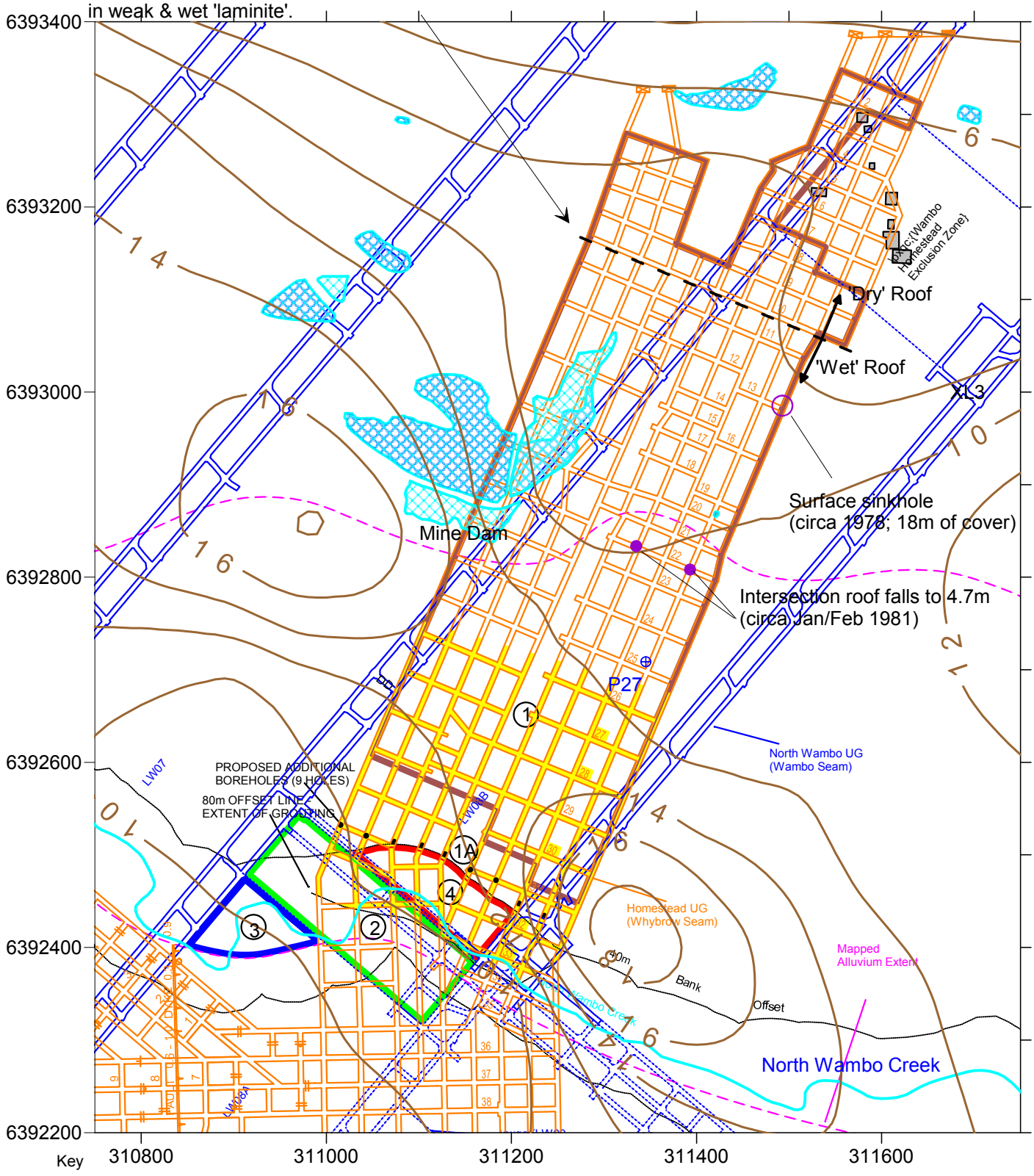
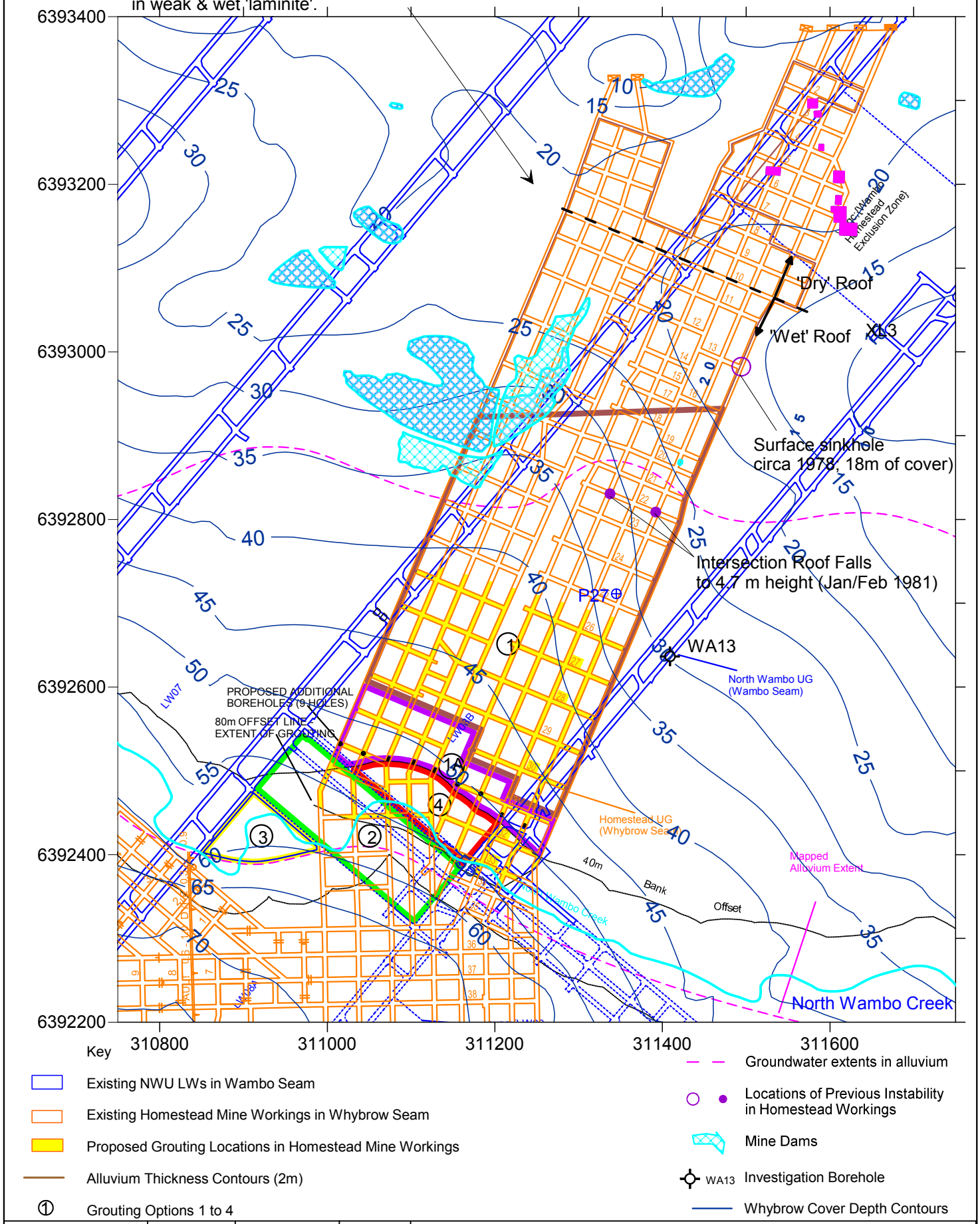
Fax: 02 65 702290
Prepared by NWU Survey Ph: 02 65 702318

Plan Showing North Wambo Underground Mine Relative to Homestead Underground, North Wambo Creek 40m Bank Offset and Mapped Alluvium Extents

Date	Scale:	Drawn	Checked	Approved	Drawing No.	Revision No.	Sheet Size
30/5/2013	1:3,000	MW	MM	MA	1051	E_20/8/2013	A3

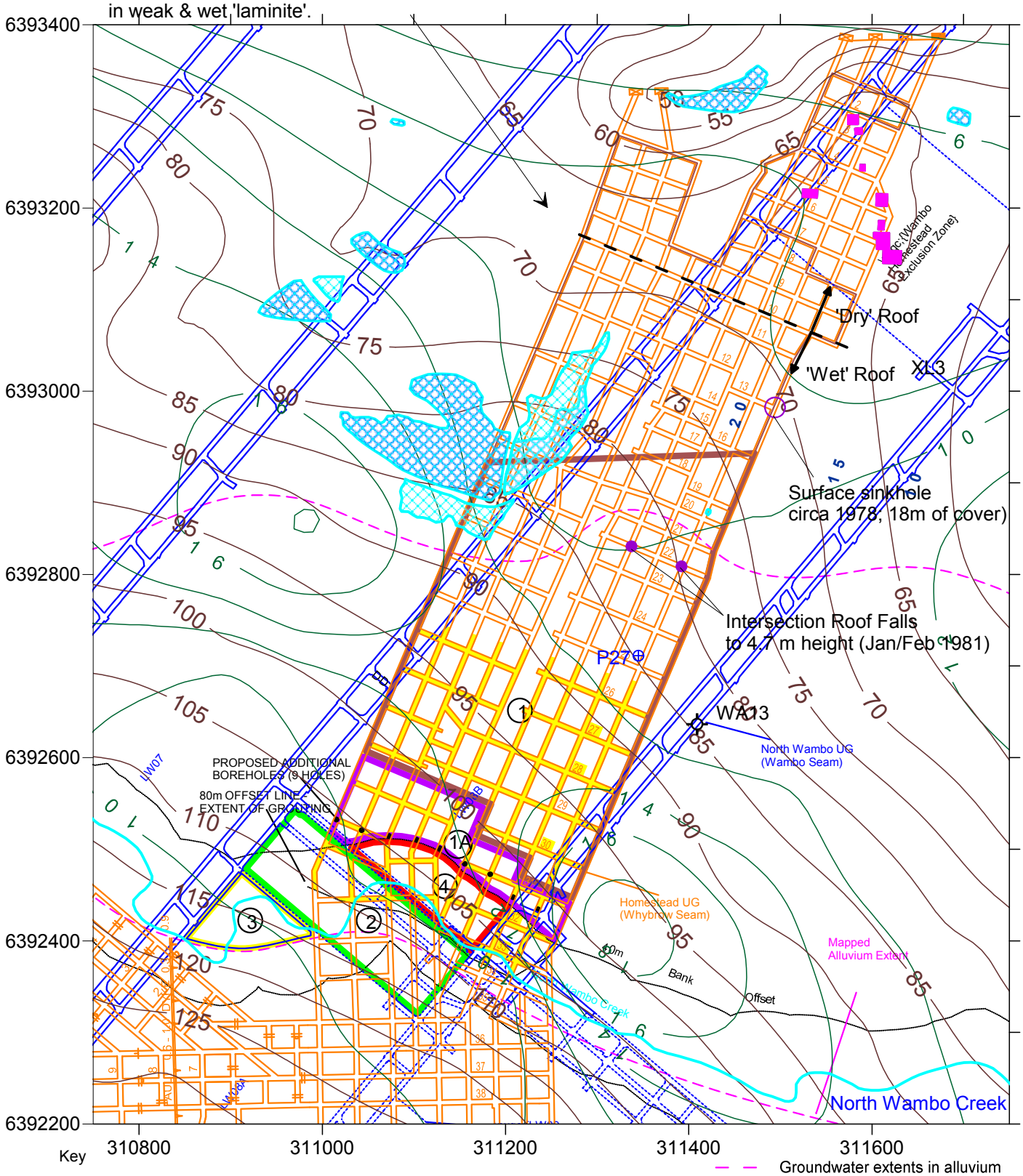


DgS	Engineer:	S.Ditton	Client:	Peabody Energy NWU-001/7	
	Drawn:	S.Ditton			
	Date:	23.08.13	Title:	Proposed North Wambo LWs 7 and 8 in the Wambo Seam with Proposed Grouting Options in the Whybrow Seam and Surface Alluvimum Thickness Contours	
	Ditton Geotechnical Services Pty Ltd		Scale:	1:600	Figure No: 1



DgS	Engineer:	S.Ditton	Client:	Peabody Energy NWU-002/7	
	Drawn:	S.Ditton			
	Date:	23.08.13	Title:	Proposed North Wambo LWs 7 and 8 in the Wambo Seam with Whybrow Seam Cover Depth Contours and Proposed Grouting Areas	
Ditton Geotechnical Services Pty Ltd			Scale:	1:600	Figure No: 2

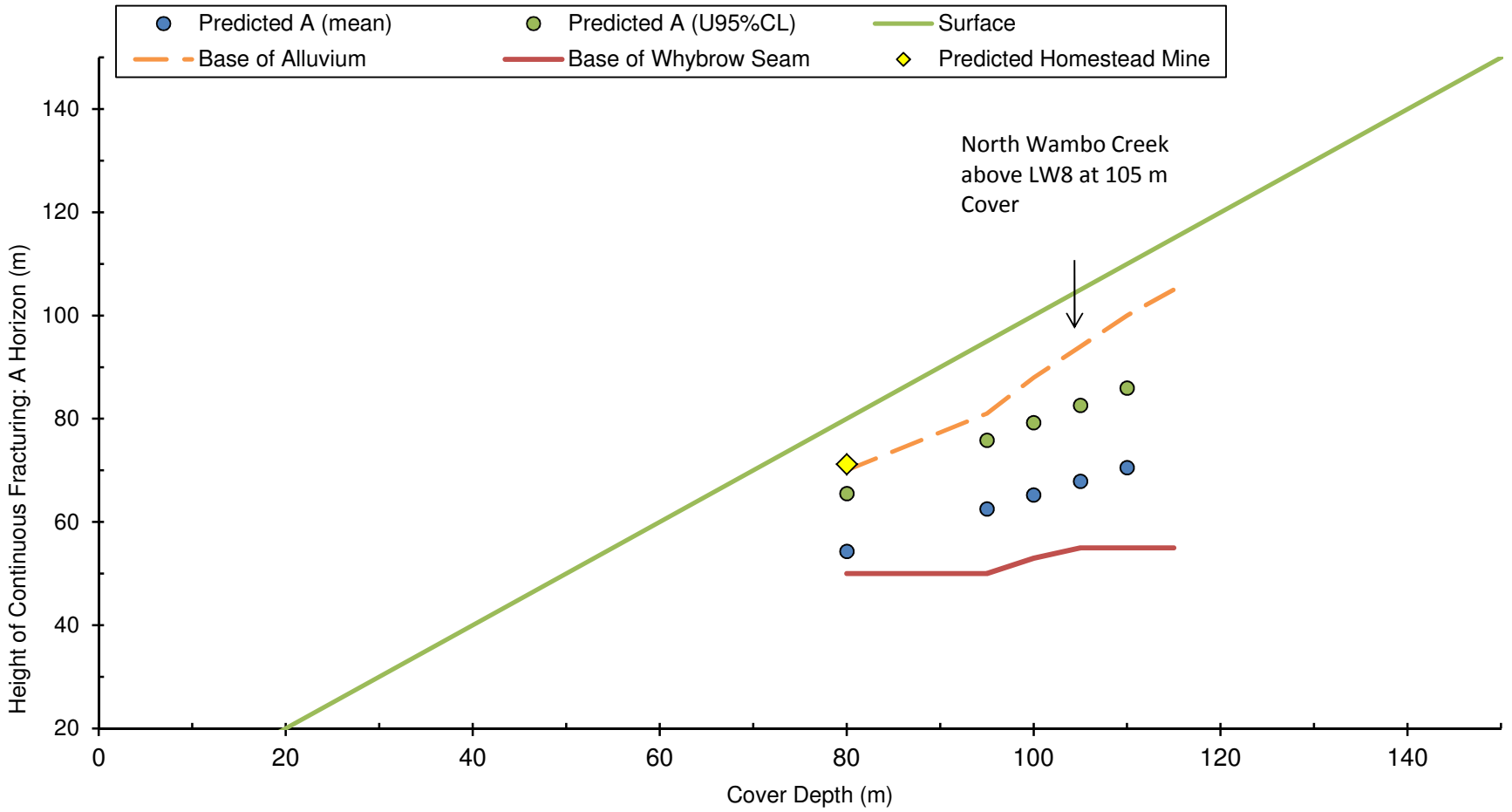
Note: Difficult roof conditions were encountered in-bye of 10 c/t, with 0.3 m to 0.5 m cavities forming in weak & wet 'laminite'.



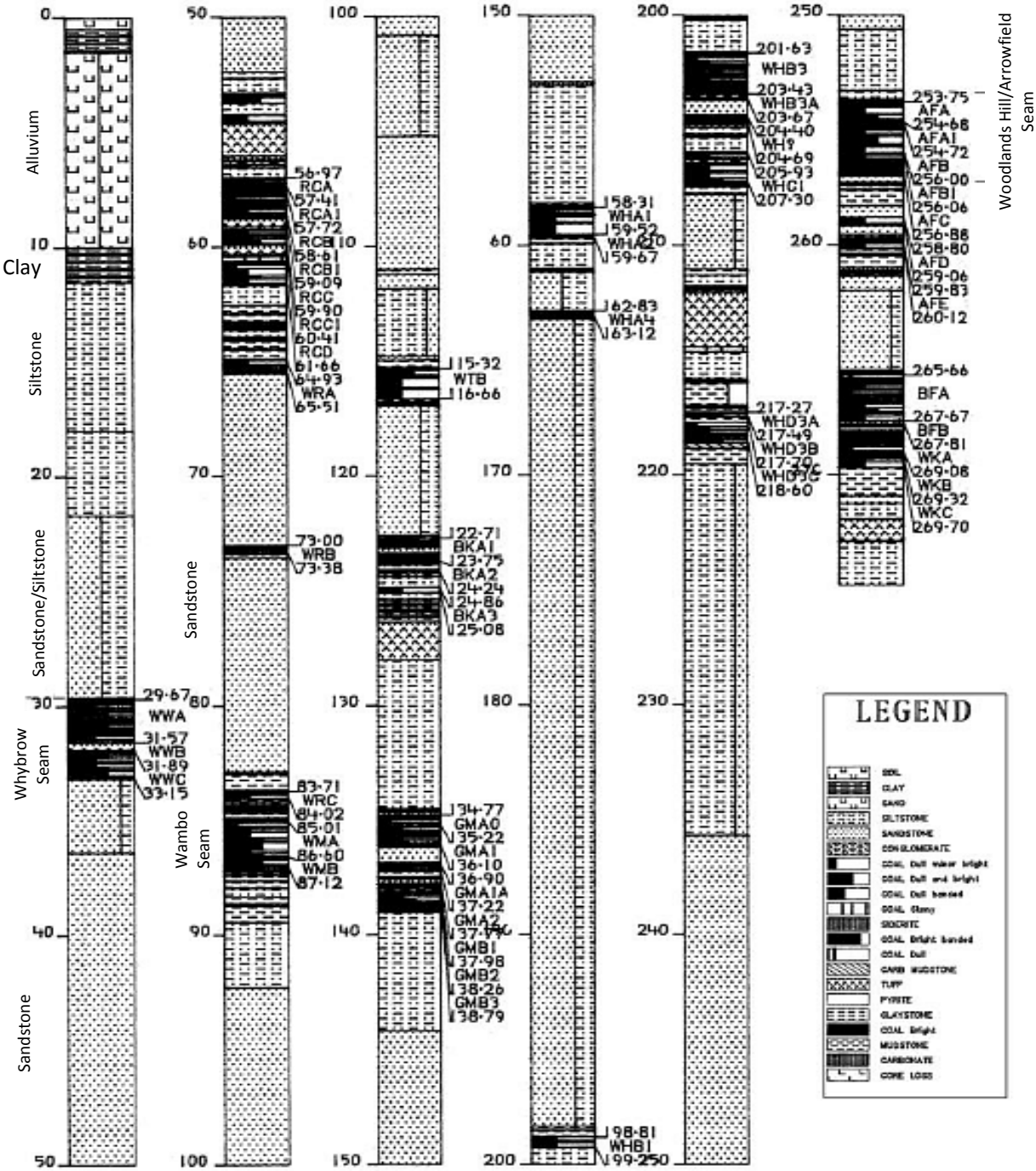
Key

- Existing NWU LWs in Wambo Seam
- Existing Homestead Mine Workings in Whybrow Seam
- Proposed Grouting Locations in Homestead Mine Workings
- Alluvium Thickness Contours (2m)
- ① Grouting Options 1 to 4
- Groundwater extents in alluvium
- Locations of Previous Instability in Homestead Workings
- Mine Dams
- WA13 Investigation Borehole
- Wambo Seam Cover Depth Contours

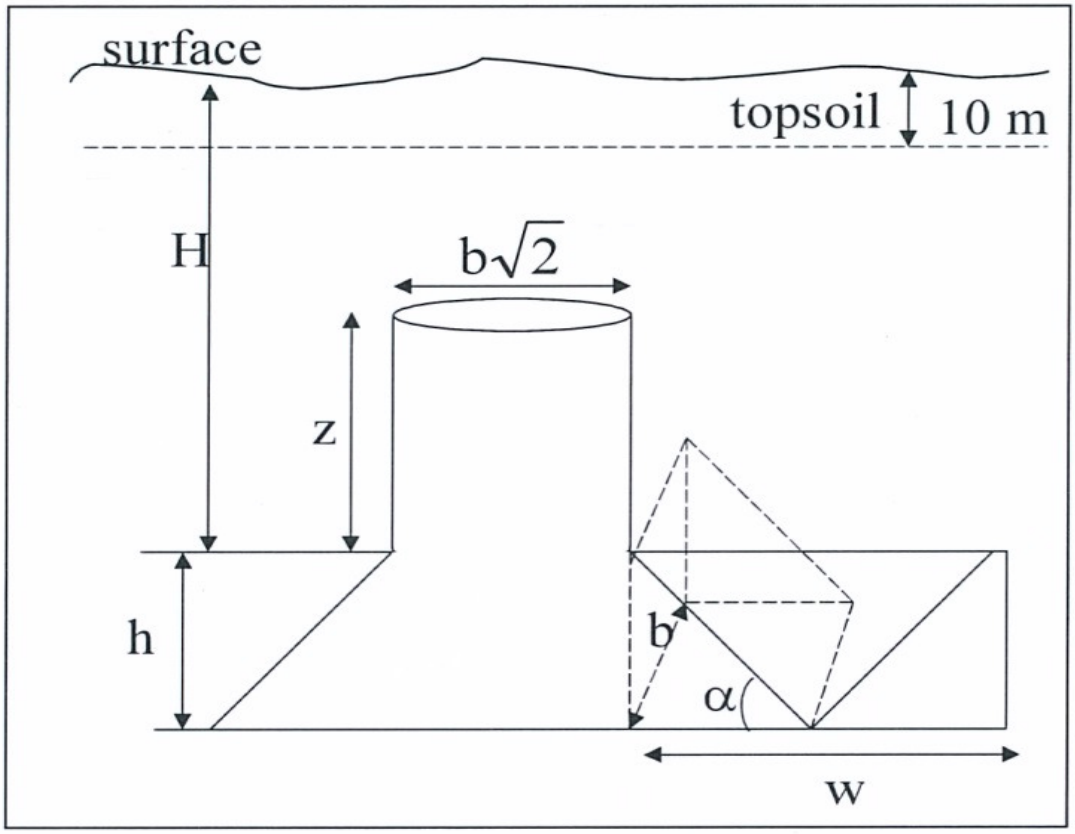
DgS	Engineer:	S.Ditton	Client:	Peabody Energy NWU-002/7	
	Drawn:	S.Ditton			
	Date:	23.08.13	Title:	Proposed North Wambo LWs 7 and 8 in the Wambo Seam with Wambo Seam Cover Depth Contours and Proposed Grouting Areas in the Whybrow Seam	
	Ditton Geotechnical Services Pty Ltd		Scale:	1:600	Figure No: 3



DgS	Engineer:	S.Ditton	Client:	Peabody Energy NWU-001/7	
	Drawn:	S.Ditton			
	Date:	23/08/2013	Title:	Predicted Heights of Continuous Fracturing above Longwall 8 in the Wambo Seam	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: 4



DgS	Engineer:	S.Ditton	Client:	Peabody Energy	
	Drawn:	S.Ditton		NWU-001/7	
	Date:	23.08.13	Title:	Borehole Lithology in WA13	
	Ditton Geotechnical Services Pty Ltd			(see Figure 2 for location)	
			Scale:		Figure No: 5



H = Cover Depth
z = Caving Height above intersection
b = Roadway Width
ψ = Bulking factor of collapsed material.
α = angle of repose of collapsed material
h = roadway height
w = pillar width between roadways

$z = 2[h^2b/\tan\alpha + b^2h]/[(\psi-1)\pi b^2]$

DgS	Engineer:	S.Ditton	Client:	Peabody Energy	
	Drawn:	S.Ditton		NWU-001/7	
	Date:	23.08.13	Title:	Pot-Hole Subsidence Caving Height Prediction Model	
	Ditton Geotechnical Services Pty Ltd		Scale:		Figure No: 6

Attachment A - Sub-Surface Fracturing Prediction Model Details

(Extract from Subsidence Prediction Models, DgS, 2013)

A11 Sub-Surface Fracturing Model

A11.1 Sub-Surface Fracturing Zones

The caving and subsidence development processes above a longwall panel usually result in sub-surface fracturing and shearing of sedimentary strata in the overburden, according to **Peng and Chiang, 1984** (see **Figure A40a**) and **Whittaker and Reddish, 1989** (see **Figure A40b**). The height of fracturing (HoF) is dependent on mining geometry and overburden geology.

International and Australian research on longwall mining interaction with groundwater systems indicates that the overburden may be divided into essentially four or five zones of surface and subsurface fracturing. The zones are defined in **Table A4** (in descending order):

Table A4 - Sub-Surface Fracture Zone Summary

Zone Type	Zone	Fracture and Groundwater Response Description	Typical Vertical Strain (mm/m)
Surface Cracking Zone (un-constrained)	D	Vertical cracking due to horizontal strains extending to maximum depths of 10 - 15 m. Surface waters may be diverted below affected area and resurface downstream where interaction with B & C Zones occur.	<3
Elastic Deformation Zone (dilated bedding & constrained)	C	Generally unaffected by strains with some bedding parting dilation. Horizontal strains constrained by overlying/underlying strata. Groundwater levels may be lowered temporarily due to new storage volume in voids between beds, but likely to recover at a rate dependant on climate. Elastic Zone may not be present if B or A Zones extend up to Surface Zone.	<3
Discontinuous Fracture Zone (dilated bedding & constrained)	B	Minor vertical cracking due to bending that do not extend through strata units. Increased bedding parting dilation and similar groundwater response to Zone C. Some groundwater leakage may occur to B Zone, however, losses likely to be recharged by surface hydro-geological system.	<8
Continuous Fracture Zone (unconstrained)	A	Major vertical cracking due to bending that pass through strata units and allow a direct hydraulic connection to workings below. Full depressurisation of groundwater occurs in the Zone that may recover in the long term once mining is completed.	>8
Caved (included in the A-Zone)	A	Caved strata up to 3 to 5 x Mining Height above the workings. Collapsed roof bulks in volume to provide some support to overlying strata.	>80

The characteristics of each HoF zone are further described below:

Starting from the seam level, the **Caved Zone** (included in the **A-Zone**) refers to the immediate mine workings roof above the extracted panel, which has collapsed into the void left after the coal seam has been extracted. The Caved Zone usually extends for 3 to 5 times the mining height, T, above the roof of the mine workings due to bulking factors of 1.3 to 1.5, and sometimes from 10 to 15T if the strata have low bulking properties (e.g. bulking factors of 1.10 to 1.15). Thinly bedded and laminated strata are likely to have lower bulking factors than thickly bedded or massive units within the Caved Zone.

The **Continuous Fracture Zone (A-Zone)** has been affected by a high degree of bending deformation, resulting in significant fracturing and bedding parting separation and shearing of the rock mass. Vertical tensile strains range from -10 to 140 mm/m with strata dilation in excess of 1 m. Compressive strains tend to develop at horizontal bedding separations after initial fracturing and overlying strata deflections occur resulting in re-compaction of the goaf and disturbed strata.

Continuous sub-surface fracturing refers to the zone of cracking above a longwall panel that is likely to result in a direct flow-path or hydraulic connection to the workings. All groundwater (or surface waters) within this Zone would be expected to drain vertically into the mine workings goaf.

The **Discontinuous Fracture Zone (B-Zone)** refers to the section of overburden immediately above the A-Zone that has also been deformed by bending action, but to a lesser degree than the A-Zone. The B-Zone will have bedding parting separations and discontinuous fractures through bending strata units due to vertical strains ranging from -2 to 8 mm/m and strata dilation from 30 mm to 400 mm, depending on the panel width. An increase to horizontal rock mass permeability (hydraulic conductivity) is expected in the B-Zone with groundwater flowing horizontally into dilated strata.

Only minor vertical permeability increases are expected in the B-Zone due to alternating horizontal tensile and compression zones associated with Voussoir Beam action above the A-Zone. It is noted in **Whittaker and Reddish, 1989**, that some groundwater leakage from the B-Zone to the A-Zone is possible due to limited crack or joint interaction between the zones.

Overall, the majority of the B-Zone is considered to be a ‘constrained dilated’ strata zone with low connectivity potential to the mine workings. The B-Zone therefore represents a sub-surface fracturing zone that causes only minor groundwater system disturbance.

The **Elastic Deformation Zone (C-Zone)** is where the strata may have suffered minor bed separations (due to vertical tensile strains between 1 and 2 mm/m) and horizontal shearing, with cracking and jointing unlikely to cause a major change in vertical hydraulic conductivity. The bedding separations of up to 30 mm will allow minor increases to horizontal hydraulic conductivity, but they are more likely to act as additional groundwater storage ‘reservoirs’ with only minor groundwater system losses expected.

The development of the Elastic Deformation Zone (C-Zone) will depend on the cover depth above the workings, the mining geometry and the presence of spanning strata. The C-Zone is probably only likely to develop above critical to sub-critical mining geometries (i.e. W/H < 1.4) but may also be present above super-critical panels also (see **Section 11.3**).

As for the B-Zone, the Elastic Deformation Zone is also likely to be predominately in compression due to natural arch formation above sub-critical and critical panels and will also act as barrier to vertical drainage of groundwater. Groundwater will still able to 'leak' downwards through the C-Zone due the presence of naturally occurring vertical joints in the rock mass. However, the presence of low permeability strata such as claystone, tuff and mudstone and zones of compressive strain in the spanning region of the overburden will limit rock mass 'gaps' and further retard vertical flow rates.

In the absence of significant geological structure (i.e. faults and dykes), the overall effect on the surface groundwater system due to leakage through the B and C-Zones will be minimal, with re-charging of groundwater losses likely to occur from the surface hydrological system. The presence of significant geological structure may increase the drainage rates through these strata zones however. Monitoring of mine groundwater makes v. rainfall - runoff data will determine the rate of leakage that is occurring through these zones.

The **Surface Cracking Zone (D-Zone)** includes the vertical cracking due to horizontal tensile and compressive strains caused by mine subsidence deformation. The D-Zone may extend to depths ranging from 5 m to 20 m (typically < 15 m) in the Newcastle Coalfield, and is dependent on near-surface geology and surface topography.

For mine design purposes, typical D-Zone depths in relatively flat terrain may be assumed to range from 10 m to 12 m (i.e. < 15m). *Note: **Forster and Enever, 1992** adopted a D-Zone thickness of <15 m based on data from Wyee and Cooranbong Collieries, and included it in the minimum cover depth formula of 45T+10 m for designing supercritical panels below tidal waters of Lake Macquarie in the Newcastle Coalfields.*

A11.2 Mine Design Criteria for Sub-Surface Fracture Height Control

When designing mining layouts for sub-surface fracture control, the A-Zone is the most significant in regards to groundwater and surface water interaction as it represents the region of broken ground whereby a hydraulic connection to the mine workings will most certainly occur.

The B-Zone is probably just as important as it represents the transition zone between the continuously fractured ground and elastic deformation or surface zones. The B-Zone also includes strata which are confined and where bedding parting separations (i.e. dilations) occur in the sagging rock mass above the caved and broken strata units in the A-Zone.

The C-Zone has been deformed as well, but not to the same extent as the B-Zone.

Note: It is difficult to define the boundary between the B and C-Zones without vertical strain measurements from extensometers, however, both zones are considered to be 'constrained dilated' zones that act as an effective barrier between the A-Zone and near surface groundwater and surface watercourses.

The formation and thickness of the HoF Zones will firstly be dependent on the 'criticality' of the proposed longwall panel. The same terms used for subsidence prediction are also referred to below and are based on the ratio between panel width (W) and the cover depth (H):

- Subcritical refers to panels with W/H < 0.7;
- Critical refers to panels with W/H > 0.7 and < 1.4; and
- Supercritical refers to panels with W/H > 1.4.

Several case studies have been referred to below which consider super-critical and sub-critical panel geometries separately due to their fundamental differences in spanning behaviour.

Conceptual models of the A and B-Zones above supercritical panels are presented in **Whittaker & Reddish, 1998** and are based on physical modelling results. **Forster and Enever, 1992** indicated similar strata zoning from field monitoring (**Figure A40c**) above supercritical, total pillar extraction panels in the Lake Macquarie Area of the Newcastle Coalfield.

A conceptual model that includes the B and C-Zones was presented in **ACARP, 2007** (**Figure A40d**) for sub-critical mining geometries in the Western Coalfield. A similar sub-surface fracture zoning is also suggested by **Mark, 2007** (**Figure A40e**) for the US Coalfields and **Kendorski, 1993** for the UK Coalfields (**Figure A40f**).

From the above conceptual height of fracturing models, several simple empirical models have been developed over the years to estimate the thicknesses of the A, B and C-Zones for the purpose of avoiding groundwater and surface water connectivity with underground mines. The suite of HoF prediction models that probably represent the state-of-the-art are summarised in the following sections.

A11.2.1 Wardell, 1975, Reynolds, 1977 and Singh and Kendorski, 1981

Wardell, 1975 recommended that a minimum rock cover depth of 50T - Surface Zone thickness above total extraction or longwall panels when mining under tidal waters in the Newcastle Coalfield. The minimum cover depth (H) was based on a maximum horizontal tensile strain limit of 7.5 mm/m and the Newcastle Holla curves. It is noted that a maximum horizontal tensile strain of 10 mm/m has been specified in the UK when mining below permanent waters.

Wardell has also recommended a minimum cover depth of 60T (which included a Surface Zone thickness ranging from 12 m to 15 m) for mining below stored waters with longwalls in the Southern Coalfield.

The Wardell Guidelines recommended that panel widths should be limited to <0.4H to maximize the thickness of the Constrained Zone (i.e. B and C-Zones) beneath tidal waters. **Reynolds, 1977** recommended 0.33H for maximum panel widths at depths more than 120 m below the reservoirs in the Southern Coalfield.

The height of continuous fracturing was not estimated in the Wardell Guidelines, but probably assumed to be significantly lower than 50T - the 15 m thick surface cracking zone. **Holla, 1991** noted that the 60T value is dependent on the S_{max} and K ratio (and hence W/H ratio) and should not be applied blindly to all mining geometries.

Singh and Kendorski, 1981 adopted a general height of A-Zone Fracturing of $56T^{0.5}$ based on a review of international case studies with a minimum Constrained plus Surface Zone thickness of 45 m for mudstone and 57 m for sandstone strata conditions when mining below tidal waters. The model recognizes that fracturing may extend further through massive strata than thinly bedded units due to their propensity to carry greater load.

A11.2.2 Whittaker and Reddish Physical Model, 1989

It is considered that the published physical modeling work in **Whittaker and Reddish, 1989** provides valuable insight into the mechanics of sub-surface fracturing over longwall panels. The outcomes included specific guidelines (over and above such work as the Wardell, 1975 Guidelines) for the prevention of inundation of mine workings beneath surface and sub-surface water bodies.

The **Whittaker and Reddish, 1989** height of fracturing model was developed in response to the water ingress problems associated with early longwall extraction at the Wistow Mine in Selby, UK. The longwall panel was located at 350 m depth and experienced groundwater inflows of 121 to 136 litres/sec when sub-surface fracturing intersected a limestone aquifer 77 m above the seam.

The physical model is a scaled down version of the real-world, and therefore requires compatible material strength properties (i.e. plaster) to generate fracturing from the laboratory-sized void widths and mining heights being simulated. The pattern of cracking and heights of fracturing observed should therefore not be dismissed because of the materials used to create the model.

The Whittaker and Reddish model identifies two distinct zones of fracturing above super-critical width extractions (continuous A-Zone and discontinuous B-Zone fracturing) and indicates the height of each is a function of maximum tensile strain at the surface. As such, its use is also based upon being able to make credible subsidence and strain predictions. The mechanical concepts of the model are shown in **Figure A40b**.

The definition of the 'continuous' height of fracturing refers to the height in which a zone of direct hydraulic connection for groundwater inflows to the mine workings develops (i.e. the A-Zone).

The definition of the extent of 'discontinuous' height of fracturing refers to the height at which the horizontal permeability increases as a result of strata de-lamination and incomplete fracturing through the strata beds (i.e. the B-Zone). Minor occurrences of direct connection of fractures to the workings is considered possible, but will depend on the geology (e.g. massive units and / or the presence of persistent vertical structure such as faults and dykes).

The outcomes of the modeling work resulted in two logarithmic type curves that relate the surface horizontal strain to the measured A and B fracture heights normalized to the cover depth (see **Figure A40b**).

The physical modeling work that was completed to derive the prediction curves is summarised below:

- The physical model was constructed from multiple layers of coloured sand and plaster with sawdust bond breakers placed between each successive layer. The model was initially devoid of vertical joints or cracks.

- The scale and mechanical properties of the model satisfied dimensional analysis and similitude laws. *Note: This aspect of mechanical models is very important, as overburden strength properties will not fracture if they are too high for the model's mining geometry.*

- The model was used to simulate the overburden behaviour of a panel with a W/H ratio of 1.31 and a progressively increasing working height range that commenced at 1.2 m and finished at 10.8 m. The advancing longwall face was simulated by removing timber blocks at the base of the model in 1.2 m to 2.0 m lift stages.

- The extent or heights of 'continuous' and 'discontinuous' fracturing above the longwall 'face' were measured and plotted with the associated peak tensile strain predictions at the surface. The strains were calculated using the method provided in the UK Subsidence Engineers Handbook, 1975.

- The fracturing path progressed up at an inward angle of approximately 18^{o} from the solid rib and increased towards the centre of the panel higher up into the strata. Continuous fracturing occurred in the cantilever bending zone close to the rib-side only, as fracturing in the overburden above the middle portion of the panel tended to 'close' and did not appear to represent an area where groundwater inflows into the workings would eventuate.

- Any inflow conditions were therefore considered to be "mainly associated with the longwall rib-side fracture zone [or tensile strain zone]" above 'supercritical' longwall panels.

The findings above are considered reasonable for super-critical longwall geometries where panel widths are greater than the critical width (i.e. 1.4H) and the height of fracturing is likely to be controlled primarily by the mining height.

A11.2.3 Forster and Enever, 1992

A comprehensive monitoring program above two supercritical pillar extraction and one longwall panel in the Great Northern Seam was presented in **Forster and Enever, 1992**.

The outcomes of the work was to recommend a reduction in the minimum rock cover limit required to extract coal beneath Lake Macquarie to 45T + 10 m, and was based on borehole piezometric and rock mass permeability testing before and after total extraction mining. The 10 m was not added to account for the surface cracking zone, but to allow for localized depressions that could reduce the rock cover thickness to < 45T. The surface cracking zone of <15 m was therefore included in the 45T+10 m criterion.

The height of continuous fracture zone was assessed to have ranged between 21T and 33T above the mine workings. The thickness of the Constrained Zone was defined as being dependent on the cover depth, but should be > 12T + 10 m below tidal waters.

The thickness of the 'Constrained Zone' above the 'Fractured Zone' was also considered to have greater importance in regards to providing a groundwater drainage path barrier than the tensile strain limit of 7.5 mm/m set by **Wardell, 1975**. It was considered that the thickness of the Constrained Zone and the presence of low permeability lithologies, such as mudstone and claystone, were more likely to influence the performance of the strata barrier above the A-Zone than putting a limit on surface strain. The strain limit criterion has subsequently been left out of sub-aqueous mine design criteria in NSW Coalfields.

A11.2.4 ACARP, 2006

This report reviews the impacts of shallow longwall mining on the groundwater systems based on fieldwork conducted in the Hunter Valley, NSW (Beltana Mine) and Bowen Basin, Queensland (Gregory Crinum Mine).

The **ACARP, 2006** report suggests that continuous cracking is likely to occur through the strata beams within the Fractured Zone defined by an "angle of break" of 12^o to the vertical and extending inwardly from the rib-sides. International research suggests a range between 10^o and 15^o.

A complementary set of fractures would also be expected to develop further inside the panel on the undersides of the bending units where full subsidence develops in the strata. The angle to full subsidence ranges from 25^o to the vertical according to **ACARP, 2006** and from 32^o to 45^o in **Li and Cairns, 2000**.

Back analysis of the angles of break suggest that surface to seam cracking could theoretically reach the surface above panels that are wide enough to prevent the opposing cantilevering abutments to interact together and limit fracturing. For a panel width of 200 m, this would

occur where cover depths are < 370 m to 470 m (due to angles of break of 12^o to 15^o). It is also noted that the inferred height of fracturing is very sensitive to the assumed angle of break.

Note: The panel geometry discussed is actually still in the sub-critical range (i.e. W/H < 0.7) and it is considered by DgS that theoretical fracturing to the surface can only occur in the critical to supercritical panel width range.

ACARP, 2006 also notes an absence of surface to seam fracturing connection or groundwater inflows in the literature, where sub-aqueous mining has occurred below a depth of cover of 120 m to 160 m (for assumed critical to super-critical panel widths). The reason for this phenomenon is considered to be related to the observation that cracked and rotated blocks may still interact and provide low permeability regions in the zones of compressive strain above and below tensile cracking in the deflected beams. It was assessed that the reduction in effective span due to the cantilever effect over the ribs and increase in support that develops to overlying strata units may also allow strata units as thin as 10 m or so span across the fractured zone.

The report concluded that the height of continuous fracturing is therefore likely to be controlled by either spanning strata units or units that are not spanning which are thick enough to stop fracturing occurring right through the unit.

In the case of the non-spanning strata mechanism, **ACARP, 2006** did not have the resources available to fully evaluate what the minimum strata thickness range is likely to be in order to limit the continuous fracturing height.

Note: A similar conclusion was reached by DgS after a case by case review by DgS of supercritical longwall geometries in the NSW Coalfields in this study. It is also considered likely that this phenomenon would require the compressive stress in the deformed rock mass units to exceed their unconfined compressive strength for complete break-through to occur. However, it is also apparent that the presence of thin strata units that deform predominately in shear along slipping bedding partings, can also limit vertical cracking from developing to the surface cracking zones.

A11.2.5 MSEC, 2011 and SCT, 2001

The MSEC and SCT models are based on several published case-studies for mining impacts in the NSW Coalfields and their own internal analytical and numerical modeling results. The 'heights of fracturing' are predicted based on longwall and total pillar extraction panel widths and indicate maximum values ranging from 1W to 1.5W (SCT) and 1.374 (W-30) (MSEC).

The database of 'observed heights of fracturing' and the above panel width models are presented in **Figure A40g**.

Based on a review by DgS of the database on which the MSEC and SCT models are derived and extensometer and vertical strain measurements at other mines, that it is apparent that their

models include cases of both A and B-Zone fracture heights (see **Figure A40g** and **Section 11.3** for further details). DgS concludes that the MSEC and SCT 'height of fracturing' models are probably conservative.

It is also apparent that there are three cases in the database which indicate 'fracturing through to the surface' has occurred (LW1 at Invincible, LW11 at Angus Place and LWE1 at South Bulga). A review of the extensometer data published by **Holla, 1991** for the Invincible case study, DgS concurs with the assessment that continuous fracturing has probably extended to the surface (or to within 10 m of it). DgS has requested a copy of the Angus Place and South Bulga reports for review before the results of these studies are confirmed.

A11.2.6 Bulli Seam PAC, 2010

The NSW Government Planning and Assessment Commission (PAC) identified several deficiencies in the commonly used 'height of sub-surface fracturing' models as follows:

- It is apparent that prediction models based on panel width only indicate significantly greater sub-surface fracture heights than models based on mining height only.

- The panel width only-based models do not seem to distinguish between continuous and discontinuous fracture heights, so it is probably the case that the data on which they are based are likely to include both A and B fracture zones.

- The mining height models do not include the influence of panel width, which is believed to be a key parameter as well.

- The authors and reviewers of the prediction models all recognize the deficiencies in the height of fracturing models that are based solely on panel width or mining height. They also indicate that more thorough analysis is probably required to determine a 'more definitive' function that relates the height of connective cracking to the mining geometry. The height of fracturing is also considered unlikely to extend further up into the strata once the critical panel width is reached (for a given mining height).

A11.2.7 State of the Art Summary and Gap Analysis for Alternative Models

In summary, the literature review outcomes indicate the following:

- The A-Zone is assessed to range from 21T to 33T above supercritical panels and from 43T to 60T above critical and sub-critical panels. The B and C-Zone thicknesses will generally depend on the cover depth less the A-Zone Horizon estimate.

- The models that are based on the longwall panel widths only indicate maximum 'heights of fracturing' that range from 1.0W to 1.5W (SCT) and 1.374(W-30). These models however, probably include both A and B-Zone fracture heights in some instances and are therefore likely to be conservative.

- It is apparent that the published height of fracturing models based on mining height alone varies significantly for supercritical, critical and sub-critical mining geometries. The A-Zone could (and does) extend higher up into the overburden above sub-critical panel geometries as the fracturing due to strata deformation is also influenced by the panel width.

- It is also reasonable to assume that the maximum height of the A-Zone will probably occur above the centre of a sub-critical longwall panel with a naturally spanning catenary arch.

- Surface drilling investigations above subsided longwall panels in NSW and QLD have found the maximum height of fracturing is in fact 'dome-shaped' and develops somewhere between the point of maximum tensile strain and the centre of the panels.

- In order to distinguish between A and B-Zones it is considered best-practice to install borehole extensometers and multiple-piezometers (deep and shallow) above longwall panels and measure the various fracture and dilated zones based on anchor displacements, vertical strain and the short to medium term impacts to established groundwater regimes.

- When longwall mining beneath lakes and sensitive groundwater aquifers, it is essential that the mining geometry be controlled to provide an effective B/C-Zone or Constrained Zone thickness to minimise the potential for connective cracking to develop up to the feature. The presence of geological structure should also be considered as it may act as a potential groundwater conduit between the A and B-Zones.

- Based on **Forster and Enever, 1992**, the minimum Constrained Zone (B/C Zone) thickness above the Fractured A-Zone should be >12T + 10 m and includes the surface cracking zone thickness of <15 m beneath Lake Macquarie. The minimum B/C Zone thickness does not include weathered material and/or alluvial sediments.

- For cases where permanent water bodies do not exist, but surface to seam hydraulic connection is not desirable, it is recommended that the continuous height of fracturing zone should not encroach within the surface cracking zone (ie. A minimum of 10 m to 12 m below the surface should be assumed generally, but may need to be increased up to 20 m for steep topography affects).

- As mentioned earlier, the height of A-Zone fracturing is strongly dependant on the presence of the bridging capability of massive conglomerate or sandstone units above a given panel. Therefore, estimating the height of A and B-Zone fracturing also requires a review of the overburden lithology and the presence of geological structure.

- It is also apparent from a case by case review, that the height of fracturing may be controlled by strata that is not actually spanning, but may be thick enough to stop fracturing occurring right through the strata unit. For this scenario, it is considered the height of fracturing will be controlled by (i) the thickness of the strata units relative to the panel width and its location above the workings, (ii) the thickness of compressible goaf material that will induce curvature in the overlying strata units as the goaf is compressed, and (iii) the presence of semi-impermeable strata units such as mudstone and claystone in the B-Zone.

- For the case of sub-critical panels, the maximum non-spanning strata height and load acting on the goaf will probably be limited by the 'natural' or catenary arch that can form across the mined void width.

- For super-critical panels on the other hand, the height of fracturing could theoretically reach the surface and the maximum load acting on the goaf will probably equal the cover depth.

Based on the HoF prediction model review, it was considered necessary in this study to:

(i) review and expand the database of continuous and discontinuous cracking to include a representative range of mining geometries on which to base the empirical models on;

(ii) update and re-evaluate the **ACARP, 2003** models;

(iii) attempt to develop further subsurface fracturing models that included the panel width, mining height, cover depth and lithology (strata unit thicknesses and its mechanical properties).

(iv) provide a clearer definition of the surface cracking depth (D-Zone).

A11.3 Expansion of the Database and Review of Sub-Surface Fracturing Prediction Models Presented in ACARP, 2003

A recent review of the **ACARP, 2003** database and the inclusion of new HoF data has recently been undertaken by DgS in 2012 and 2013 for various projects in the Newcastle/Lake Macquarie and Hunter Valley Coalfields. The up-dated database is presented in **Table A4.1** and includes a greater number of cases where A and B-Zone fracture heights have been determined from borehole extensometer and piezometeric data collected over a reasonable period of time (i.e. > 12 months after mining impacts). Surface and groundwater interaction may also be established by other means in the absence of piezometers and extensometer results (e.g. mine water make increases several days or weeks (instead of months) after rainfall events, would indicate direct hydraulic connection to the surface).

The measured coalfield data base presented in **ACARP, 2003** was based mainly on a dataset of post-mining drilling data to estimate heights of fracturing for the A and B-Zones (except for the **Forster and Enever, 1992** data). The updated model database now includes further data from the Southern and Western NSW coalfields presented in **MSEC, 2011** (see **Figure A40g)** and additional Newcastle Coalfield cases based on extensometer and piezometric data from Abel, West Wallsend and Mandalong Mines.

Based on a review of published extensometer results presented in **Holla, 1991**, **Frith, 2006, MSEC, 2011** and **ACARP, 2007**, it is assessed that there are six cases in the database presented in **MSEC, 2011** that appear to include the B-Zone and three cases whereby the 'height of fracturing' is claimed to reach the surface a distance above the workings of 43T (Invincible Colliery, LW1), 57T (South Bulga LWE1) and 105T (Angus Place, LW11); see **Figure A40g**. A fourth surface to seam connective cracking case (Homestead, LW9) was also added to the database.

In order to use the height of fracturing data presented in **MSEC, 2011** with the **ACARP, 2003** data, it was necessary to identify the likely A-Zone cases and B-Zone cases based on the following fracture zoning criteria:

(i) B-Zones are likely to have vertical strains of <8 mm/m, based on measured values for cases with piezometer-established B-Zone strains measured at other mines; and

(ii) it does not necessarily follow that uniform vertical strains throughout the strata mean the height of continuous fracturing is likely to have reached the surface. The uniform strains may also be due to strata bedding dilations if strains are < 8 mm/m.

The results of the database review and re-assignment of A to B Zones are shown in **Figure A40h**.

At this stage the height of fracturing claimed for Angus Place LW11 is well above established ranges and based on extensometer data only. The point has been removed from the database at this stage and assumed to be an outlier until confirmation of its validity can be obtained. The

remaining two points are just within the quoted ranges in the literature and have been left in the data base for further analysis as follows:

- The height of fracturing for LW1 at Invincible Colliery was assessed to extend to within 10 m of the surface, with the B-Zone extending to the surface.

- The height of fracturing for LWE1, South Bulga has been assumed to have reached 10 m below the Surface as the extensometer data is not available to review at this stage.

It has also been decided to remove two case study points (Central and Southern German Creek Mines) from the original **ACARP, 2003** data base due to the uncertainty associated with using drilling data only above old goaves to assess the height of fracturing.

A summary of the extensometer results for the amended A-Zone to B-Zone cases is presented in **Table A4.2**.

The expanded database presented in **Table A4.1** has subsequently been used to update the strain and curvature index-based models presented in **ACARP, 2003** in the following sections.

Table A4.1 - Updated HoF Model Database for Australian Coalfields

Site	Panels	Mine	W (m)	H (m)	W/H	T (m)	A (m)	B (m)	A/T	ACARP 2003 Model Predictions				
										t^ (m)	y^ (m)	Unit SRP*	U95%CL S_{max} (m)	U95%CL E_{max} (mm/m)
1	LW10	Metropolitan	140	460	0.30	3.4	130	-	38	50	130	High	0.29	3
2	LW1 to 4	South Coast	110	325	0.34	2.5	85	-	34	50	85	High	0.24	3
3	LW6	Kemira	117	335	0.35	1.7	98		58	50	98	High	0.16	2
4	LWA1	Austar	159	453	0.35	6.0	126	243	21	50	143	High	0.56	4
5	LW20	Metropolitan	163	450	0.36	3.4	100	-	29	50	100	High	0.34	2
6	LW514	Bellambi West	150	400	0.38	2.7	90	-	33	50	90	High	0.29	2
7	LW28	Appin	200	500	0.40	2.3	90	-	39	50	90	High	0.27	1
8	LW2	Ellalong	150	368	0.41	3.5	*113*	*210*	*32*	50	113	High	0.40	3
9	LW3	Tahmoor	180	424	0.42	2.2	-	*204*		50	100	High	0.29	2
10	LW9	Teralba	150	350	0.43	2.7	110	150	41	37	110	High	0.32	2
11	TE	West Cliff	200	446	0.45	2.5	*101*	*300*	*40*	50	101	High	0.30	1
12	LW11	Angus Place	211	263	0.80	2.5	***253***	*258*	*102*	10	210	Low	1.11	5
13	LW5	Mandalong	160	179	0.89	3.7	118	162	32	25	82	High	0.68	5
14	411	Springvale	315	350	0.90	3.3	*139*	*244*	*43*	72	139	High	1.38	3
15	LW5	Dendrobium	245	255	0.96	3.8	123	-	33	50	123	High	1.25	5
16	LW1	Wyee	216	206	1.05	3.4	126	-	37	25	126	High	1.09	5
17	LW1	Invincible	145	116	1.25	2.7	*96*	111	36	13	63	Low	1.62	16
18	Panel1	Abel 1	120	95	1.26	2.6	45	75	18	10	41	Low	1.51	22
19	LW40	WWD	179	113	1.58	3.8	80	108	21	20	45	Low	2.28	21
20	LWE1	Sth Bulga	259	155	1.67	2.6	***145***	150	57	10	124	Low	1.53	8
21	LW41	WWD	179	105	1.70	3.8	72	100	19	14	36	Low	2.28	24
22	LW9	Crinum	280	155	1.81	3.5	85	150	24	35	105	High	1.82	8
23	LW39	WWD	179	97	1.84	3.9	68	92	17	14	34	High	2.18	25
24	TE	Wyee North 3D	355	185	1.92	1.9	63	143	33	40	63	Moderate	1.14	4
25	355	Wyee North (LW4)	355	180	1.97	1.9	40	-	21	40	40	Low	1.14	4
26	Panel2	Abel 2	150	76	1.97	1.9	45	71	24	10	33	Low	1.13	23
27	TE	Cooranbong North B	150	75	2.00	2.8	58	70	21	10	58	High	1.68	33
28	LW1	Oaky Creek	205	95	2.16	3.2	55	90	17	12	55	Low	1.92	25
29	LW9/9a	Homestead	200	80	2.50	3.3	70	75	21	10	62	Low	1.98	29

- = not available;
bold - surface to seam fracturing assessed by others. DgS unable to review these assessments and currently considered to be outliers compared to rest of data base;
italics - Continuous Fracture Zone heights (A-Zone) assessed by others may have included the Constrained Discontinuous Fracture and Dilated Zone (B-Zone) and have been assumed at this stage to equal the height of the B-Zone based on data review of measured vertical strains by DgS (see **Figure A40h**);
No shade - Sub-critical panels; Light grey shade - Critical panels; Grey shade - Supercritical panels.
* - SRP = Subsidence Reduction Potential for strata unit with thickness t and distance y above the workings. The SRP may be due to spanning or bulking behavior over the range of W/H and is also considered to be an indicator of whether a strata unit will limit the height of continuous fracturing (despite whether its spanning or not).
^ - maximum likely values assumed from borehole data.

Table A4.2 - Summary of Measured A, B, C & D Zone Strains in Extensometers*

Parameter	**Underground Coal Mines**									
	Springvale		**West Wallsend**				**Abel^**			
Panel No.	LW411		LW39		LW40		Panel 1		Panel 2	
Cover Depth H (m)	368		97		113		95		76	
Panel Width W (m)	315		179		179		120		150	
W/H	0.90		1.84		1.58		1.26		2.0	
Mining Height, T	3.25		3.8		3.9		2.1		2.1	
Fracture Zone	Dilat-ion (mm)	**Strains# (mm/m)**	Dilat-ion (mm)	**Strains# (mm/m)**	Dilat-ion (mm)	**Strains# (mm/m)**	Dilat-ion (mm)	**Strains# (mm/m)**	Dilat-ion (mm)	**Strains# (mm/m)**
D-Zone	-	***3***	-	***25***	-	***24***	-	***24***	-	***23***
C-Zone	<15	**<1**	<10	**1 - 2**	-	**-**	<13	**<1.5**	-	**-**
B-Zone	15 - 80	**1 - 2**	12 - 30	**2 - 3**	30 - 213	**<8**	30 - 86	**2 - 3**	<20	**-1 - 0**
A-Zone	2300 - 2800	**32 - 42**	636 - 1907	**-204 - 139**	236 - 1833	**18 - 77**	734 - 1351	**-46 - 40**	78 - 298	**-22 - 19**
Parameter	**Mandalong**		**Austar**		**Ellalong**		**Invincible**		**Tahmoor**	
Panel No.	LW5		LWA1		LW2		LW1		LW3	
Cover Depth H (m)	179		453		368		116		424	
Panel Width W (m)	160		159		150		145		180	
W/H	0.89		0.35		0.41		1.25		0.42	
Mining Height, T	3.7		6.0		3.5		1.26		2.2	
Fracture Zone	Dilat-ion (mm)	**Strains# (mm/m)**	Dilat-ion (mm)	**Strains# (mm/m)**	**Strains# (mm/m)**		**Strains# (mm/m)**		**Strains# (mm/m)**	
D-Zone	-	***5***	-	***3***	***3***		***10***		***1***	
C-Zone	<20	**<1**	<10	**<1**	**<1**		**-**		**<1**	
B-Zone	20 - 166	**2 - 5**	30 - 365	**-3 - 7**	**1 - 5**		**<5**		**1 - 4**	
A-Zone	2008 - 1242	**80**	411 - 1820	**11 - 59**	**>10**		**10 - 75**		**N/A**	

* - A, B & C-Zone strains are vertical.
italics - D-Zone strains are horizontal.
- Tensile strains are positive.
^ - Effective mining height for total pillar extraction (Te = 0.85T).

A11.3.1 Updated Tensile Strain Model

The tensile strain model presented in **ACARP, 2003** was found to have a much stronger fit to the new database for the A-Zone, with only a slight improvement for the B-Zone horizon apparent. The R^2 value for the logarithmic regression curve fitted to the A-Zone data was previously 0.44 and is now 0.70. The R^2 value for the B-Zone was previously 0.46 and is now 0.47.

The results of the review of the strain based model are presented in **Figure A41a** and summarized below:

{A-Line} Mean A/H = $0.180\ \mathrm{Ln}(E_{max}) + 0.1405$, $R^2 = 0.70$

U95%CL A/H* = $0.180\ \mathrm{Ln}(E_{max}) + 0.3742$.

{B-Line} Mean B/H = $0.146\ \mathrm{Ln}(E_{max}) + 0.5315$, $R^2 = 0.47$

U95%CL B/H* = $0.146\ \mathrm{Ln}(E_{max}) + 0.8426$.

* - Maximum A/H and B/H = 1.

where

A, B = height above workings to A and B-Zone horizons,
H = cover depth,
E_{max} = the maximum predicted tensile strain for a 'smooth' subsidence profile.

The measured database model still appears to indicate a similar height of fracturing trend to the **Whittaker and Reddish, 1989** physical model. However, as was concluded in **ACARP, 2003**, the predicted height of 'continuous' and 'discontinuous' fracturing are again higher for a given tensile strain at the surface, and is probably due to geological structure and strata bedding thickness differences in the rock mass compared those used in the physical model.

The real world database indicates that the tensile strain probably needs to be >32 mm/m for surface to seam connection to occur, and is approximately 50% of the physical model value of 60 mm/m. It should also be noted that if connective cracking is likely to extend into the Surface Cracking Zone (a depth of 10~15 m below the surface), then the maximum tensile strain for surface to seam connection reduces to 25 mm/m. It is assessed however, that the predicted strains are dependent on surface crack width development and should therefore not be used to assess surface to seam connectivity without considering near surface and B-Zone lithology.

Considering the potential difficulties with predicting strains after the onset of cracking, **ACARP, 2003** attempted to modify the strain model to a curvature-based approach. The curvature model has now also been updated (see **Section 11.3.2**).

A11.3.2 Updated Overburden Curvature Index Model

It should be understood that the tensile strain model is reliant on a non-robust parameter (i.e. tensile strain) that has been noted for its high variability if cracking develops. It was therefore decided to re-plot the database again using the previously derived Overburden Curvature Index or S_{max}/W'^2 term to provide a readily measurable field parameter that would not be compromised by surface strain concentration effects (i.e. cracking). Logarithmic regression lines were re-derived to give predictions of mean and U95%CL values for both A and B-Zones.

The revised regression results are shown in **Figure A41b** and summarised below:

{A-Line} Mean A/H = $0.198\ \mathrm{Ln}(S_{max}/W'^2) + 1.1518$, $R^2 = 0.66$

U95%CL A/H* = $0.198\ \mathrm{Ln}(S_{max}/W'^2) + 1.3915$.

{B-Line} Mean B/H = $0.152\ \mathrm{Ln}(S_{max}/W'^2) + 1.3265$, $R^2 = 0.52$;

U95%CL B/H* = $0.152\ \mathrm{Ln}(S_{max}/W'^2) + 1.5928$.

* - Maximum A/H and B/H = 1.

where

A, B = height above workings to A and B Horizons,
H = cover depth (m).
S_{max}/W'^2 = Overburden Curvature Index,
W' = lesser of W and 1.4H

Note: It is reasonable to assume the effective mining width (W') and height of fracturing (A/B) will be limited beyond the point where the maximum subsidence or strata deformation has been reached above supercritical mining geometries (i.e. W/H > 1.4).

The same apparent differences still remain between the Australian height of fracturing database and the UK physical modelling results. The differences between the model and measured values indicate that there are further parameters that need to be included in one or both of the models, or the scaling of the physical model did not match the range of real-world conditions likely to be present.

One obvious difference is that the UK physical model represents a case study where the panel width and cover depth was constant (i.e. W/H = 1.34) and within the critical to supercritical range. The Australian database however, has a significant range of sub-critical, critical and super-critical panel geometries and further investigation of this issue is therefore required (see **Section A11.3.4**).

A11.3.3 Influence of Lithology on Sub-Surface Fracture Heights

An assessment was also made on whether the lithology had the potential to control or limit the height of fracturing above a longwall panel. Reference to the database presented in **ACARP, 2003**, indicates that 15 of the 29 case studies were assessed to have 'High' SRP and had A-Horizons that coincided with the base of the massive strata units. The other data points had 'Low' SRP with no massive units present. The potential for massive strata units to mitigate the height of continuous fracturing above the workings should therefore not be ignored where subsidence magnitudes and HoF are clearly being controlled by spanning strata.

Overall, the HoF results suggest that the presence of massive sandstone or conglomerate lithology could control the height of direct hydraulic fracturing. Due to the complex nature of this problem, it is usually recommended that a mine undertake a sub-surface fracture-monitoring program, which includes a combination of borehole extensometer and piezometer measurements during extraction in non-sensitive areas of the mining lease. Mitigation strategies for longwall mining are generally limited to (i) reducing the extraction height, (ii) decreasing the panel width and (iii) panel location adjustment.

A11.3.4 Height of Fracturing Angle Model, DgS 2012

Due to the currently held belief in the Australian mining industry that the sub-surface fracture heights are strongly influenced by panel width and mining height, an alternative model was developed by DgS in 2012 using a different approach to analysing the UK model data presented in **ACARP, 2003**.

Predictions of the heights of continuous and discontinuous fracturing (the A and B-Zone horizons) were re-analysed using the panel width, the mining height and a simple parabolic profile formula to estimate A and B-Zone fracture heights from a calibrated abutment angle at seam level (theta A) as follows:

- Continuous Fracture Zone Height, $A = W'/(4\tan(\text{theta}_A))$
- Discontinuous Fracture Zone Height, $B = W'/(4\tan(\text{theta}_B))$

where,

W' = Effective Panel width or minimum of W and 1.4H.

theta_A = abutment angle to estimate height of A-Zone

theta_B = abutment angle to estimate height of B-Zone

When the UK model's fracture height data is plotted as a height of fracturing angle (estimated from an assumed parabolic fracturing profile between rib abutments), a strong correlation is apparent between the mining height for a given panel width and cover depth (W/H = 1.34); see **Figures A41c** and **A41d** for A and B-Zone Horizons respectively.

The regression analysis indicates the following fracture height angles (in degrees) apply for estimating A and B-Zone fracture heights in the real world:

$theta_A = 41.617T^{-0.467}$ (mean) and $25.083T^{-0.401}$ (lower 95%CL)

$theta_B = 21.806T^{-0.233}$ (mean) and $17.295T^{-0.238}$ (lower 95%CL)

Real world fracture height data measured with piezometers and borehole extensometers indicates a similar trend as the physical model results, although there is more scatter in the data that is probably due to both mining geometry (W/H) and geological variability.

The UK physical model assessed mining heights of 1.2 m to 10.8 m, and generated fracture height angles at the abutments ranging from 55^o to 18^o for the A-Zone and from 37^o to 18^o for the B-Zone horizon. The fracture height angle tends to follow a decaying power law as the mining height increases.

For real-world mining heights of 1.9 m to 6.0 m (median of 3.0 m), the calibrated fracture height angles range from 34^o to 18^o for the A-Zone, and from 22^o to 13^o for the B-Zone. One A-Zone case had a fracture height angle of 58^o due to the apparent 'truncating' effect of a 40 m thick conglomerate strata unit 40 m to 60 m above a supercritical panel in the Great Northern Seam (Wyee Colliery's North-3D Panel).

As was found in the strain and curvature-based model's, the presence of pre-existing jointing in the rock mass is likely to have contributed to greater fracture heights determined from the field data compared to the laboratory model.

The effect of massive strata units is apparent in the database (see **Figure A41c**) and further measurements are necessary to develop a more discerning prediction model that allows 'Low' and 'High' SRP strata to be assessed separately using this model. The height of fracturing model proposed at the time was considered likely to be conservative for greenfields sites if based on the lower bound fracture height angles and to give upper bound fracture height predictions.

Further review of sub-critical, critical and supercritical panel case studies in 2013 has found that the fracture height angle model proposed by DgS in 2012 should also be further divided into sub-critical, critical and supercritical panel geometries (see **Figure A41e**). The review outcomes suggest that heights of subsurface fracturing appear to increase above sub-critical panels for a given mining height, but are also likely to be due to the panel width and changes in macro-scale structural behaviour of the overburden as well.

Whilst the trend from sub-critical to supercritical panel geometries appears reasonably consistent across the abutment angle model database (with a few cases where thick strata has clearly limited the fracture heights) it was considered a new modelling approach based on Dimensional Analysis and Buckingham's PI Theorem would be needed to reasonably establish definitive relationships between the key variables over a broader range of mining geometries and geological conditions.

A11.4 Alternative Sub-surface Fracture Model Development

Starting with the influence of mining height on the height of fracturing, if we firstly consider a supercritical panel of a given width W and cover depth H, **Whittaker and Reddish, 1989** and **Singh & Kendorski, 1991** each demonstrated that the height of continuous fracturing (A) will increase with the square root of the mining height, $T^{\sim 0.5}$, or a power rule of the form $A = aT^b$, as shown in **Figure A41f**. It is apparent that the database of real-world fracture heights with W/H range from 0.3 to 2.22 has greater scatter than the UK model curve for supercritical panel geometry, and therefore indicates that other factors such as the panel width and geology should probably be considered.

If the fracture heights are plotted against panel width (W) only, a similar 'scattered' outcome results as shown in **Figure A41g**. A slightly improved regression analysis results if A is plotted against W/H in **Figure A41h** or when normalized to the panel width (A/W) and is plotted against T in **Figure A41i** for sub-critical, critical and super-critical panel geometries.

Based on these plots, it is clear that consideration also needs to be given to the structural behavior of the overburden across the full range of mining geometries, its constituent strata units (or 'beams') and the influence of mining height, T on the development of fracture heights above longwall panels.

A11.4.1 Strata Behaviour Mechanisms that Influence Fracture Heights above Longwalls

Based on structural analysis theories, a conceptual model of the macro-scale and micro-scale mechanisms of sub-surface fracture height development are described below and shown graphically in **Figure A41j**:

Macro-Scale Mechanisms:

- For sub-critical panels, a natural catenary will probably form and transfer the weight of the top half to 2/3 of the overburden to the abutments. The strata below the arch will be subject to sagging or bending forces caused by the void formation. Depending on the span and thickness of individual strata units, the strata in the immediate roof will bend, separate, crack and ultimately cave into the extracted coal void (see *Micro-scale Mechanisms* below).

- Natural catenary arching action infers that the spanning overburden can remain entirely in compression and there is an absence of tensile and shear or 'bending' stresses. Subsidence data indicates that catenary arching stops occurring once W/H exceeds 0.7.

- Once W/H exceeds 0.7, the overburden will still attempt to span, however, the geometry of the arch will be too shallow for a catenary arch to develop, resulting in bending and cracking of the rock mass.

- The load will still be able to be carried over the void by the overburden, provided the rock mass has adequate strength and stiffness to resist the applied bending moments and shear and tensile stresses (along with increased compressive stresses from inward strata block rotation). This type of behaviour is known as Voussoir or 'cracked beam' behaviour, and is basically a flatter, but a less stiff version of a catenary arch.

- Shallow arching or Voussoir beam action will continue across the panel until it can no longer support the span or weight of the shallow arch. This is usually assumed to have occurred once W/H reaches 1.2 to 1.4H. The weight of the overburden will then be fully supported by the goaf beyond this point and subsidence will be a function of the mining height and cover depth or goaf load.

- The above macro-mechanisms will influence the behavior of the overburden strata units and subsequent development of the sub-surface fracture heights as follows:

Micro-scale Mechanisms:

- Soon after the coal seam is extracted from beneath the overburden, its constituent 'beams' in the immediate roof will generally deflect and behave elastically until the tensile and shear stresses within the rock mass units exceed the material and/or bedding parting strength of the units.

- The strata units will subsequently crack at the abutments and mid-span and the confinement will be partially lost. The cracked beam segments will then rotate inwardly and create a shallow compression arch within the beams (Voussoir action) that may or may not support the load.

- The cracks in the beams at this stage are likely to be discontinuous, with the beam continuing to behave pseudo-elastically with zones of compressive stress above and below the tensile cracks.

- The beam will continue to span and deflect under the applied loading until the compressive strength of the beam is reached, where the beam will then either collapse into the available void, or yield and load the previously failed strata units and goaf below it.

- The goaf will compress and cause further overlying strata units to deflect, shear and crack. The goaf load will continue to increase as cracking continues up into the strata.

- The curvature induced in the beams will probably not cause complete fracture to develop through the beam until the compressive strength of the beam materials is reached. The induced curvature will therefore be a function of the stiffness of the goaf and the load acting on it.

- The goaf stiffness will initially be a function of the mining height and the bulking properties of the collapsed roof materials. The goaf stiffness will also increase as the load acting upon it increases (i.e. strain hardening behavior).

- The goaf load will be a function of the rock mass density and effective height of rock above it. The effective goaf load height will be dependent on the height to the underside of the spanning catenary arch above sub-critical panels, which increases to the full cover depth once supercritical panel geometries are reached.

A11.4.2 Analytical Height of Fracturing Model

An analytical model of how sub-surface fracturing develops in the overburden is described below in an attempt to define the relationships between the mining geometry and overburden behaviour described in the previous section.

The maximum horizontal tensile stress before fracturing (σ_t) in a beam of thickness (t) with an effective span of W_i at a distance (y) above the workings will be:

$$\sigma_t = 6M/t^2 = 3\gamma(H-y)W_i^2/4t^2$$

where

M = surcharge load x span^2 /12 = $\gamma DW_i^2/12 = \gamma(H-y)\ W_i^2/12$

γ = unit weight of the rock mass

D = the depth to the base of the spanning beam (or H-y)

The equation shows that the tensile stress in a stack of beams will be greatest near the roof of the mine workings and then decrease linearly towards the surface. The effective span W_i of the beam will decrease as a function of the angle of break of the collapsing strata in the Caving Zone. The angles of break are likely (θ) to range between 12^o and 19^o according to the literature and underground observations.

The fracturing will continue to progress higher up into the strata until a beam of a certain critical thickness is reached that can either span the distance between the naturally occurring abutments or is thick enough not to fracture right through the beam after it has failed. It is also important to note that the angle of break is not the same as the height of fracturing angle discussed in **Section 11.3.3**, as the latter is back-calculated from measured heights of continuous fracturing and an assumed parabolic fracture profile.

As discussed earlier, the cracking of the strata will lead to the development of Voussoir arching or 'cracked beam' behaviour. The stability of the Voussoir beam will depend upon the compressive stress (σ_c) developed in the beam of thickness (t) that is located a distance, y, above the workings with an effective span (W_i) as follows:

$$\sigma_c = \gamma(H-y)W_i^2/(2nt^2(1-0.667n))$$

where

n = the proportion of the beam t in compression and may be determined iteratively by minimizing σ_c as the arch shortens under load and develops a new equilibrium (and provided the stress remains in the elastic region or is less than the UCS). Voussoir analysis results indicate that 'n' can range from 0.5 and 0.75 in spanning beams and will be closer to 0.5 when beam crush conditions are reached.

$$W_i = W - 2y\tan\theta$$

It follows then, that the height of continuous fracturing, A, is likely to develop up to the point where σ_c = UCS and infers the following relationship will exist:

$$UCS = \gamma(H'-A)(W-2A\tan\theta)^2/(2nt^2(1-0.667n)) \quad (1)$$

where

θ = the angle of break that subtended to vertical from the rib side and ranges from 12^o - 19^o based on subsidence data and underground observations.

Equation (1) indicates that the height of A-Zone fracturing is likely to be a <u>cubic function</u> that is dependent on the following variables:

- Panel width, W
- Effective Goaf Load Height Cover Depth, H'
- Thickness, location and strength and stiffness of the strata units within the overburden (t, y, UCS, n, E)

Equation (1) also suggests that the following approximate relationships exist between A and the independent variables:

- $W^{0.67}$
- $H'^{0.33}$
- $t^{-0.66}$
- $UCS^{-0.33}$
- $E^{-0.33}$
- $\tan\theta^{-0.67}$

It is noted that the above equation ignores the presence of collapsed and fractured material within the A-Zone itself. The formation of a compressible goaf will provide support to overlying fractured units, but also influence the magnitude of curvature and bending stress in

the overlying beams as the goaf is compacted and the beams deflect. The curvature of the beams (p) may be estimated as follows:

$$p_i = 2\Delta/(L_i)^2 = 2\,(\varepsilon_g\,6T)/L_i^2 = 12\,(\sigma_g/E_g)T/L_i^2 = 12\,(\gamma H'/E_g)T/L_i^2$$

where

Δ = mid-span deflection of beam with an effective span, L_i.
ε_g = vertical strain of goaf with thickness of 6T (T+5T).
σ_g = maximum vertical stress acting on the goaf = γH'.
θ_b = angle subtended to vertical from the rib side to the point of maximum concave curvature along a beam or maximum subsidence.
L_i = effective span distance to estimate curvature = y ($\tan\theta_{b)}$ = 0.5 y.
H' = effective goaf load height = W'/4tanθ where
θ = goaf loading height angle.

The goaf loading height angle is similar to the angle of break or caving angle, θ, but also represents the angle subtended to the vertical for the assumed parabolic profile or catenary arch above sub-critical panels. The goaf angle height angle is expected to increase for critical and supercritical panel geometries as the spans increase and cover depth decreases.

From the estimated curvature of the strata units above the compacting goaf, the bending stress in the beam may be estimated as follows:

$$\sigma_c = 2M/(Znt) = 2p_i\,E't^3/[(n\,t^2\,(1\text{-}0.667n))] = 8(\gamma H')T(E'/E_g)t/[y^2n(1\text{-}0.667n)]$$

where

E' = rock mass Young's Modulus = 150UCS
n = 0.5 for beam at yield point
$\theta_b = 26.5^o$
$L_i = y\tan\theta_b = 0.5$ y

As before, if σ_c exceeds the UCS, the height of fracturing, A, may continue to develop up to the next strata unit. The following relationship will therefore exist at the A horizon:

$$\sigma_c = UCS = 24(\gamma H')TEt/[E_gA^2]$$

which gives by re-arrangement,

$$A = 4.9((\gamma H')^{0.5}T^{0.5}t^{0.5}E^{0.5}/(UCS^{0.5}\,E_g^{\,0.5}) \qquad (2)$$

and if H' is substituted with W'/4tanθ for subcritical panel geometries then (2) becomes

$$A = 2.45((\gamma W')^{0.5}T^{0.5}t^{0.5}E^{0.5}/(UCS^{0.5}\,E_g^{\,0.5}\,\tan\theta_c^{\,0.5}) \qquad (3)$$

For supercritical panel geometries, W' may then be substituted with 1.4H, and (3) becomes

$$A = 2.9((\gamma H)^{0.5}T^{0.5}t^{0.5}E^{0.5}/(UCS^{0.5}\,E_g{}^{0.5}\tan\theta_c{}^{0.5}) \qquad (4)$$

Overall, the equations represent the physical relationships for either spanning strata (Equation (1)) or yielded strata (Equations (2) to (4) that are thick enough to limit fracture continuation through it. The equations indicate a very complex system with a significant number of variables that will influence the height of fracturing outcomes.

The net result for the variables assuming the first process is followed by the second gives:

$A = f(W'^{0.83}, T^{0.5}, t^{-0.16}, E^{0.83}, E_g{}^{-0.5}, \gamma^{0.83}, \tan\theta^{-0.5})$ for sub-critical cases and

$A = f(H'^{0.83}, T^{0.5}, t^{-0.16}, E^{0.83}, E_g{}^{-0.5}, \gamma^{0.83}, \tan\theta^{-0.5})$ for super-critical cases.

Several of the parameters above are readily measureable or can be reasonably estimated, however, the strata unit thickness t and it's distance y above the workings may not be able to be practically measured in the field without extensometry and borehole data.

The physical relationship between the variables may then be assessed practically with Dimensional Analysis, a commonly used tool in hydraulics (see **Section A11.4.3**).

A11.4.3 Dimensional Analysis and Buckingham's PI Theory

According to **Vennard and Street, 1982**, Dimensional Analysis is "the mathematics of dimensions of quantities" built on Fourier's 1882 "principle of dimensional homogeneity". The underlying principle states that "an equation expressing a physical relationship between quantities must be dimensionally homogeneous" i.e. the dimensions of each side of the equation must be the same. It is a valuable means of determining physical relationships between variables in complex systems that defy analytical solution and must be solved by empirical means (i.e. observation, intuition or experiment).

Buckingham's PI theory accomplishes this by the formation of dimensionless groups of independent variables that are measureable in the field. For the theory to work, the PI terms together must represent all of the three fundamental or primary dimensions of Mass (M), Distance (L) and Time (T), be independent of each other, and not break down into further dimensionless groups.

Buckingham's PI theory states that in order to determine the physical relationship between a set of 'n' independent parameters in a complex system, it follows that n-3 dimensionless parameters (known as PI terms) will be required to reasonably define the heights of continuous fracturing (A) and discontinuous fracturing (B) respectively. The final equations obtained are in the form of:

$$\pi_1 = f(\pi_2, \pi_3 \ldots \pi_{n-3}) \text{ or } f'(\pi_1, \pi_2 \ldots \pi_{n-3}) = 0$$

From the previous analytical equations derived in **Section A11.4.2**, it is assessed that up to 10 variables may influence the height of Continuous Fracturing (A) and Discontinuous Fracturing (B) as follows:

$$A, B = f(W, H', T, t, \rho, UCS, E, E_g, \tan\theta)$$

The above variables may then be expressed as a combination of products and powers:

$$A, B = aW^b H'^c T^d t^e UCS^f, \rho^g E^h E_g^i \tan\theta^j$$

Seven dimensionless PI-Terms will therefore be necessary to describe the relationships between ten variables identified in a system driven by horizontal and vertical stress, panel width, cover depth, mining height, rock mass density, rock mass strength and stiffness, goaf thickness and rock mass stiffness, caving angle and the location of competent or relatively thick strata units in the overburden.

Note:

1. The y term may be ignored as it corresponds with the dependent variable (A or B).

2. The beam thickness, t refers to the thickness likely to exist just above the fracture height location (which is probably going to be unknown before mining commences and will be discussed further later).

3. The caving angle or angle of break, tanθ is considered to be dependent on the W and H terms, so it may be ignored at this point. It has been included later indirectly to estimate the goaf height load, H' = W/4tanθ.

The first step in the analysis is to select a suitable set of recurring variables that cannot themselves be formed into a dimensionless group and can be used to represent one or more of the fundamental dimensions. The recurring variable set selected included the panel width, W, rock mass strength, UCS, and density, ρ, and were used to express the fundamental variables as follows:

$$L: W; \qquad M: \rho W^3; \qquad T: \rho^{0.5} W / UCS^{0.5}$$

The dimensionless π terms for the remaining variables were then assessed using the recurring variable set:

π_1: $A \cdot L^{-1} = A/W$ (Height of Fracturing Term)

π_2: $H \cdot L^{-1} = H'/W$ (Goaf Load Index Term)

π_3: $T \cdot L^{-1} = T/W$ (Strata Curvature Index Term)

π_4: $t \cdot L^{-1} = t/W$ (Strata Unit Thickness that may limit Fracture Height Term)

π_5: $E \cdot M^{-1} L^1 T^2 = E/UCS$ (Strata Unit Stiffness and Strength Ratio Term)

π_6: $E_g \cdot M^{-1} L^1 T^2 = E_g/UCS$ (Goaf Stiffness and Strength Ratio Term)

which gives:

$$A/W = a\,(H'/W)^b\,(T/W)^c\,(t/W)^d\,(E/UCS)^e(E_g/UCS)^f$$

The constants and powers for each PI-Term can now be determined using measured values in the field and non-linear regression techniques.

If we assume for the moment that the last two π terms representing the rock mass density and strength, and the goaf stiffness for all cases in the database will be constant, then the full equation of dimensionless π terms may be simplified as follows:

$$A/W = a\,(H'/W)^b\,(T/W)^c\,(t/W)^d \text{ and } B/W = e\,(H'/W)^f\,(T/W)^g\,(t/W)^h$$

The form of the dimensionless π term equations will be further explained in the following sections.

Note: Some of the published literature recommends that the super-critical panel width W' = 1.4H should be used instead of the Panel Width, W, for estimating the height of fracturing above super-critical panels. This is because it was argued that the height of fracturing would probably not continue to develop higher into the strata once the overburden had reached the critical width and had already completely failed. The height of continuous fracturing beyond this point would then be controlled by the mining height and geological conditions.

A11.4.3 Identifying Strata Units Likely to Limit the Height of Fracturing

The likelihoods that a strata unit will span the fractured zone have been determined by plotting the 'spanning' and 'non-spanning' strata unit thicknesses as π_4 terms (i.e. t is normalised to the effective panel width, W') against the unit location factor y/H.

For ease of expression, the significant strata units that are likely to limit heights of continuous fracturing have been termed 'spanning' units. Strata units that did not stop the height of fracturing in the A-Zone are described as 'non-spanning'.

Logistic regression analysis was subsequently used to define probabilistic straight line equations that indicate the 50%, 90% and 95% probabilities of whether a strata unit has spanned and/or limited the development of the height of fracturing; see **Figure A42a**.

Given that i= 1 or 0 for a spanning or non-spanning case study and P(i=1)=95% for t_{min} refers to a 95% probability that a beam of a minimum thickness will span between abutments at a given location in the overburden, then:

P(i=1)=50% for t_{min} = W'[0.17 - 0.075(y/H)]

P(i=1)= 90% for t_{min} = W'[0.19 - 0.075(y/H)]

P(i=1)= 95% for t_{min} = W'[0.20 - 0.075(y/H)]

A summary of spanning and non-spanning cases are presented in **Table A4.3**.

Table A4.3 - Spanning and Non-Spanning Case Studies in HoF Model Database for Australian Coalfields

Site	Panels	Mine	W (m)	H (m)	W/H	T (m)	A (m)	A/H	Strata Unit Spanning Analysis Results						
									t^ (m)	y (m)	t/W'	y/H	t_{min} P(i=1, 50%)	t_{min} P(i=1, 95%)	Success/ Failure i (1/0)
1	LW10	Metropolitan	140	460	0.30	3.4	130	0.28	50	130	0.36	0.28	21	25	0
2	LW1 to 4	South Coast	110	325	0.34	2.5	85	0.26	50	85	0.45	0.26	16	20	1
3	LW6	Kemira	117	335	0.35	1.7	98	0.29	50	98	0.43	0.29	17	21	0
4	LWA1	Austar	159	453	0.35	6.0	126	0.28	50	143	0.31	0.28	23	28	1
5	LW20	Metropolitan	163	450	0.36	3.4	100	0.22	50	100	0.31	0.22	25	30	1
6	LW514	Bellambi West	150	400	0.38	2.7	90	0.23	50	90	0.33	0.23	23	27	1
7	LW28	Appin	200	500	0.40	2.3	90	0.18	50	90	0.25	0.18	31	37	1
8	LW2	Ellalong	150	368	0.41	3.5	*113*	0.31	50	113	0.33	0.31	22	27	1
9	LW3	Tahmoor	180	424	0.42	2.2	-	-	50	100	0.28	0.24	27	33	1
10	LW9	Teralba	150	350	0.43	2.7	110	0.31	37	110	0.25	0.31	22	26	1
11	TE	West Cliff	200	446	0.45	2.5	*101*	0.23	50	101	0.25	0.23	30	37	1
12	LW11	Angus Place	211	263	0.80	2.5	***253***	***0.96***	10	210	0.05	0.96	20	27	0
13	LW5	Mandalong	160	179	0.89	3.7	118	0.66	25	82	0.16	0.67	19	24	1
14	411	Springvale	315	350	0.90	3.3	*139*	0.40	72	139	0.23	0.40	44	54	1
15	LW5	Dendrobium	245	255	0.96	3.8	123	0.48	50	123	0.20	0.48	32	40	1
16	LW1	Wyee	216	206	1.05	3.4	126	0.61	25	126	0.12	0.61	26	33	0
17	LW1	Invincible	145	116	1.25	2.7	106	0.83	13	63	0.09	0.83	15	20	0
18	Panel1	Abel 1	120	95	1.26	2.6	45	*0.47*	10	41	0.08	0.43	16	20	0
19	LW40	WWD	179	113	1.58	3.8	80	0.71	20	45	0.13	0.35	22	27	0
20	LWE1	Sth Bulga	259	155	1.67	2.6	***145***	***0.94***	10	124	0.05	0.80	23	30	0
21	LW41	WWD	179	105	1.70	3.8	72	0.69	14	36	0.14	0.30	21	26	0
22	LW9	Crinum	280	155	1.81	3.5	85	0.55	35	105	0.16	0.68	25	32	1
23	LW39	WWD	179	97	1.84	3.9	68	0.70	14	34	0.15	0.19	21	25	0
24	TE	Wyee North 3D	355	185	1.92	1.9	63	0.34	40	63	0.15	0.34	37	45	1
25	355	Wyee North (LW4)	355	180	1.97	1.9	40	0.22	40	40	0.16	0.22	38	46	1
26	Panel2	Abel 2	150	76	1.97	1.9	45	0.59	10	33	0.09	0.43	14	18	0
27	TE	Cooranbong North B	150	75	2.00	2.8	58	0.77	10	58	0.10	0.77	12	15	0
28	LW1	Oaky Creek	205	95	2.16	3.2	55	0.58	12	55	0.10	0.58	17	21	0
29	LW9/9a	Homestead	200	80	2.50	3.3	68	0.88	10	62	0.09	0.78	12	16	0

W' = minimum(W, 1.4H); t^ - maximum likely values from borehole data.

$t_{min\ for\ spanning}$ P(i=1, 50%) = W'[0.17 - 0.075(y/H)]

$t_{min\ for\ spanning}$ P(i=1, 95%) = W'[0.20 - 0.075(y/H)]

For the purposes of making robust predictions, the 95% logistic regression lines were subsequently used to determine maximum beam thickness for cases where the borehole logs indicated that the overburden units were significantly thicker (and therefore likely to span).

For cases where non-spanning strata were likely to be present a minimum beam thickness of 10 m or the actual strata thickness (whichever was the greater) was adopted.

A11.4.4 PI-Term Model for Predicting Height of Continuous Fracturing (A) above Longwalls

Based on the empirical database presented in **Table A4.1**, the statistics software XLSTAT® was used to complete a multi-nonlinear regression analyses on the first four PI terms defined earlier as follows:

$$\underline{\text{Mean } A/W' = 1.905(H'/W')^{1.21}(T/W')^{0.398}(t'/W')^{-0.219}} \qquad R^2 = 0.7$$

$$U95\%\ A/W' = \text{Mean } A/W' + a$$

where

a = 0.22W' for subcritical panels; 0.22W' m for critical panels and 0.1W' for supercritical panels.

H' = Goaf Load Height = $W'/4\tan\theta$

and $\theta = 12^o$ for $W/H < 0.45$;

$\theta = 12+5.43(W/H-0.45)^o$ $0.45 < W/H < 0.7$;

$\theta = 6.52+9.2(W/H)^o$ $0.7 < W/H < 1.4$;

$\theta = 19.29^o$ for $W/H > 1.4$.

The goaf load height angles v. the W/H ratio are shown in **Figure A42b**.

W' = Effective Panel Width = minimum of W and 1.4H.

T = Mining Height.

t' = Effective strata unit thickness = $t_{\text{min for non-spanning}} < t' < t_{\text{min for spanning}}$

$t_{\text{min for non-spanning}}$ = 10 m.

$t_{\text{min for spanning}}$ = see **Section A11.4.3**.

Re-arranging the above equation in terms of A gives:

$$\underline{A = 0.356(1/\tan\theta)^{1.21}W'^{0.821}T^{0.398}t'^{-0.219} \quad +/- a} \qquad R^2 = 0.7$$

Note: The respective errors (a) are similar to the thicknesses of possible spanning strata units.

The height of goaf loading is also considered to be the maximum height of continuous fracturing or A_{max}, which has been derived from the abutment angles and panel widths. The predicted A_{max} values are plotted with the measured A-Zone values in **Figure A42c**.

The above results indicate that the model is likely to provide reasonable estimates of the heights of continuous fracturing for the full range of mining geometries, based on the effective panel width, effective goaf load heights, mining heights and effective strata unit thickness in the A or B Zones.

The predicted v. observed A/W' and A values for the proposed PI-Term model are presented in **Figures A42d** and **Figure A42e** respectively. The residual errors reasonably follow a normal probability distribution about the regression curve according to Central Limit Theory in statistics (see **Figure A42f**).

The regression results suggest that the height of continuous fracturing will increase with effective panel width, W', goaf load H' and mining height, T raised to powers ranging from to 0.4 to 0.8 and decrease with strata unit thickness raised to the power of -0.2.

The results are generally consistent with **Whittaker and Reddish, 1990**, **Singh & Kendorski, 1991** and the analytical models presented in **Section A11.3**.

It is assessed that the assumptions that the height of fracturing will be limited when either:

- critical panel widths exceed 1.4H;
- the maximum possible arch height across sub-critical panels has been reached,
- Spanning strata exists that can bridge the fractured zone.

The presence of 'plastic' and low strength strata that tends to shear along bedding partings when deformed through bending action, rather than crack vertically, may also limit continuous cracking heights.

All of these outcomes are intuitively correct and correlate well with observed behaviours across sub-critical to supercritical mining geometries. It is also noted that the strata unit thickness term enables all of the database and subsequent regression equations to be used with a reasonable level of confidence, such that the predicted worst-case values will not be unduly biased by the database itself.

Ignoring the Angus Place result for the moment, three critical cases were identified in the analysis where the A-Zone extended to within 10 m of the surface (Invincible, South Bulga, and Homestead) with a minimum t' value of 10 m assumed. Adopting a minimum beam thickness of 10 m will therefore generally indicate the maximum likely height of continuous fracturing for all cases in the database (see **Figures A42e** and **A42g**).

The presence of relatively thick strata units at a given distance y within the height of fracturing may truncate or reduce the result indicated. It is assessed from the database that the strata unit thickness would have to be at least 0.15 times the span, W', before a fracture height truncation would be considered possible (see **Figure A42a**).

A11.4.4 PI-Term Model for Predicting Heights of Discontinuous Fracturing (B) Above Longwalls

Based on the empirical database presented in **Table A4.1**, the statistics software XLSTAT® was used to complete a multi-nonlinear regression analysis as follows for estimating the height of the dilated B-Zone :

$$\text{Mean } B/W' = 1.717(H'/W')^{1.62}(T/W')^{0.22}(t'/W')^{-0.17} \qquad R^2 = 0.93$$

$$U95\%\ B/W' = \text{Mean } B/W' + b$$

where

b = 0.37W' for subcritical panels; 0.10W' m for critical panels and 0.07W' for supercritical panels.

H' = Goaf Load Height = $W'/4\tan\theta$

and $\theta = 12^o$ for $W/H < 0.45$;

$\theta = 12+5.43(W/H-0.45)^o$ $0.45 < W/H < 0.7$;

$\theta = 6.52+9.2(W/H)^o$ $0.7 < W/H < 1.4$;

$\theta = 19.29^o$ for $W/H > 1.4$.

The goaf load height angles v. the W/H ratio are shown in **Figure A42b**.

W' = Effective Panel Width = minimum of W and 1.4H.

T = Mining Height.

t' = Effective strata unit thickness = $t_{\text{min for non-spanning}} < t' < t_{\text{min for spanning}}$

$t_{\text{min for non-spanning}}$ = 10 m.

$t_{\text{min for spanning}}$ = see **Section A11.4.3**.

Re-arranging the above equation in terms of B gives:

$$B = 0.181(1/\tan\theta)^{1.622}W'^{0.949}T^{0.221}t'^{-0.170} \pm b \qquad R^2 = 0.93$$

The predicted v. observed B/W' and B' values are presented in **Figure A42h** and **Figure A42i** respectively. The residual errors follow a normal probability distribution about the regression curve as expected according to Central Limit Theory in statistics (see **Figure A42j**).

The regression indicates a relatively weaker relationship exists between the height of B-Zone fracturing and the mining height compared to the A-Zone relationship.

A11.4.5 PI-Term Model Validation

Validation of the proposed PI-Term model has been completed as follows:

(i) A review of the database to check if the model is likely to be biased towards a particular parameter or mining geometry, and

(ii) Comparison of prediction v. measured database of A and B-Horizons

In regards to the data base, the following parameters from **Table A4** were plotted against the W/H ratio in **Figures A43a** to **43d** to test for sample bias:

- Panel Width (W)
- Cover Depth (H)
- Mining Height (T)
- Height of A-Zone Fracturing (A)
- Height of B-Zone Fracturing/Strata Dilation (B)

It is assessed that the database has sufficient coverage in regards to panel width, cover depth and mining height to reliably estimate HoF Zones above sub-critical to super-critical panels with W/H values ranging from 0.3 to 2.2.

In regards to prediction model reliability, the distributions of model residual errors should follow central limit theory for regression analysis. That is, a normal distribution of errors would be expected to occur about the regression line of 'best-fit'. If the regression lines are deemed to meet this requirement, the assessment of predicted confidence limits will then be possible. It would then be expected that < 5% of measured values would exceed the predicted U95%CL values on average.

The results for the A-Zone model checks are summarised in **Table A5.2** and demonstrate the model errors satisfy normality tests with ~50% of the measured values above and below the predicted mean values with 95% of the measured values below the Upper 95%CL predictions.

Table A5.2 - Summary of Measured v. Predicted Height of Continuous Fracture A-Zones

Site	Panel	Mine	Panel Width W (m)	Cover Depth H (m)	W/H	Mining Height T (m)	t' (m)	Predicted A (m)		Measured A (m)	Pass = 1; Fail = 0	
								mean	U95%CL		m	U95
1	LW10	Metropolitan	140	460	0.30	3.4	25	108	139	**130**	0	1
2	LW1 to 4	South Coast	110	325	0.34	2.5	20	82	106	**85**	0	1
3	LW6	Kemira	117	335	0.35	1.7	21	73	99	**98**	0	1
4	LWA1	Austar	159	453	0.35	6.0	28	146	181	**126**	1	1
5	LW20	Metropolitan	163	450	0.36	3.4	30	117	153	**100**	1	1
6	LW514	Bellambi West	150	400	0.38	2.7	27	102	135	**90**	1	1
7	LW28	Appin	200	500	0.40	2.3	37	113	157	**90**	1	1
8	LW2	Ellalong	150	368	0.41	3.5	27	114	147	**113**	1	1
9	LW3	Tahmoor	180	424	0.42	2.2	33	105	144	**-**	0	-
10	LW9	Teralba	150	350	0.43	2.7	37	103	136	**110**	0	1
11	TE	West Cliff	200	446	0.45	2.5	37	118	162	**101**	1	1
12	LW11	Angus Place	211	263	0.80	2.5	10	135	182	***253***	0	-
13	LW5	Mandalong	160	179	0.89	3.7	25	97	132	**118**	0	1
14	411	Springvale	315	350	0.90	3.3	54	134	203	**139**	0	1
15	LW5	Dendrobium	245	255	0.96	3.8	40	117	171	**123**	0	1
16	LW1	Wyee	216	206	1.05	3.4	25	106	154	**126**	0	1
17	LW1	Invincible	145	116	1.25	2.7	10	74	106	**106**	0	1
18	Panel1	Abel 1	120	95	1.26	2.6	10	61	88	**45**	1	1
19	LW40	WWD	179	113	1.58	3.8	10	83	99	**80**	1	1
20	LWE1	Sth Bulga	259	155	1.67	2.6	10	92	114	***145***	0	0
21	LW41	WWD	179	105	1.70	3.8	10	78	93	**72**	1	1
22	LW9	Crinum	280	155	1.81	3.5	10	104	126	**85**	1	1
23	LW39	WWD	179	97	1.84	3.9	10	74	88	**68**	1	1
24	TE	Wyee North 3D	355	185	1.92	1.9	40	70	96	**63**	1	1
25	355	Wyee North (LW4)	355	180	1.97	1.9	40	68	94	**40**	1	1
26	Panel2	Abel 2	150	76	1.97	1.9	10	45	56	**45**	1	1
27	TE	Cooranbong North B	150	75	2.00	2.8	10	53	63	**58**	0	1
28	LW1	Oaky Creek	205	95	2.16	3.2	13	64	77	**55**	1	1
29	LW9/9a	Homestead	200	80	2.50	3.4	10	60	71	**70**	0	1
Reliability check for mean and U95% Predictions: % Pass											**52**	**96**

Ignoring the Angus Place result for LW11 until it can be confirmed, the proposed mean and U95%CL model satisfactorily over predicts 52% and 96% of the measured A-Zone data (i.e. expected values of 50% and 95%). The one model failure was indicated for Site 20 (South Bulga) which is not available for review at this stage.

It is therefore considered that the reliability of the new model is acceptable for worst-case estimates of A-Zone fracture heights at new or existing coal mines in Australia until local performance data either confirms or supersedes it.

The results for the B-Zone model checks also indicate the model errors satisfy normality tests as shown in **Figure A42f** and are summarised in **Table A5.3**.

Table A5.3 - Summary of Measured v. Predicted Heights of Discontinuous Fracture B-Zones

Site	Panel	Mine	Panel Width W (m)	Cover Depth H (m)	W/H	Mining Height T (m)	t' (m)	Predicted B (m)		Measured B (m)	Pass = 1; Fail = 0	
								mean	U95%CL		m	U95
1	LW10	Metropolitan	140	460	0.30	3.4	25	184	236	-	-	
2	LW1 to 4	South Coast	110	325	0.34	2.5	20	142	183	-	-	
3	LW6	Kemira	117	335	0.35	1.7	21	138	181	-	-	
4	LWA1	Austar	159	453	0.35	6.0	28	231	290	**243**	0	1
5	LW20	Metropolitan	163	450	0.36	3.4	30	207	267	-	-	
6	LW514	Bellambi West	150	400	0.38	2.7	27	185	240	-	-	
7	LW28	Appin	200	500	0.40	2.3	37	222	296	-	-	
8	LW2	Ellalong	150	368	0.41	3.5	27	196	252	**210**	0	1
9	LW3	Tahmoor	180	424	0.42	2.2	33	202	269	**204**	1	1
10	LW9	Teralba	150	350	0.43	2.7	37	185	241	**150**	1	1
11	TE	West Cliff	200	446	0.45	2.5	37	226	300	**300**	0	1
12	LW11	Angus Place	211	263	0.80	2.5	10	257	263	**258**	1	1
13	LW5	Mandalong	160	179	0.89	3.7	25	165	179	**162**	1	1
14	411	Springvale	315	350	0.90	3.3	54	264	296	**244**	1	1
15	LW5	Dendrobium	245	255	0.96	3.8	40	210	234	-	-	
16	LW1	Wyee	216	206	1.05	3.4	25	179	200	-	-	
17	LW1	Invincible	145	116	1.25	2.7	10	109	116	**111**	0	1
18	Panel1	Abel 1	120	95	1.26	2.6	10	89	95	**75**	1	1
19	LW40	WWD	179	113	1.58	3.8	10	110	113	**108**	1	1
20	LWE1	Sth Bulga	259	155	1.67	2.6	10	136	152	**150**	0	1
21	LW41	WWD	179	105	1.70	3.8	10	103	105	**100**	1	1
22	LW9	Crinum	280	155	1.81	3.5	10	146	155	**150**	0	1
23	LW39	WWD	179	97	1.84	3.9	10	96	97	**92**	1	1
24	TE	Wyee North 3D	355	185	1.92	1.9	40	119	138	**143**	0	0
25	355	Wyee North (LW4)	355	180	1.97	1.9	40	116	134	-		
26	Panel2	Abel 2	150	76	1.97	1.9	10	65	72	**71**	0	1
27	TE	Cooranbong North B	150	75	2.00	2.8	10	70	75	**70**	0	1
28	LW1	Oaky Creek	205	95	2.16	3.2	13	86	95	**90**	0	1
29	LW9/9a	Homestead	200	80	2.50	3.3	10	78	80	**75**	1	1
Reliability check for mean and U95% Predictions: % Pass											**50**	**95**

The proposed mean and U95%CL model satisfactorily over predicts 50% and 95% of the measured B-Zone data (i.e. within 5% of the expected values of 50% and 95%. The one model failure was indicated for Site 24, with an under prediction of 5 m.

It is considered that the reliability of the new model is acceptable for general estimates of B-Zone discontinuous fracture height assessments at new or existing coal mines in Australia and should be confirmed with local measurement data.

The reliability test results also indicate that the proposed heights of fracturing models for estimating A and B Zones are likely to be conservative.

A11.4.6 Definition of Surface Cracking Zone

During the development of the Pi-Term Model it has also been necessary to better define the surface cracking zone depth. The depth of the surface cracking zone has been estimated from subsidence data, surface crack observations and published measurements as follows:

- The literature review findings presented in **Section 11.2** indicate that surface cracking depths above longwalls are likely to be <11 to <15 m generally.

- The Mean and median strain/curvature ratios of 5.3 m and 7.4 m mentioned earlier in Section derived from subsidence data measurements for Newcastle Coalfield (see **Figures A43e** and **A43f**) indicates the ***average surface cracking depth***. The ratio is considered to be a direct measurement of the depth to the neutral axis of bending where tensile strains cross over to compressive strain. This also suggests near surface strata beam thicknesses are twice the depth to the neutral axis of bending or 11 m to 15 m. It is apparent that these values are consistent with the minimum beam thicknesses determined for the PI-Term model.

- Borehole measurement devices measured depths of cracking at the base of sandstone valleys in the Southern Coalfield of up to 12 m after mine subsidence effects (refer **Mills, 2007**).

- Measured crack depths of up to 20 m have been measured along the crests of steep slopes above LW41 (ref to **RCA, 2013**).

Based on the above information, it is assessed that the following conservative crack depths presented in **Table A5.4** may be assumed when assessing surface to seam connectivity potential above longwalls in the Newcastle Coalfield beneath varying topography:

Table A5.4 - Recommended Maximum Cracking Depths

Location and Topography	Maximum Surface Cracking Depth (m)
Flat Terrain with Moderate Slopes up to 18^o	12
Bases of Valleys	15
Low side of panel beneath steep slopes > 18^o (not valley floor)	10
Crests or high side of panel beneath steep slopes > 18^o	20

A11.4.7 Summary

The new models for HoF estimation presented in **Sections A11.4.3** and **A11.4.4** have therefore been adopted for estimating the A-Zone and B-Zone Horizons and are generally consistent with the prevailing view that the panel width, cover depth and mining height will have the greatest influence on fracture development heights above longwall panels.

The spanning capability of thicker strata units in the overburden however, cannot be ignored when assessing the potential fracturing heights above a longwall panel.

Where local extensometer and piezometric data are available to establish the heights of A, B (and C) Zones, the influence of spanning strata may be adopted. Predictions based on the up-dated Strain and Overburden Curvature Index Models are still also considered relevant and will provide similar, if not more conservative outcomes.

For estimates of HoF above partial pillar extraction panels, the HoF zones may be based on the effective mining height, T_e (if remnant pillars are likely to fail) or the maximum span between stable remnant pillars.

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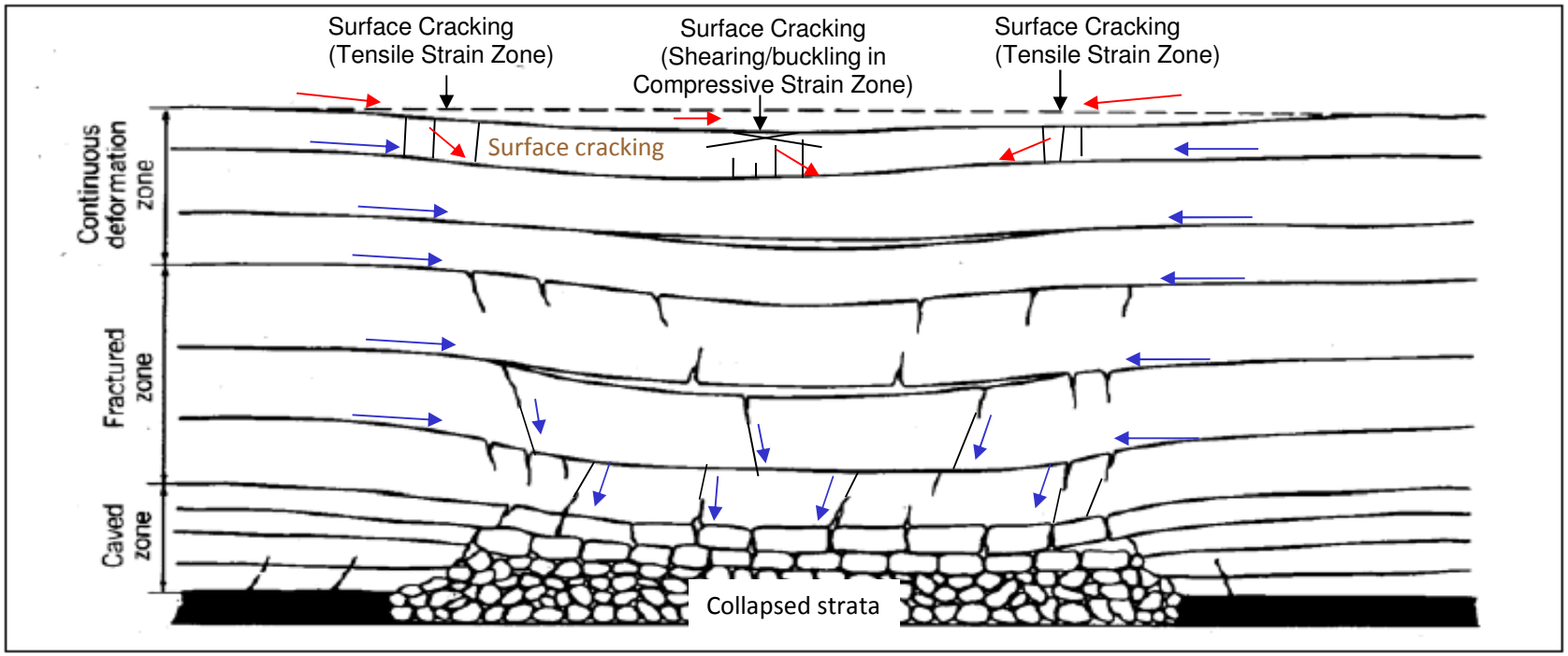


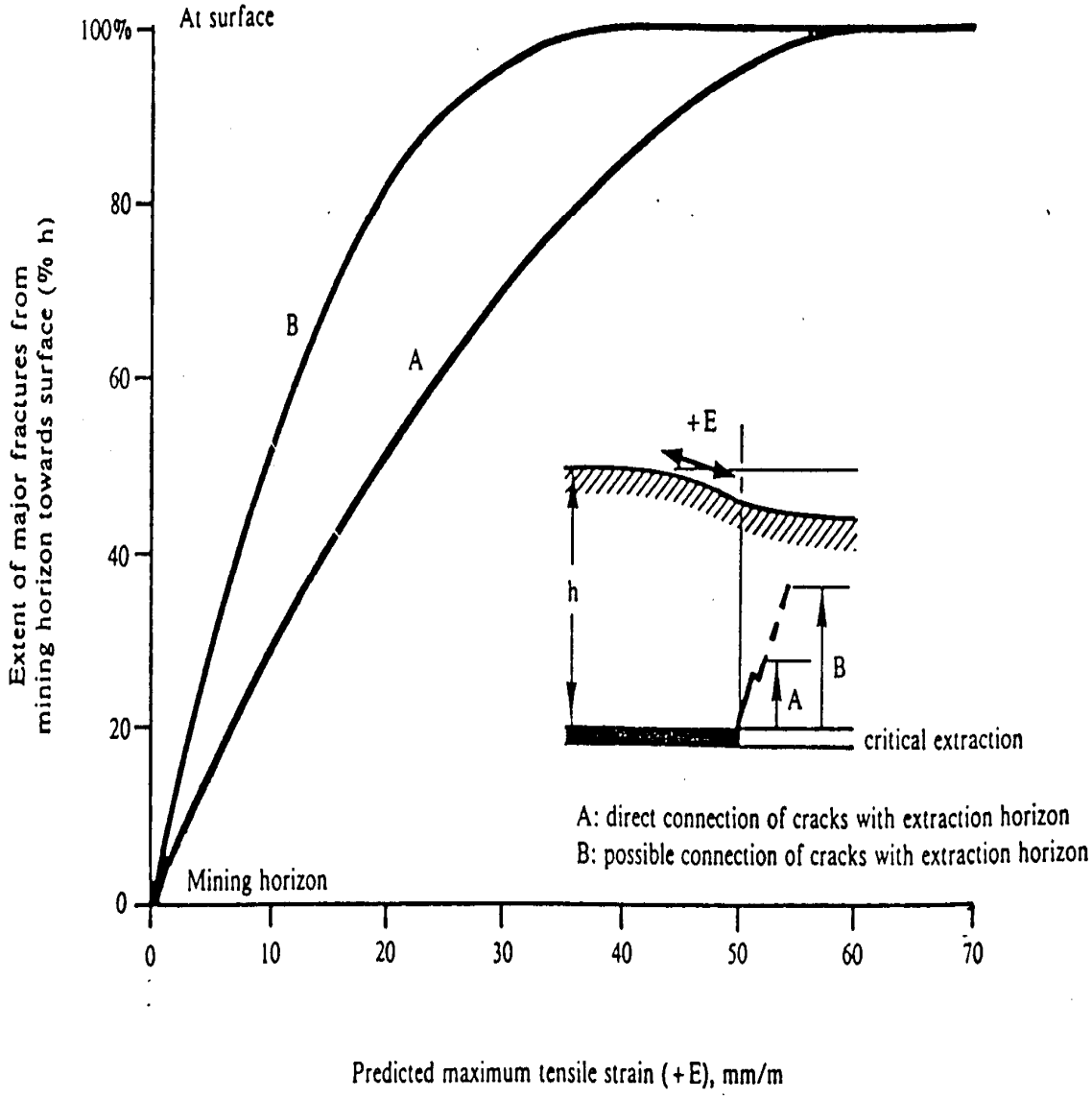
Zones in the Overburden According to Peng and Chiang (1984)

Key

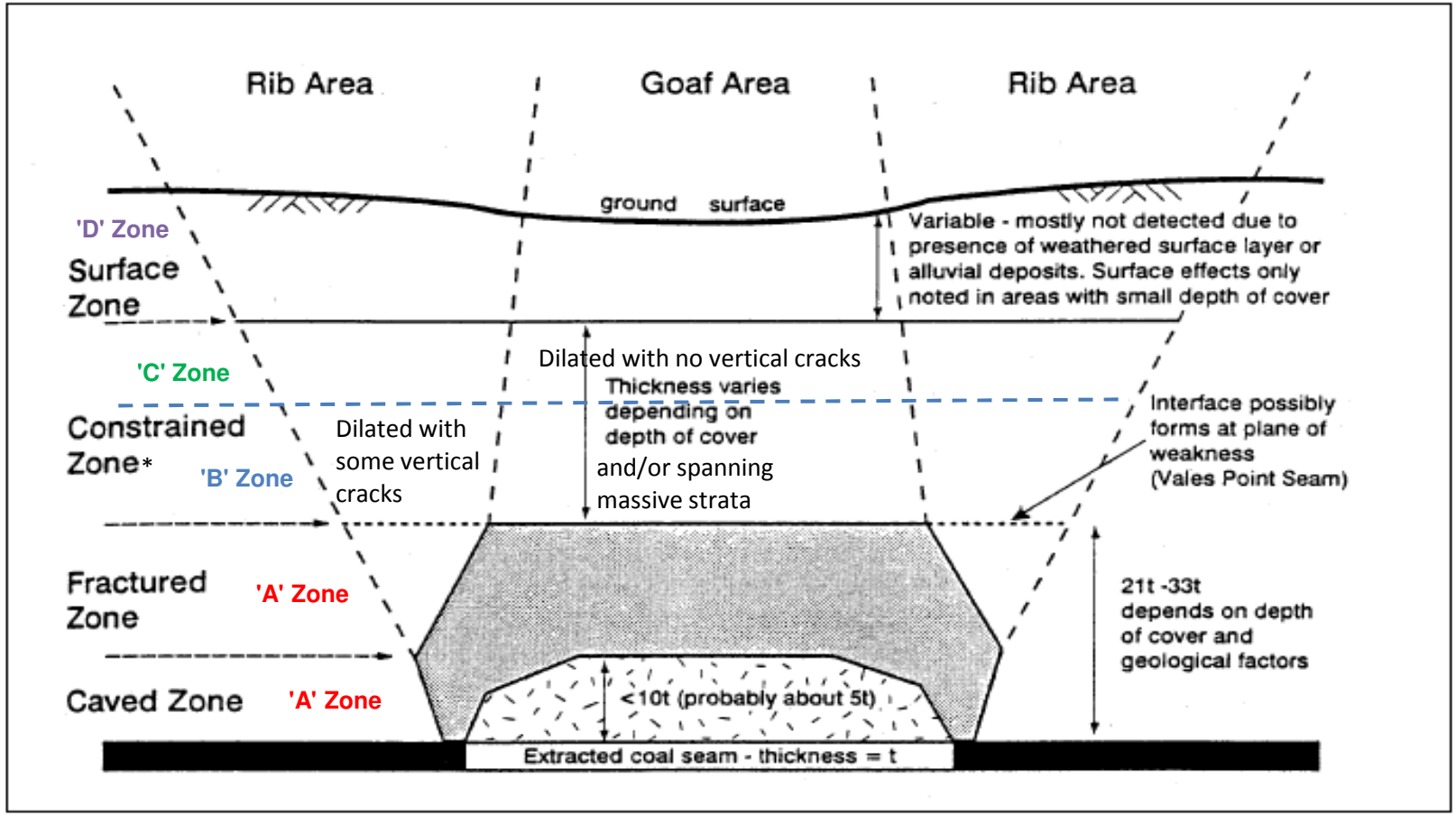
Surface water flow path

Sub-surface water flow path

DgS	Engineer:	S.Ditton	Client:	Appendix A	
	Drawn:	S.Ditton			
	Date:	23.11.12	Title:	Schematic Model of Overburden Fracture Zones Above Longwall Panels	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A40a



DgS	Engineer:	S.Ditton	Client:	Extract from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	30.04.07	Title:	Enpirically Based Sub-Surface Fracturing Model Presented in Whittaker & Reddish, 1989	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A40b



Zones in the Overburden according to Forster (1995)

* - Constrained Zone generally means B-Zone, but may include C-Zone , depending on W/H ratio and geology

DgS	Engineer:	S.Ditton	Client:	Appendix A	
	Drawn:	S.Ditton			
	Date:	23.11.12	Title:	Schematic Model of Overburden Fracture Zones in **Forster, 1995** Model (based on Piezometric Data Above High Extraction Panels in the Newcastle Coalfield)	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A40c

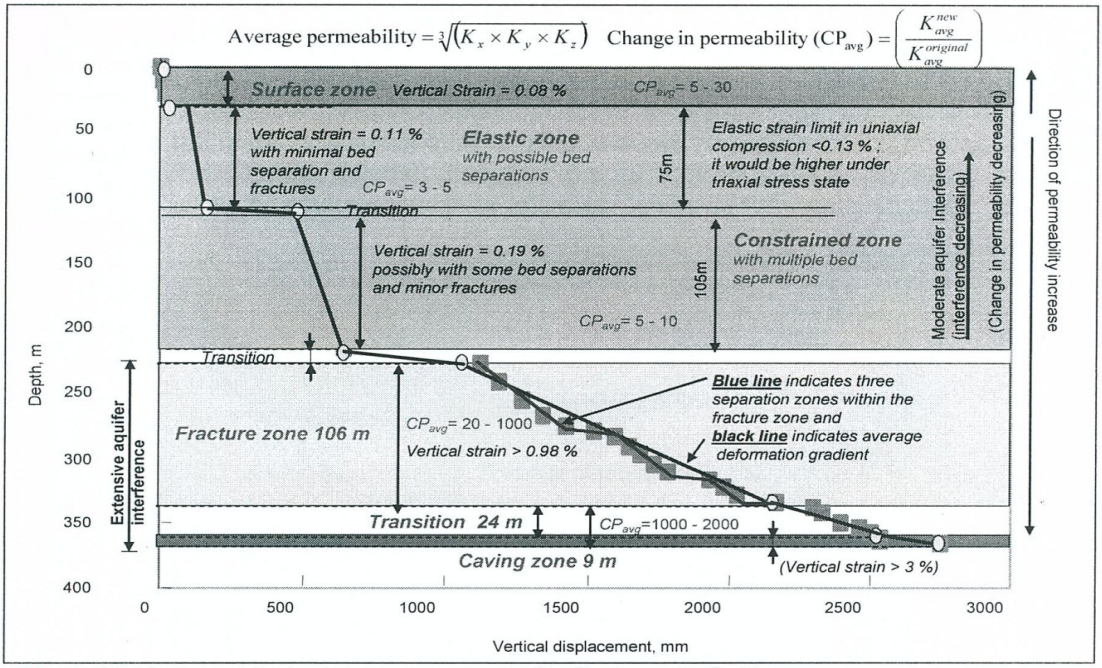


Figure H. Hydrogeological response model for Springvale Colliery

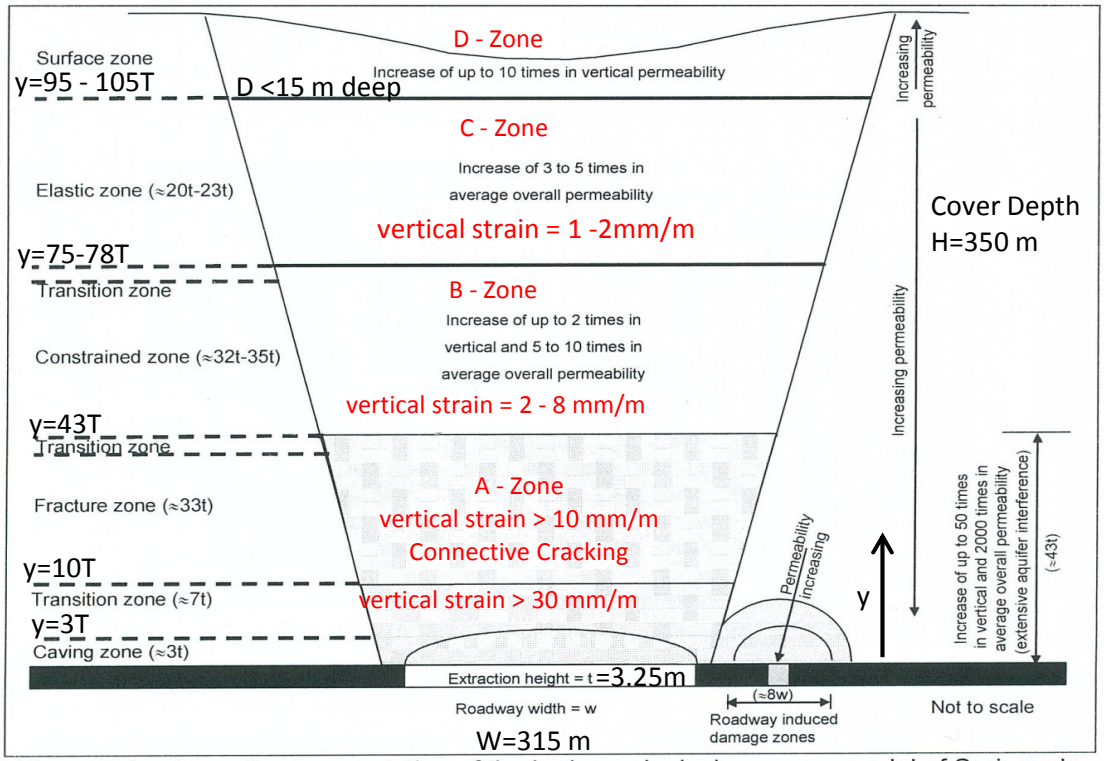


Figure I. A schematic representation of the hydrogeological response model of Springvale Colliery

DgS	Engineer:	S.Ditton	Client:	Appendix A	
	Drawn:	S.Ditton			
	Date:	23.11.12	Title:	Schematic Model of Overburden Fracture Zones **in ACARP, 2007**	
	Ditton Geotechnical Services Pty Ltd		Scale:		Figure No: A40d

Figure 6 is a conceptual model that illustrates the type of damage that can be expected within the overburden due to subsidence above a full-extraction panel. Five broad zones can be identified [Singh and Kendorski 1981; Peng and Chiang 1984; Kendorski 1993, 2006]:

1. The *complete caving zone*, in which the roof rock is completely disrupted as it falls into the gob, normally extends two to four times the extracted seam height (h).
2. The *partial caving zone,* in which the beds are completely fractured but never lose contact with one another, extends up to 6–10 h.
3. The *fracture zone,* within which the subsidence strains are great enough to cause new fracturing in the rock and create direct hydraulic connections to the lower seam. The top of this zone can be as high as 24 h above the lower seam.
4. The *dilated zone,* where the permeability is enhanced but little new fracturing is created, extends up to 60 h.
5. The *confined zone,* where subsidence normally causes no change in strata properties other than occasional bed slippage. This zone extends from the top of the dilated zone to about 50 ft below the surface.

6. D - Zone (<15 m)

5. C - Zone

4. B - Zone

3. A - Zone

1, 2. A - Zone

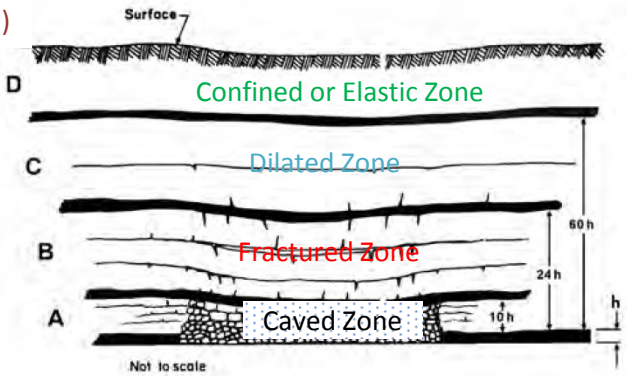


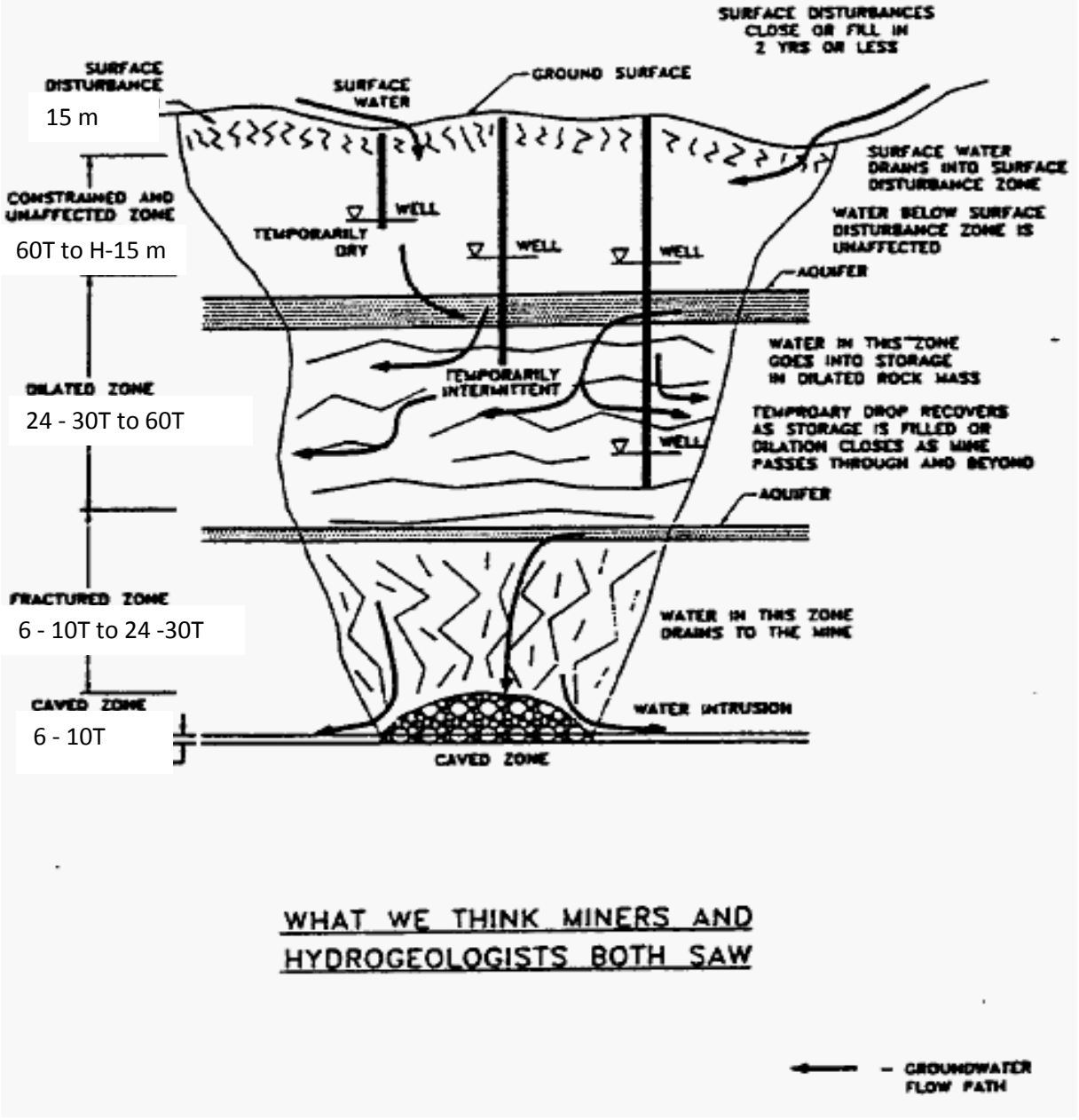
Figure 6.—Overburden response to full-extraction mining: (A) caving zones, (B) fracture zone, (C) dilated zone, and (D) confined zone.

The dimensions of these zones vary from panel to panel because of differences in geology and panel geometry. The implication of this model for multiple-seam mining is that when the interburden thickness exceeds approximately 6–10 times the lower seam thickness, the upper seam should be largely intact, although the roof may be fractured or otherwise damaged.

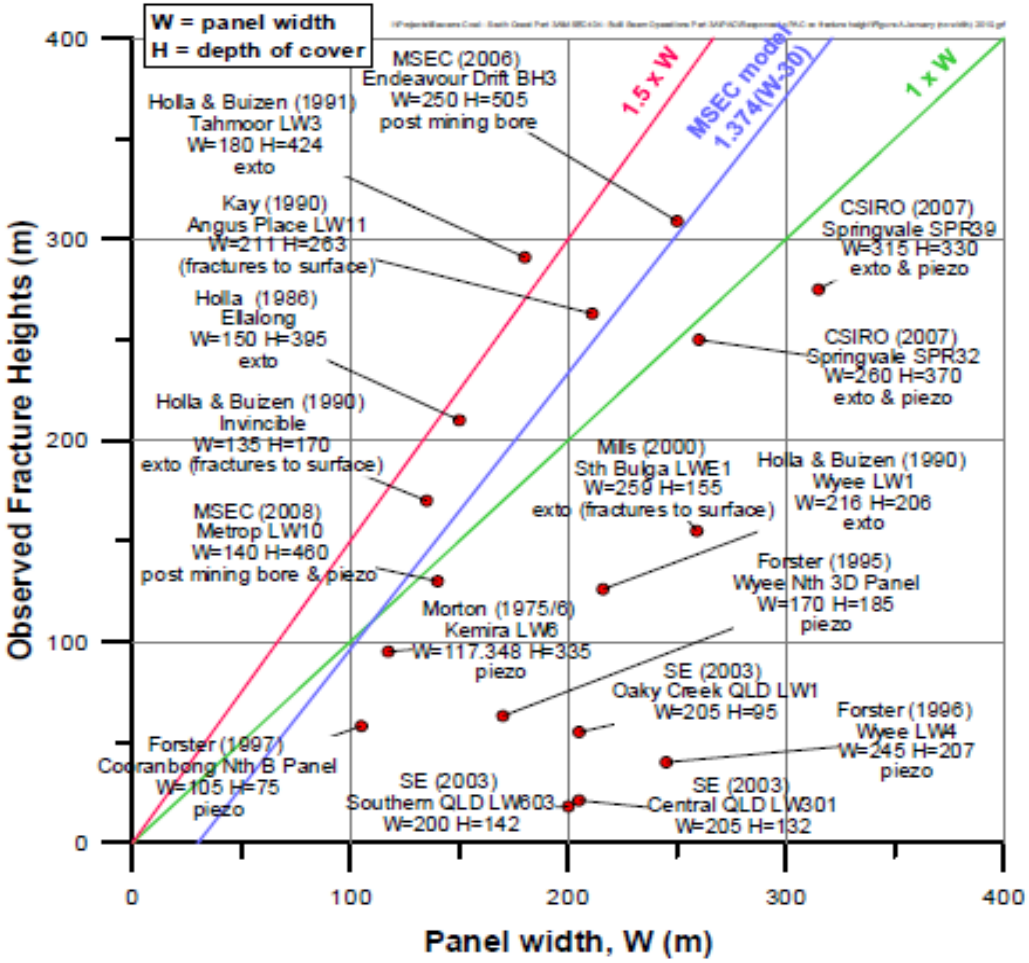
Note: Equivalent **ACARP, 2007** model zones A to D also shown down the left side.

DgS	Engineer:	S.Ditton	Client:	Appendix A	
	Drawn:	S.Ditton			
	Date:	03.06.13	Title:	Model of Overburden Fracture Zones above US Longwall Mines According to Mark, 2007	
	Ditton Geotechnical Services Pty Ltd		Scale:		Figure No: A40e

Zone and Thickness Ranges
(based on Mining Height, T)

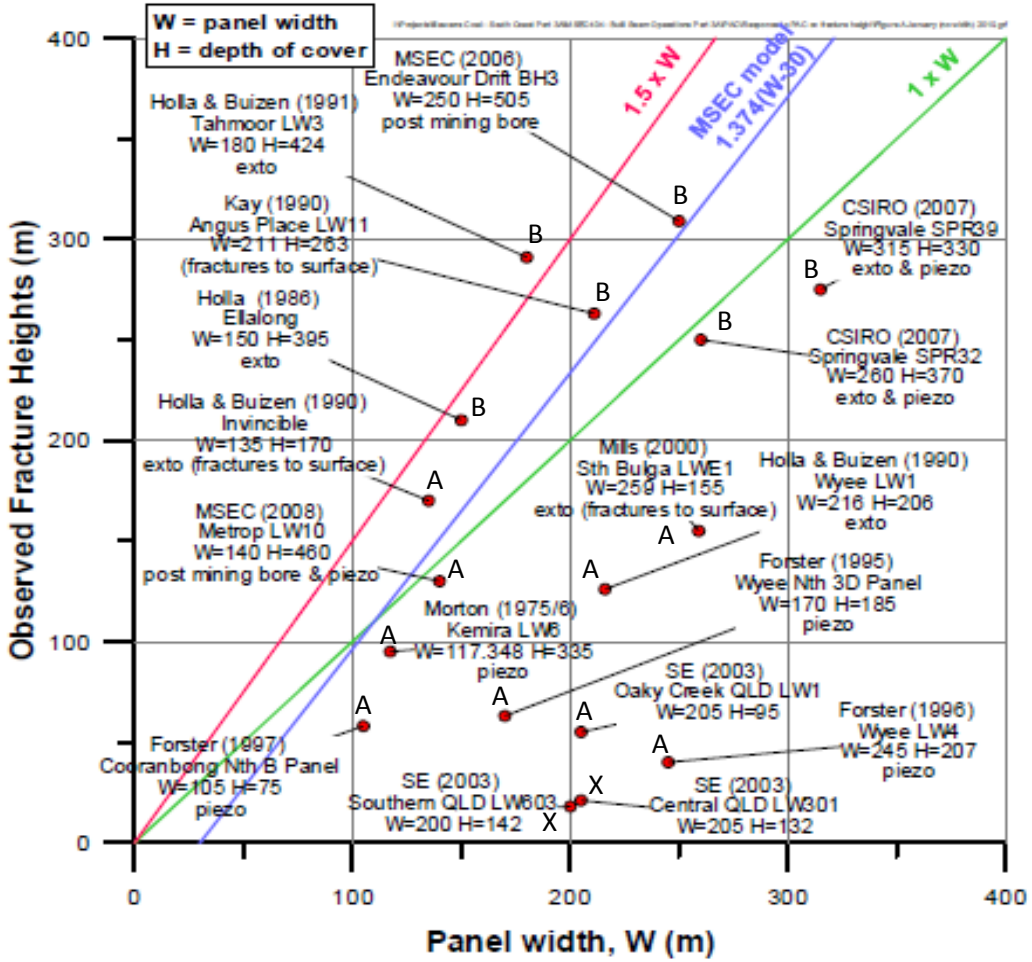


DgS	Engineer:	S.Ditton	Client:	Appendix A	
	Drawn:	S.Ditton			
	Date:	03.06.13	Title:	Model of Overburden Fracture Zones above UK Longwall Mines According to Kendorski, 1993	
	Ditton Geotechnical Services Pty Ltd		Scale:		Figure No: A40f



Ref: MSEC, 2011

DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	07.06.13	Title:	Observed Fracture Height Models presented by SCT and MSEC	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A40g



Key

A: A-Zone Horizon

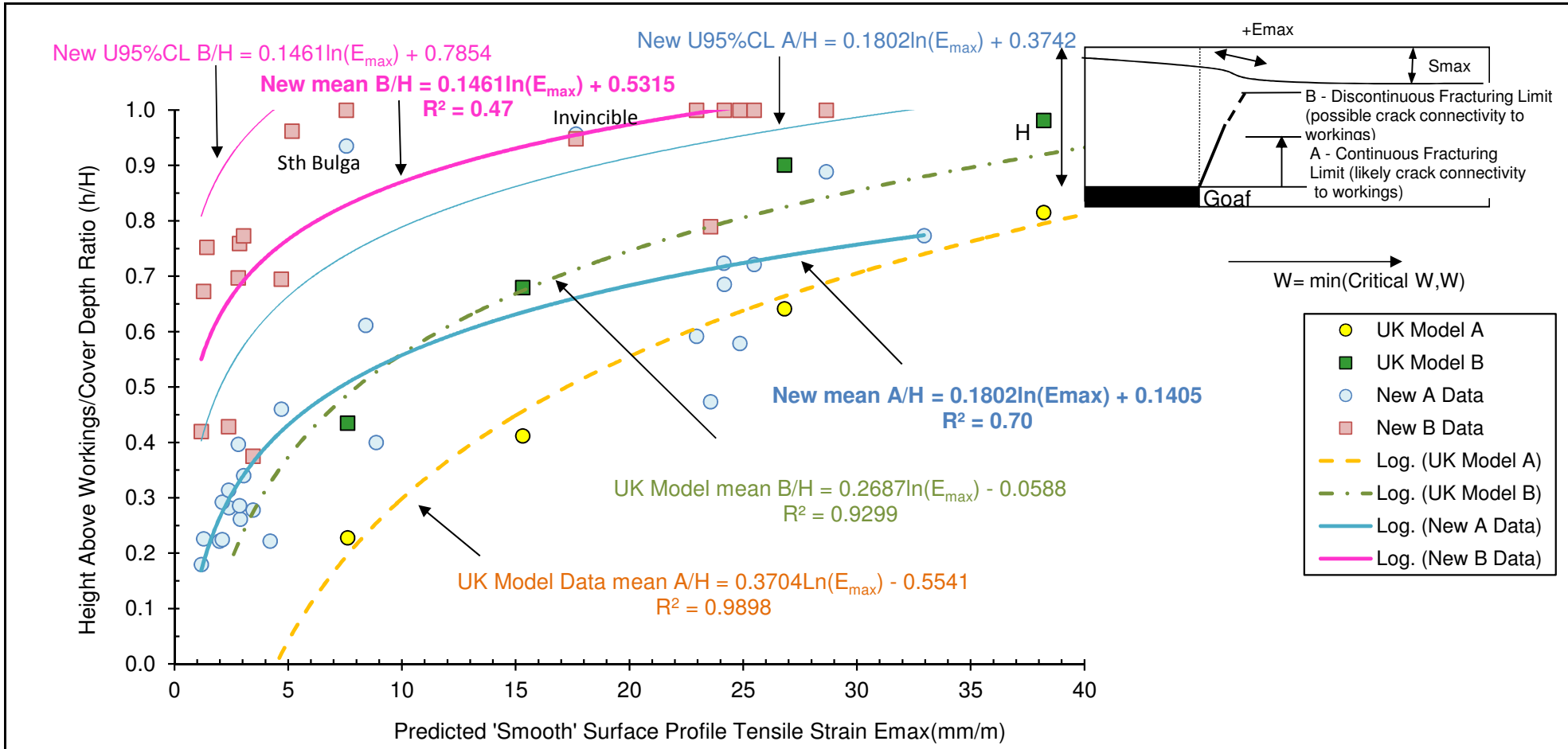
B: B-Zone Horizon

X: In-conclusive data

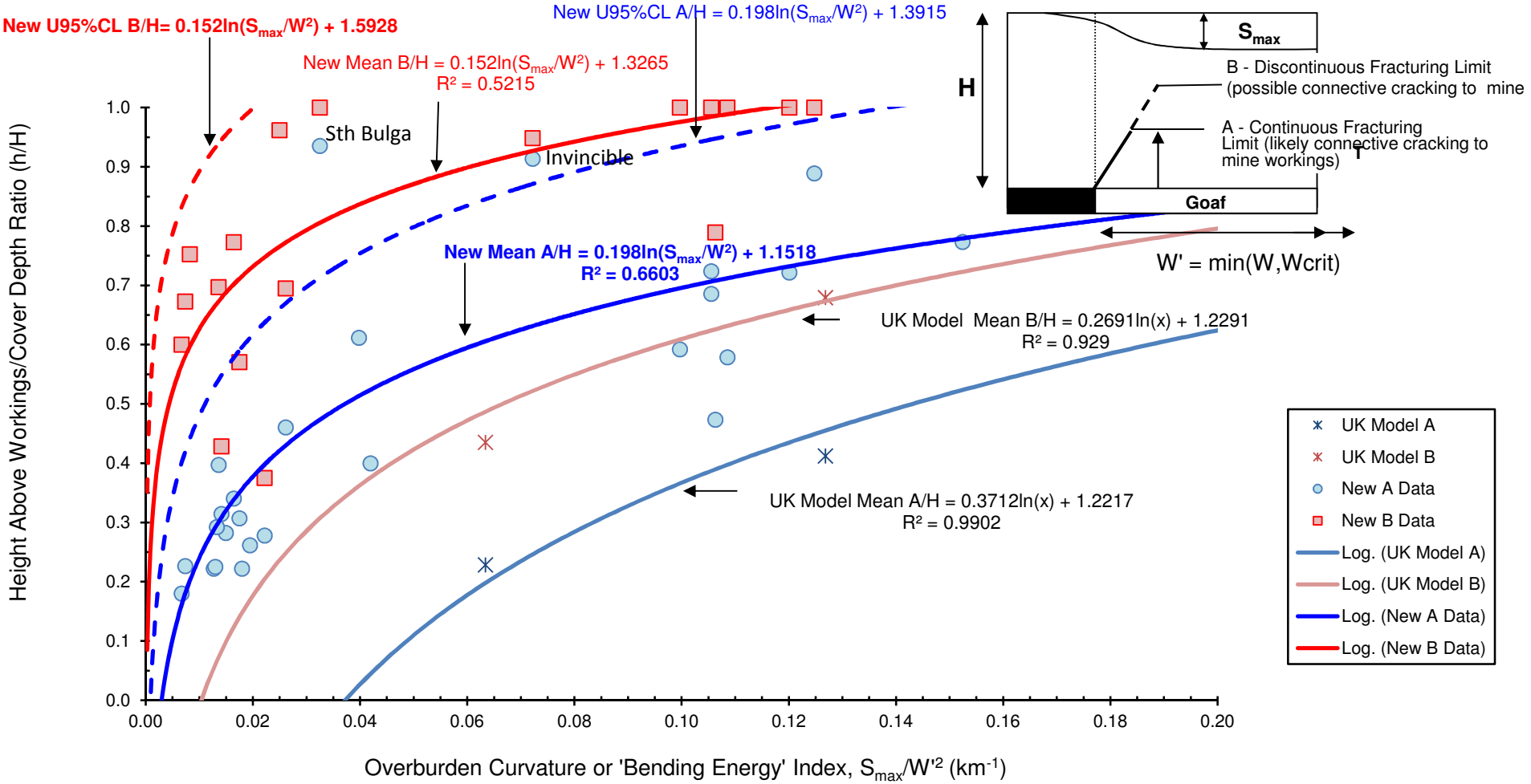
Note: amended zone horizons presented in Table A4

Ref: MSEC, 2011

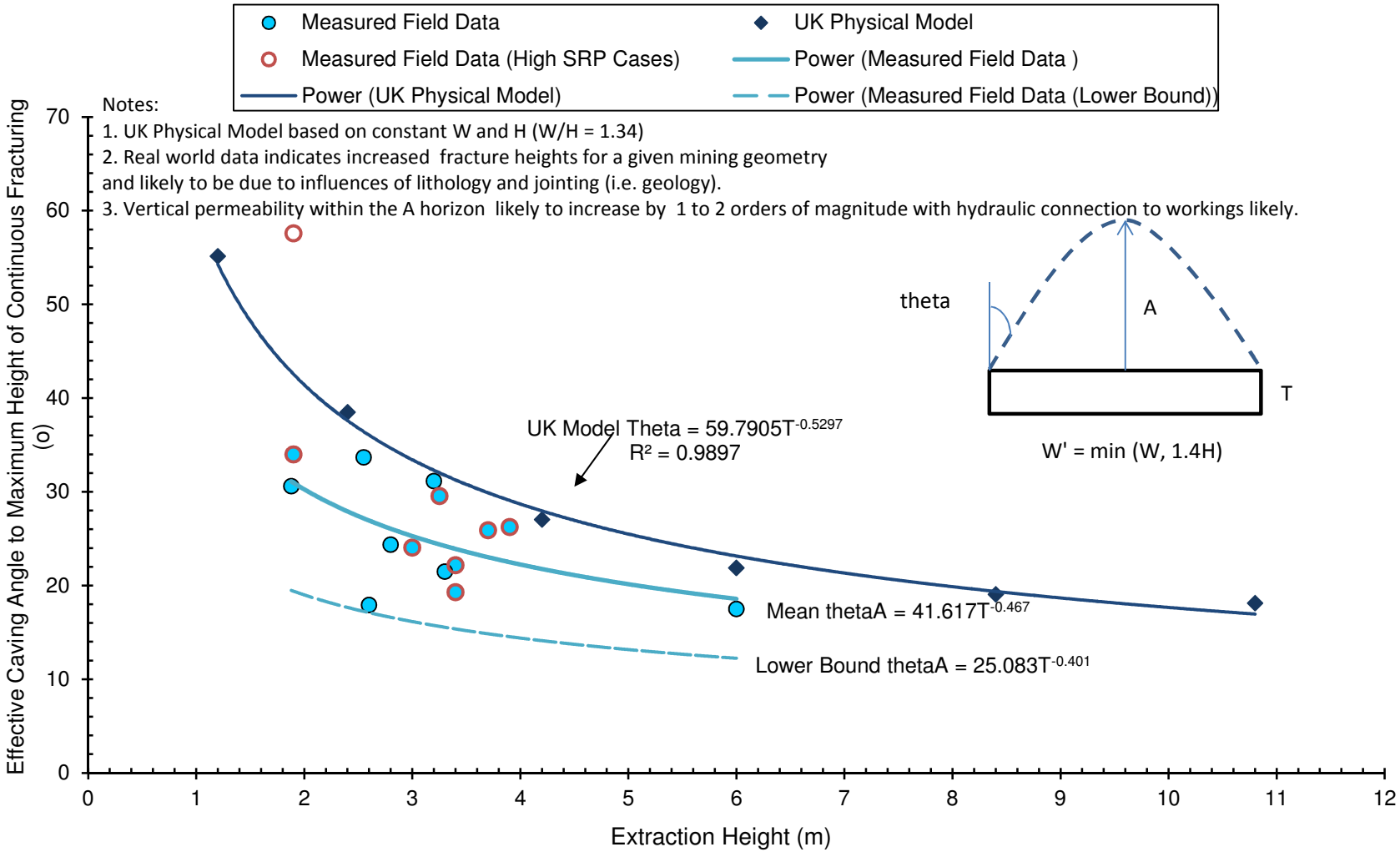
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	07.06.13	Title:	Review of Observed Fracture Height Models presented by SCT and MSEC v. Whittaker & Reddish Sub-Surface Fracture Model Zoning	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A40h



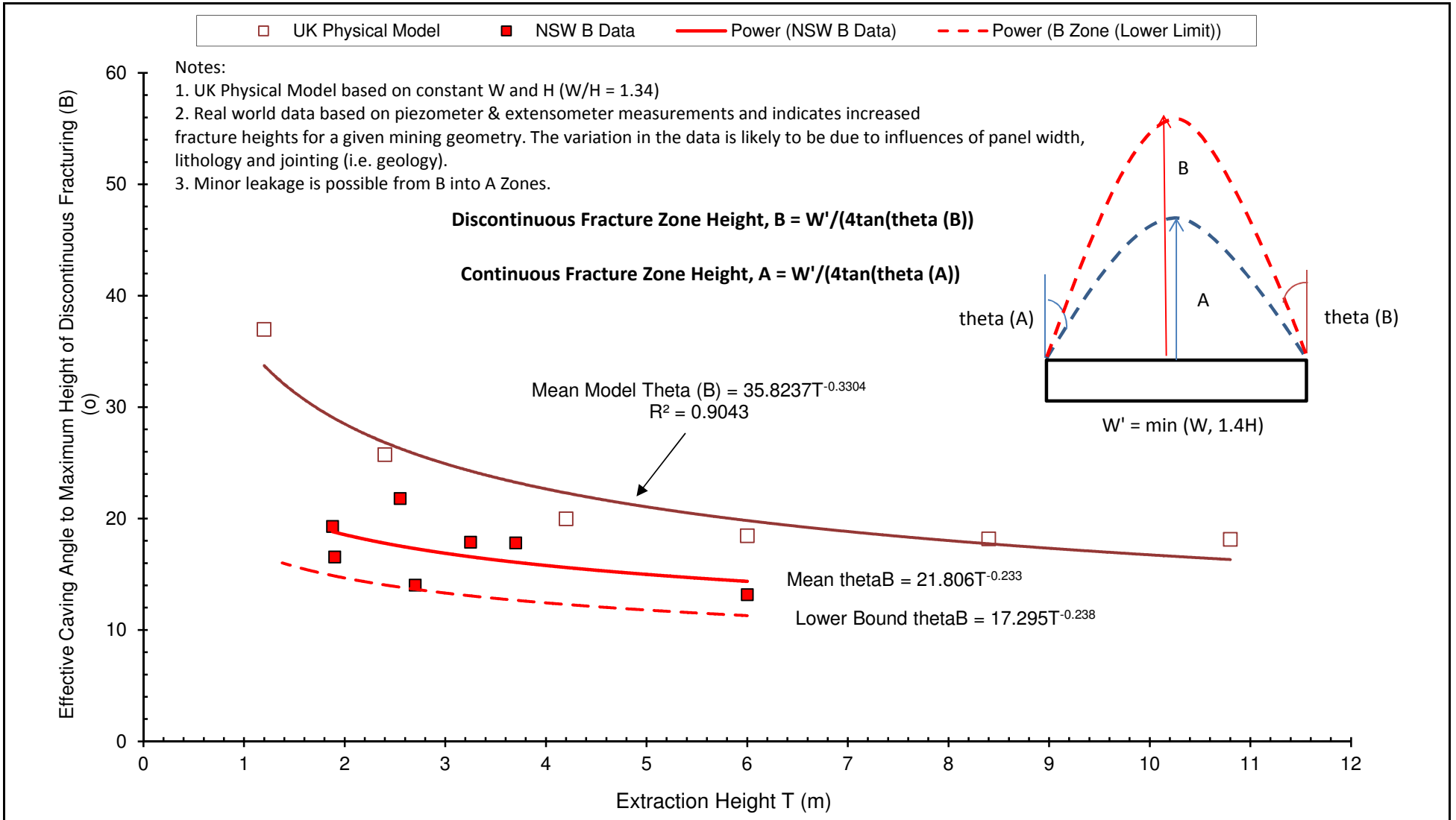
DgS	Engineer:	S.Ditton	Client:	Updated Whittaker and Reddish Model presented in ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	18.11.12	Title:	Continuous and Discontinuous Sub-Surface Fracture Height Model above Longwalls using Surface Tensile Strains as the Key Indicator	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41a



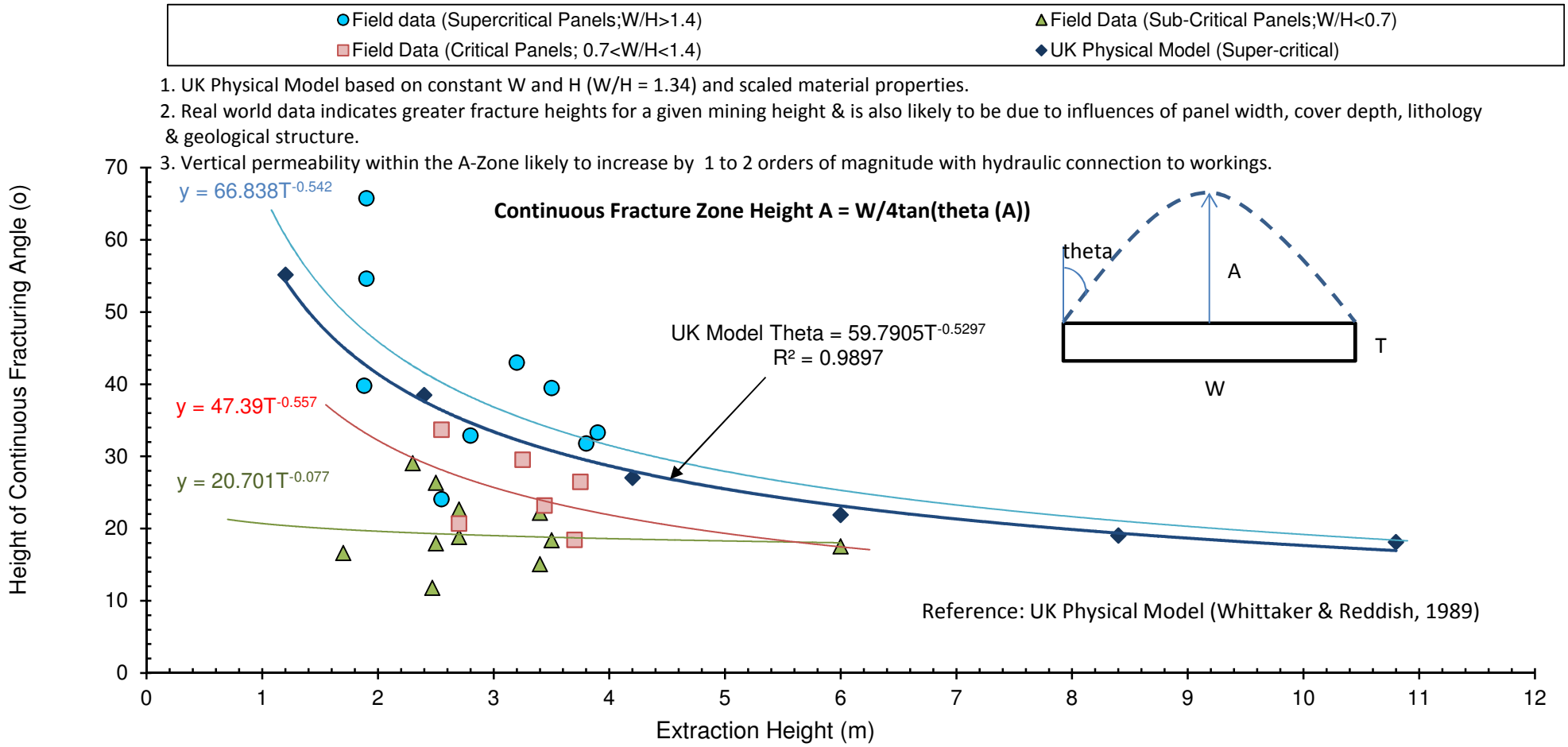
DgS	Engineer:	S.Ditton	Client:	Updated from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	03.12.12	Title:	Continuous and Discontinuous Sub-Surface Fracture Heights above Longwalls (based on ACARP, 2003)	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41b



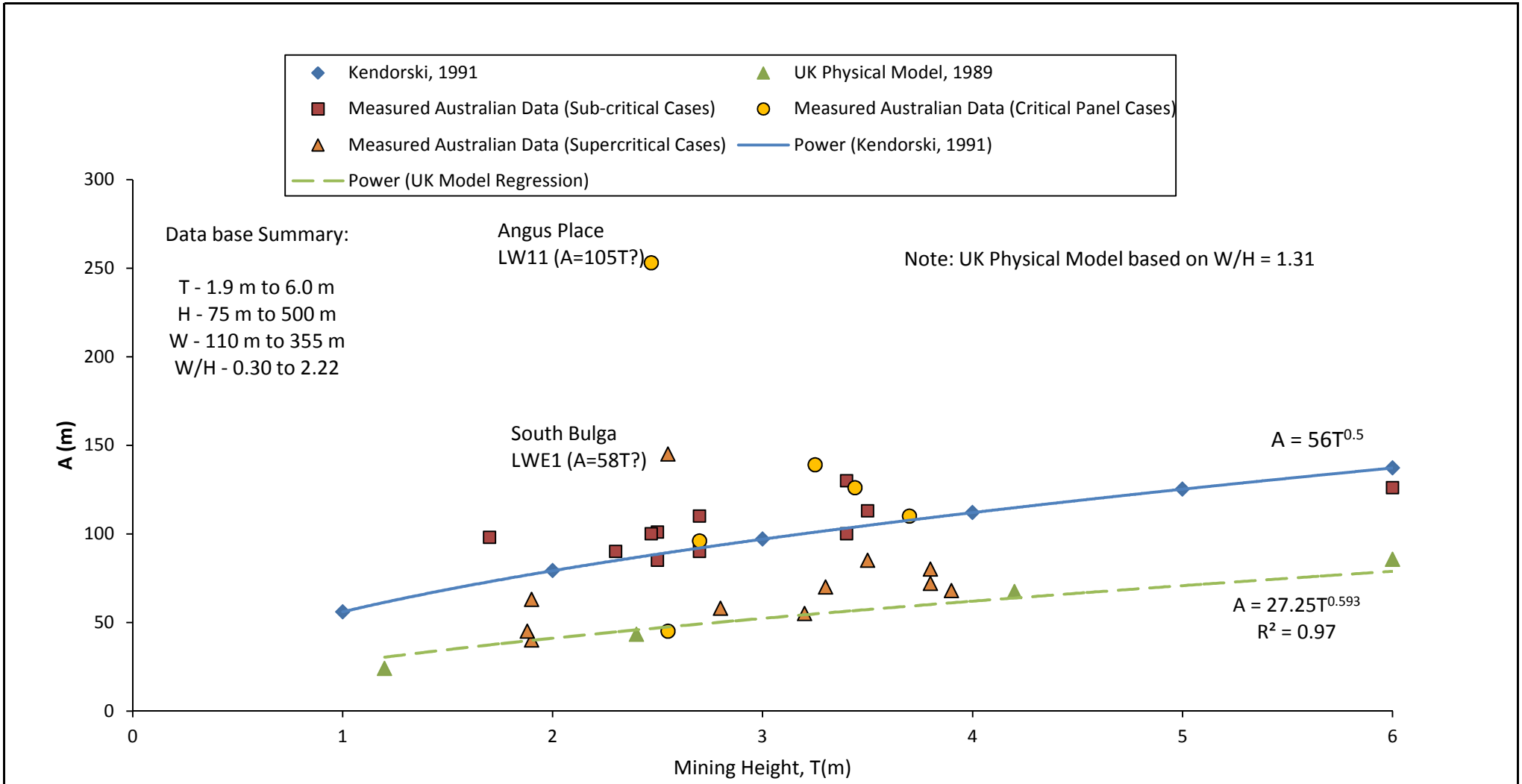
DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003 (DgS,2012)	
	Drawn:	S.Ditton			
	Date:	15.11.12	Title:	Alternative ACARP, 2003 A-Zone Sub-Surface Fracture Height Model based on Panel Width and Mining Height as Key Parameters	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41c



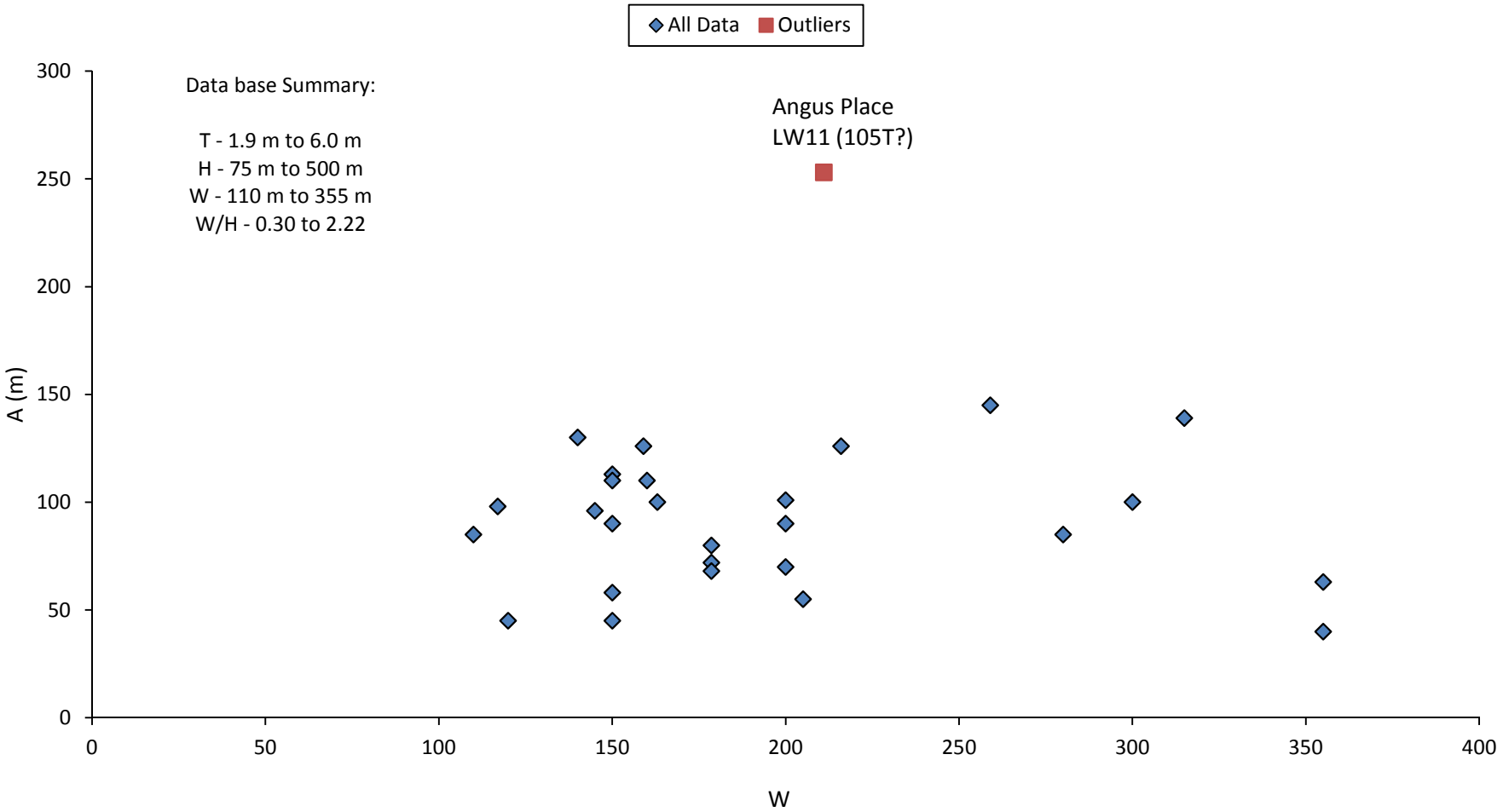
DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003 (DgS,2012)	
	Drawn:	S.Ditton			
	Date:	15.11.12	Title:	Alternative ACARP, 2003 B-Zone Sub-Surface Fracture Height Model based on Panel Width and Mining Height as Key Parameters	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41d



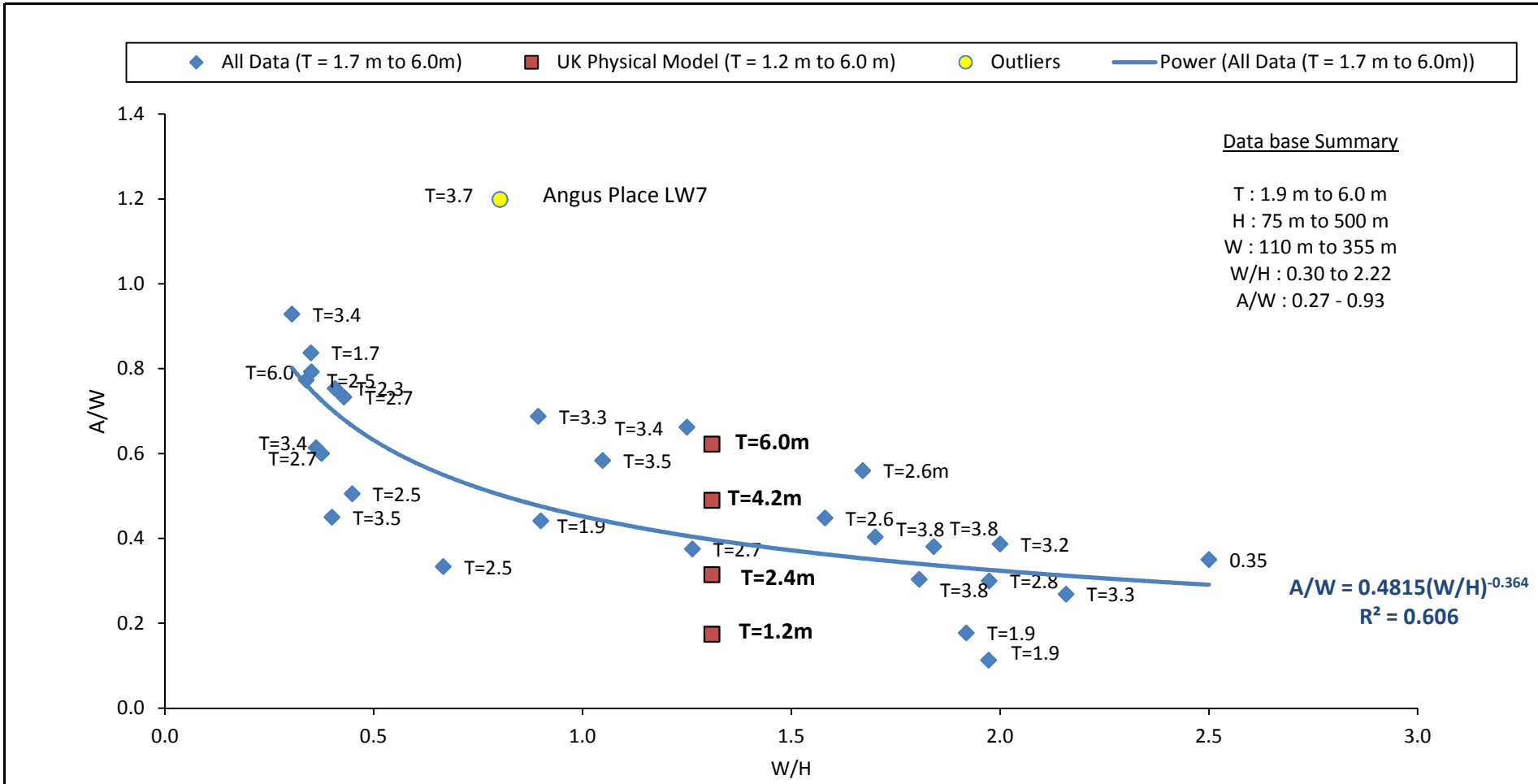
DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	10.06.13	Title:	Predicted Height of Continuous Fracturing Based on HoF Angle and Mining Height	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41e



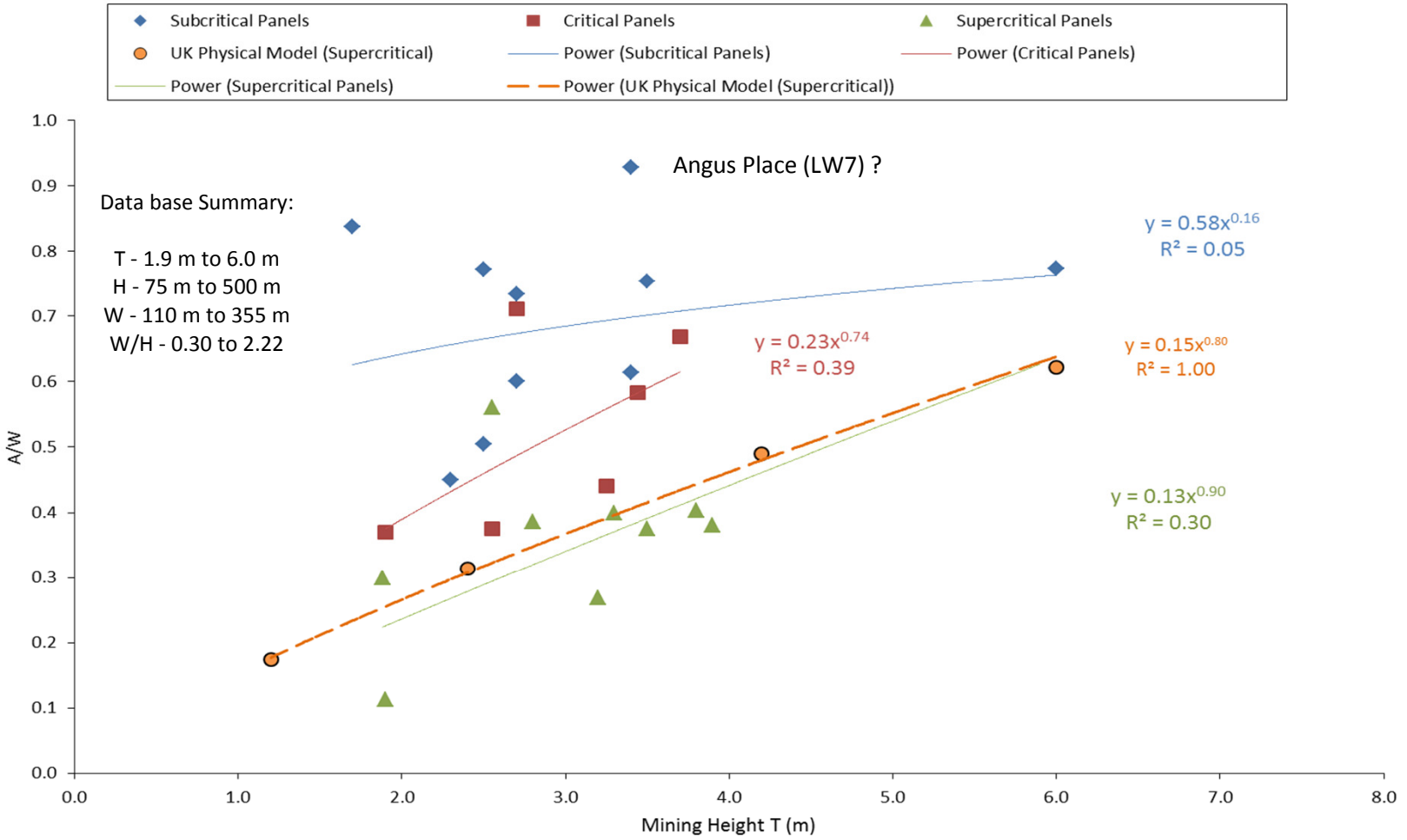
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	07.06.13	Title:	Continuous UK Fracture Height Models based on Mining Height Only v. Measured Australian Database	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41f



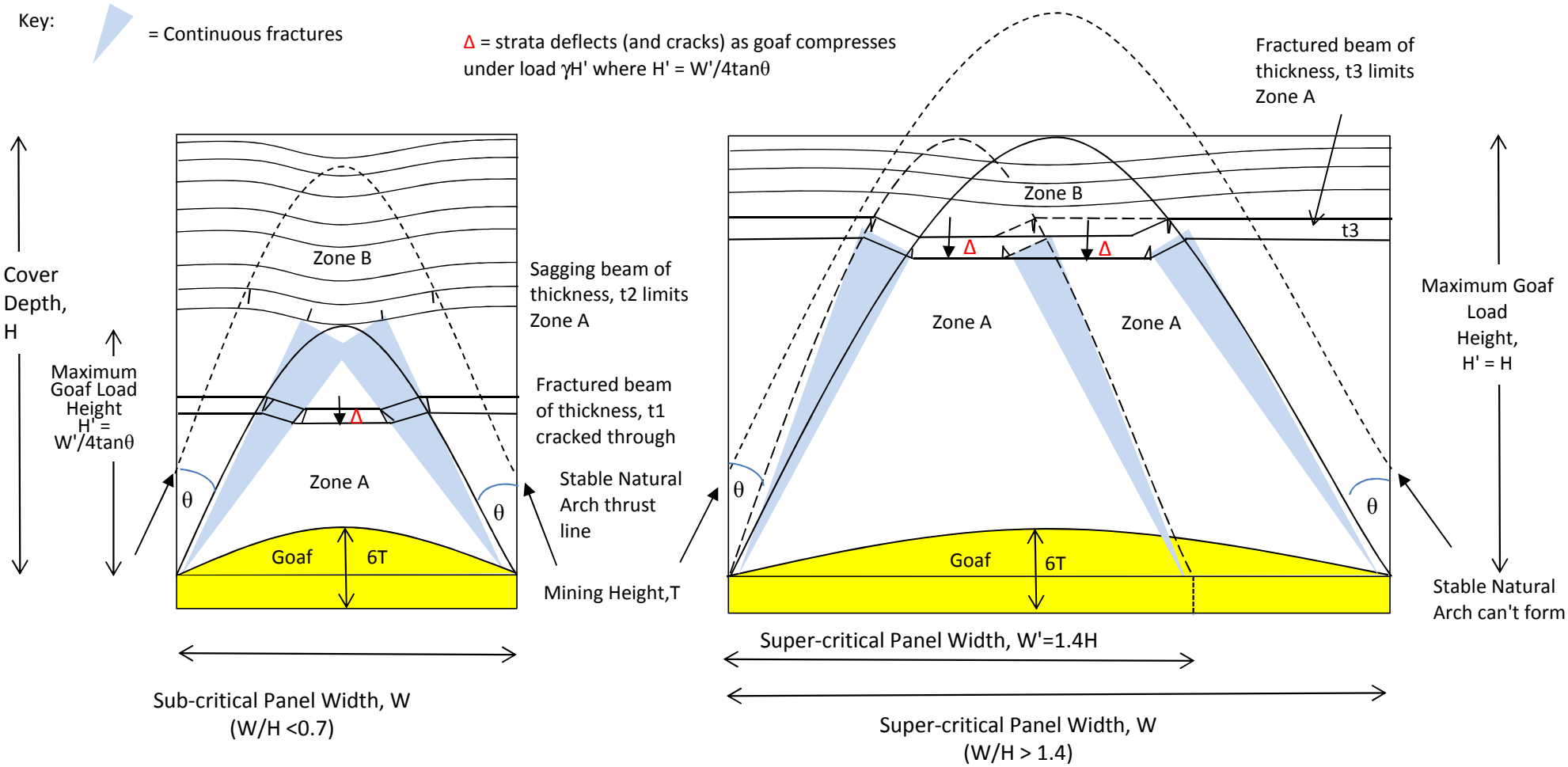
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	07.06.13	Title:	Continuous Australian Fracture Height Model based on Panel Width Only Database	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41g



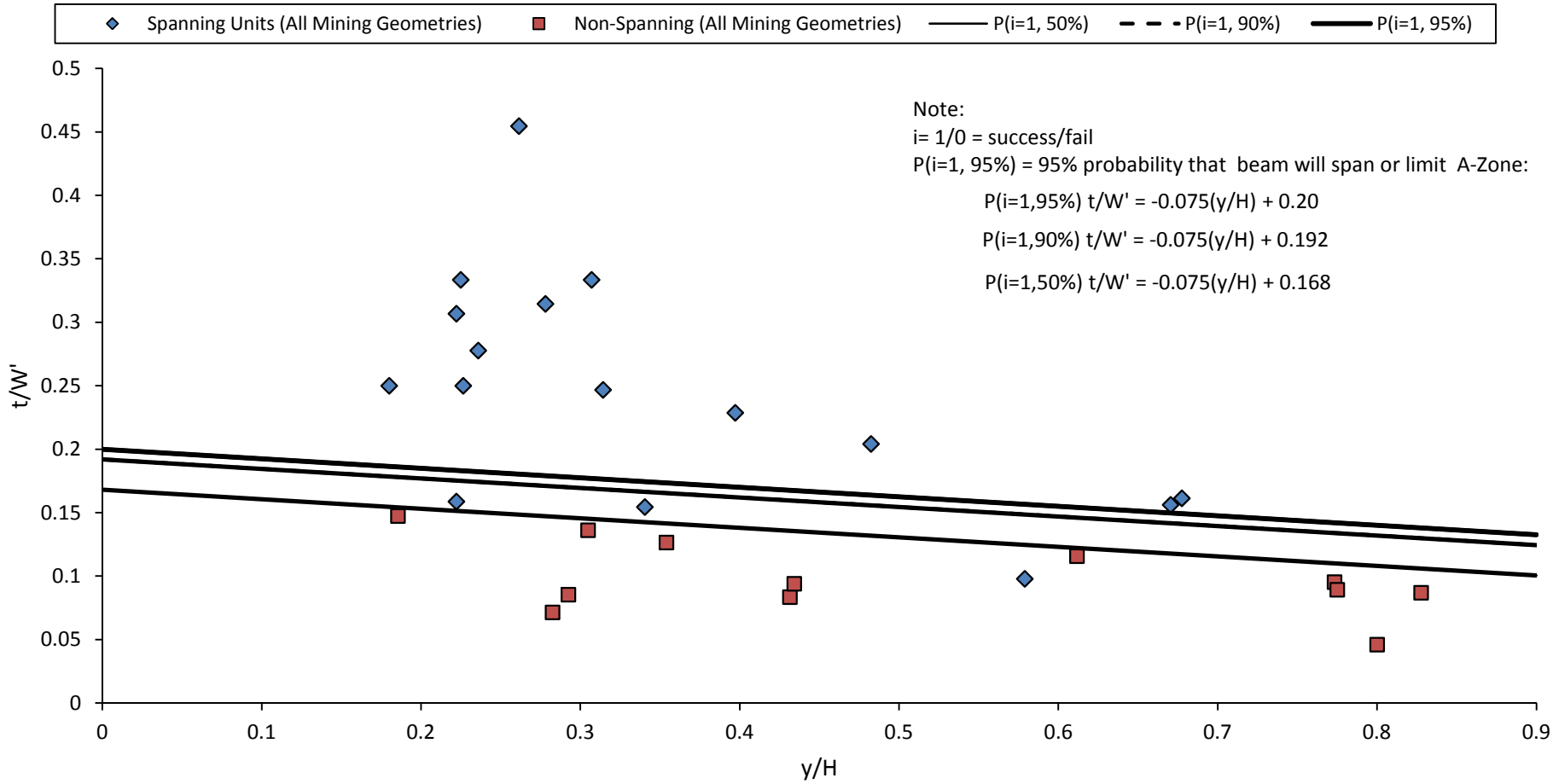
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	07.06.13	Title:	Continuous Australian Fracture Height Model based on A normalised to Panel Width with Influence of Mining Height Included	
Ditton Geotechnical Services Pty Ltd			Scale:	NTS	Figure No: A41h



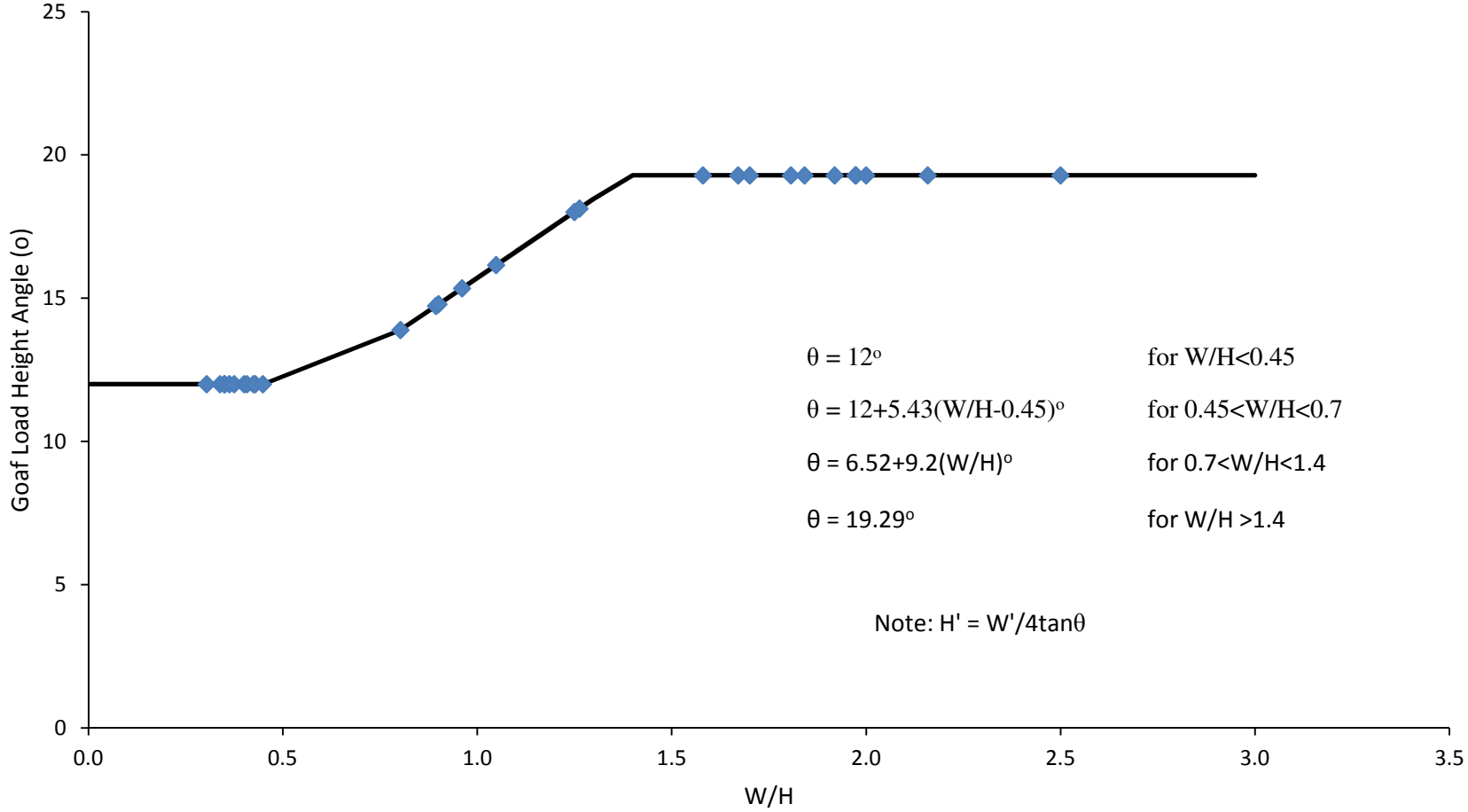
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	07.06.13	Title:	Continuous Australian Fracture Height Model based on A normalised to Panel Width v. Mining Height	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: 41i



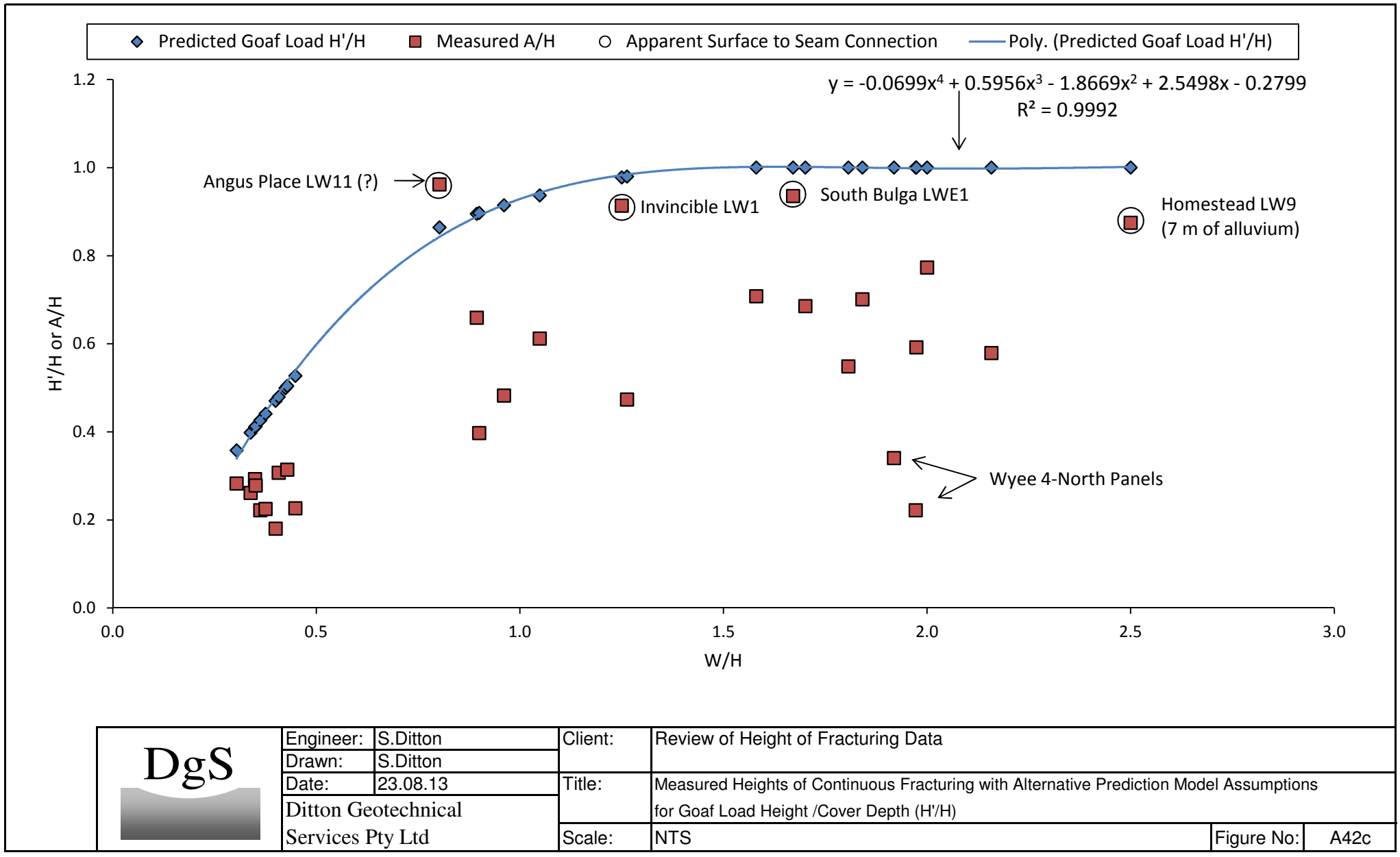
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	26.08.13	Title:	Conceptual Model for Development of Height of Continuous Fracturing Zone for a range of Longwall Panel Geometries	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A41j



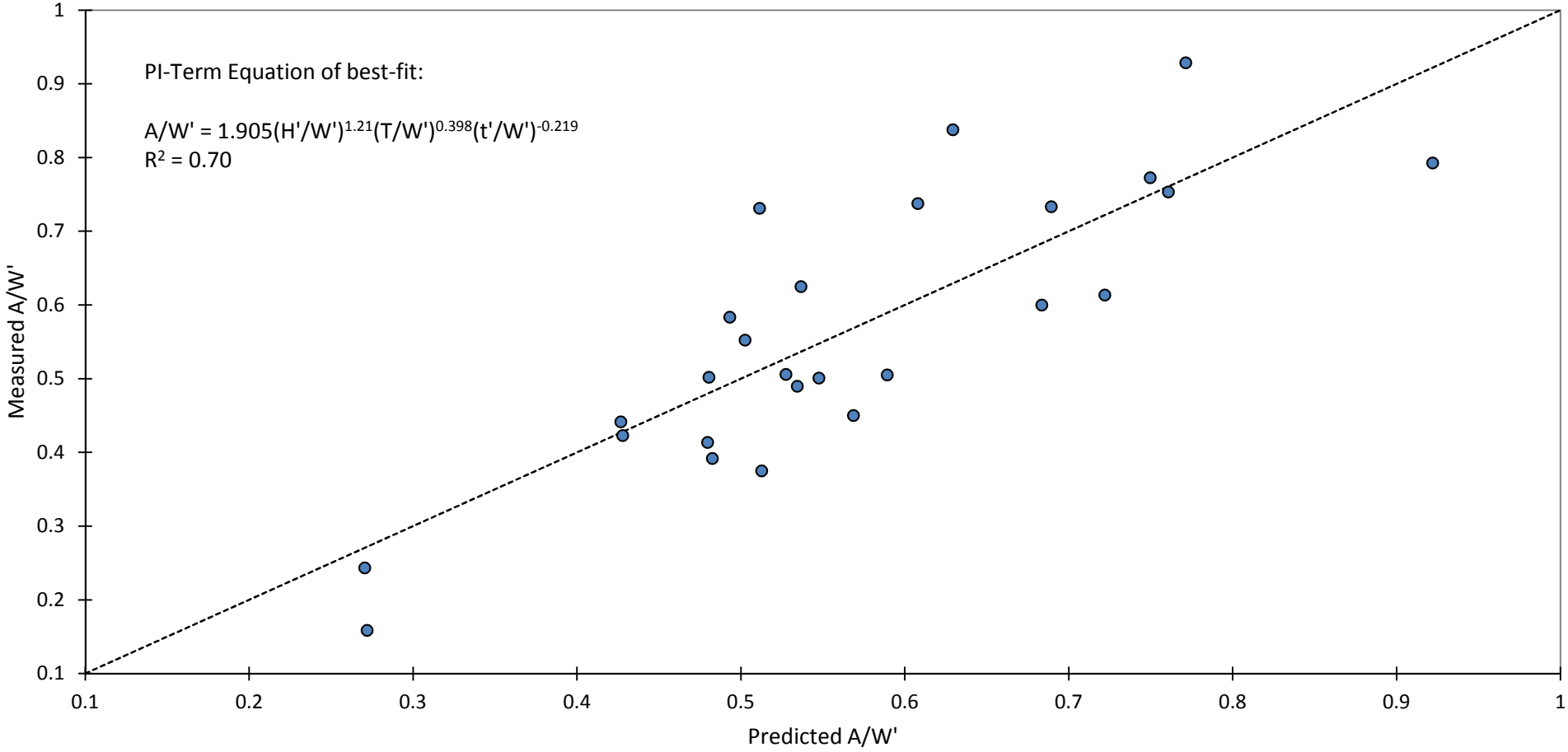
DgS	Engineer: S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn: S.Ditton			
	Date: 23.08.13	Title:	Results of Logistic Regession Analysis for Spanning and Non-Spanning Strata Units above Longwall Panels	
	Ditton Geotechnical Services Pty Ltd	Scale:	NTS	Figure No: A42a



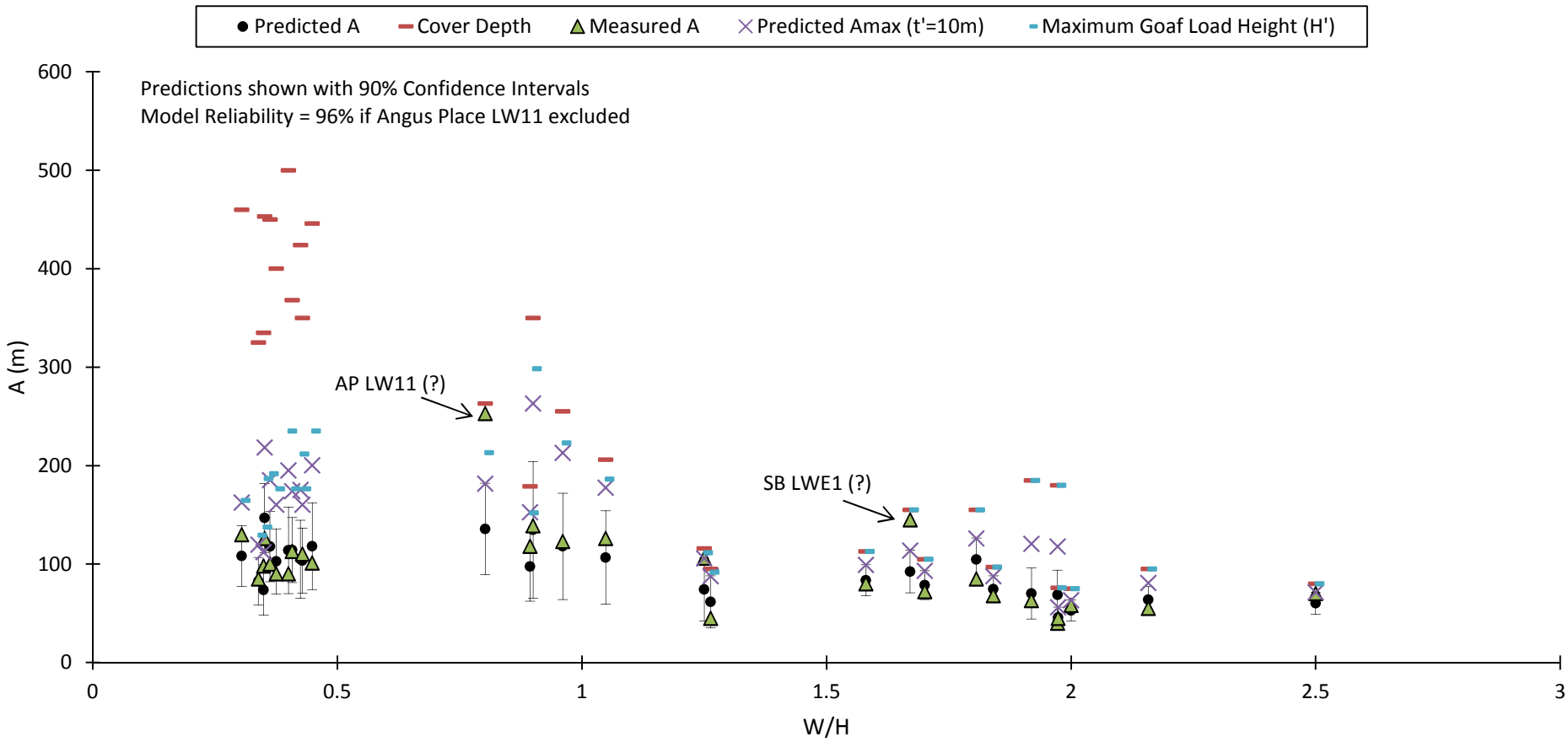
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	26.08.13	Title:	Height of Goaf Load Angle for PI-Term Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42b



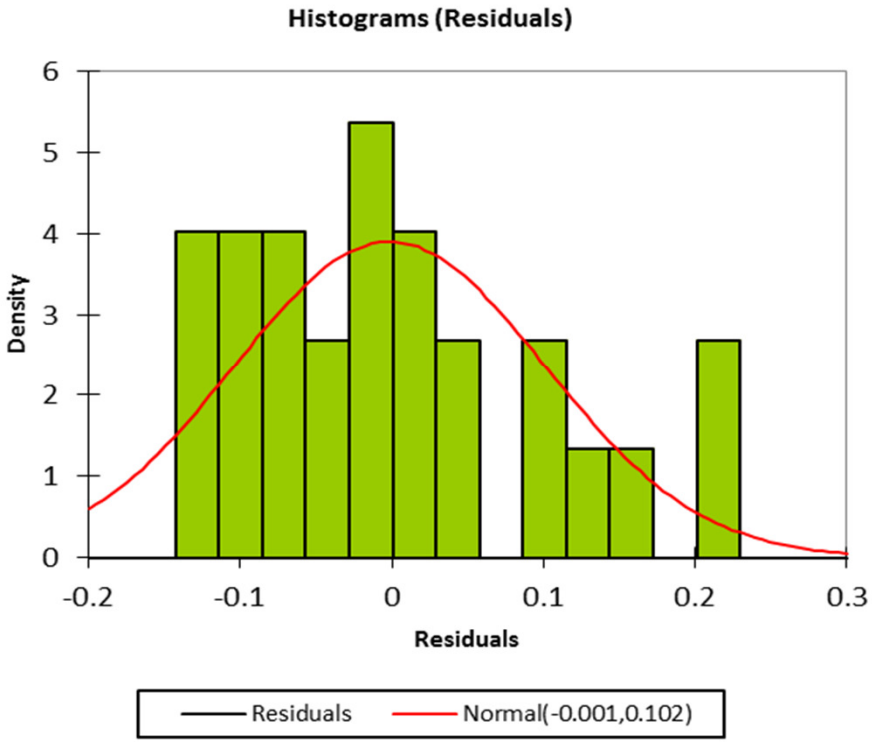
DgS	Engineer: S.Ditton	Client:	Review of Height of Fracturing Data
	Drawn: S.Ditton		
	Date: 23.08.13	Title:	Measured Heights of Continuous Fracturing with Alternative Prediction Model Assumptions for Goaf Load Height /Cover Depth (H'/H)
	Ditton Geotechnical Services Pty Ltd	Scale:	NTS — Figure No: A42c

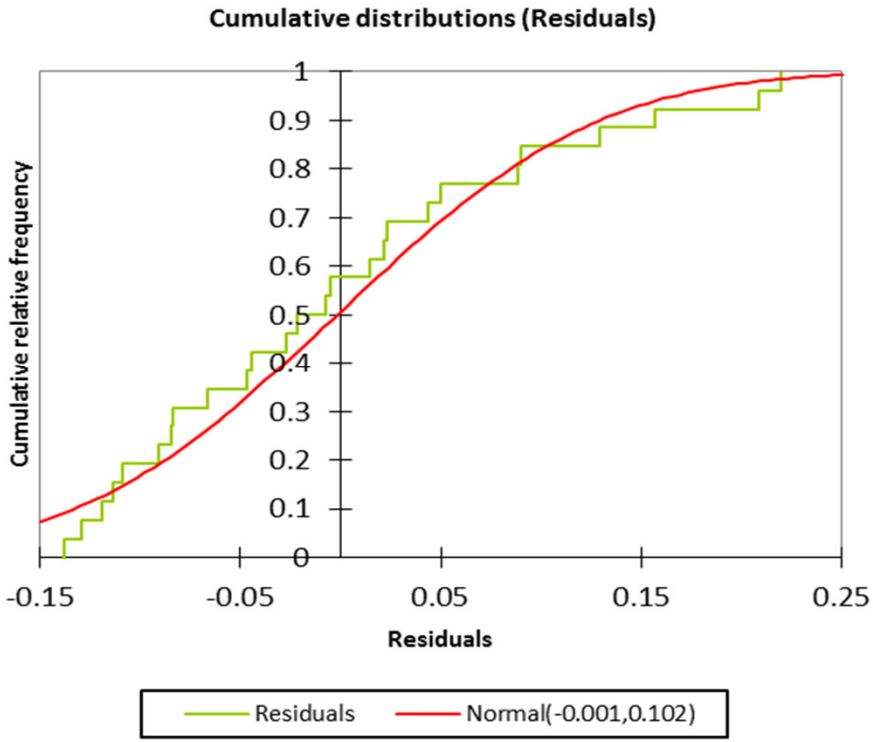


DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	26.08.13	Title:	Results of Non-Linear Regession Analysis: Predicted v. Measured Value Analysis for Height of A-Zone Fracturing	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42d



DgS	Engineer: S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn: S.Ditton			
	Date: 23.08.13	Title:	Results of Non-Linear Regession Error analysis for Height of A-Zone Prediction Model	
	Ditton Geotechnical Services Pty Ltd	Scale:	NTS	Figure No: A42e





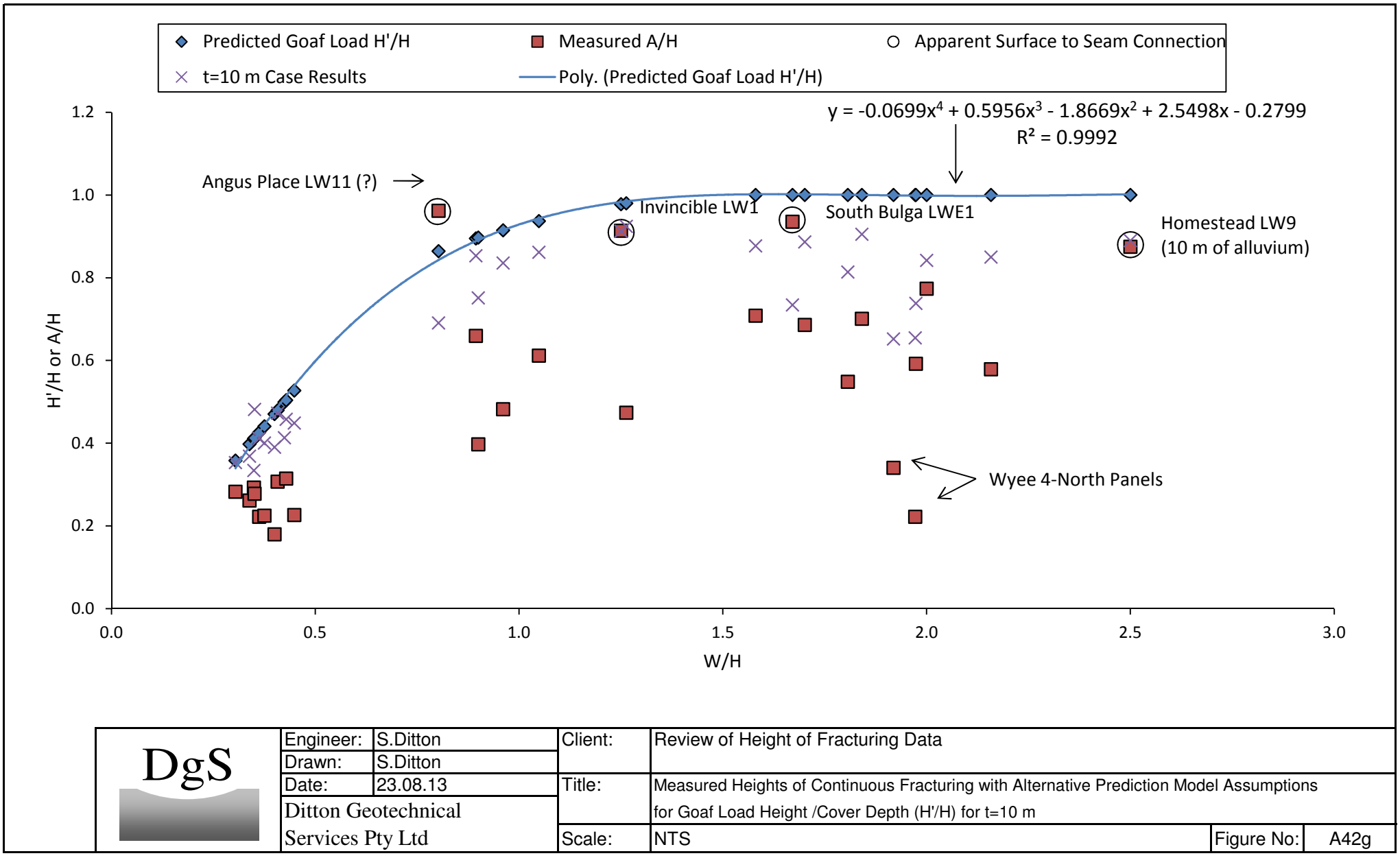
Kolmogorov-Smirnov test:

D	0.097
p-value	**0.957**
alpha	**0.05**

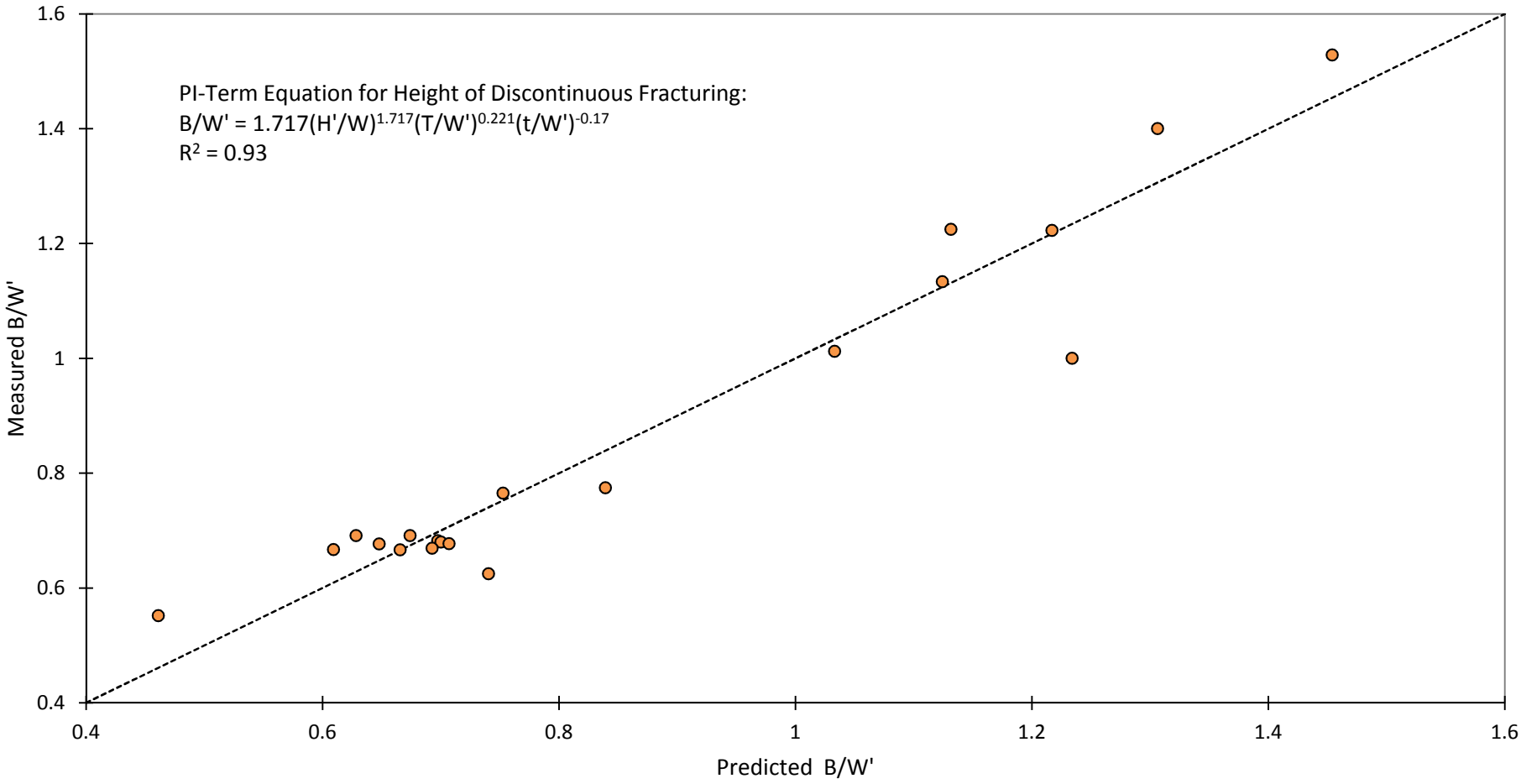
Test interpretation:

H0: The sample follows a Normal distribution
Ha: The sample does not follow a Normal distribution
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.
The risk to reject the null hypothesis H0 while it is true is 95.67%.

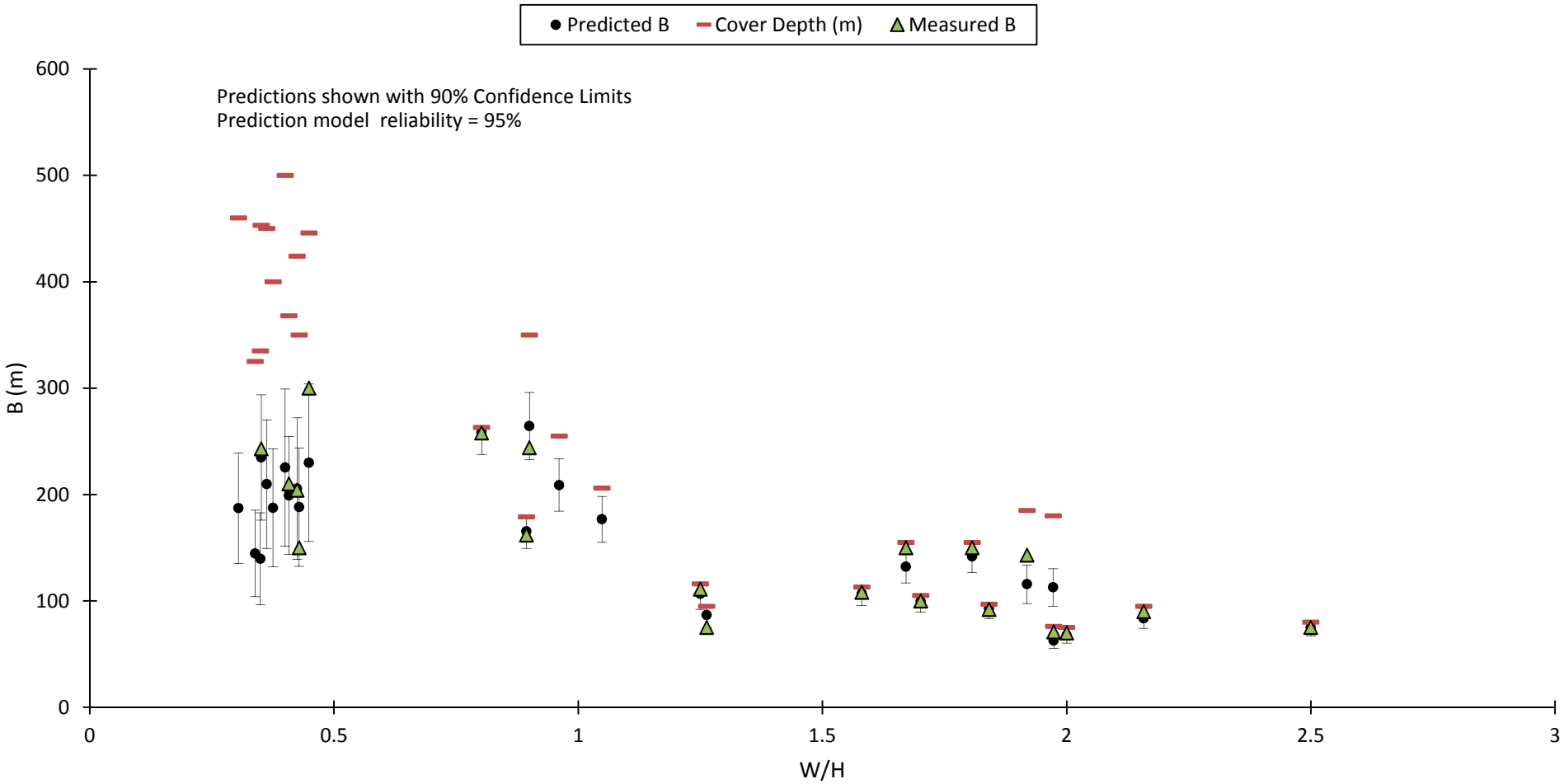
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	23.08.13	Title:	Results of Non-Linear Regession Error analysis for Height of A-Zone Prediction Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42f



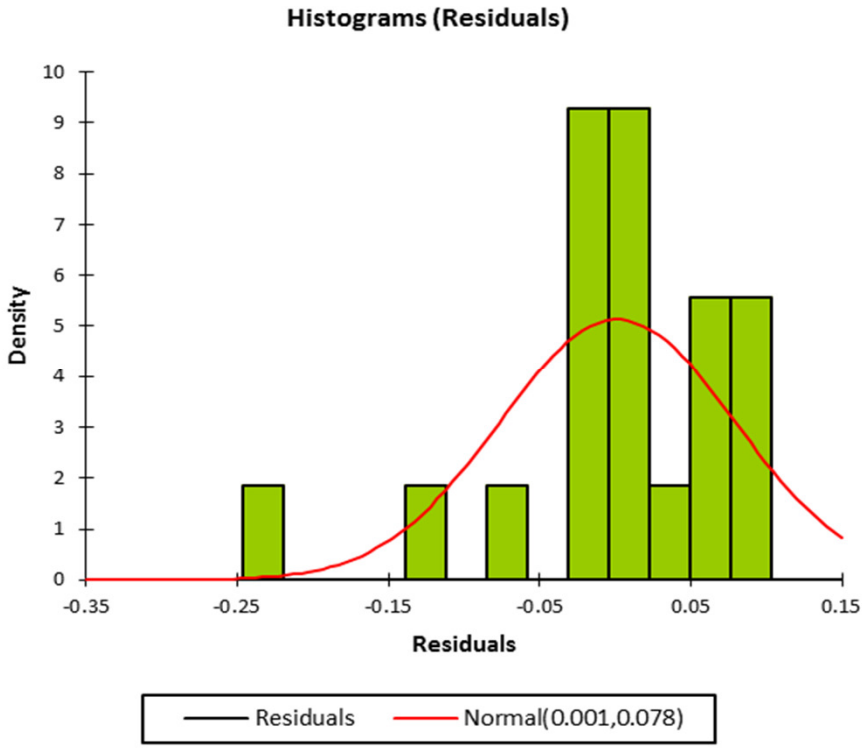
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	23.08.13	Title:	Measured Heights of Continuous Fracturing with Alternative Prediction Model Assumptions for Goaf Load Height /Cover Depth (H'/H) for t=10 m	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42g

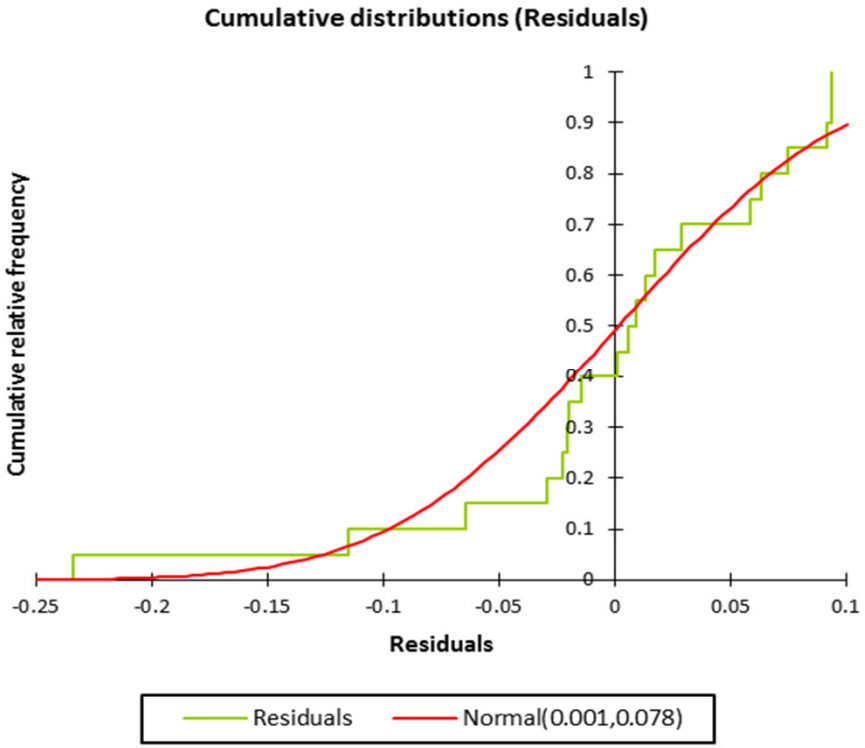


DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	26.08.13	Title:	Results of Non-Linear Regession: Predicted v. Measured Value Analysis for Height of B-Zone Prediction Model Normalised to Effective Panel Width	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42h



DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	26.08.13	Title:	Results of Non-Linear Regession: Predicted v. Measured Value Error Bar Analysis for Height of B-Zone Predictions v. W/H	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42i





Kolmogorov-Smirnov test:

D	0.196
p-value	0.387
alpha	0.05

Test interpretation:

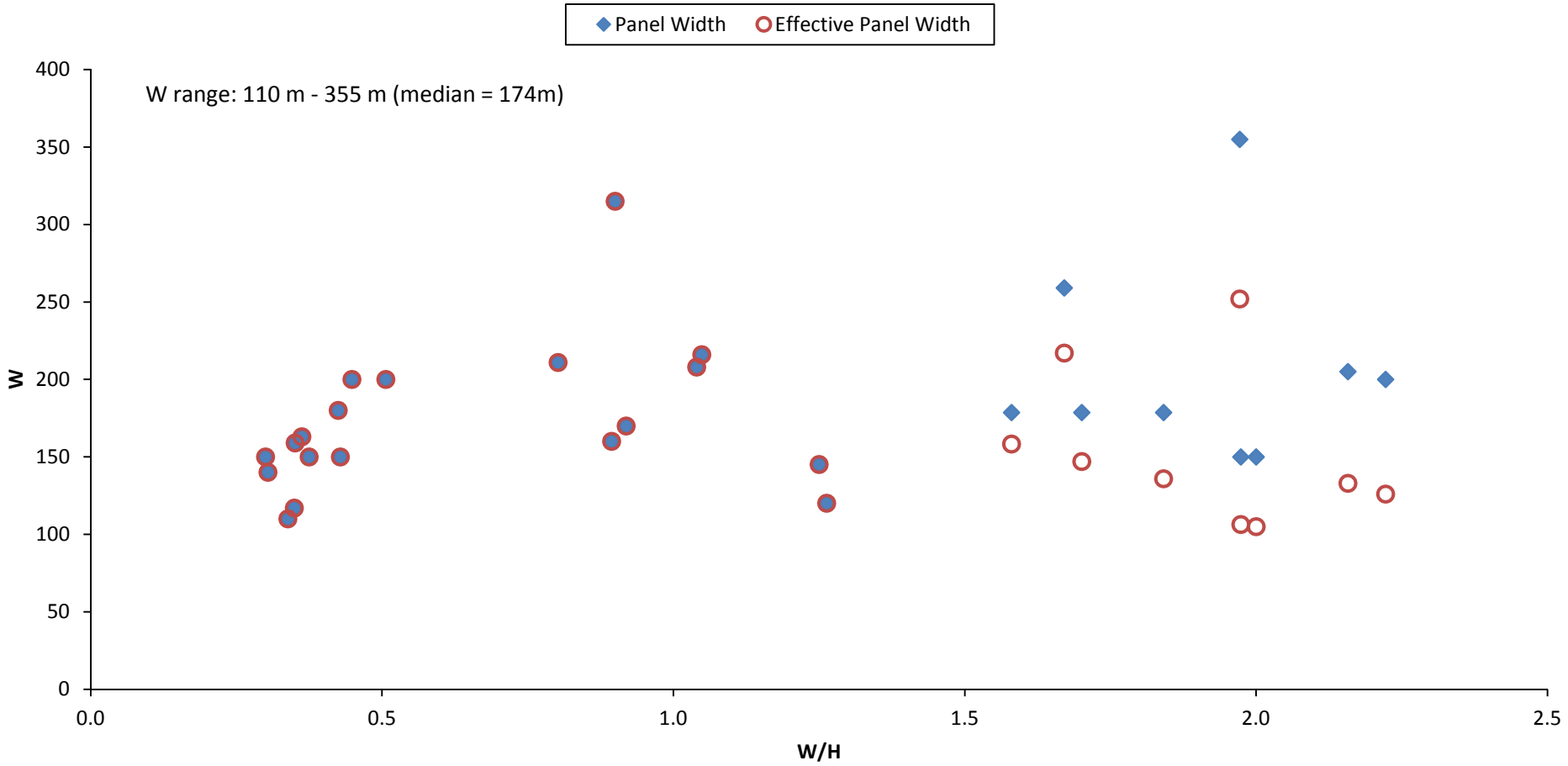
H0: The sample follows a Normal distribution

Ha: The sample does not follow a Normal distribution

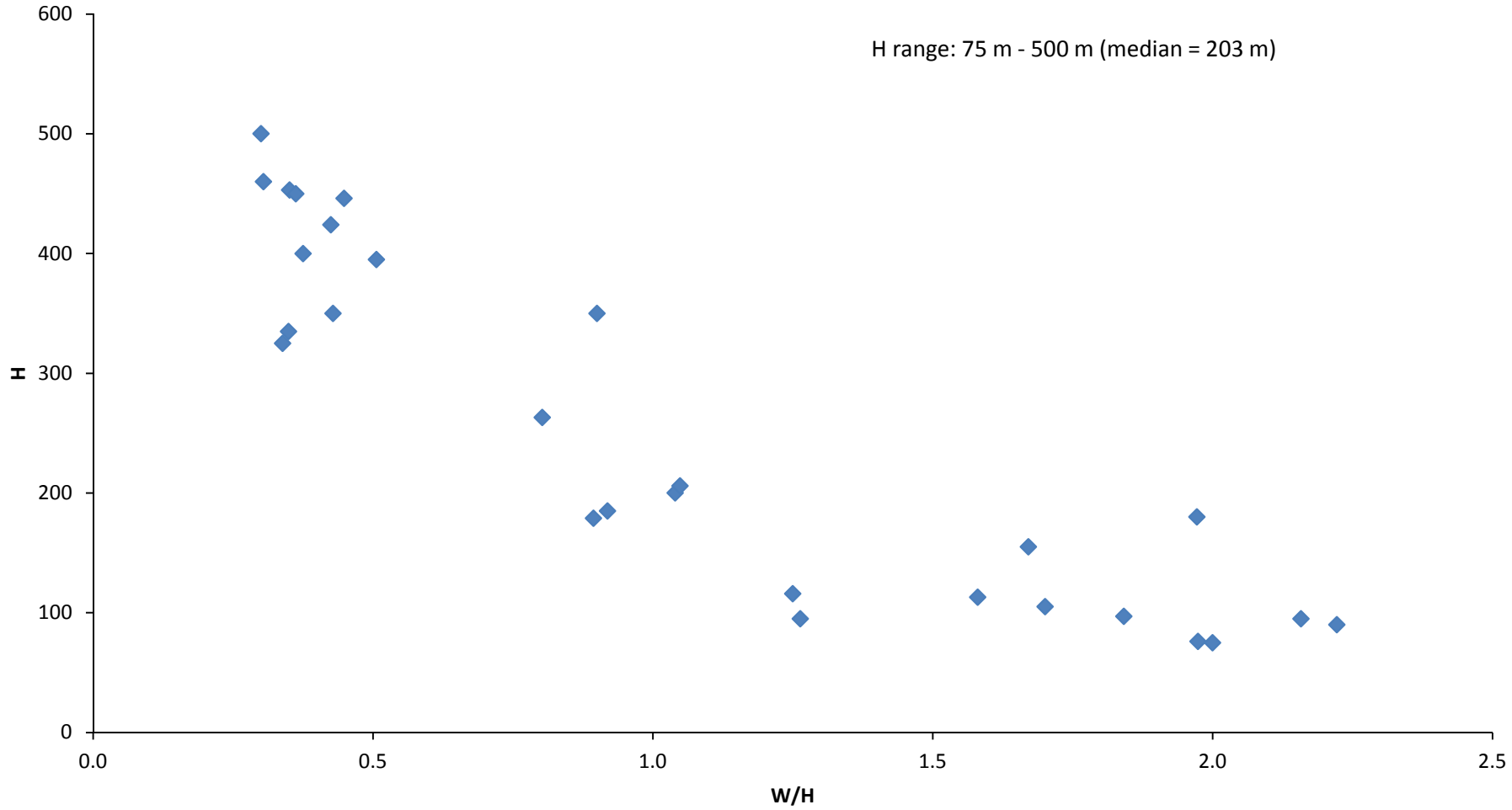
As the computed p-value is greater than the significance level alpha=0.05, one cannot reject the null hypothesis H0.

The risk to reject the null hypothesis H0 while it is true is 38.69%.

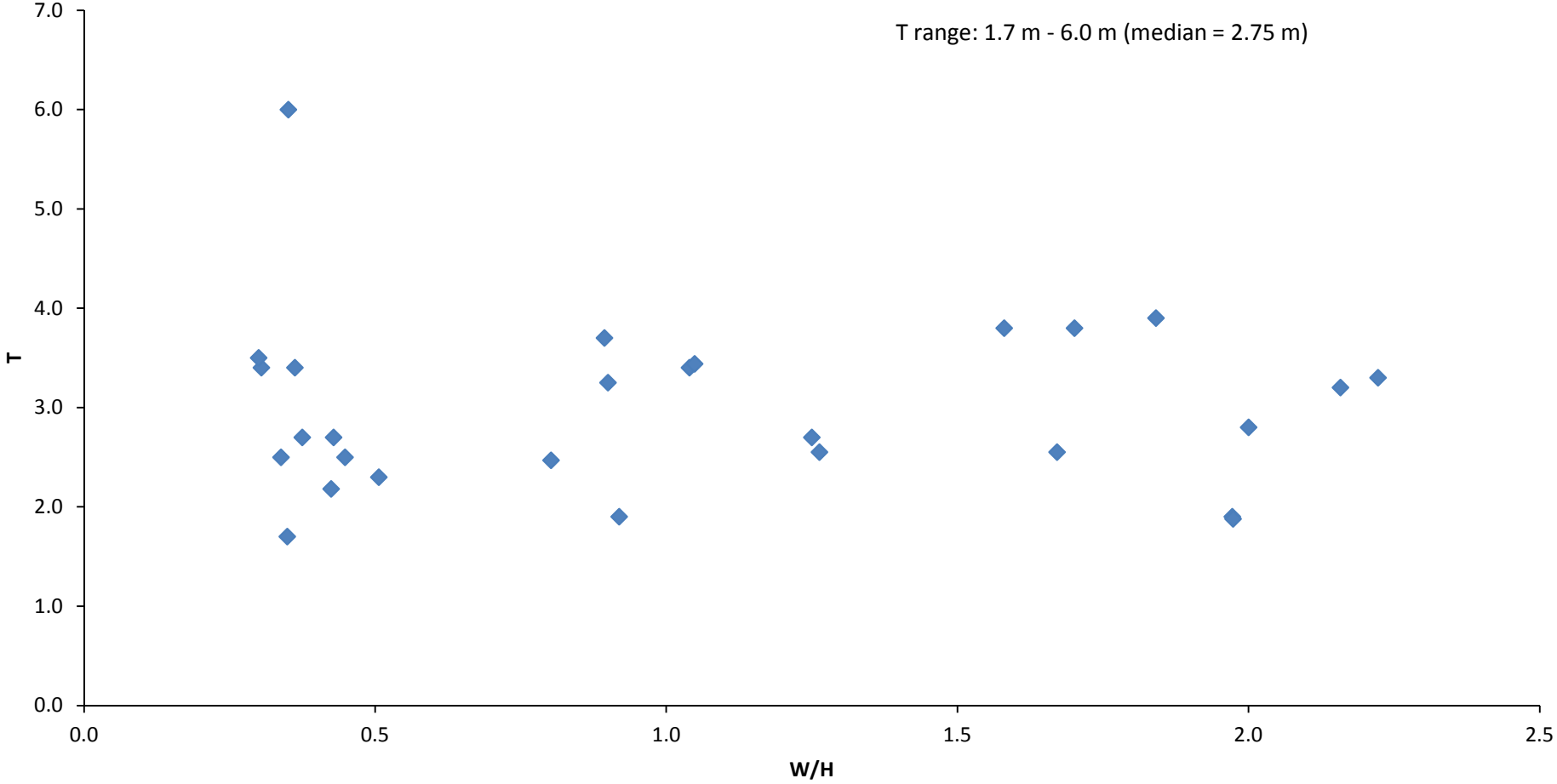
DgS	Engineer:	S.Ditton	Client:	Review of Height of Fracturing Data	
	Drawn:	S.Ditton			
	Date:	26.08.13	Title:	Results of Non-Linear Regession Error analysis for Height of B-Zone Prediction Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A42j



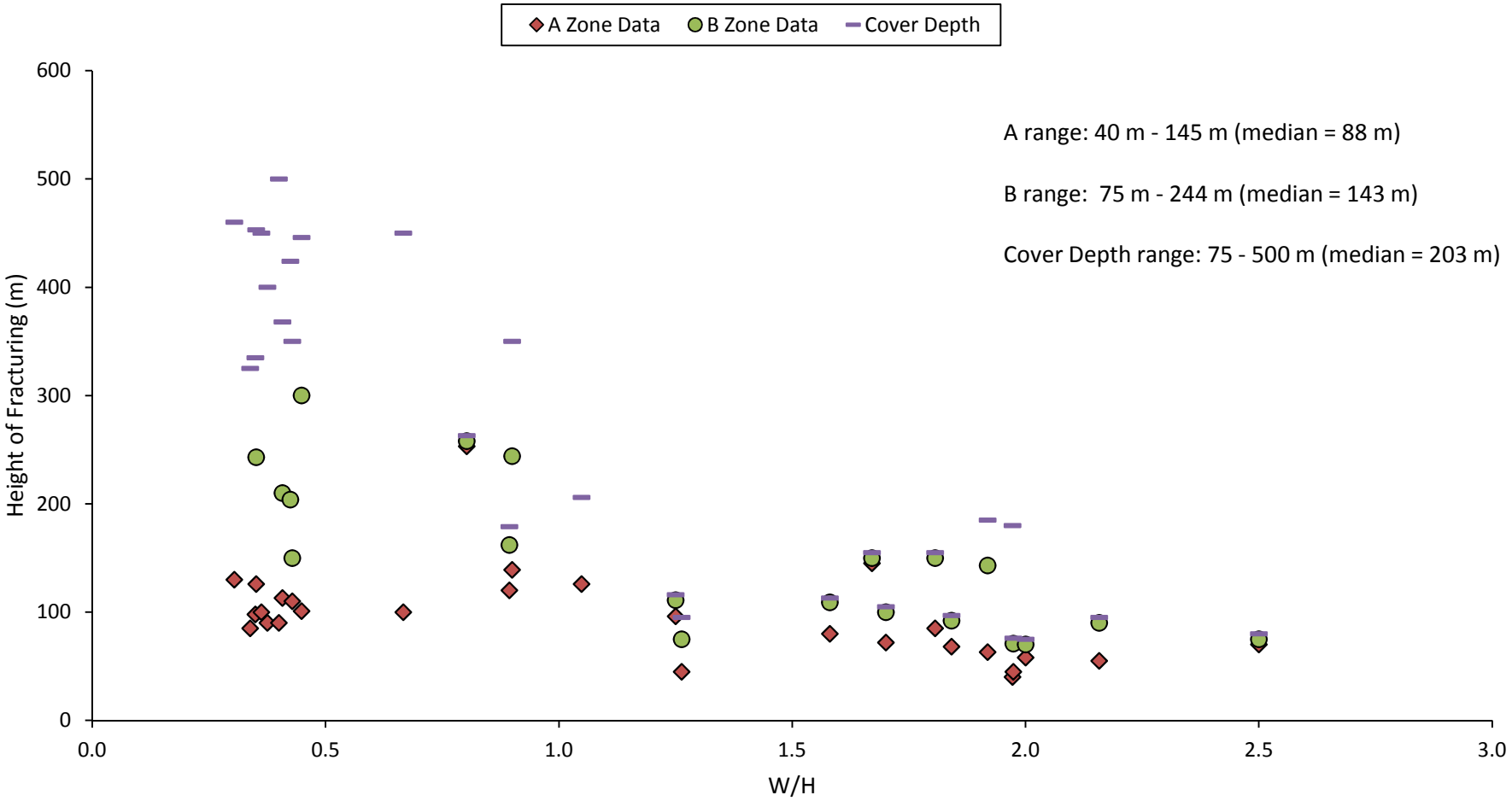
DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	03.12.12	Title:	Panel Width v. W/H Database for Sub-surface Fracturing Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A43a



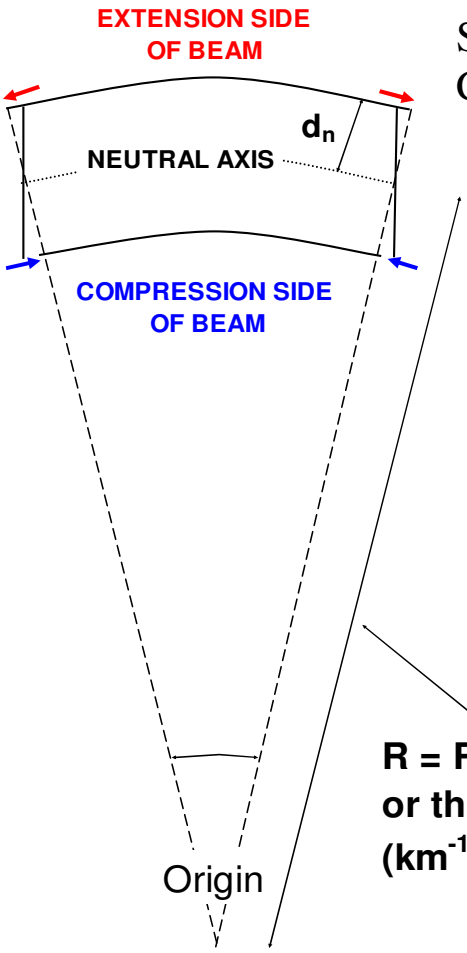
DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	03.12.12	Title:	Cover Depth v. W/H Database for Sub-surface Fracturing Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A43b



DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	03.12.12	Title:	Mining Height v. W/H Database for Sub-surface Fracturing Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: 43c



DgS	Engineer:	S.Ditton	Client:	Modified from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	03.12.12	Title:	Measured A-Zone and B-Zone Fracture Heights v. W/H Database for Sub-surface Fracturing Model	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: 43d



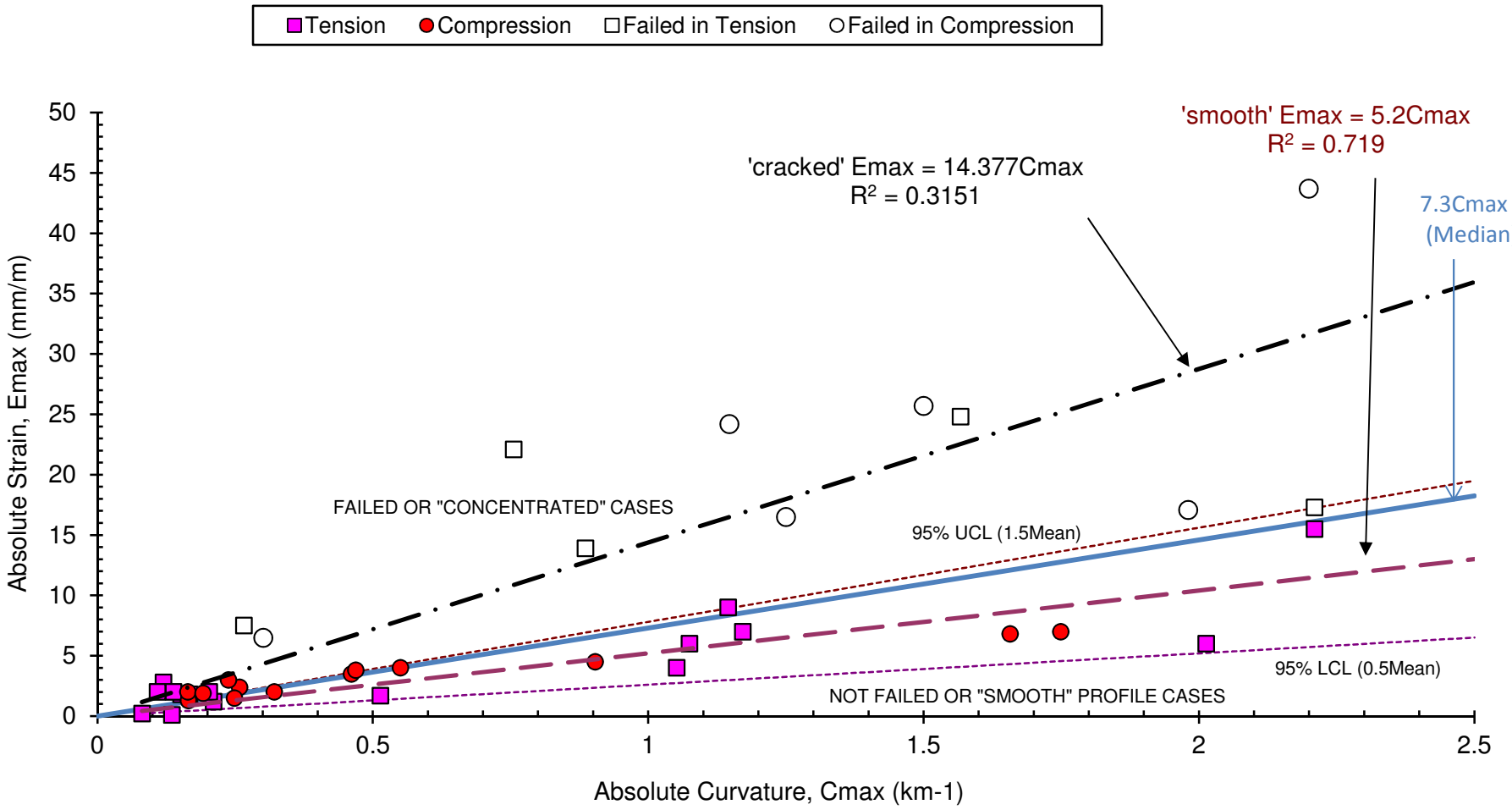
Strain E = (mm/m)
Curvature C = km^{-1}

$E = C \times d_n$

Mean - Median
d_n = 5.3 m
to 7.4 m
for database
= Depth of Cracking

R = Radius of curvature or the curvature, C = 1/R (km^{-1})

DgS	Engineer:	S.Ditton	Client:	Extract from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	08.08.08	Title:	Bending Beam Theory for Strain Prediction from Curvature Measurements	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A43e



DgS	Engineer:	S.Ditton	Client:	Extract from ACARP, 2003	
	Drawn:	S.Ditton			
	Date:	08.08.08	Title:	Empirical Model for Maximum Panel Strain Prediction Above Longwall Panels for Smooth and Cracked Profiles in the Newcastle Coalfield	
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS	Figure No: A43f

ATTACHMENT C

OUTOTEC REPORT: ZONE 1a & 4 MINEFILL POTENTIAL (P228-L10-rev2)

Peabody Energy Australia Pty Ltd
Jerry Plains Road
Warkworth via Singleton NSW 2330

Attention: Mr. Grant Wilkinson

Wambo Coal Mine Backfill Project – Homestead Underground, Whybrow seam, Zone 1A and 4 minefill potential

INTRODUCTION

In addition to paste fill activities that are currently underway in "Zone 1" of the Homestead workings, Peabody have indicated an intention to paste fill mine workings in Zones 1A and 4 of the Whybrow seam. These workings are adjacent to "Zone 1" of the Homestead underground as defined in Figure 1. Peabody have requested Outotec explore the possibilities and limitations associated with this project considering the following constraints;

1) Filling is to be completed utilising the same plant and processes as are currently being employed in Zone 1 of the Homestead underground.

2) In addition to currently proposed boreholes, only additional boreholes C31.5, D31.5, E31, F31, G31, H31, I31, J31, and K31 are to be drilled. The location of these holes is presented in Figure 1.

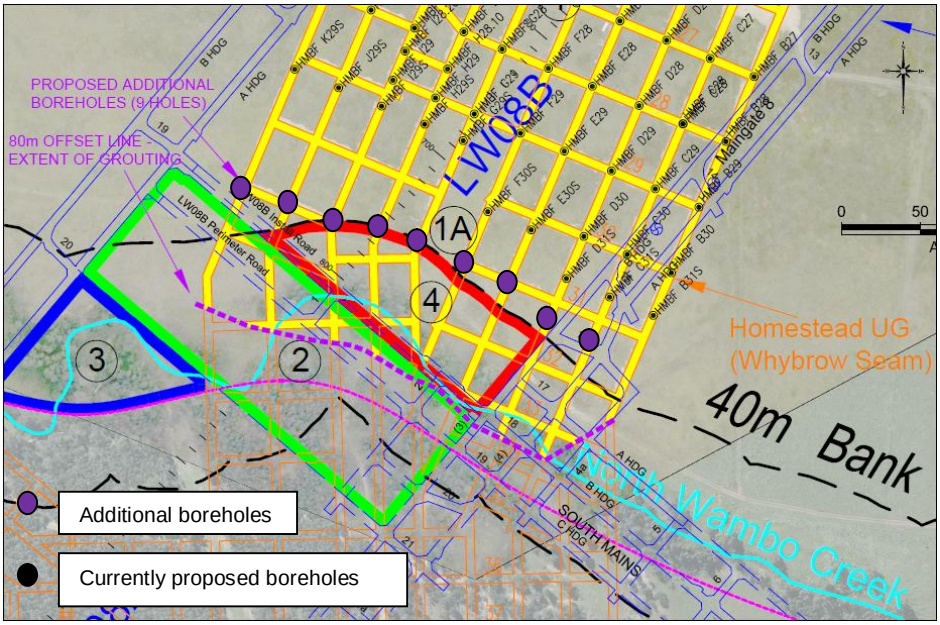


Figure 1: Specific delineated zones for the Homestead Underground, Whybrow Seam workings

The objective of this letter is to make an estimate of the required paste parameters and maximum lateral distance in the underground workings the paste could be expected to fill, down dip of the accessible boreholes. In accordance with Outotec – Backfill Specialists (2013) paste, to be deposited into Zones 1A and 4, is required to meet the following criteria:

1) Resistance to "flow liquefaction", to minimise risks associated with current and future underground operations, adjacent to and beneath the workings to be filled.

2) Sufficient paste fill integrity, to minimise the risk of sinkhole propagation from the Homestead underground workings up to the Wambo Creek Alluvium and to the surface by targeting a 28 day UCS of 50 kPa.

3) Adequate paste flowablility during placement by targeting a maximum elevation difference, between the final paste fill level and the nominal roof elevation, of 500 mm.

DISCUSSION

In previous operations Outotec have found that, when placed down similar boreholes to those at Wambo (length of 50 m), paste has successfully tight filled relatively flat dipping drives to a length of 50-80 m if placed with a conical slump of 220-250 mm.

During the paste filling activities in the first borehole of the Wambo Zone 1 area (borehole J26) the paste beach angle / flowability was monitored. Due to inaccessibility the paste beach could only be surveyed at discrete (borehole) locations. Figure 2 shows the location of relevant fill and survey boreholes during this initial fill campaign.

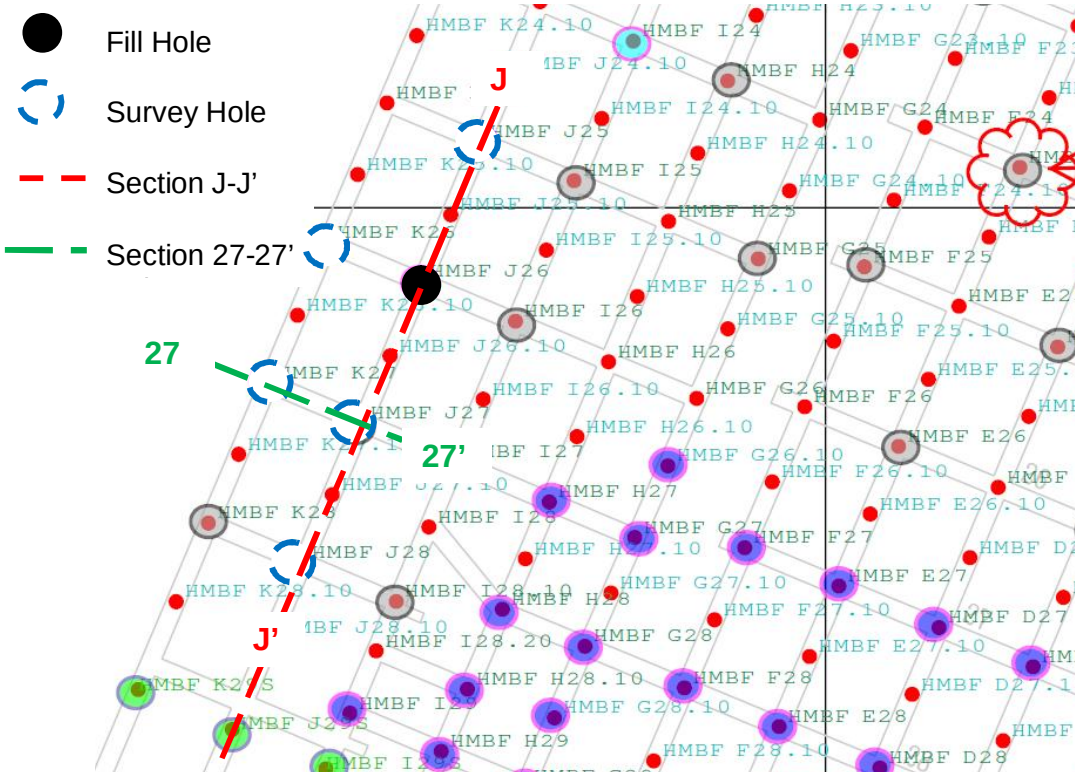


Figure 2: Location of paste survey activity

During this survey fill was placed with a nominal conical slump of 200-220 mm.

At the completion of filling (in J26) intersections J25 and J27 were shown to be completely full, K26 was shown to have been adequately filled (i.e. within 500 mm of the roof) and intersections K27 and J28

were partially full. A section showing the measured fill profile along Section J-J' at the completion of filling is presented in Figure 3.

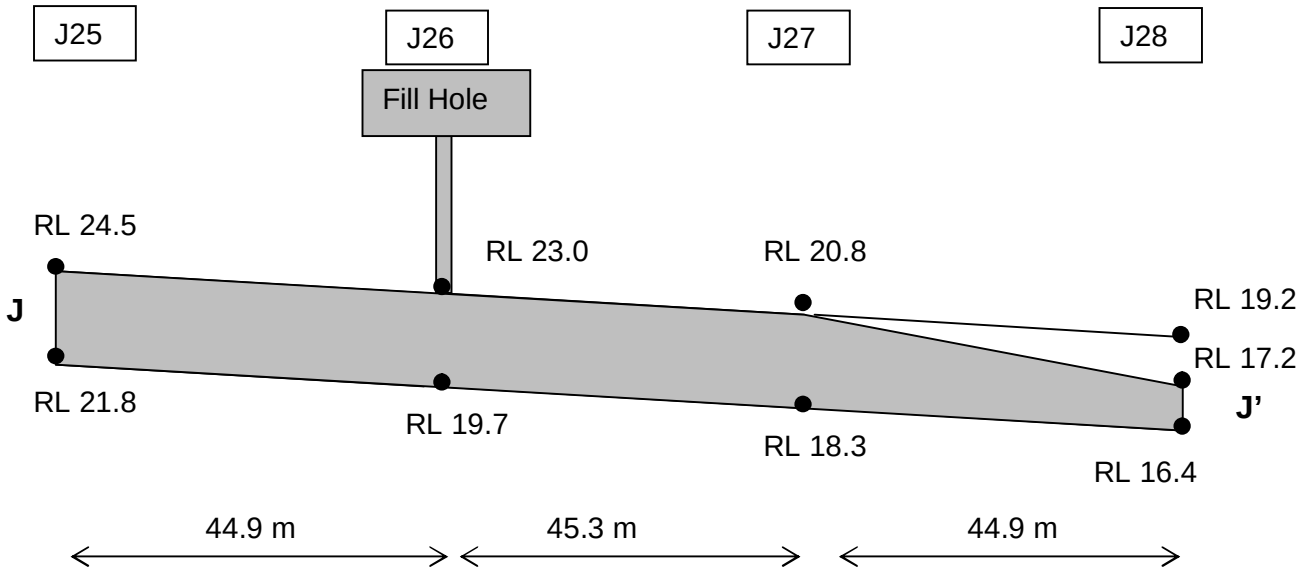


Figure 3: Fill profile along Section J-J' after filling J26 hole

Based on the data presented in Figure 3, Table 1 provides a summary of the beach angle findings. In addition, the calculated paste beach angle between J26 and K26 and that between J27 and K27 are also presented.

Table 1: Estimated beach angle profile from Wambo borehole J26 filling

Section	Dist from borehole (m)	Floor gradient (deg.)	Roof gradient (deg.)	Paste beach gradient (deg.)
J26-J25	0 - 44.9	-2.6º	-1.9º	< -1.9º (tight filled up-dip)
J26-J27	0 - 45.3	1.8º	2.8º	< 2.8º
J27-J28	45.3 - 90.2	2.4º	1.9º	> 4.5º
J26-K26	0 - 29.9	-0.5º	1.3º	>2.2º
J27-K27	45.3 - 75.3*	0.0º	-0.2º	>2.5º

*perpendicular to the initial paste flow direction

The results from the first fill hole in Wambo Zone 1 indicate that drives can be tight filled a distance of 45 m up and downdip of the deposition borehole, with paste at a nominal slump of 200-220 mm.

However, between 45 and 90 m the paste beach angle appears to increase considerably. The results to date show that, with similar dip angles, to that at J26, paste fill can only fill to within 1.5-2.0 m of the roof at a distance of 90 m from the fill hole, if placed with 200-220 mm slump.

To provide insight into the ability to fill "cross cut" drives, the borehole survey from intersection J27 to K27 (when filling J26) is relevant. During the filling of borehole J26 the drive section through intersection J27 was tight filled. However, fill was shown to be 1.33 m from the roof at intersection J27. To illustrate this profile the fill geometry through Section 27-27' is presented in Figure 4.

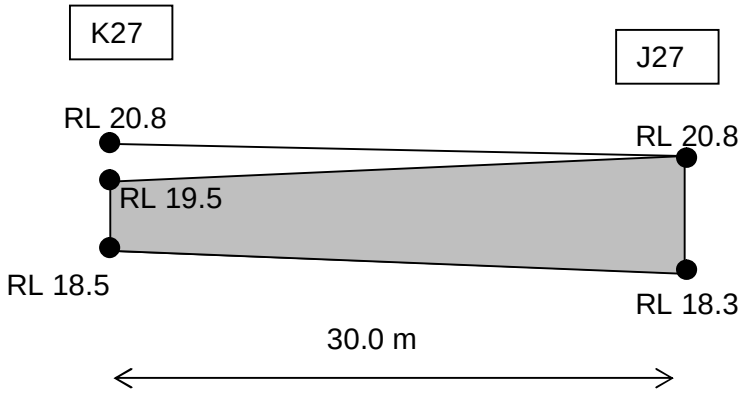


Figure 4: Fill profile along Section 27-27' after filling J26 hole

Based on the results presented in Figure 4 it appears that the paste is dipping at an average angle of 2.5º in cross cut perpendicular to the original flow direction of the paste. Therefore, if the same fill strategy was adopted, in Zones 1A and 4, it is possible that some parts of the cross cut may not be adequately tight filled (i.e. to within 500 mm).

It should be noted that the J26 hole was the "commissioning" hole for the new paste fill system and consequently filling was relatively slow with considerable breaks between fill pours. Furthermore, to save binder and reduce the "run-out" distance fill was placed with a conical slump of 200-220 mm. Compared with the 50-80 m of tight fill distance, as observed at other sites, the shorter run-out distance measured for the first fill hole at Wambo is as expected. Furthermore, an increase in the continuity of placement and increase in paste slump (from 200-220 mm to 230-240 mm) would be expected to increase the Wambo "run-out" distance to a value closer to the upper distance (of 80 m) measured at other sites.

Therefore, given the previous experience at other sites as well as the brief experience at Wambo it is expected that, with a roof dip angle of approximately 2º, if paste is deposited with a conical slump of 230-240 mm:

- Paste can almost certainly tight fill a region 50 m from the deposition point.
- It is likely that paste can tight fill (within 500 mm) a distance of 80 m from the deposition point.

Assuming this to be the case, when placed from existing boreholes (which are understood to include boreholes B31S, C31S, D31S, E30S, F30S, G29S, H29S, I29S, J29S, and K29S), and the proposed boreholes (i.e. C31.5, D31.5, E31, F31, G31, H31, I31, J31, and K31), paste with a conical slump of 230-240 mm, paste may flow sufficiently to fill the majority of Zone 1A and a reasonable section of Zone 4, as indicated by the "80 m offset line" in Figure 1.

As discussed, paste fill activities are currently ongoing in Zone 1 of the Homestead underground, Whybrow seam. Preliminary paste filling information provided to date indicates that source material variability is considerable and consequently the paste rheological behavior also varies. As a result, there is a risk that maintaining the consistent rheological characteristics may be challenging.

It should however be noted that the objective of refilling the underground workings is specifically to ensure that insufficient void space exists to allow for the "bulking" that occurs during sinkhole formation. As described by Strata Engineering (2009) and Golder Associates (2013):

- The likelihood of a sinkhole extending through to the surface is significantly reduced as the overburden thickness (depth) is increased.
- The amount of void space required to allow unravelling to continue, i.e. allowing unravelling when the fallen ground "bulks up", increases as the thickness of the overburden (depth) increases.

Consequently, while it may not be possible to achieve the tight fill criteria, as set out in Criterion #3, for the fill in some parts of Zone 1A and 4 it may be appropriate to increase the allowable distance from the fill surface to the roof height in this area due to the increased overburden thickness above Zones 1A and 4. Wambo's geotechnical engineers should be consulted on this aspect.

To illustrate the likely mix solids concentration for paste that is to be batched to achieve a conical slump of 230-240 mm the results of rheological testing on a range of different Wambo sources is presented in Figure 5.

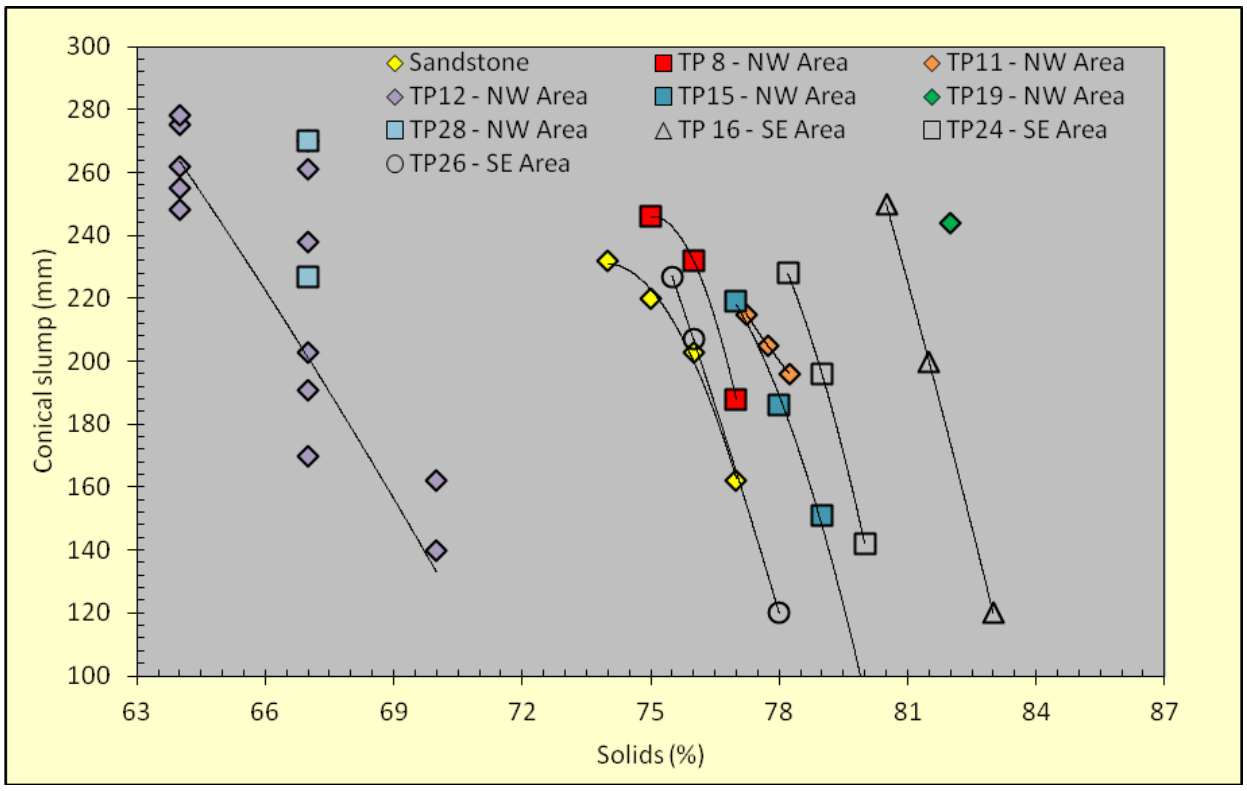


Figure 5: Conical slump verses mix solids content for Wambo alluvial soils

Figure 5 shows that, to achieve the target conical slump of 230- 240 mm, paste made from Wambo alluvial soils is expected to be batched to a solids content of 64-81% solids. However, based on experience during the initial stages of filling it is expected that this range would be closer to 67-70%. Using the design set out in Outotec (2013), binder addition (which is dependent on the mix solids content) can be adjusted to achieve the requirements set out in criteria 1 and 2. As the paste would be deposited with a low yield stress (and hence low solids content) in order to ensure that it flows the maximum distance, it should be expected that the binder addition would be towards the upper end of the values quoted in Outotec 2013, (i.e. around 3-3.5% LH cement).

FUTURE WORK

Filling activities in the Wambo "Zone 1" Homestead area have recently commenced. During August and September an intense campaign of quality control monitoring and beach angle measurements is ongoing. The outcome from this testwork is to define the beach angle and tight fill behavior of paste manufactured from Wambo alluvial soils. To date only a single borehole has been monitored and based on these observations it appears that most of Zone 1A and 4 could be successfully filled. However, due to regular interruptions to filling and the objective of achieving a higher solids content (to that in Zone 1A and 4) this result is expected to be conservative. As additional data is gathered from within Zone 1 it is expected that an improved estimate can be delivered.

CONCLUSION

It is proposed to fill the sections "Zones 1A and 4" of the Homestead underground workings, as defined in Figure 1 of this report. Based on previous experience at Wambo and other sites it is expected that paste batched to a conical slump of 230 – 240 mm would be able to tight fill mined out drives 50-80 m from the base of the borehole. Should this be the case in Zones 1A and 4, it would be possible to fill the Zone 1A area to within 500 mm of the roof and a considerable amount of paste would be expected to penetrate into Zone 4.

Through adjusting the binder addition it is expected that the other required criteria for Wambo paste could be achieved in accordance with the recommendations presented in Outotec 2013. The binder requirement for this region is expected to be approximately 3-3.5%.

While a "tight fill" criterion of 500 mm was specified for Zone 1 of the Homestead workings, Zone 1A and 4 are deeper than the majority of the areas in Zone 1. With a thicker overburden layer it may not be necessary to achieve such a strict tight fill criteria to avert a sinkhole formation in Zones 1A and 4. Considering this it is recommended that Peabody contact their geotechnical consultant to review this tight fill" criteria specifically for Zones 1A and 4.

Intensive testwork is currently underway to more accurately define the beach angle and "tight fill" behavior of paste made from Wambo alluvial soils. This work is ongoing, however initial results indicate that if the paste slump was increased and filling was undertaken in continuous campaigns most of Zone 1A and 4 could be successfully filled.

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REFERENCES:

Outotec – Backfill Specialists, Helinski M., Revell M. (2013) *Wambo homestead paste project material analysis report*, Report Number: P228-R01 Rev 1