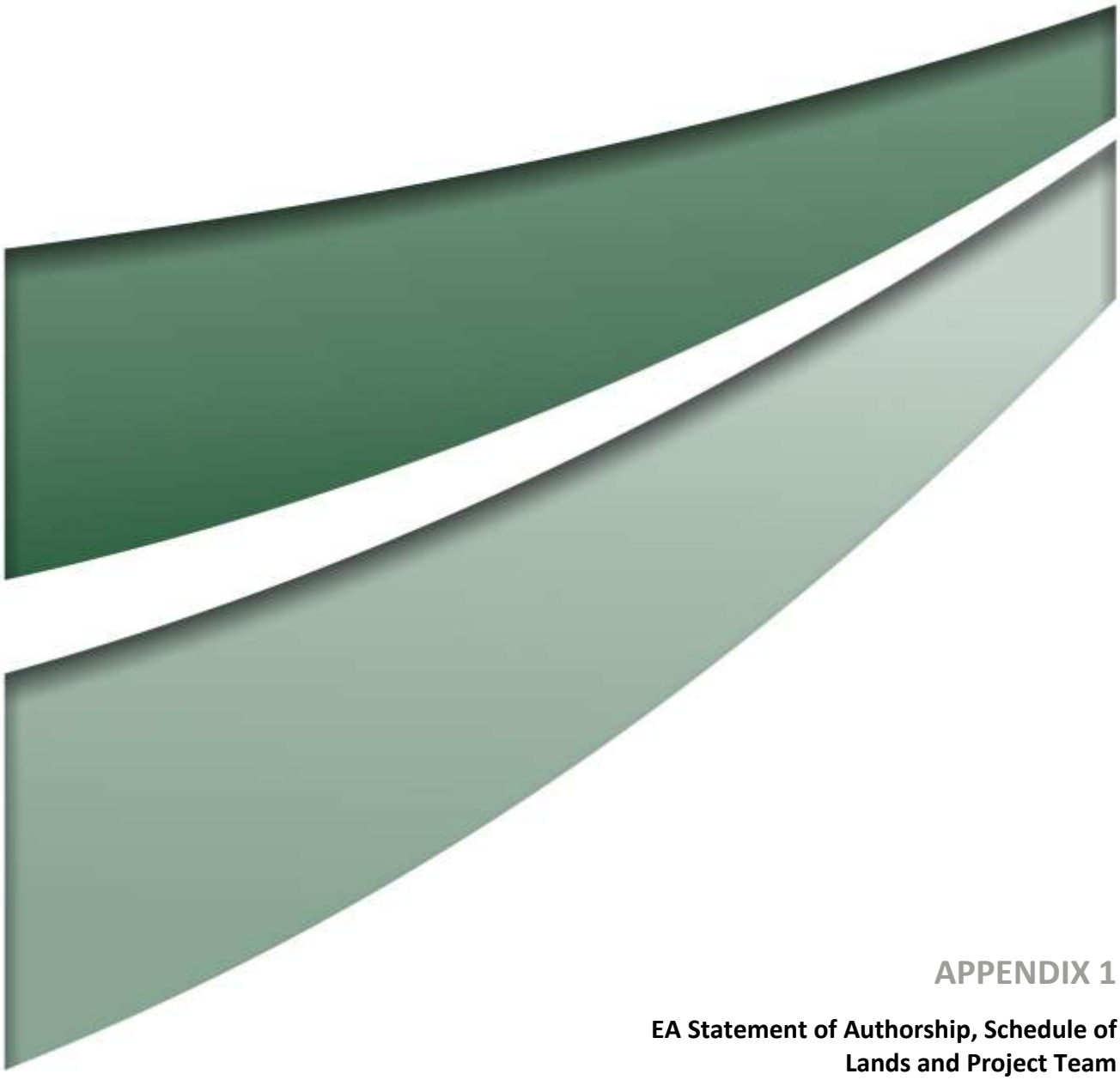


APPENDIX 1

EA Statement of Authorship, Schedule of Lands and Project Team

Statement of Authorship

EA prepared by	
Name:	Bret Jenkins, Senior Principal Environmental Consultant
Address:	Umwelt (Australia) Pty Limited 75 York Street Teralba NSW 2284
In respect of:	Modification 4 to DA 67/98 as described in the accompanying Environmental Assessment
Applicant Name:	Tahmoor Coal Pty Ltd
Applicant Address:	PO Box 100 Tahmoor NSW 2573
Land to be developed:	See Schedule of Lands attached.
Proposed Development:	Modification 4 to DA 67/98 as described in the accompanying Environmental Assessment.
Environmental Assessment	An Environmental Assessment is attached.
Certification	I certify that I have prepared the contents of this environmental assessment and to the best of my knowledge: it is in accordance with the relevant provisions of the *Environmental Planning and Assessment Act 1979*, and it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Signature:	
Name:	Bret Jenkins
Date:	25 October 2017

Schedule of Lands

This modification application relates to the following land parcels and lease areas located within the Modification Area.

Lot	DP
2	520158
14	733692
18	733692
15	733692
16	733692
10	246487
11	733692
1	233747
11	246487
27	246487
30	246487
14	246487
29	246487
3	246487
9	733692
7	246487
12	733692
1	246487
13	733692
20	246487
6	733692
8	246487
19	733692
31	246487

Lot	DP
211	1094898
26	246487
18	246487
24	246487
5	733692
23	246487
10	733692
4	246487
16	246487
20	733692
7	733692
22	246487
21	733692
6	246487
25	246487
21	246487
19	246487
17	246487
28	246487
15	246487
5	246487
8	733692
9	246487
7	515146
12	246487
13	246487
2	703168

Lot	DP
4	574093
1	703168
2	233747
13	1232515
12	1232515
14	1232515
3	703168
2	560990
11	1232515
67	3007
Part Argyle Street	
Part Wood Street	
Part Coachwood Crescent	
Part of Mining Lease ML 1539	

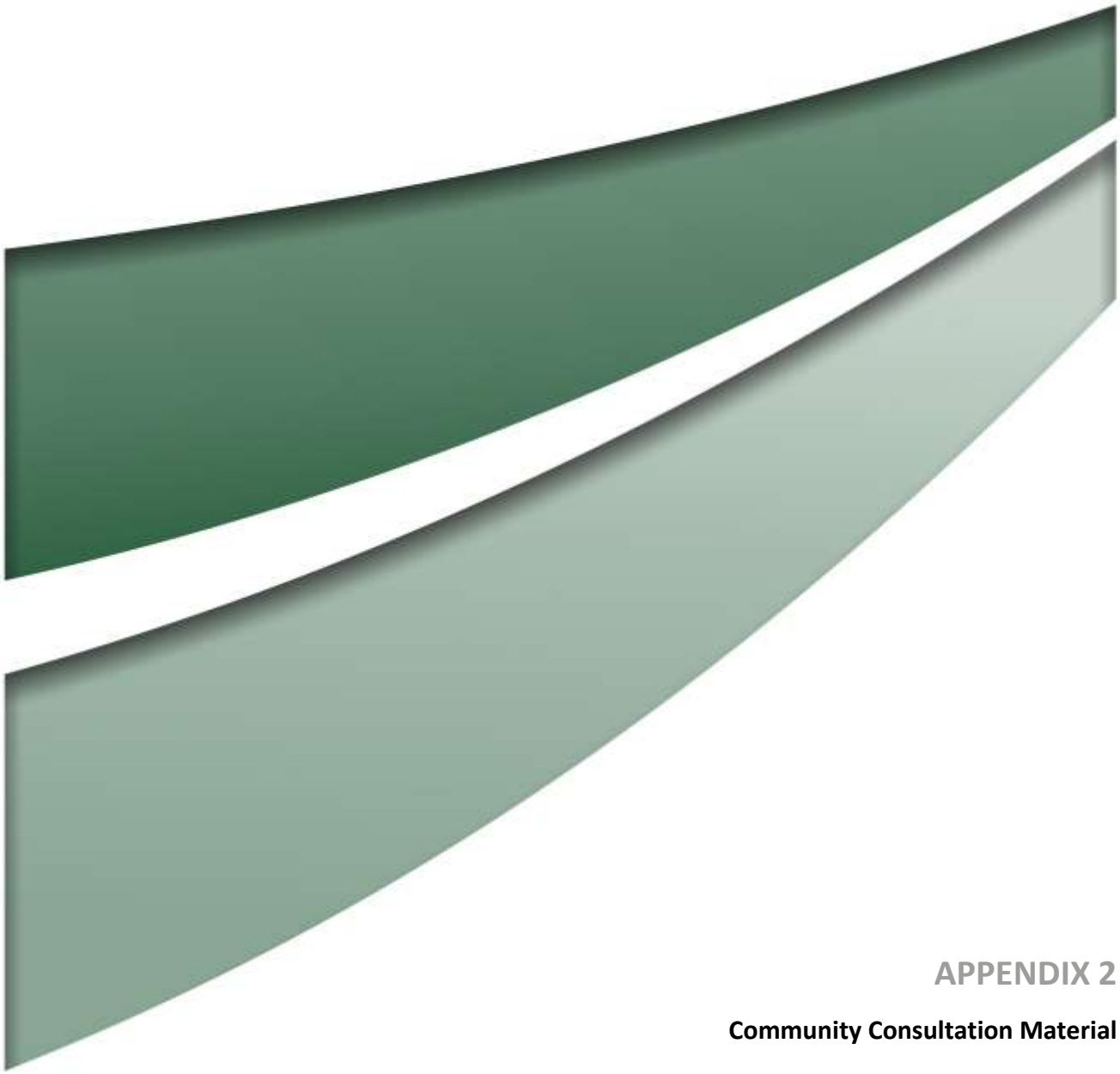
Project Team

Umwelt (Australia) Pty Limited – Environmental Assessment	
Bret Jenkins, Senior Principal Environmental Consultant	Project Director
Gabrielle Allan, Principal Environmental Consultant B Env Sc	Project Manager
Emma Mudford, Environmental and Social Consultant B Env Sc	Consultation strategy
Rebecca Abbott, Drafting Coordinator	Drafting and Graphic Design

Mine Subsidence Engineering Consultants (MSEC) – Subsidence Assessment
Daryl Kay, Associate Director

GeoTerra – Groundwater Assessment
Andrew Dawkins, Principal Hydrogeologist

Tahmoor Coal Pty Ltd – Applicant project team
Andrew Reid, Environment and Community Manager, Tahmoor
Ian Shepherd, Environment and Community Manager, Tahmoor (former)
Tim Walls, GCAA Manager – Approvals & Cultural Heritage, NSW
Belinda Treverrow, Approvals and Community Coordinator
Fiona Robinson, Environment Coordinator



APPENDIX 2

Community Consultation Material

TAHMOOR UNDERGROUND

GLENCORE

Development Consent Modification Newsletter October 2017

Tahmoor Underground Mining

Tahmoor Underground Mine has been part of the Wollondilly area for more than 30 years.

The mine has been operating since 1979. Longwall mining, which is safer and more efficient than other underground mining methods, was first introduced at Tahmoor in 1986.

We extract coal from the Bulli Seam, approximately 400m beneath the surface, and produce more than 2million tonnes of saleable hard coking coal each year for export markets.

We are the largest employer in the region, with approximately 320 people on site, including contractors.

We are also involved in a number of community partnerships, including the Wollondilly Beach Bus, The Picton High Science Fair and Business Week.

Ongoing Operations

Identifying and developing options for future mining is an important part of our annual planning.

We're currently preparing for the mining of Longwall 32, which will take place at the end of 2018.

In accordance with Tahmoor Underground's original Mining Consent awarded in 1999, we will require a minor modification to this consent to proceed with Longwall 32. Tahmoor Underground is currently preparing a Environmental Impact Statement that will be lodged to the Department of Planning in late October 2017. A copy of the Environmental Impact Statement will be placed on Public Exhibition during the approval process.

Our History

1979 Tahmoor Colliery is an underground operation which began mining by Clutha Developement Ltd. In 1979 additional consent was given to establish a Coal Handling & Preparation Plant (CHPP) and Refuse Emplacement Area (REA) onsite.

1982 The CHPP allows the coal to be processed onsite before rail transport to Port Kembla Coal Terminal, where it is shipped to overseas markets. Production of coal began.

1985 - 86 In 1986 amended consent allowed for the construction of a gas extraction plant and implementation of a gas drainage system in preparation for longwall mining to be undertaken.

1986 In 1986 longwall mining was introduced.

2000 On-site 3rd party owned methane gas power plant commissioned in 2000

2007 The mine has changed hands several times during its 30 year history. In 2007 Xstrata Coal (now Glencore) purchased Tahmoor Underground mine.

Picton High School

Tahmoor Underground's Development Consent required a modification if subsidence caused by mining was likely to occur in a number of specified areas.

Picton High School is approximately 210m at its closest from Longwall 32 and has been identified as one of the properties that may be affected by subsidence associated with our longwall mining.

Our studies suggest that a small degree of subsidence (between 70mm and 20mm) may occur at the school during the active subsidence period (approximately three to four months) of mining longwall 32.

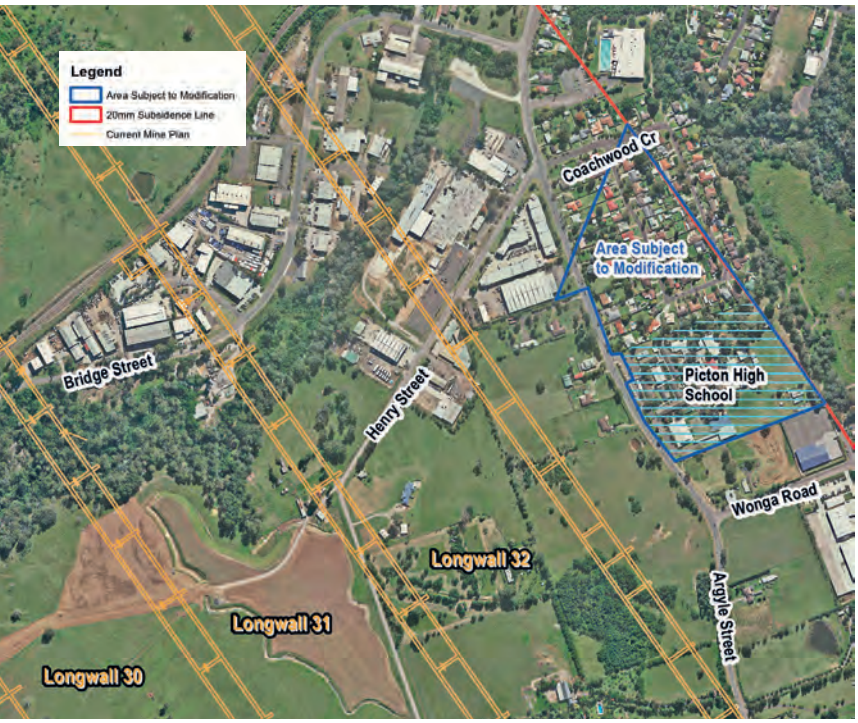
Because of the depth of mining at Tahmoor, subsidence at the surface is generally not visible and develops progressively as mining moves forward.

Therefore, subsidence of this magnitude is not expected to cause any adverse impacts on school buildings or activities.

Tahmoor Underground has extensive experience of mining directly beneath and adjacent to critical civil infrastructure, including the township of Tahmoor, commercial and retail buildings including Tahmoor Town Centre and the Main Southern Railway. There has been a history of mining near schools within the Southern Coalfields.

Both Tahmoor and Appin Public Schools have been affected by subsidence, with no impacts to any infrastructure at either school.

In addition, our mining is expected to take place ahead of Picton High School's redevelopment, so these works will also be unaffected by the subsidence.



Frequently Asked Questions

- **Will subsidence interrupt my child's education?**
  No. We are committed to ensuring that no disruption occurs to the school and its students as a result of our mining activities.
- **Will we see impacts to Picton High School?**
  If any subsidence does occur, it will be minor (between 20mm and 70mm) and will take place gradually over many weeks. As has been the case with other longwall mining near local schools, we expect this level of subsidence will not cause impacts to Picton High School.
- **Will this impact on the Picton High School Redevelopment?**
  We've discussed our plans in detail with the architects of the redevelopment and do not believe that subsidence will impact the works. Nonetheless, we will continue to consult with the Project Team to ensure that mining does not affect the redevelopment.
- **Will my child be safe while attending school during this mining?**
  There will be no discernible impact on the school as a result of mining and the subsidence does not constitute a safety issue for teachers or students.
  Tahmoor Underground will monitor the high school during the active subsidence period including weekly survey and visual inspection, with all results being reviewed by specialist engineers.
- **Will I notice subsidence occurring?**
  No. The ground does not "drop" immediately.
  Any impacts on Picton High School and surrounding areas will happen slowly over a period of around three to four months. During this time, maximum subsidence of between 20mm and 70mm may occur.

To find out more details on the future mining operation at Tahmoor Underground

phone: (02) 4640 0100 | email: tahmoorenquiries@glencore.com.au
www.tahmoorcoal.com.au | www.glencore.com

TAHMOOR UNDERGROUND
GLENCORE

Tahmoor Colliery Newsletter - September

TAHMOOR UNDERGROUND
GLENCORE

Subsidence Update

September 2017 Longwall Progress

On the 29th June 2017 Longwall 31 commenced and has progressed 447 meters since commencement.
A mine plan is outlined on page two of this Newsletter.

Subsidence Impacts

In Tahmoor and Thirlmere 1,955 premises are located in areas where subsidence has occurred since Longwall 22 commenced in May 2004.

57.44% (1,123)	No reported impacts
32.42% (634)	Superficial or easily repaired impacts
10.12% (198)	Impacts that may require more significant repair by the MSB

Pre Mining Inspections

If you would like a pre-mining inspection report prepared it is important to contact the Subsidence Advisory NSW to arrange a pre-mining inspection prior to your property experiencing subsidence.
A pre-mining inspection is not compulsory.

Important Phone Numbers

Tahmoor Colliery

- General information (24 hrs) - **1800 154 415**

Subsidence Advisory NSW

- General information Picton Office - **02 9372 8539**
- Subsidence Advisory NSW - Emergency claims and potholes - 24 Hour Emergency Hotline - **1800 248 083** (free call)

Project Update

Development Consent Modification

Tahmoor Colliery intends to lodge a minor Development Consent Modification for an area of subsidence relating to the extraction of longwall 32. For further information please attend the Community Information Session.

Future Mining in Tahmoor North

Future mine activities including Longwall 32 and future Longwalls will be on display at the Community Information Session. For further details please attend.

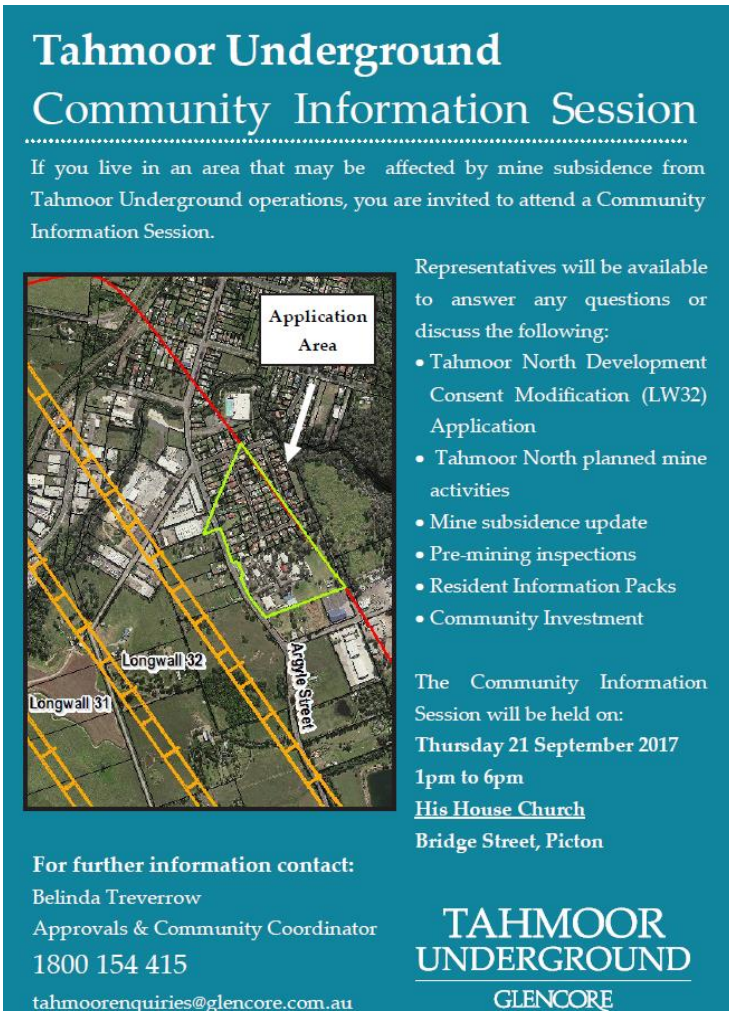
Tahmoor South Project

An Environmental Impact Statement (EIS) for the Tahmoor South Project is currently being prepared.

If you would like further details please attend the Community Information Session.

Community Update

Community Information Session



Please phone Belinda (**1800 154 415**) if you would like more information.

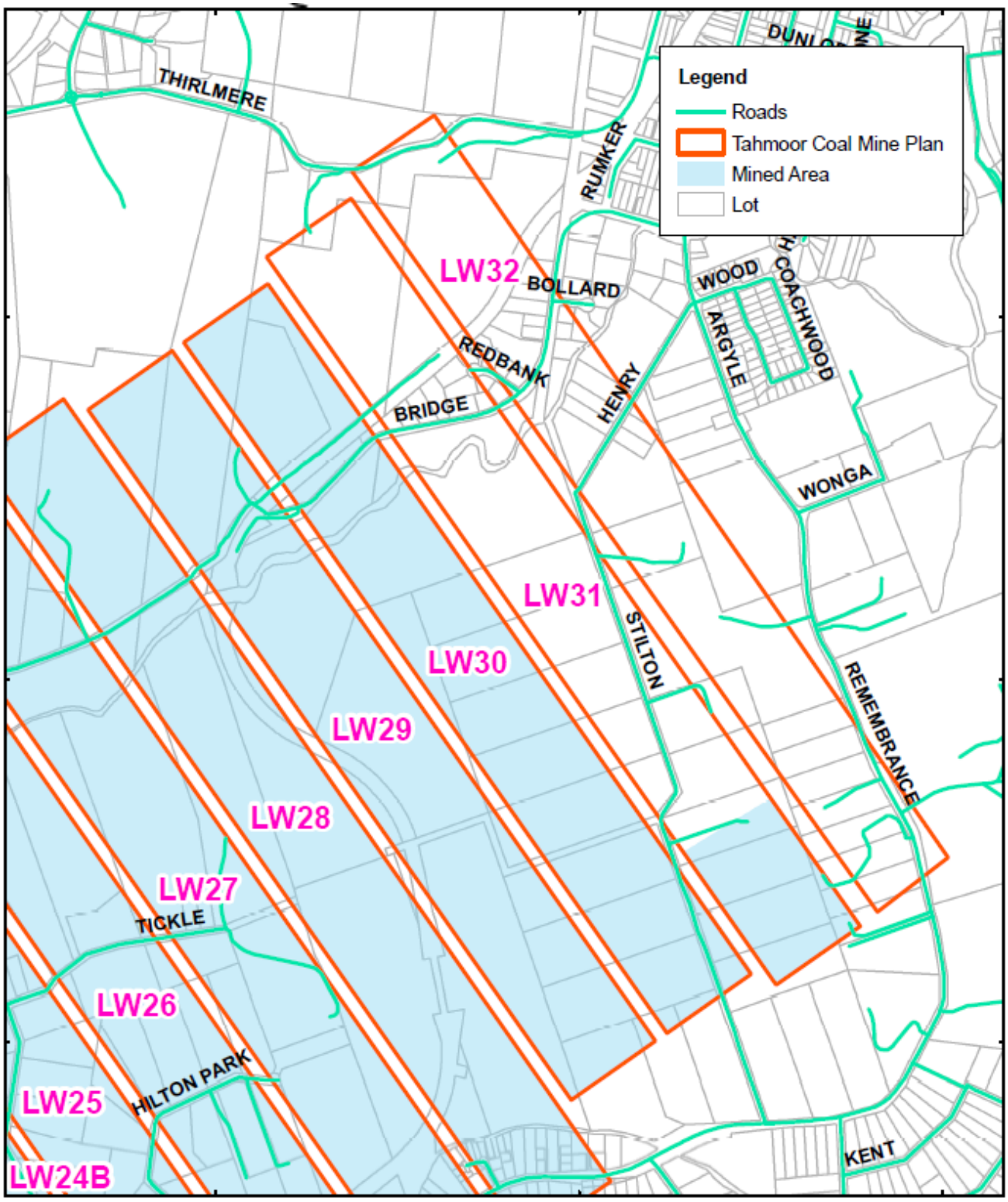
Important Contact Details

For further information		www.tahmoorcoal.com.au
Tahmoor Underground Main Office	*8.00am to 4.00pm*	(02) 4640 0100
Subsidence Advisory NSW	*8.30am to 4.30pm*	(02) 4677 1967
Tahmoor Underground 24 hour enquiry, counselling and complaints line		1800 154 415

Tahmoor Colliery Newsletter - September

TAHMOOR UNDERGROUND
GLENCORE

Longwall 31 commenced on the 29th of June 2017 and has progressed 447 meters.



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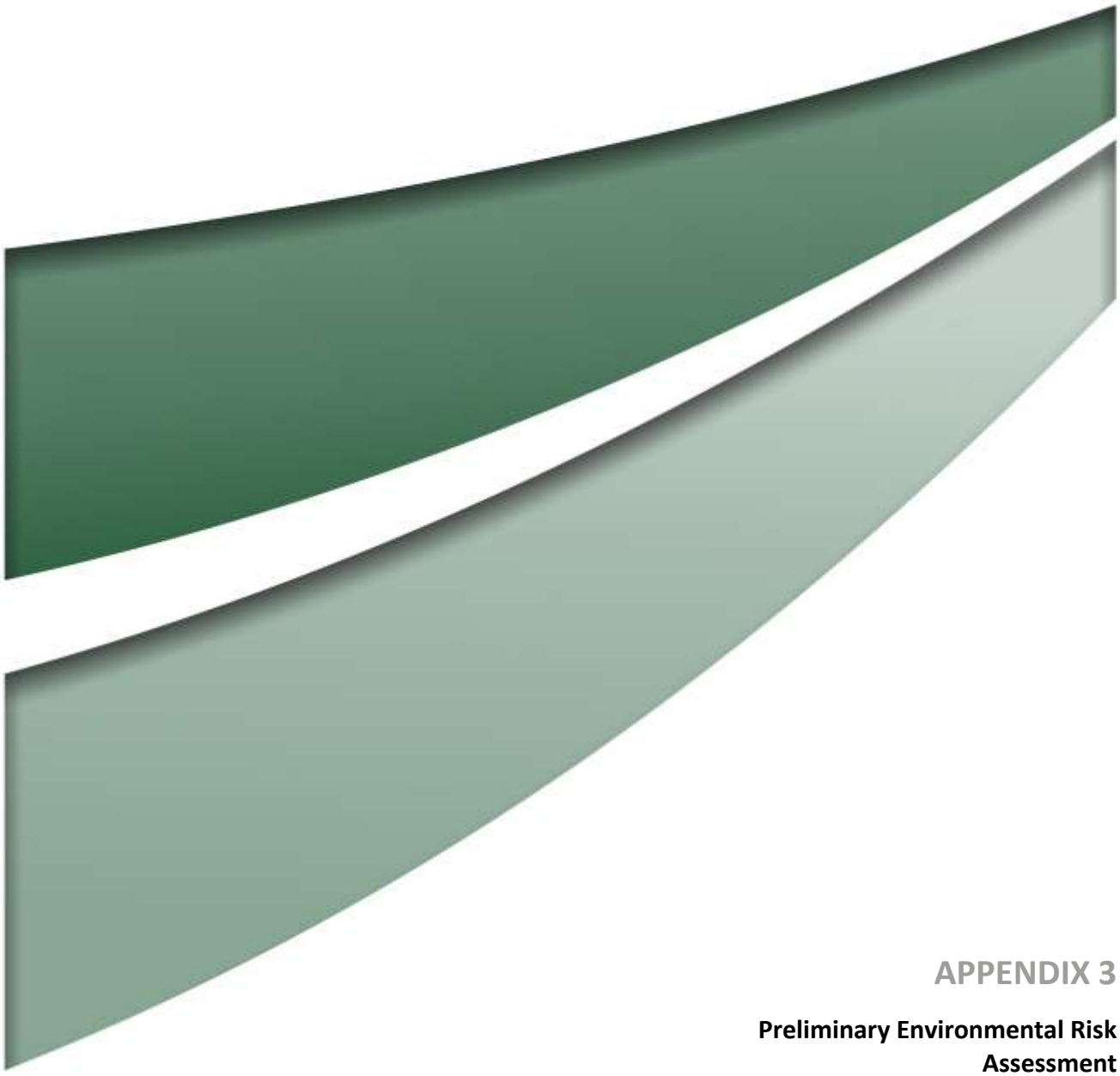

APPENDIX 3

Preliminary Environmental Risk Assessment

umwelt

Inspired people | Dedicated team
Quality outcomes

TAHMOOR
UNDERGROUND
GLENCORE

TAHMOOR UNDERGROUND MODIFICATION 4

Preliminary Environmental Risk Analysis

October 2017

Preliminary Environmental Risk Analysis

To assist in identifying the key environment and social issues that require detailed assessment as part of the Environmental Assessment (EA), a preliminary environmental risk analysis has been completed for the Tahmoor Underground Modification 4. The preliminary environmental risk analysis has been undertaken in general accordance with the principles outlined in Australian Standard AS/NZS ISO 31000:2009. The environmental and social risks have been categorised with a Risk Ranking based on the Glencore Coal Assets Australia risk ranking matrices provided in **Appendix A**.

A risk review workshop was held on Thursday, 24 August 2017 at the Tahmoor Underground offices. Attendees for the risk review are shown in **Table 1**.

Table 1 – Tahmoor Modification 4 Risk Review Attendees

Attendee	Organisation
Andrew Reid – E&C Manager	Tahmoor Coal
Belinda Treverrow	Tahmoor Coal
Sam Beresford	Tahmoor Coal
Fiona Robinson	Tahmoor Coal
Paul Amidy	Glencore Coal Assets Australia
Bret Jenkins	Umwelt

Results of the risk review are provided in **Table 2**.

Table 2 – Preliminary Environmental Risk Analysis

Aspect	Potential Impact	Status and Proposed Control	Initial Risk Assessment			Further Assess. Required	Residual Risk Assessment		
			C	L	R		C	L	R
Subsidence	Subsidence will be the key impact from the proposed modification. While the overall levels of subsidence predicted are low (20 to 70mm), there is potential for low level impacts to occur to residential and Picton High School structures. Subsidence also has the potential to impact the following infrastructure features: • local roads • street drainage • potable water • Sewer • gas • electricity • telecommunications infrastructure No natural watercourses are present within the Modification Area. Predicted impacts on structures and surface features within the Modification Area are likely to be minor and within the range of those previously predicted/experienced within Tahmoor Underground.	The Subsidence Assessment prepared by MSEC for LW31-37, indicates that predicted subsidence impacts are manageable and controlled by the preparation and implementation of SMPs. All houses within the modification area are expected to experience Nil or Category R0 impacts (MSEC 2014). SMP monitoring and reporting will be in place. SA processes in place for repair costs. Comprehensive consultation with residents and Picton High School (including Department of Education) will be required to ensure they are informed of the low impact and low risks to houses and structures.	3	C	13 (M)	Yes. MSEC to prepare subsidence assessment specific to structures and infrastructure in the Modification Area. Detailed consultation program required per below.	2	C	8 (M)

Aspect	Potential Impact	Status and Proposed Control	Initial Risk Assessment			Further Assess. Required	Residual Risk Assessment		
			C	L	R		C	L	R
Surface water resources	No natural water courses are located within the Modification Area. The modification will result in minor changes to landform that has the potential to alter drainage patterns. The LW31-37 Flood Impact Assessment (WRM 2014) indicates that flooding will not extend into the mod area and that LW31-37 will result in a reduction in overall flood levels in Redbank Creek in the vicinity of the Modification Area. Given the urban nature of the Modification Area, minor changes to the landform resulting from subsidence may result in minor changes to street drainage that will need to be considered.	Existing management measures exist for impacts to street drainage system. Stormwater systems installed by Sydney Water to allow for changes in pipe levels. SMP monitoring and reporting will be in place.	2	D	5 (L)	Yes. EA to provide a review of potential surface water impacts within Modification Area based on findings of LW31-37 Flood Impact Assessment (WRM 2014) and MSEC subsidence assessment.	2	D	5 (L)
Groundwater resources	Based on previous experience within the Tahmoor North mining area and the findings of the LW31-37 Stream, Dams and Groundwater Assessment (GeoTerra 2014), a temporary lowering of the upper regional groundwater level may occur within the Modification Area as a result of mining of LW32. It is noted that the effect of this lowering will have largely dissipated within the Modification Area, as it is located on the edge of the subsidence zone. Groundwater levels are expected to recover, based on previous experience at Tahmoor North, within a few months to a year, and there is generally no permanent reduction in the Hawkesbury Sandstone groundwater level. No bores are located within Modification Area, therefore no groundwater users are likely to be impacted as a result of the proposed modification. No GDE is known to exist in the Modification Area. Hydraulic connection of surface water is not likely given the depth of cover, and offset from the mining panel, and no adverse interconnection of aquifers and aquitards is anticipated within 20m of the surface as there are no recorded aquifers in this interval.	Existing management measures including and monitoring of groundwater levels, groundwater quality, mine inflows and rainfall has been proposed as part of the LW31-37 Stream, Dams and Groundwater Assessment which will address potential groundwater impacts from the mining of LW32.	3	C	13 (M)	Confirm no known presence of groundwater users or GDE in the Modification Area. GeoTerra to provide a specific assessment of the potential impacts of the proposed modification on groundwater as they relate to the Modification Area.	2	D	5 (L)

Aspect	Potential Impact	Status and Proposed Control	Initial Risk Assessment			Further Assess. Required	Residual Risk Assessment		
			C	L	R		C	L	R
Community stakeholder concerns	Potential exists for revised subsidence predictions to cause concern amongst residents and school staff/students/parents in the Modification Area. Changing policies and approach to subsidence (driven by Subsidence Advisory NSW) may have resulted in potential uncertainty for home owners and local government. This could cause additional concerns for community stakeholders.	A detailed stakeholder engagement program is to be developed. Engagement with landholders, the school and a parent's forum is recommended before lodgement of the modification. Engagement materials should provide clear advice in relation to potential impacts, changes to Subsidence Advisory and Tahmoor Coal's approach to managing subsidence.	3	C	13 (M)	Detailed stakeholder engagement strategy to be updated for Mod 4 area, school, residents, etc.	2	D	5 (L)
Socio-economic	The modification will not result in any change to employment levels at Tahmoor Underground. The modification will ensure ongoing employment which would otherwise not continue if LW32 cannot be viably mined.	A detailed socio economic assessment is not considered required.	1	D	2 (L)	Nil	1	D	2 (L)
Ecology	The Modification Area is urban in nature and has been largely cleared of any remnant native vegetation. The modification will not result in any direct clearing of vegetation. Secondary impacts associated with subsidence such as changes to the landform or hydrological regime as also not expected due to the very low levels of subsidence predicted and the native vegetation present within the Modification Area.	Given the urban nature of the Modification Area and the negligible potential for impact on ecological features, no detailed assessment of ecological impacts is proposal. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)

Aspect	Potential Impact	Status and Proposed Control	Initial Risk Assessment			Further Assess. Required	Residual Risk Assessment		
			C	L	R		C	L	R
Aboriginal Cultural Heritage	No Aboriginal sites are known to occur within the Modification Area (based on MSEC 2014). The Modification Area is urban in nature and has been largely disturbed for residential and school use. The potential for any Aboriginal sites to be present is therefore low. The modification will not result in any direct disturbance of the ground surface. Secondary impacts associated with subsidence such as surface cracking, subsidence remediation works, changes in landform or hydrogeological regimes are unlikely to be a factor given the very low levels of subsidence predicted. The potential for impacts on Aboriginal cultural heritage is therefore considered to be very low.	An updated AHIM search will be undertaken to confirm the absence of known sites within the Modification Area, otherwise, no detailed assessment is proposed as part of the EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Historic Heritage	No historic heritage sites are known to occur within the Modification Area (based on MSEC 2014). The Modification Area is urban in nature and has been largely disturbed for residential and school use. The potential for any historic heritage site that are not already listed on relevant heritage databases is low. The modification will not result in any direct disturbance of the ground surface. Secondary impacts associated with subsidence such as surface cracking, subsidence remediation works, changes in landform or hydrogeological regimes are unlikely to be a factor given the very low levels of subsidence predicted. The potential for impacts on historical heritage is therefore considered to be very low.	Updated heritage database searches will be undertaken to confirm the absence of known sites within the Modification Area, otherwise no detailed assessment is proposed as part of the EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)

Aspect	Potential Impact	Status and Proposed Control	Initial Risk Assessment			Further Assess. Required	Residual Risk Assessment		
			C	L	R		C	L	R
Land resources and agriculture	No agricultural land is present within the Modification Area. Given the very low levels of subsidence predicted, no adverse impacts to soils or land capability are likely.	Given the urban nature of the Modification Area and the negligible potential for impact on soils or the land surface, no detailed assessment is proposed as part of the EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
GHG	The proposed modification will not result in any change to current approved GHG emissions associated with Tahmoor Underground	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Noise	The proposed modification will not result in any change to current approved noise emissions associated with Tahmoor Underground	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Vibration	The proposed modification will not result in any change to the number, magnitude or frequency of vibration events associated with Tahmoor Underground.	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Air Quality	The proposed modification will not result in any change to current approved air emissions associated with Tahmoor Underground	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Traffic	The proposed modification will not result in any change to current approved traffic generation of Tahmoor Underground.	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)

Aspect	Potential Impact	Status and Proposed Control	Initial Risk Assessment			Further Assess. Required	Residual Risk Assessment		
			C	L	R		C	L	R
Visual amenity	Given the proposed modification does not involve any development on the surface, is unlikely to result in the need for significant remediation of the land surface and the overall levels of subsidence predicted are very low, the proposed modification is not expected to result in any impact on visual amenity.	No detailed assessment proposed as part of EA.	1	D	2 (L)	Nil	1	D	2 (L)
Waste (excluding rejects and tailings)	The modification will not generate additional waste streams or increase existing waste volumes.	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Hazard/Risk	The modification will not result in any change to existing operations that would alter existing hazard or risk ratings.	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)
Rehabilitation and mine closure	The modification will not result in any change to existing approved rehabilitation methods, rehabilitation targets or objectives. No additional rejects or tailings will be generated by the modification.	No detailed assessment proposed as part of EA. Existing management measures exist.	1	D	2 (L)	Nil	1	D	2 (L)

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APPENDIX A - GLENCORE COAL ASSETS AUSTRALIA RISK MATRICES

CONSEQUENCE [potential foreseeable outcome of the event]

	Health & Safety	Environment	Financial Impact	Image & Reputation / Community	Legal & Compliance
5 Catastrophic	• Multiple fatalities (5 or more fatalities in a single incident) • Multiple cases (5 or more) of Permanent Damage Injuries or Diseases that result in permanent disabilities in a single incident	• Unconfined and widespread • Environmental damage or effect (permanent; >10 years) • Requires major remediation	• >$600M investment return • >$100M operating profit • >$20M property damage	• Loss of multiple major customers or large proportion of sales contracts • Sustained campaign by one or more international NGOs resulting in physical impact on the assets or loss of ability to operate • Security incident resulting in multiple fatalities or major equipment damage • Formal expression of significant dissatisfaction by government • Grievance from internal or external stakeholder alleging human rights violation resulting in multiple fatalities	• Major litigation / prosecution at Glencore corporate level • Nationalisation / loss of licence to operate
4 Major	• Single incident resulting in: Less than 5 Fatalities • Permanent Damage Injury or Disease that results in a permanent disability- less than 5 cases in a single incident	• Long-term (2 to 10 years) impact • Requires significant remediation	• $60-600M investment return • $20-100M operating profit • $2-20M property damage	• Security/ stakeholder incident resulting in single loss of life or equipment damage • Grievance from internal or external stakeholder alleging human rights violation resulting in single fatality or serious injuries • Topic of broad societal concern and criticism • Negative media coverage at international level resulting in a Corporate statement within 24 hours • Investigation from government and/ or international (or high-profile) NGOs • Complaints from multiple "final" customers • Loss of major customer • Negative impact on share price	• Major litigation / prosecution at Department level
3 Moderate	• Lost Time Injury (LTI) • Lost Time Disease (LTD) • Permanent Disabling Injury (PDI) • Permanent Disabling Disease (PDD) • Single incident that results in multiple medical treatments	• Medium-term (<2 years) impact (typically within a year) • Requires moderate remediation	• $6-60M investment return • $2-20M operating profit • $200K-2M property damage	• Negative media coverage at national level over more than one day • Complaint from a "final" customer • Off-spec product • Local Stakeholder action resulting in national societal scrutiny	• Major litigation / prosecution at Operation level
2 Minor	• Medical Treatment Injury (MTI) • Medical Treatment Disease (MTD) • Restricted Work Injury (RWI) • Restricted Work Disease (RWD)	• Near source • Short-term impact (typically <week) • Requires minor remediation	• $600K-6M investment return • $200K-2M operating profit • $10-200K property damage	• Negative local/ regional media coverage • Complaint received from an internal or external stakeholder	• Regulation breaches resulting in fine or litigation
1 Negligible	• First Aid Injury (FAI) or illness (not considered disease or disorder)	• Near source and confined • No lasting environmental damage or effect (typically <day) • Requires minor or no remediation	• <$600K investment return • <$200K operating profit • <$10K property damage	• Negligible media interest	• Regulation breaches without fine or litigation

LIKELIHOOD [of the event occurring <u>with that consequence</u>]

Basis of Rating	E - Rare	D - Unlikely	C - Possible	B - Likely	A – Almost Certain
LIFETIME OR PROJECT OR TRIAL OR FIXED TIME PERIOD OR NEW PROCESS / PLANT / R&D	Unlikely to occur during a lifetime OR Very unlikely to occur OR No known occurrences in broader worldwide industry	Could occur about once during a lifetime OR More likely <u>NOT</u> to occur than to occur OR Has occurred at least once in broader worldwide industry	Could occur more than once during a lifetime OR As likely to occur as not to occur OR Has occurred at least once in the mining / commodities trading industries	May occur about once per year OR More likely to occur than not occur OR Has occurred at least once within Glencore	May occur several times per year OR Expected to occur OR Has occurred several times within Glencore
5 Catastrophic	**15 (M)**	**19 (H)**	**22 (H)**	**24 (H)**	**25 (H)**
4 Major	**10 (M)**	**14 (M)**	**18 (H)**	**21 (H)**	**23 (H)**
3 Moderate	**6 (L)**	**9 (M)**	**13 (M)**	**17 (H)**	**20 (H)**
2 Minor	**3 (L)**	**5 (L)**	**8 (M)**	**12 (M)**	**16 (M)**
1 Negligible	**1 (L)**	**2 (L)**	**4 (L)**	**7 (M)**	**11 (M)**

APPENDIX A

umwelt

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Teralba NSW 2284

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Sydney

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Brisbane

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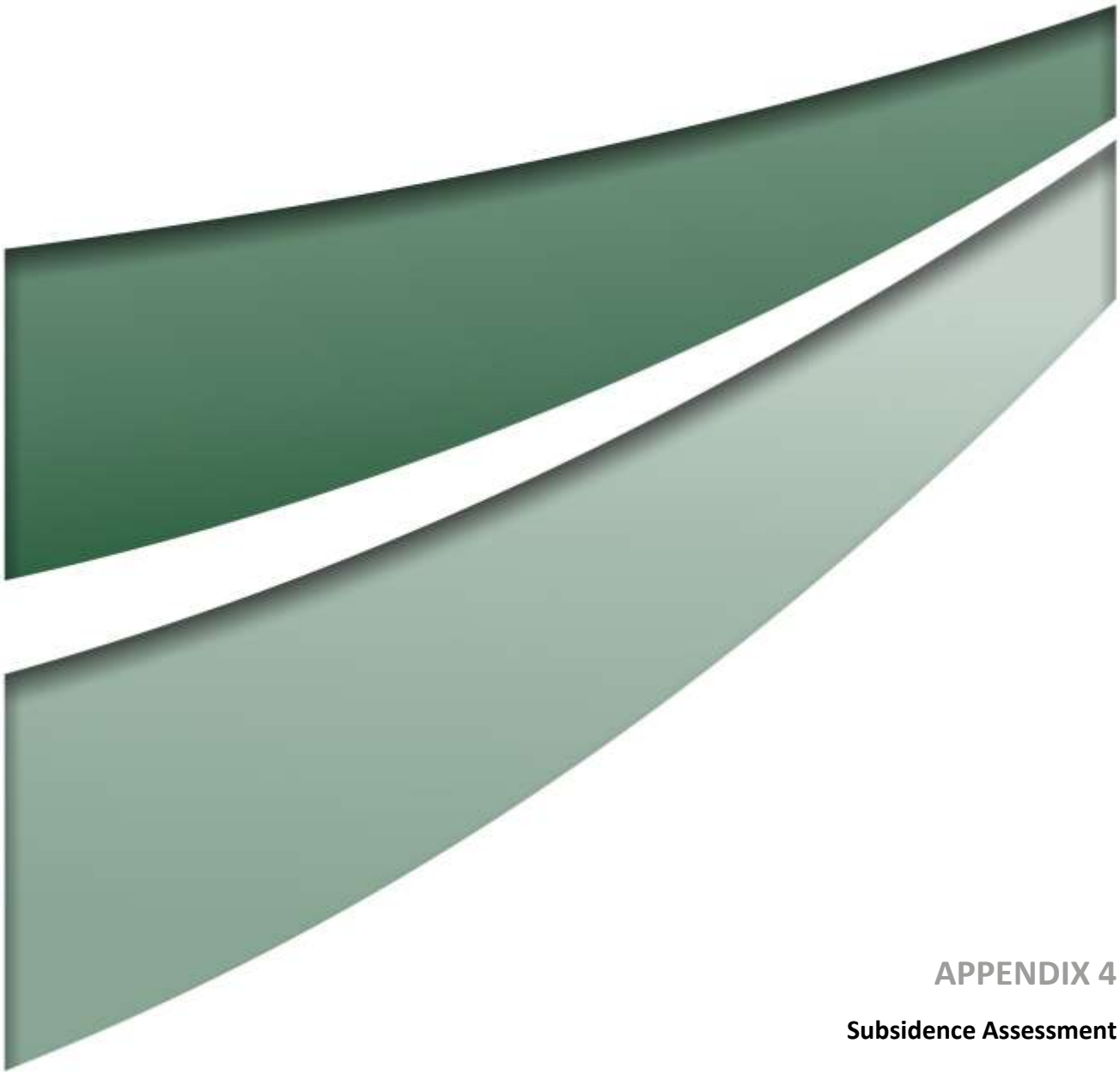

APPENDIX 4

Subsidence Assessment

msec
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ENGINEERING CONSULTANTS

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15th September 2017

Tahmoor Coal Pty Ltd
PO Box 100
Tahmoor NSW 2573

For the attention of Ms. Belinda Treverrow

Dear Belinda,

RE: Amended Development Consent for Tahmoor Longwall 32

I refer to our recent discussions and have pleasure in providing a report outlining the variations that will be required to the Development Consent for the Tahmoor North mining lease, based upon the revised longwall layout, together with revised assessments of subsidence impacts compared to those that were indicated at the time of the Environmental Impact Statement (EIS) and the Commission of Inquiry. The general layout of the proposed longwalls up to Longwall 32 is shown in Drawing No. MSEC837-01, which also illustrates the additional area for which Development Consent will be required.

Description of the Area requiring approval under Condition 6(i) of DA67/98

The Area covers approximately 10.6 hectares, and is located within the urban area of Picton. It is bounded as follows:

- To the south and west by the limit of the area shown in black cross-hatching in Figure 2 of the development consent;
- To the north by the prescribed limit of subsidence in the EIS; and
- To the east by the current predicted limit of subsidence based on the revised longwall layout.

It is proposed to extract Longwall 32 adjacent to this Area. The Area is located between 185 and 450 metres from Longwall 32, as shown in Drawing No. MSEC837-01.

It is predicted that the Area will experience vertical subsidence between 20 and 75 mm following the extraction of Longwall 32.

The Area consists of 238 surface structures, including 49 houses, 116 sheds, 9 private swimming pools and 64 public amenity buildings at Picton High School.

Potential Impacts for Residential Structures within the Area

A subsidence impact study was undertaken in 1997 by Waddington Kay & Associates (former name of Mine Subsidence Engineering Consultants) and the report on the study (Report No. WKA18) was included as Volume 4 of the EIS for the Tahmoor North Project in 1998. The impact assessments that were reported in the EIS for residences and other buildings and structures were based upon the statistical distribution of measured strains over Longwalls 3 to 7 and 9 at Tahmoor Colliery and on the statistical distribution of buildings within particular length ranges.

The method provided a statistical distribution of likely overall impacts due to the proposed extraction of longwalls directly beneath a group of houses. In this case, the Area requiring approval under Condition 6(i) of DA67/98 is located more than 200 metres from the nearest edge of the proposed mining area. The method adopted at the time of preparing the EIS was not designed to be applied in this situation.

In light of the above, potential impacts have been assessed based on the current method, which was applied in support of Tahmoor Colliery's SMP Application for Longwalls 31 to 37 (Report No. MSEC647). The current method was developed following the results of two parallel studies: one as part of a funded ACARP Research Project C12015 and one at the request of the Department of Primary Industries (DPI).

At the time of these studies, over 1,000 residential and significant civil structures had experienced subsidence movements, resulting from mining at Tahmoor Colliery, and impacts had been observed at over 150 houses. The experience gained and the data gathered during the mining of these longwalls were used to develop the current method for the assessment of the potential impacts on houses. The background on the development of this method is provided in Appendix C of Report No. MSEC647.

Site-specific subsidence predictions and impact assessments have been prepared for the houses in the Area, which were provided in our Report No. MSEC647. The predictions for all identified structures and impact assessments for the houses within the Area have been included in Table A at the end of this report. As Longwall 32 is the last panel in the series of panels commencing from Longwall 22, the predictions include an allowance for long term residual subsidence movements that continue to develop after the completion of extraction.

It can be seen from Table A that maximum predicted subsidence for all structures is 70 mm. Predicted mining-induced tilts are less than 0.5 mm/m and predicted mining-induced curvatures are less than 0.01 km^{-1}.

The histogram of the maximum observed tensile and compressive strains measured at similar distances from the longwalls at Tahmoor Colliery is provided in Figure 1, which was included in Report No. MSEC647. The predicted strains based on the 95 % confidence levels are less than 0.5 mm/m tensile and compressive, which is similar to the order of survey tolerance, i.e. not measureable.

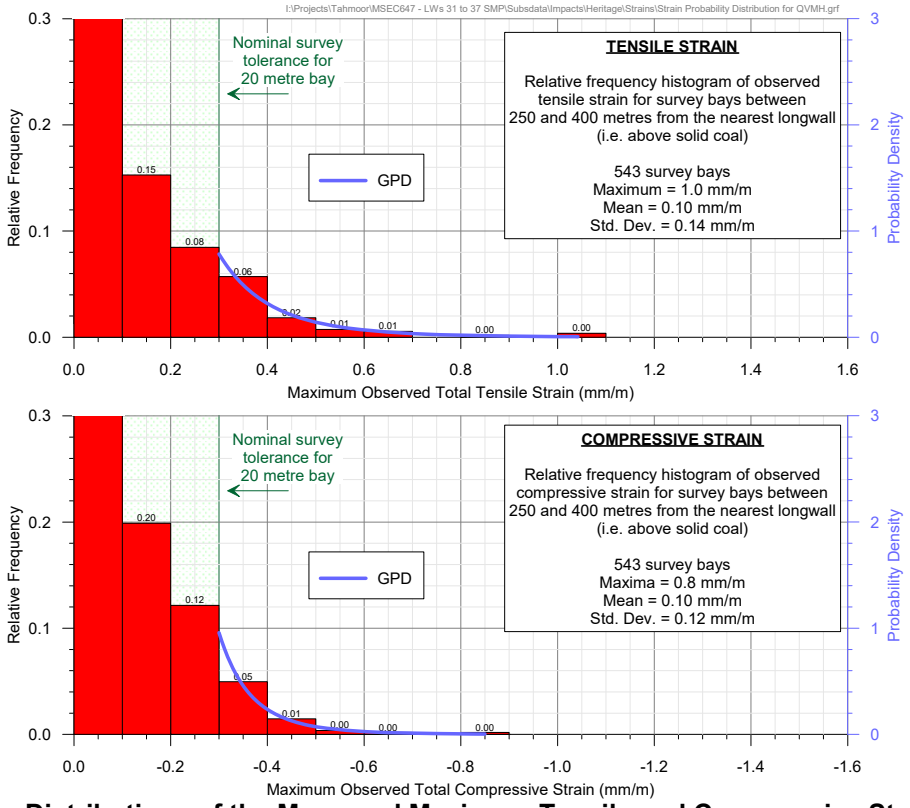

Figure 1 Distributions of the Measured Maximum Tensile and Compressive Strains for Bays Located between 250 metres and 400 metres from Previous Longwalls at Tahmoor Colliery

A probabilistic assessment of potential impacts on houses was provided in Report No. MSEC647 and these have been provided in Table A. While the definitions of Repair Categories R0 to R5 in Report No. MSEC647 differ from the Impact Categories 0 to 5 in Figure 3 of the Development Consent, the Repair Categories R0 to R5 can be considered mostly similar to Impact Categories 0 to 5, respectively.

It can therefore be seen that for all houses within the Area, the likelihood of experiencing nil or negligible (Category 0) impacts is assessed as approximately 95%. The likelihood of experiencing very slight (Category 1) to slight (Category) 2 impacts is assessed as approximately 4% and the likelihood of experiencing moderate (Category 3) to very severe (Category 5) impacts is assessed as approximately 1%.

In addition to the above assessment, information from claims received by Subsidence Advisory NSW (formerly the Mine Subsidence Board) during the mining of Longwalls 22 to 30 have been analysed spatially. A plot showing the location and severity of impacts is shown in Figure 2.

The closest house within the Area is located approximately 240 metres from the edge of proposed Longwall 32. As shown in Figure 1, no houses have reported impacts at a distance of 240 metres or greater from the mined extent of Longwalls 22 to 30. There have been a small number of houses above solid coal that have reported impacts; however, these occurred at distances between 200 and 240 metres away from the mined extent.

It can be seen that the severity of reported impacts has generally been slight to very slight at this distance. For example, the furthest impacts to the side or ends of a longwall at Tahmoor Colliery occurred at a house located approximately 200 to 240 metres from longwalls, and the impacts comprised cracked tiles in the bathroom, cracks to internal linings and doors that rub against the door frame. On the basis of this information, it is considered that the experiences observed during the mining of Longwalls 22 to 30 correlate reasonably well with the impact assessments that were provided in Report No. MSEC647.

It is therefore predicted that the houses within the Area requiring approval under Condition 6(i) of DA67/98 are likely to experience nil to negligible impacts.

The current method of impact assessment for houses in Report No. MSEC647 cannot be applied to sheds or pools, which are also included in Figure 3 of the Development Consent. It is noted, however, that the likelihood of impacts to sheds and pools within the Area is assessed as extremely low, given the low predicted subsidence movements, their relatively small footprints and their distances from the proposed Longwall 32.

It is therefore concluded that the proposed changes to the mine layout will not result in an increase in the number of structures predicted to be subject to structural damage in the moderate, severe or very severe categories, as defined in the EIS.

Tahmoor Colliery has extensive experience of mining adjacent to urban areas. It has developed and acted in accordance with a risk management plan to manage potential impacts to residential structures during the mining of Longwalls 22 to 30.

It is recommended that Tahmoor Colliery continue to develop management plans to manage potential impacts during the mining of the proposed Longwall 32. With the appropriate management plans in place, it is considered that the residential structures will remain safe and serviceable at all times during mining, even if actual subsidence movements were to be greater than the predictions or substantial non-conventional movements occurred.

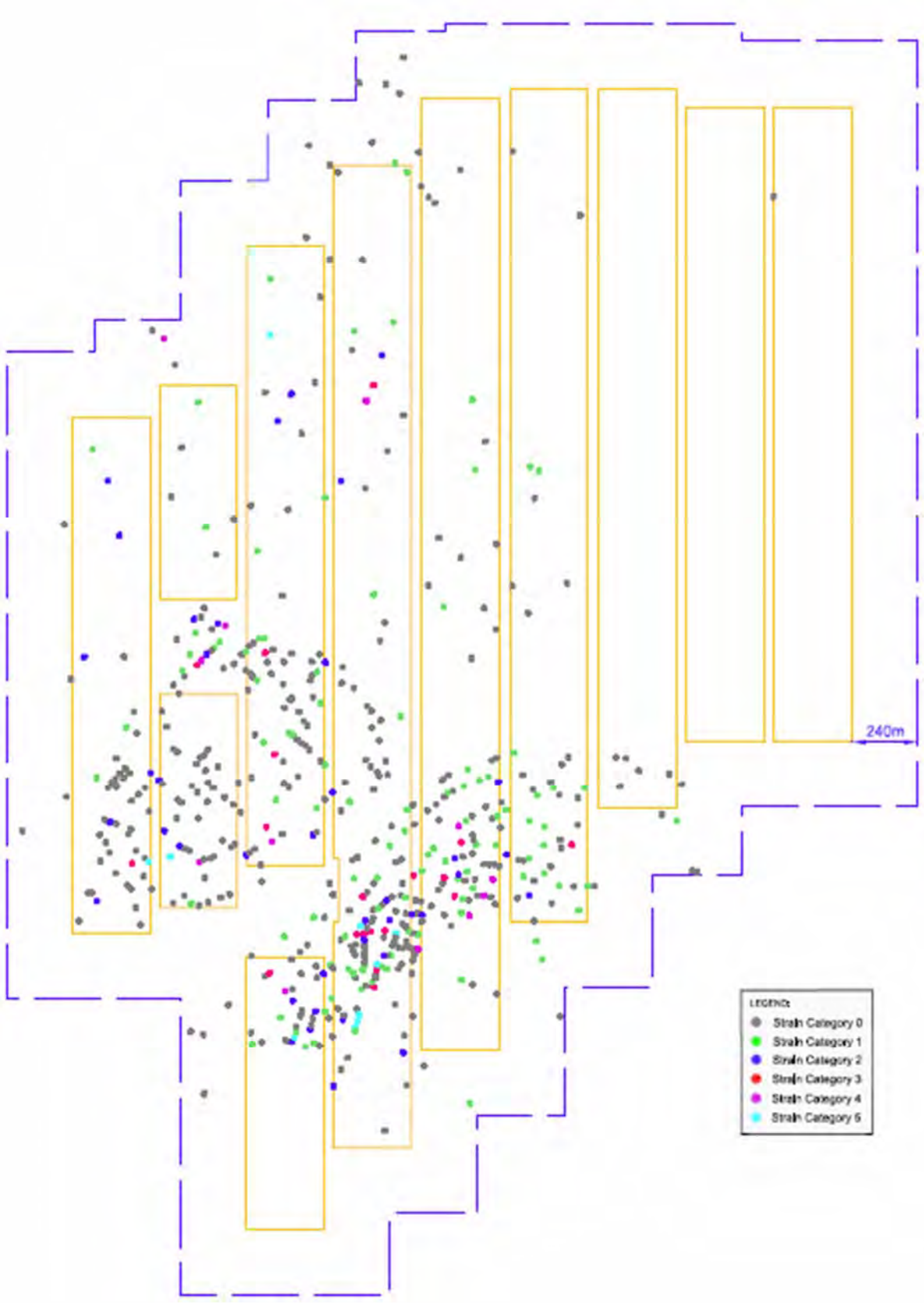

Figure 2 **Location of impacts on houses after extraction of Longwalls 22 to 30**

Potential Impacts on Picton High School

Picton High School is located to the side of the proposed Longwall 32. The closest distance between the school buildings and Longwall 32 is approximately 210 metres.

There are 64 building structures (Refs. PAR_210_pa01 to pa55 and PAR_210_pa57 to pa65) which are located within the Area requiring approval under Condition 6(i) of DA67/98. The locations of the buildings are shown in Drawing No. MSEC837-02.

The main building structures are: the classrooms (refer to Figure 3) which are single and double storey structures; the main hall (refer to Figure 4) which is a single storey structure with portal framed roof with metal sheeting; demountable classrooms (refer to Figure 5); covered walkways and outdoor learning areas (refer to Figure 6); and amenities including mixed use courts (refer to Figure 7).

John Matheson and Associates (JMA, 2014) inspected the school buildings and advised that the structures at the school are of the following structural types:

a. Single storey brick veneer classrooms;
b. Ductile steel framed structural steel walkways with structural steel roofing;
c. Demountable type structures;
d. Ductile steel framed structural steel COLA's with structural steel roofing;
e. Structural steel framed multi-purpose hall with perimeter articulated cavity brickwork of relatively recent construction constructed on a concrete raft slab;
f. Two-storey classroom buidling, consisting of reinforced concrete framed beam and column structure;
g. Single storey articulated masonry structure with an internal structural steel frame on a reinforced concrete raft slab; and
h. Structural steel framed administration building, which has perimeter concrete block walls and clad metal walls, constructed on a concrete raft slab.

Figure 3 Typical Classroom Buildings

Figure 4 School Hall

Figure 5 Typical Demountable Classroom Buildings

Figure 6 Covered Walkways and Covered Outdoor Learning Area

Figure 7 Mixed Use Courts

The maximum predicted values of conventional subsidence, tilt and curvature for the building structures associated with the Picton High School, after the completion of Longwall 32, are included in Table A, which is appended to this report.

A summary of the maximum predicted subsidence parameters is provided in Table 1.

Table 1 Subsidence Predictions for the Picton High School

Location	Number of Building Structures	Maximum Predicted Subsidence (mm)	Maximum Predicted Tilt (mm/m)	Maximum Predicted Hogging Curvature (1/km)	Maximum Predicted Sagging Curvature (1/km)
Picton High School	8 total	20 ~ 30	< 0.5	< 0.01	< 0.01
	12 total	30 ~ 40	< 0.5	< 0.01	< 0.01
	16 total	40 ~ 50	< 0.5	< 0.01	< 0.01
	16 total	50 ~ 60	< 0.5	< 0.01	< 0.01
	12 total	60 ~ 70	< 0.5	< 0.01	< 0.01

The buildings were inspected by structural engineer John Matheson & Associates, who advised that the structures were broadly found to be in serviceable conditions with no significant structure dilapidation noticeable. The building structures are located at distances between 210 metres and 400 metres from the proposed longwalls. The school buildings are similar in size and construction to those commonly found in residential areas. As discussed earlier in this report, Tahmoor Longwalls 22 to 30 have mined directly beneath and adjacent to the townships of Tahmoor and Thirlmere. Very few impacts have occurred to houses that are located outside the mining extent, and those impacts have been minor, as shown in Figure 2.

A probabilistic assessment of potential impacts on houses was provided in Report No. MSEC647. Many of the school buildings, particularly those located closest to Longwall 32, are single storey brick veneer buildings, which are similar in construction to residential houses. If the same method of probabilistic assessment of potential impacts on houses were applied to the school buildings, the calculated results are very similar to the results were calculated for the houses within the Area requiring approval. The likelihood of experiencing nil or negligible (Category 0) impacts is assessed as approximately 95%. The likelihood of experiencing very slight (Category 1) to slight (Category) 2 impacts is assessed as approximately 4% and the likelihood of experiencing moderate (Category 3) to very severe (Category 5) impacts is assessed as approximately 1%.

It is unlikely, therefore, that the Picton High School would experience adverse impacts as a result of the proposed mining, even if the predictions were exceeded by a factor of 2 times.

The period of active subsidence is expected to be 2 to 3 months during the mining of Longwall 32, with no further longwalls planned to subside the School. In the unlikely event that impacts occur, repairs can be undertaken outside school hours, on weekends or during school holidays, to minimise inconvenience to students and staff. Any impacts would be expected to be minor and develop gradually, allowing them to be repaired at a suitable time.

Tahmoor Colliery has extensive experience of mining directly beneath and adjacent to critical civil infrastructure, including the township of Tahmoor, commercial and retail buildings including Tahmoor Town Centre and the Main Southern Railway. The experience including mining directly beneath or adjacent to four child care centres and preschools. It has developed and acted in accordance with risk management plans to manage potential impacts to residential structures during the mining of Longwalls 22 to 30.

In addition to the above, Tahmoor Colliery has previously mined near Tahmoor Public School, which is located at the corner of Remembrance Drive and Bronzewing Street. The locations of previous mining around the School are shown in Figure 8. No mine subsidence impacts have been reported at the School.

The School first experienced mine subsidence movements in the 1980s during the extraction of the 201, 202 and 203 Panels, which were located to the south of the School. The closest distance between the 201, 202 and 203 Panels and the School buildings was approximately 40 metres. Whilst 203 Panel was relatively narrow in width (approximately 50 metres), 201 and 202 Panels were approximately 350 metres wide. Survey marks were installed along and across the mining area, the closest of which was located near the intersection of Remembrance Drive and Bronzewing Street, opposite the School. Approximately

70 mm of subsidence was measured at that time at this location, with measured tilts and ground strains being within survey tolerance.

From 2004 to 2008, Tahmoor Colliery completed the extraction of Longwalls 22 to 24A. The locations of these longwalls are shown in Figure 8, where it can be seen that the closest distance to Tahmoor Public School was approximately 200 metres. Survey pegs were installed along Remembrance Drive opposite the school. Approximately 100 mm of subsidence was measured during that time at this location, with measured tilt and ground strains being within survey tolerance.

West Cliff Colliery has previously mined near Appin Public School, which is located on Appin Road. The locations of previous mining around the School are shown in Figure 9. No mine subsidence impacts have been reported at the School.

The School may have experienced very minor subsidence movements in the 1970s during the extraction of Longwall 2 at Appin Colliery. It later experienced mine subsidence movements during the extraction of Longwall 5A2 at West Cliff Colliery in 2000. The closest distance to Appin Public School was approximately 90 metres from the corner of Longwall 5A2. Survey pegs were installed along Appin Road opposite the school. Approximately 70 mm of subsidence was measured at that time at this location, with measured tilt and ground strains being within survey tolerance.

Based on the above information, it is assessed that with the implementation of a robust subsidence management plan, Longwall 32 can be extracted without impacting on the safety of students and staff, or affect the use of the buildings at any time for educational or other purposes. It is recommended that a subsidence management plan be developed in consultation with Picton High School to manage potential subsidence impacts that might occur. The plan will include surveys, visual inspections and planned responses if impacts are observed.

Potential Impacts on other surface infrastructure within the Area

Services infrastructure, including electrical and telecommunications infrastructure, gas infrastructure, potable water infrastructure, sewer infrastructure and State Survey Marks are located within the Area. Their locations are shown in Drawing No. MSEC837-03.

Wollondilly Shire Council owned infrastructure, including road pavements and stormwater drainage structures are located within the Area.

There are no Items of Archaeological or Heritage Significance within the Area. There are no streams, steep slopes or cliffs within the Area. There are no commercial, industrial and business establishments within the Area. There are no bridges, tunnels or culverts within the Area.

There have been extensive experiences of mining adjacent to services infrastructure and council owned infrastructure at Tahmoor Colliery. No impacts have been observed to infrastructure located between 185 and 450 metres from previously extracted longwalls at Tahmoor Colliery. The potential for impacts due to the extraction of proposed Longwall 32 on services infrastructure and local road and drainage infrastructure within the Area is therefore considered to be very low. The potential for general ground deformations within the Area is also considered to be very low.

Tahmoor Colliery and infrastructure owners have developed and acted in accordance with agreed risk management plans to manage potential impacts to services and council owned infrastructure during the mining of Longwalls 22 to 30. It is recommended that the management plans be reviewed and updated to incorporate the proposed Longwall 32.

Please do not hesitate to contact us if you have any further queries.

Yours sincerely,

Daryl Kay
Associate Director,
Mine Subsidence Engineering Consultants

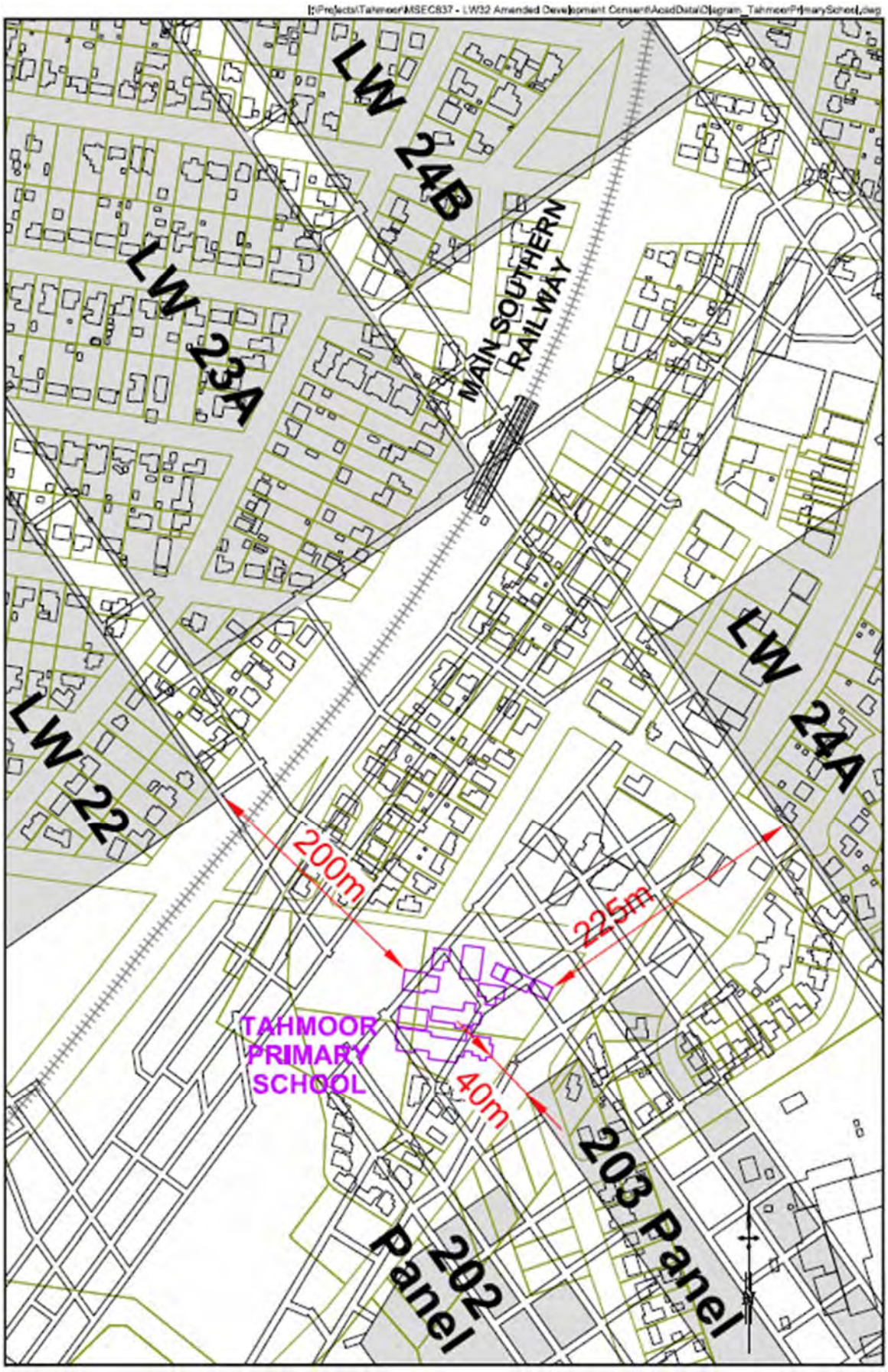

Figure 8 **Previous Mining at Tahmoor Colliery near Tahmoor Public School**

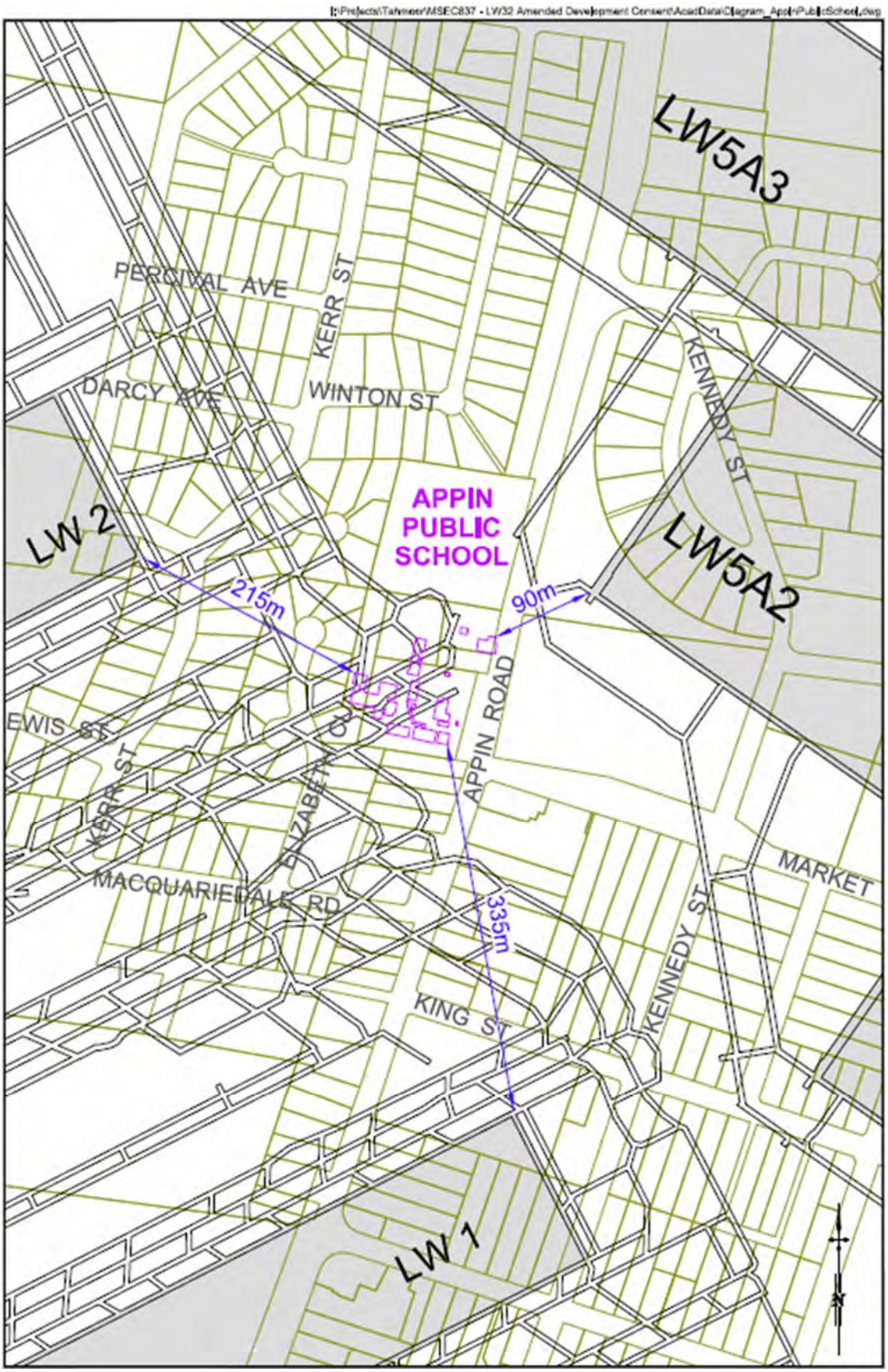

Figure 9 Previous Mining at Appin and West Cliff Colliery near Appin Public School

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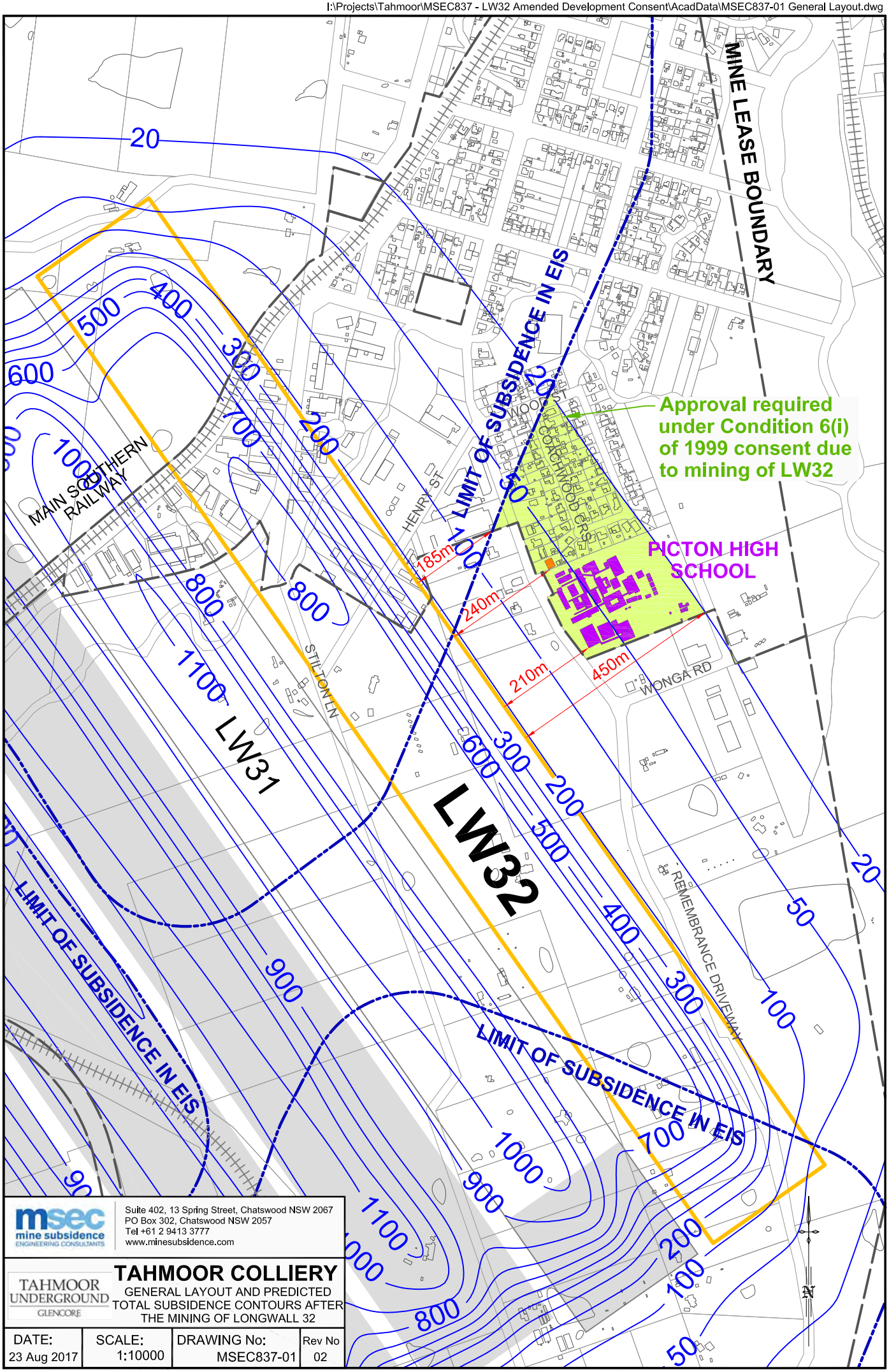

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TAHMOOR UNDERGROUND GLENCORE

TAHMOOR COLLIERY

GENERAL LAYOUT AND PREDICTED TOTAL SUBSIDENCE CONTOURS AFTER THE MINING OF LONGWALL 32

DATE:	SCALE:	DRAWING No:	Rev No
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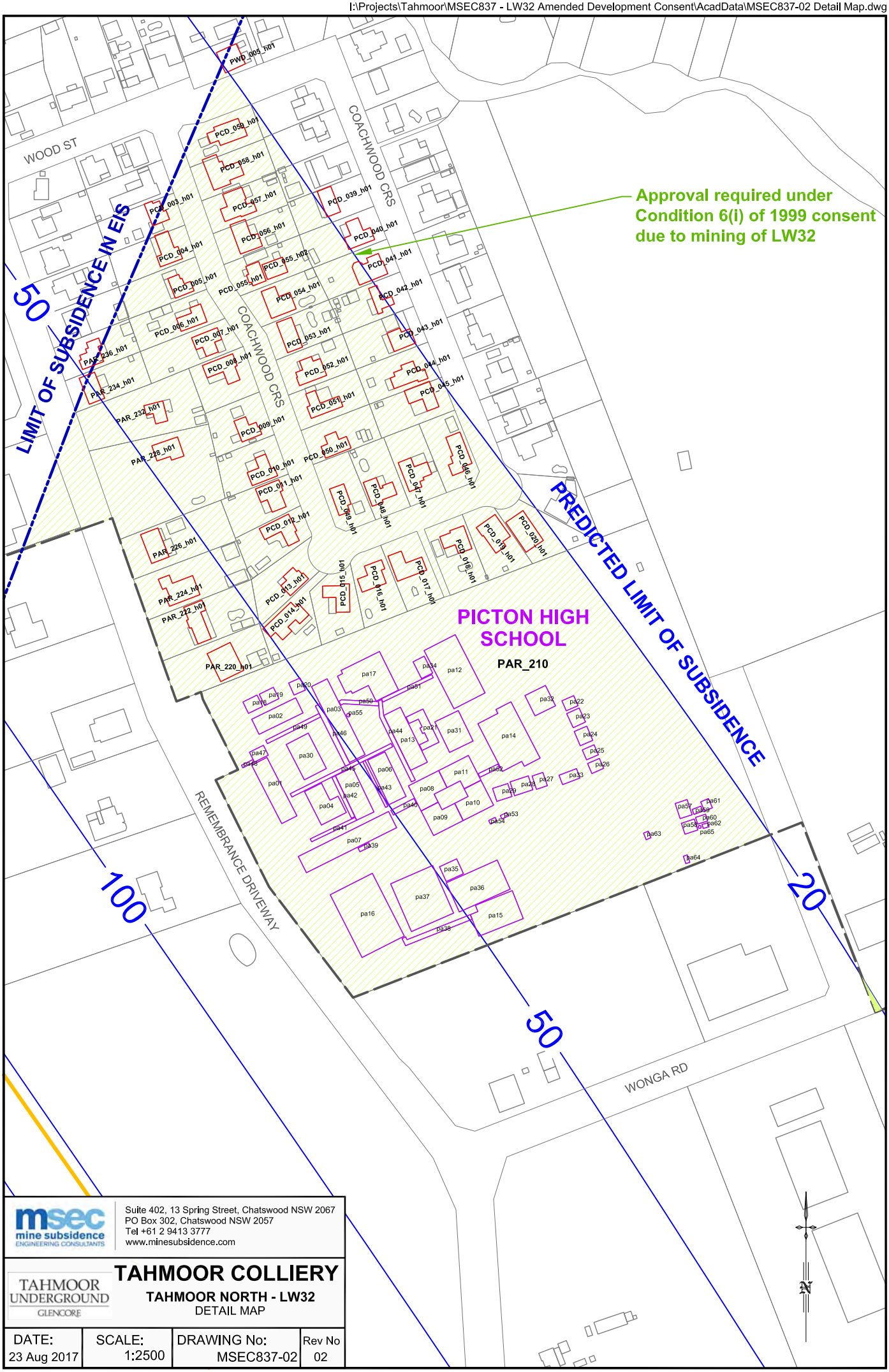

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TAHMOOR UNDERGROUND GLENCORE

TAHMOOR COLLIERY

TAHMOOR NORTH - LW32

DETAIL MAP

DATE:	SCALE:	DRAWING No:	Rev No
23 Aug 2017	1:2500	MSEC837-02	02

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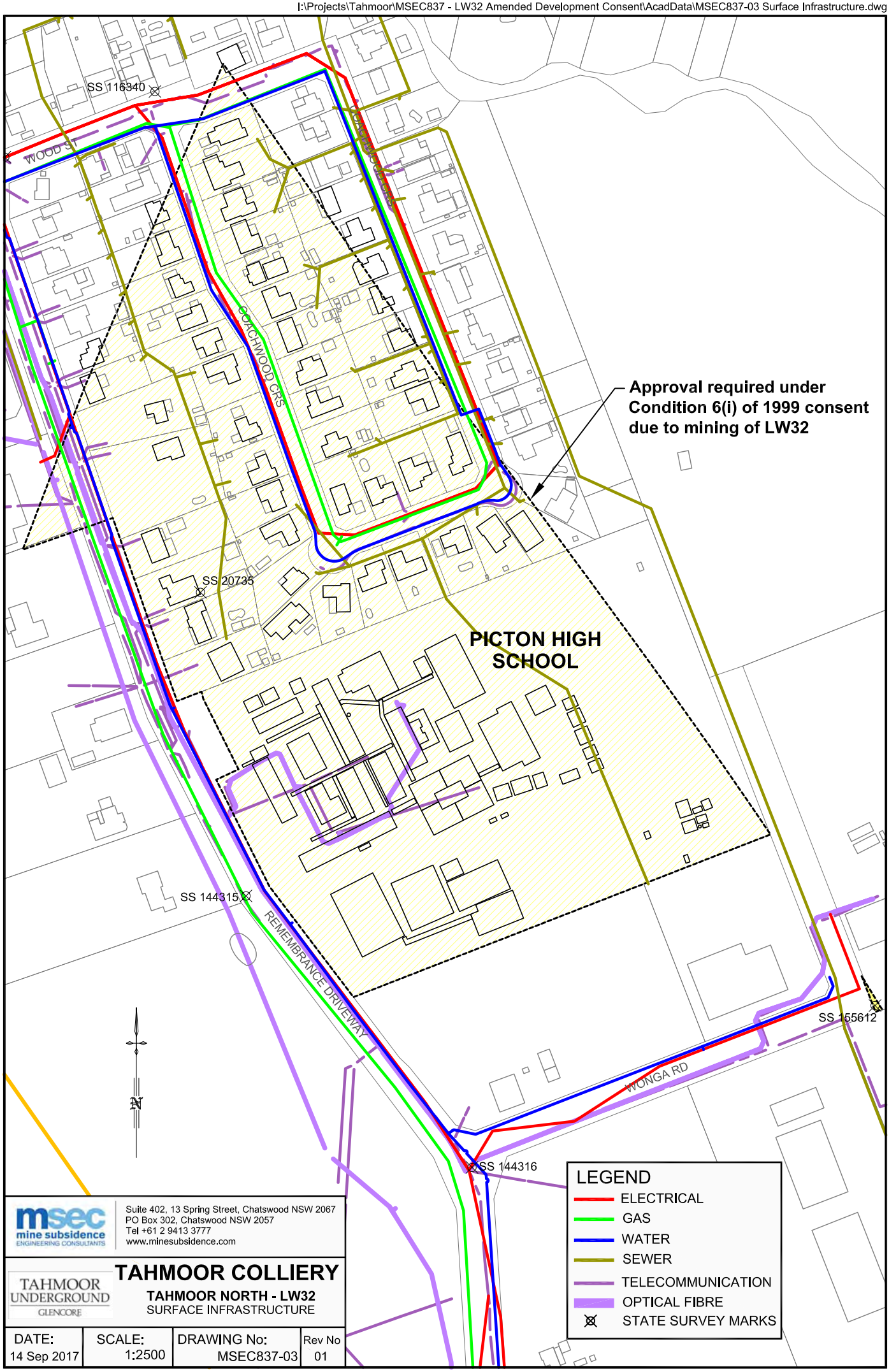

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TAHMOOR UNDERGROUND GLENCORE

TAHMOOR COLLIERY

TAHMOOR NORTH - LW32

SURFACE INFRASTRUCTURE

DATE:	SCALE:	DRAWING No:	Rev No
14 Sep 2017	1:2500	MSEC837-03	01

Table A - Predicted Subsidence Parameters for the Structures within Area requiring approval under Condition 6(i) of DA67/98 after the Extraction of Longwall 32

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Maximum Predicted Total Subsidence after LW32 (mm)	Maximum Predicted Total Tilt after LW32 (mm/m)	Maximum Predicted Hogging Curvature during or after LW32 (1/km)	Maximum Predicted Sagging Curvature during or after LW32 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses after LW32 (%)	Predicted Probability of Category R1 or R2 Impact for Houses after LW32 (%)	Predicted Probability of Category R3 to R5 Impact for Houses after LW32 (%)
PAR_210_pa01	279497	6213677	Public Amenity	70	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa02	279499	6213721	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa03	279535	6213718	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa04	279527	6213669	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa05	279545	6213675	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa06	279564	6213684	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa07	279540	6213646	Public Amenity	70	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa08	279588	6213677	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa09	279596	6213660	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa10	279615	6213671	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa11	279607	6213687	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa12	279604	6213747	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa13	279575	6213707	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa14	279636	6213708	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa15	279629	6213604	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa16	279552	6213603	Public Amenity	70	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa17	279553	6213744	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa18	279484	6213728	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa19	279494	6213732	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa20	279511	6213738	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa21	279585	6213713	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa22	279672	6213728	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa23	279676	6213720	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa24	279680	6213709	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa25	279684	6213699	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa26	279687	6213691	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa27	279654	6213682	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa28	279643	6213680	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa29	279632	6213676	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa30	279516	6213697	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa31	279603	6213712	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa32	279655	6213730	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa33	279672	6213685	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa34	279585	6213750	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa35	279602	6213629	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa36	279618	6213620	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa37	279585	6213613	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa38	279593	6213594	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa39	279550	6213643	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa40	279574	6213667	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa41	279532	6213654	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa42	279538	6213673	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa43	279557	6213681	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa44	279569	6213706	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-

Table A - Predicted Subsidence Parameters for the Structures within Area requiring approval under Condition 6(i) of DA67/98 after the Extraction of Longwall 32

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Maximum Predicted Total Subsidence after LW32 (mm)	Maximum Predicted Total Tilt after LW32 (mm/m)	Maximum Predicted Hogging Curvature during or after LW32 (1/km)	Maximum Predicted Sagging Curvature during or after LW32 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses after LW32 (%)	Predicted Probability of Category R1 or R2 Impact for Houses after LW32 (%)	Predicted Probability of Category R3 to R5 Impact for Houses after LW32 (%)
PAR_210_pa45	279537	6213689	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa46	279532	6213710	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa47	279488	6213699	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa48	279481	6213693	Public Amenity	70	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa49	279508	6213713	Public Amenity	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa50	279547	6213729	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa51	279576	6213737	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa52	279624	6213688	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa53	279633	6213662	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa54	279626	6213659	Public Amenity	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa55	279541	6213721	Public Amenity	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa57	279740	6213666	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa58	279743	6213655	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa59	279748	6213665	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa60	279750	6213660	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa61	279753	6213668	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa62	279753	6213656	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa63	279718	6213650	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa64	279741	6213636	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_210_pa65	279749	6213655	Public Amenity	30	< 0.5	< 0.01	< 0.01	-	-	-
PAR_220_h01	279468	6213753	House	60	< 0.5	< 0.01	< 0.01	94.3	4.7	1.1
PAR_220_r01	279485	6213754	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_220_r02	279492	6213753	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_220_r03	279490	6213759	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_222_h01	279452	6213777	House	60	< 0.5	< 0.01	< 0.01	94.2	4.7	1.1
PAR_222_r01	279449	6213768	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_222_r02	279458	6213775	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_222_r03	279475	6213774	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_222_r04	279481	6213776	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_224_h01	279441	6213796	House	60	< 0.5	< 0.01	< 0.01	94.2	4.7	1.1
PAR_224_r01	279475	6213803	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_224_r02	279471	6213818	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_226_h01	279426	6213822	House	60	< 0.5	< 0.01	< 0.01	94.2	4.7	1.1
PAR_226_r01	279435	6213821	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_226_r02	279431	6213828	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_226_r03	279439	6213833	Rural	60	< 0.5	< 0.01	< 0.01	-	-	-
PAR_228_h01	279434	6213879	House	50	< 0.5	< 0.01	< 0.01	94.6	4.4	1.0
PAR_228_r01	279461	6213876	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_232_h01	279427	6213901	House	50	< 0.5	< 0.01	< 0.01	94.6	4.4	1.0
PAR_232_r01	279423	6213899	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_232_r02	279434	6213905	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_232_r03	279453	6213896	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_232_r04	279452	6213902	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_234_h01	279389	6213915	House	50	< 0.5	< 0.01	< 0.01	94.5	4.5	1.0

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PAR_234_r01	279395	6213919	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_234_r02	279412	6213933	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_236_h01	279389	6213935	House	50	< 0.5	< 0.01	< 0.01	94.3	4.6	1.1
PAR_236_r01	279396	6213937	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_236_r02	279410	6213950	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PAR_236_r03	279414	6213944	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PAR_238_r01	279406	6213961	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_003_h01	279427	6214019	House	40	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_003_r01	279427	6214010	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_004_h01	279434	6213997	House	40	< 0.5	< 0.01	< 0.01	94.5	4.5	1.1
PCD_004_r01	279427	6213999	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_005_h01	279441	6213976	House	40	< 0.5	< 0.01	< 0.01	94.5	4.5	1.1
PCD_005_r01	279435	6213982	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_005_r02	279435	6213974	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_006_h01	279448	6213957	House	40	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_006_r01	279449	6213965	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_006_r02	279443	6213960	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_006_r03	279433	6213962	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_006_r04	279427	6213960	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_006_r05	279426	6213952	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_007_h01	279457	6213943	House	40	< 0.5	< 0.01	< 0.01	94.5	4.5	1.1
PCD_007_r01	279465	6213940	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_007_r02	279454	6213936	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_007_r03	279436	6213926	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_008_h01	279466	6213927	House	40	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_008_r01	279463	6213921	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_009_h01	279481	6213891	House	40	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_009_r01	279475	6213901	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_009_r02	279474	6213885	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_009_r03	279462	6213887	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_009_r04	279484	6213884	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_010_h01	279490	6213866	House	40	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_010_r01	279488	6213876	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_010_r02	279484	6213869	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_010_r03	279470	6213875	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_010_r04	279465	6213873	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_010_r05	279470	6213852	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_011_h01	279495	6213851	House	40	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_011_r01	279492	6213845	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_011_r02	279472	6213850	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_012_h01	279501	6213831	House	50	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_012_r01	279499	6213825	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_012_r02	279484	6213806	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_012_r03	279476	6213824	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-

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PCD_013_h01	279509	6213801	House	50	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_013_r01	279502	6213801	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_014_h01	279504	6213777	House	50	< 0.5	< 0.01	< 0.01	94.3	4.6	1.1
PCD_014_r01	279512	6213775	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_014_r02	279498	6213756	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_015_h01	279535	6213791	House	40	< 0.5	< 0.01	< 0.01	94.4	4.5	1.1
PCD_015_r01	279531	6213786	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_015_r02	279536	6213771	Rural	50	< 0.5	< 0.01	< 0.01	-	-	-
PCD_016_h01	279555	6213804	House	40	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_017_h01	279575	6213810	House	40	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_018_h01	279605	6213825	House	30	< 0.5	< 0.01	< 0.01	94.6	4.3	1.0
PCD_018_r01	279602	6213819	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_018_r02	279594	6213820	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_019_h01	279627	6213829	House	30	< 0.5	< 0.01	< 0.01	94.7	4.3	1.0
PCD_019_r01	279634	6213808	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_019_r02	279623	6213803	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_020_h01	279645	6213830	House	20	< 0.5	< 0.01	< 0.01	94.7	4.3	1.0
PCD_038_r03	279509	6214032	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_038_r04	279502	6214045	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_038_r05	279503	6214041	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_038_r06	279503	6214038	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_039_h01	279529	6214026	House	20	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_039_r01	279524	6214024	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_039_r02	279508	6214025	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_040_h01	279547	6214007	House	20	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_040_r02	279521	6213993	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_041_h01	279554	6213986	House	20	< 0.5	< 0.01	< 0.01	94.5	4.5	1.1
PCD_041_r01	279531	6213979	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_042_h01	279560	6213968	House	20	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_042_r01	279555	6213963	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_042_r02	279544	6213969	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_042_r03	279539	6213967	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_042_r04	279534	6213967	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_042_r05	279535	6213964	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_042_r06	279536	6213961	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_043_h01	279572	6213944	House	20	< 0.5	< 0.01	< 0.01	94.6	4.3	1.0
PCD_043_r01	279566	6213954	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_043_r02	279573	6213955	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_043_r03	279564	6213941	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_043_r04	279556	6213933	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_044_h01	279577	6213923	House	30	< 0.5	< 0.01	< 0.01	94.6	4.3	1.0
PCD_044_r01	279565	6213917	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_044_r02	279554	6213918	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_045_h01	279585	6213911	House	20	< 0.5	< 0.01	< 0.01	94.6	4.3	1.0

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PCD_045_r01	279583	6213904	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_045_r02	279560	6213906	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_045_r03	279557	6213904	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_046_h01	279606	6213876	House	30	< 0.5	< 0.01	< 0.01	94.6	4.3	1.0
PCD_046_r01	279602	6213894	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_047_h01	279580	6213864	House	30	< 0.5	< 0.01	< 0.01	94.6	4.3	1.0
PCD_047_r01	279591	6213868	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_047_r02	279583	6213873	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_048_h01	279559	6213854	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_048_r01	279560	6213860	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_048_r02	279545	6213876	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_048_r03	279543	6213878	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_049_h01	279536	6213849	House	40	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_049_r01	279547	6213844	Rural	40	< 0.5	< 0.01	< 0.01	-	-	-
PCD_050_h01	279533	6213881	House	30	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_050_r01	279547	6213887	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_050_r02	279550	6213887	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_050_r03	279553	6213888	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_051_h01	279526	6213905	House	30	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_051_r01	279519	6213915	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_051_r02	279527	6213911	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_052_h01	279519	6213925	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_052_r01	279529	6213940	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_052_r02	279522	6213933	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_052_r03	279512	6213928	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_053_h01	279506	6213947	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_053_r01	279513	6213947	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_053_r02	279528	6213958	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_053_r03	279533	6213959	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_053_r04	279535	6213955	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_053_r05	279519	6213963	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_054_h01	279499	6213966	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_054_r01	279518	6213983	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_055_h01	279486	6213983	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_055_h02	279497	6213986	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_055_r01	279480	6213984	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_055_r02	279486	6213993	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_055_r03	279500	6214000	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_055_r04	279498	6213994	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_055_r05	279515	6213994	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_056_h01	279480	6214005	House	30	< 0.5	< 0.01	< 0.01	94.6	4.4	1.1
PCD_056_r01	279484	6214009	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_056_r02	279495	6214003	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_056_r03	279500	6214021	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-

Table A - Predicted Subsidence Parameters for the Structures within Area requiring approval under Condition 6(i) of DA67/98 after the Extraction of Longwall 32

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Maximum Predicted Total Subsidence after LW32 (mm)	Maximum Predicted Total Tilt after LW32 (mm/m)	Maximum Predicted Hogging Curvature during or after LW32 (1/km)	Maximum Predicted Sagging Curvature during or after LW32 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses after LW32 (%)	Predicted Probability of Category R1 or R2 Impact for Houses after LW32 (%)	Predicted Probability of Category R3 to R5 Impact for Houses after LW32 (%)
PCD_057_h01	279475	6214024	House	30	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_057_r01	279472	6214034	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_057_r02	279481	6214032	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-
PCD_057_r03	279494	6214040	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_057_r04	279496	6214037	Rural	20	< 0.5	< 0.01	< 0.01	-	-	-
PCD_058_h01	279466	6214043	House	30	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_059_h01	279469	6214067	House	30	< 0.5	< 0.01	< 0.01	94.5	4.4	1.1
PCD_059_r01	279455	6214061	Rural	30	< 0.5	< 0.01	< 0.01	-	-	-