XSTRATA COAL:

Tahmoor Colliery - Longwalls 27 to 30

Management Plan for Potential Impacts to Endeavour Energy Infrastructure

AUTHORISATION OF MANAGEMENT PLAN

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DOCUMENT REGISTER

Date	Report No.	Rev	Comments
Mar-06	MSEC286-0406	A	Draft for Submission to Endeavour Energy (formerly Integral Energy)
May-06	MSEC286-0406	B	Agreed plan
Aug-06	MSEC286-0406	C	Chapter 1 amended
Sep-08	MSEC286-0406	D	Updated for Longwall 25
May-10	MSEC446-06	A	Updated for Longwall 26
Sep-12	MSEC567-06	A	Updated for Longwalls 27 to 30
Oct-12	MSEC567-06	B	Updated after consultation with Endeavour Energy

References:-

AS/NZS 4360:1999 Risk Management

Report on the Status of Integral Energy's Assets in the areas of Longwalls 24, 25 and 26 for Centennial Tahmoor Coal, prepared by Power Line Design, March 2006

Tahmoor Colliery Longwalls 27 to 30 - The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Items of Surface Infrastructure due to mining Longwalls 27 to 30 at Tahmoor Colliery in support of the SMP Application. (Report MSEC355, Revision B, July 2009), prepared by Mine Subsidence Engineering Consultants

Result of On Site Audit – Integral Energy Assets for Xstrata Coal – Tahmoor Colliery Longwalls 27 to 30, prepared by Integral Energy Network Asset Operations, May 2009

Gale, W. and Sheppard, I. (2011). *Investigation into Abnormal Increased Subsidence above Longwall Panels at Tahmoor Colliery.* Mine Subsidence Technological Society, Proceedings of the 8th Triennial Conference on Mine Subsidence, May 2011.

CONTENTS

Tables

Tables are prefaced by the number of the chapter in which they are presented.

Figures

Figures are prefaced by the number of the chapter or the letter of the appendix in which they are presented.

Drawings

Drawings referred to in this report are included in Appendix A at the end of this report.

Drawing No.	*Description*	*Revision*
MSEC567-00-01	Observed Incremental Subsidence due to LW26	A
MSEC567-00-02	Observed Subsidence due to LW24A to LW26	A
MSEC567-06-01	Electrical Infrastructure	A
MSEC567-06-02	Critical Power Poles	B

1.1. Background

Tahmoor Colliery is located approximately 80 kilometres south west of Sydney in the township of Tahmoor NSW. It is managed and operated by Xstrata Coal. Tahmoor Colliery has previously mined 25 longwalls to the north and west of the mine's current location. It is currently mining Longwall 26.

Longwalls 27 to 30 are a continuation of a series of longwalls that extend into the Tahmoor North Lease area, which began with Longwall 22. The longwall panels are located between the Bargo River in the south-east, the township of Thirlmere in the west and Picton in the north. Infrastructure owned by Endeavour Energy (formerly Integral Energy) is located within these areas.

Longwall 27 is approximately 283 metres wide (rib-to-rib) and approximately 3.0 kilometres long. The width of the chain pillar between Longwalls 26 and 27 is 40 metres.

This Management Plan provides detailed information about how the risks associated with the mining beneath electrical infrastructure will be managed by Tahmoor Colliery and Endeavour Energy.

The Management Plan is a live document that can be amended at any stage of mining, to meet the changing needs of Tahmoor Colliery and Endeavour Energy.

1.2. Maximum Predicted Systematic Parameters

Predicted mining-induced systematic subsidence movements were provided in Report No. MSEC355, which was prepared in support of Tahmoor Colliery's SMP Application for Longwalls 27 to 30.

A summary of the maximum predicted incremental systematic subsidence parameters, due to the extraction of each of the proposed longwalls, is provided in Table 1.1. A summary of the maximum predicted cumulative systematic subsidence parameters, after the extraction of each of the proposed longwalls, is provided in Table 1.2. A summary of the maximum predicted travelling parameters, during the extraction of each of the proposed longwalls, is provided in Table 1.3.

Table 1.1 Maximum Predicted Incremental Systematic Subsidence Parameters due to the Extraction of Each of the Proposed Longwalls 27 to 30

Longwall	Maximum Predicted Incremental Subsidence (mm)	Maximum Predicted Incremental Tilt (mm/m)	Maximum Predicted Incremental Hogging Curvature (1/km)	Maximum Predicted Incremental Sagging Curvature (1/km)
After LW27	755	6.0	0.07	0.14
After LW28	735	5.9	0.07	0.13
After LW29	735	5.9	0.06	0.13
After LW30	725	5.8	0.06	0.13

Table 1.2 Maximum Predicted Cumulative Systematic Subsidence Parameters after the Extraction of Each of the Proposed Longwalls 27 to 30

Longwall	Maximum Predicted Cumulative Subsidence (mm)	Maximum Predicted Cumulative Tilt (mm/m)	Maximum Predicted Cumulative Hogging Curvature (1/km)	Maximum Predicted Cumulative Sagging Curvature (1/km)
After LW27	1260	6.3	0.09	0.15
After LW28	1270	6.2	0.09	0.14
After LW29	1270	6.1	0.09	0.14
After LW30	1270	6.3	0.09	0.14

The values provided in the above table are the maximum predicted cumulative systematic subsidence parameters which occur within the general SMP Area, including the predicted movements resulting from the extraction of Longwalls 22 to 30.

Table 1.3 Maximum Predicted Travelling Subsidence Parameters during the Extraction of Each of the Proposed Longwalls 27 to 30

Longwall	Maximum Predicted Travelling Tilt (mm/m)	Maximum Predicted Travelling Hogging Curvature (1/km)	Maximum Predicted Travelling Sagging Curvature (1/km)
During LW27	3.1	0.04	0.03
During LW28	3.0	0.03	0.03
During LW29	3.0	0.03	0.03
During LW30	3.0	0.03	0.03

1.3. Observed Subsidence during the mining of Longwalls 22 to 26

Extensive ground monitoring within the urban areas of Tahmoor has allowed detailed comparisons to be made between predicted and observed subsidence, tilt, strain and curvature during the mining of Longwalls 22 to 26.

In summary, there is generally a good correlation between observed and predicted subsidence, tilt and curvature. Observed subsidence was generally slightly greater than predicted in areas that were located directly above previously extracted longwalls and areas of low level subsidence (typically less than 100 mm) were generally observed to extend further than predicted.

While there is generally a good correlation between observed and predicted subsidence, substantially increased subsidence has been observed above most of Longwall 24A and the southern ends of Longwall 25. Subsidence was more than double the predicted amount in some locations though ground strains were within the normal range. This was a very unusual event for the Southern Coalfield.

Observed Increased Subsidence during the mining of Longwall 24A

Observed subsidence was greatest above the southern half of Longwall 24A, and gradually reduced in magnitude towards the northern half of the longwall, which was directly beneath the urban area of Tahmoor. These observations are shown graphically in Fig. 1.1, which shows observed subsidence at survey pegs located along the centreline of Longwall 24A.

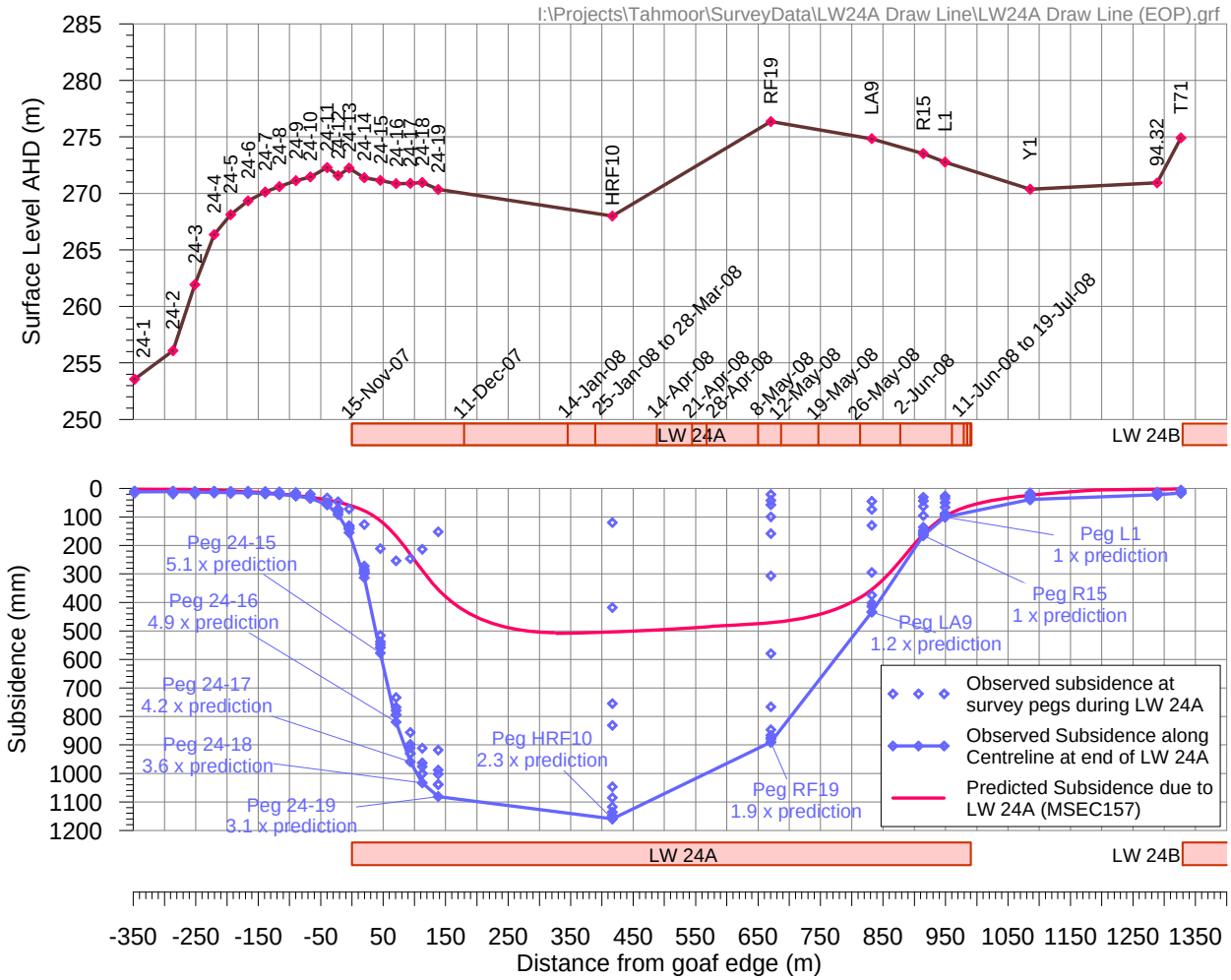

Fig. 1.1 Observed Subsidence along Centreline of Longwall 24A

It can be seen from Fig. 1.1, that observed subsidence was more than twice the predicted maximum value, reaching a maximum of 1169 mm at Peg HRF10. It is possible that actual maximum subsidence developed somewhere between Pegs HRF10 and RF19, though this was not measured. Observed subsidence was similar to prediction near Peg R15 on Remembrance Drive. Survey pegs RF19 and LA9 are located within a transition zone where subsidence gradually reduced from areas of maximum increased subsidence to areas of normal subsidence.

Observed Increased Subsidence during the mining of Longwall 25

Increased subsidence was observed during the first stages of mining Longwall 25. These observations are shown graphically in Fig. 1.2, which shows observed subsidence at survey pegs located along the centreline of Longwall 25.

It can be seen from Fig. 1.2, that observed subsidence was approximately twice the predicted maximum value, with maximum subsidence of 1216 mm at Peg 25-28.

Observed subsidence is similar to but slightly more than predicted at Peg RE7 and is similar to prediction at Peg Y20 and at all pegs located further along the panel. Survey pegs A6, A7, A8 and A9 are located within a transition zone where subsidence has gradually reduced from areas of maximum increased subsidence to areas of normal subsidence.

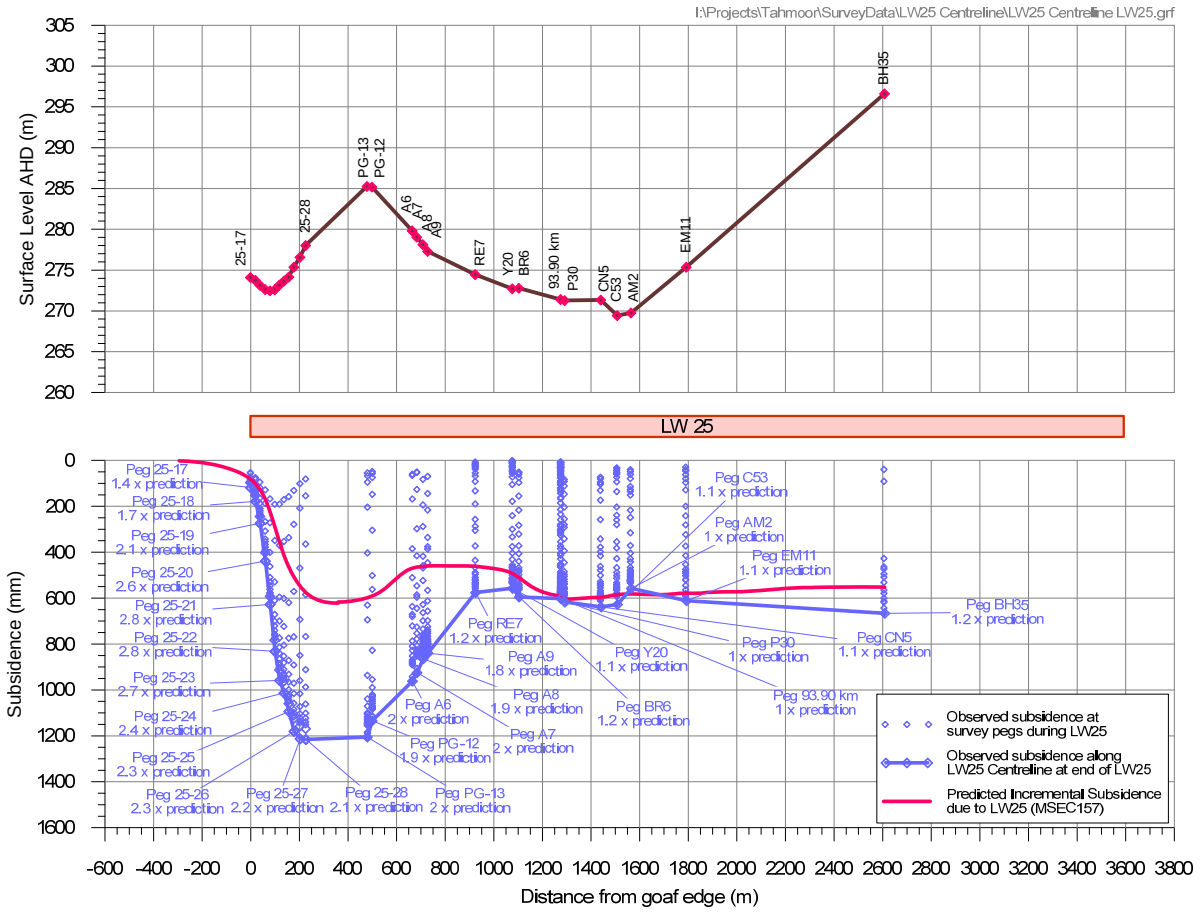

Fig. 1.2 Observed Subsidence along Centreline of Longwall 25

Observed Increased Subsidence during the mining of Longwall 26

Increased subsidence was observed during the first stages of mining Longwall 26, but at a reduced magnitude compared to the subsidence observed above Longwalls 24A and 25. These observations are shown graphically in Fig. 1.3, which shows observed subsidence at survey pegs located along the centreline of Longwall 26. The graph shows the latest survey results for each monitoring line as at August 2012. It is likely that further small increases in subsidence will be observed at these pegs when they are surveyed at the completion of Longwall 26.

It can be seen from Fig. 1.3 that observed subsidence was approximately 1.3 times the predicted maximum value, with maximum subsidence of 867 mm at Peg TM26.

Observed subsidence reduced along the panel until Peg Y40 on York Street, where it was less than prediction. Survey pegs S9, and RE27 are located within a transition zone where subsidence has gradually reduced from areas of maximum increased subsidence between Pegs TM26 and MD4 to areas of normal subsidence at Peg Y40 and beyond.

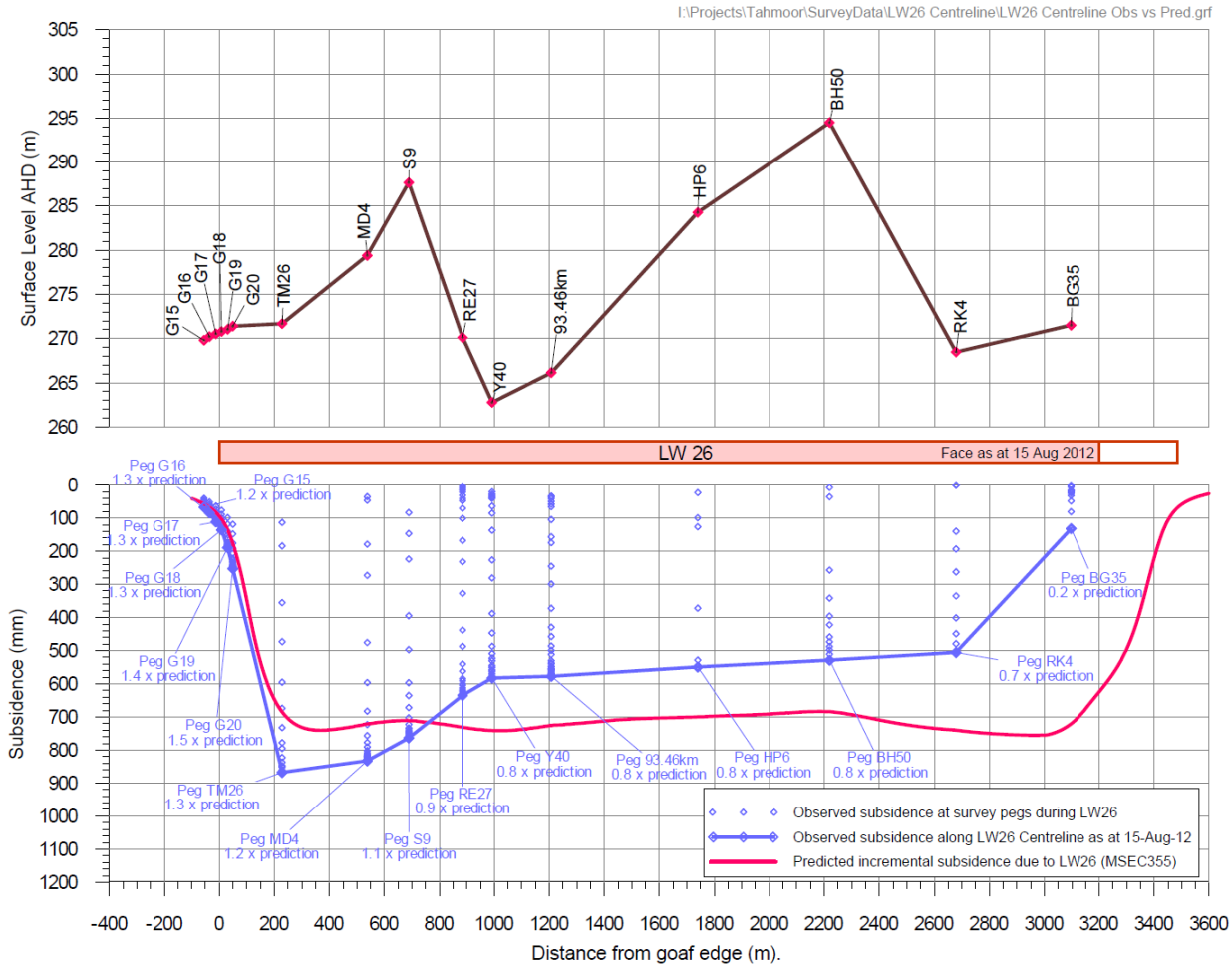

Fig. 1.3 Observed Subsidence along Centreline of Longwall 26 as at August 2012

Analysis and commentary

The cause for the increased subsidence has been investigated by Strata Control Technologies on behalf of Tahmoor Colliery (Gale and Sheppard, 2011). The investigations concluded that the increased subsidence is consistent with localised weathering of joint and bedding planes above a depressed water table adjacent to an incised gorge.

In light of the above observations, the region above the extracted longwalls at Tahmoor has been partitioned into three zones:

1. Normal subsidence zone – where the observed vertical subsidence is within the normal range and correlates well with predictions
2. Maximum increased subsidence zone – where the observed vertical subsidence is substantially greater than predictions but has reached it upper limit. Maximum subsidence above the centreline of the longwalls appears to be approximately 1.2 metres above Longwalls 24A and 25, and 900 mm above Longwall 26.
3. Transition zone – where the subsidence behaviour appears to have transitioned between areas of maximum increased subsidence and normal subsidence.

When the locations of the three zones are plotted on a map, as shown in Drawing No. MSEC567-00-01 (refer Appendix), it can be seen that the transition zone is roughly consistent in width above Longwall 24A, Longwall 25 and Longwall 26. The orientation of the transition zone is also roughly parallel to the Nepean Fault and not the Bargo River.

Prior to the mining of Longwall 26, it was not yet known whether the location of the transition zone was related to the alignment of the Nepean Fault or the Bargo River as both features were aligned approximately parallel to each other adjacent to previously extracted Longwalls 24A and 25.

The Bargo River, however, abruptly turns a sharp bend near the end of Longwalls 25 and 26 and observations during the mining of Longwall 26 were able to provide a first indication that the location of the transition zone was related to the alignment of the Nepean Fault, rather than the Bargo River.

The magnitude of subsidence above Longwall 26 is reduced compared to Longwalls 24A and 25. Given that the alignment of the Nepean Fault moves away from the Bargo River above Longwall 26, it appears that the magnitude of increased subsidence is linked to the proximity of the Bargo River. This observation confirms the findings of Gale and Sheppard that the increased subsidence is linked to localised weathering of joint and bedding planes above a depressed water table adjacent to the incised gorge of the Bargo River.

In summary, it appears that the location of increased subsidence is linked to the alignment of the Nepean Fault and the magnitude of the increased subsidence is linked to the proximity to the Bargo River.

The zones have been projected above Longwalls 27 to 30 from the observed zones above Longwalls 24A and 26, as shown in Drawing No. MSEC567-00-02 (refer Appendix). The projection is based on the orientation of the Nepean Fault. It can be seen that the transition zone extends to sections of Myrtle Creek Avenue, Remembrance Drive, Myrtle Creek and the Main Southern Railway.

Given that Longwalls 27 to 30 are located further away from the Bargo River than Longwall 26, it is expected that the magnitude of maximum subsidence at the commencing end of the longwalls will be less than 900 mm. The amount of reduction in maximum subsidence is difficult to predict. The difference in maximum subsidence between Longwalls 24A and 25 and Longwall 26 is approximately 300 mm. If maximum subsidence at the commencing end of Longwall 27 reduces a further 300 mm, the magnitude of subsidence at the commencing end will return to normal levels.

It is recognised that despite the above analysis and projections, substantially increased subsidence could develop as the mining of Longwals 27 to 30 progresses. This Management Plan has been developed to manage potential impacts if substantial additional subsidence were to occur.

1.4. Predicted Strain

The prediction of strain is more difficult than the predictions of subsidence, tilt and curvature. The reasons for this are that strain is affected by many factors, including ground curvature and horizontal movement, as well as local variations in the near surface geology, the locations of joints at bedrock, and the depth of bedrock. The measurements are also affected by survey tolerance. The profiles of observed strain can, therefore, be irregular even when the profiles of observed subsidence, tilt and curvature are relatively smooth.

The relative frequency distribution of maximum observed tensile strains and compressive strains for survey bays located directly above goaf is provided in Fig. 1.4.

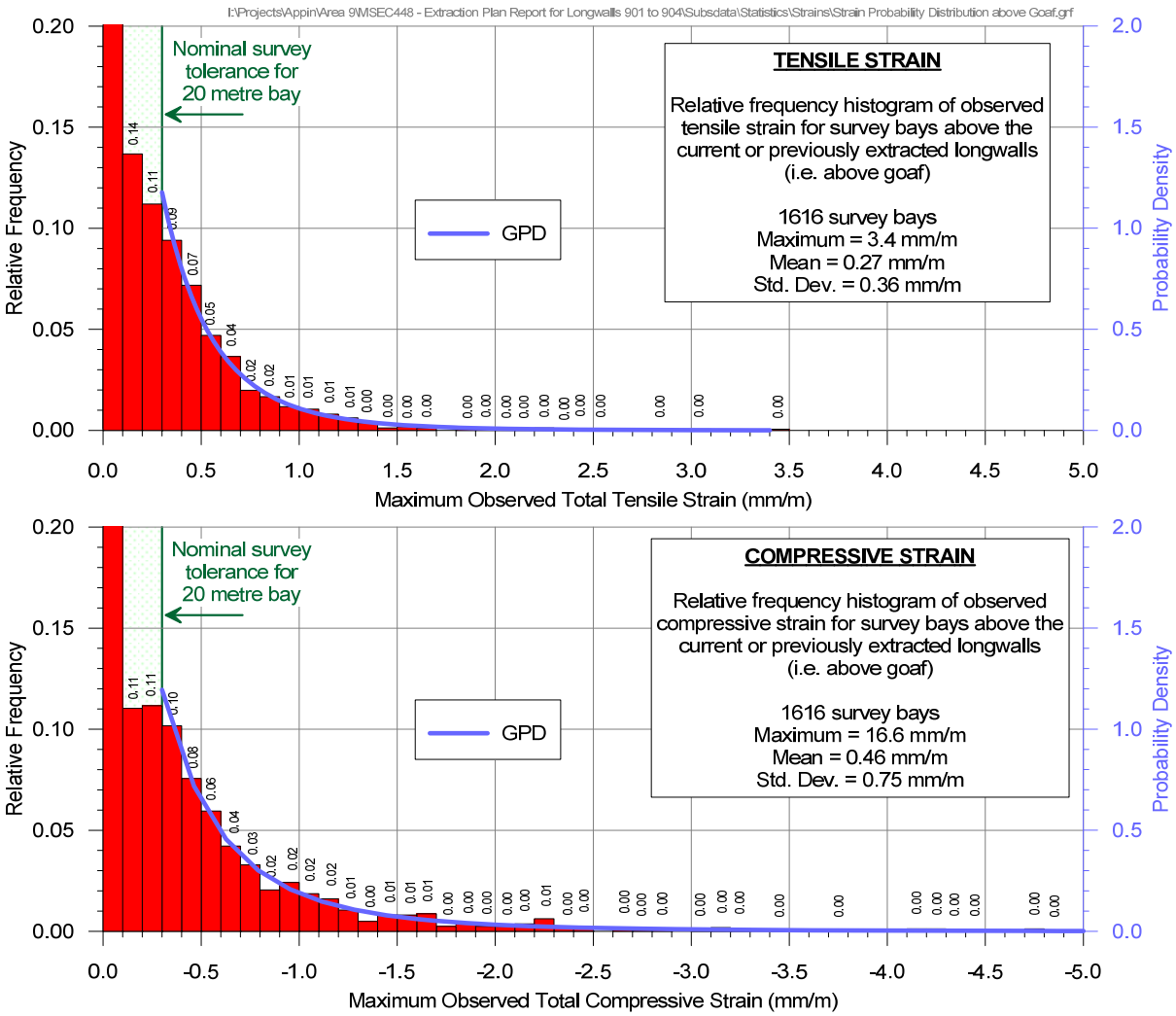

Fig. 1.4 Distributions of Measured Maximum Tensile and Compressive Strains at Any Time for Pegs Located Above Goaf in the Southern Coalfield

While not shown in Fig. 1.4, it is noted that the maximum observed compressive strain of 16.6 mm/m, which occurred along the T-Line above Appin Longwall 408, was the result of movements along a low angle thrust fault within the Cataract Tunnel. All remaining compressive strains in this dataset (which exclude valley related movements) were less than 5 mm/m.

The relative frequency distribution of maximum observed tensile strains and compressive strains above solid coal is provided in Fig. 1.5.

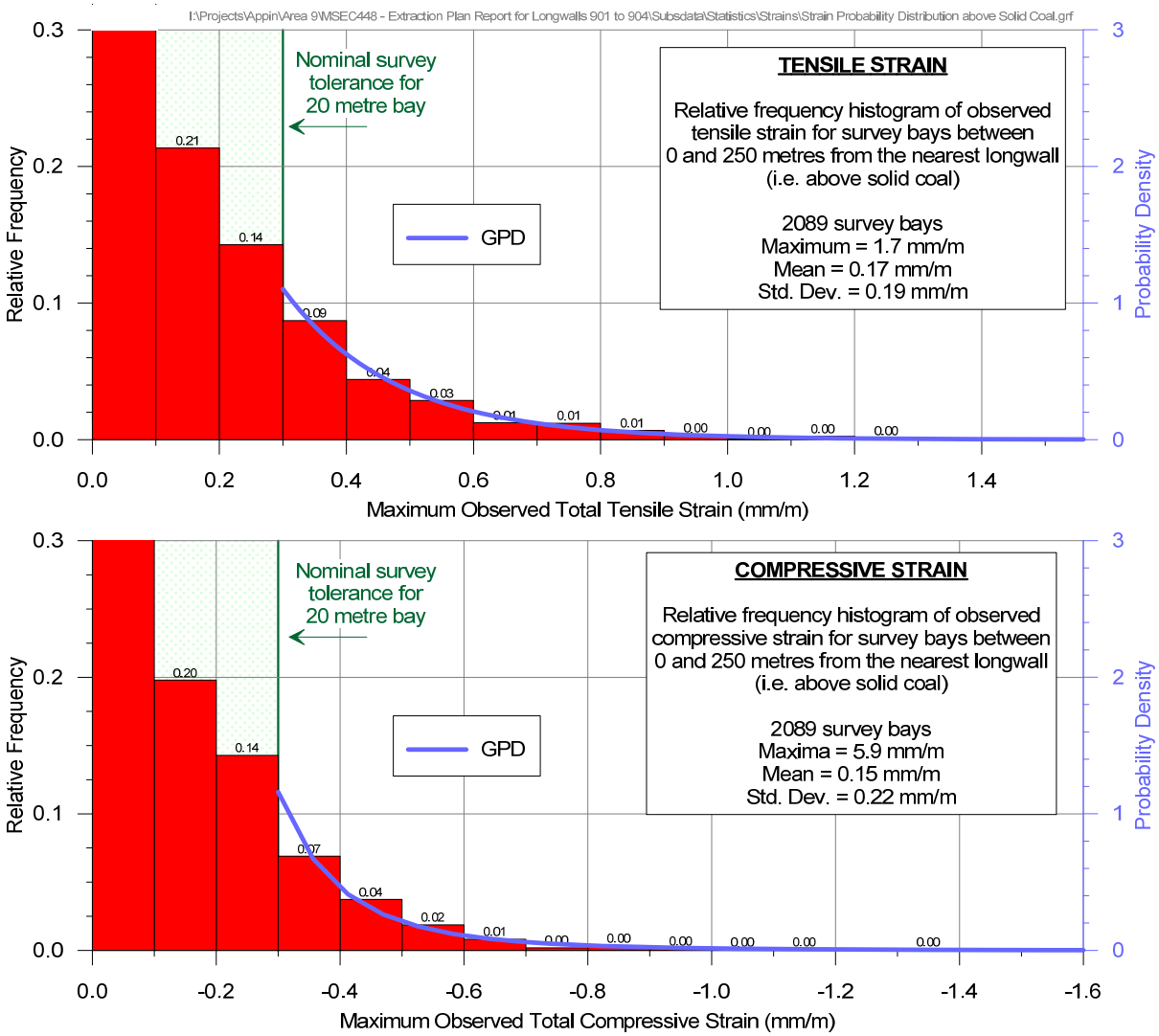

Fig. 1.5 Distributions of Measured Maximum Tensile and Compressive Strains at Any Time for Pegs Located Above Solid Coal in the Southern Coalfield

While not shown in Fig. 1.5, it is noted that the maximum observed compressive strain of 5.9 mm/m, which occurred along the T-Line above Appin Longwall 408, was the result of movements along a low angle thrust fault within the Cataract Tunnel as Longwall 408 approached the monitoring line. A maximum observed compressive strain of 3.1 mm/m was observed across the fault at the completion of Longwall 407. All remaining compressive strains in this dataset (which exclude valley related movements) were less than 5 mm/m.

1.5. Objectives

The primary objectives of this Management Plan are to establish procedures to identify, measure, control, mitigate and repair potential impacts that might occur on surface infrastructure owned by Endeavour Energy as a result of mining Longwalls 27 to 30. The objectives of the Management Plan have been developed to:-

- Ensure the safe and serviceable operation of all surface infrastructure. Public and workplace safety is paramount. Disruption and inconvenience should be kept to minimal levels.
- Monitor ground movements and the condition of surface infrastructure during mining.
- Initiate action to mitigate or remedy potential significant impacts that are expected to occur on the surface.
- Provide a plan of action in the event that the impacts of mine subsidence are greater than those that are predicted.
- Provide a forum to report, discuss and record impacts to the surface. This will involve Tahmoor Colliery, Endeavour Energy, Mine Subsidence Board, Industry and Investment, NSW, and consultants as required.
- Establish lines of communication and emergency contacts.

1.6. Scope

The Management Plan is to be used to protect and monitor the condition of the items of electrical infrastructure identified to be at risk due to mine subsidence.

The Management Plan describes measures that will be undertaken as a result of mining Longwall 27 only.

1.7. Proposed Mining Schedule

It is planned that each longwall will extract coal working northwest from the southeastern ends. This Management Plan covers longwall mining until completion of mining in Longwall 30 and for sufficient time thereafter to allow for completion of subsidence effects. The current schedule of mining is shown in Table 1.4.

Table 1.4 Schedule of Mining

Longwall	Start Date	Completion Date
Longwall 27	November 2012	October 2013
Longwall 28	November 2013	July 2014
Longwall 29	August 2014	February 2015
Longwall 30	March 2015	October 2016

1.8. Definition of Active Subsidence Zone

As a longwall progresses, subsidence begins to develop at a point in front of the longwall face and continues to develop after the longwall passes. The majority of subsidence movement typically occurs within an area 150 metres in front of the longwall face to an area 450 metres behind the longwall face.

This is termed the “active subsidence zone” for the purposes of this Management Plan, where surface monitoring is generally conducted. The active subsidence zone for each longwall is defined by the area bounded by the predicted 20 mm subsidence contour for the active longwall and a distance of 150 metres in front and 450 metres behind the active longwall face, as shown by Fig. 1.6.

Fig. 1.6 Diagrammatic Representation of Active Subsidence Zone

2.1. Observations during Longwalls 22 to 26

Longwalls 22 to 26 have directly mined beneath approximately 29.6 kilometres of electrical cables and 800 power poles and no significant impacts have been recorded so far. However, tension adjustments have been made by Endeavour Energy to some aerial services connections to houses. This is understandable as the overhead cables are typically pulled tight between each house and power pole.

While the experience at Tahmoor has been relatively benign, Endeavour Energy has been required to adjust power pole tilts and catenaries as a result of mine subsidence at other locations within the Southern Coalfield. This repair work is more substantial but the frequency of such impacts is very low.

2.2. Electrical Infrastructure

Endeavour Energy has an extensive electrical infrastructure network within the SMP Area. The electrical distribution lines within the SMP Area are shown according to their voltage in Drawing No. MSEC567-06-01.

The drawing has been updated from the drawing provided in Report No. MSEC355 as some 66kV power poles have been relocated to accommodate the construction of the new Redbank Tunnel Deviation along the Main Southern Railway.

It can be seen from this drawing that the distribution lines range between low voltage (LV) and 66 kV. The main 66 kV transmission line runs alongside the Main Southern Railway. The majority of distribution lines are 11 kV or low voltage cables, which provide power to each property.

All of the electrical distribution lines are overhead cables, supported by power poles, which are shown in Drawing No. MSEC567-06-01. This drawing also shows that the Tahmoor Substation is located outside the influence of Longwalls 27 to 30.

2.3. Review of Risk Assessment and Management Measures

The range of subsidence movements is predicted to be similar to those experienced during the mining of Longwalls 22 to 26. The nature of the infrastructure that will experience subsidence during the mining of Longwalls 27 to 30 is similar to the infrastructure above Longwalls 22 to 26.

A risk assessment was conducted by Endeavour Energy (formerly Integral Energy) and the results are described in a letter by Endeavour Energy (formerly Integral Energy), dated 4 May 2006, which is shown in the Appendix. In light of minimal impacts on electrical infrastructure during the mining of Longwall 26, the results of the risk assessment remain applicable to Longwalls 27 to 30.

Endeavour Energy and Tahmoor Colliery have developed and acted in accordance with an agreed management plan during the mining of Longwalls 22 to 26.

Given that no significant impacts have been experienced to date, Endeavour Energy and Tahmoor Colliery consider that there is no need to amend the risk assessment or the management measures that have been developed in previously agreed management plans.

2.4. Power Poles recommended for monitoring

An inspection of all power poles within the mining area has been conducted by Power Line Design on two occasions. Both reports concluded that the electricity infrastructure is generally in a good state of repair.

- Poles located within the SMP Area for Longwalls 24 to 26 were inspected in 2006. A total of 31 poles were recommended for monitoring during mining.
- Poles located within the SMP Area for Longwalls 27 to 30 were inspected in 2009. A total of 43 poles were recommended for monitoring during mining.

The poles recommended for monitoring during Longwalls 27 to 30 are listed in Table 2.1, and are shown in Drawing No. MSEC567-06-02.

Table 2.1 Summary of Maximum Subsidence Parameters along Monitoring Lines

Sub No.	Pole No.	Street Name	Type	Position relative to LWs
Poles selected for monitoring during the mining of Tahmoor Longwalls 27 to 30 by Endeavour Energy				
12192	166	Innes Street	Substation Pole	Above LW27
-	171	Innes Street	HV Pole	Above LW26
ABS 69438	794667	Bridge Street east of Innes Street	Air Brake Switch Pole	Above LW26
27175	794670	Bridge Street east of Innes Street	Substation Pole	Above LW27
10210	80	Off Thirlmere Way	Substation Pole	Near end of LW30
Fuses J328	83	Off Thirlmere Way	Fuses	Near end of LW30
10902	87	Off Thirlmere Way	Substation Pole	Near end of LW30
-	89	Off Bridge Street	HV Pole	Above LW30
11601	387	Off Bridge Street	Substation Pole	Above LW30
16483	478	Off Stilton Lane	Substation Pole	Above LW28
-	26	Stilton Lane	HV Pole	Near side of LW30
-	25	Stilton Lane	HV Pole	Near side of LW30
Links K701	85	Stilton Lane	Links	Near side of LW30
12016	89	Stilton Lane	Substation Pole	Above LW30
ABS J346	381	Stilton Lane North of Remembrance Drive	Air Brake Switch Pole	Near end of LW30
-	137	York Street	HV Pole	Above LW27
12060	194	Remembrance Drive	Substation Pole	Above LW27
ABS P699	139	Remembrance Drive North of York Street	Air Brake Switch Pole	Above LW27
12061	323	Remembrance Drive	Substation Pole	Above LW28
-	129	Remembrance Drive West of River Road	HV Pole	Near end of LW29
Links 13773	156	Remembrance Drive opposite River Road	Links	Near end of LW29
-	128	Remembrance Drive corner of River Road	HV Pole	Near end of LW29
-	150	Remembrance Drive West of Stilton Lane	HV Pole	Near end of LW29
ABS J356	125	Remembrance Drive West of Stilton Lane	Air Brake Switch Pole	Near end of LW29
-	100	Remembrance Drive corner of Stilton Lane	HV Pole	Near end of LW30
10218	122	Remembrance Drive East of Stilton Lane	Transmission Pole	Near end of LW30
Links 13768	45-A120	Remembrance Drive West of Koorana Road	Transmission Pole	Near end of LW30
23177	296821	Park Avenue	Substation Pole	Near side of LW27
10352	188	Struan Street west of Myrtle Creek Avenue	Substation Pole	Above LW27
-	190	Struan Street corner of Myrtle Creek Avenue	HV Pole	Above LW27
-	93	Myrtle Creek Ave	HV Pole	Above LW27
-	96	Myrtle Creek Avenue corner of Moorland Road	HV Pole	Near end of LW27
ABS J360	154	Moorland Road	Air Brake Switch Pole	Near side of LW27
Fuses J361	J98	Myrtle Creek Avenue South of Moorland Road	Fuses	Near end of LW27

Sub No.	Pole No.	Street Name	Type	Position relative to LWs
-	215448	Moorland Road east of Myrtle Creek Avenue	HV Pole	Near end of LW27
10329	49	Moorland Road	Substation Pole	Near end of LW27
Links J363	48	Moorland Road	Links	Near end of LW27
11455	1	Park Avenue West of River Road	Substation Pole	Near end of LW29
-	199	River Road opposite Park Avenue	HV Pole	Near end of LW29
Links 38089	2	River Road South of Park Avenue	Links	Near end of LW29
22656	291167	River Road South of Suffolk Place	Substation Pole	Near end of LW29
-	25883	River Road South of Suffolk Place	HV Pole	Near end of LW29
-	54-A416	Off Remembrance Drive	Transmission Pole	Above LW28
-	54-A421	Off Remembrance Drive	Transmission Pole	Above LW27

3.0 RISK CONTROL PROCEDURES

Infrastructure	Hazard / Impact	Risk	Trigger	Control Procedure/s	Frequency	By Whom?
Electrical Infrastructure	Impacts to infrastructure	Refer Letter from Endeavour Energy (formerly Integral Energy) in App D	None	Conduct visual inspection for surface deformation along streets	Twice a week when the roads are within active subsidence area	Tahmoor Colliery
				Conduct surveys along survey lines to provide some early warning for potentially damaging subsidence events	Every 200 metres of longwall face movement	Tahmoor Colliery (SMEC Urban / MSEC)
				Conduct pole surveys that measure subsidence at base and vertical offset or tilt of selected poles.	Monthly for each pole within active subsidence zone and for next 3 months after leaving active subsidence zone End of Longwall for all poles within limit of subsidence for panels	Tahmoor Colliery (SMEC Urban / MSEC)
				Advise of position of longwall by email	Weekly	Tahmoor Colliery
				Keep Mine Subsidence Board informed of events – Tahmoor Colliery / Endeavour Energy.	As required	Tahmoor Colliery / Endeavour Energy
				Communicate regularly	Ongoing	Tahmoor Colliery / Endeavour Energy
			Impacts observed	Notify all stakeholders, including Endeavour Energy, Tahmoor Colliery, Mine Subsidence Board and DTIRIS	Within 24 hours	Endeavour Energy or Tahmoor Colliery
				Repair impact.	As per Endeavour Energy procedures	Endeavour Energy
				Increase the frequency of survey and visual inspections in vicinity of impact, if appropriate.	As agreed between Tahmoor Colliery and Endeavour Energy	Tahmoor Colliery

4.0 MANAGEMENT PLAN REVIEW MEETINGS

Management Plan Review Meetings will be held between Tahmoor Colliery and Endeavour Energy for discussion and resolution of issues raised in the operation of the Management Plan. The frequency of the Plan Review Meetings will be as requested by any party.

Plan Review Meetings will discuss any incidents reported in relation to the relevant surface feature, the progress of mining, the degree of mine subsidence that has occurred, and comparisons between observed and predicted ground movements.

It will be the responsibility of the meeting representatives to determine whether the incidents reported are due to the impacts of mine subsidence, and what action will be taken in response.

In the event that a significant risk is identified for a particular surface feature, any party may call an emergency Plan Review Meeting, with one day's notice, to discuss proposed actions and to keep other parties informed of developments in the monitoring of the surface feature.

5.0 AUDIT AND REVIEW

This Management Plan has been agreed between parties. The Management Plan will be reviewed following extraction of each longwall.

Should an audit of the Management Plan be required during that period, an auditor shall be appointed by Tahmoor Colliery to review the operation of the Management Plan and report at the next scheduled Plan Review Meeting.

Other factors that may require a review of the Management Plan are:-

- Observation of greater impacts on surface features due to mine subsidence than was previously expected.
- Observation of fewer impacts or no impacts on surface features due to mine subsidence than was previously expected.
- Observation of significant variation between observed and predicted subsidence.

6.0 RECORD KEEPING

Tahmoor Colliery will keep and distribute minutes of any Management Plan Review Meeting.

7.0 CONTACT LIST

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Xstrata Coal Tahmoor Colliery – Community Coordinator	Belinda Clayton	(02) 4640 0133 0428 260 899	bclayton@xstratacoal.com.au	(02) 4640 0140
Endeavour Energy	Emergency Contact	131 003		
Endeavour Energy	David Olley (Project Officer – Central Region)	131 081 or (02) 4869 6276	david.olley@endeavourenergy.com.au	(02) 4869-6235

APPENDIX A.

Please find enclosed the following documents:

- Drawings
- Power Line Design (2006). *Report on the Status of Integral Energy's Assets in the areas of Longwalls 24, 25 and 26 for Centennial Tahmoor Coal,* Power Line Design, March 2006.
- Integral (2006). *Result of On Site Audit – Integral Energy Assets for Centennial Coal Tahmoor Longwalls 24 -26*
- Integral (2009). *Result of On Site Audit – Integral Energy Assets for Xstrata Coal – Tahmoor Colliery Longwalls 27 to 30,* Integral Energy Network Asset Operations, May 2009.

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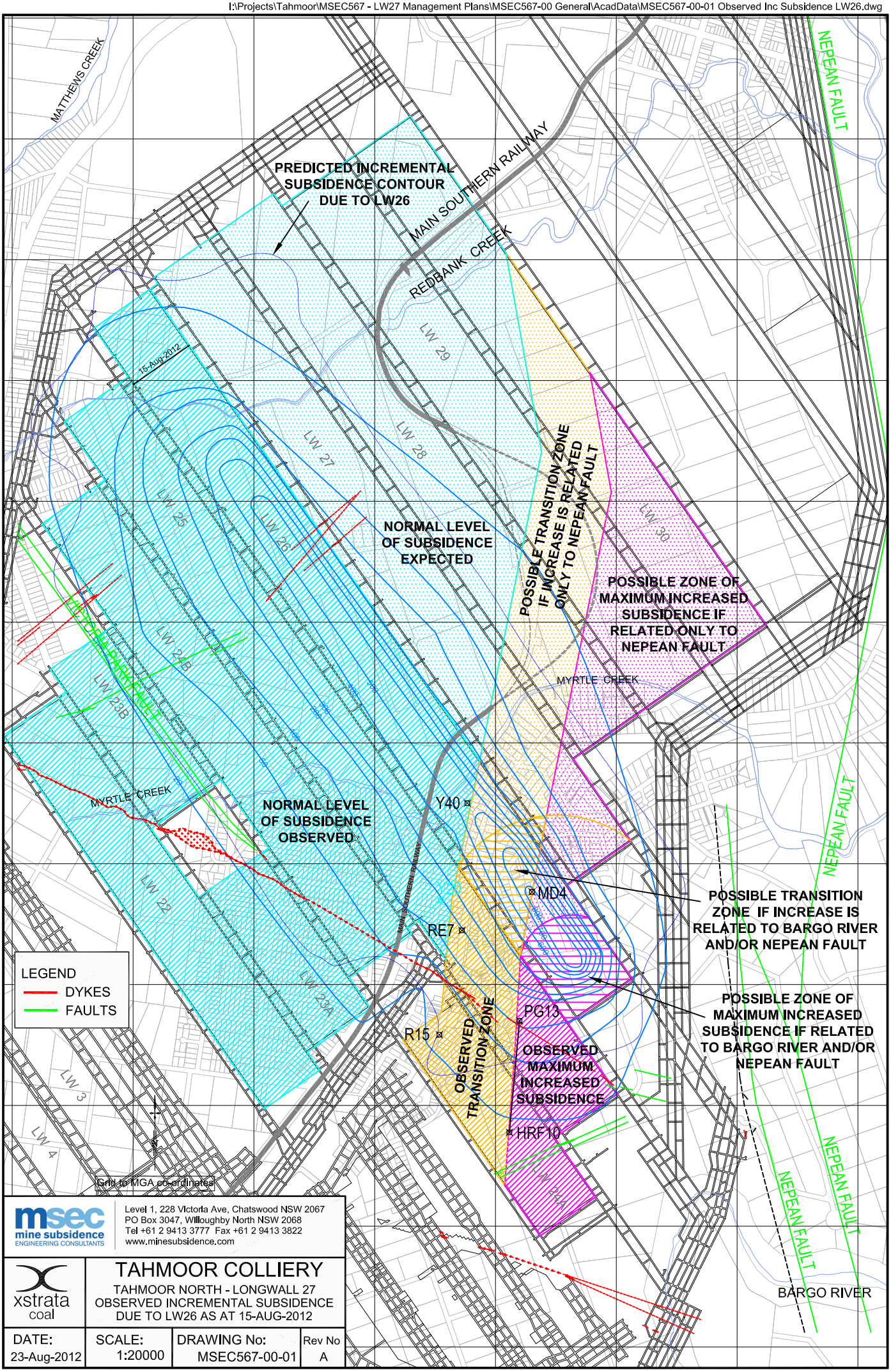

msec mine subsidence ENGINEERING CONSULTANTS
Level 1, 228 Victoria Ave, Chatswood NSW 2067
PO Box 3047, Willoughby North NSW 2068
Tel +61 2 9413 3777 Fax +61 2 9413 3822
www.minesubsidence.com

xstrata coal

TAHMOOR COLLIERY

TAHMOOR NORTH - LONGWALL 27
OBSERVED INCREMENTAL SUBSIDENCE
DUE TO LW26 AS AT 15-AUG-2012

DATE:	SCALE:	DRAWING No:	Rev No
23-Aug-2012	1:20000	MSEC567-00-01	A

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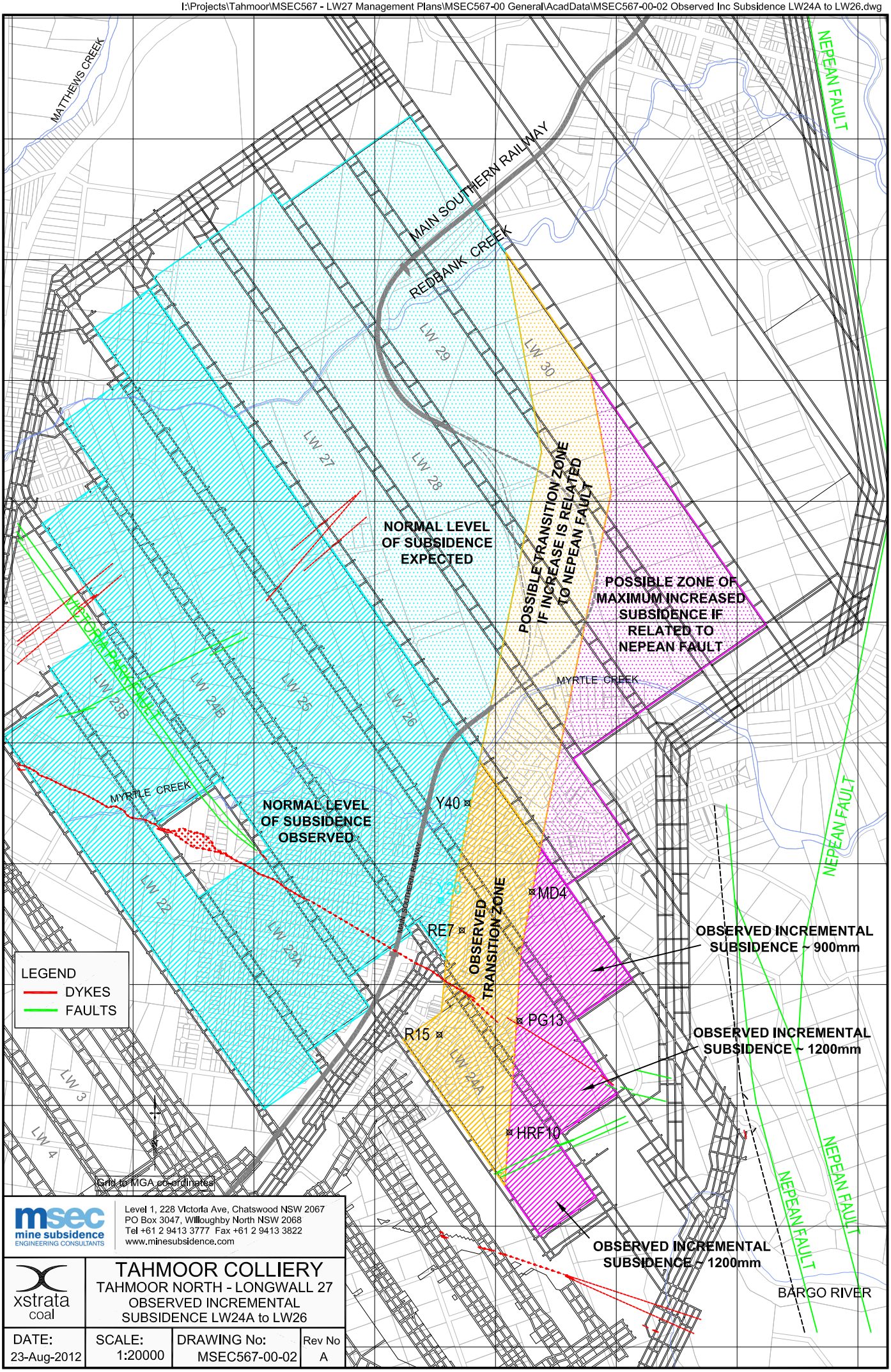

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TAHMOOR COLLIERY

TAHMOOR NORTH - LONGWALL 27
OBSERVED INCREMENTAL SUBSIDENCE LW24A to LW26

DATE:	SCALE:	DRAWING No:	Rev No
23-Aug-2012	1:20000	MSEC567-00-02	A

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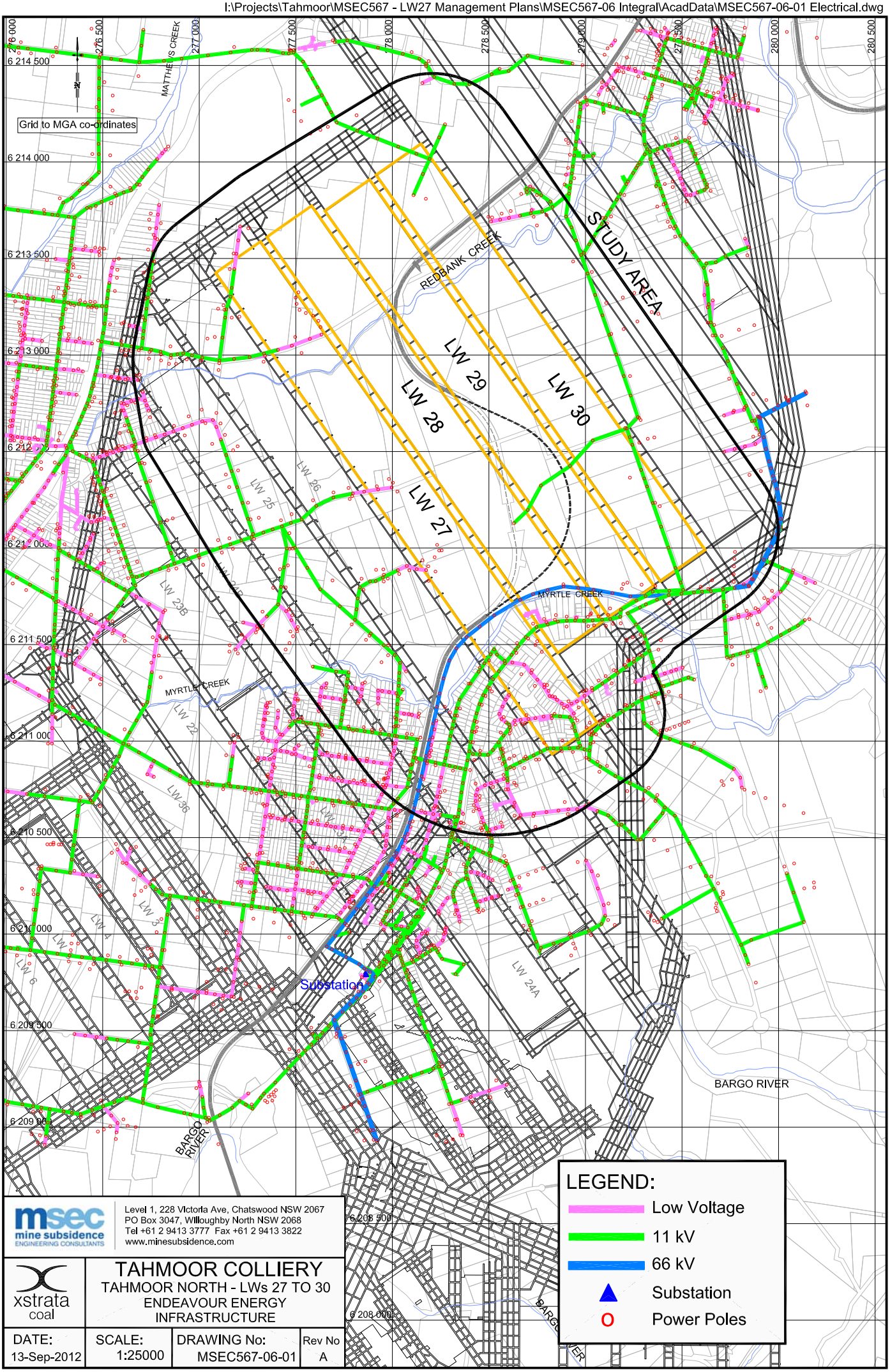

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TAHMOOR COLLIERY

TAHMOOR NORTH - LWs 27 TO 30
ENDEAVOUR ENERGY
INFRASTRUCTURE

DATE:	SCALE:	DRAWING No:	Rev No
13-Sep-2012	1:25000	MSEC567-06-01	A

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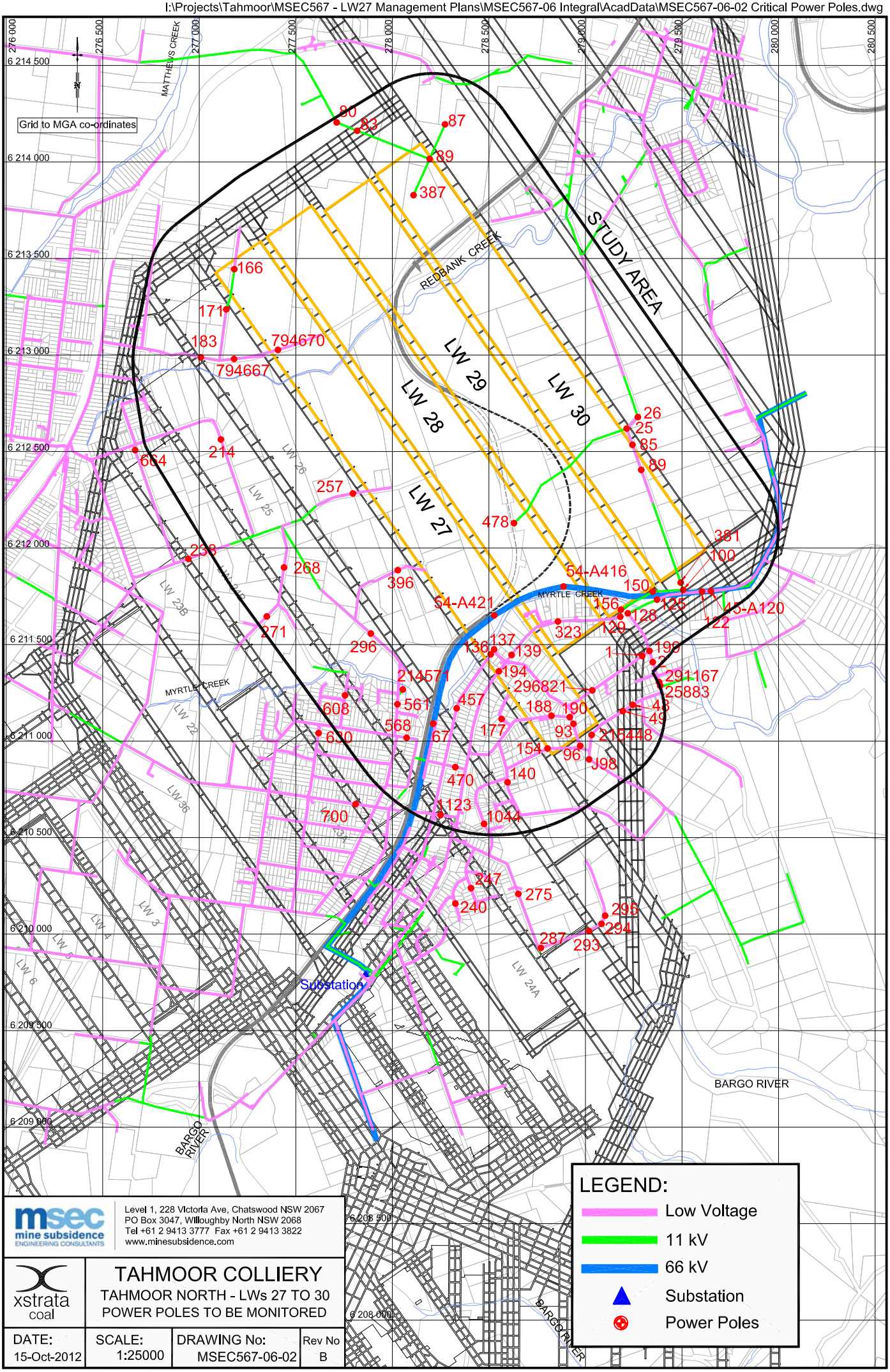

msec mine subsidence ENGINEERING CONSULTANTS
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xstrata coal

TAHMOOR COLLIERY

TAHMOOR NORTH - LWs 27 TO 30
POWER POLES TO BE MONITORED

DATE:	SCALE:	DRAWING No:	Rev No
15-Oct-2012	1:25000	MSEC567-06-02	B

Power Line Design Pty Ltd

ABN: 33 107 591 846

Report on the Status of Integral Energy's Assets in the areas of Longwalls 24, 25 & 26

for

Centennial Tahmoor Coal

Remembrance Drive, Tahmoor NSW 2573

Prepared by

Laurence McKinnon
Power Line Design Pty Ltd
Level 3 Accredited Service Provider
Accreditation No: 2486

1 March 2006

P.O. Box 338, Mittagong, NSW, 2575 *ph: 02 4872 1920*
Email: powerld@bigpond.net.au *fax: 02 4872 1240*

Power Line Design has conducted an on-site audit of Integral Energy's Assets within the areas of Longwalls 24, 25 & 26 at Tahmoor as recommended by Mine Subsidence Engineering Consultants Report No. MSEC157 para 3.12.10.

Each pole and pole substation within the defined area as has been identified and inspected visually to determine its state of repair. As recommended in the above-mentioned report MSEC157, it is important that measures should be put in place to monitor the movements and maintain the power lines and the power poles in a safe and serviceable condition.

Our on-site inspection shows that the electricity infrastructure within the defined area is generally in a good state of repair. The power lines and power poles appear to be in a safe and serviceable condition. This could change with movement caused by subsidence.

As a result we have identified 28 critical poles within the defined Longwall mining area including 26 substation poles, 1 Air Break Switch Pole and 1 transmission line pole. Attachment A. is a list of these critical poles with photographs and comments.

In addition to the critical poles identified in "Attachment A", there are 3 existing poles showing signs of movement in Greenacre Drive (not photographed) in the area of Longwall 25.
These poles have moved up to 2 poles in the head and although they are not in the same critical category as the substation poles should be monitored. The pole numbers are;

- 287
- 293
- 294

Recommendations
Due to the likelihood of pole movement due to subsidence it is recommend that for the duration of the mining period and for a suitable period after mining has concluded that the 28 poles identified on attachment A and the 3 poles in Greenacre Drive be monitored by periodically measuring the top and base co-ordinates of each pole.
Should significant movement of the poles be detected Integral Energy should be contacted so that mitigating measures can be implemented.

INTEGRAL energy

The power is in your hands

4th May, 2006

Centennial Coal Tahmoor
PO Box 100
TAHMOOR NSW 2573

Attention: Mr David Clarkson

Integral Energy
Asset Management

Result of On Site Audit
Integral Energy Assets

For

Centennial Coal Tahmoor

At Tahmoor
Longwalls 24 - 26

(On Site Audit conducted on Tuesday 4th April, 2006)

INTEGRAL energy

The power is in your hands

4th May, 2006

Centennial Coal Tahmoor
PO Box 100
TAHMOOR NSW 2573

Attention: Mr David Clarkson

Dear Sir,

PROPOSED LONGWALLS 24 – 26, Centennial Coal - Tahmoor

In order to assist Centennial Coal Tahmoor in their application to the Department of Mineral Resources, for approval to mine Longwalls 24 – 26 at Tahmoor, Integral Energy has conducted a risk assessment based on the on-site audit, performed by Power Line Design Pty Ltd, with the following results.

The on-site audit indicates Integral Energy's existing assets to be in a good state of repair and in serviceable order. History has also shown that similar projects in other locations have resulted in little or no unduly influence on Integral's assets due to subsidence.

Given the above, and the "prediction of subsidence parameters" from Mine Subsidence Engineering Consultants Pty Ltd (Report No. MSEC286 Revision A), it is considered unlikely that Centennial Coal's proposal will result in any adverse effect on Integral Energy's assets in the Tahmoor Longwalls 24 - 26 area.

However, as a means of assisting with Integral Energy's ongoing risk management, it is important that should subsidence impact our assets we have some quantitative information to assist with our evaluations. We believe that it is appropriate that a number of our assets, which have been identified as "critical poles", should be monitored to assess any impact of the proposed mining.

It is requested, at a minimum, that Centennial Coal Tahmoor arrange for the following:

- Monitoring of subsidence at the base of the identified Integral Energy "critical poles"
- Monitoring of the coordinates at the base and top of each of the identified Integral Energy "critical poles" to detect any movement.

Integral Energy would require the monitoring identified above to be undertaken on the "critical poles" as listed in Table 3.1, Report No. MSEC286 Revision A and the On Site Audit conducted by Power Line Design Pty Ltd.

Please send the results of these observations in report format to:

Mr David Olley
Integral Energy Asset Management
Central Region
PO Box 6366
Blacktown NSW 2148

Alternatively, email to:

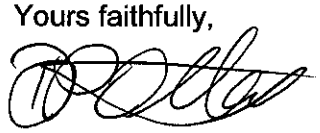
david.olley@integral.com.au

The initial report should be sent prior to commencement of works and updated reports submitted on a monthly basis over a period up to 3 months after extraction has been completed.

Subject to your agreement with the requested monitoring, reporting regime and the responsibility for any proven damage to Integral Energy assets in the forecast subsidence period, we endorse your application to proceed as planned.

If you have any queries or wish to further discuss this matter further, please contact David Olley, Project Officer Asset Management at Bowral, on phone (02) 4861 0476.

Yours faithfully,



David Olley
Project Officer
Asset Management
Integral Energy Australia

Asset Status / Condition Audit For Centennial Coal - Tahmoor

(On Site Audit performed by Power Line Design Pty Ltd on 1-3-2006)

Site: **Tahmoor Colliery**
Longwalls 24, 25 and 26

Refer to Pictures in On Site Audit performed by Power Line Design Pty Ltd on 1-3-2006.

Scope:

The inspection was carried out to determine the condition of existing Integral Energy Assets which may potentially be adversely impacted by works carried out at the above mentioned sites, prior to commencement of those works.

Areas considered during the inspection process included:-

- Stability of pole foundations
- Ground clearance
- Alignment of poles
- Electrical clearances to structures
- Identification of "critical poles" for the purpose of regular monitoring.

Observations:

Integral Energy's assets constructed over the above sites were visually inspected. The On Site Audit including photographs show that the poles are generally in good order above ground and that they are vertical in both the traverse and longitudinal directions to the lines.

From the on site audit 10 poles were noted as leaning slightly and pictured in the audit and an additional 3 poles (Nos. 287, 293 & 294) also noted as slightly leaning. Movement of these poles is consistent with the settling of the pole foundation and the effects of wind loading on the poles and conductors over an extended period of time.

There is no compromising of clearances to ground or structures evident and insulator swing angles were also minimal, indicating very little, if any, relative movement of structures since installation.

The On Site Audit performed by Power Line Design Pty Ltd confirms the observations made above.

Conclusion:

There was no evidence found to suggest any compromise of the integrity of the inspected distribution lines in the effected mining zone. The lines were found to be in a good state of repair and in serviceable order.

We note that our site audit, whilst extensive, was not exhaustive and therefore we reserve the right to identify other critical structures or issues in the future.

INTEGRAL energy

The power is in your hands

25 May, 2009

Xstrata Coal – Tahmoor Colliery
PO Box 100
Tahmoor, NSW 2573

Attention: Mr David Clarkson

Dear Sir,

XSTRATA COAL, PROPOSED LONGWALLS 27 – 30, TAHMOOR COLLIERY.

In order to assist Xstrata Coal in their application to the Department of Mineral Resources, for approval to mine Longwalls 27-30 Tahmoor Colliery, Integral Energy (with the help of Laurence McKinnon "Powerline Design Pyt Ltd") has conducted an on-site audit in this location with the following results.

Our on-site audit indicates Integral Energy's existing assets to be in a good state of repair and in serviceable order. History has also shown that similar projects in other locations have resulted in no significant unduly influence on Integral's assets due to subsidence.
Given the above, and the "prediction of subsidence parameters" from Xstrata Coal – Tahmoor Colliery (by Mine Subsidence Engineering Consultants Pty Ltd), it is considered unlikely that Xstrata Coal's proposal will result in any significant or unmanageable adverse effect on Integral Energy's assets in the Tahmoor / Thirlmere (Longwalls 27-30) area.

However, as a means of assisting with Integral Energy's ongoing risk management, it is important that should subsidence impact our assets we have some quantitative information to assist with our evaluations. We believe that it is appropriate that a number of our assets, which have been identified as "critical poles", should be monitored to assess any impact of the proposed mining.

It is requested, at a minimum, that Xstrata Coal – Tahmoor Colliery arrange for the following:

- Monitoring of subsidence at the base of the identified Integral Energy "critical poles"
- Monitoring of the coordinates at the base and top of each of the identified Integral Energy "critical poles" to detect any movement.
- Report of any visual change in the tension or sag of the power lines within the subsidence region.

Integral Energy would require the monitoring identified above to be undertaken on the following "critical poles" listed over page.

Contact name: David Olley - Direct phone: 4869 6276 - Fax: 4869 6235 - Email: david.olley@integral.com.au
51 Huntingwood Drive Huntingwood NSW 2148. PO Box 6366 Blacktown NSW 2148. DX 8148 Blacktown
Integral Energy Australia ABN 59 253 130 878 www.integral.com.au

Integral Energy Identified Critical Poles				
	Pole No	**Asset**	**Location**	**Photo Number**
1	166	Pole Sub 12192	Innes Street (Map D1)	2
2	171	HV Pole	Innes Street (Map D1)	4
3	794667	ABS 69438	Bridge Street east of Innes Street (Map D1)	5
4	794670	Pole Sub 27175	Bridge Street east of Innes Street (Map D1)	8
5	80	Pole Sub 10210	Off Thirlmere Way (Map D2)	9
6	83	Fuses J328	Off Thirlmere Way (Map D2)	11
7	87	Pole Sub 10902	Off Thirlmere Way (Map D2)	13
8	89	HV Pole	Off Bridge Street (Map D2)	24
9	387	Pole Sub 11601	Off Bridge Street (Map D2)	33
10	478	Pole Sub 16483	Off Stilton Lane (Map D3)	35
11	26	HV Pole	Stilton Lane (Map D3)	42
12	25	HV Pole	Stilton Lane (Map D3)	44
13	85	Links K701	Stilton Lane (Map D3)	50
14	89	Pole Sub 12016	Stilton Lane (Map D3)	51
15	381	ABS J346	Stilton Lane North of Remembrance Drive (Map D3)	58
16	137	HV Pole	York Street	61
17	194	Pole Sub 12060	Remembrance Drive South of York Street (Map D4)	62
18	139	ABS P699	Remembrance Drive North of York Street (Map D4)	66
19	323	Sub Pole 12061	Remembrance Drive (Map D4)	68
20	129	HV Pole	Remembrance Drive West of River Road (Map D4)	71
21	156	Links 13773	Remembrance Drive opposite River Road (Map D4)	75
22	128	HV Pole	Remembrance Drive corner of River Road (Map D4)	78
23	150	HV Pole	Remembrance Drive West of Stilton Lane (Map D5)	82
24	125	ABS J356	Remembrance Drive West of Stilton Lane (Map D5)	84
25	*381*	*ABS J346*	*Stilton Lane North of Remembrance Drive (Map D5),(Repeated on Map D3)*	*58*
26	100	HV Pole	Remembrance Drive corner of Stilton Lane (Map D5)	89
27	122	Pole Sub 10218 (Transmission Pole)	Remembrance Drive East of Stilton Lane (Map D5)	88
28	45-A120	Links 13768 (Transmission Pole)	Remembrance Drive West of Koorana Road (Map D5)	87
29	296821	Pole Sub 23177	Park Avenue (Map D6)	105
30	188	Pole Sub 10352	Struan Street west of Myrtle Creek Avenue (Map D6)	108
31	190	HV Pole	Struan Street corner of Myrtle Creek Avenue (Map D6)	111
32	93	HV Pole	Myrtle Creek Ave	114
33	96	HV Pole	Myrtle Creek Avenue corner of Moorland Road (Map D6)	117
34	154	ABS J360	Moorland Road (Map D6)	126
35	J98	Fuses J361	Myrtle Creek Avenue South of Moorland Road (Map D6)	123
36	215448	HV Pole	Moorland Road east of Myrtle Creek Avenue (Map D6)	135
37	49	Pole Sub 10329	Moorland Road (Map D6)	143
38	48	Links J363	Moorland Road (Map D6)	141
39	1	Pole Sub 11455	Park Avenue West of River Road (Map D7)	92
40	199	HV Pole	River Road opposite Park Avenue (Map D7)	96
41	2	Links 38089	River Road South of Park Avenue (Map D7)	98
42	291167	Sub Pole 22656	River Road South of Suffolk Place (Map D7)	102
43	25883	HV Pole	River Road South of Suffolk Place (Map D7)	104
44	57-A419	Transmission Pole	Off Remembrance Drive (Map T1)	132
45	54-A416	Transmission Pole	Off Remembrance Drive (Map T1)	131

Please send the results of these observations in report format by email to:

Mr David Olley
Network Asset Operations
Integral Energy

Email address: david.olley@integral.com.au

The initial report should be sent prior to commencement of works and updated reports submitted on a monthly basis over a period up to 3 months after extraction has been completed.

Subject to your agreement with the requested monitoring, reporting regime and the responsibility for any proven damage to Integral Energy assets in the forecast subsidence period, we endorse your application to proceed as planned.

If you have any queries or wish to further discuss this matter further, please contact David Olley, Project Officer Network Asset Operations at Moss Vale, on phone (02) 4869 6276.

Yours faithfully,

David Olley
Project Officer
Network Asset Operations
Integral Energy Australia

Recommendation

To approve Integral Energy's attached Audit of Assets, Risk Assessment, and Conditions, to be incorporated into Xstrata Coal Tahmoor Colliery's Subsidence Management Plan for proposed Longwalls 27-30 at Tahmoor.

Submitted for Integral Energy approval.

Recommended

David Olley
Project Officer, Central Region
Network Asset Operations
Integral Energy

Endorsed

Darko Stevanovic 26/5/09
Regional Services Manager, Central Region
Network Asset Operations
Integral Energy

Approved

29.5.9

Peter Langdon
Manager, Central Region
Network Asset Operations
Integral Energy