Telstra Corporation Ltd
NDCG, Network Integrity Services.
N.S.W.

Centennial Coal Pty Ltd.
Tahmoor Colliery.

MANAGEMENT PLAN

LONGWALL MINING (LW 24 to LW25)
BENEATH TELSTRA PLANT
@ TAHMOOR & THIRLMERE N.S.W.

Authorised on behalf of
Telstra Corporation Ltd

…….

(Name:…….)
(Position:…….)
(Date: …….)

Authorised on behalf of
Centennial Coal Pty Ltd.

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(Name:……)
(Position…….)
(Date: …….)

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1.0) Summary

This Telstra management plan has been compiled from an audit of the Telstra network located within the 20mm subsidence contour for longwalls LW24 and LW25. The area of the audit required for longwalls LW24 to LW26 was too large to be able to complete prior to Tahmoor Colliery submitting the Subsidence Management Plan (SMP) for longwalls LW24 to LW26. This management plan will be updated to include longwall LW26 by June 2006.

The current Telstra management plan for LW22 & LW23 will continue in operation until a sufficient period of time after the completion of LW23 to allow for final subsidence impacts. This management plan will be reviewed at the end of LW23 to incorporate any new information on the performance of the Telstra network into this management plan for Longwalls LW24 and LW25. It is also intended to review this management plan following completion of each longwall.

The control procedures for monitoring of the Telstra network during mining of LW24 and 25 are set out in Table 3 on page 18. This table summarises the monitoring required and the resulting actions necessary should the Telstra network be considered at risk from mine subsidence impacts. It is intended to set up a *Plan Review Meeting* comprising of representatives from Tahmoor Colliery, Telstra and consultants as required, to review mine progress and report any detailed impacts on the Telstra network. The *Plan Review Meeting* was initiated for longwall LW22, via a teleconference facility, on a monthly basis and it is intended to continue this method of review for LW23 to LW25.

The existing Customer Access Network (CAN) optical fibre cable, F CBTN 1201, currently has only one operating line system on the cable. However as the Tahmoor / Bargo area develops, during the period of longwall mining, it is likely this cable will be more fully utilised. Dependant on the type and capacity of new line systems placed on the optical fibre cable it will be necessary to review the risk factor with time. Additionally a review of the aerial distribution cable network will be necessary, when the tilt and strain details are available from Mine Subsidence Engineering Consultants, for the prediction lines, principally on the eastern side of the railway, where the majority of aerial cable is installed.

2.0 Introduction

Centennial Coal Limited, Tahmoor Colliery propose to extend longwall mining activities under the Tahmoor and the eastern side of Thirlmere townships in NSW. Tahmoor Colliery has previously mined Longwall 22 and has commenced mining Longwall 23 in the new series of Longwalls 22 to 26. The Subsidence Management Plan (SMP) is currently being prepared for the new Longwalls in this series Longwalls 24 to 26.

As part of the planning for longwall mining, Tahmoor Colliery has identified surface assets which may be affected by the mining operation at Thirlmere / Tahmoor. Some of these assets belong to Telstra and are part of Telstra's infrastructure in the area. This management plan will consider the impact of the ground surface movements contributed by the longwalls LW24 and LW25 on Telstra's assets at Thirlmere / Tahmoor. The impacts from Longwalls 24 to 25 have only been considered at this stage due to the extensive task of auditing Telstra's entire network over the Longwall 24 to 26 area in this largely urban area. The potential impacts on the Telstra network from Longwall 26 will be considered separately at a later date, due to time constraints to complete this audit and review process for Longwalls 24 & 25.

The two new longwalls LW24 & LW25 are planned, LW24 will commence mining in late 2006 followed by LW25, both new longwalls are approximately 4000 metres in length, located between Thirlmere Way at Thirlmere on the north western end of the longwalls and the Bargo River at Tahmoor, at the south eastern end. Longwall LW23A is now complete and mining is about to commence in April 2006 on LW23B.

Centennial Coal Limited commissioned a report by Mine Subsidence Engineering Consultants Pty Ltd, with a Draft issued in August 2005 titled *"Tahmoor Colliery Longwalls 24 & 28 Report on The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Surface and Sub-Surface Features Due to Mining Longwalls 24 to 28@ Tahmoor Colliery (In Support of an SMP Application)"- Reference 1.* This report identifies an area to be considered for mine subsidence impacts, bounded by the 20mm subsidence contour line for LW 24 to 28. The drawings MSEC157-25 & 26 (Reference 1) are attached as Appendix A Sheets 4 & 5 showing both the 20mm subsidence contour lines and the layout of the Telstra copper and optical fibre cable networks in the area. Since preparation of the original report, Reference 1, the Application Area has been amended to cover Longwalls 24 to 26 and the drawings attached as Appendix A Sheets 4 & 5 have been amended to reflect this change in area under consideration. There have also been slight changes in the chain pillar geometry but not sufficient to significantly change the subsidence parameters.

Telstra's Tahmoor telephone exchange is located on the north-east corner of Thirlmere Way and Denmead Streets. All of Telstra's main cable network into and out of Tahmoor exchange feeds along Thirlmere Way, north-east and south-west and to the south along Denmead Street. Since longwalls LW24 & LW25 are centred on a north-west south-east axis crossing the eastern end of Thirlmere Way, the greatest potential impact on Telstra's main cable network, including optical fibre, copper main and junction cables, is along Thirlmere Way to the east of the exchange. There are also major impacts on the copper main and junction cables located along the western side of Remembrance Drive north towards Picton crossing LW25. For the remainder of the Telstra network there are also impacts in the following areas :-

a) Optical fibre, junction and main copper cable south from Thirlmere Way into York Street on the eastern side of the railway. These cables feed the main businesses district in Tahmoor and provide major transmission links into Bargo crossing LW24B in Thirlmere Way & LW24A at York Street.
b) Copper junction and main cable along Thirlmere Way and south along York Street. These cables feed to Tahmoor and south to Bargo crossing LW24A & 24B.
c) The distribution cable network to individual customers within the 20mm subsidence zone. This network is distributed across the entire 20mm subsidence zone area. However, in general, the cables are less than 100 pairs and are non pressurised polyethylene insulated copper cables. Note however, there are some sections of paper insulated lead cables present in this network. This network crosses LW24A & 24B & LW25.

The items of plant affected by ground surface movement therefore include inter-exchange network (IEN) and local customer access network (CAN) optical fibre cables, junction and main copper cables from the exchange and the associated subscriber cable distribution network in the Thirlmere / Tahmoor area as well as the manhole, pit and conduit network, that supports all of the above cable distribution network.

The Mine Subsidence Engineering Consultants Pty Ltd Report, Reference 1, Table 3.1), summarises the Maximum Predicted Incremental Subsidence Parameters and Table 3.2) summarises the Maximum Predicted Cumulative Subsidence Parameters for LW 22 to LW28. Refer to the following extract from Table 3.1 & 3.2 for LW24 & LW25 from the report, Reference 1:-

Extract From Tables 3.1) & 3.2) Maximum Predicted Incremental & Cumulative Subsidence Values

Subsidence Parameter	***Extract Table 3.1)***		***Extract Table 3.2)***	
	Incremental Subsidence LW24	***Incremental Subsidence LW25***	***Cumulative Subsidence LW's 24***	***Cumulative Subsidence LW's 25***
Vertical Subsidence (500)	*596*	*635*	*852*	*892*
Tilt (mm/m)	*4.7*	*5.2*	*4.8*	*5.2*
Longitudinal Tilt (mm/m)	*3.5*	*3.7*	*5.1*	*5.2*
Transverse Tensile Strain(mm/m)	*0.7*	*0.8*	*1.3*	*1.3*
Longitudinal Tensile Strain(mm/m)	*0.8*	*0.8*	*0.9*	*0.9*
Transverse Compressive Strain(mm/m)	*1.5*	*1.7*	*1.8*	*1.8*
Longitudinal Compressive Strain(mm/m)	*0.6*	*0.6*	*0.8*	*0.8*
Transverse Hogging Curvature (km^{-1})	*0.05*	*0.05*	*0.09*	*0.09*
Longitudinal Hogging Curvature(km^{-1})	*0.05*	*0.05*	*0.06*	*0.06*
Transverse Sagging Curvature (km^{-1})	*0.01*	*0.11*	*0.12*	*0.12*
Longitudinal Sagging Curvature (km^{-1})	*0.04*	*0.04*	*0.05*	*0.05*

The maximum predicted cumulative subsidence parameters, after the extraction of each longwall, is shown in the extract from Table 3.2)
The predicted maximum subsidence occurs near the centre of LW25 & 26

Given the width of the longwalls relative to the depth of cover, the maximum final longitudinal tilts and strains are similar in magnitude to the maximum transverse tilts and strains. The location of significant longitudinal tilts and strains are restricted to the ends of the longwall panels and at the coal barriers, and are not expected to coincide with significant tilts and strains in the transverse direction.

The maximum predicted travelling tilt and strain values, during the extraction of each longwall from LW22 to 28B are provided in Table 3.3)

Table 3.3) Maximum Predicted Travelling Tilt and Strain

Longwall Panel	*Maximum Predicted Travelling Tilt(mm/m)*	*Maximum Predicted Travelling Tensile Strain (mm/m)*	*Maximum Predicted Travelling Compressive Strain (mm/m)*
LW22	*2.1*	*0.4*	*0.4*
LW23	*2.7*	*0.5*	*0.6*
LW24	*2.5*	*0.6*	*0.4*
LW25	*2.6*	*0.6*	*0.4*
LW26	*2.6*	*0.6*	*0.6*
LW27	*2.3*	*0.6*	*0.4*
LW28	*2.5*	*0.6*	*0.4*

It should be noted (from Reference No 1) that the maximum subsidence is generated near the centre of LW25 and LW26 for the incremental subsidence (631 & 636mm) and the cumulative impacts of subsidence on LW24 & LW25 increase the maximum predicted subsidence for LW25 to 892mm. Hence, approximately 2/3rds of the total predicted subsidence will occur initially with extraction of LW25 and the full impact in this area will not occur until final extraction of LW28. The gathering of data during the subsidence impacts from LW22 & LW23 will be a valuable guide for finally assessing the cumulative impacts from LW 24 & 25.

For this reason it is vital to continue to monitor the performance of the Telstra network during the subsidence events from LW22 and LW23 and continue to review this management plan in the future to account for the past performance of the network. However for the purpose of this management plan, which will be in operation for the duration of mining for LW24 & 25, the cumulative figures and corresponding area of impact will be considered.

"Section 3.12.11) Telecommunication Services" Reference No 1 states *"Due to the sensitive nature and costs associated with damaged optical fibre or copper cables, it is recommended that subsidence be monitored along the cables during mining to provide early warning of any anomalous behaviour. It is recommended that the monitoring procedures contained in the existing management plan for Longwalls 22 & 23 be extended to include Longwalls 24 to 28."*

This management plan will address these monitoring issues related to the associated risk to the various elements of the Telstra network exposed to mine subsidence.

2.1) Limitations

The mechanism of mine subsidence and its impact on the Telstra network has only recently been considered in detail. Generally for optical fibre cables only tensile loading, as a result of mine subsidence, has been considered however there is now some concern as to the level of compressive strain which may be sustainable by these cables. There have been recent studies on Telstra plant in the Appin, Thirlmere and Broke, which to date, have shown some impacts on the network, confirming significant movement of cables does occur and the degree of freedom for cables to move is a critical characteristic in their performance. Considering optical fibre cables, there is also the potential for these cables to continue to operate with higher attenuation after a subsidence event (dependant on system capacity and power budgets) up to the point where the cable can no longer adequately transmit signal. This produces a gradual time dependant failure rather than a catastrophic failure, resulting after one or a number of subsidence events.

Once the mine subsidence is initiated there is no method of halting the subsidence event and hence if the degree of ground movement begins to damage Telstra plant, then it is irreversible. All that can be done is to attempt to manage the extent of the damage that may occur. A management plan for Telstra's assets will not necessarily prevent damage but will limit its impact and put in place actions to be taken should evidence of significant ground movement indicate the potential for damage to occur.

2.2) Objectives

The objectives of this management plan in relation to Telstra's plant are to put in place procedures to be followed :-

a) To audit and assess the relative risk for each section of the Telstra network exposed to mine subsidence.
b) To monitor the impact of mine subsidence and initiate action to mitigate potential damage to the Telstra infrastructure by recording visible changes or changes in transmission characteristics which may occur to plant.
c) To provide a plan of action should the subsidence effects impact on the serviceability or performance of plant.
d) Provide a forum, *Plan Review Meeting*, to report, discuss and record impacts on Telstra plant and transmission performance. The *Plan Review Meeting* will involve representatives from Tahmoor Colliery, Telstra Planners & Network Design & Construction Group (NDCG), The Mine Subsidence Board, Mine Subsidence Engineering Consultants Pty Ltd, and other consultants as required.

2.3) Scope

This plan is to be used to protect and assess the performance of the items of Telstra's network identified to be most at risk due to mine subsidence. The major items of plant are considered according to their location and relative to subsidence impacts from LW24 & LW25. The items are listed below as items a) to f) and are referred to in this management plan by these reference numbers, ie a) to f).

South East along Thirlmere Way along York Street and Remembrance Drive.

a) Inter Exchange Network (IEN) optical fibre cable designated F CBTN 1201, 12 fibre cable, installed from the exchange along Thirlmere Way to York Street and then south in York and Emmett Streets to Remembrance Drive and through to Bargo.
b) Customer Access Network (CAN) optical fibre cable designated F CBTN 1201 RGB-AS, AS-AQ, 12 fibre, installed along Thirlmere Way from Pitt Street to York Street, Emmett Street to Bronzwing Street predominantly on the eastern side of the railway.

c) Lead Junction cables C PICT 444 A01 J1-100 and Cable 101 Z01 J1-50 (Both designated T444, 1-100 & 1-50). Installed east along Thirlmere Way from the Exchange to York Street. The major cable of the two the 100 pair junction cable is jointed at York Street and Thirlmere Way changing configuration into :-
   i) C PICT T444 Z01, J1-150/0.90 along Thirlmere Way and then north along Remembrance Drive to Picton
   ii) C PICT T444 A03, J1-74 / 0.90 along York Street, Emmett Street into Remembrance Drive and then south to Bargo.

d) Copper Main cables east along Thirlmere Way Cables C1, C4 & C7 feeding to Remembrance Drive, Progress & Straun Streets and also south into York Street.

Distribution Cable and Pit, Manhole & Pipe Network Supporting all Cables

e) Copper customer distribution cable on the customer side of the pillar providing connection to each customer's premises. This network covers the entire area of the 20mm subsidence zone. The network consists of cable directly buried, in conduit and aerial distribution cable. This network is the most extensive throughout the zone yet potentially mining should have the lowest impact on this network in terms of number of services potentially affected.

f) Conduit, manhole and pit network across the entire area of the 20mm subsidence zone, impacts are possible in the areas where maximum ground movement is predicted due to the age and brittle nature of some components of this network.

2.4) Timing

It is planned that LW23A & 23B will take approximately nine to twelve months to mine, working north-west from the south-eastern end of LW23. Mining will then continue with LW24 & LW25 which will take approximately 12 months each and both will be mined in the north-west direction commencing from the south-eastern end. This management plan, covering the longwall mining under Telstra plant at Thirlmere / Tahmoor, will continue in operation until completion of mining of longwall LW25 and for sufficient period of time thereafter to allow for completion of subsidence effects. Hence it is proposed that the management plan will be in operation until mid 2008.

Table 1 Mining Schedule (March 06 Forecast)

Longwall	Start Date	Finish Date
LW23A & 23B	September 05	October 06
LW24	November 06	September 07
LW25	October 07	September 08

2.5) Definitions

B-OTDR - Brillouin OTDR test equipment used to measure strain characteristics in the individual optical fibres and then compare changes in strain over time. **Currently this unit owned by Telstra requires repair and is unavailable for test use in the immediate future.**
CAN - Customer Access Network, the cable distribution network which provides communications services direct to subscribers premises.
Global Operations Centre:- The group located in Melbourne responsible for continuously monitoring the performance of Telstra's network. This group would contact NDCG to carry out emergency repair work through Regional Services Manager Operations & Maintenance.
IEN – Inter Exchange Network, the cable network which provided direct connection between telephone exchanges in the Telstra network.
Main Cable – Subscriber main pairs between the exchange and the distribution point or cross connect point generally a pillar
NDCG:- Network Design & Construction Group, Telstra's external plant construction team.
NDCG Network Services, Service Delivery Manager, NSW :- The Service Delivery Manager is responsible for initiating restoration of telecommunications services where services are damaged, or potential damage is imminent. Currently this position is occupied by Mr John Rorison.

OTDR :- Optical Time Domain Reflectometer, used to determine loss characteristics for transmission systems on optical fibre cables.

Pillar – Is the interconnection point between the distribution cable leading to the customer and the main cable from the exchange. It provides flexibility to the Customer Access Network. The exchange area is broken up into distribution areas supported by pillars ie Pillars 1 to 10, P1 to P10.
Plan Review Meeting: Regularly convened forum to be meet (teleconference) to implement this management plan. Participants from Tahmoor Colliery, Telstra, NDCG, Mine Subsidence Engineering Consultants Pty Ltd, Mine Subsidence Board and consultants as required.
Pulse Code Modulation Systems (PCM) :- Is a modulation method used to convert analogue signals to digital transmission signals. Currently PCM systems are used to provide 2MBit links for customer services. When used on junction cables the PCM systems allows multiplexing of circuits of up to 30 channels on one cable pair.
Standard Optical Fibre Cable (Std) - used for duct installation and direct burial applications
Sub-Duct - 32mm dia polyethylene pipe, hauled into the conduit network for the installation of major trunk optical fibre cables.

3.0) Principal Risks Identified

In relation to the assets identified in 1.3) item a) to f) above, the following are the assessed relative risks associated with existing Telstra plant within the 20mm mine subsidence contour area. The items of plant have been assessed according to the probability of damage and the consequences resulting from that damage, associated with the general category of plant. The Risk Factors Low to High are shown in the attached Table 2.

Table 2

Relative Risk Factor for Telstra Plant

Risk Assessment Matrix		**Consequence**				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost Certain	Significant	Significant	High	High	High
	Likely	Moderate	Significant	Significant	High	High
	Moderate	Low	Moderate	Significant	High	High
	Unlikely	Low	Low	Moderate	Significant	High
	Rare	Low	Low	Moderate	Significant	Significant

a) IEN optical fibre cable designated F CBTN 1201, 12 fibre cable, east along Thirlmere Way to York, Emmett Streets and south into Remembrance Drive. (Refer to Appendix A)

This cable is a standard construction optical fibre cable from the exchange east along Thirlmere Way to York Street then to Emmett Street and south into Remembrance Drive at Tahmoor where it then continues south to the Bargo exchange. Over the area of influence of the mine subsidence due to LW24 & LW25 east from the exchange there will be minimum impact on this cable due to the presence of the coal pillar remaining in LW24 between LW24A &24B. (Appendix A Sheet 3).

This cable would be approximately 10-15 years old and the main concern is that this is the primary network feed out of Tahmoor exchange south to Bargo. Without this cable Bargo exchange has limited diversity and would be isolated. There is also a minor risk of differential settlement between the relatively light asbestos cement conduits (A100) carrying the cable and the heavier manholes through which the cable passes to the east along Thirlmere Way. This is due to the differing construction using reinforced concrete for the manholes and lightweight asbestos cement for conduits. Also differing foundation materials for manholes and conduits contributes to the non-homogeneous nature of the system. Should these factors lead to differential settlement occurring, then three major possibilities arise:-

i) The cable and conduit may be subject to pressure at the duct face in the manhole.
ii) The conduit may fail in the area adjacent to the manhole or pit.
iii) The conduits may fracture in length and then place pressure on the cable

Since this cable is exposed to the minimum subsidence impacts from LW24A & LW24B in the area of Castlereagh Street and Thirlmere Way and since the potential outcome of damage is Catastrophic for the network, that is, isolation of Bargo exchange, the likelihood is assessed as Unlikely, the risk factor is **HIGH.**

b) Customer Access Network (CAN) optical fibre cable designated F CBTN 1201 RGB-AS, AS-AQ, 12 fibre, installed along Thirlmere Way from Pitt Street, York Street, Emmett Street to Bronzwing Street predominantly on the eastern side of the railway.

This cable is a standard optical fibre cable installed in 100mm conduit from joint 'RGB' in Thirlmere Way on the western side of the railway then crossing the railway to York Street to joint 'AS'. From joint 'AS' the cable follows Emmett Street and Remembrance Drive to Bronzewing Street and joint 'AQ'. The exposure to mine subsidence is similar to cable above in a) however this cable is a local cable providing connection to Tahmoor Public School. Because of the relatively short subsidence exposure distance, approximately 100 metres along Thirlmere Way near Castlereagh Street, and since the cable is subject to minimal predicted subsidence of 100mm, this, combined with the fact that this cable has limited number of local line systems, reduces the risk factor of this cable. The cable is designed for the CAN to the east of the exchange, hence the risk factor is assessed as Unlikely/Minor **LOW.** This assessment will change with time as more line systems are installed on the cable, hence the risk factor should be revised in the future as additional traffic is placed on the cable.

c) Lead Junction cables C PICT 444 A01 J1-100 and Cable 101 Z01 J1-50 (Both designated T444, 1-100 & 1-50) Installed east along Thirlmere Way from the Exchange to York Street.

This cable is jointed at York Street and Thirlmere Way changing configuration to :-

i) C PICT T444 Z01, J1-150/0.90 along Thirlmere Way and then north along Remembrance Drive to Picton
ii) C PICT T444 Z02, J1-74 / 0.90 along York Street, Emmett Street into Remembrance Drive and then south to Bargo.

These two junction cables are very old lead sheathed paper insulated cables. They are jointed along Thirlmere Way east of the exchange through to York Street and then jointed into a Pillar (SAH2) at York Street. Additionally, at the York Street Pillar there is a PCM regenerator which appears to feed pairs in both the Picton and Bargo legs of these cables. The 150/0.90 cable to Picton from York Street is generally a direct buried single wire armoured lead cable north along Remembrance Drive. The 74/0.90 cable south along York and Emmett Streets and Remembrance Drive to Bargo is also a lead paper insulated cable.

The degree of exposure of each cable is different since at the corner of York Street and Thirlmere Way the cables split into north and south directions.

i) C PICT T444 Z01, J1-150/0.90 to Picton along Thirlmere Way and Remembrance Drive is more vulnerable since it is directly buried and exposed to the full subsidence of around 850mm from LW25 along Remembrance Drive (Appendix A Sheet 2). There is also some impact along Thirlmere Way near Castlereagh Street. Because of the age of this cable and vulnerability to movement at pit and manhole locations where the armouring is stripped away and the degree of movement it will experience across LW24 and more significantly across LW25, this cable is vulnerable. **This section of the Junction cable between Tahmoor and Picton is still carrying six special circuits that have not been transferred onto the optical fibre cable.** Since these circuits have no diversity and there will be impacts across longwall 25 it has been classified as Likely occurrence with Moderate impact, risk factor **SIGNIFICANT**

ii) C PICT T444 Z02, J1-74/0.90 to Bargo along York Street Emmett Street and Remembrance Drive is less vulnerable to impacts from mine subsidence since it has small exposure to LW24B at Castlereagh Street and east of this point it is protected by the coal pillar between LW24A & 24B. **During 2005 jointers were working on de-loading sections of this cable so that it could be used as a Main copper cable. Now this old Junction cable acts as a Main cable from Tahmoor exchange to the south towards Bargo. This cable now carries main pairs MP1-74 (30 working pairs) to P27 located south along Remembrance Drive.** One problem associated with both junction

cables is that they pass through manhole No 623 (See Plate 1 on following page) which is located on the southern side of Thirlmere Way on the eastern boundary of the railway in a very low and swampy area of land. During the two months of the field audit this manhole was constantly full of water. Any movement causing stress on the cable sheath at this location will potentially allow water into the cable leading to cable failure. For this reason, although the exposure for this cable is minimal at around 100 metres and it is carrying 30 working pair, the risk to the cable is high due to it's age and construction the risk factor is assessed as Moderate/ Moderate, **SIGNIFICANT.**

Plate 1:
View to west across railway to Bush Fire Services Building on the southern side of Thirlmere Way. Manhole No 623 is located in foreground at cable marker and water table in this area is at ground level. This presents a significant risk to the two lead junction cables T444 as well as the copper main cables feeding east across the railway.

d) Copper Main cables east along Thirlmere Way Cables C1,C4 & C7 east along Thirlmere Way feeding to Remembrance Drive, Progress & Straun Streets

These cables feed the pillars to the east of the exchange and provide the primary connection between the exchange and all subscriber services to the cross connection point at the pillar. There are three main cables feeding east from Tahmoor exchange identified as follows:-

i) Cable No 1 – C1 MP 1-600
ii) Cable No 4 – C4 MP 1-400
iii) Cable No 7 – C7 MP 1-1800

These three cables east along Thirlmere Way, feed main copper pairs to the pillars located to the east of the exchange within the subsidence zones as follows:-

i) Cable 7 – Main Pair M1201-1300 to Pillar 22 @ Macquarie Place, LW22.
ii) Cable 4 – Main Pair M1-300 to Pillar 15 @ Fraser Street, LW23A.
iii) Cable 4 – Main Pair M301-400 to Pillar 6 @ Fraser Street, LW22.
iv) Cable 7 – Main Pair M1301-1600 to Pillar 21 @ Castlereagh Street, LW24B
v) Cable 7 & 1 – Main Pair C7 M101-200 & M801-900 & C1 M1-300 to Pillar 7 @ York Street, LW24B
vi) Cable 7 – Main Pair M601-800 to Pillar 14 @ Progress Street, LW25
vii) Cable 7 – Main Pair M301-550 to Pillar 9 @ Remembrance Drive, LW25
viii) Cable 7 – Main Pair M1-300 & M551-600 to Pillar 8 @ Straun Street, LW26

The remainder of the copper pairs in Cable 1 (M301-600) pass through the subsidence zone of LW26 & 27 and feed to P20 located in The River Road east at the end of Park Road. Hence all the main pairs in these three cables are subject to subsidence impacts from longwalls LW24A & 24B & LW25 as they diagonally cross the longwalls east along Thirlmere Way and along Remembrance Drive, Progress Street and Straun Street. Two cables have polyethylene or cellular polyethylene insulated pairs and this would make them less vulnerable to movement than the paper insulated pairs. However Cable 1 is lead sheathed paper insulated cable similar in construction but larger in size than the

junction cables mentioned in c) above, which follow the same route. They all have air filled cores and pass through manholes full of water, hence it is vital to maintain the integrity of the air feed system to prevent ingress of water and resulting loss of service.
It is considered that because Cables 4 & 7 are more resilient than those in c) above (although they still have lead sleeve joints) and the degree of movement they will experience, particularly across LW25, will be the maximum developed for this longwall, the two cables have therefore been classified as Moderate likelihood with Moderate impact, risk factor **SIGNIFICANT. Any impact on these cables has the ability to impact services for around 2000 customers**

Cable 1 is a lead sheathed paper insulated cable and is more vulnerable to movement due to its age and the condition of the lead sheath. This cable is carrying telecommunications services for approximately 500 subscribers located near the Woolworths development site and on the north eastern side of Remembrance Drive in the area of Myrtle Creek Avenue, Moorland Road and River Road Area. This cable since it is vulnerable and carrying a significant number of local services has been classified as a Likely event with Moderate to Moderate impact, risk factor **SIGNIFICANT.**

Distribution Cable and Pit, Manhole & Pipe Network Supporting all Cables

e) Copper customer distribution cable on the customer side of the Pillar, providing connection to each customer's premises, covering the entire subsidence zone

The distribution of services from the pillars are by different methods. Generally these cables are installed in conduit however they can also be directly buried or use aerial distribution networks. The sections of distribution cable sustaining the highest predicted subsidence from LW24 & LW25 are in:-

- Rita, Marion and Audrey Streets
- Bridge Street
- Brundah Road and Tickle Drive and Glenanne Place
- Hilton Park Road
- Winparra Close, Pimelia Street, Monica Close and Lehia Place
- Elphin Street, Park Street and Huen Place
- Frazer, Patterson and Chapman Streets
- Castlereagh and Mahonga Streets
- Thirlmere Way and Pitt Street

On the Eastern Side of the Main Southern Railway

- Ralfe Street, Harper Close, Mitchell Close and Lintena Avenue
- Courtland Avenue, Tanya Place, and Pandora Place
- Progress Street and Greenacre Drive
- Abelia Street and Janice Drive
- Oxley, Grange and Straun Streets
- Remembrance Drive
- Larkin Street, Emmett Street, York Street (North & South) and George Street (North & South)
- Bronzewing Street and Bradbury Street

In past experience with subscriber distribution cable at Appin and Thirlmere there has been no damage reported or observed with the subscriber distribution network with the exception of an old lead junction cable used to feed the distribution network at Appin. The plastic distribution cables using either polyethylene or cellular polyethylene insulation on copper conductors are of much smaller size than main cables discussed above and are able to tolerate tighter bends due to their smaller size and more flexible nature than the main cable. Unlike the main cable they do not generally use rigid lead joints which can fracture when moved, but generally use openable joints or in-line joints. These joints are able to tolerate significant movement as they are lifted out of pits to be able to make and re-make connections within the joints. Hence the entire distribution network is much more able to tolerate movement than the heavier more rigid main copper cable network. However, within the distribution cable in this area there are some sections of old lead cable still remaining and these areas will require specific monitoring during subsidence in areas where these cables are vulnerable.

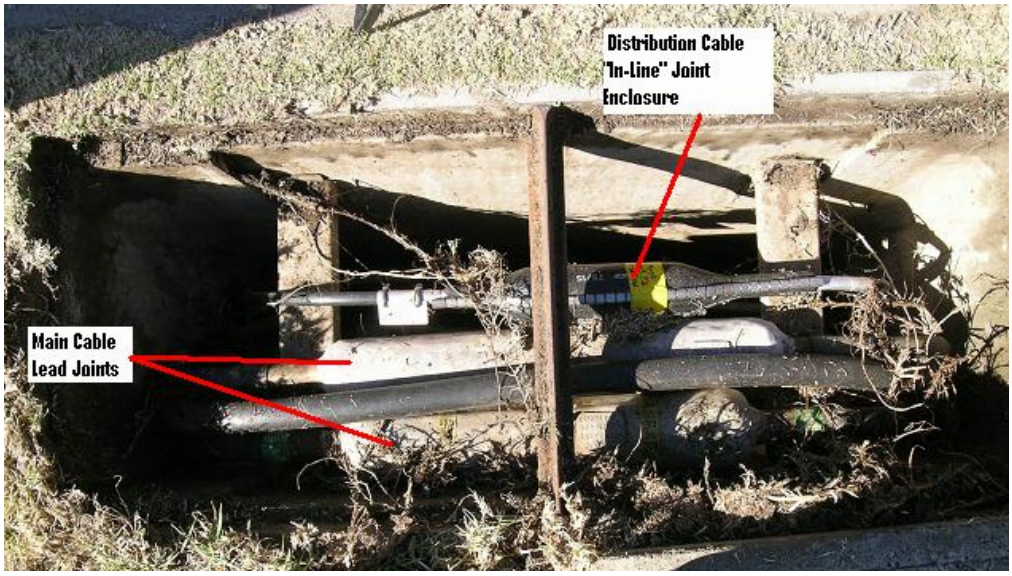

Plate 2:
View into No 8 Pit showing more rigid lead main cable joints and more flexible "lighter" distribution cable joint.

The distribution cable network is installed using different techniques to the approximately 800 properties within the subsidence zone as follows:-

i) Distribution cable in conduit
This distribution cable is located in various sized conduit, through pits of varying size and vulnerability, crossing the areas of maximum subsidence along the roads and streets as mentioned above. It is assessed that 90% of the network, supplying service to approximately 700 residences in the subsidence zone, are fed by distribution cable in conduit. This conduit network covers the entire subsidence zone extending from the 20mm contour through to areas that will experience up to 900 mm of subsidence. It is therefore assessed that in the higher order subsidence zones, say above 500mm, that there may be some degree of risk to these cables. Hence accepting that there is this mix of cable sizes, joints, pits and conduit types throughout this areas, the risk to these cables particularly in the subsidence area above 500mm, is assessed to be Unlikely / Moderate, **MODERATE. The consequence is assessed as moderate, as up to 100 subscribers could be impacted by one fault event on one of these cables, as a worst case.**

ii) Aerial Cable.
The aerial distribution network is reasonably extensive, covering the streets listed below. However, of the approximate total of 800 residences within the subsidence zone, aerial cable feeds to approximately 90 residences or roughly 10% of the customers. The predicted tilts in the areas of aerial cable have not been completed in the Draft Report, Reference No 1 and when this detail is available the locations where aerial cable is present, can be ranked according to the predicted levels of tilt and the relative cable sizes present at these locations. The roads listed below involving aerial cable distribution are on the eastern side of Remembrance Drive and located directly over LW24A & LW25. Until further information is available it is anticipated, considering both longitudinal and transverse tilts, that the possible range will be between 0.4 to 5 mm/m. (Refer to Tables 3.1 & 3.2 from Reference No 1 shown as an extract in Section 1.0 of this report.)

The streets identified below are the locations of the aerial distribution cable network within the subsidence zone, also indicating the aerial Integral Bearer Cable (IBC) size.

- Mitchell Close 10pr IB cable
- Lintena Avenue 50pr IB cable
- Courtland Avenue 70pr IB cable
- Pandora Place 20pr IB cable
- Tanya Place 20pr IB cable
- Abelia Street 100pr IB cable
- Janice Drive 20pr IB cable

As assumed above, the anticipated range of tilts experienced by poles in the aerial distribution network are between 0.4 and 4.8mm/metre. It is considered that even allowing for adjacent poles 8.0 metres in height to tilt in opposite directions there is generally sufficient depth of catenary in the cable to allow for pole top

movement of approximately 80-100mm at the height of the cable fixing to the pole. The risk associated with these aerial cables is considered as Unlikely/Moderate, **MODERATE**.

iii) Direct Buried Cable

There was no direct buried cable encountered in the field audit of the Telstra network in the street distribution. However there are a number of instances throughout the subsidence area where the cable lead-in is directly buried from the street pit to the residence. Generally these cables are small diameter plastic 2 or 6 pair cables and the risk associated with this type of cable, considering it is generally feeding one residence, is assessed as Unlikely/Minor, **LOW.**

f) Conduit, manhole and pit network.

The conduit, manhole and pit network is the critical factor in the performance of any of the cable network during mine subsidence. The possibility of differential movement between the components of this network as a result of mine subsidence is low due to the large extent of the network. However, due to its lack of homogeneity and its differing age, it is considered to be the critical factor in evaluating the performance of the cables it supports. In addition, because of the above factors, it is also the most difficult item of plant to assess for potential risk of damage. The main concern in this network is the performance of the old asbestos cement 100mm conduits (A100) and the larger sized asbestos cement pits, which typically perform poorly in areas where ground movement occurs, such as in expansive soils. The main problem identified in this area of the network is that all the main and optical fibre cables along Thirlmere Way, in the area of Castlereagh Street are installed in a 4 xA100 conduit route, probably installed in the 1970's. This also applies to main and optical fibre cables installed in 2 x A100 conduits along York Street, Emmett Street and Remembrance Drive to the south of Thirlmere Way and to the north along Remembrance Drive towards Picton. See also the discussion of conduit network in sections a) and e) above

The distribution network is generally installed in smaller asbestos and plastic pits using PVC small sized conduit (50-12mm dia conduit) and it is not considered to be at the same level of risk as the main cable conduit network, due to its different characteristics

The risk assessment for the distribution network is assessed as Unlikely/Minor **LOW**

The risk assessment for the main copper and optical fibre cable network is assessed as Moderate/Major **HIGH**.

4.0) Control Procedure

As discussed in Item 1.1) there is now some data recorded on the performance of Telstra plant due to ground subsidence caused by longwall mining operations. The current information available is from experience gained at Appin, Thirlmere and Broke in NSW. The current longwall mining at Thirlmere / Tahmoor provides a continuing opportunity to gather data on the performance of the network. This is needed to understand the interaction between ground movement and the Telstra plant, comprising both robust and very sensitive elements of the network.

4.1) Surface Subsidence Survey

The control procedure for the Telstra plant should be supplemented by ground surveys carried out by Tahmoor Colliery at agreed time intervals along agreed base lines indicating the :-

- **Initial RL of the surface prior to mining commencing**
- **Incremental subsidence over the agreed period**
- **Incremental ground strain over the agreed period**
- **Incremental ground tilt over the agreed period.**

It is suggested that the most relevant survey line for the Telstra plant would be along Thirlmere Way and Remembrance Drive since this is the area of maximum predicted subsidence, impacting on the most vital part of the Telstra network. The location of the survey pegs should be negotiated with Telstra NDCG Network Integrity Services, field staff representatives as well as with other utilities, to avoid damage to plant during placement of the survey marks. Note that the major Telstra network is located on the southern side of Thirlmere Way, east of the exchange and on the western side of Remembrance drive to both the north and south of Tahmoor.

In addition the frequency of the survey and the reporting of the results to the *Plan Review Meeting,* are to be monthly or as agreed by the members of the *Plan Review Meeting* at each regular meeting of the group. The initial meeting should agree on the limits of the survey lines and set the initial frequency of the survey work.

4.2) General

The general control procedure considered in this management plan is to look at each item of plant described in Sections 2.0) & 3.0) items a) to f), according to the assessed exposure risk and determine methods of monitoring the plant during the ground subsidence events occurring. In addition in Table 3 contains a summary of recommendations for monitoring procedures and basic actions to be taken, should the potential for damage be observed during mine subsidence events.

Since there are similar types of cable involved in the risk assessment and the proposed monitoring methods for each cable type are similar, they have been grouped together below and in Table 3 to simplify the discussion and management of the entire network.

Optical Fibre Cables.{Items a) & b)}

a) IEN optical fibre cable designated F CBTN 1201, 12 fibre cable, east along Thirlmere Way to York, & Emmett Streets and south into Remembrance Drive, Risk Factor assessed as **HIGH.**

b) Customer Access Network (CAN) optical fibre cable designated F CBTN 1201 RGB-AS, AS-AQ, 12 fibre, installed along Thirlmere Way from Pitt Street, York Street, Emmett Street to Bronzwing Street predominantly on the eastern side of the railway, Risk Factor is assessed as **LOW**

The primary monitoring method for the optical fibre cable is to use two different types of OTDR's.

i) Brillouin OTDR

The first method is to use the Brillouin OTDR to analyse individual fibres in the cable prior to subsidence commencing, so that a base value is established for the existing strain level in the fibre. The base value can then be compared with future recordings, to identify locations where the strain characteristics in the fibre have changed, with time. This test should be repeated if there is any cause for concern, as to the performance of the cable, or should the continuous OTDR monitoring indicate a change in the attenuation level on the fibre. **Note that currently this equipment is not available for use.**

ii) Continuous OTDR Monitoring

An OTDR is connected to a spare fibre at a remote telephone exchange. The procedure for monitoring the optical fibre cables is to utilise a continuous recording Remote Fibre Management Systems (RFMS). The

RFMS will have an alarm system to alert the Global Operations Centre (GOC) should any increase in attenuation on the cables be detected. The optical fibre cables to be monitored by this method are

F CBTN 1201, Item a) has already had Brillouin & Continuous OTDR system established for LW22 & LW23. Hence the RFMS should be maintained for LW24 & LW25 as the assessed Risk Factor is High.

The CAN section of this cable, F CBTN 1201 RGB-AS, AS-AQ, 12 fibre, commences from the joint on the IEN cable F CBTN 120, 12f at Thirlmere Way and Pitt Street. Hence this section of the cable is only exposed to subsidence from LW24A at the southern edge of the maingate pillar, where there is limited subsidence. Although the cable is installed bare in the A100 conduit since the exposure length is short and degree of subsidence is limited, the monitoring required is visual inspection during LW24A subsidence. **OTDR testing is not required**. At present there are limited line systems on this cable and regular review of the cable occupancy should be maintained over the currency of the management plan. This will ensure that as additional higher capacity line systems are added to the cable, the current assessed risk factor can be reviewed.

The RFMS for the IEN optical fibre cables uses an OTDR through connected at Campbelltown telephone exchange to spare fibres in the above cables a) via Menangle, Douglas Park and Picton. For subsidence monitoring for LW23 to LW25 the RMFS has been through connected at Tahmoor exchange to pick up the 12f cable to Bargo, F CBTN 1201. The RFMS monitoring is set up on a continuous basis on spare fibres to set an alarm condition where loss on the cable exceeds 0.5dB. OTDR traces for the cable have been obtained prior to the commencement of mining at Tahmoor as a reference trace. This monitoring should be carried out at 1550 or 1650nm to provide early warning of deterioration of the transmission characteristics of the cable.
In the event of loss being recorded of (+ or –) 0.5 dB then:-

- The point loss or area of loss should be recorded and an investigation carried out of the conduit network at that location to determine if any damage is evident, i.e. movement of conduit, relative movement between pit/manhole and conduit, degree of freedom of cable in conduit or movement of joints.
- The loss event should continue to be continuously monitored and should the loss progress to (+ or -) 1dB then the cable and conduit should be exposed at the recorded location to attempt to relieve pressure or tension/compression on the cable.
- In the event of the loss on the cable continuing and exceeding 3dB an interruption cable should be laid and cutover of the cable carried out. A decision should be made at this time, once the once the interruption cable is performing satisfactorily, how to complete the permanent restoration of the cable. This decision should be made with reference to the *Plan Review Meeting* considering the future impact from continuing subsidence.

In the event of loss continuing and exceeding 3dB on any of the four cables then the cutover strategy for the cables must ensure continuous operation of line systems into and out of Tahmoor and Bargo telephone exchanges.

Copper Cables Under Air Pressure
The primary control procedure for monitoring copper cables under air pressure is to visually inspect cables and record the pressure in these cables on a regular basis. The pressure is then to be monitored during mine subsidence to detect any loss of pressure and resultant impact on the pressurised cable network due to ground movement. The Risk Factor is assessed as **SIGNIFICANT** for the following cables:-

c) Lead Junction cables C PICT 444 A01 J1-100 and Cable 101 Z01 J1-50 (Both designated T444, 1-100 & 1-50) Installed east along Thirlmere Way from the Exchange to York Street.
This cable is jointed at York Street and Thirlmere Way into:-

i) C PICT T444 Z01, J1-150/0.90 along Thirlmere Way and then north along Remembrance Drive to Picton
ii) C PICT T444 Z02, J1-74 / 0.90 along York Street, Emmett Street into Remembrance Drive and then south to Bargo. This cable now operating as a Main cable to Pillar P27 south along Remembrance Drive

d) Copper Main cables east along Thirlmere Way Cables C1,C4 & C7 east along Thirlmere Way feeding to Remembrance Drive, Progress & Straun Streets

The main cable network south-east of the exchange Cables C1, C4 & C7 out of Tahmoor exchange are air core cables carrying positive air pressure which are currently generally operating at approximately 30-50kPa.

The most efficient method of recording any change in the condition of these cables due to ground movement is to record the air pressure in these cables at the same location at regular intervals. This should be performed weekly to fortnightly during the period of mine subsidence. Obviously, should damage occur, repair at the joints or in-length repairs should be carried out immediately to prevent any water penetration and loss of service on these cables. Further, it would be anticipated that if any pressure points or loss of service occurs on the optical fibre cables then this would indicate a potential problem with the other main copper or junction cables since they are all installed along the same route following Thirlmere Way.

The lead Junction cables C PICT 444 A01 J1-100 and Cable 101 Z01 J1-50 (both designated T444, 1-100 & 1-50, as mentioned in Section 2.0) are very old lead sheathed paper insulated cables. The 100 pair cable has been recently modified (July 2005) to carry main copper pairs to a new pillar as well as special junction circuits. These cables split at the manhole at Thirlmere Way and York Street into a direct buried, wire armoured, lead sheathed 150/0.90 cable, north to Picton and a lead sheathed 74/0.90 cable to Bargo. The age and condition of the lead sheathing on these cables is the main concern and it is essential, as with the copper main cables, that the air pressure in these cables is monitored to provide early warning of possible damage to the cable sheaths.

e) Copper customer distribution cable on the customer side of the Pillar, providing connection to each customer's premises, covering the entire subsidence zone **(Risk Factor-Moderate)**

i) Distribution Cable in Conduit (Risk Factor Unlikely/Moderate, **Moderate**.)
This distribution cable is located throughout the entire subsidence zone for longwalls LW24 & LW25 covering services to approximately 800 residences in the area. This network has been audited and there is some old lead cable in York Street. From previous experience with the copper distribution network at Appin and Thirlmere LW22 this type of cable is vulnerable to damage from ground movement. The more vulnerable cable is located on the northern end of York Street in the area of maximum subsidence from LW 25. Hence these sections of cable must be closely monitored during subsidence from LW24A and LW25. For the remainder of the distribution network located in conduit there should be only minor impact. It is anticipated that this minor impact may cause some cracking of old asbestos pits and possible slight movement of both plastic and asbestos pits relative to existing footpath levels. Should this type of ground movement become evident at the surface, (ie cracking of road pavements, footpath movement, kerb movement or house damage) then at that stage it would be prudent to carry out a second audit on the particular area of the network, where damage at the surface is evident. During subsidence from LW22 the distribution network was monitored on a regular basis to ensure that if there was evidence of road or kerb movement, the adjacent Telstra network was checked for any possible movement or damage. Close liaison should be maintained with the Picton Line Depot to ensure that any abnormal fault incidence in the Tahmoor / Thirlmere area is investigated concurrent with the fault clearance, to ensure there is no component of ground movement responsible.

In addition, if it becomes apparent through monitoring of the optical fibre cable and the main copper cable network that ground strain is an issue in that particular area, then the distribution network should be concurrently investigated to determine if there is also an impact on this network.

ii) Aerial Cable. (Risk Factor Unlikely / Moderate, **Moderate)**
This distribution cable is assessed as having a Moderate risk factor since there are sections of up to 100 pair Integral Bearer Cable (IBC) jointed to aerial lead–in cable, as identified below. It is recommended for the aerial cable within the area of tilt above 1.5mm/metre, that a regular inspection be carried out during periods of maximum tilt associated with the subsidence trough from both longwalls LW24 & LW25. These areas to be determined following issue of the final report from MSEC Pty Ltd, Reference No 1. Inspections should be carried out in the following Streets:-

- Mitchell Close 10pr IB cable
- Lintena Avenue 50pr IB cable
- Courtland Avenue 70pr IB cable

- Pandora Place 20pr IB cable
- Tanya Place 20pr IB cable
- Abelia Street 100pr IB cable
- Janice Drive 20pr IB cable

The cable will be inspected during the subsidence period for each longwall and any apparent visible strain on the cables reported to the plan review meeting for action to relieve strain on the cable where necessary.

f) Conduit, manhole and pit network .

(Risk Factor- Distribution cable conduit network - LOW)

(Optical Fibre & Main Copper cable conduit network -HIGH)

The cable distribution network is obviously subject to the greatest risk of damage in the areas of maximum subsidence since it is exposed for the greatest distance, is not homogenous in nature, is of differing ages, and is installed with varying cover and with varying conduit sizes through varying ground conditions.

As discussed above it is considered that the distribution cable network on the customer side of the pillar is at low risk of damage due to its smaller diameter, reduced cover to the surface and almost exclusive use of PVC conduit. There is some risk of damage to the larger asbestos pits in this network, but it is not considered that this alone will expose the distribution cable network and joints to damage.

The main cable network however is considered to have a **HIGH** risk factor for the reasons outlined in Section 2.0) item f). Within the Application Area, Appendix A, Sheet 1 the 4 xA100 conduits supporting the optical fibre and main cable network are exposed in two subsidence areas:-

i) in the area of Thirlmere Way and Castlereagh Street (LW24B) and
ii) the 2 x A100 conduits crossing LW25 in Remembrance Drive.

These main cable conduit routes represent a distance of approximately 400 metres, with the most significant impact likely to occur along Remembrance Drive.

A detailed audit has been carried out of these sections of the network prior to subsidence commencing. This has involved checking cable entries to pits and manholes and completing notes on the general condition of the Telstra plant at these locations.

In addition, in the areas of highest impact from the two longwalls, from Fraser Street to York Street in Thirlmere Way east of the exchange and from Thirlmere Way to Straun Street along Remembrance Drive, it is recommended that the main and optical fibre cables, in this conduit route be marked at the duct face with tape to identify cables involved and to provide a relative measurement of movement of the cables within the duct network. At the same time as movement is recorded in the manholes, the surface area above the conduit will be "walked over" to note any changes in road pavement or in the footpath area, which may indicate excessive strain from ground subsidence impacting on the conduit and cable network. This work should be initiated prior to ground subsidence commencing and then monitored on a regular basis following the commencement of subsidence from LW24 & LW25.

Refer to the following table, Table 3, which presents a Summary of the Telstra Plant, Risk Factor, Monitoring and Actions required for items of plant, which may be impacted by mine subsidence. Note that in the Table 3 items of plant have been grouped according to the monitoring technique outlined above and identified by the item numbers previously assigned items a) to f).

Table 3 - Summary of Monitoring Procedures and Actions

ITEM OF PLANT	Risk Factor	Monitoring				Actions & Responsibilities
		Method	Detail	Frequency	Trigger Levels	
Optical Fibre Cable **a) F CBTN 1201, 12f IEN** **b) FCBTN 1201, 12f CAN**	High Low	a)Continuous RFMS. Gen Audit b) Physical Monitor LW24	Technical Specialist set up remote automatic loss detection equipment on F CBTN 1201 east of exchange through to Bargo, Initial Brillouin test has been established & check @ completion LW24 if equipment is available. Cables are included in General Audit. b) Check cable movement during LW24	Prior to mining Continuous monitor, Alarm, set @ 0.5dB initial loss level. Separate OTDR testing as required by Telstra. Gen Audit prior to mining	0.5dB inspection 1dB Uncover Cable 3dB Replace Cable	At 1dB trigger, NDCG Network Services Delivery Manager, NSW (John Rorison) to identify replacement cable. Telstra to advise of alarm condition or advise of damage reports to GOC. John Rorison to advise of proposed action, uncover cable or arrange cable replacement. C Dove advise any damage to CAN cable
Main Copper Cables & Junctions ,Air Pressure **c) C1,C4 & C7** **d) Lead Junction Cables** **C PICT 444 J1-100** **C PICT 444 T1-74 (Now Main cable to P27)**	Significant Significant	Record Cable Pressure, Physically Monitor, Gen Audit	Record initial cable pressure on all cables C1, C4,C7 & T444 Record cable pressure @ exchange & through subsidence contour zone at regular intervals during periods of ground subsidence All cables included in General Audit	Record cable pressures prior to mining then as reqd by Plan Review Meeting, if main cables shows loss of pressure check optical fibre and distribution cables over the same area. Gen Audit prior to mining	10Kpa variation investigate, 20Kpa carry out maint. on cable.	C Dove to advise John Rorison & Aaron White 0419 696 295 Picton line depot of loss of pressure on cable. John Rorison to advise Plan Review Meeting of proposed action in relation to maintenance on cables.

ITEM OF PLANT	Risk Factor	Monitoring				Actions & Responsibilities
		Method	Detail	Frequency	Trigger Levels	
General Audit Item e) **e)Copper Distribution Cable in Conduit** **ii) Aerial**	Moderate Moderate	Gen Audit & regular physical checks on condition of distribution cables Maintain close liaison with Picton line depot re faults occurring in subsidence zone. Investigate Faults	Audit distribution cables recording any areas of existing damage to network. Carry out physical check of cables related to any subsidence damage reported and any abnormal faults occurring in the subsidence zone. Complete regular physical inspections of network during critical subsidence events	Prior to mining & then as required by Plan Review Meeting dependant also on performance of optical fibre & copper main cable. Investigate conduit network if problems identified with main or optical fibre cables.	If damage to optical fibre or main copper cables, reinspect subs cables in same area. If fault incidence increases investigate area involved related to ground subsidence. Carry out regular physical checks on the network	If problems identified in a) to d) above with cable performance C Dove to re-inspect subscriber cables (conduit & aerial) and advise John Rorison of results. John Rorison to advise Plan Review Meeting & contact Picton line depot Aaron White 0419 696 295 to arrange maintenance as required. C Dove to complete regular inspections of network during periods of maximum subsidence
f) Main Copper & Optical Fibre Conduit, Manhole & Pit Network Note distribution cable network covered in item e) above	High	Gen Audit setup & monitor conduit & cable movement in Thirlmere Way & Remembrance Drive	Audit to record condition of cable, pits, manhole, details at duct face & degree of cable freedom. Setup & monitor conduit & cable movement in Thirlmere Way & Remembrance Drive	Prior to mining then as determined by Plan Review Meeting.	Visual check of section being monitored. If significant movement evident check other cables & optical fibre for loss.	Should damage occur to cables a) to d) then rectify conduit/pit network where cable damage has occurred. C Dove to advise John Rorison of any damage. John Rorison to advise Plan Review Meeting & contact Aaron White 0419 696 295 to arrange rectification work.
Survey Line	Not Applicable	Establish permanent marks at approx 20 metre intervals along critical sections of Telstra network	Tahmoor Colliery to carry out detail survey , (subsidence, strain and tilt recorded) along survey lines agreed to by the Plan Review Meeting Survey line to capture important data for Telstra Network, required along Thirlmere Way and Remembrance Drive	To be determined by Plan Review Meeting dependant on degree of subsidence occurring and potential hazard to Telstra plant	To be initiated prior to commencement of mining & frequency subject to regular review by Plan Review Meeting	Tahmoor Colliery to make survey results available to Plan Review Meeting members prior to regular meetings.

5.0) Geological Structures:

There is evidence of a number of faults and dykes in the vicinity of the longwalls (Drawing MSEC157-09, Reference No 1). Should any evidence of unpredicted movement of faults at surface level or additional fault locations become apparent during future development of first workings or should "Regional or Far Field Horizontal Ground Movements" be recorded, this information should immediately be reported to the *Plan Review Meeting* to consider the implications on the Telstra network.

6.0) Resources

Technical resources required to carry out the monitoring as identified in Table 3 are to be provided by Telstra or consultants as required. The costs associated with the monitoring work required for the network are to be reported to the *Plan Review Meeting* and agreement reached as to the responsibility for individual costs. Tahmoor Colliery will provide the survey resources required for the line surveys to determine incremental subsidence, strain and tilt during the operation of the Management Plan. The initial survey is to be carried out prior to mining operations commencing and the frequency of the survey work is to be reviewed at the regular *Plan Review Meeting*s.

Prior to commencing any proposed rectification work the Telstra representatives will detail the extent of the work and the associated costs, to the *Plan Review Meeting*. At that meeting agreement will be reached between Tahmoor Colliery, Telstra and the Mine Subsidence Board as to the responsibility for the costs of the proposed work. In the event of a dispute as to responsibility for the costs, involving work to secure Telstra's network, where loss of service to customers or line systems outage is involved, the work will be carried out by Telstra and the dispute referred to the next meeting of the *Plan Review Meeting* for further discussion and agreement.

7.0) Roles and Responsibilities

The monitoring of the Telstra network by this Management Plan is to be carried out by Telstra. The Management ***Plan Review Meeting*** is to be the forum for discussion and resolution of issues raised in the operation of the Management Plan. The current understanding of the status of the subsidence and any risk to the Telstra network is to be used to determine the frequency of future *Plan Review Meeting*s.

The representatives invited to attend the *Plan Review Meeting* are:-
Mitchell Geddes - Acting Technical Services Manager, Centennial Coal, Tahmoor Colliery.
David Clarkson- Environment & Community Coordinator, Centennial Coal, Tahmoor Colliery.
John Rorison, Manager Telstra NDCG, Network Integrity Services.
Peter Bristol, Telstra, Team Leader, Access Planning South East & Western N.S.W.
Gregory Humphries, Telstra, Senior Engineer, Access Planning South East & Western N.S.W.
Kannan Krishnamurthi, Manager Transmission Technology, Telstra Corporation Ltd..
Darren Bullock, District Supervisor, Southern Coalfields, Mine Subsidence Board
Daryl Kay, Mine Subsidence Engineering Consultants Pty Ltd.
Colin Dove, Consultant Telecommunications Engineer.

The *Plan Review Meeting* is to appoint chairperson and a minutes secretary responsible for maintaining all documentation presented to the meeting and responsible for circulating minutes and advising participants of future meetings.
At the *Plan Review Meeting* meetings, Telstra is to report any incidents recorded in relation to the performance of the Telstra plant and a detailed log is to be maintained of each incident reported to the *Plan Review Meeting*. Full details are to be reported of significant events observed or events which have an impact on the provision of Telstra services in the area. Tahmoor Colliery are to report on the degree of subsidence that has occurred at that time and how closely subsidence is following the predictions made in Reference No 1.
It is the responsibility of this meeting to determine if the events recorded are due to the impact of mine subsidence and then determine the degree of responsibility each party has, for those events.
Should significant risk be identified then either party may call an emergency *Plan Review Meeting*, with one day's notice, to discuss proposed action and to keep other parties informed of developments in the monitoring or maintenance of the Telstra network.

8.0) Audit and Review

It is anticipated that this plan will be in place for approximately 2 years from the commencement of mining of LW24 through to completion of LW25 or for a minimum period of three months following final ground settlement after extraction of LW25. Should an audit of the Management Plan be required during that period then a representative is to be appointed by Telstra, Tahmoor Collieries, and the Mine Subsidence Board to review the operation of the plan and report amendments to the next scheduled meeting of the *Plan Review Meeting*.

Other factors which may require the management plan to be reviewed are:-

- Poor performance of the Telstra plant in regard to mine subsidence, such as loss of services.
- Favourable performance of the Telstra plant in regard to mine subsidence, no observe red or recorded impacts.
- Significant variations from predicted settlement occurring.
- Evidence of significant geological fault or "Far field effects"

After each longwall has been extracted the management plan will be reviewed to ensure that the plan reflects the current knowledge gained from the behaviour of ground subsidence from the previous longwall.

9.0) Record Keeping

The minutes secretary of the *Plan Review Meeting* shall keep minutes from the regular meetings and advise participants of future or emergency meetings to be held. The minutes are to include details as reported on the condition of the individual items of Telstra plant, the assessment of the degree of ground subsidence that has occurred, any agreements reached and a log of incidents reported to the meeting involving the Telstra network.

10.0) Associated Documents and References

10.1) Appendices

Appendix A Centennial Tahmoor, Tahmoor Colliery Longwalls 24-26 Application Area	Sheet 1 of 5
(Drawings from Reference 1) Figure, Predicted Subsidence Tilt & Strain Profiles along Remembrance Drive due to the Extraction of Longwalls LW24A to LW28B	Sheet 2 of 5
Figure, Predicted Subsidence Tilt & Strain Profiles along Thirlmere Way due to the Extraction of Longwalls LW24A to LW28B	Sheet 3 of 5
Telecommunications Infrastructure - Copper Cables Drawing No. MSEC 157-25	Sheet 4 of 5
Telecommunications Infrastructure - Optical Fibre Cables Drawing No MSEC 157-26	Sheet 5 of 5

10.2) References

Reference No 1- DRAFT Mine Subsidence Engineering Consultants Pty Ltd Report dated August 2005 titled
"Tahmoor Colliery Longwalls 24 & 28 - Report on The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Surface and Sub-Surface Features Due to Mining Longwalls 24 to 28 At Tahmoor Colliery (In Support of An SMP Application)"

11.0) Contact List.

Contacts of Participants involved in *Plan Review Meeting*s:

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