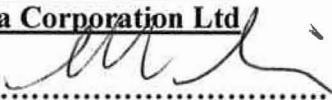


**Telstra Corporation Ltd**  
Network Integrity.  
N.S.W.

**Tahmoor Coal Pty Ltd.**  
Tahmoor Colliery.

**MANAGEMENT PLAN**  
LONGWALL MINING (LW31)  
BENEATH TELSTRA PLANT  
@ TAHMOOR & PICTON N.S.W.

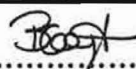
**Authorised on behalf of**  
**Telstra Corporation Ltd**

  
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(Date: 23rd June 17.....)

**Issue Date:** 22<sup>nd</sup> March 2017

**Authorised on behalf of**  
**Tahmoor Coal Pty Ltd.**

  
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(Date: 16/08/2017.....)

**Revision No. & Date:**

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## **1.0 Introduction**

Tahmoor Coal Proprietary Limited at Tahmoor Colliery proposes to continue to extend longwall mining activities to the north of Tahmoor and towards the south-western side of Picton in NSW. Tahmoor Colliery has previously mined Longwalls 22-29 in the current series and is currently planning on completing extraction of LW30 in April 17 with LW31 extraction to follow.

As part of the planning for mining Longwalls LW31, Tahmoor Colliery has identified surface assets which may be affected by the mining operation in Tahmoor north area. 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 longwall LW31 on these assets owned by Telstra. The new longwall LW31 is planned to commence in April 2017 and it is anticipated to take approximately 18 months for full extraction of coal. See layout of LW28-LW31 in Plate 1 on the following page.

Tahmoor Coal commissioned a report by Mine Subsidence Engineering Consultants Pty Ltd (MSEC) in support of the Subsidence Management Plan (SMP) for Longwalls 31 to 37. The Report MSEC 647, Revision A, Reference No 1, is titled "Glencore - Tahmoor Colliery - Longwalls 31 to 37- Subsidence Predictions and Impact Assessments for Natural and Built Features in Support of the SMP Application". This report identifies an area, to be considered for mine subsidence impacts, bounded by the 20mm subsidence contour line for LW31 to LW37 which is shown in MSEC drawing MSEC647-01 attached as Appendix A, Sheet 1. The layout of the Telstra optical fibre and copper cable networks in the area under consideration is shown in Appendix A, Sheet 2, MSEC Drawing number MSEC647-22.

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. During the extraction of previous longwalls LW22 to LW30 the mining impacts from mine subsidence on the Telstra network that have occurred have been managed satisfactorily. As mining has continued north of the telephone exchange the potential for impacts on the major network cable infrastructure has changed as now the longwalls are commencing to impact on the Picton telephone exchange area and the optical fibre cables and copper network to the south of Picton. The commencing end of LW31 is to the north-west of Remembrance Drive where there are main Trunk cables and local cables present from Tahmoor exchange and the north western end of the longwall will affect cables in the Picton exchange area. The current optical fibre cables potentially impacted by the new longwall cross LW31 in the north along Bridge Street and in the centre along Stilton Lane and both of these cables originate from Picton exchange rather than Tahmoor. Therefore the Telstra cable network potentially impacted by LW31, determined by the 20mm subsidence zone, is located in the following areas :-

- a) The copper junction cable from Thirlmere Way north along the western side of Remembrance Drive and continuing north east through to Picton C PCTN 444 M1-150/0.90 is approximately 200m to the east of the southern goaf edge of LW31 and is inside the interpolated SMP Area for LW31, see Appendix A Sheet 2.
- b) The distribution cable network to individual customers within the 20mm subsidence zone located along Stilton Lane from both Tahmoor and Picton exchange areas and from Remembrance Drive to the west towards LW31 is owned and controlled by Telstra. **Note that there has been a recent change of ownership of the Local cable network from Telstra to NBN. See Item 1.1) below. Generally the existing manhole, pit, conduit and pole network still belongs to Telstra along with cable distribution in Henry Street, Stilton Lane and Remembrance Drive. The Local cable only in Redbank Place and Bridge Street is now controlled by NBN and additionally NBN have installed optical fibre cable in Bridge Street and Redbank Place.** The Telstra Local cable distribution network is therefore confined to the area south of Henry Street influenced by LW31. The Local cable in Bridge Street and Redbank Place is owned and controlled by NBN which also has a section of aerial distribution within the northern end of LW31.
- c) The Telstra manhole, pit and pole installations supporting the cable network over the entire area including this section of the Telstra network used by NBN for cable distribution.
- d) Optical Fibre cable network:-
  - i) Optical Fibre Cable F PCTN 3002 Section A) installed from Picton exchange along Henry Street and Stilton Lane to the Mobile Telecommunications tower above Redbank Tunnel and
  - ii) Optical Fibre Cable F PCTN 3002 Section B) installed from Picton exchange along Bridge Street feeding to the industrial area located on the north eastern edge of LW30.See cable details in yellow in Plate 1.

The items of plant affected by ground surface movement therefore include optical fibre and the associated buried and aerial local cable distribution network in the Tahmoor / Picton area, the manhole, pit, pole and conduit network that supports the entire cable distribution network.

Refer to Plate 1 on the following page showing the general layout of the new longwalls.



Plate 1:  
 Google Earth aerial view of four longwalls LW28 to LW31 showing current location of extraction in LW30 (Green Line). Longwall LW31 extends north-west from north of Remembrance Drive at Tahmoor, crosses Stilton Lane and then Bridge Street and the Main Southern Railway in the north to the west of Picton. The yellow lines indicate Telstra optical fibre cables, two sections of cable F PCTN 3002 A) and B) feeding along Bridge Street and south section along Stilton Lane to the Telstra Tower

1.1) NBN

Since the management plan was prepared for LW29 & LW30 there has been a change of ownership of a section of Telstra’s network. NBN is now responsible from the customer cable distribution network to the east of Remembrance Drive and in the area of Bridge Street and Redbank Place. Telstra has transferred ownership of some sections of the



Local cable distribution network from Telstra to NBN as NBN progressively becomes the owner of the cable distribution network from the Pillar to the customer. NBN cable ownership is from the customer connection point at the Pillar or Fibre to the Node (FTTN) connection, through to customer's premises. However the ownership of the manholes, pits, conduit and poles for that NBN Local cable network for the most part remains with Telstra. The exception is where NBN install new pits or conduit to make the customer connection possible. This somewhat complicates the management plan of Telstra's assets in that Telstra is responsible for all the supporting network of manholes, pits, conduit and poles for the Local cable but NBN actually owns the cables in that section of the network, where ownership is being progressively transferred as NBN services rollout. In the case of Bridge Street area there are two interconnect points for NBN optical fibre cables into the local cable network:-

- a) Along Bridge Street 100m south-west of Redbank Place
- b) On the eastern side of Redbank Place

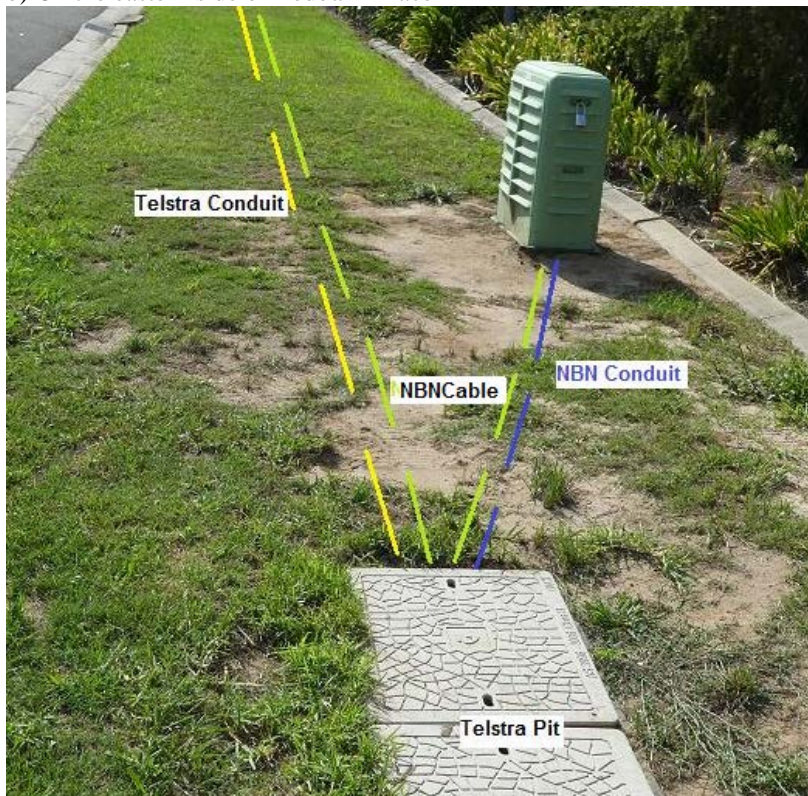


Plate 2:  
NBN above ground Micro Node or VDSL (Very High Bit Rate Subscriber Line) Cabinet in Redbank Place. Shows an example of the arrangement of the ownership of the network between Telstra & NBN.

## 1.2) Subsidence Predictions (Reference No 1)

The Mine Subsidence Engineering Consultants Pty Ltd Report N0647, Reference 1, Section 6.13 (Vol 1) Telecommunications Services makes the statement that:-

“Tahmoor Colliery and Telstra have developed and acted in accordance with an agreed risk management plan to manage potential impacts to telecommunications infrastructure during the mining of Longwalls 22 to 28. It is recommended that this management plan is reviewed and updated to incorporate the proposed longwalls.”

This management plan for the Telstra network will take into consideration the subsidence predictions for longwall LW31 plus utilise the experience gained from the management of the Telstra infrastructure from previous subsidence events due to LW22-LW30 at Tahmoor.

It is recognised from past experience gained at Tahmoor that the more critical parts of the Telstra network are :-

- a) Optical Fibre Cable - this is predominantly due to the nature of the cable in that it is only able to sustain relatively low ground compressive and tensile strains before the external sheath transfers the strain to the individual fibres within the cable. When this occurs the individual fibres have limited capacity to tolerate tensile or compressive strains before they cause interruption to or failure of transmission systems. The other concern with optical fibre cables is that they have much larger capacity to carry telephone, data and internet services such that any minor interruption to traffic can cause serious impacts on the overall telecommunications network.

b) Aerial Cable - Aerial cable anchored at adjacent poles or from pole to building can be impacted by ground tilt. Where poles are affected by ground tilt the top of the pole can move such that there is a change in the cable catenary with the potential to either stretch the cable or reduce the ground clearance on the particular cable. For LW31 this section of the cable network is owned by NBN but the poles remain under the control of Telstra.

Generally the more extensive Main and Local copper cable network is more robust and able to tolerate reasonable levels of mining induced ground strain. The interaction is complex since the network comprises of very small cable of 5mm diameter up to heavily armoured 60mm diameter cables spread diversly across the entire mining area. As a result the cable types will be considered within the general groups of

- a) The copper Main & Junction Cable along Remembrance Drive.
- b) Local copper cable distribution direct buried and in conduit in Henry Street, Stilton Lane, Remembrance Drive. Note the Local aerial cable in Bridge Street is now owned by NBN.
- c) Cable distribution network consisting of manholes, pits, conduit and poles over the SMP area supporting the cable network
- d) Optical fibre cables in Henry Street, Stilton Lane, Bridge Street and Redbank Place .
- e) Telstra Mobile Transmission Tower located over LW28

The predictions for these various cable types is as shown below in tables 6.42, 6.43, 6.44 and 6.45 extracted from Reference No 1.

**Table 6.42 Maximum Predicted Incremental Conventional Subsidence, Tilt and Curvature for the Optical Fibre Cables**

Location	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)
Optical Fibre Cable adjacent to Bridge Street	Due to LW31	700	5.0	0.05	0.10
	Due to LW32	700	3.5	0.03	0.07
	Due to LW33 to LW37	< 20	< 0.5	< 0.01	< 0.01
Optical Fibre Cable adjacent to Remembrance Drive	Due to LW31	40	< 0.5	< 0.01	< 0.01
	Due to LW32	250	1.0	0.05	0.01
	Due to LW33 to LW37	< 20	< 0.5	< 0.01	< 0.01
Optical Fibre Cable adjacent to Stilton Lane and Henry Street	Due to LW31	675	2.0	0.06	0.11
	Due to LW32	700	5.0	0.06	0.11
	Due to LW33 to LW37	< 20	< 0.5	< 0.01	< 0.01
Optical Fibre Cable adjacent to Stonequarry Creek Road	Due to LW31 to LW33	< 20	< 0.5	< 0.01	< 0.01
	Due to LW34	30	< 0.5	< 0.01	< 0.01
	Due to LW35	150	1.0	0.02	< 0.01
	Due to LW36	650	5.0	0.05	0.11
Optical Fibre Cable adjacent to Thirlmere Way	Due to LW37	675	4.0	0.06	0.11
	Due to LW31 to LW35	< 20	< 0.5	< 0.01	< 0.01
	Due to LW36	30	< 0.5	< 0.01	< 0.01
	Due to LW37	250	1.5	0.04	0.03

**Table 6.43 Maximum Predicted Total Conventional Subsidence, Tilt and Curvature for the Optical Fibre Cables**

Location	Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (1/km)	Maximum Predicted Total Sagging Curvature (1/km)
Optical Fibre Cable adjacent to Bridge Street	After LW30	1,200	5.5	0.09	0.13
	After LW31	1,225	5.5	0.09	0.13
	After LW32	1,225	4.5	0.09	0.13
	After LW37	1,225	4.5	0.09	0.13
Optical Fibre Cable adjacent to Remembrance Drive	After LW30	< 20	< 0.5	< 0.01	< 0.01
	After LW31	50	< 0.5	0.05	< 0.01
	After LW32	300	1.0	0.06	0.01
	After LW37	300	1.0	0.06	0.01
Optical Fibre Cable adjacent to Stilton Lane and Henry Street	After LW30	1,075	5.0	0.07	0.11
	After LW31	1,150	4.0	0.07	0.11
	After LW32	1,175	5.0	0.07	0.11
	After LW37	1,175	5.0	0.07	0.11
Optical Fibre Cable adjacent to Stonequarry Creek Road	After LW35	175	1.5	0.02	< 0.01
	After LW36	750	5.0	0.06	0.10
	After LW37	1,075	4.5	0.08	0.11
Optical Fibre Cable adjacent to Thirmere Way	After LW35	80	0.5	0.01	0.01
	After LW36	90	0.5	0.01	0.01
	After LW37	300	1.5	0.04	0.03

The predictions for the Telstra network for LW31 are summarised in MSEC Fig E16 for Bridge Street (Optical Fibre & Copper Local Cable) attached as Appendix A sheet 3 and Fig E20 for Stilton Lane (Optical Fibre & Copper Local Cable) attached as Appendix A sheet 4. A summary of the Subsidence Tilts and Curvature (Strain) taken from Figures E16 & E20 are shown below in Table 1 below. Note it is considered there is no impact on Telstra cables along Remembrance Drive from LW31, see reference 1 Figure E15.

**TABLE 1**

**Maximum Predicted Cumulative Subsidence Parameters for LW 29 & LW30**

Location of Network	Subsidence mm	Tilt mm/m	Curvature (1/km)	Transverse Strain (Applying a factor of 10 to curvature)
Optical fibre, Aerial & Local underground copper cable Bridge St and Redbank PI	1100	5.5	+0.075, -0.10	0.75mm/m tension 1.0mm/m compression
Optical fibre & Local underground copper cable Stilton Lane	1050	1.0	+0.07, -0.11	0.7mm/m tension 1.1mm/m compression

The Telstra Mobile Telecommunications tower is located towards the northern goaf edge of LW28 and is shown in MSEC Drawing MSEC567-22 attached as Appendix A Sheet 2. The predicted subsidence parameters for the tower are included in the table below in Table 6.44 which is an extract from Reference No 1. These predicted subsidence parameters are the maximum predicted in any direction during or after the extraction of each longwall.

**Table 6.44 Maximum Predicted Total Conventional Subsidence, Tilt and Curvature for the Telstra Tower**

Location	Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (1/km)	Maximum Predicted Total Sagging Curvature (1/km)
Telstra Tower Located above Longwall 28	After LW30	1,100	3.5	0.05	0.08
	After LW31	1,125	3.5	0.05	0.08
	After LW32	1,125	3.5	0.05	0.08
	After LW37	1,125	3.5	0.05	0.08

As a result of extraction of LW31 the tower is predicted to experience an additional 25mm of subsidence during the full extraction of LW31 to LW37 and the predicted tilts curvatures and strains at the tower, due to all these proposed longwalls, are predicted to be of the order of the survey tolerance, so that they are not measurable by conventional survey techniques. As a result of these predictions and with tiltmeters remaining in place it is considered that with the monitoring system in place and very low levels of ground movement that there will be no impact on the tower. Hence monitoring of the tower is only maintained as a check on the minimal levels of tilt predicted for LW31.

Reference 1 Section 6.13.3) Impact Assessments for the Telecommunications Infrastructure also considers potential impacts from previous longwalls at Tahmoor. The summary of previous impacts on the Telstra copper network is summarised in Table 6.45 Reference No 1.

**Table 6.45 Examples of Mining Beneath Copper Telecommunications Cables**

Colliery and LWs	Length of Copper Cables Directly Mined Beneath (km)	Observed Maximum Movements at the Copper Cables	Observed Impacts
Tahmoor LW22 to LW27	42 km of underground cables and 4.0 km of aerial cables	1370 mm Subsidence 8 mm/m Tilt 1.5 mm (typ.) and up to 4.1mm/m Tensile Strain  2 mm (typ.) and up to 6.3 mm/m Comp. Strain (Extensive street monitoring)	No adverse impacts to underground cables. Some pole tilts and cable catenaries adjusted. Some consumer cables were re-tensioned as a precautionary measure
Appin LW401 to LW409	4 km of underground cables and 0.8 km of aerial cables	700 mm Subsidence 5 mm/m Tilt 1 mm/m Tensile Strain 2 mm/m Comp. Strain (Measured A6000-Line)	No adverse impacts
Appin LW702 to LW704	5.8 km of underground cables	1100 mm Subsidence 1.5 mm/m Tensile Strain 4 mm/m Comp. Strain (Measured HW2, ARTC and MPR Lines)	No adverse impacts
West Cliff LW29 to LW34	Longwalls have mined beneath 13 km of underground cables	1100 mm Subsidence 1 mm/m Tensile Strain 5.5 mm/m Comp. Strain (Measured B-Line)	No adverse impacts

In Reference No 1 MSEC have prepared the above summary of impacts on copper cables undermined in the Southern Coalfields showing the predominant impact with these cables involved adjustment of catenaries on aerial cables. While the detail shown in Table 6.45 as extracted from Reference No 1 is true there are two exceptions concerning lead sheathed cable in the Appin and Tahmoor area. A section of direct buried lead sheathed cable was replaced at Appin



during mining of longwall 5A2 and a lead sheathed cable at Tahmoor was repaired during mining of LW24B. The damage in these two instances was primarily due to the age and crystalline nature of the lead cable sheath. The experience gained has assisted to identify vulnerable cable types within the extensive copper cable network. Even with the extent of the data covered in Table 6.45 there still remains the possibility of anomalous ground movement affecting small sized direct buried copper cables or cables still remaining in the network with lead sheaths. This management plan will continue the agreement between Telstra and Tahmoor Coal to effectively manage and address the monitoring issues related to the degree of risk assessed by Telstra during mining, for the various elements of the Telstra network exposed to mine subsidence from LW31 extraction.

### **1.3) Limitations**

The mechanism of mine subsidence and its impact on the Telstra network has now been considered over a large number of longwall mining events in different geographic locations with different types of Telecommunications networks present as illustrated above. The impacts range from undermining of direct buried major interstate optical fibre cables to undermining two pair copper cables servicing one customer. It is known that longwall mining can impact on the transmission characteristics of optical fibre cables, older more brittle lead sheathed cables and aerial cables. In this case since there are optical fibre cables located across the LW31 there is maximum exposure of these two cables and accompanying risk to the mobile telephone network and customers in the Industrial Area. These two cables are the critical link for connection of all mobile services to the tower and data links for the industrial premises.

Also as mentioned above there are both, local copper buried and aerial cables which are vulnerable to sheath damage or high tensile loads respectively. Since monitoring has been performed on the network during LW24 through to LW30 subsidence there is now some basis for assessing the performance of the Telstra network from past experience. Generally as mentioned it has been found that the older lead sheathed main, junction and local copper cables are more vulnerable to ground movement along with the local aerial copper cable distribution network, where that network is exposed to ground tilting.

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 the impact is irreversible and repair work is required. This has been done in the past where, through continuous monitoring, vulnerable plant has been identified to be at risk during the event and action has been taken to minimise the risk of any continuing damage to the network. 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.

### **1.4) 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 affect plant performance.
- 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 Network Integrity, Subsidence Advisory NSW, Mine Subsidence Engineering Consultants Pty Ltd, and other consultants as required.

### **1.5) Scope**

**As identified in 1.1) above the Local cable reticulation in Bridge Street is now owned by NBN while Telstra retains ownership of Manholes, pits, conduit and poles. However Telstra retains ownership of all the Main & Local cable and distribution network in Stilton Lane.**

This management plan is to be used to assess and protect the performance of the items of Telstra's network identified to be most at risk, due to mine subsidence impacts. The major items of Telstra plant are considered, according to their location relative to subsidence impacts from LW31. These items are listed below as items a) to e) and are referred to in the management plan by these reference numbers.

- a) Lead Junction cables C PICT 444 Z01 J1-100 and Cable 101 Z01 J1-50 (Both designated T444, 1-100 & 1-50). Installed east along Thirlmere Way from Tahmoor to Picton telephone exchange. This cable is jointed at York Street and Thirlmere Way changing configuration into the northern cable along Remembrance Drive to Picton, designated as C PCTN T444 Z01, J1-150/0.90. Current advice from Telstra's Planning Group is that this cable is not carrying traffic north of Thirlmere Way but is still capable of carrying customer services to the rural area between Tahmoor and Picton along Remembrance Drive should additional services be required.
- b) Copper customer distribution cable on the customer side of the pillar providing connection to each customer's premises in Stilton Lane Henry Street and Remembrance Drive. This network covers the area inside the 20mm subsidence zone as shown in Appendix A Sheet 2. The network consists of cable directly buried and some sections of cable in conduit. This network is installed along Henry Street into Stilton Lane along the eastern side of Stilton Lane and west from Remembrance Drive into LW31.
- c) Conduit, manhole, pit and pole network across the area of the 20mm subsidence zone along Henry Street, Stilton Lane, Remembrance Drive, Bridge Street and Redbank Place. Pole distribution along Bridge Street crossing into LW31.
- d) i) Optical Fibre Cable F PICT 3002 –Section A) provides the data and mobile telephony services to and from the Telstra tower located over LW28 and this cable is installed along Henry Street and Stilton Lane from Picton exchange. The cable is vulnerable to subsidence impacts over LW31 where it diagonally crosses LW31 along western side of Stilton Lane. See Plate 3 below.  
 ii) Optical Fibre Cable F PICT 3002 –Section B). This cable enters the subsidence zone and goaf edge of LW31 along Bridge Street providing services to the industrial area. The layout of the cable is such that it is jointed in Bridge Street over LW31 and the cable then back-feeds into Redbank Place so that the cable each side of the joint is vulnerable both in Bridge Street and Redbank Place.
- e) The Telstra Mobile Telephone Tower is located over the old Redbank Railway Tunnel inside the northern goaf edge of LW28 at the end of the optical fibre cable along Stilton Lane crossing LW31 as shown in Plate 1 and Appendix A Sheet 2. However as mentioned above anticipated subsidence over LW31 to LW37 is an additional 25mm with subsidence, tilts and strain below the survey measurement tolerance. Hence considering existing tiltmeters are in place no additional monitoring is required.



Plate 3:

View north from ridge line on Stilton Lane near western goaf edge of LW31 showing approximate route of to the north of F PCTN 3002 Section A) along the western side of Stilton Lane across LW31 towards Henry Street.

## **1.6) Timing**

As mentioned above longwall LW30 will be completed in March 2017 and LW31 is anticipated to commence in April 2017. The longwall will then take approximately 18 months to mine, working to the north west from the south eastern end of the longwall. Therefore this management plan covering the longwall mining under Telstra plant at Tahmoor / Picton will continue in operation until completion of mining of longwall LW31, anticipated towards the end of 2018 and for sufficient period of time thereafter to allow for completion of subsidence effects.

## **1.7) Definitions**

**CAN** - Customer Access Network, the cable distribution network which provides communications services direct to customers premises.

**Main Cable** – Subscriber main copper cable providing pairs of copper conductors between the exchange and the distribution point or cross connect point generally a pillar location, i.e. Pillar P8.

**NBN FTTN** - New system of providing services to the customer. NBN will install an above ground Micro Node or VDSL (Very High Bit Rate Subscriber Line) Cabinet at the Pillar or on the customer's side of the pillar to provide data, phone and internet services to customer's premises. The Node will be fed by optical fibre cable from the exchange and the distribution from the node to the customer will be by NBN copper cable network.

**Local Cable** – Subscriber local copper cable providing pairs of copper conductors between the Pillar distribution point and the customer's premises. This cable may be directly buried, installed in conduit or use aerial distribution to the individual premises.

**NI** :- Telstra Network Integrity responsible for the protection of the Telstra external plant network.

**OTDR** :- Optical Time Domain Reflectometer, used to determine loss characteristics for transmission systems on optical fibre cables. General used for testing quality of optical fibre with testing at 1625nm at higher frequency than transmission systems to provide early warning of possible loss in the system.

**Pillar** – Is the interconnection point between the local cable leading to the customer's premises and the main cable from the exchange. It provides flexibility within the Customer Access Network to connect new and disconnect cancelled services. The main telephone exchange distribution area is broken up into smaller distribution areas where the individual pillar provides the connection between the exchange and the customer. Note that with the rollout of NBN this section of the Telstra cable network will be divested from Telstra to NBN.

**Plan Review Meeting:** Regularly convened forum to be meet (teleconference) to implement this management plan. Participants from Tahmoor Colliery, Telstra NI, Mine Subsidence Engineering Consultants Pty Ltd, Subsidence Advisory NSW and consultants as required.

## 2.0) Principal Risks Identified

In relation to the assets identified in 1.5) item a) to e) 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 that 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				
		<u>Insignificant</u>	<u>Minor</u>	<u>Moderate</u>	<u>Major</u>	<u>Catastrophic</u>
Likelihood	<u>Almost Certain</u>	Significant	Significant	High	High	High
	<u>Likely</u>	Moderate	Significant	Significant	High	High
	<u>Moderate</u>	Low	Moderate	Significant	High	High
	<u>Unlikely</u>	Low	Low	Moderate	Significant	High
	<u>Rare</u>	Low	Low	Moderate	Significant	Significant

a) Lead Junction cable C PCTN 444 M1-150, Installed north along Remembrance Drive.

**NOTE: Advice from Telstra Planning Group that this cable does not carry inter-exchange services. However the cable is in reasonable condition and may be used to provide customer services to the rural area between Picton and Tahmoor as now may also be used by NBN to provide rural services in this area along Remembrance Drive.**

This junction cable is an older lead sheathed paper insulated cable, jointed along Thirlmere Way east of the exchange through to York Street and then jointed into a Pillar (SAH2) at York Street. At the York Street Pillar the cable splits and there is a PCM regenerator which feeds cable pairs in both the Picton section to the north and the Bargo section to the south. Then from York Street north the cable is a 150/0.90 cable to Picton and is installed as a direct buried heavy wire armoured lead cable north along Remembrance Drive.

This cable is direct buried north along northern and western side of Remembrance Drive and it is just within the 20mm subsidence zone to the east of LW31. Since the longwall however does not undermine Remembrance Drive the curvature or strain is predicted to be at a very low level, potentially zero in this section of Remembrance Drive. Note that the predicted strains will increase for LW32 where Remembrance Drive is undermined at the south eastern end. **As mentioned in the note above the junction cable between Tahmoor and Picton is not currently carrying inter-exchange services however Telstra may bring this cable back into service for rural customers.** Since the cable is not currently carrying services and strain is not existent the only moderating risk to the cable is minor movement from previous longwalls affecting the old lead sheath hence the consequence of any damage is Insignificant and the likelihood is Rare, hence the risk factor is at the very **Low** level.





Plate 4:

View of manhole in private property on east side of Myrtle Creek along Remembrance Drive showing lead joint in C PCTN 444 Z01, J1-150/0.90. Cable still has air pressure and joints to the east of LW31 are generally in good condition.

**As noted above some of this cable network is now owned by NBN and NBN will be responsible to manage the subsidence impacts on the cable only in this section of the network in Bridge Street and Redbank Place.**

b) The Telstra copper Local cable distribution on the customer side of the Pillar, providing connection to each customer's premises, installed within the subsidence zone for LW31 in Henry Street, Stilton Lane and Remembrance Drive.

The distribution of telephone services from the pillars are by different methods, generally these cables are installed in conduit however they can be directly buried as in Stilton Lane or use aerial distribution networks as along Bridge Street (NBN).

In past experience with subscriber distribution cable at Appin and Tahmoor/Thirlmere there has been no damage reported or observed with the subscriber distribution network with the exception of an old lead cables used to feed the distribution network at Appin and a main lead sheathed cable in Thirlmere Way. The plastic distribution grease filled cables with either polyethylene or cellular polyethylene insulation over copper conductors are of much smaller size than main cables and are able to tolerate a greater degree of movement due to their smaller size and more flexible nature than the main copper cable. Unlike the main cable they do not generally use rigid lead joints which can fracture when moved, but use openable, in-line or elevated type joints. These joints are able to tolerate significant movement as they are lifted out of pits for jointing and maintenance work. Hence the entire distribution network is generally able to tolerate some reasonable degree of ground movement, see Plate 5.

This distribution cable is installed in various sized conduit and a significant amount of the cable distribution is directly buried entering pits of varying size and vulnerability. The 30 and 50 pair cables are located along Henry Street to the goaf edge of LW31 and the direct buried 10, 6 and 2 pair cables then continue south east along Stilton Lane over LW31. The only other cable entering LW31 originates from Remembrance Drive. The higher ground strains in Stilton Lane of around 0.7mm/m tension and 1mm/m compression may present some degree of risk to these small cables dependant on uniform development of the subsidence strain. The risk to the cables would be due to anomalous localised ground strain developing over a limited area causing a spike in ground strain. Hence accepting that there is this mix of direct buried cables, joints, pits and conduit types within the area, the risk to these cables is assessed to be Unlikely/Minor **LOW**. The consequence is assessed as minor, since these cables feed a small number of customers and it is unlikely that these smaller distribution cables will be impacted under uniform subsidence, having performed without damage, during past subsidence events.

Note NBN cable will be inspected concurrently with Telstra cable and conduit inspections. Any potential impact indicated or observed on the Telstra network will immediately be reported to NBNC0.



Plate 5:  
View of above ground joint 10Pr/6Pr in Stilton lane over LW31 showing direct buried copper cables entering above ground openable joint.

Note Local and Aerial Cable Distribution in Bridge Street and Redbank Place controlled by NBN.

c) Conduit, Manhole, Pit & Pole network.

The conduit, manhole pit & pole network is the critical factor in the performance of the cable network during mine subsidence. Although the possibility of differential movement between the components of this network, due to mine subsidence is low, due to the large geographical extent of the network, its lack of homogeneity and its differing age, it is considered to be an important factor in the performance of the entire cable network. The conduit, manholes, pits and poles provide the primary isolation of the cable network from ground movement and strain. In addition because of the variation in the components of this network 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 older asbestos pits present in Bridge Street which typically perform poorly, in areas where ground movement occurs, such as expansive soils. Most of the cable is installed using varying sized PVC conduit (20-100mm dia.) which is considered to be at a low level of risk of damage from ground strain.

The risk assessment for the Local copper distribution network is considered to be Unlikely/Minor **LOW**.

d) Optical Fibre Cables F PICT 3002 sections A) & B)

i) Optical Fibre Cable F PCTN 3002 Section A) -Tower

The tower and mobile service interface to the Telstra network is via the optical fibre cable F PCTN 3002 12f Section A) which is installed along Henry Street to Stilton Lane and then running approximately 900 metres along Stilton Lane across LW31 then crossing the old workings of LW30 & LW29 and the new rail alignment to the old rail tunnel over LW28 where the tower is located. Although the old tunnel was filled with excavated material from the new tunnel and there has been packing of rock material between brick tunnel lining and the tunnel void there does exist the remote possibility of anomalous ground behaviour in the area over the old tunnel. This was possible during LW28 to LW30 as extraction of these two longwalls was directly under the old tunnel alignment. However as noted above the tower is anticipated to experience extremely minor ground disturbance from LW31 to LW37. Longwall LW31 exposes a different section of the direct buried cable along Stilton Lane from the ridge line north for around 900m along the western side of Stilton Lane into the northern side of Henry Street, as shown in Plate 3. The predictions along the cable



line over LW31 are for tensile strains of around 0.8mm/m and compressive strains of around 1mm/m. Refer to Appendix A Sheet 3. It is worthwhile noting that localised anomalous ground strains have been recorded along the optical fibre cable line of 1.2mm/m tension and almost 5mm/m compression. Fortunately these strains occurred in the newly diverted section of the cable installed in conduit, over the rail diversion and should these levels of strain have developed over LW31, where the cable is direct buried, then the impact would most likely be a major event. The levels of strain predicted for the direct buried cable along Stilton Lane are below the accepted maximum strain for this type of cable of around + or – 2mm/m. However there still remains the potential for anomalous ground movement impacts on the cable and accordingly the risk factor for the cable is assessed as a Moderate Likelihood with Major Consequence since transmission capacity to the tower could be affected therefore the Risk Factor **SIGNIFICANT**.

As for copper cables NBN optical fibre cables will be inspected concurrently with Telstra cables and conduit inspections. Any potential impact indicated or observed on the Telstra fibre network will immediately be reported to NBNC<sub>o</sub>.

ii) Optical Fibre Cable F PCTN 3002 Section B) - Bridge Street

The industrial area of Picton along the western end of Bridge Street on the eastern side of the railway is fed from the same cable F PICT 3002 from Picton exchange as feeds the tower. There is a joint in Argyle Street Picton where the cable splits with one Section A) continuing south to the tower and the other Section B) continuing west into the industrial area. There are major Telstra customers who rely on the large high capacity transmission systems that the fibres on this cable are able to deliver to the industrial area.



Plate 6;  
View east along Bridge Street showing Telstra optical fibre cable (yellow) to Energy Australia Depot in Bridge Street. Also shows cable feed into Redbank Place and NBN cable (green) to their Node from the Telstra Pit.

The optical fibre cable enters the 20mm subsidence zone around 600m north east of pit shown above and enters the eastern goaf edge of LW31 to the west of Redbank Place. With reference to Appendix A Sheet 3 the predictions for the western end of the cable along Bridge Street are for tensile strain of 0.75mm/m and compression of 1.1mm/m. These levels of ground strain are within the capacity of the cable and providing there is no anomalous ground movement, the Likelihood of impact is Unlikely /Rare but the consequence would be Major resulting in a **Significant** Risk Factor.

e) As mentioned above the predicted ground movement around the Telstra Tower over LW28 is outside the survey tolerances for measurement. The Likelihood of impact is Rare but the consequence of this degree of ground movement would be Moderate resulting in a **Moderate** Risk Factor.

### **3.0) Control Procedure**

#### **3.1) General**

As discussed in Item 1.1) above there is now information available 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, West Wallsend, Camberwell and Broke in NSW. The longwall mining operation at Thirlmere / Tahmoor provides a continuing opportunity to gather information on the performance of the network, needed to understand the interaction between ground movement and the Telstra plant, comprising both robust and also relatively sensitive elements of the network.

The general control procedure considered in this management plan is to look at each item of plant described in Section 2.0) Items a) to e) and determine the practical level of monitoring that can be performed according to the assessed risk factor applied. The monitoring described for the plant identified should be completed during the ground subsidence events occurring at the particular location as the longwall progresses. In addition Table 3, is a summary of recommendations for monitoring procedures and basic actions to be taken during mining, should the potential for damage be indicated by surface impacts, cable testing or from survey data.

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 can then be monitored during mine subsidence, to detect any loss of pressure and resultant impact on the pressurised cable network, due to ground movement.

Since there are similar types of cable involved 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 network during ground subsidence.

#### **a) Junction Cable. C PCTN 444 Z01, J1-150/0.90 north along Remembrance Drive .(Risk Factor Unlikely/Low- **Low**)**

The lead Junction cables C PCTN 444 Z01, J1-150/0.90, as mentioned in Section 2.0) a) is an old lead sheathed paper insulated junction cable installed between Tahmoor and Picton. The cable is a direct buried, heavy wire armoured cable and the age and condition of the lead sheathing on this cable is the main concern. However as mentioned in 1.3) a) above this cable no longer carries any inter-exchange transmission services so it is not considered an important component of the cable network. The cable currently does not carry any local services out of Tahmoor exchange however the fact that it is not in current use does not preclude Telstra from installing services on the cable in the future to supply customers between Tahmoor and Picton. The cable appears in pits and manholes along Remembrance Drive and these should be inspected regularly to ensure no damage to the cable or joints is visible within the larger pits or manholes. Provided Telstra maintains the air flow on the cable this can also be recorded to indicate the condition of the cable.

#### **b) Copper Local cable distribution on the customer side of the Pillar.**

##### **Local Distribution Cable (Risk Factor. -Unlikely/Minor- **Low**)**

The Telstra distribution cable is located along Remembrance Drive, Henry Street and Stilton Lane as mentioned above and the majority of this small sized rural distribution cable is direct buried. These services in the rural area of Tahmoor-Picton only service 5 houses along Stilton Lane. This network has been audited and over LW31 there is no old lead cable present which is located further south in the exchange area. However the cable present should be monitored during subsidence to ensure there is no risk of cable damage from anomalous ground movement affecting these small diameter cables. Should evidence of ground movement appear at the surface, (i.e. cracking of road pavements, footpath movement, kerb movement or house damage) then the cable network in the area should be investigated, to determine if there are any observable impacts on the network. Close liaison should be maintained with the Telstra line maintenance staff to ensure that any abnormal fault incidence in the Stilton Lane area is investigated concurrent with the fault clearance, to ensure there is not a component of ground movement responsible.

The above cables will be inspected during subsidence as the longwall progresses and any apparent visible strain on the cables reported to Telstra and the plan review meeting for further action to relieve strain on the cable where necessary.

#### **c) Conduit, Manhole, Pit and Pole Network. (Risk Factor -Unlikely/Minor **Low**)**

The cable distribution network is obviously subject to the greatest risk of damage in the areas of maximum subsidence, however in this case for LW31, there is only a small amount of the network in Stilton Lane and this network is directly buried with a minimum number of pits and installed conduit. The remainder of the network in Bridge Street consists of smaller sized conduit and both asbestos and polyethylene pits.



For all areas of cable exposure to potential mining impacts it is recommended that the cable routes and pit network be inspected regularly during critical subsidence impacts at each location. This will include inspections along parts of Remembrance Drive, Stilton Lane and Bridge Street at varying times during mining. Additionally 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 ground strains potentially impacting on the conduit and cable network.

d) Optical Fibre Cables F PICT 3002 sections A) & B)

i) Optical Fibre Cable F PCTN 3002 Section A) (Significant).

The optical fibre cable F PCTN 3002 12f Section A) is installed from Stilton Road for approximately 900 metres diagonally crossing LW31 along the western side of Stilton Lane as shown in Plate 3. Due to subsidence impacts from LW31 there is a risk to the transmission capacity into and out of the tower thus isolating the tower and the mobile network from the switching network at Picton Exchange. The predictions from Appendix A Sheet 4 used for the Optical Fibre Cable (which have a factor of 10 applied for conversion from Curvature to Strain) indicate for longwall LW31, that strains are likely to be approximately 0.7mm/m tension and 1.1mm/m compression. This data can be compared to the subsidence data collected for LW28 to LW30 for the Optical Fibre Survey line which showed anomalous ground movement with maximum strains of 1.2mm/m tension and around 5mm/m compression recorded. Additionally towards the eastern end of the Hilton Park survey line compressive strains of around 1.4mm/m were recorded in the general vicinity of the tower and cable entry to the tower. Therefore using this data and accepting that where the high ground strains were recorded the cable was installed in protective conduit there have been no impacts on the cable from previous longwall mining. However as the cable along the western side of Stilton Lane across LW31 is direct buried there is moderate level of risk involved to the optical fibre cable with potential for high strains from unpredicted ground movements and as a result an inspection and testing regime is recommended for this cable. This work can be arranged by Comms Network Solutions Pty Ltd to carry out OTDR testing from the Tower Hut east and north across LW31 @ 1650nm with particular emphasis on the condition of the 900 metres of cable along the western side of Stilton Lane. Testing will initially be monthly as the longwall progresses and then reduced to fortnightly and weekly as the cable is undermined.

ii) Optical Fibre Cable F PCTN 3002 Section B) (Significant).

As indicated this cable enters the eastern goaf edge of LW31 at Bridge Street Picton. The cable provides service to the Industrial Area along Bridge Street. Although the potential impact on the cable is low should there be any anomalous ground movement there is the remote possibility that services to the Industrial Area could be significantly impacted.

Since Section A) of the cable is vulnerable to mine impacts concurrently it will require little additional effort to also monitor fibres in this Section B) of the same cable to the Industrial Area. OTDR testing of the cable will also provide baseline data for subsequent mining in LW32 when this section of the cable is fully undermined. The cable testing will also be supplemented by survey data provided by Tahmoor Coal along this section of Bridge Street.

e) Telstra Mobile Telephone Tower (Low)

As mentioned above due to the low level of predicted ground movement occurring at the Tower the existing tiltmeters only will be used as a check on very minor levels of predicted tower movement.



Plate 7:

View of base of tower showing installation of tiltmeters on the base slab of the tower. Live data from the tower for tilt is recorded at 15 minute intervals and graphed on the Lynton Survey website.

### **3.2) Surface Subsidence Survey**

The control procedure for the Telstra plant should be supplemented by ground surveys carried out by Tahmoor Coal at agreed time intervals along agreed base lines of Remembrance Drive, Stilton Lane, Bridge Street recording:-

- 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.

In addition the frequency of the survey and the reporting of the results, to the *Plan Review Meeting*, are to be 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.

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 e).

**Table 3 - Summary of Monitoring Procedures and Actions**

<b><u>ITEM OF PLANT</u></b>	<b><u>Risk Factor</u></b>	<b><u>Method Levels</u></b>	<b><u>Detail</u></b>	<b><u>Monitoring Frequency</u></b>	<b><u>Trigger</u></b>	<b><u>Actions &amp; Responsibilities</u></b>
<b><u>a) Lead junction Cable C PICT 444, J1-150</u></b>	Low	Record Cable Pressure, Physically Monitor	Record initial cable pressure on cables C1 at pillar manhole and through subsidence zone at regular intervals during periods of ground subsidence.	Record cable pressures prior to mining then as required by Plan Review Meeting,	Variation in cable pressure of 5-10Kpa.	C Dove to advise Mark Schneider of loss of pressure on cable. Mark Schneider to advise Plan Review Meeting of proposed action in relation to repair / maintenance on cables.
<b><u>b)Copper Distribution</u></b> <b><u>i) Local Copper Cable (Telstra and NBN Cables)</u></b>	Low	Regular physical checks of cables & general condition of distribution cables.	Carry out physical check of cables related to any subsidence damage reported and any anomalous ground movement occurring in the subsidence zone. Complete regular physical inspections of network during the critical subsidence event for that particular location. Check available survey data to indicate areas of anomalous subsidence behaviour.	Monitor as required by Plan Review Meeting dependant on survey results provided along roads within the subsidence zone.	Investigate any anomalous subsidence variations from predicted subsidence profile. Carry out regular physical checks on the network.	If problems identified in a) above with cable performance C Dove to re-inspect subscriber cables and advise Telstra & NBNSCo of results. C Dove to liaise with Plan Review Meeting & arrange repair / maintenance as required by NBN or Telstra. C Dove to complete regular inspections of network during periods of maximum subsidence at particular locations.
<b><u>c) Conduit, Manhole Pit &amp; Pole Network</u></b>	Low	Monitor conduit & cable movement in pits and manholes and Pole Tilt.	Monitor conduit & cable movement in Remembrance Drive, Stilton Lane & Bridge St during subsidence period from LW31 impacting on particular areas.	Prior to mining then as determined by Plan Review Meeting.	Visual check of section being monitored. If significant surface movement evident check distribution cables in conduit network.	Should surface damage occur or survey data indicate anomalous movement check conduit pit and manhole network in this area. C Dove to advise Mark Schneider of any damage evident & Mark Schneider to advise Plan Review Meeting of maintenance / repair work proposed.

<b><u>ITEM OF PLANT</u></b>	<b><u>Risk Factor</u></b>	<b><u>Method Levels</u></b>	<b><u>Detail</u></b>	<b><u>Monitoring</u></b>	<b><u>Frequency</u></b>	<b><u>Trigger</u></b>	<b><u>Actions &amp; Responsibilities</u></b>
<b><u>F PCTN 3002 Sect A)&amp;B) &amp; NBN Optical Fibre</u></b>  <b><u>i) Optical Fibre Cable F PCTN 3002 Sect A)</u></b>  <b><u>iii) Optical Fibre Cable F PCTN 3002 Sect B)</u></b>	Significant  Significant	Survey cable line Base line OTDR Testing.	Tahmoor Coal (TC) to survey cable line. OTDR Testing @ 1625nm of F PCTN 3002 A) & B) by Comms Network Solutions P/L (CNS).	Initial survey & OTDR test then fortnightly / weekly during critical subsidence events.	Ground Strain > 1mm/m, OTDR loss on fibre <0.3dB.	TC or CNS P/L (Colin Dove) to report trigger levels to plan Review Meeting for decision on action to be taken as considered necessary by Telstra representatives to protect the cables. Any impact on Telstra cables to be reported to NBNC0 immediately as cables are co-located.	
<b><u>d) i) Telstra Tower</u></b>	Low	Monitor tower tilt with installed tiltmeters.	TC to maintain continuously recording bi-directional tiltmeters on Tower base	Tiltmeter continuous recording, data available to Telstra via website	Tilt 0.5 degrees by tiltmeter.	TC to advise Telstra Mark Schneider and Rhadhika Anandamohan of trigger on Tower and report to Plan Review Meeting for decision on action to be taken as considered necessary by Telstra representatives to protect the transmission network.	
<b><u>Survey Line</u></b>	Not Applicable	Establish permanent marks at approx. 20 metre intervals along roads, cable line where Telstra network installed.	TC to carry out detail survey, (subsidence, strain and tilt recorded) along Remembrance Drive, Bridge Street, Stilton Lane & along optical fibre cable line and tower base. Provide survey results to Telstra representatives.	To be determined by Plan Review Meeting dependant on degree of subsidence occurring and potential hazard to Telstra plant	Ground strain above 1mm/m	TC to make survey results available to Telstra following each regular survey.	



#### **4.0) Geological Structures:**

Refer to Section 1.8) Reference No 1 and the discussion indicating that there have been extensive drilling investigations to identify geological structures at coal seam level. “*The only known fault is the Nepean Fault, which is located to the east of the proposed longwalls*” However while there is little or no evidence of geological structures related to LW31 the experience gained from longwalls LW24 to LW30 east of the Main Southern Railway indicates anomalous subsidence behaviour is possible in this area. It has been suggested this excessive ground movement could possibly be related to the presence of the Bargo River Valley or the Nepean Fault. The existing known geological structures are shown on MSEC Drawing MSEC647-08 “Tahmoor North LW31 to LW37 SMP Geological Structures” attached as Appendix A - Sheet 6. Should any evidence of unpredicted movement or location of geological structures become apparent during mining of LW31 this should be reported immediately to Telstra. Also during future mining development works or should “Regional or Far Field Horizontal Ground Movements” be recorded, this information should also be immediately reported to the *Plan Review Meeting* for Telstra to consider the impact on their network.

#### **5.0) 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 established on the roads around the tower and along the optical fibre cable line within the subsidence zone to determine incremental and total subsidence, strain and tilt during mine subsidence from LW31. The initial survey is to follow on from LW30 survey and the frequency of the survey work is to be reviewed at the regular *Plan Review Meetings*.

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 Subsidence Advisory NSW 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.

#### **6.0) Roles and Responsibilities**

The monitoring of the Telstra network in accordance with this management plan is to be carried out by Telstra with the ground survey component of the monitoring work completed by Tahmoor Colliery. The Management *Plan Review Meeting* is to be the forum for discussion and resolution of issues raised in the operation of the Management Plan and impacts on the Telstra network. This meeting need only be convened in the event of trigger levels being reached, mining induced faults or damage occurring within the Telstra network. Any anomalous ground movement resulting from subsidence over LW31 and any risk perceived by Tahmoor Colliery to the Telstra network due to mining is to be used to prompt an initial *Plan Review Meeting*.

The representatives invited to attend the *Plan Review Meeting* are:-

Belinda Treverrow – Approvals & Community Coordinator, Tahmoor Coal Pty Ltd, Tahmoor Coal.

Mark Schneider, Team Leader Telstra Network Integrity.

Radhika Anandamohan Technology Specialist Telstra Mobile Coverage Delivery NSW & ACT.

Matthew Montgomery, District Supervisor, Southern Coalfields, Subsidence Advisory NSW.

Daryl Kay, Mine Subsidence Engineering Consultants Pty Ltd.

Colin Dove, Consultant Telecommunications Engineer.

When required the *Plan Review Meeting* is to appoint 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 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 Telstra Network or 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 References 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.

## **7.0) Audit and Review**

It is anticipated that this plan will be in place for approximately 12 months from the commencement of mining through to completion of LW31 or for a minimum period of three months following final ground settlement after extraction of LW31. 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 Subsidence Advisory NSW 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 interruption or loss of services.
- Any trigger levels being reached or exceeded.
- Favourable performance of the Telstra plant in regard to mine subsidence, no observed or recorded impacts.
- Significant variations between actual and predicted subsidence occurring including variations in ground strain observed from survey data.
- Evidence of significant geological faults or evidence suggesting major "Far field effects" may develop.

## **8.0) Record Keeping**

As required when meeting is initiated the minutes secretary of the *Plan Review Meeting* shall keep minutes from the meetings called and advise participants of any 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 any incidents/damage reported to the meeting involving the Telstra network.

## **9.0) Associated Documents and References**

### **9.1) Appendices**

Appendix A (Drawings Extracted from Reference No 1)

Tahmoor Colliery, Tahmoor North,  
LW 31 to 37 SMP,  
General Layout,  
Drawing No MSEC 647-01 Sheet 1 of 6

Tahmoor Colliery, Tahmoor North,  
LW 31 to 37 SMP  
Telecommunications Infrastructure  
Drawing No MSEC 646-22 Sheet 2 of 6

Tahmoor North, LW31 to LW37,  
MSEC Fig. E.16  
Predicted Profiles of Systematic Subsidence, Tilt and Curvature  
Along Bridge Street, Resulting from the  
Extraction of Longwall 22-37 Sheet 3 of 6

Tahmoor North, LW31 to LW37,  
MSEC Fig. E.20  
Predicted Profiles of Systematic Subsidence, Tilt and Curvature  
Along the Optical Fibre Cable, due to the  
Extraction from Longwall 22-37 Sheet 4 of 6

Tahmoor North, LW31 to LW37,  
MSEC Fig. E.15  
Predicted Profiles of Systematic Subsidence, Tilt and Curvature  
Along Remembrance Drive, Resulting from the  
Extraction of Longwall 22-37

Sheet 5 of 6

Tahmoor Colliery, Tahmoor North,  
LW31 to LW37 SMP,  
Drawing No MSEC 647-08  
Geological Structures

Sheet 6 of 6

## 9.2) References

### Reference No 1

The Report MSEC 647, Revision A, Volume 1,  
Titled "Glencore - Tahmoor Colliery - Longwalls 31 to 37,- Subsidence Predictions and  
Impact Assessments for Natural and Built Features in Support of the SMP Application"  
December 2014.

## **10.0) Contact List.**

Contacts of Participants involved in *Plan Review Meetings*:

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