Telstra Corporation Ltd
Network Integrity
N.S.W.

SIMEC Mining
Tahmoor Coking Coal Operations

MANAGEMENT PLAN

LONGWALL MINING (LW32)
BENEATH TELSTRA PLANT
@ TAHMOOR & PICTON N.S.W.

AUTHORISATION OF MANAGEMENT PLAN

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1.0 Introduction

Tahmoor Coking Coal Operations proposes to continue the extension of longwall mining activities to the north of Tahmoor and towards the south-western side of Picton in NSW. Tahmoor Coking Coal Operations has previously mined Longwalls 22-30 in the current series and is currently planning on completing extraction of Longwall (LW) 31 in August 2018 with LW32 extraction to follow.

As part of the planning for mining longwall LW32, Tahmoor Coking Coal Operations 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 LW32 on these assets owned by Telstra. The new longwall LW32 is planned to commence at the end of September 2018 and it is anticipated to take approximately 12 months for full extraction of coal. See layout of LW28-LW32 in Plate 1 on the following page.

Tahmoor Coal Pty Ltd 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. This impact area has been specifically updated for LW32 and MSEC Drawing MSEC945-07-01 is attached as **Appendix A**, Sheet 1which also shows the layout of the Telstra optical fibre and copper cable networks on this drawing.

Telstra's major assets in the area are: Tahmoor telephone exchange which is located on the north east corner of Thirlmere Way and Denmead Streets and Picton telephone exchange which is Menangle Street. Telstra's main cable network between these exchanges feeds along Thirlmere Way or Remembrance Drive with the customer distribution area essentially split along the line of LW32 with the north-east area fed from Picton and the south west area from Tahmoor. During the extraction of previous longwalls LW22 to LW31 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 LW32 is partially crossing Remembrance Drive at the location of the main Trunk cable between Picton and Tahmoor exchanges and the northern end of the longwall will potentially affect cables in the Picton exchange area. The current optical fibre cables potentially impacted by the new longwall cross LW32 in the north along Bridge Street and Thirlmere Way within the 20mm subsidence contour and in the centre of the longwall along Henry Street – Stilton Lane and these cables originate from Picton exchange. Therefore, the Telstra cable network potentially impacted by LW32, 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 within the southern goaf end of LW32.

b) The distribution cable network to individual customers within the 20mm subsidence zone located along Henry Street-Stilton Lane from Picton exchange and along a short section of Remembrance Drive to the west towards LW32 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, Redbank Place and to the north of Thirlmere Way**. The Telstra Local cable distribution network is therefore confined to the area in Henry Street and Remembrance Drive influenced by LW32. 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 ends of LW31-LW32.

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 crossing LW32
   iii) The IEN Optical Fibre Cable F PCTN 103 installed from the railway line at Thirlmere Way west and to the north of Thirlmere way linking Picton & Tahmoor exchanges.

See cable details in yellow in **Plate 1** and **Appendix A** Sheet 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 principally the Picton area, the manhole, pit, pole and conduit network that supports the entire cable distribution network.

Refer to **Plate 1** showing the general layout of the new longwalls.

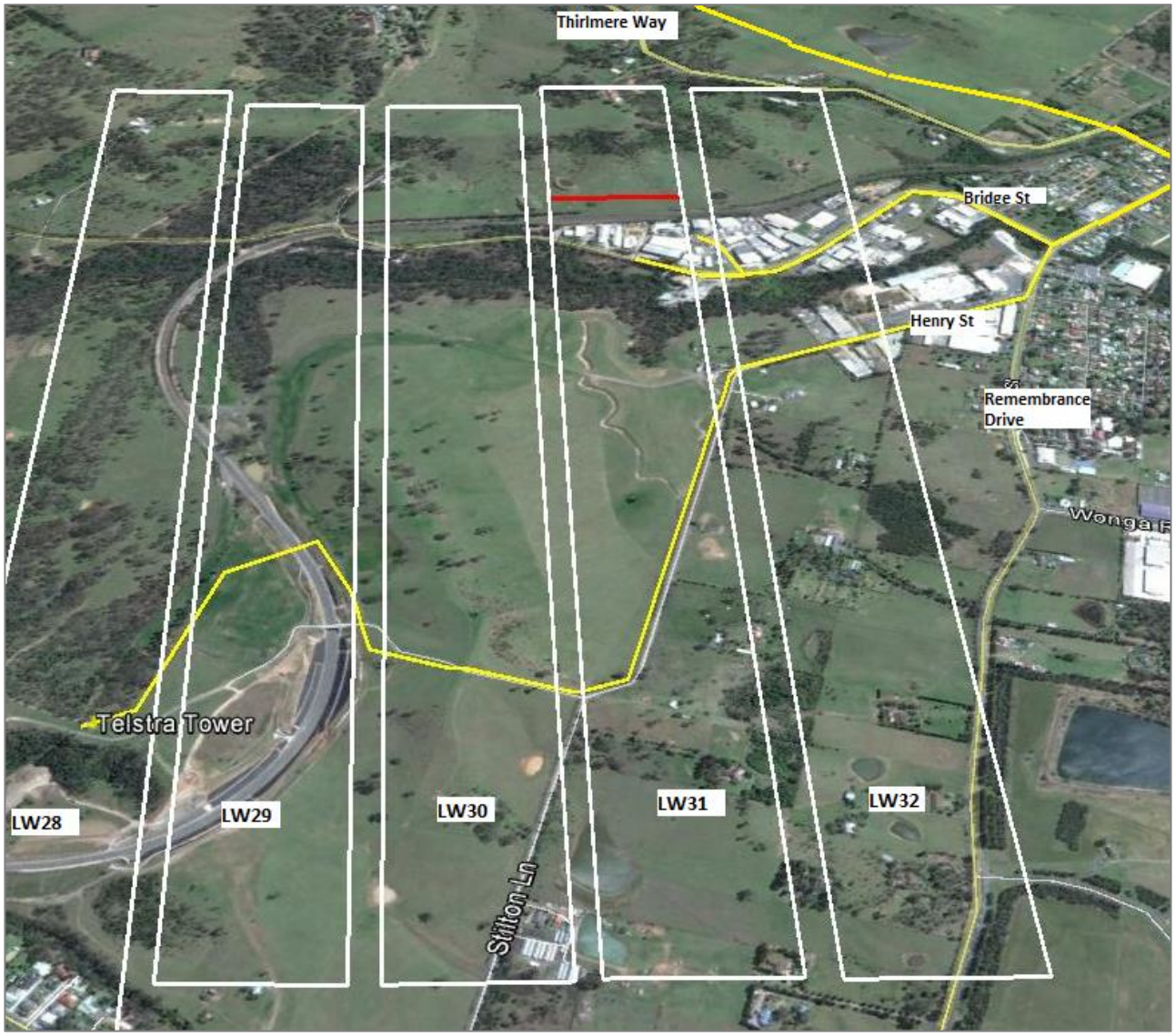

Plate 1:
Google Earth aerial view of five longwalls LW28 to LW32 showing location of extraction in LW31 as at June 2018 (Red Line). LW32 extends north-west from crossing Remembrance Drive between Picton and Tahmoor, crosses Henry Street at the intersection with Stilton Lane and then crosses Bridge Street, Redbank Place and the Main Southern Railway in the north to the west of Picton. The yellow lines indicate Telstra optical fibre cables, two sections of the cable are F PCTN 3002 A) and B). Section A) is installed along Henry Street -Stilton Lane to the Telstra Tower and Section B) feeds along Bridge Street and Redbank Place. The IEN cable F PCTN 103 is to the north of Thirlmere Way just within the 20mm subsidence contour.

1.1) NBN

Since the original management plan was prepared for LW30 there has been a gradual change of ownership of some sections of Telstra's network. NBN is now responsible for some of 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 distribution 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. See Screen Print from NBN Roll-Out Map below and also refer to Appendix A sheet 5 attached.

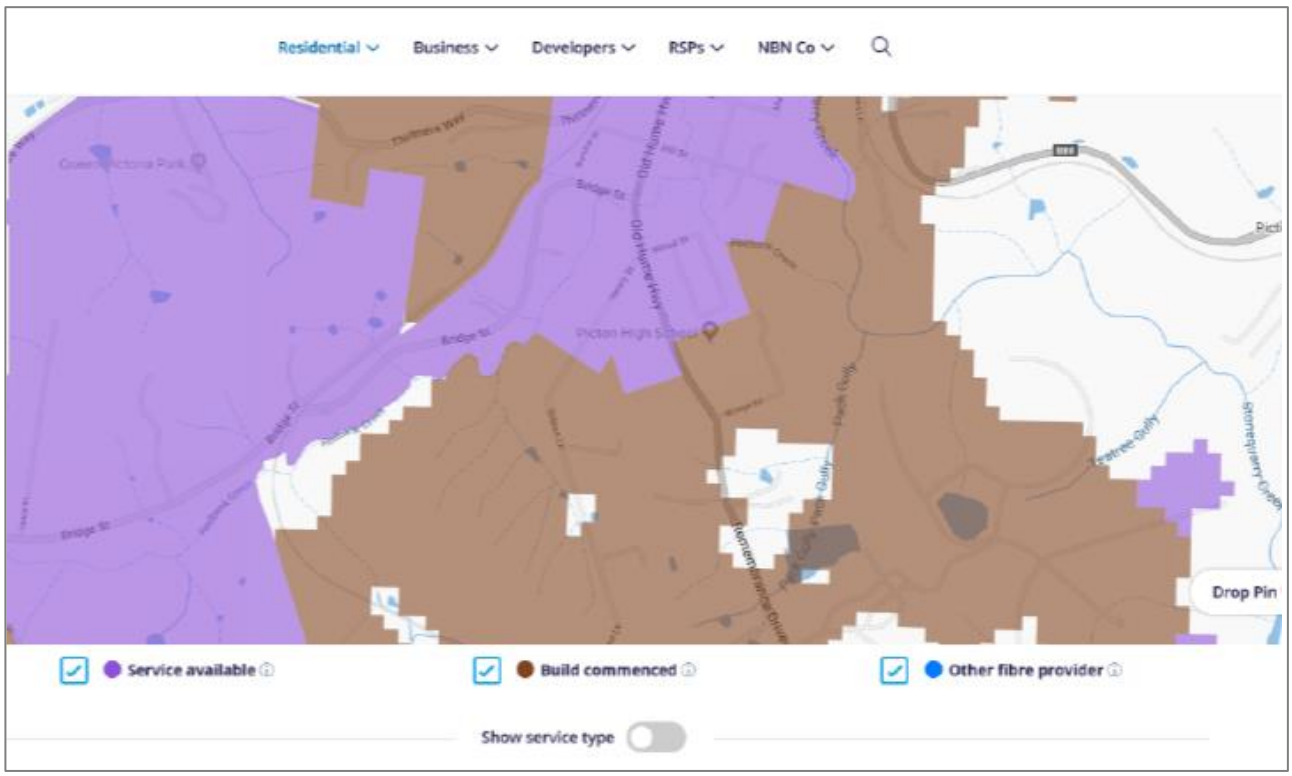

Figure 1:
NBN Rollout Map (22-6-18) indicating the difficulty presented with ownership of the communications network in the Picton – Tahmoor Area. Purple Area to the north along Bridge Street but not including Thirlmere Way is the area of NBN Local cable ownership. The remaining Brown Area to the south, split half way south-west along Henry Street and then in Stilton Lane and Remembrance Drive is under control of Telstra with NBN commencing some build activity in this area. Note that all the conduit, pit, poles and manholes that NBN cables are installed in remain Telstra's property.

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 west of Redbank Place.

b. On the eastern side of Redbank Place.

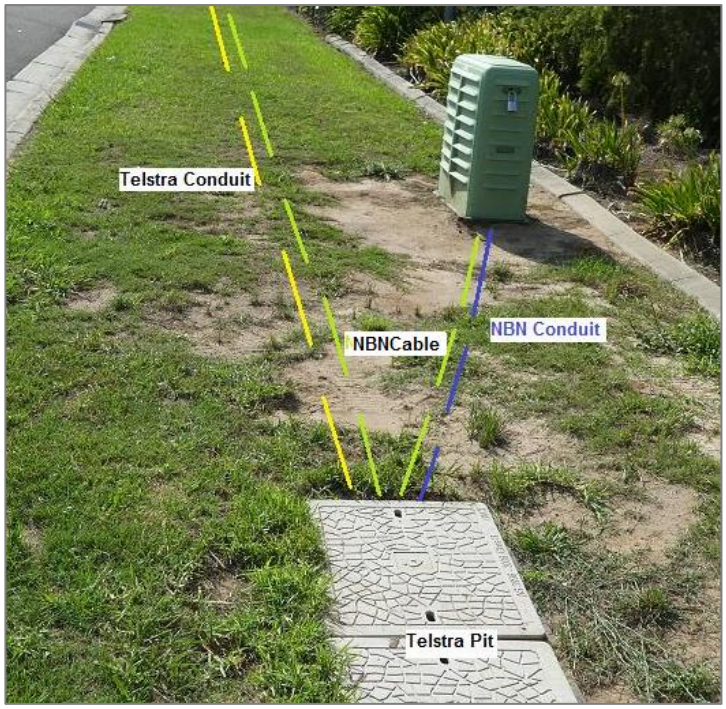

Plate 2:
NBN above ground Micro Node or VDSL (Very High Bit Rate Subscriber Line) Cabinet in Redbank Place. Shows an example of the arrangement of the ownership of the network between Telstra & NBN.

1.2) Consultation

1.2.1) Consultation with Telstra

Tahmoor Coking Coal Operations regularly consults with Telstra in relation to mine subsidence effects from mining. This includes consultation during the development of Subsidence Management Plans for previous Longwalls 22 to 31, and regular reporting of subsidence movements and impacts.
Details regarding consultation and engagement are outlined below:

- A risk assessment was held on 10 May 2018.
- Meeting with Colin Dove (Comms Network Solutions) and in August 2018 to discuss the draft Subsidence Management Plan for Longwall 32.

Tahmoor Coking Coal Operations will continue to consult regularly with Telstra during the extraction of Longwall 32 in relation to mine subsidence effects from mining.

1.2.2) Consultation with Government Agencies & Key Infrastructure Stakeholders

Government agencies including the NSW Department of Planning & Environment, Resources Regulator, Mine Safety Operations, Subsidence Advisory NSW (Mine Subsidence Board) and key infrastructure stakeholders including Wollondilly Shire Council, Endeavour Energy, Sydney Water and Jemena have also been consulted as part of the Subsidence Management Plan (SMP) approval process.

1.3) 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 LW32 plus utilise the experience gained from the management of the Telstra infrastructure from previous subsidence events due to LW29 to LW31 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 natutre 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 catenery with the potential to either stretch the cable or reduce the ground clearance on the particular cable. For LW32 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, Wonga Road, Thirlmere Way, Bollard Place, Wood Street and Coachwood Crescent. 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, Redbank Place, Bollard Place and Wonga Road and to the north of Thirlmere Way, see **Plate 1**.

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, Shown in **Appendix A** Sheets 2-4.

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
	Due to LW37	675	4.0	0.06	0.11
Optical Fibre Cable adjacent to Thirlmere Way	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 Thirlmere 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 LW32 are summarised in MSEC **Fig E16** for Bridge Street (Optical Fibre & Copper Local Cable) attached as Appendix A sheet 2 and Fig E20 for Stilton Lane (Optical Fibre & Copper Local Cable) attached as **Appendix A** sheet 3 and for copper cable in Remembrance Drive **Fig E15** attached as **Appendix A** Sheet 4. A summary of the Subsidence Tilts and Curvature (Strain) taken from Figures E16, E20 & E15 are shown below in **Table 1** below. There is minimal potential impact from LW32 on Telstra cables along Remembrance Drive, see Reference 1 Figure E15 attached as **Appendix A** Sheet 4. Note the predicted impact of LW32 along Thirlmere Way as shown in Ref 1 Figure E18 is less than 100mm subsidence and ground strains are less than 0.1mm/m hence it can be reasonably assumed that there will be no impact on optical fibre F PCTN 103 and local copper cables in this area.

TABLE 1

Maximum Predicted Cumulative Subsidence Parameters for LW32

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 Pl	800	4.0	+0.06, -0.12	0.6mm/m tension 1.2mm/m compression
Optical fibre & Local underground copper cable Henry Street	800	5.0	+0.06, -0.11	0.6mm/m tension 1.1mm/m compression
Trunk & Local underground copper cable Remembrance Drive	300	1.0	+0.06, -0.01	0.5mm/m tension 0.1mm/m compression

The Telstra Mobile Telecommunications tower is located towards the northern goaf edge of LW28 and is shown in **Appendix A** Sheet 1. The tower is outside the predicted 20mm subsidence contour and it is reasonable that it is considered that there will be no impact from LW32.

It is proposed that this management plan will continue the agreement between Telstra and Tahmoor Coking Coal Operations 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 LW32 extraction.

1.4) 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 LW32 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 LW31 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.

1.5) Objectives

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

a. Ensure the safe and serviceable operation of all surface infrastructure. Public and workplace safety is paramount. Ensure that the health and safety of people who may be present in the vicinity are not put at risk due to mine subsidence.

b. Disruption and inconvenience should be avoided or, if unavoidable, kept to minimal levels.

c. To audit and assess the relative risk, for each section of the Telstra network, exposed to mine subsidence.

d. 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.

e. To provide a plan of action, should the subsidence effects impact on the serviceability or performance of plant.

f. Establish a clearly defined decision-making process to ensure timely implementation of risk control measures for high consequence but low likelihood mine subsidence induced hazards that involve potential serious injury or illness to a person or persons that may require emergency evacuation, entry restriction or suspension of work activities.

g. 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 Coking Coal Operations, Telstra Network Integrity, Subsidence Advisory NSW, Mine Subsidence Engineering Consultants Pty Ltd, and other consultants as required.

1.6) Scope

As identified in 1.1) above the Local cable reticulation in Bridge Street is now owned by NBN while Telstra retains ownership of main cable, manholes, pits, conduit and poles. Telstra retains ownership of all the Main & Local cable and distribution network in Henry Street-Stilton Lane and along Remembrance Drive.

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 and to ensure that the health and safety of people who may be present on public property or Telstra property are not put at risk due to mine subsidence. The major items of Telstra plant are considered, according to their location relative to subsidence impacts from LW32. These items are listed below as items a) to d) 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 1. 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 south along Remembrance Drive into LW32.

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 LW32.

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 LW32 where it crosses LW32 extending into Stilton Lane over LW31. See **Plate 3** below.

ii) Optical Fibre Cable F PICT 3002 –Section B). This cable enters the subsidence zone and goaf edge of LW32 along Bridge Street providing services to the industrial area. The layout of the cable is such that it is jointed in Bridge Street over LW32 and the cable then feeds into Redbank Place and continues west along Bridge Street to Endeavour Energy so that the cable each side of the joint is vulnerable both in Bridge Street and Redbank Place.

Plate 3:
View north along Stilton Lane towards Henry Street on Chain Pillar of LW31 / LW32 showing approximate route of F PCTN 3002 Section A) along the western side of Stilton Lane and crossing into LW32 in Henry Street.

1.7) Timing

As mentioned above longwall LW31 will be completed in August 2018 and LW32 is anticipated to commence at the end of September 2018. The longwall will then take approximately 12 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 LW32, anticipated towards the end of 2019 and for sufficient period of time thereafter to allow for completion of subsidence effects.

1.8) 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 Coking Coal Operations, Telstra NI, Mine Subsidence Engineering Consultants Pty Ltd, Subsidence Advisory NSW and consultants as required.

1.9) NSW Work Health & Safety Legislation

All persons conducting a business or undertaking (PCBUs), including mine operators and contractors, have a primary duty of care to ensure the health and safety of workers they engage, or whose work activities they influence or direct. The responsibilities are legislated in *Work Health and Safety Act 2011* and the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and associated Regulations (collectively referred to as the 'WHS laws').

The *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* commenced on 1 February 2015 and contains specific regulations in relation to mine subsidence.

As outlined in the Guide by the NSW Department of Trade & Investment Mine Safety:

"a PCBU must manage risks to health and safety associated with mining operations at the mine by:

- *Complying with any specific requirements under the WHS laws.*
- *Identifying reasonably foreseeable hazards that could give rise to health and safety risks.*
- *Ensuring that a competent person assesses the risk.*
- *Eliminating risks to health and safety so far as is reasonably practicable.*
- *Minimising risks so far as is reasonably practicable by applying the hierarchy of control measures, any risks that it is are not reasonably practical to eliminate.*
- *Maintaining control measures.*
- *Reviewing control measures.*

The mine operator's responsibilities include developing and implementing a safety management system that is used as the primary means of ensuring, so far as is reasonably practicable:

- *The health and safety of workers at the mine, and*
- *That the health and safety of other people is not put at risk from the mine or work carried out as part of mining operations."*

Detailed guidelines have also been released by the NSW Department of Planning & Environment, Resources Regulator, Mine Safety Operations (MSO, 2017).
The risk management process has been carried out in accordance with guidelines published by the NSW Department of Planning & Environment, Resources Regulator, Mine Safety Operations (MSO, 2017). The following main steps of subsidence risk management have been and will be undertaken, in accordance with the guidelines.

1. Identification and understanding of subsidence hazards.
2. Assessment of risks of subsidence.
3. Development and selection of risk control measures.
4. Implementation and maintenance of risk control measures, and
5. Continual improvement and change management.

Each of the above steps have been or will be conducted together with the following processes.

1. Consultation, co-operation and co-ordination, and
2. Monitoring and review.

This Management Plan documents the risk control measures that are planned to manage risks to health and safety associated with the mining of Longwall 32 in accordance with the WHS laws.

2.0) Principal Risks Identified

In relation to the assets identified in 1.6) item a) to d) above, the following are the assessed relative risks associated with existing Telstra plant within the 20mm mine subsidence contour area as shown in **Appendix A** Sheet 1. 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**				
		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) 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 and 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 south eastern corner of LW32. The predictions for Remembrance Drive is for minimal subsidence @300mm and ground strains of 0.5mm/m tension and 0.1mm/m compression. **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 at a very low level 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 considered as **Low**.

Plate 4:
View of No6 Pit in private property on west side of Remembrance driveinside the eastern goaf edge of LW32 showing lead joint in C PCTN 444 Z01, J1-150/0.90. Cable still has air pressure and joints to the south over 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 LW32 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 and Remembrance Drive 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 above ground. 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 LW32 and the direct buried 10, 6 and 2 pair cables then continue south east along Stilton Lane over LW32. The only other cable entering LW32 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 NBNCo.

Plate 5:
Typical view of above ground joint 30Pr / 30Pr / 6Pr in Remembrance Drive over LW32 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 and Remembrance Drive 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) -To 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 across LW32 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. Longwall LW32 exposes a 400m section of the direct buried cable along Henry Street from Stilton Lane east as shown in **Plate 3**. The predictions along the cable line over LW32 are for tensile strains of around 0.6mm/m and compressive strains of around 12mm/m. Refer to **Appendix A** Sheet 3 and **Table 1** above. It is worthwhile noting that localised anomalous ground strains have been recorded along the optical fibre cable line of 1.9mm/m tension and almost 2.4mm/m compression. Particularly ground strains over 2mm/m compression are of concern for direct buried optical fibre cable. Fortunately, these strains were monitored and the cable regularly tested to ensure there was no localised impact on the cable at the high strain locations. The levels of strain predicted for the direct buried cable along Henry Street 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.**

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 and crossing LW32. 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 over LW31 east to LW32 showing Telstra optical fibre cable (yellow) to Energy Australia Depot in Bridge Street. Also shows cable feed east along Bridge Street and NBN cable (green) to the Node from the Telstra Pit.

The optical fibre cable enters the 20mm subsidence zone around along Bridge Street and enters the eastern goaf edge of LW32 at Bollard Place. With reference to Appendix A Sheet 2 and Table 1above the predictions for the cable along Bridge Street are for tensile strain of 0.6mm/m and compression of 1.2mm/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.

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 NBNCo.

2.1) Identification of subsidence hazards that could give rise to risks to health and safety

Clause 34 of the *Work Health and Safety Regulation (2017)* requires that the duty holder (in this case Tahmoor Coking Coal Operations), in managing risks to health and safety, must identify reasonably foreseeable hazards that could give rise to risks to health and safety.
This section of the Management Plan summarises hazards that have been identified which could rise to risks to health and safety of people in the vicinity of Telstra infrastructure.
Mine subsidence hazards have been identified, investigated and analysed in a systematic manner by examining each aspect of the infrastructure, as described in Section 2.0 of this Management Plan. Each of the aspects below could potentially experience mine subsidence movements that give rise to risks to the health and safety of people:

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

b. The Telstra copper Local cable distribution on the customer side of the Pillar, providing connection to each customer's premises.

c. Conduit, Manhole, Pit & Pole network.

d. Optical Fibre Cables F PICT 3002.

The following mine subsidence hazards were identified that could give rise to risks to health and safety due to the extraction of Longwall 32.

- Temporary loss of telecommunication services.
- Loss of clearance height of aerial cables.
- Tensile pulling of consumer lines at customer connections.

The identification and risk assessment process took into account the location of infrastructure relative to LW32 and the associated timing and duration of the subsidence event, as described in this Management Plan.

Whilst mine subsidence predictions and extensive past experiences from previous mining at Tahmoor Coking Coal Operations were taken into account, the identification and risk assessment process recognised that there are uncertainties in relation to predicting subsidence movements, and uncertainties in how mine subsidence movements may adversely impact Telstra infrastructure. In this case, creeks and geological structures have been mapped that intersect Telstra infrastructure.

Tahmoor Coking Coal Operations has considered the outcomes of the hazard identification and risk assessment process when developing measures to manage potential impacts on the health and safety of people, and potential impacts on Telstra infrastructure in general. These are described in Section 3 of this Management Plan.

3.0) Control Procedure

Tahmoor Coking Coal Operations has developed and selected risk control measures in consultation, co-ordination and co-operation with the infrastructure owner in accordance with WHS legislation. In accordance with Clauses 35 and 36 in Part 3.1 of the *Work Health and Safety Regulation 2017* and the guidelines (MSO, 2017), a hierarchy of control measures has been considered and selected where reasonably practicable, using the following process:

1. Eliminate risks to health and safety so far as is reasonably practicable, and
2. If it is not reasonably practicable to eliminate risks to health and safety – minimise those risks so far as is reasonably practicable, by doing one or more of the following:
   (a) Substituting (wholly or partly) the hazard giving rise to the risk with something that gives rise to a lesser risk.
   (b) Isolating the hazard from any person exposed to it.
   (c) Implementing engineering controls.
3. If a risk then remains, minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls.
4. If a risk then remains, the duty holder must minimise the remaining risk, so far as is reasonably practicable, by ensuring the provision and use of suitable personal protective equipment.

A combination of the controls set out in this clause may be used to minimise risks, so far as is reasonably practicable, if a single control is not sufficient for the purpose.

There are primarily two different methods to control the risks of subsidence, namely:

Method A – Selection of risk control measures to be implemented prior to the development of subsidence, (Items 1 and 2 above), and
Method B – Selection of risk control measures to be implemented during the development of subsidence (Items 3 and 4 above).

Tahmoor Coking Coal Operations considered Method A and Method B risk control measures in relation to managing potential impacts on Telstra infrastructure due to the extraction of LW32.

Elimination
In this instance, no reasonably practicable controls could be identified that would eliminate the identified risks.

Substitution
In this instance, no reasonably practicable controls could be identified that will change the environment so the hazards could be substituted for hazards with a lesser risk.

Isolation
In this instance, no reasonably practicable controls could be identified to isolate a hazard from any person exposed to it.

Engineering Controls
In this instance, no reasonably practicable controls could be identified to to put in place a structure or item that prevents or minimises risks.

Administrative Controls
Tahmoor Coking Coal Operations and Telstra have developed and implemented Administrative Controls that will put in place procedures to minimise the potential of impacts on the health and safety of people associated with damage to Telstra infrastructure.

Tahmoor Coking Coal Operations and Telstra have developed a management strategy of detecting early the development of potential adverse subsidence movements in the ground, so that contingency response measures can be implemented before impacts on the safety and serviceability develop. The TARP is described in **Table 3** of this Management Plan.

The risk control measures described in this Management Plan have been developed to ensure that the health and safety of people on Telstra infrastructure are not put at risk due to mine subsidence. It is also an objective to avoid disruption to services, or if unavoidable, keep disruption and inconvenience to minimal levels.

With respect to the extraction of Longwall 32, no potential hazards have been identified that could reasonably give rise to the need for an emergency response. Of the potential hazards identified, only a complete loss of mobile and fixed line services could possibly give rise to the need for an emergency response. The likelihood is considered extremely remote and would require substantial differential subsidence movements at multiple locations to develop before such an event occurs.

Mine subsidence movements will develop gradually and there will be ample time to identify the development of potentially adverse differential subsidence movements early, consider whether any additional management measures are required, and repair or adjust affected surface features, in close consultation with Telstra.

Tahmoor Coking Coal Operations and Telstra will review and assess monitoring reports and consider whether any additional management measures are required on a weekly basis. If potentially adverse differential subsidence movements are detected, it is anticipated that a focussed inspection will be undertaken in the affected area, and a decision will likely be made to increase the frequency of surveys and/or inspections. Additional management measures may also be implemented. It is therefore expected that, as a potential adverse situation escalates, Tahmoor Coking Coal Operations will be present on site on a more frequent basis to survey or inspect the affected site, and that Telstra will be consulted on a more frequent basis.

Notwithstanding the above, if a hazard has been identified that involves potential serious injury or illness to a person or persons on public property or in the vicinity of Telstra infrastructure, and cannot be controlled, the immediate response

is to remove people from the hazard. If such a situation is observed or is forecast to occur by either Tahmoor Coking Coal Operations or by people on public property, Tahmoor Coking Coal Operations and Telstra will immediately meet and implement emergency procedures.

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, Tahmoor - 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 d) 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 1.6) 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 or Picton 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 will also protect copper conductors from damage.

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. There are also services along Thirlmere Way but the level of subsidence and ground strain in this area is very low to the level that it is just within the survey measurement tolerances. The services in the rural area of Tahmoor-Picton only service five houses along Stilton Lane & Remembrance Drive. This network has been audited and over LW32 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, Henry Street and Remembrance Drive 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 LW32, there is only a small amount of the network in Henry Street & 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 Henry Street and Stilton Road for approximately 400 metres across LW32 along the northern side of Henry Street as shown in Plate 3. Due to subsidence impacts from LW32 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 3 used for the Optical Fibre Cable (which have a factor of 10 applied for conversion from Curvature to Strain) indicate for longwall LW32, that strains are likely to be approximately 0.6mm/m tension and 1.2mm/m compression. This data can be compared to the subsidence data collected for LW28 to LW31 for the Optical Fibre Survey line which showed anomalous ground movement with maximum strains of 1.9mm/m tension and around 5mm/m compression recorded. 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 and north side of Henry Street across LW32 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 LW32 @ 1650nm with particular emphasis on the condition of the 1300 metres of cable along the western side of Stilton Lane and along Henry Street. Testing will initially be monthly as the longwall progresses and then reduced to fortnightly and weekly as the cable is undermined and ant anomalous ground movement is identified.

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

As indicated this cable enters the eastern goaf edge of LW32 at Bollard Place at 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 possibility that services to the Industrial Area could be significantly impacted.

Since Section A) of the cable is vulnerable to mine impacts and being monitored it is also prudent 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 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 and inspections along this section of Bridge Street, Redbank Place and Bollard Place.

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- Henry Street, Wonga Road, Wood Street, Coachwood Crescent, Redbank Place, Bollard Place, Bridge Street and Thirlmere Way 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

Item of Plant	Risk Factor	Method Levels	Monitoring Details	Frequency	Trigger	Actions and Responsibilities
a) Lead junction Cable C PICT 444, J1-150	Low	Physically Monitor	Record initial cable pressure on cable at joint over LW32 as necessary during periods of ground subsidence.	Record cable pressure 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)Copper Distribution **i) Local Copper Cable (Telstra and NBN Cables)**	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 & NBNCo 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.
c) Conduit, Manhole Pit & Pole Network	Low	Monitor conduit & cable movement in pits and manholes and Pole Tilt.	Monitor conduit & cable movement in Remembrance Drive, Stilton Lane-Henry Street & Bridge St during subsidence period from LW32 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.

Item of Plant	Risk Factor	Method Levels	Monitoring Details	Frequency	Trigger	Actions and Responsibilities
F PCTN 3002 Sect A)&B) & NBN Optical Fibre **i) Optical Fibre Cable F PCTN 3002 Sect A)** **iii) Optical Fibre Cable F PCTN 3002 Sect 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 NBNCo immediately as cables are co-located.
F PCTN 3002 Sect A)&B) & NBN Optical Fibre **i) Optical Fibre Cable F PCTN 3002 Sect A)** **iii) Optical Fibre Cable F PCTN 3002 Sect 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 NBNCo immediately as cables are co-located.
Survey Line	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- Henry Street & along optical fibre cable line over LW31 & LW32. 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"*. Tahmoor Coking Coal Operations commissioned an engineering geologist from Strata Control Technologies in 2018 (SCT) to undertake site inspections and mapping of the Nepean Fault. This work has provided detailed information on the nature and location of Nepean Fault, and second order geological structures associated with the fault.

The geological structures as mapped by SCT have been overlaid with surface features within and adjacent to Longwall 32. These are shown in Drawing No. MSEC945-07-01 (Sheet 1).

It can be seen that the built areas within Tahmoor and Picton are located near a mapped first order Nepean Fault, which follows the escarpment along the western bank of Stonequarry Creek. Drawing No. MSEC945-07-01 shows that Telstra infrastructure crosses the mapped first order fault within the area predicted to experience more than 20mm subsidence.

Telstra infrastructure does, however, cross mapped second order geological structures to the side and beyond the end of Longwall 32.

Tahmoor Coking Coal Operations has surveyed subsidence along many streets during the mining of previous Longwalls 24A to 31. Some of these monitoring lines are located over solid, unmined coal, between the extracted longwalls and the Nepean Fault. None of the survey lines cross first order faults, though two survey lines (Stilton Dam Line and Remembrance Drive East Line) cross mapped second order conjugate faults. A study has been completed to ascertain whether irregular subsidence have occurred along the survey lines. The information provides an indication of the likelihood of irregular movements during the extraction of Longwall 32. The study found no increased subsidence, tilt or strains were measured along the survey lines that were located over unmined, solid coal areas between the extracted longwalls and the Nepean Fault.

Despite the above, the experience gained from longwalls LW24 to LW31 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 or other unknown geological structures. Should any evidence of unpredicted movement or location of geological structures become apparent during mining of LW32 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 Coking Coal Operations will provide the survey resources required for the line surveys established on the roads around and over LW32 and along the optical fibre cable line within the subsidence zone to determine incremental and total subsidence, strain and tilt during mine subsidence from LW32. The initial survey is to follow on from LW31 survey 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 Coking Coal Operations, 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 following procedures will be implemented during and after active subsidence of Telstra infrastructure to ensure the continued effective consultation, co-operation and co-ordination of action with respect to subsidence between Tahmoor Coking Coal Operations and Telstra.

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 Coking Coal Operations. 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 LW32 and any risk perceived by Tahmoor Coking Coal Operations 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:-

Ron Bush – Environment and Community Manager, Tahmoor Coking Coal Operations.
Belinda Clayton – Environment and Community Officer, Tahmoor Coking Coal Operations.
Mark Schneider – Team Leader Telstra Network Integrity.
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 minute's secretary responsible for maintaining all documentation presented to the meeting and responsible for circulating minutes and advising participants of future meetings.

The purpose of the reviews are to:

- Assess monitoring data, including the early detection of potential impacts on health and safety and impacts to Telstra infrastructure;
- Verify the risk assessments previously conducted;
- Ensuring the effectiveness and reliability of risk control measures; and
- Supporting continual improvement and change management.

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 Coking Coal Operations 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

This Management plan has been agreed between parties and can be reviewed and updated to continually improve the risk management systems based on audit, review and learnings from the development of subsidence during mining and manage changes in the nature, likelihood and consequence of subsidence hazards.
The review process will be conducted to achieve the following outcomes;

- Gain an improved understanding of subsidence hazards based on ongoing subsidence monitoring and reviews, additional investigations and assessments as necessary, ongoing verification of risk assessments previously conducted, ongoing verification of assumptions used during the subsidence hazard identification and risk assessment process, ongoing understanding of subsidence movements and identified geological structures at the mine.

- Revise risk control measures in response to an improved understanding of subsidence hazards.

- Gain feedback from stakeholders in relation to managing risks, including regular input from business or property owners.

- Ensure on-going detection of early warnings of changes from the results of risk assessments to facilitate corrective or proactive management actions or the commencement of emergency procedures in a timely manner.

- Ensure timely implementation of a contingency plan in the event that the implemented risk control measures are not effective.

Some examples where review may be applied include:

- 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 observe red 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.

It is anticipated that this plan will be in place for approximately 12 months from the commencement of mining through to completion of LW32 or for a minimum period of three months following final ground settlement after extraction of LW32. Should an audit of the Management Plan be required during that period then a representative is to be appointed by Telstra, Tahmoor Coking Coal Operations 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*.

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 Coking Coal Operations, Tahmoor North -LW 32, Telstra Infrastructure, Drawing No MSEC 945-07-01	Sheet 1 of 5
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 2 of 5
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 3 of 5
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 4 of 5
Tahmoor North, LW31 to LW37 SMP, General Layout- NBN Network MSEC Drawing MSEC647-01	Sheet 5 of 5

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.

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