Telstra Corporation Ltd

Centennial Mandalong Pty Ltd

Network Integrity.

Mandalong, N.S.W.

<u>Telstra Communications Assessment Report</u> for Extraction Plan LW30-LW33

MANDALONG MINE FOR LONGWALL MINING, CROSSING UNDER TELSTRA NETWORK, @ Mandalong, N.S.W.

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1.0 Introduction

Mandalong Mine is a modern underground longwall operation located on the western side of Lake Macquarie near Morisset and west of the M1 Motorway. The Mine is situated approximately 130 km north of Sydney and 50 km from the Port of Newcastle, suppling up to 6.5 million tonnes of coal to the domestic power and export markets.

Centennial Mandalong Pty Ltd (Centennial Mandalong) is the operator of Mandalong Mine and is a wholly owned subsidiary of Centennial Coal Company Limited which is also a wholly owned subsidiary of by Banpu Public Company Limited.

Mandalong Mine commenced longwall mining in 2005 and operates narrow longwall panels in the West Wallarah Seam that utilise the bridging effect of the overlying massive strata to provide reduced levels of subsidence. This design is proven and provides subsidence impacts below safe, serviceable and repairable (SSR) criteria for dwellings and minimises the impacts to the Mandalong valley flood plain, natural features and built features.

As part of the Mandalong Southern Extension Project Approval Conditions, Centennial Mandalong are required to develop Extraction Plans to implement appropriate subsidence impact management strategies in order to satisfy the expectations of the relevant government departments, agencies and stakeholders and meet the performance measures specified in the Conditions of Consent.

The Mandalong Southern Extension Project development application SSD-5144 was approved by the Planning Assessment Commission (PAC) on 12 October 2015. The Report prepared by Ditton Geotechnical Services Pty Ltd (DgS) "Centennial Mandalong Pty Ltd – Subsidence Predictions and Impact Assessment for LW30 to LW33 at Mandalong Mine "– DgS Report No MAN-005/1- Dated 18th August 2020 – Reference No 1 has been prepared to develop the Extraction Plan in accordance with Schedule 4 Condition 6 of the Project Approval. The Extraction Plan (EP) Area comprises a surface area of approximately 167 hectares covering longwalls LW30 to LW33 with individual panel widths of 200m and lengths varying from 1429 to 1929 metres dependant on seam conditions and geological constraints.

Centennial Mandalong have identified surface assets throughout this series of longwalls which may be affected by the mining operations. Some of the assets in this area are owned by Telstra and are part of Telstra's infrastructure providing telecommunications services to this area which are potentially impacted by mine subsidence from longwalls LW30 to LW33. Refer to Plate 1 on following page showing assets considered for this management plan and mine layout shown in Appendix B.

In the proposed mining area as shown below in Binalong Way Telstra's assets consist of:-

- a) Aerial (CAN) copper cable along Binalong Way crossing LW30-LW33.
- b) Associated joints & poles supporting the above cable network.



Plate 1:

Google Earth plan of layout of general area of proposed longwalls LW30 to LW33 to the south of the current series of longwalls LW25 and LW29 shown north of proposed longwalls. Telstra Local cable network identified in red installed as aerial cable along Binalong Way across the longwalls.

Following identification of the Telstra network in the proposed area I was contacted by Mr Phil Enright, Mining Approvals Coordinator from Centennial Mandalong to engage my consulting company to carry out a survey and audit of the Telstra network and prepare a management plan for the Telstra network within the proposed mining area.

This management plan will consider the impact of the ground surface movements, contributed by the proposed extraction of LW30 to LW33 on the Telstra assets.

The DgS Report (Reference No1) has predicted ground subsidence values based on data obtained from previous mining at Mandalong. This subsidence data has been modified for the wider panels to be extracted and the variations in cover and seam heights to present the subsidence values listed below generally for LW30 to LW33. Refer to Appendix A Sheets 2 to 4 for details of maximum subsidence impacts, including vertical subsidence, ground strain & tilt along Binalong Way

Table 1

Summary of Subsidence Parameters for Telecommunications Plant in Mandalong Road and Binalong Way (mean values) from Appendix A Sheets 2 to 4.

LW30 to LW33	Binalong Way Local Aerial Copper
LW30 Max Vertical Subsidence	1200-1400mm
LW30 Max Ground Strain	-6 to -7 mm/m
LW30 Max Ground Tilt	12 - 15 mm/m
LW31 Max Vertical Subsidence	1200-1400mm
LW31 Max Ground Strain	-3 to -4 mm/m
LW31 Max Ground Tilt	7 - 8 mm/m
LW32 Max Vertical Subsidence	800-1000mm
LW32 Max Ground Strain	-1 to -2 mm/m
LW32 Max Ground Tilt	9 - 10 mm/m
LW33 Max Vertical Subsidence	20-200
LW33 Max Ground Strain	-1 to -2mm/m
LW33 Max Ground Tilt	0 - 1.0 mm/m

1.1) Telstra Network Details

1.1.1) Local (CAN) Aerial crossing Longwalls LW30-LW33 in Binalong Way

Refer to Plate 1, for cable location details in this area.

Binalong Way:

Since the direct buried copper cable from Cooranbong exchange area terminates over LW28 on Mandalong Road this aerial cable in the southern section of the mining area along Binalong Way is fed from Dooralong Exchange Area by an aerial 100Pr cable feeding east along Mandalong Road via the Durren Durren area. Therefore, there is an area of around 2000m along Mandalong Road from the last service south from Cooranbong to the services east from Dooralong, into Binalong Way, where there is no Telstra cable installed. This area is the approximate area around the north western corner of LW33.

As shown in Plate 1 above the Local aerial cable crosses all for longwalls LW33-LW30 and then continues east away from LW30 to the east. The aerial cable is 10Pr/0.64 with poles at around 50-60m centres through a relatively narrow tree covered track



Plate 4; Typical 10/0.64 pole mounted joint on aerial cable in Binalong Way



Plate 5: View along Binalong Way showing 10/0.64 aerial cable mounted on Telstra poles

1.2) Limitations.

The mechanism of mine subsidence and its impact on the telecommunications network has been studied recently in some detail especially at Mandalong over the past extraction of longwalls LW1 to LW29. The major concern has been with optical fibre cables which are more vulnerable to tensile strains and compressive strains. However, the only Telstra optical fibre cable in this area terminates at the intersection of Little Valley Road and Mandalong Road over LW24A so there are no issues regarding optical fibre cables to be considered for this management plan.

Based on previous mining experience with Telstra copper cables the more modern and robust plastic sheathed grease filled copper cables installed along Mandalong Road, these types of cables are more able to sustain ground movement without damage. However, in this instance across LW30-LW33 aerial copper cable is installed throughout the subsidence area in the local cable network. In general, aerial cables have sufficient catenary freedom between adjacent poles to accept pole movement caused by ground tilting.

Once the mine subsidence is initiated there is no simple method of halting the subsidence event. Hence if the degree of ground movement begins to affect the Telstra network then there are limited options available to relieve developing tension in the aerial cable. Adjacent spans could be released at the pole top to allow for catenary adjustment and then re-terminated on adjacent poles. The aim of the management plan is to identify the assets present and assess the potential for damage to the network. The plan in itself will not prevent damage but provides a risk assessment and a method for management and minimisation of the risk.

1.3) Objectives & Risk

The objectives of this Management Plan in relation to Telstra's plant are to broadly identify risks associated with the existing network and to provide a strategy for managing this risk.

In relation to the assets identified in 1.1) above, the following are the assessed relative risks associated with existing Telstra plant within the proposed mine subsidence area. The items of plant have been assessed according to the probability of damage and the consequences resulting from that damage. The Risk Factors shown in Table 2 assessed for the plant type, are based on the predicted levels of ground strain and the particular vulnerability of the plant.

Table 2	
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Risk Assessment Matrix		Consequence				
		Insignificant	<u>Minor</u>	<u>Moderate</u>	<u>Major</u>	Catastrophic
	<u>Almost</u> <u>Certain</u>	Significant	Significant	High	High	High
po	<u>Likely</u>	Moderate	Significant	Significant	High	High
keliho	<u>Moderate</u>	Low	Moderate	Significant	High	High
Lil	<u>Unlikely</u>	Low	Low	Moderate	Significant	High
	Rare	Low	Low	Moderate	Significant	Significant

Relative Risk Factor (RF) for Telecommunications Plant

Refer to Appendix A Sheet 1 for cable location crossing the longwalls.

1.3.1) Local (CAN) Aerial Cable Crossing Longwalls LW30-LW33 along Binalong Way - (CAN) 10 and 2 pair 0.64 conductor diameter.

The aerial cable present is influenced predominantly by ground tilt which as shown in Table 1 is decreasing from LW30 west to LW33. Reference 1 suggests the poles carrying the cables "*are likely to be subject to subsidence of between 0.02 and 1.0m and strains between 2 and 10mm/m compressive strain and tensile strain*" Hence the degree of potential ground movement from pole tilt for say 6-8m high poles is a maximum of around 80mm at the pole top. For Telstra poles generally the tilt will be reduced near the centre and increasing towards the goaf and then reducing again over the chain pillars. The eastern goaf edge of LW30 has the most significant tilt as mentioned above at a predicted level of around 10mm/m. It is anticipated that in this worst case for around 80mm tilt the degree of catenary sag would adjust to this change of pole movement. However due to the relatively short spacing of poles and the reducing tilt across the longwalls to the west the risk factor for LW30 is assessed as **Moderate** (Moderate event with Minor consequences) and for the other longwalls where pole top movement would reduce to around 50-60mm (say 7mm/m maximum for 6-8m pole) the risk factor is assessed as **Low** (Unlikely event with Minor consequences)

1.3.2) Associated Poles and Joints Supporting the above CAN Cables.

There is little risk to the Telstra poles from ground subsidence as the degree of differential movement between adjacent poles is anticipated to be low. Also as identified in Reference 1 for Ausgrid poles experiencing similar levels of strain and subsidence as predicted for Telstra poles:-*The conductors between the poles may experience lengthening and/or shortening due to the pole tilts, which may result in conductor clearance losses. It is considered 'very unlikely' that the poles will be impacted by surface strains due to the absence of cracking observed to-date Therefore, it is considered the risk to the poles is Low (Rare event with minor consequence). The in-line joints on the aerial cable are fixed to the poles with slack cable available from the aerial fixture down to the joint. Hence since the poles are unlikely to be impacted the joints are therefore not impacted at all.*

<u>1.4) Scope</u>

The management plan is used to identify and assess the performance of the items of Telstra's plant installed in the proposed mine subsidence area. In this instance the two minor categories of plant have been assessed with relative risk factors assigned to their anticipated performance, based on previous experience and the ground subsidence predictions from reference No1. Since there are many variables involved with the variable ground conditions experience across the 1.0 kilometre of cable length monitoring of Telstra's assets is considered the most viable method of assessing performance and protecting the network as subsidence impacts occur. Hence the management plan will put in place actions and responsibilities to monitor the cables and inspect the aerial network, during the major periods of ground subsidence for each longwall.

1.5) Timing

LW30 is scheduled to commence extraction in July 2021 and is anticipated that the subsidence impacts will commence at the cable line along the northern arm of Binalong Way around September to October 2021. LW31 will then follow through to extraction of LW33 over the ensuing 12

months with extraction planned to be completed by late 2022. The management plan will be in place for a further 3 months or until subsidence impacts are fully achieved in the areas impacted by LW33.

1.6) Definitions

CAN:- Customer Access Network, that part of the Telstra network which delivers services to customer's premises.

DSLAM –Digital Subscriber Line Access Multiplexer is equipment installed in telephone exchanges and at remote locations to provide customer broadband access. The DSLAM allows customer modem access using ADSL technology for broadband access to the internet. The DSLAM equipment can be installed remote from the exchange to multiplex modem connections to the exchange.

Elevated Joint (EJ) :- Galvanised steel channel section buried approximately 400 mm below ground level and extending approximately 800mm above ground. This post is used to bring buried cable to the surface to allow jointing. Allows ease of access for maintenance of joint and provides identification of cable line and protection of joint.

Plan Review Meeting: Forum to be convened as required to implement this management plan. Participants to include representatives from Centennial Mandalong, Telstra, Mine Subsidence Board and consultants as required. Meetings to be at agreed as required.

RAM 8 Systems- Digital pair gain systems where 2 copper pairs are used to multiplex up to 8 subscriber lines. The multiplexing unit is installed in a pit to separate the individual signals to each customer premises.

Telstra NI:- Telstra Network Integrity, responsible for the protection of the external telecommunications network owned and operated by Telstra Pty Ltd

2.0) <u>Control Procedure</u>

As identified in Item 1.3.1) to 1.3.2) above it is considered there are **Low** to **Moderate** risk factors applying to the Telstra cable network across LW30 through to LW33 for the maximum predictions for subsidence strain and tilt operating along the cable line. The following discussion sets out the proposed method of monitoring potential impacts for these low risk factors for the cable line and associated poles supporting the cable.

2.1) Mandalong Road Customer Access Network (CAN) local cable 10 and 2 pair 0.64 conductor diameter &
2.2) Associated poles supporting the Cable in 2.1) above

Risk Assessment Moderate to Low

It is recommended that during periods of developing subsidence from LW30 to LW33 impacting on these cables, that physical monitoring of the cable network be carried out along the cable route during subsidence events impacting the area of the cable line. This inspection should be combined with any feedback received from property owners in the area, who may be aware of particular problems associated with buildings, roadways or other services on their properties. The survey data from LW30-33 for Cross Line A should also be considered in relation to the accuracy of the predictions in relation to actual ground movement occurring. The survey data should be made available to Telstra as soon as subsidence monitoring is completed by Centennial Mandalong.

The frequency of the field monitoring should be based on the survey data recorded along monitoring lines shown in Appendix A Sheet 5. The aim being to show that there is correlation between predicted and actual ground strain developing along the monitoring lines such that anomalous ground movement is not a likely outcome of subsidence occurring. Should anomalous movement be detected in the survey data this should immediately be referred to Telstra for their consideration of the risks this may present to the network. As confidence is gained from the correlation of the survey data the frequency of inspections can then be reviewed during the inspection period based also on the fact that as LW31-LW33 are extracted particularly predicted ground strain and tilts reduce along the cable line to the west.

Should it be necessary to review frequency of inspections the case should be made by Telstra and referred, as necessary to the *Plan Review Meeting*, for consideration by the parties. The initial frequency on cable monitoring should be agreed between Telstra and Centennial Coal.

Refer to the following table, Table 3, which presents a Summary of Risk Factor, Monitoring and Actions required for protection of the Telstra Network which may be impacted by mine subsidence.

Table 3 - Summary of Telstra Monitoring Procedures and ActionsNOTE: Any cable fault detected should be immediately reported to Telstra's fault Line, Contact 132203

ITEM OF DI ANT	Risk	Monitoring & Proposed Action				Actions & Responsibilities
<u>IIEWIOF FLANI</u>	Factor	Method	<u>Detail</u>	Frequency	Trigger Levels	
2.1) CAN Local Aerial Cables. 10/0.64 & 2.2) Poles	Moderate to Low	Physical cable inspection, reports of property damage & survey data	Physical monitoring of cable lines to be completed as per the subsidence monitoring programme and following any report of increased subsidence. Advice from Centennial Mandalong (CM) of any reports of damage by property owners. CM to provide survey data for Cross Line A as identified in Appendix A Sheet 5 to show that actual subsidence parameters recorded are following predictions.	As per the subsidence monitoring programme and following report of increased subsidence frequency as agreed and reviewed by Plan Review Meeting	Significant ground tilt advised from survey results, reports of property / track damage advise and report to Plan Review Meeting.	CM to advise M Schneider & C Dove four weeks prior to each longwall LW31 to LW33 potentially impacting along cable line. Telstra to review survey data for anomalous ground movement, cable inspection details for anomalies. Physical Inspection and report by C Dove to Plan Review Meeting outlining proposed action if impacts occur.

3.0) Geological fault:

For LW30 to LW33 from Reference No 1 Sheet 6 there are no identified Dykes or Fault Lines identified from surface geology. Should Centennial Mandalong become aware of any evidence of increased subsidence due to presence of dykes, faults or other geological structures impacting at the surface or at seam level as longwall extraction progresses then this information should be reported to Telstra to consider the implications for the Telstra network in the area.

4.0) Resources

Resources required to carry out the monitoring as identified in Table 3 are to be provided by Telstra. The costs associated with the monitoring work required for management of the Telstra network are to be covered by Centennial Mandalong and are to be reported to the *Plan Review Meeting* as necessary and agreement reached prior to costs being incurred. Centennial Mandalong will provide the survey resources required for the line surveys identified to determine incremental subsidence, strain and tilt during the operation of the management plan. The initial survey work is to be carried out prior to mining operations impacting on the cable and the frequency of the survey work is to be agreed and reviewed when required by the *Plan Review Meeting*.

Prior to commencing any proposed repair work on the network, the Telstra representatives will detail the extent of the work and the associated costs to a specially convened meeting of the *Plan Review Meeting*. At that meeting agreement will be reached between Centennial Mandalong and Telstra 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 ther discussion and resolution.

5.0) Functions

The monitoring of the Telstra network outlined in this Management Plan is to be carried out by Telstra and Centennial Mandalong. The Management *Plan Review Meeting* is to be the forum for discussion and resolution of issues raised in the operation of the Management Plan when and if required. The current understanding of the status of the subsidence and any risk perceived to the Telstra network is to be used to determine the necessity of a *Plan Review Meeting*.

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

Mark Harrower, Subsidence and Projects Surveyor, Centennial Mandalong. Phil Enright, Mining Approvals Coordinator, Centennial Mandalong Steve Ditton, Principal Engineer, Ditton Geotechnical Services Pty Ltd. Mark Schneider, Team Manager, Telstra Network Integrity. 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 any significant incident recorded in relation to the performance of the Telstra network and a detailed log is to be maintained of any incident reported to

the *Plan Review Meeting*. Full details are to be reported of significant events observed or events which have an impact on the provision of Telstra services in the area. Centennial Mandalong are to report on the degree of subsidence that has occurred at that time and how closely subsidence is following the predictions made in Table No 1 of this report. In additions any reports of property damage or subsidence recorded by property owners is to be reported to the *Plan Review Meeting*.

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.

6.0) Audit and Review

It is anticipated that this plan will be in place for approximately two years from the commencement of mining in LW30 through to completion of LW33 or for a minimum period of three months following final ground settlement from LW33.

Should an audit of the Management Plan be required during its period of operation then a representative is to be appointed by Telstra and Centennial Mandalong 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 cable damage.
- Favourable performance of the Telstra plant in regard to mine subsidence, no observed or recorded impacts.
- Significant variations from predicted subsidence, tilt or strain occurring.
- Variable subsidence data obtained in relation to a steep seam roll.
- Evidence of significant faulting or geological structures likely to affect subsidence.

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

7.0) Record Keeping

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

8.0) Associated Documents

8.1) Appendices

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8.2) References

Reference No 1; The Report prepared by Ditton Geotechnical Services Pty Ltd (DgS) "Centennial Mandalong Pty Ltd – Subsidence Predictions and Impact Assessment for LW30 to LW33 at Mandalong Mine "– DgS Report No MAN-005/1- Dated 18th August 2020.

9.0) Contact List. (Contacts of Participants involved in *Plan Review Meetings*)

Steve Ditton, Principal Engineer, Ditton Geotechnical Services Pty Ltd. 82 Roslyn Avenue, Charlestown, NSW, 2290. Telephone: 0413 094 074, Email: steve.dgs@westnet.com.au

Centennial Coal Company Limited, Phil Enright, Mining Approvals Coordinator, 12 Kerry Anderson Drive, Mandalong, NSW, 2264 Telephone: 02 4973 0948, Mobile 0439 409 781, Email : phil.enright@centennialcoal.com.au Centennial Mandalong, Mark Harrower Subsidence and Projects Surveyor 12 Kerry Anderson Drive, Mandalong, NSW, 2264 Telephone: 02 4973 0955, Mobile 0447234185, Email : mark.harrower@centennialcoal.com.au

Telstra Mark Schneider, Team Manager, Telstra Network Integrity Locked Bag 5035, Parramatta, 2124, NSW, Mobile 0419 242 044, Email :Mark.P.Schneider@team.telstra.com

Colin Dove, Comms Network Solutions Pty Ltd, Telecommunications Consultant, External Plant, Mobile 0428 970 826, Email cdove@commsnet.net.au,

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Untitled Map

Write a description for your map.

LW25- LW29

-Reynolds Rd -

Binalong Way

Old Layout LW30& LW31

New Layout LW30 to LW33*

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Google Earth

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 Ditton Geotechnical
 Wallarah Seam and the Mandalong Southern Extension Area

 Services Pty Ltd
 Scale:
 1:20,000 (A4)
 Figure No:

3d