METROPOLITAN COAL

LONGWALLS 301-303

BUILT FEATURES MANAGEMENT PLAN TELSTRA

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DP&E Approval Date
All	LW301-303 BFMP_TELSTRA-R01-A	Original – Draft for Consultation	Telstra	-
Section 4.1.1, Figure 4, Tables 3, 5 & 6 and Appendix 3	LW301-303 BFMP_TELSTRA-R01-B	Revised – Incorporating Telstra Agreement and updates	Telstra	-

November 2016

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1 INTRODUCTION

Metropolitan Coal is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody). Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) under section 75J of the New South Wales (NSW) *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009. A copy of the Project Approval is available on the Peabody website (http://www.peabodyenergy.com).

The Project comprises the continuation, upgrade and extension of underground coal mining operations and surface facilities at Metropolitan Coal. The underground mining longwall layout is shown on Figure 1. Following the anticipated completion of Longwall 27 in 2017, Longwalls 301, 302 and 303 (herein referred to as Longwalls 301-303) define the next mining sub-domain within the Project underground mining area (Figures 1 to 3).

1.1 PURPOSE AND SCOPE

In accordance with Condition 6(f), Schedule 3 of the Project Approval, this Built Features Management Plan – Telstra (Longwalls 301-303 BFMP-TELSTRA) has been developed to manage the potential consequences of Longwalls 301-303 extraction on the Telstra assets.

The relationship of this Longwalls 301-303 BFMP-TELSTRA to the Metropolitan Coal Environmental Management Structure and to the Metropolitan Coal Longwalls 301-303 Extraction Plan is shown on Figure 4.

In accordance with Condition 6 of Schedule 3, the suitably qualified and experienced experts that have prepared this Longwalls 301-303 BFMP-TELSTRA, namely representatives from Mine Subsidence Engineering Consultants (MSEC) and Metropolitan Coal were endorsed by the Director-General (now Secretary) of the Department of Planning and Environment (DP&E) on 6 June 2016. This Longwalls 301-303 BFMP-TELSTRA has been prepared in consultation with Telstra including consideration of prior consultation during the development of the previously approved Longwalls 20-22 and Longwalls 23-27 Built Features Management Plans. The Longwalls 20-22 and Longwalls 23-27 Built Features Management Plans will be superseded by this document consistent with the recommended approach in the draft *Guidelines for the Preparation of Extraction Plans* (DP&E and DRE, 2014).

1.2 STRUCTURE OF THE LONGWALLS 301-303 BFMP-TELSTRA

The remainder of the Longwalls 301-303 BFMP-TELSTRA is structured as follows:

Section 2: Describes the review and update of the Longwalls 301-303 BFMP-TELSTRA.

Section 3: Outlines the statutory requirements applicable to the Longwalls 301-303 BFMP-TELSTRA.

Section 4: Provides a revised assessment of the potential subsidence impacts and environmental consequences for Longwalls 301-303, including the results of a risk assessment.

Section 5: Details the performance measures and indicators that will be used to assess the Project.

Section 6: Provides the detailed baseline data.

Section 7: Describes the monitoring program.

Section 8: Describes the management measures that will be implemented.

Section 9: Provides a contingency plan to manage any unpredicted impacts and their consequences.

Section 10: Describes the Trigger Action Response Plan (TARP) management tool.

Section 11: Describes the program to collect sufficient baseline data for future Extraction Plans.

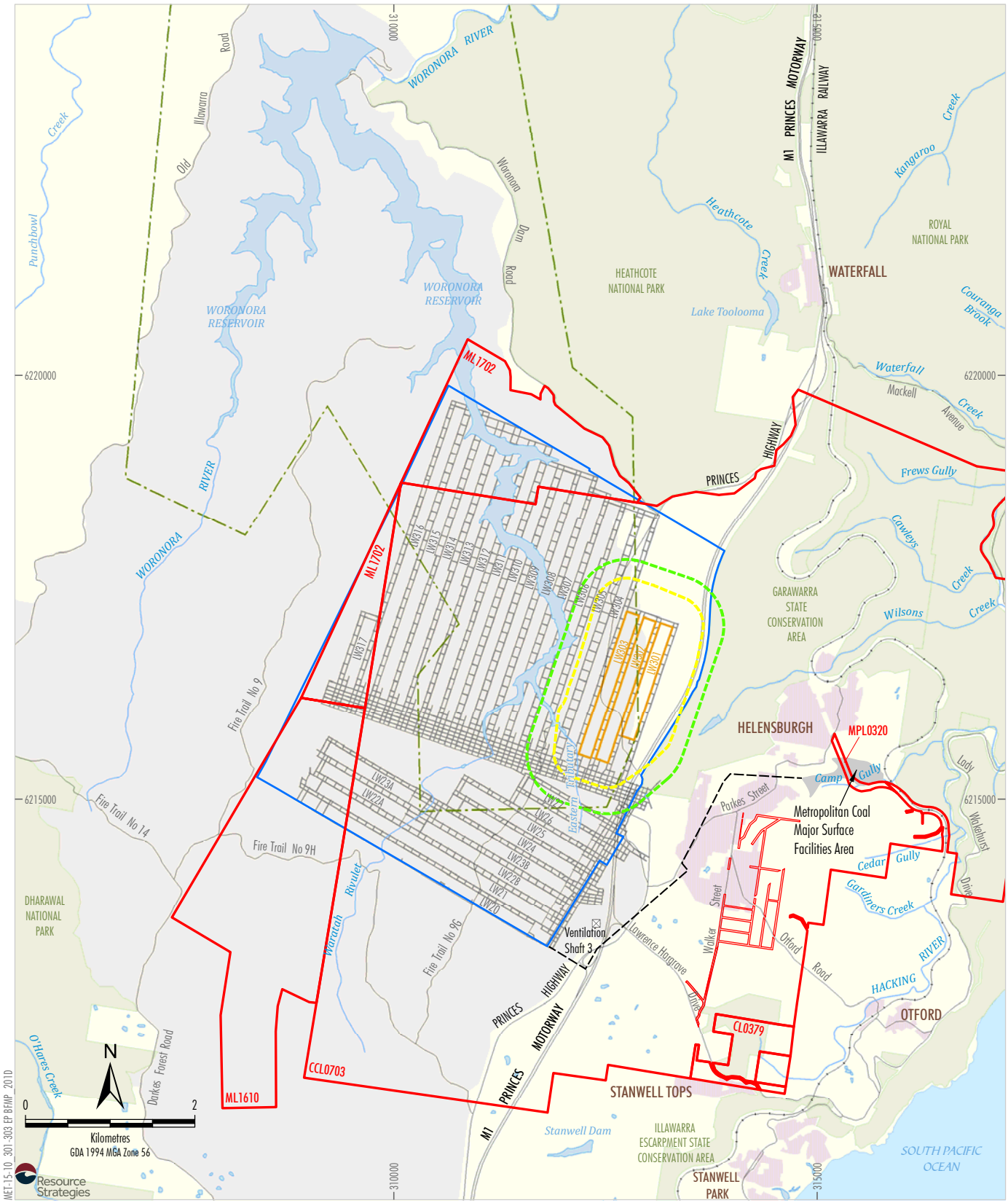
Section 12: Describes the annual review and improvement of environmental performance.

Section 13: Outlines the management and reporting of incidents.

Section 14: Outlines the management and reporting of complaints.

Section 15: Outlines the management and reporting of non-compliances with statutory requirements.

Section 16: Lists the references cited in this Longwalls 301-303 BFMP-TELSTRA.



LEGEND

- Mining Lease Boundary
- Woronora Special Area
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 301 - 303 Secondary Extraction
- 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Secondary Extraction of Longwalls 301-303
- Woronora Notification Area
- Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2016); MSEC (2016)

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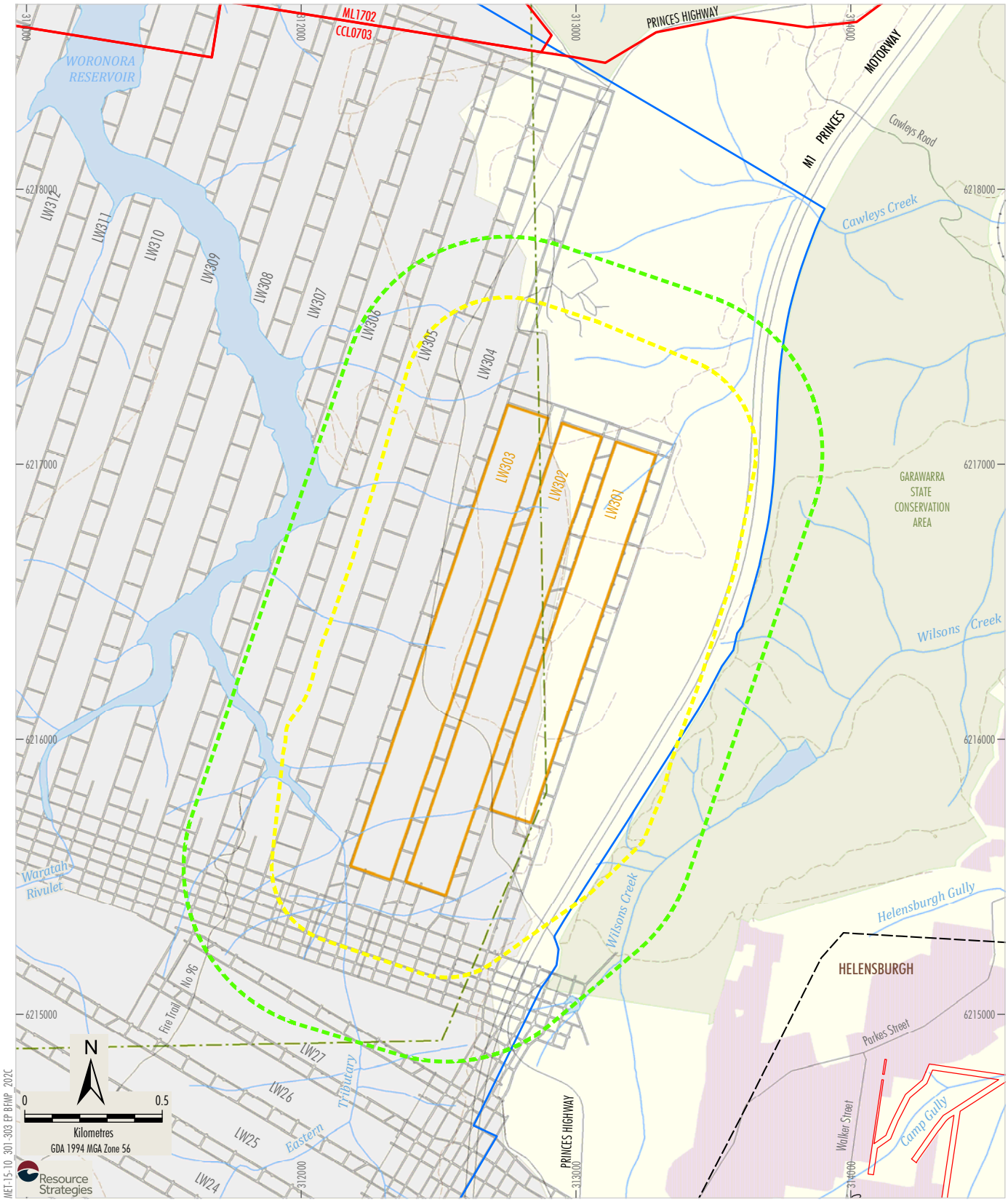
Project Longwalls 20 - 27 and Longwalls 301 - 317 Layout

Figure 1



LEGEND

- Mining Lease Boundary
- Woronora Special Area
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 301 - 303 Secondary Extraction
- 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Secondary Extraction of Longwalls 301-303
- Woronora Notification Area
- Existing Underground Access Drive (Main Drift)
- Road
- Vehicular Track

Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2016); MSEC (2016)

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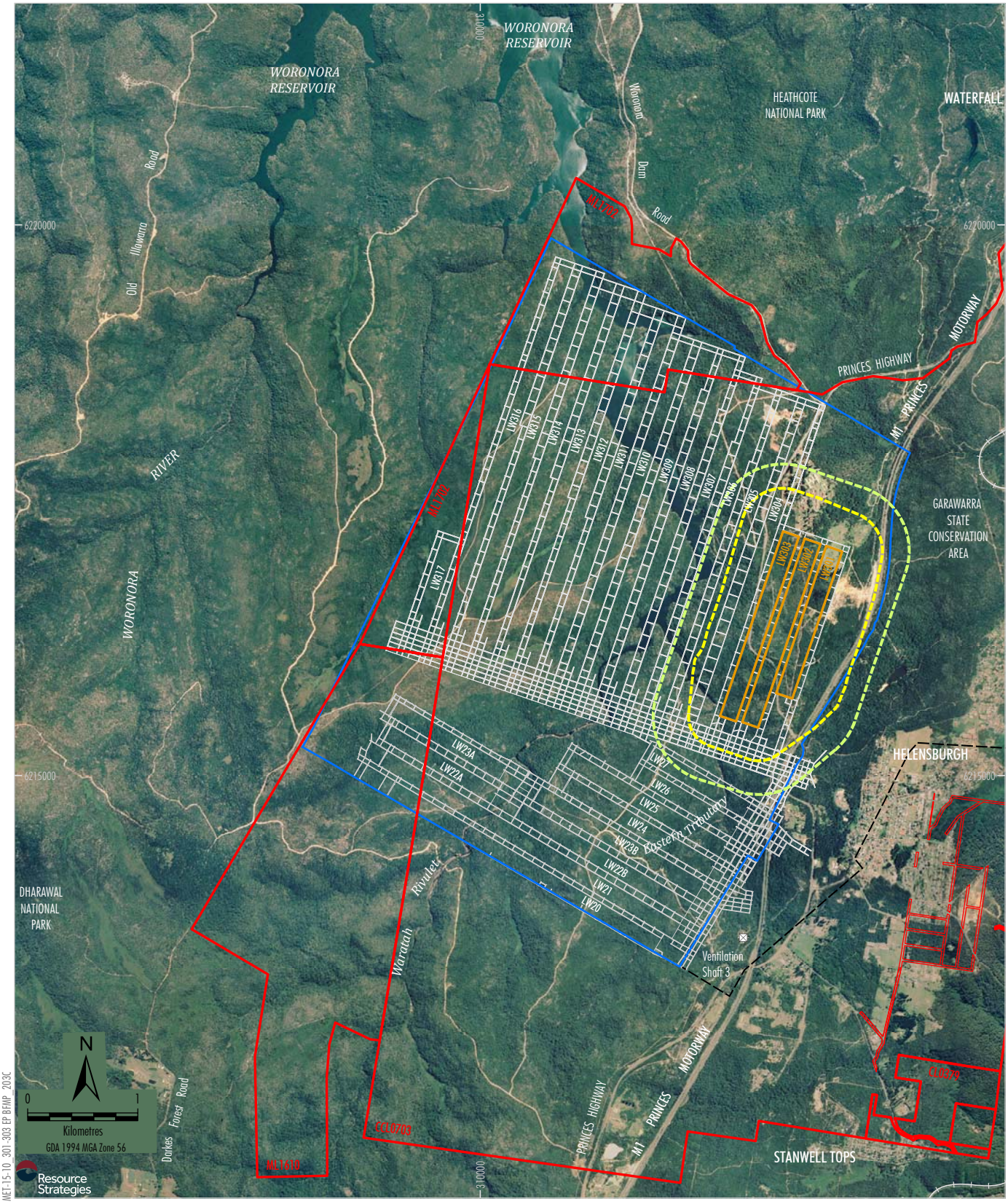
Longwalls 301 - 303 Layout

Figure 2



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LEGEND

- Mining Lease Boundary
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 301 - 303 Secondary Extraction
- 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Secondary Extraction of Longwalls 301-303
- Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Date of Aerial Photography 1998; Department of Industry (2015); Metropolitan Coal (2016); MSEC (2016)

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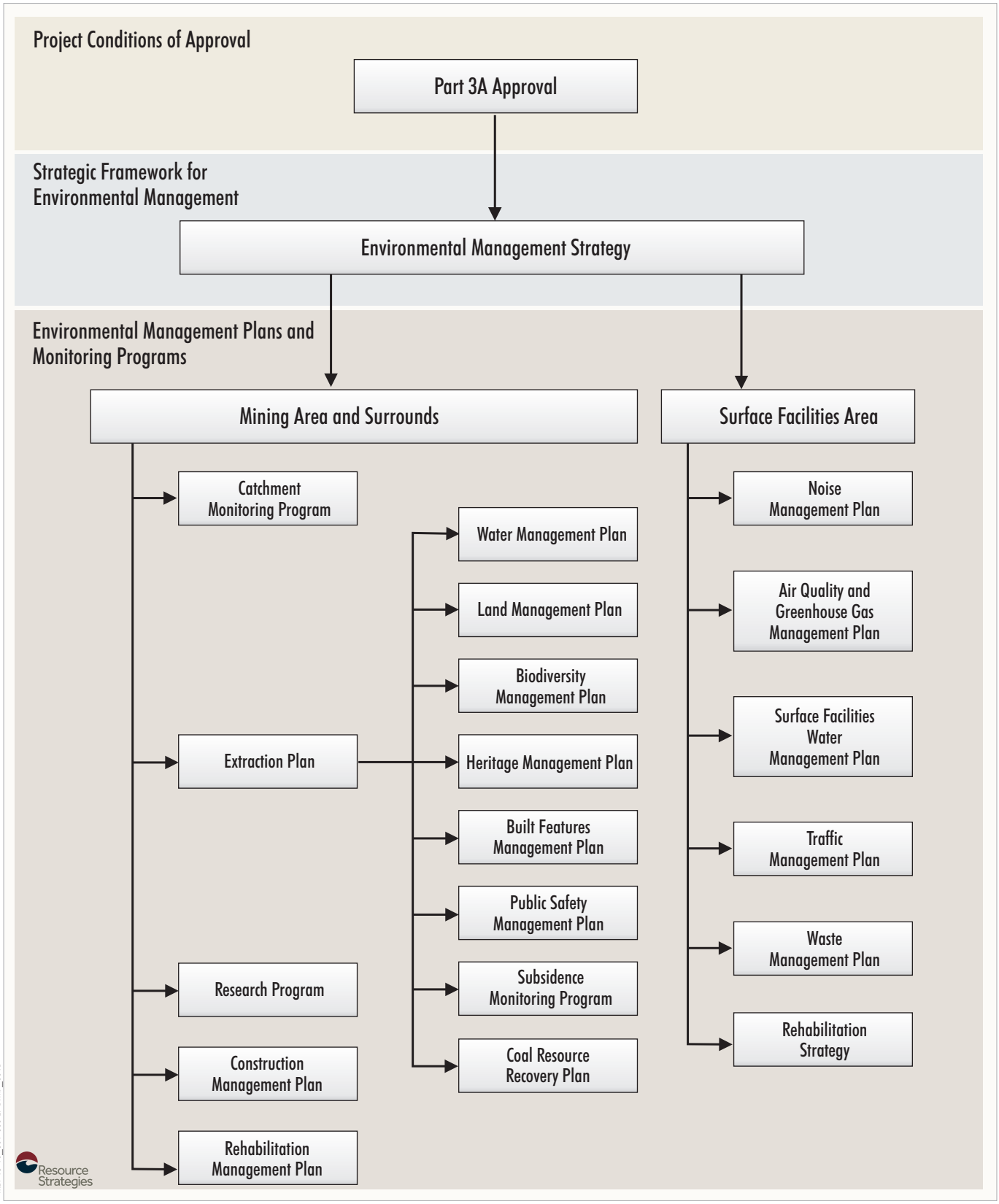
Project Longwalls 20 - 27 and Longwalls 301 - 317 Layout - Aerial Photograph

Figure 3



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Environmental Management Structure

Figure 4

2 LONGWALLS 301-303 BFMP-TELSTRA REVIEW AND UPDATE

In accordance with Condition 4, Schedule 7 of the Project Approval, this Longwalls 301-303 BFMP-TELSTRA will be reviewed within three months of the submission of:

- an audit under Condition 8 of Schedule 7;
- an incident report under Condition 6 of Schedule 7;
- an annual review under Condition 3 of Schedule 7; and

if necessary, revised to the satisfaction of the Director-General (now Secretary) of DP&E, to ensure the plan is updated on a regular basis and to incorporate any recommended measures to improve environmental performance.

This Longwalls 301-303 BFMP-TELSTRA will also be reviewed within three months of approval of any Project modification and if necessary, revised to the satisfaction of the DP&E.

The revision status of this plan is indicated on the title page of each copy of the Longwalls 301-303 BFMP-TELSTRA. The distribution register for controlled copies of the Longwalls 301-303 BFMP-TELSTRA is described in Section 2.1.

Revisions to any documents listed within this Longwalls 301-303 BFMP-TELSTRA will not necessarily constitute a revision of this document.

2.1 DISTRIBUTION REGISTER

In accordance with Condition 10, Schedule 7 'Access to Information', Metropolitan Coal will make the Longwalls 301-303 BFMP-TELSTRA publicly available on the Peabody website. A hard copy of the Longwalls 301-303 BFMP-TELSTRA will also be maintained at the Metropolitan Coal site.

Metropolitan Coal recognises that various regulators have different distribution requirements, both in relation to whom documents should be sent and in what format. An Environmental Management Plan and Monitoring Program Distribution Register has been established in consultation with the relevant agencies and infrastructure owners that indicates:

- to whom the Metropolitan Coal plans and programs, such as the Longwalls 301-303 BFMP-TELSTRA, will be distributed;
- the format (i.e. electronic or hard copy) of distribution; and
- the format of revision notification.

Metropolitan Coal will make the Distribution Register publicly available on the Peabody website.

Metropolitan Coal will be responsible for maintaining the Distribution Register and for ensuring that the notification of revisions is sent by email or post as appropriate.

In addition, Metropolitan Coal employees with local computer network access will be able to view the controlled electronic version of this Longwalls 301-303 BFMP-TELSTRA on the Metropolitan Coal local area network. Metropolitan Coal will not be responsible for maintaining uncontrolled copies beyond ensuring the most recent version is maintained on the Metropolitan Coal computer system and Peabody website.

3 STATUTORY REQUIREMENTS

Metropolitan Coal's statutory obligations are contained in:

(i) the conditions of the Project Approval;

(ii) relevant licences and permits, including conditions attached to mining leases; and

(iii) other relevant legislation.

These are described below.

3.1 EP&A ACT APPROVAL

Condition 6(f) of Schedule 3 of the Project Approval requires the preparation of a BFMP as a component of Extraction Plan(s) for second workings. Project Approval Condition 6(f), Schedule 3 states:

> ***SECOND WORKINGS***
>
> ***Extraction Plan***
>
> *6. The Proponent shall prepare and implement an Extraction Plan for all second workings in the mining area to the satisfaction of the Director-General. This plan must:*
>
> *…*
>
> *(f) include a:*
>
> *…*
>
> - *Built Features Management Plan, which has been prepared in consultation with the owner of the relevant feature, to manage the potential environmental consequences of the Extraction Plan on any built features;*
>
> *…*

In addition, Condition 2, Schedule 7 and Condition 7, Schedule 3 of the Project Approval outline management plan requirements that are applicable to the preparation of the Longwalls 301-303 BFMP-TELSTRA. Table 1 indicates where each component of the conditions is addressed within this Longwalls 301-303 BFMP-TELSTRA.

Table 1
Management Plan Requirements

Project Approval Condition	Longwalls 301-303 BFMP-TELSTRA Section
Condition 2 of Schedule 7	
2. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
a) detailed baseline data;	Section 6
b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 3
• any relevant limits or performance measures/criteria;	Section 5
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	Section 5
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 7, 8, 9 and 10
d) a program to monitor and report on the:	Sections 7, 8 and 12
• impacts and environmental performance of the project;	
• effectiveness of any management measures (see c above);	
e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 9
f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Sections 7 and 12
g) a protocol for managing and reporting any;	
• incidents;	Section 13
• complaints;	Section 14
• non-compliances with statutory requirements; and	Section 15
• exceedances of the impact assessment criteria and/or performance criteria; and	Section 9
h) a protocol for periodic review of the plan.	Section 2
Condition 7 of Schedule 3	
7. In addition to the standard requirements for management plans (see condition 2 of schedule 7), the Proponent shall ensure that the management plans required under condition 6(f) above include:	
a) a program to collect sufficient baseline data for future Extraction Plans;	Section 11
b) a revised assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval;	Section 4
c) a detailed description of the measures that would be implemented to remediate predicted impacts; and	Section 8
d) a contingency plan that expressly provides for adaptive management.	Section 9

3.2 LICENCES, PERMITS AND LEASES

In addition to the Project Approval, all activities at or in association with Metropolitan Coal mine will be undertaken in accordance with the following licences, permits and leases which have been issued or are pending issue.

- The conditions of mining leases issued by the NSW Division of Resources and Energy (DRE), within the NSW Department of Industry, Skills and Regional Development (NSW Department of Industry) under the NSW *Mining Act, 1992* (e.g. Consolidated Coal Lease [CCL] 703, Mining Lease [ML] 1610, ML 1702, Coal Lease [CL] 379 and Mining Purpose Lease [MPL] 320).
- The *Metropolitan Coal Mining Operations Plan 1 October 2012 to 30 September 2019* approved by NSW Department of Industry.
- The conditions of Environment Protection Licence (EPL) No. 767 issued by the NSW Environment Protection Authority (EPA) under the NSW *Protection of the Environment Operations Act, 1997*. Revision of the EPL will be required prior to the commencement of Metropolitan Coal activities that differ from those currently licensed.
- The prescribed conditions of specific surface access leases within CCL 703 for the installation of surface facilities as required.
- Water Access Licences (WALs) issued by the Department of Primary Industries (DPI) Water under the NSW *Water Management Act, 2000*, including WAL 36475 under the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011* and WAL 25410 under the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011.*
- Mining and workplace health and safety related approvals granted by NSW Department of Industry and WorkCover NSW.
- Supplementary approvals obtained from WaterNSW (previously the Sydney Catchment Authority [SCA]) for surface activities within the Woronora Special Area (e.g. fire road maintenance activities).

3.3 OTHER LEGISLATION

Metropolitan Coal will conduct the Project consistent with the Project Approval and any other legislation that is applicable to an approved Part 3A Project under the EP&A Act.

The following Acts may be applicable to the conduct of the Project (Helensburgh Coal Pty Ltd [HCPL], 2008):

- *Contaminated Land Management Act, 1997;*
- *Crown Lands Act, 1989;*
- *Dams Safety Act, 1978;*
- *Dangerous Goods (Road and Rail Transport) Act, 2008;*
- *Energy and Utilities Administration Act, 1987;*
- *Fisheries Management Act, 1994;*
- *Mining Act, 1992;*
- *Noxious Weeds Act, 1993;*
- *Protection of the Environment Operations Act, 1997;*
- *Rail Safety (Adoption of National Law) Act, 2012;*

- *Roads Act, 1993;*
- *Threatened Species Conservation Act, 1995;*
- *Sydney Water Catchment Management Act, 1998;*
- *Water Act, 1912;*
- *Water Management Act, 2000;* and
- *Work Health and Safety Act, 2011; and*
- *Work Health and Safety (Mines and Petroleum Sites) Act, 2013.*

Relevant licences or approvals required under these Acts will be obtained as required.

4 REVISED ASSESSMENT OF POTENTIAL ENVIRONMENTAL CONSEQUENCES

4.1 LONGWALLS 301-303 EXTRACTION LAYOUT

Longwalls 301-303 and the area of land within 600 metres (m) of Longwalls 301-303 secondary extraction are shown on Figures 2 and 3. Longwall extraction occurs from north to south. The longwall layout includes 163 m panel widths (void) with 45 m pillars (solid).

The provisional extraction schedule for Longwalls 301-303 is provided in Table 2.

Table 2
Provisional Extraction Schedule

Longwall	Estimated Start Date	Estimated Duration	Estimated Completion Date
301	April 2017	6 months	September 2017
302	November 2017	7 months	May 2018
303	June 2018	7 months	December 2018

The layout for Longwalls 301-303 (i.e. 163 m panel widths [void] and 45 m pillars [solid]) will be trialled to build on the experience and dataset obtained from Longwalls 20-27. The outcomes of the trial will be used to inform the potential for a similar mine layout to be applied to the next Extraction Plan (i.e. Longwall 304 onwards). The assessment of the trial longwall layout is described in Section 11.1.

The future Extraction Plans will consider the cumulative subsidence effects, subsidence impacts and/or environmental consequences. Note that the total cumulative predicted subsidence effects, subsidence impacts and/or environmental consequences at the completion of the Project are considered in the Metropolitan Coal Project Environmental Assessment (Project EA) (HCPL, 2008) and the Preferred Project Report (HCPL, 2009).

4.1.1 Telstra Assets

Figure 5 illustrates the Telstra assets in relation to Longwalls 301-303 extraction. The assets include (Appendix 3):

- Telecommunications Tower and Compound (including equipment hut, security fencing and optical fibre cable entries which terminate at the mobile telephone tower);
- Major Interstate Trunk Cable F KNST 2005 ENGA-HBGH 80f Sydney-Melbourne No.3 optical fibre cable (labelled as Cable 1);
- Customer Access Network (CAN) Cable F ENGA 3001 6f Engadine-Garrawarra-Mobile Phone Tower optical fibre cable (labelled as Cable 2);
- Customer Access Network (CAN) Cable F ENGA 3005 12f Engadine-Garrawarra-RIM and Garrawarra Hospital customer cable (labelled as Cable 2);
- copper telecommunications cables supplying customer services throughout Garrawarra Hospital and residential area (including buried and aerial copper cables); and
- associated pits, conduits and poles supporting the above cable network.

4.2 REVISED SUBSIDENCE AND IMPACT PREDICTIONS

4.2.1 Revised Subsidence Predictions

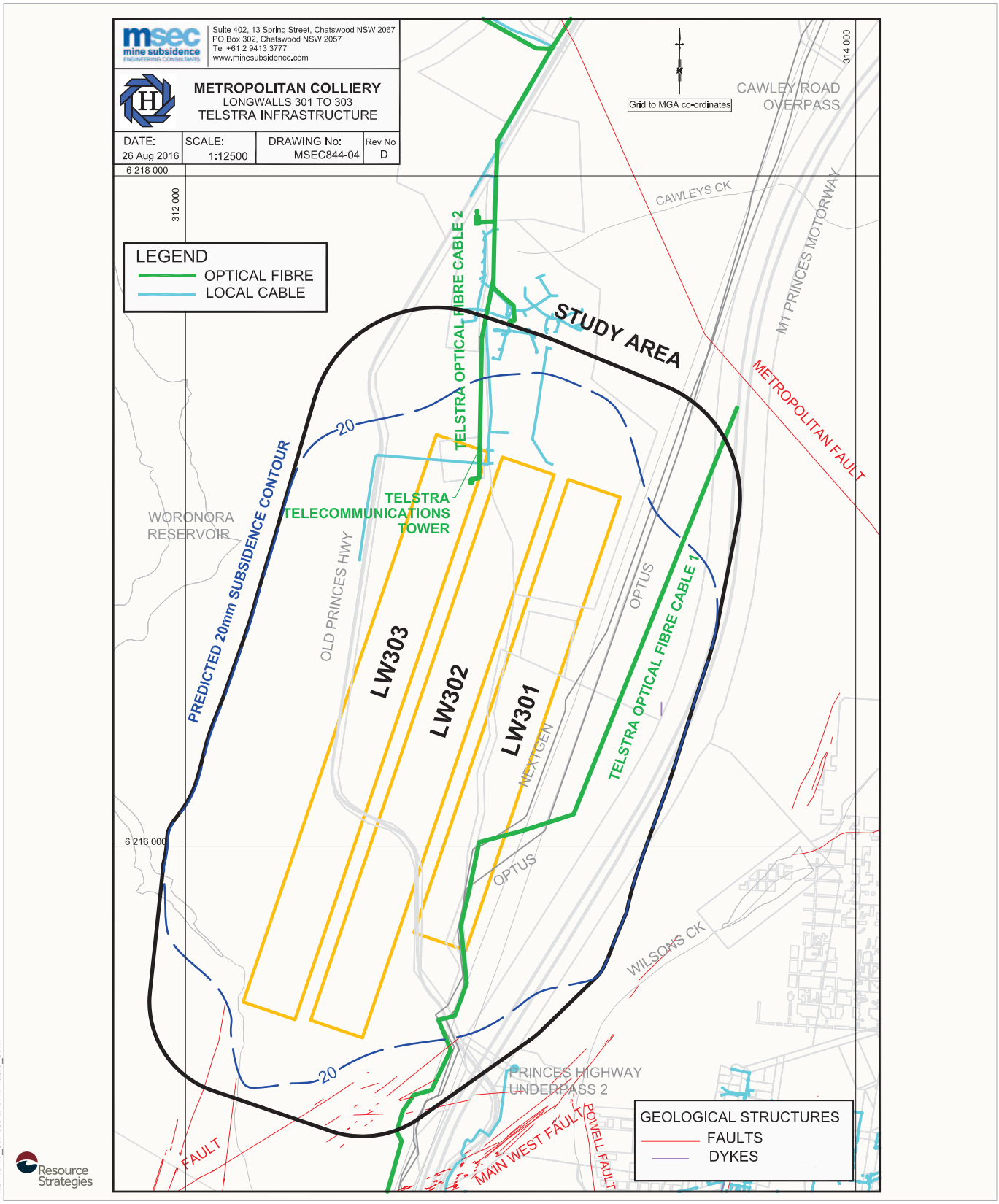
Subsidence predictions for Longwalls 20-44 in relation to the Telstra assets was conducted by MSEC (2008) as part of the Metropolitan Coal Project EA. MSEC (2008) includes a table summarising the incremental systematic subsidence parameters for the extraction of each longwall from Longwalls 20-44. These include:

- maximum predicted incremental subsidence (vertical movement);
- maximum predicted incremental tilt along alignment;
- maximum predicted incremental tilt across alignment;
- maximum predicted incremental tensile strain; and
- maximum predicted incremental compressive strain.

Revised subsidence and impact predictions for the extraction of Longwalls 301-303 on Telstra assets were conducted by MSEC and reported in MSEC (2016) (Appendix 1).

In relation to subsidence predictions, MSEC (2016) make the following conclusions:

- The optical fibre cables are direct buried and, therefore, will not be impacted by the tilts resulting from the extraction of Longwalls 301-303.
- The buried optical fibre cables are likely to experience curvatures and ground strains resulting from the extraction of Longwalls 301-303.
- The predicted curvatures and strains for the optical fibre cables are similar to those where longwalls in the Southern Coalfield have previously mined directly beneath similar cables.
- Based on the predicted curvatures and strains, it is unlikely the copper telecommunications cables would experience adverse impacts.



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Telstra Assets

Figure 5

- The magnitude of tilt predicted at the telecommunications tower (and compound) is very small (less than 1%) and is unlikely to be adversely impacted.
- Due to its lightweight construction, it is unlikely the steel framed building enclosure would experience any adverse impacts.
- It is expected that the building enclosure would remain in safe and serviceable conditions during and after mining.

It is important to note that the above predictions and conclusions are for total subsidence after extraction of the three Longwalls 301, 302 and 303. Subsidence effects predicted for the optical fibre cable 2, telecommunications tower and compound and copper cable network during mining of Longwall 301 alone are minimal to nil as the total subsidence profile does not develop until after commencement of Longwall 302 (i.e. November 2017) and Longwall 303 (i.e. June 2018).

Based on the tower footings details from Telstra (i.e. StrucTel) (refer Appendix 3), Metropolitan Coal will provide horizontal sheer impact information to Telstra.

4.2.2 Risk Assessment Meeting

In accordance with the draft *Guidelines for the Preparation of Extraction Plans* (DP&E and DRE, 2014) a risk assessment meeting was held on 11 August 2016. Attendees at the risk assessment meeting included representatives from Metropolitan Coal, Telstra (Comms Network Solutions Pty Ltd), MSEC, Resource Strategies and Axys Consulting (risk assessment facilitator).

The investigation and analysis methods used during the risk assessment included:

- preliminary identification of Telstra assets;
- review of the revised subsidence predictions and potential impacts on Telstra assets (including consideration of past experience in the Southern Coalfield); and
- development of a preliminary monitoring plan.

A number of risk control measures and procedures were identified during the risk assessment which considered the extraction of coal beneath the Telstra assets, and are summarised as follows:

Baseline Data / Validation

1. Obtain information from Telstra Structural Engineering Group (StrucTel) on the effect of mining under the Mobile Tower may have based on the revised subsidence predictions and have Telstra confirm that it is within the limitation of the current Tower.
2. Obtain from Telstra the Mobile Tower Footing details to assist with a review of the potential for Horizontal Sheer that mining would have on the tower footings.
3. Conduct a review of the Horizontal Sheer impact on the structural integrity / footings of the Tower due to mining of Longwalls 301 to 303 and provide this information to StrucTel.
4. Obtain from Telstra if there is any impact on the proposed tilt of the tower after the mining of Longwalls 301 to 303 has completed to confirm if there is any impact on services supplied by the tower.
5. Obtain from Telstra an audit to confirm that all services (including any vulnerabilities due to age, installation process, etc.) of optical fibre cables, cables entering the tower hut and copper cables that may be affected by mining of Longwalls 301 to 303 have been identified and document in the BFMP.

6. Carry out an audit of the physical location of the Sydney to Melbourne Optic Fibre Cable within the Study area prior to any mining to confirm that physical access is available.
7. Provide survey information on the Optic Fibre Cable run within the Study area for the main cable between Sydney to Melbourne (Cable 1) and have Telstra confirm that this is correct to validate the current studies.

Management / Monitoring / Response Measures

8. Develop a Trigger Action Response Plan (TARP) and include a trigger to confirm that the Optical Fibre Cables monitoring is being carried out when the mining of Longwalls 301 to 303 may impact on the main Optic Fibre Cable run between Sydney to Melbourne.
9. Include in the TARP a trigger to conduct physical audits of the Optic Fibre Cable between Sydney to Melbourne when mining is likely to affect the cable so that rectification work can commence if required based on the TARP Conditions.
10. Develop a TARP and include a trigger to confirm that the Optical Fibre Cables monitoring is being carried out when the mining of Longwalls 301 to 303 may impact on the Optic Fibre Cable to the mobile tower hut.
11. Include in the TARP a trigger to conduct physical audits of the Optic Fibre Cable to the mobile tower hut when mining is likely to affect the cable so that rectification work can commence if required based on the TARP Conditions.
12. Include a pre and post inspection in the BFMP of the Telstra Compound (including the hut, fencing, etc.) to document if there has been any damage to the Telstra infrastructure as a result from the mining of Longwalls 301 to 303.

Contingency Planning

13. Include in the BFMP contact information from Telstra to mobilise Auxiliary Mobile Towers if the existing Telstra Mobile Tower was to become unserviceable.
14. Obtain an understanding from Telstra of the time involved that it would take to mobilise an Auxiliary Mobile Towers.
15. Carry out an investigation on the Telstra customers (e.g. Garrawarra Centre) that would be affected if the copper cabling became unserviceable and what service would be need to be provided while copper cabling repairs were carried out.
16. Include in the BFMP that if the copper cabling becomes unserviceable a plan to resolve issues with affected customers (e.g. mobile solution).

Metropolitan Coal considers all risk control measures and procedures to be feasible to manage all identified risks.

The proposed risk control measures and procedures have been incorporated where relevant in this BFMP and the program for implementation is summarised in Table 3.

Table 3
Program for Implementation of Proposed Risk Control Measures and Procedures

	Risk Control Measure / Procedure	BFMP Section	Proposed Timing
Baseline Data / Validation			
1	Obtain tower details from Telstra (StrucTel)	Appendix 3	Complete
2	Obtain tower footings details from Telstra (StrucTel)	Appendix 3	Complete
3	Provide horizontal sheer impact information to Telstra (StrucTel)	Section 4.2.1	Prior to LW301, or as otherwise agreed with Telstra
4	Obtain tower tilt details from Telstra to confirm if any impact on services supplied by the tower	Appendix 3	Complete
5	Obtain from Telstra an audit to confirm that all services (including any vulnerabilities due to age, installation process, etc.) of optical fibre cables, cables entering the tower hut and copper cables have been identified and document in the BFMP	Appendix 3	Complete
6	Carry out an audit of the physical location of the Sydney to Melbourne Optic Fibre Cable within the Study area to confirm that physical access is available	Section 6	Prior to LW301
7	Provide survey information to Telstra on the Optic Fibre Cable run within the Study area for the main cable between Sydney to Melbourne	Section 6	Prior to LW301
Management / Monitoring / Response Measures			
8	Develop a TARP and include a trigger to confirm that the Optical Fibre Cables monitoring is being carried out when mining is likely to affect the main Optic Fibre Cable run between Sydney to Melbourne	Appendix 3 / Section 10 / Table 7	Complete
9	Include in the TARP a trigger to conduct physical audits of the Optic Fibre Cable between Sydney to Melbourne when mining is likely to affect the cable	Appendix 3 / Section 10 / Table 7	Complete
10	Develop a TARP and include a trigger to confirm that the Optical Fibre Cables monitoring is being carried out when mining is likely to affect the cable to the mobile tower hut	Appendix 3 / Section 10 / Table 7	Complete
11	Include in the TARP a trigger to conduct physical audits of the Optic Fibre Cable to the mobile tower hut when mining is likely to affect the cable	Appendix 3 / Section 10 / Table 7	Complete
12	Include a pre and post inspection of the Telstra hut and fencing at the compound	Appendix 3 / Section 7.2.3	Prior to LW301, or as otherwise agreed with Telstra
Contingency Planning			
13	Include Contact Information from Telstra to mobilise auxiliary mobile towers and include in BFMP	Appendix 3 / Section 9.1	Complete
14	Obtain timing estimate from Telstra to mobilise auxiliary towers	Section 9.1	If required
15	Carry out an investigation on the Telstra customers (e.g. Garrawarra Centre) that would be affected if the copper cabling became unserviceable	Appendix 3	Complete
16	Include plan to resolve issues for copper cabling (e.g. mobile solution) in the BFMP	Appendix 3 / Section 9.1	Complete

5 PERFORMANCE MEASURES AND INDICATORS

The Project Approval requires Metropolitan Coal not to exceed the subsidence impact performance measures outlined in Table 1 of Condition 1, Schedule 3. The subsidence impact performance measure specified in Table 1 of Condition 1, Schedule 3 in relation to built features is:

Safe, serviceable and repairable, unless the owner and the MSB agree otherwise in writing.

The performance indicators proposed to ensure that the above performance measure is achieved include:

- negligible transmission loss in fibre optic cables from mine subsidence impacts;
- the structural integrity of the cable line and associated facilities is maintained;
- the structural integrity of the telecommunications tower and compound is maintained; and
- the serviceability of the access roads/tracks is maintained.

Section 7 of this Longwalls 301-303 BFMP-TELSTRA describes the monitoring that will be conducted to assess the Project against the above performance measure. Section 9 of this Longwalls 301-303 BFMP-TELSTRA provides a Contingency Plan in the event the performance measure is exceeded.

6 BASELINE DATA

An audit of the physical location of the Optic Fibre Cables will be conducted within the Study Area to confirm that physical access is available. Survey information will be provided to Telstra.

The telecommunications tower and compound are shown on Plates 1 and 2.

Plates 1 & 2 – Telecommunications Tower and Compound (Source: MSEC, 2016)

An audit and site inspection of the Telstra assets including inspection of the cable lines and entries to the hut and condition of the cable will be conducted.

6.1 STATE OF ASSET BEFORE MINING

In consultation with Telstra (and similar to the approach adopted for other optical fibre cables), Metropolitan Coal will assess and determine the state of the Telstra optical fibre cables before mining of Longwall 301.

For example, the state of nearby IOF cables was previously assessed before mining commenced in Longwall 20. The amplifier outputs and fibre loss between nominated end points O2WF Waterfall CEV and O2WM Wollongong CEV were measured. Measurement points O2WF and O2WM were located on the SM2 IOF at either end of the planned mining area.

Table 4 below shows the loss measured between O2WF and O2WM from amplifier to amplifier.

Table 4
Measured Loss in O2WF Waterfall – O2WM Wollongong SM-2 IOF Section

Location	Tx Level (dBm)	Rx Level (dBm)	Loss (dBm)
O2WF 1B	14.3	-	-
O2WM 1A	-	-3.8	18.1
O2WM 2B	14.0	-	-
O2WF 2A	-	-3.8	17.8

dBm = decibel-milliwatt.

7 MONITORING

A monitoring program will be implemented to monitor the impacts of Longwalls 301-303 on the Telstra assets.

Where relevant, inspections of subsidence impacts will include photographic record of the impacts for comparison with baseline photographic records.

Telstra or their delegates will conduct the various visual inspections. Metropolitan Coal will be notified of the timing of inspections and accompany Telstra or delegates if considered necessary. All personnel will complete necessary inductions or orientation relevant to the tasks required.

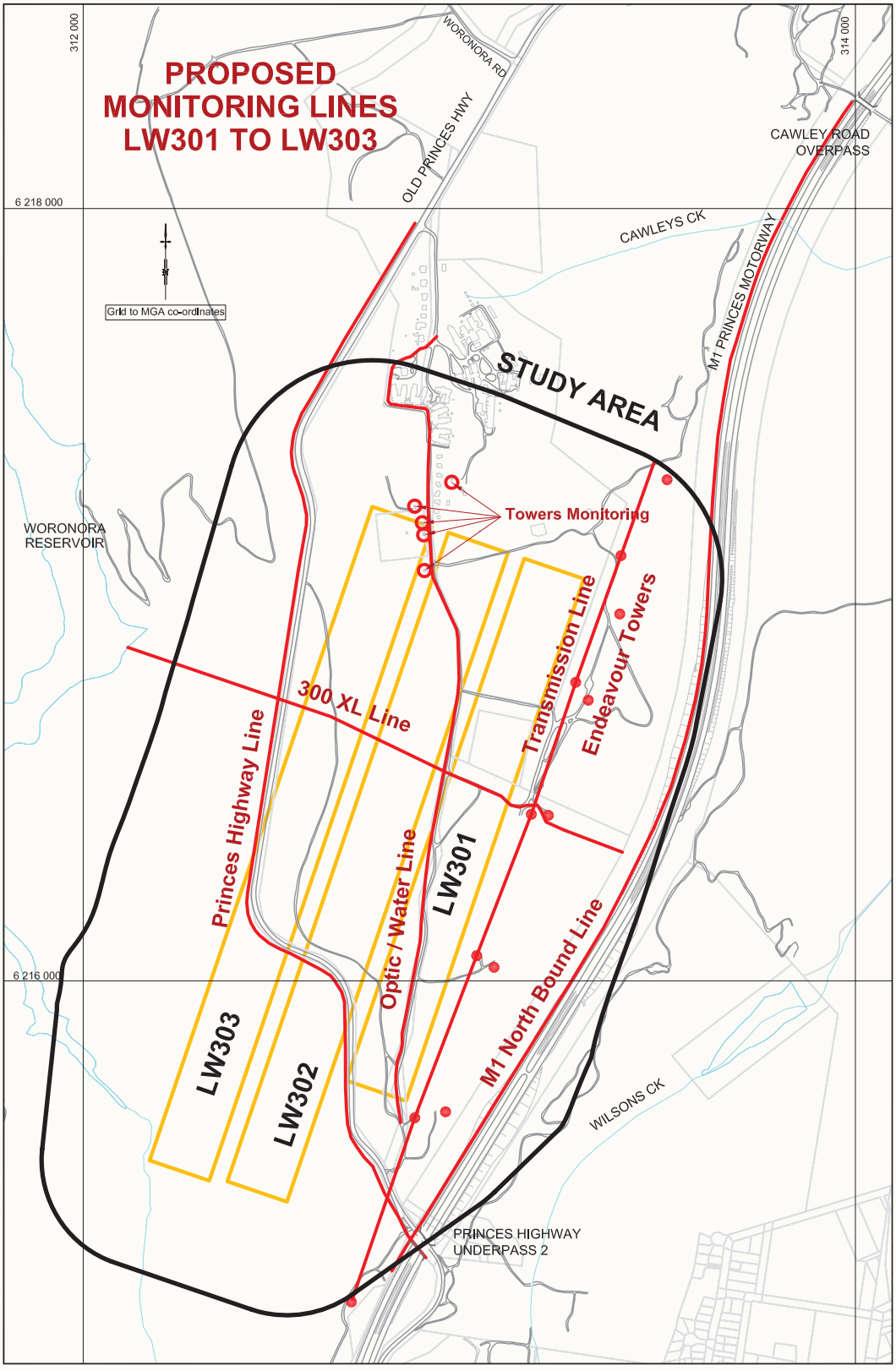
Table 5 summarises the Longwalls 301-303 BFMP-TELSTRA monitoring components.

The frequency of monitoring will be reviewed either:

- in accordance with the Annual Review outlined in Section 12; or
- if triggered as a component of the Contingency Plan as outlined in Section 9 of this Longwalls 301-303 BFMP-TELSTRA.

Table 5
Longwalls 301-303 BFMP-TELSTRA Monitoring Program Overview

Monitoring Component	Locations	Frequency	Parameters
Subsidence Parameters	• As described in the Metropolitan Coal Longwalls 301-303 Subsidence Monitoring Program (SMP). This includes subsidence line along the transmission line corridor and M1 Princes Motorway within 600 m of Longwalls 301-303 extraction and the optic / water line (Figure 6).	*Baseline* • Prior to the commencement of Longwall 301 extraction. *During Mining* • As per the Longwalls 301-303 SMP. This includes at the completion of each longwall.	• Monitoring parameters include: subsidence, tilt, tensile strain, compressive strain.
RFMS Monitoring	• 1,625 nanometres Optical Time Domain Reflectometer (OTDR) monitoring on Telstra spare fibres (Cable 1).	• Continuous.	• Signal integrity.
	• 1,625 nanometres OTDR monitoring on Telstra spare fibres (Cable 2).	• Continuous (during commencing 400 m of extraction from Longwalls 302 and 303).	• Signal integrity.
Subsidence Impacts - Cable line 1 and associated pits	• Within 600 m of Longwalls 301-303 extraction.	• Weekly physical inspection for the period covering 100 m prior to undermining the cable to 400 m past the cable line.	• Movement of conduit, degree of freedom of cable in conduit, ground compression / tension.
	• Point loss or area of loss within 600 m of Longwalls 301-303 extraction.	• If RFMS records loss event ±0.3 dB; or exceeds ±1.0 dB.	• Movement of conduit, degree of freedom of cable in conduit, ground compression / tension.
Subsidence Impacts - Cable line 2 and associated pits	• Within 600 m of Longwalls 301-303 extraction.	• Weekly physical inspection (during commencing 400 m of extraction from Longwalls 302 and 303).	• Movement of conduit, degree of freedom of cable in conduit, ground compression / tension.
	• Point loss or area of loss within 600 m of Longwalls 301-303 extraction.	• If RFMS records loss event ±0.3 dB; or exceeds ±1.0 dB.	• Movement of conduit, degree of freedom of cable in conduit, ground compression / tension.
Subsidence Impacts – Telecommunications Tower (and compound)	• As per Figure 6, tower monitoring.	*Baseline* • Prior to the commencement of Longwall 301 extraction or otherwise agreed with Telstra. *During Mining* • After commencing 400m of extraction from Longwalls 302 and 303. • Within 3 months following the completion of extraction of Longwalls 301-303.	• Structural integrity of the telecommunications tower and compound. • Tower tilt (>1 degree).
Subsidence Impacts – Access roads/tracks	• Within 600 m of Longwalls 301-303 extraction.	*Baseline* • Prior to the commencement of Longwall 301 extraction. *During Mining* • Following the completion of extraction of Longwalls 301-303. • Opportunistic visual observations during catchment visits as per the Longwalls 301-303 Land Management Plan.	• Surface cracks, buckling and general safety.



MET-15-10_301-303 EP BHMP_003A

Resource Strategies

Peabody ENERGY

METROPOLITAN COAL

Longwalls 301-303 Subsidence Monitoring
Layout

Figure 6

7.1 SUBSIDENCE PARAMETERS

Subsidence parameters (i.e. subsidence, tilt, tensile strain, compressive strain, absolute horizontal translation, and differential leg movement) associated with mining will be measured in accordance with the Longwalls 301-303 Subsidence Monitoring Program (Figure 6).

In summary, surveys will be conducted to measure subsidence movements in three dimensions using a total station survey instrument. Subsidence movements (i.e. subsidence, tilt, tensile strain and compressive strain) will be measured along subsidence lines that have been positioned across the general landscape.

Monitoring of subsidence parameters specific to the Telstra assets include the survey lines along the Optic / Water Line, the 330 kilovolt (kV) and 132 kV transmission lines and the M1 Princes Motorway. These surveys will monitor the general movement about the longwalls and the data will allow evaluation of the likely ground movements about the cable lines (by comparison between measured and predicted movements). Monitoring of subsidence parameters at the telecommunication tower will also occur.

7.2 SUBSIDENCE IMPACTS

7.2.1 Fibre Optic Cables

Visual inspections will be conducted of the cable lines in accordance with the Telstra inspection system or if triggered by a transmission fault detected by the Telstra monitoring system (Appendix 3).

Specific details that will be noted and/or photographed include:

- the date of the inspection;
- the location of longwall extraction (i.e. the longwall chainage);
- assessment against the performance indicators and performance measure;
- whether any actions are required (e.g. initiation of the Contingency Plan, incident notification, implementation of appropriate safety controls, review of public safety, etc.); and
- any other relevant information.

The information will be recorded in the Built Features Management Plan - Subsidence Impact Register (Appendix 2) and reported in accordance with the Project Approval conditions.

7.2.2 Copper Telecommunication Cables

Visual inspections will be conducted as required in accordance with the Telstra Management Plan Agreement (2016) for the area.

7.2.3 Telecommunications Tower and Compound

A pre and post-mining inspection of the Telstra hut and fencing at the compound will be undertaken. Visual inspections will be conducted as required in accordance with the Telstra Management Plan Agreement (2016) for the area.

7.2.4 Access Roads/Tracks

Visual inspection of the access roads/tracks to the Telstra assets will occur prior to the commencement of Longwall 301, and following extraction of each longwall panel.

Opportunistic visual observations of access roads/tracks would occur as part of routine works and inspections as well as during catchment visits within 600 m of Longwalls 301-303 secondary extraction as described in the Metropolitan Coal Longwalls 301-303 Land Management Plan (Longwalls 301-303 LMP).

Specific details that will be noted and/or photographed that are relevant to the Telstra access roads/tracks include:

- the location, approximate dimensions (length, width and depth), and orientation of surface tension cracks;
- the location of the surface tension crack in relation to access road/track to the Telstra asset;
- whether any actions are required (e.g. implementation of management measures as outlined in the Longwalls 301-303 LMP, initiation of the Contingency Plan as outlined in the Longwalls 301-303 LMP, incident notification, implementation of appropriate safety controls, review of public safety, etc.); and
- any other relevant information.

The date of the observation, details of the observer and the location of longwall extraction will also be documented.

The information obtained will be recorded in the Longwalls 301-303 LMP - Subsidence Impact Register and reported in accordance with the Project Approval conditions.

The information obtained will be used to assess the potential environmental consequences of the subsidence impact (described in the Longwalls 301-303 LMP) and to identify required management measures. Management measures are discussed in the Longwalls 301-303 LMP.

In the event the subsidence impacts are deemed to present a safety hazard (i.e. regardless of the nature or extent of the subsidence impact), actions will be implemented in accordance with the Metropolitan Coal Longwalls 301-303 Public Safety Management Plan.

7.3 ENVIRONMENTAL CONSEQUENCES

Metropolitan Coal and Telstra will compare the results of the subsidence impact monitoring against the built features performance measure and indicators. In the event the observed subsidence impacts exceed the performance measure or indicators, Metropolitan Coal and Telstra will assess the consequences of the exceedance in accordance with the Contingency Plan described in Section 9.

8 MANAGEMENT MEASURES

A number of potential management measures in relation to cable lines are considered to be applicable. These are described in the Telstra Management Plan Agreement (Appendix 3).

Follow-up inspections will be conducted to assess the effectiveness of the management measures implemented and the requirement for any additional management measures.

Management measures will be reported in the Annual Review (Section 12).

9 CONTINGENCY PLAN

In the event the subsidence impacts observed exceed the performance measure or indicators detailed in Section 5 of this Longwalls 301-303 BFMP-TELSTRA, Metropolitan Coal will implement the following Contingency Plan:

- The observation will be reported to the Manager - Technical Services or the Manager – Safety & Environmental Services within 24 hours.
- With the exception of access roads/tracks, the observation will be recorded in the Built Features Management Plan - Subsidence Impact Register (Appendix 2) consistent with the monitoring program described in Section 7 of this Longwalls 301-303 BFMP-TELSTRA.
- If relating to an access road/track, the observation will be recorded in the Metropolitan Coal LW301-303 Land Management Plan – Subsidence Impact Register.
- Metropolitan Coal will report any exceedance of the performance measure or indicators to the DP&E and Telstra as soon as practicable after Metropolitan Coal becomes aware of the exceedance.
- Metropolitan Coal will assess public safety and where appropriate implement safety measures in accordance with the Metropolitan Coal Longwalls 301-303 Public Safety Management Plan;
- Metropolitan Coal will conduct an investigation to evaluate the potential contributing factors. The investigation will:
  - include the re-survey of relevant subsidence monitoring lines;
  - compare and critically analyse measured versus predicted subsidence parameters;
  - review measured subsidence parameters against the observed impact; and
  - review the subsidence monitoring program and update the program where appropriate.
- The course of action with respect to the identified impact(s), in consultation with specialists and relevant agencies, will include:
  - a program to review the effectiveness of the contingency measures; and
  - consideration of adaptive management.

  Potential contingency measures are provided in Section 9.1.
- Metropolitan Coal will submit the proposed course of action to the DP&E for approval.
- Metropolitan Coal will implement the approved course of action to the satisfaction of the DP&E.

In accordance with Condition 6, Schedule 6 of the Project Approval, Metropolitan Coal will provide a suitable offset to compensate for the impact to the satisfaction of the Director-General (now Secretary) of DP&E if either the contingency measures implemented by Metropolitan Coal have failed to remediate the impact or the Director-General (now Secretary) determines that it is not reasonable or feasible to remediate the impact.

Metropolitan Coal will comply with the NSW *Mine Subsidence Compensation Regulation, 2002* in the event that property damages occur as a result of mining Longwalls 301-303.

9.1 CONTINGENCY MEASURES

Contingency measures will be developed in consideration of the specific circumstances of the feature (e.g. the location, nature and extent of the impact, and the assessment of environmental consequences).

Potential contingency measures are provided in the Telstra Management Plan Agreement (Appendix 3) and are summarised in Table 6.

Table 6
Potential Contingency Measures

Asset	Contingency Measures / Description	
Phone Tower (Pole Type)	Stabilisation	• Installation of tower supports such as guy wires in response to tilt.
	Rebuilding	• Construction of new tower and foundations.
	Contingency	• Deployment of temporary broadcast/receiving tower as per special event infrastructure (temporary mobile tower systems available).
	Redundancy	• Telstra has three alternate phone towers nearby (two at Helensburgh and one at Waterfall).
Main Fibre 120 Core	Stabilisation	• Automatic monitoring detects degradation in signal. Trench fill material is removed from the identified degradation zone, allows fibre to flex, and relieve compression forces.
	Emergency	• Certain bandwidth is redeployed to other cores within this cable and/or to other two (2) Telstra interconnectors between Sydney / Melbourne.
	Rebuilding	• Fibre heat treatment to soften compression point on core and return affected cores to operation.
	Redundancy	• Telstra has cable at this location plus 2 additional cables further west in NSW as alternate connectors between NSW and Victoria. The cable at this location has 120 cores (each core is independent for data communication). [*NB: alternative potentially undermined concurrently at Douglas Park*].
Spur Line Tower Fibre 12 Core	Stabilisation	• Technician travels to tower and undertakes localised monitoring to identify location of issue. Soil removed at location to allow fibre to flex.
	Emergency	• Spare cores available in cable. Bypass affected cores to re-establish functionality.
	Rebuilding	• Fibre heat treatment to soften compression point and return affected cores to operation.
	Redundancy	• Phone tower operation requires 2 cores; fibre supplying tower has 12 cores, 10 spare.
Copper Cable	Emergency	• Failure in local phone cables at Garrawarra Centre Complex rectified by repairs. If extended duration outage then temporary mobile phone connection to be provided to Garrawarra Centre Complex commercial user by Telstra.
	Redundancy	• Mobile phone coverage to replace landlines, all commercial carriers have towers located at Garrawarra Centre Complex.

It is understood that there may be opportunities to deploy temporary broadcast/receiving tower as per special event infrastructure that could be used as a contingency. If required, Metropolitan Coal would consult with Telstra to obtain contact details and timeframes for mobilisation.

10 TARP – MANAGEMENT TOOL

The framework for the various components of the Longwalls 301-303 BFMP-TELSTRA are summarised in the Longwalls 301-303 BFMP-TELSTRA TARP shown in Table 7. The Longwalls 301-303 BFMP-TELSTRA TARP illustrates how the various predicted subsidence impacts, monitoring components, performance measures, and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

The TARP comprises:

- baseline conditions;
- predicted subsidence impacts;
- trigger levels from monitoring to assess performance; and
- triggers that flag implementation of contingency measures.

The TARP system provides a simple and transparent snapshot of the monitoring of environmental performance and the implementation of management and/or contingency measures.

Table 7
Longwalls 301-303 BFMP-TELSTRA Trigger Action Response Plan

Condition	Baseline Conditions	Predicted Impacts	Restoration/Contingency Phase
Trigger	• Fibre Optic Cables and cobber cables are safe and serviceable. • Telecommunication Tower and Compound is safe and serviceable. • Access roads/tracks serviceable.	• Negligible impact to fibre optic and copper cables and associated infrastructure (connection points at hut). • Negligible impacts to Telecommunications Tower and Compound. • Surface cracking developed on access road/track.	• Detection of transmission fault or structural integrity or function of connection pits (refer Appendix 3). • Tension cracks developed on access roads/tracks.
Action	Establish baseline data. Includes: • Pre-mining inspection. • Pre-extraction subsidence survey as per the Longwalls 301-303 Subsidence Monitoring Program.	• Conduct monitoring and physical audits as per Telstra Management Plan Agreement (Appendix 3). • Update the 'Built Features Management Plan – Subsidence Impact Register'. • For access roads/tracks, update the 'Land Management Plan – Subsidence Impact Register'. • Repair of access roads/tracks where significant cracks are detected (e.g. those that affect serviceability).	• Implement Contingency Plan as per Section 9. • Implement Telstra Management Plan Agreement (Appendix 3). • Implement measures in relation to maintenance of access roads/tracks as described in Land Management Plan.
Position of Decision-making	• Manager - Technical Services. • Telstra Manager Access Engineering Planning.	• Manager - Technical Services. • Telstra Manager Access Engineering Planning.	• General Manager. • Telstra General Manager Access Engineering.

11 FUTURE EXTRACTION PLANS

In accordance with Condition 7 of Schedule 3, Metropolitan Coal will collect baseline data for the future Extraction Plan (e.g. Longwall 304 onward). The collection of baseline data will be consistent with the baseline data collected for Longwalls 301-303. Specifically, baseline data obtained will include pre-mining inspection of the telecommunications lines, tower and/or compound.

In addition to the baseline data collection, consideration of the environmental performance and management measures in accordance with the review(s) conducted as part of this Longwalls 301-303 BFMP-TELSTRA will inform the appropriate type and frequency of monitoring of the assets relevant to the next Extraction Plan.

11.1 ASSESSMENT OF TRIAL LONGWALL LAYOUT FOR LONGWALLS 301-303

As described in Section 4.1, the layout for Longwalls 301-303 (i.e. 163 m panel widths [void] and 45 m pillars [solid]) will be trialled to build on the experience and dataset obtained from Longwalls 20 to 27. The outcomes of the trial will be used to inform the potential for a similar mine layout to be applied to the next Extraction Plan (i.e. Longwall 304 onwards).

Following the completion of Longwall 301, and during the mining of Longwall 302, Metropolitan Coal will review the available subsidence monitoring results and assess the changes to, and impacts on, Telstra assets.

12 ANNUAL REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

In accordance with Condition 3, Schedule 7 of the Project Approval, Metropolitan Coal will conduct an Annual Review of the environmental performance of the Project by the end of March each year.

The Annual Review will:

- describe the works carried out in the past year, and the works proposed to be carried out over the next year;
- include a comprehensive review of the monitoring results and complaints records of the Project over the past year, including a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the EA, Preferred Project Report and Extraction Plan;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the Project;
- identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the Project.

As described in Section 2, this Longwalls 301-303 BFMP-TELSTRA will be reviewed within three months of the submission of an Annual Review, and revised where appropriate.

13 INCIDENTS

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the Project Approval.

The reporting of incidents will be conducted in accordance with Condition 6, Schedule 7 of the Project Approval.

Metropolitan Coal will notify the Director-General (now Secretary) of DP&E and any other relevant agencies of any incident associated with the Project as soon as practicable after Metropolitan Coal becomes aware of the incident. Within seven days of the date of the incident, Metropolitan Coal will provide the Director-General (now Secretary) of DP&E and any relevant agencies with a detailed report on the incident.

Telstra will be notified within 24 hours of any access limitations or restrictions.

14 COMPLAINTS

A protocol for the managing and reporting of complaints has been developed as a component of Metropolitan Coal's Environmental Management Strategy and is described below.

The Manager – Safety & Environmental Services is responsible for maintaining a system for recording complaints.

Metropolitan Coal will maintain public signage advertising the telephone number on which environmental complaints can be made. The Manager – Safety & Environmental Services is responsible for ensuring that the currency and effectiveness of the service is maintained. Notifications of complaints received are to be provided as quickly as practicable to the Manager – Safety & Environmental Services.

Complaints and enquiries do not have to be received via the telephone line and may be received in any other form. Any complaint or enquiry relating to environmental management or performance is to be relayed to the Manager – Safety & Environmental Services as soon as practicable. All employees are responsible for ensuring the prompt relaying of complaints. All complaints will be recorded in a complaints register.

For each complaint, the following information will be recorded in the complaints register:

- date and time of complaint;
- method by which the complaint was made;
- personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- nature of the complaint;

- the action(s) taken by Metropolitan Coal in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by Metropolitan Coal, the reason why no action was taken.

The Manager – Safety & Environmental Services is responsible for ensuring that all complaints are appropriately investigated, actioned and that information is fed back to the complainant, unless requested to the contrary.

In accordance with Condition 10, Schedule 7 of the Project Approval, the complaints register will be made publicly available on the website and updated on a monthly basis. A summary of complaints received and actions taken will be presented to the Community Consultative Committee as part of the operational performance review.

15 NON-COMPLIANCES WITH STATUTORY REQUIREMENTS

A protocol for the managing and reporting of non-compliances with statutory requirements has been developed as a component of Metropolitan Coal's Environmental Management Strategy and is described below.

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with Metropolitan Coal, and will be developed through promotion of Metropolitan Coal ownership under the direction of the General Manager.

The Manager - Technical Services and/or Manager – Safety & Environmental Services will undertake regular inspections, internal audits and initiate directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance.

As described in Section 13, Metropolitan Coal will notify the Director-General (now Secretary) of the DP&E and any other relevant agencies of any incident associated with Metropolitan Coal as soon as practicable after Metropolitan Coal becomes aware of the incident. Within seven days of the date of the incident, Metropolitan Coal will provide the Director-General (now Secretary) of the DP&E and any relevant agencies with a detailed report on the incident.

A review of Metropolitan Coal's compliance with all conditions of the Project Approval, mining leases and all other approvals and licenses will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the Peabody website.

Additionally, in accordance with Condition 8, Schedule 7 of the Project Approval, an independent environmental audit was undertaken by the end of December 2011, and is undertaken a minimum of once every three years thereafter. A copy of the audit report will be submitted to the Director-General (now Secretary) of the DP&E and made publicly available on the Peabody website. The independent audit will be undertaken by an appropriately qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General (now Secretary) of the DP&E.

16 REFERENCES

Department of Planning & Environment and Division of Resources and Energy (2014) *Guidelines for the Preparation of Extraction Plans*. Draft.

Helensburgh Coal Pty Ltd [HCPL] (2008) *Metropolitan Coal Project Environmental Assessment*.

Helensburgh Coal Pty Ltd [HCPL] (2009) *Metropolitan Coal Project Preferred Project Report*.

Mine Subsidence Engineering Consultants (2008) *Subsidence Assessment Report on the Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure Resulting from the Proposed Extraction of Longwalls 20 to 44 at Metropolitan Colliery in Support of a Part 3A Application.*

Mine Subsidence Engineering Consultants (2016) *Metropolitan Colliery – Proposed Longwalls 301 to 303 - Subsidence Predictions and Impact Assessments for the Telstra Infrastructure, 30 August 2016.*

APPENDIX 1

MSEC (2016) METROPOLITAN COLLIERY – PROPOSED LONGWALLS 301 TO 303 - SUBSIDENCE PREDICTIONS AND IMPACT ASSESSMENTS FOR THE TELSTRA INFRASTRUCTURE, DATED 30 AUGUST 2016

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30th August 2016

Jon Degotardi
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Ref: MSEC844-04

Dear Jon,

RE: Metropolitan Colliery – Proposed Longwalls 301 to 303 - Subsidence Predictions and Impact Assessments for the Telstra Infrastructure

This letter report summarises the predicted subsidence movements and the assessed subsidence impacts for the Telstra infrastructure resulting from the extraction of the proposed Longwalls 301 to 303 at Metropolitan Colliery.

The locations of the Telstra infrastructure and the proposed longwalls are shown in the attached Drawing No. MSEC844-04. There are two optical fibre cables within the Study Area that are located above the southern end of Longwall 301 and above the northern end of Longwall 303. Copper telecommunications cables are also located above the northern ends of Longwalls 302 and 303 and these cables service the Garrawarra Complex.

A telecommunications tower and compound are located above Longwall 303. Photographs of this installation are provided in Figure 1.

Figure 1 Telecommunications Tower and Compound

The predictions and impact assessments for the Telstra infrastructure are provided in the following sections.

Conventional Subsidence Parameters for the Telstra Infrastructure

The following provides summaries of the maximum predicted conventional movements for the Telstra infrastructure resulting from the extraction of Longwalls 301 to 303. It is possible that localised and elevated movements could develop as the result of non-conventional ground movements due to geological structures or valley closure effects. Discussions on the potential for non-conventional movements are provided in this letter report.

The optical fibre cable located above the southern end of Longwall 301 is referred to as *Cable 1* and the optical fibre cable located above the northern end of Longwall 303 is referred to as *Cable 2* in this letter report.

The predicted profiles of incremental and total conventional subsidence, tilt and curvature along the alignment of the Telstra optical fibre cables, resulting from the extraction of Longwalls 301 to 303, are shown in the attached Figs. A.1 and A.2. The black dashed lines are the incremental profiles that represent the additional movements due to each of the longwalls. The solid blue lines represent the total or accumulated movements after the completion of each longwall. The range of predicted curvatures in any direction at any time during or after the extraction of the longwalls is shown by the grey shading.

Summaries of the maximum predicted values of incremental subsidence, tilt and curvature for the optical fibre cables, due to the extraction of each of the Longwalls 301 to 303, are provided in Table 1 and Table 2. The values are the maxima anywhere along the cables at any time during or after the extraction of each longwall.

Table 1 Maximum Predicted Incremental Subsidence, Tilt and Curvature for the Telstra Optical Fibre Cable 1 Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Incremental Subsidence (mm)	Maximum Predicted Incremental Tilt (mm/m)	Maximum Predicted Incremental Hogging Curvature (km^{-1})	Maximum Predicted Incremental Sagging Curvature (km^{-1})
Due To LW301	80	< 0.5	< 0.01	< 0.01
Due To LW302	225	2.0	0.04	< 0.01
Due To LW303	70	< 0.5	< 0.01	< 0.01

Table 2 Maximum Predicted Incremental Subsidence, Tilt and Curvature for the Telstra Optical Fibre Cable 2 Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Incremental Subsidence (mm)	Maximum Predicted Incremental Tilt (mm/m)	Maximum Predicted Incremental Hogging Curvature (km^{-1})	Maximum Predicted Incremental Sagging Curvature (km^{-1})
Due To LW301	< 20	< 0.5	< 0.01	< 0.01
Due To LW302	50	0.5	< 0.01	< 0.01
Due To LW303	275	2.5	0.02	0.01

The maximum predicted incremental subsidence for the optical fibre cables, due to the extraction of each of the Longwalls 301 to 303, varies from less than 20 mm to 275 mm. It is noted, that the maximum predicted incremental subsidence for Cable 1 due to Longwall 302 is greater than that due to Longwall 301, as it is a second panel in the series and therefore results in higher magnitudes of subsidence above the mining area.

Summaries of the maximum predicted values of total subsidence, tilt and curvature for the optical fibre cables, resulting from the extraction of Longwalls 301 to 303, are provided in Table 3 and Table 4. The values are the maxima anywhere along the cables at any time during or after the extraction of the longwalls.

Table 3 Maximum Predicted Total Subsidence, Tilt and Curvature for the Telstra Optical Fibre Cable 1 Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
After LW301	80	< 0.5	< 0.01	< 0.01
After LW302	300	2.5	0.03	< 0.01
After LW303	375	3.0	0.04	< 0.01

Table 4 Maximum Predicted Total Subsidence, Tilt and Curvature for the Telstra Optical Fibre Cable 2 Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
After LW301	< 20	< 0.5	< 0.01	< 0.01
After LW302	70	0.5	< 0.01	< 0.01
After LW303	350	3.0	0.03	< 0.01

The maximum predicted total subsidence for the optical fibre cables, resulting from the extraction of Longwalls 301 to 303, are 375 mm for Cable 1 and 300 mm for Cable 2. The maximum predicted conventional tilt for these cables is 3.0 mm/m (i.e. 0.3 %, or 1 in 335). The maximum predicted conventional curvatures are 0.04 km^{-1} hogging and < 0.01 km^{-1} sagging, which equate to minimum radii of curvature of 25 kilometres and 100 kilometres, respectively.

The copper telecommunications cables are located above the northern end of Longwalls 303. A summary of the maximum predicted values of total subsidence, tilt and curvature for these copper cables, resulting from the extraction of Longwalls 301 to 303, is provided in Table 5.

Table 5 Maximum Predicted Total Subsidence, Tilt and Curvature for the Telstra Copper Cables Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
After LW301	20	< 0.5	< 0.01	< 0.01
After LW302	325	3.0	0.02	0.02
After LW303	425	4.0	0.03	0.03

The maximum predicted conventional tilt for the copper cables is 4.0 mm/m (i.e. 0.4 %, or 1 in 250). The maximum predicted conventional curvatures are 0.03 km^{-1} hogging and sagging, which equate to minimum radii of curvature of 33 kilometres.

The telecommunications tower and compound are located adjacent to the tailgate of Longwall 303. A summary of the maximum predicted values of total subsidence, tilt and curvature for this installation, resulting from the extraction of Longwalls 301 to 303, is provided in Table 6.

Table 6 Maximum Predicted Total Subsidence, Tilt and Curvature for the Telecommunications Tower and Compound Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
After LW301	< 20	< 0.5	< 0.01	< 0.01
After LW302	30	< 0.5	< 0.01	< 0.01
After LW303	150	1.5	0.02	< 0.01

The maximum predicted conventional tilt for the telecommunications tower and compound is 1.5 mm/m (i.e. 0.15 %, or 1 in 667). The maximum predicted conventional curvatures are 0.02 km^{-1} hogging and < 0.01 km^{-1} sagging, which equate to minimum radii of curvature of 50 kilometres and greater than 100 kilometres, respectively.

Predicted Strains

The prediction of strain is more difficult than the predictions of subsidence and tilt. The reason for this is that strain is affected by many factors, including ground curvature and horizontal movement, as well as local variations in the near surface geology, the locations of pre-existing natural joints at bedrock and the depth of bedrock. Survey tolerance can also represent a substantial portion of the measured strain, in cases where the strains are of a low order of magnitude. The profiles of observed strain, therefore, can be irregular even when the profiles of observed subsidence, tilt and curvature are relatively smooth.

In previous MSEC subsidence reports, predictions of conventional strain were provided based on the best estimate of the average relationship between curvature and strain. Similar relationships have been proposed by other authors. The reliability of the strain predictions was highlighted in these reports, where it was stated that measured strains can vary considerably from the predicted conventional values.

Adopting a linear relationship between curvature and strain provides a reasonable prediction for the conventional tensile and compressive strains. In the Southern Coalfield, it has been found that a factor of 15 provides a reasonable relationship between the predicted maximum curvatures and the predicted maximum conventional strains. The locations that are predicted to experience hogging or convex curvature are expected to be net tensile strain zones and locations that are predicted to experience sagging or concave curvature are expected to be net compressive strain zones.

At a point however, there can be considerable variation from the linear relationship, resulting from non-conventional movements or from the normal scatters which are observed in strain profiles. When expressed as a percentage, observed strains can be many times greater than the predicted conventional strain for low magnitudes of curvature. We have therefore provided a statistical approach to account for the variability, instead of just providing a single predicted conventional strain.

The range of predicted strains for the Telstra infrastructure has been determined using the monitoring data from Metropolitan Colliery and other nearby collieries. The data used in the analysis of observed strains included those resulting from both conventional and non-conventional anomalous movements, but did not include those resulting from valley related movements. The strains resulting from damaged or disturbed survey marks have also been excluded.

The Telstra infrastructure is partially located above Longwalls 301 to 303. A histogram of the maximum tensile and compressive strains measured in survey bays located above previously extracted longwalls in the Southern Coalfield is provided in Figure 2. The probability distribution functions, based on a fitted *Generalised Pareto Distribution (GPD)*, have also been shown in this figure.

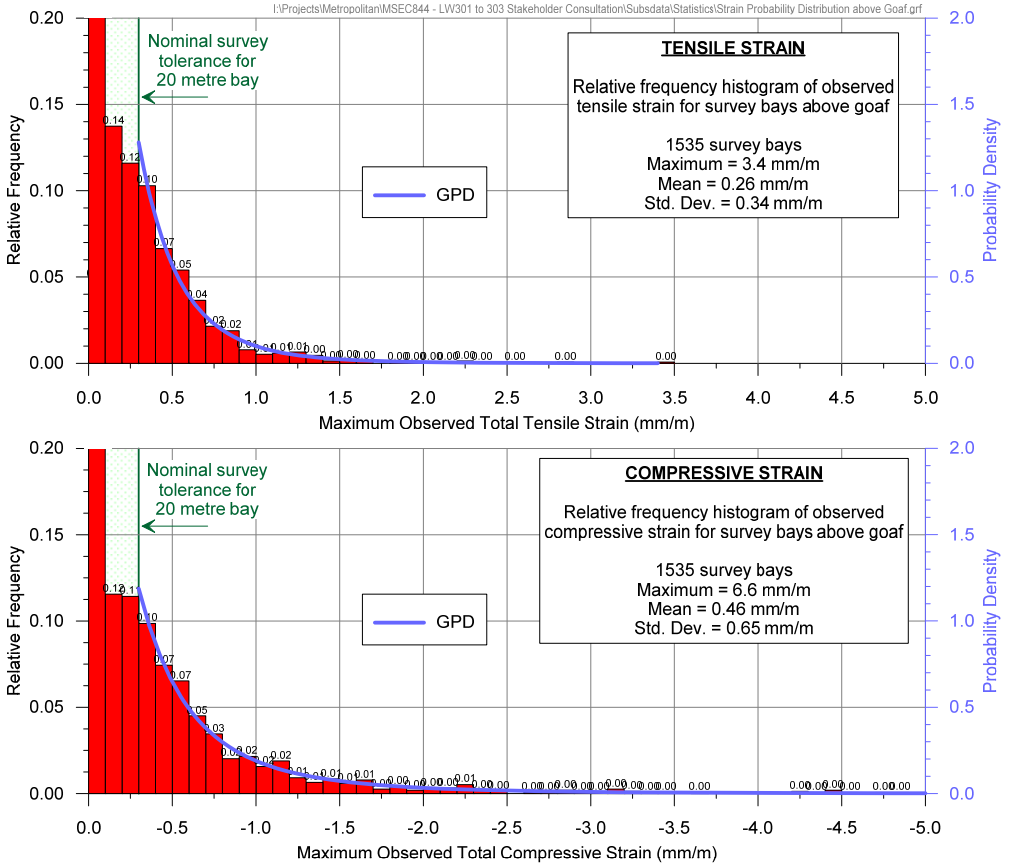

Figure 2 Distributions of the Measured Maximum Tensile and Compressive Strains during the Extraction of Previous Longwalls in the Southern Coalfield Above Goaf

Confidence intervals have been determined from the empirical strain data using the fitted GPDs. In the cases where survey bays were measured multiple times during a longwall extraction, the maximum tensile strain and the maximum compressive strain were used in the analysis (i.e. single tensile strain and single compressive strain measurement per survey bay).

A summary of the probabilities of exceedance for tensile and compressive strains for survey bays located above goaf, based on the fitted GPDs, is provided in Table 7.

Table 7 Probabilities of Exceedance for Strain for Survey Bays Located above Goaf

Strain (mm/m)		Probability of Exceedance
Compression	-8.0	1 in 1,300
	-6.0	1 in 570
	-4.0	1 in 185
	-2.0	1 in 35
	-1.0	1 in 9
	-0.5	1 in 3
	-0.3	1 in 2
Tension	+0.3	1 in 3
	+0.5	1 in 6
	+1.0	1 in 30
	+2.0	1 in 300
	+3.0	1 in 1,800

The 95 % confidence intervals for the maximum total strains that the individual survey bays above goaf experienced at any time during mining are 0.9 mm/m tensile and 1.6 mm/m compressive. The 99 % confidence intervals for the maximum total strains that the individual survey bays above goaf experienced at any time during mining are 1.5 mm/m tensile and 3.2 mm/m compressive.

Potential for Non-Conventional Movements

Non-conventional movements can develop due to the presence of geological structures or valley related effects. In some cases, non-conventional movements can develop with no known cause and these are often referred to as 'anomalous' movements.

The locations of the known geological structures and the streams are shown in Drawing No. MSEC844-04.

There are no mapped faults located within the extents of Longwalls 301 to 303. It is possible that the infrastructure located above the longwalls could experience localised and elevated strains due to unknown geological structures (i.e. anomalies). The range of strains provided in the previous section include those resulting from irregular anomalous movements.

The optical fibre cables do not cross any major streams within the Study Area. These cables, therefore, are not expected to experience any measurable valley closure effects.

Impact Assessments for the Optical Fibre Cables

The optical fibre cables within the Study Area are direct buried and, therefore, will not be impacted by the tilts resulting from the extraction of Longwalls 301 to 303. The cables, however, are likely to experience the curvatures and ground strains resulting from the extraction of these longwalls.

The tensile strains in the optical fibre cables can be higher, however, where the cables connect to the support structures, which may act as anchor points, preventing any differential movements that may have been allowed to occur within the ground. Tree roots have also been known to anchor cables to the ground. The extent to which the anchor points affect the ability of the cable to tolerate the mine subsidence movements depends on the cable size, type, age, installation method and ground conditions.

In addition to this, optical fibre cables contain additional fibre lengths over the sheath lengths, where the individual fibres are loosely contained within tubes. Compression of the sheaths can transfer to the loose tubes and fibres and result in 'micro-bending' of the fibres constrained within the tubes, leading to higher attenuation of the transmitted signal. If the maximum predicted compressive strains were to be fully transferred into the optical fibre cables, they could be of sufficient magnitude to result in the reduction in capacities of the cables or transmission loss.

Localised and elevated curvatures could develop along the optical fibre cables due to non-conventional movements resulting from near surface geological structures (i.e. anomalies). It is possible that these non-conventional movements could be sufficient to result in the attenuation of signal.

The predicted curvatures and strains for the optical fibre cables are similar to those where longwalls in the Southern Coalfield have previously mined directly beneath similar cables. It has been found from this previous experience that the potential impacts on optical fibre cables in the Southern Coalfield can be managed with the implementation of suitable monitoring and management strategies.

Some examples of mining beneath optical fibre cables in the Southern Coalfield are provided in Table 8.

Table 8 Examples of Mining Beneath Optical Fibre Cables in the Southern Coalfield

Colliery and Longwalls	Length of Optical Fibre Cables Directly Mined Beneath (km)	Observed Maximum Movements at Optical Fibre Cables	Pre-Mining Mitigation, Monitoring and Observed Impacts
Appin LW301 and LW302	0.8	650 mm Subsidence 1 mm/m Tensile Strain 3 mm/m Comp. Strain (Measured M & N-Lines)	600 metre aerial cable on standby. Ground survey, visual, OTDR. No reported impacts.
Appin LW703 to LW706	12.7 total for eight cables	1,200 mm Subsidence 2.1 mm/m Tensile Strain 4.5 mm/m Comp. Strain (Measured HW2, ARTC and MPR Lines)	New cable redirection to avoid potential impacts to old optical fibre cable. Ground survey, visual, OTDR. Strain concentrations detected in three cables, attenuation losses were relieved by locally exposing the cables or by building a bypass cable.
Tahmoor LW22 to LW29	1.9	775 mm Subsidence 0.8 mm/m Tensile Strain 3.9 mm/m Comp. Strain	Ground survey, visual, OTDR, SBS. No reported impacts.
Tower LW1 to LW10	1.7	400 mm Subsidence 3 mm/m Tilt 0.5 mm/m Tensile Strain 1 mm/m Comp. Strain	No reported impacts
West Cliff LW5A3, LW5A4 and LW29 to LW38	3.4	1,300 mm Subsidence 1.3 mm/m Tensile Strain 5.5 mm/m Comp. Strain (Measured B-Line)	Survey, visual, OTDR, SBS. No reported impacts.

The strains transferred into the Telstra optical fibre cables can be monitored using Optical Time Domain Reflectometry (OTDR). The ground movements can also be monitored using traditional survey lines and visual inspections. These monitoring methods can be used to identify the development of irregular ground movements. If non-conventional movements or signal attenuation are detected during active subsidence, then the cable can be relieved by locally exposing and then reburying the affected section of cable.

It is recommended that monitoring and management strategies are developed, in consultation with Telstra, to manage the optical fibre cables for potential irregular ground movements. It is expected that these cables can be maintained in serviceable condition with the implementation of the appropriate monitoring and management strategies.

Impact Assessments for the Copper Telecommunications Cables

The copper telecommunications cables within the Study Area include both buried and aerial cables. The buried cables can be affected by curvatures and ground strains and the aerial cables can be affected by the changes in cable catenaries. Copper telecommunications cables are flexible and it has been found that these types of cables can typically tolerate strains up to 20 mm/m without adverse impacts.

Extensive experience of mining beneath copper telecommunications cables in the NSW Coalfields, where the observed strains were similar or greater than those predicted for the longwalls, indicates that incidences of impacts is very low and generally of a minor nature. Some remedial measures have been required, which include adjustments to cable catenaries, pole tilts and consumer cables which connect between the poles and building structures. The incidence of these impacts, however, was very low.

It is unlikely that the copper telecommunications cables would experience adverse impacts as a result of the extraction of Longwalls 301 to 303.

Impact Assessments for the Telecommunications Tower

The telecommunications tower and compound are located adjacent to the tailgate of Longwall 303.

The maximum predicted tilt for this installation is 1.5 mm/m (i.e. 0.15 %, or 1 in 667). The magnitude of tilt is very small (i.e. less than 1 %) and therefore is unlikely to adversely impact on the tower or compound. Tilt can potentially effect directional antennas (i.e. microwave dishes) and therefore it is recommended that the radio engineer reviews the predicted change in alignment. If adverse impacts were anticipated, the alignments of the directional antennas could be adjusted during active subsidence.

The maximum predicted conventional curvatures are 0.02 km^{-1} hogging and < 0.01 km^{-1} sagging, which equate to minimum radii of curvature of 50 kilometres and greater than 100 kilometres, respectively. The predicted strains are 0.9 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence level and 1.5 mm/m tensile and 3.2 mm/m compressive based on the 99 % confidence level.

It is recommended that the structural engineer reviews the structural integrity of the tower structure based on the predicted conventional subsidence, tilt and curvatures and the predicted distributions of strain. If adverse impacts were anticipated, then preventive measures should be implemented that could include the installation of additional bracing members and/or strengthening members to the existing frame.

The building enclosure is a steel framed structure founded on a concrete ground slab. It is unlikely that the enclosure would experience adverse impacts due to its lightweight construction and its separation from the ground due to the ground slab.

Summary

The optical fibre cables are located above the southern end of Longwall 301 and above the northern end of Longwall 303. The previous experience from the Southern Coalfield has found that the potential impacts on optical fibre cables can be managed with the implementation of suitable monitoring and management strategies. These strategies could include Optical Time Domain Reflectometry (OTDR), traditional ground monitoring lines and visual inspections.

The Telstra copper telecommunications cables are located above the northern ends of Longwalls 302 and 303. It is unlikely that these copper cables would experience adverse impacts as a result of Longwalls 301 to 303.

A telecommunications tower and compound is located adjacent to the tailgate of Longwall 303. It is recommended that the predicted movements are reviewed by the radio and structural engineers. Preventive measures for the tower should be installed if adverse impacts are anticipated. It is unlikely that adverse impacts would occur for the lightweight building enclosure.

It is expected that the potential impacts on the Telstra infrastructure can be managed with the implementation of the appropriate monitoring and management strategies.

Yours sincerely

Peter DeBono

Attachments:

Drawing No. MSEC844-04 – Longwalls 301 to 303 – Telstra Infrastructure

Fig. A.1 Predicted Profiles of Conventional Subsidence, Tilt and Curvature for the Telstra Optical Fibre Cable (1) due to LW301 to LW303

Fig. A.2 Predicted Profiles of Conventional Subsidence, Tilt and Curvature for the Telstra Optical Fibre Cable (2) due to LW301 to LW303

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METROPOLITAN COLLIERY
LONGWALLS 301 TO 303
TELSTRA INFRASTRUCTURE

DATE:	SCALE:	DRAWING No:	Rev No
26 Aug 2016	1:12500	MSEC844-04	D

Grid to MGA co-ordinates

6 218 000
312 000
314 000
6 216 000

LEGEND
OPTICAL FIBRE
LOCAL CABLE

STUDY AREA
PREDICTED 20mm SUBSIDENCE CONTOUR
20
20
LW303
LW302
LW301
TELSTRA OPTICAL FIBRE CABLE 2
TELSTRA OPTICAL FIBRE CABLE 1
TELSTRA TELECOMMUNICATIONS TOWER
METROPOLITAN FAULT
CAWLEY ROAD OVERPASS
CAWLEYS CK
M1 PRINCES MOTORWAY
WORONORA RESERVOIR
OLD PRINCES HWY
NEXTGEN
OPTUS
OPTUS
WILSONS CK
PRINCES HIGHWAY UNDERPASS 2
FAULT
MAIN WEST FAULT
POWELL FAULT

GEOLOGICAL STRUCTURES
FAULTS
DYKES

Predicted Profiles of Conventional Subsidence, Tilt and Curvature along the Telstra Optical Fibre Cable (1) due to LW301 to LW303

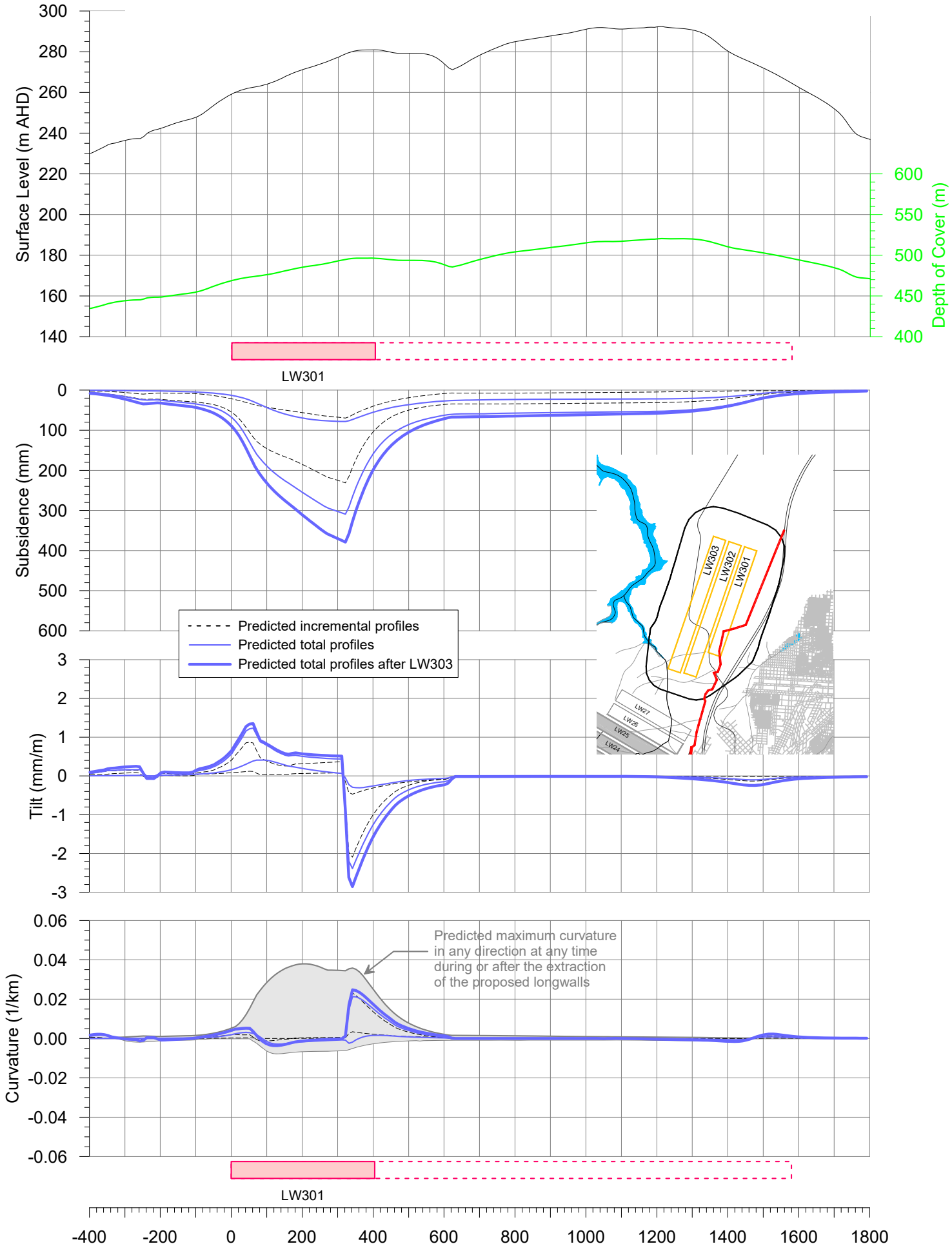

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Fig. A.1

Predicted Profiles of Conventional Subsidence, Tilt and Curvature along the Telstra Optical Fibre Cable (2) due to LW301 to LW303

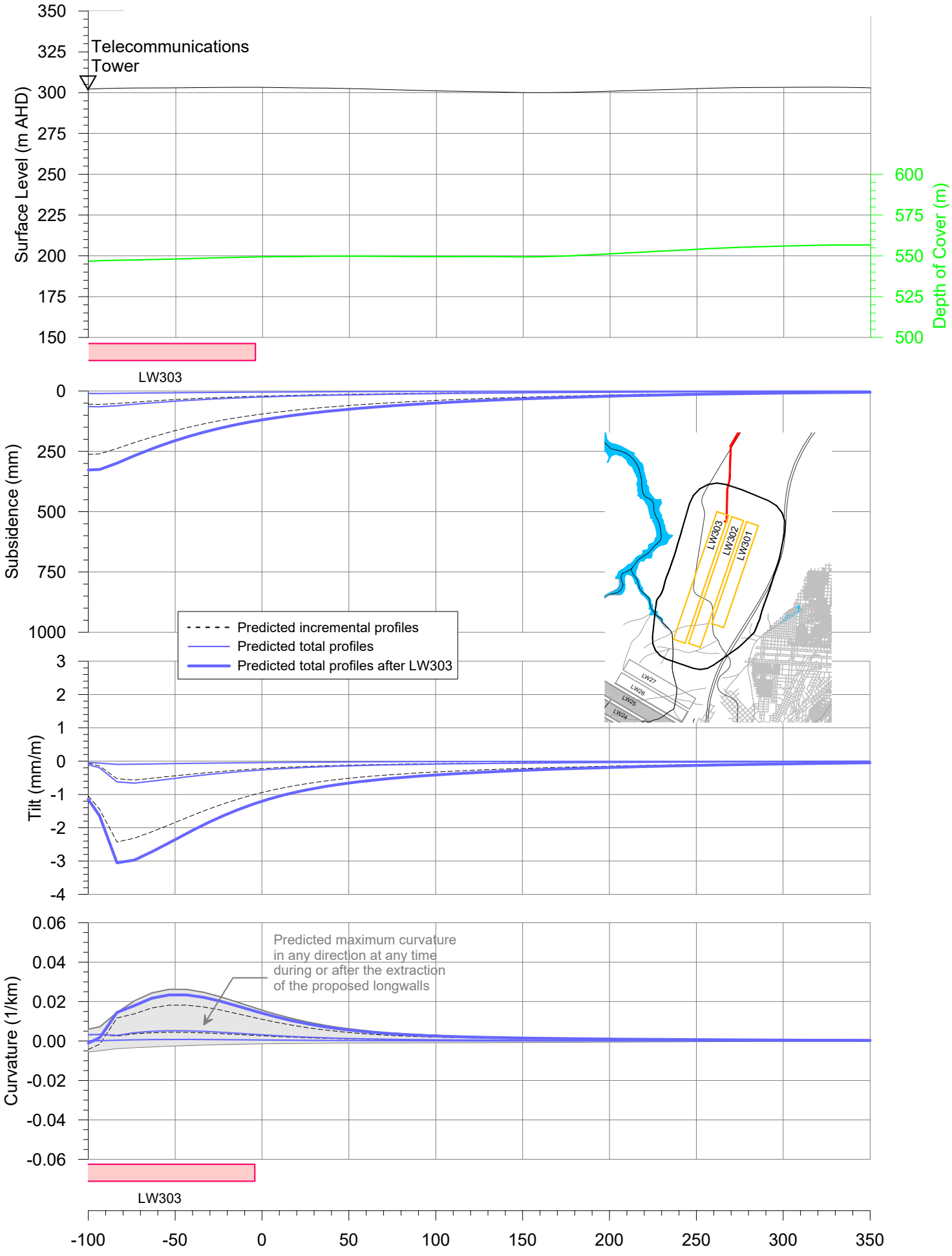

Fig. A.2

APPENDIX 2

BUILT FEATURES MANAGEMENT PLAN – SUBSIDENCE IMPACT REGISTER

Built Features Management Plan - Subsidence Impact Register

Impact Register Number[1]	Built Feature[2,3]	Impact Description	Does Impact Exceed the Built Feature Performance Measure/Indicators? (Yes/No)	Management Measures Implemented	Were Management Measures Effective? (Yes/No)

Notes:

1: Fill out all details in the Assessment Form and record the register number here.

2: Built feature (e.g. cable line, etc.).

3: Impacts to access roads/tracks to be included in the Land Management Plan – Subsidence Impact Register.

Built Feature Management Plan – Subsidence Impact Register
Assessment Form

Date:

Observer (Name and position):

Register Number (i.e. Number 1, 2, etc.):

Longwall Number and Chainage:

Location of Observed Impact:

(Examples: location of cable line, include GPS co-ordinates and a sketch)

Description of Observed Impact:

(Examples: nature and extent of impact - cracks in road etc any relevant information, attach photographs)

Person Notified:	Manager - Technical Services	☐

Description of Photographs:

Actions Required:	Contingency Plan Initiated	☐
	Incident Notification	☐
	Safety Measures/Public Safety Management Plan Requirements	☐

Management or Contingency Measures Implemented:

Effectiveness of Management or Contingency Measures:

APPENDIX 3

TELSTRA MANAGEMENT PLAN AGREEMENT (2016)

Telstra Corporation Ltd

Telstra Network Integrity Group
Network Integrity

Metropolitan Coal,
Peabody Energy Pty Ltd
Helensburgh, N.S.W

Management Plan

Metropolitan Coal,
Peabody Energy Pty Ltd
Longwall Coal Extraction LW301 toLW303,
Below Telstra's Network,
@ Garrawarra, N.S.W.

Authorised on behalf of
Telstra Corporation Ltd

…….

(Name:…….)
(Position:…….)
(Date: …….)

Authorised on behalf of
Metropolitan Coal,

……..

(Name:……)
(Position…….)
(Date: …….)

Issue Date: **DRAFT 21-10-16**

Revision No. & Date:

TABLE OF CONTENTS

1.0 Introduction

The Metropolitan Mine is owned and operated by Metropolitan Coal Pty Ltd (MCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Ltd. MCPL was granted approval for the Metropolitan Coal Project under Section 75J of the New South Wales (NSW) Environmental Planning and Assessment Act, 1979 on 22 June 2009. A copy of the Project Approval is available on the Peabody website (http://www.peabodyenergy.com.au).

Metropolitan Mine is an underground coal mine located at Helensburgh NSW and is about to commence extraction of coal in a new longwall series, longwalls LW301 to LW303 following completion of longwall LW27 in December 2017. The new longwall extraction area is located approximately 2000m north west of Helensburgh and immediately west of the Southern Freeway and to the east of the Princes Highway. The longwalls run approximately 2000m in a north east, south west direction within the Approved Project underground mining area. See Plate 1 on the following page and the Predicted 20mm Subsidence Contour outlined on Appendix B.

MCPL has identified surface assets which may potentially be affected by the mining operations during the longwall extraction. Some of the assets in the area are owned by Telstra, and there is a possibility of subsidence impacts, on these assets. Refer to Mine Subsidence Engineering Consultants (MSEC) Report " Metropolitan Colliery – Proposed Longwalls 301 to 303 – Subsidence Predictions and Impact Assessments for the Telstra Infrastructure" dated 12th July 2016 Reference No 1, for subsidence predictions affecting Telstra infrastructure within the Study Area. Following preliminary identification of the Telstra network within the subsidence zone and in consultation with Telstra, Mark Schneider, Team Manager Telstra Network Integrity, advised to MCPL that Comms Network Solutions Pty Ltd (CNS) be engaged to carry out a survey and audit of the Telstra network and to then prepare a management plan for the Telstra network in the proposed mining area.

The audit by CNS of the Telstra network was completed on 8th, 9th and 21st September 2016 covering the Telstra network installed within the Study Area, defined by the 35 degree angle of draw outlined in yellow shown on Plate 1, following page. The area of the audit is also shown in the attached Google Earth Plan, Appendix A,"Telstra & Nextgen Cable Route -Longwalls LW301 to LW303". Following the audit of the Telstra network, the information is presented in this management plan for MCPL and Telstra to review and if found acceptable then sign off, by both parties, as acceptance of the management plan. The management plan will only consider the potential impact on the Telstra network located within the SMP investigation area as shown in Appendix A and Appendix B.

The Telstra network located in the Study Area and the 600m Secondary Extraction Area has been identified from the field audit as follows :-

a) Inter Exchange Network (IEN) Optical fibre cable:- Major Interstate Trunk Cable F KNST 2005 ENGA-HBGH 80f Sydney-Melbourne No 3 optical fibre cable. Includes 16 dedicated fibres in this cable to provide IEN Services Engadine-Helensburgh.
b) Customer Access Network (CAN) Cable F ENGA 3001 6f Engadine-Garrawarra -Mobile Phone Tower.
c) Customer Access Network (CAN) Cable F ENGA 3005 12f Engadine-Garrawarra RIM and Garrawarra Hospital customer cable.
d) Copper Cable Network supplying customer services throughout Garrawarra Hospital and residential area
    i) Buried copper cable
    ii) Aerial copper cable
e) Mobile Telephone Tower and associated Infrastructure

f) Associated pits, conduits and poles supporting the cable network in a) to e) above.

However the items within 35 degree angle of draw and 20mm subsidence contour Plate 1, the yellow outlined area, are limited to Items a) and b) and a small section of d) and item e) above. Refer to Appendix A for details of the Telstra main optical fibre cable route installed within investigation area.

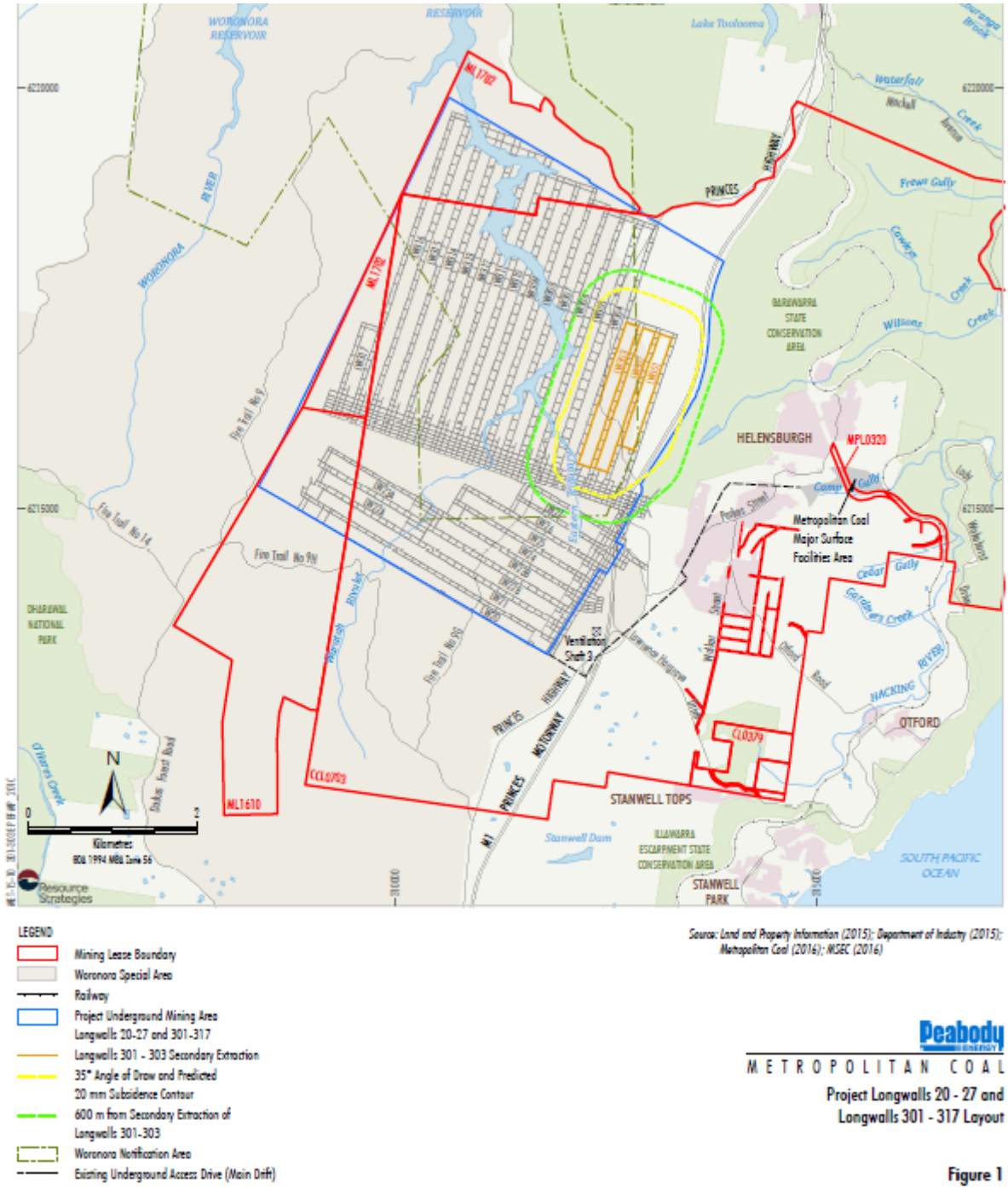

Plate 1:
Extract from Figure 1 Reference No 1:
General Arrangement of the Metropolitan Mine longwall mining area showing area under consideration for this management Plan, Longwalls LW301-303. Yellow outline around extraction area is the 20mm Subsidence Contour line and green outline is the 600m limit from Secondary Extraction.

The optical fibre cables identified as a) above cross the southern corner of LW301. The other optical fibre cable Item c), majority of copper cables d) and the RIM are located in the northern end of the study area and are only impacted by the northern ends of LW302 and LW303. Refer to Appendix B.

The Telstra Built Features Management Plan (Telstra BFMP) August 2016 has been prepared and references this document as Appendix 3. Therefore the aim of this document is to cover the detailed assessment of the Telstra network impacted by mining and recommended monitoring actions for the items of plant identified above.

1.1) Predicted Ground Movements:

As discussed in Reference No 1 predictions have been made for ground movements related to the various items of Telstra infrastructure as identified above, items a) to f). The degree of ground subsidence and curvature generally provides an indication of the impact anticipated on the network however ground strain has the greatest impact on buried cables and on the conduit and pit network, items a), b), c), d) i) & f). The other relevant ground movement factor is tilt and for above ground structures such as the Tower e) and aerial cables d) ii) they are more susceptable to tilts occuring in the area around the base of the poles or tower.

Therefore for the local copper aerial cable as identified in Table 5 below, Reference 1 show the maximum predicted tilt is 4mm/m

Table 5 Maximum Predicted Total Subsidence, Tilt and Curvature for the Telstra Copper Cables Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
After LW301	20	< 0.5	< 0.01	< 0.01
After LW302	325	3.0	0.02	0.02
After LW303	425	4.0	0.03	0.03

The maximum predicted conventional tilt for the copper cables is 4.0 mm/m (i.e. 0.4 %, or 1 in 250). The maximum predicted conventional curvatures are 0.03 km^{-1} hogging and sagging, which equate to minimum radii of curvature of 33 kilometres.

The tilt predictions for the Telstra tower as identified in Table 6, reference 1, show the maximum predicted tilt is less than for the aerial cable at 1.5mm/m

Table 6 Maximum Predicted Total Subsidence, Tilt and Curvature for the Telecommunications Tower and Compound Resulting from the Extraction of Longwalls 301 to 303

Longwall	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
After LW301	< 20	< 0.5	< 0.01	< 0.01
After LW302	30	< 0.5	< 0.01	< 0.01
After LW303	150	1.5	0.02	< 0.01

The maximum predicted conventional tilt for the telecommunications tower and compound is 1.5 mm/m (i.e. 0.15 %, or 1 in 667). The maximum predicted conventional curvatures are 0.02 km^{-1} hogging and < 0.01 km^{-1} sagging, which equate to minimum radii of curvature of 50 kilometres and greater than 100 kilometres, respectively.

As mentioned above the majority of the Telstra network is affected by ground strain which is able to be predicted for the Telstra network from previous data gathered @ MCPL and at the Southern Coalfields for survey bays located above previously extracted longwalls.

The predicted compressive and tensile strain levels from Reference 1 are as per extract below:-

The 95 % confidence intervals for the maximum total strains that the individual survey bays above goaf experienced at any time during mining are 0.9 mm/m tensile and 1.6 mm/m compressive. The 99 % confidence intervals for the maximum total strains that the individual survey bays above goaf experienced at any time during mining are 1.5 mm/m tensile and 3.2 mm/m compressive.

1.2) Anomalous Movement & Valley Closure:

There is also the potential for anomalous ground movement occurring during mine subsidence however this is minimised by the exclusion of known geological faults within the study area and also including an allowance for valley upsidence and closure within the predictions for ground strain. As indicated in the extract from Reference 1 below there are no known geological faults present in the study area as it is located just south of the east-west Metropolitan Fault line and to the north of the Main West Fault line. See Appendix A for location of known fault lines.

Potential for Non-Conventional Movements

Non-conventional movements can develop due to the presence of geological structures or valley related effects. In some cases, non-conventional movements can develop with no known cause and these are often referred to as 'anomalous' movements.

The locations of the known geological structures and the streams are shown in Drawing No. MSEC844-04.

There are no mapped faults located within the extents of Longwalls 301 to 303. It is possible that the infrastructure located above the longwalls could experience localised and elevated strains due to unknown geological structures (i.e. anomalies). The range of strains provided in the previous section include those resulting from irregular anomalous movements.

The optical fibre cables do not cross any major streams within the Study Area. These cables, therefore, are not expected to experience any measurable valley closure effects.

2.0) Scope

The predicted systematic strains at 99% confidence levels of 1.5mm/m tensile and 3.2mm/m compression are relatively high particularly for optical fibre cables however the limited extent of the cable projection at the north western areas of LW303 indicates that these cables are not in a location to sustain these levels of strain for a long period of time. The Sydney-Melbourne cable at the south eastern finishing end of LW301 will develop tensile travelling and compressive strains and then will also develop systematic compressive and tensile strains due to the location of the cable line along and then across the longwall. Therefore it is anticipated that particularly for this cable it may sustain the high levels of compressive strain predicted.

The audit that has been completed and this management plan will identify the assets at risk and propose a monitoring regime on the performance of the Telstra's plant, installed through this relatively rough undulating sandstone plateau, particularly in the south eastern area. In this instance as identified in Section 1) above there is the Sydney-Melbourne optical fibre cable F KNST 2005 present within the south eastern study area of LW301. This cable carries the majority of telephone, data and internet traffic between the two major capital cities in Australia and the IEN fibres also present in the cable provide all the telephone, data and internet services between Engadine and Helensburgh to the south. The network, identified in Section 1.0) has been assessed, in relation to the predicted subsidence impact, based on previous experience with telecommunication cables in mine subsidence areas. Since there are many variables involved with the installation conditions through the varying terrain traversed, it is considered that Optical Time Domain Reflectometer (OTDR) monitoring of the cable, combined

with a specific physical monitoring of the cable line, will offer a high level of protection to the Telstra assets during mining operations.

Monitoring of this cable Sydney-Melbourne No 3 is particularly important in this instance since 50% of Telstra's Sydney Melbourne network is potentially impacted concurrently by other mining operations. This includes also F NEWT 2001 Sydney Melbourne No 1 cable, subject to mining impacts at Douglas Park from LW707. So with mining concurrent in two geographic areas the combined risk to the network increases dramatically. Hence the management plan will put in place some actions to monitor the condition of the cable and associated manhole and pipe network, during the extraction of coal from longwalls LW301 to LW303.

2.1) Limitations.

It must be understood that the mechanism of mine subsidence and its impact on the telecommunications network has only been studied recently in some detail. Generally it has been considered that impacts were only possible on optical fibre cables in tension, as tension applied to the cable sheath would then transmit to the fibres within the sheath, causing attenuation of transmission signal and interruption to services. However experience has shown that cable compression can also lead to transmission failure due to micro bending of the fibres contained within the loose tube that supports the fibres. Since cable installation is continuous through varying ground conditions it is possible that cumulative strains or physical constraints within the trench line can cause high localised stress concentrations on the cable at specific locations from unpredicted ground movement.

Once the mine subsidence is initiated there is no 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 the stresses on the cable, without exposing the cables to high risk of damage from the remedial work undertaken. The aim of the management plan is to identify any vulnerability present in the network and monitor the performance of that part of the network during and after subsidence impacts. This action will not prevent the remote possibility of damage but provides a risk assessment and a method for monitoring that risk and offering protection to the cable.

2.2) Objectives & Risk

The objectives of this management plan in relation to Telstra's plant are to initially audit the network and then identify risks associated with the existing network components and to provide a strategy for monitoring this risk.

In relation to the assets identified in 1.0) above and 2.3) below, the following are the assessed relative risks associated with existing Telstra plant within the proposed mine subsidence area. The main items of plant at risk have been assessed according to the probability of damage and the consequences resulting from that damage. The Risk Factors are shown in the following table, Table 1.

Table 1
Relative Risk Factor **(RF)** for Telecommunications 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
	Very Rare	Low	Low	Low	Moderate	Significant

Refer to Appendix A for cable locations identified in the field audit.

2.3) Telstra Network & Audit Details - Risk Assessment

2.3.1) a) Major Interstate Trunk Optical Fibre Cable F KNST 2005 ENGA-HBGH 80f, Sydney-Melbourne No 3. Includes 16 dedicated fibres in this cable to provide IEN Services Engadine-Helensburgh
(Likelihood – Moderate, Consequence- Major, Risk Assessment - **High)**

This trunk optical fibre cable is a standard construction optical fibre cable installed in the early 1990's. The cable is hard jacketed with glass reinforced central strength member with Kevlar wrapping. However the early design of optical fibre cables only had an allowable haul tension of 1000kN and low crush resistance of 250 Newtons so the cable construction is not equivalent to the more modern design of High Strength optical fibre cables, capable of resisting uniformly applied ground strains of the order of 2-3mm/ metre without impacts on transmission capacity.
This early design cable however is installed in 32mm diameter sub-duct and then installed in 100mm PVC pipe across LW301 it is therefore relatively isolated from ground movement that may impact primarily on the conduit installation. However due to the relatively high risk presented from high strain

levels predicted, combined with the presence of sub-duct and conduit, it is possible that there may be some impact on this sensitive cable. Additionally since the cable is installed in very rocky isolated terrain where anomalous surface movement may damage the network, as a precautionary measure it is recommended that the cable line is physically inspected to ensure that there are no adverse ground impacts occurring as subsidence develops at the south-east finishing end of LW301. The added precaution of using OTDR monitoring of the cable condition over the relevant cable section from Engadine to Helensburgh exchanges is also recommended.

Plate 2
View of optical fibre cables through manhole at approximately 650m north of the Princes Highway underpass of the Southern Freeway M1. There is no joint at this location and the next joint north of the Princess Highway is in the Motocross Track area approximately 800m north and outside the mining area to the east of LW301.

2.3.1) b) Customer Access Network (CAN) Cable F ENGA 3001 6f Engadine-Garrawarra -Mobile Phone Tower.

c) Customer Access Network (CAN) Cable F ENGA 3005 12f Engadine-Garrawarra RIM and Garrawarra Hospital customer cable.

(Likelihood – Unlikely, Consequence- Moderate, Risk Assessment **- Moderate)**

These two cables originate from Engadine exchange and both provide services to the Telstra mobile Telephone Tower located just inside the commencing end of LW303. Additionally F ENGA 3005 also has fibres terminated in the Remote Connection Multiplex cabinet (RCM) identified as ‘EGMW’ located at the entry to the Hospital Site. This cabinet operates as a remote switching point from Engadine exchange to provide copper customer services from an optical fibre cable connection. The RCM supplies the copper customer services to the Hospital and the residential area surrounding the Hospital. These cables are vulnerable to ground movement particularly F ENGA 3001 as it is a standard construction optical fibre cable, F ENGA 3005 is a larger diameter High Strength / Rodent Proof cable sheath.

Plate 3:
RCM cabinet 'EGMW' located on the access road to the Hospital. Provides copper cable customer services from optical fibre transmission

Plate4:
Cable entry to Mobile Telephone Tower Hut showing two optical fibre cables into the Hut the larger diameter cable is F ENGA 3005 and the smaller diameter cable is the more vulnerable cable F ENGA 3001.

As shown in Appendix B the two cables are only exposed to around 50m of mining extraction at the northern commencing end of LW303 and approximately 350m within the Study Area. Since the cables are located at the northern location, full ground subsidence and ground strain development is not anticipated to develop. Accordingly the Risk Factor is considered to be **Moderate** an Unlikely event with Moderate consequences.

2.3.1) d) Copper Cable Network supplying customer services throughout Garrawarra Hospital and residential area.
Risk Factor is considered to be **Moderate** an Unlikely event with Moderate consequences.

i) Buried copper cable
ii) Aerial copper cable

Theses copper cable services are located within the Study Area and consist of 200 Branch pair cables from the RCM to the termination in the General Services Building. Then from this building the local services radiate out to the various Hospital buildings and residences located in and around the Hospital grounds. The mix of distribution of these local cables is approximately 50:50 between buried cable and aerial cable. As the majority of the network is north of LW302 and LW303 it is not considered to be particularly vulnerable to the likely ground movements. However the aerial cable from past mine related ground movement can be more susceptible to pole tilts and damage to the cable at the pole or building terminations. It is considered specially since there is very good mobile coverage in this area due to the presence of the mobile telephone towers that the Risk Factor for the fixed line copper network is **Moderate** an unlikely event with moderate consequences.

2.3.1) e) Mobile Telephone Tower and associated Infrastructure.
Risk Factor is considered to be **Moderate** an Unlikely event with Moderate consequences
The Mobile Telephone Tower as with the optical fibre cables which feed to the Tower is located at the northern end of LW303 approximately 50m from the north goaf edge. Accordingly the risk is that the Tower structure and hut will be subject to tilt which is predicted to be a maximum of 1.5mm/m with 150mm of subsidence.

Plate 5:
View of Tower base structure showing base ring of 24 x 24mm dia bolt cage to secure the base of the 25m steel monopole.

Plate 6:
View from western side of 25m steel monopole showing transmission array on north and eastern faces projecting signal towards M1

This particular tower does not use microwave dishes for any support functions such as back-up systems signalling and as such is not particularly sensitive to tilt occurring. The accepted standard for Telstra towers at Douglas Park and Tahmoor, subject to mining is a tilt level of less than 1 degree. Hence for the 25m tower this would be a tilt at the top of around 45mm. At a predicted maximum ground tilt of 1.5mm/m this would provide a tilt of around 37mm within the accepted limit. The details for this particular tower will be requested from Telstra to verify that this level of ground movement is acceptable.
Two types of footings are used for these towers either a bored 1.0m diameter pier or a mass concrete base of a 5m cube. Details will be requested from Telstra to verify the footing type and to then recommend the installation of tilt meters with real-time data provision as well as backup survey data for subsidence and tilt monitoring verification.

The Hut at the base of the tower carrying the transmission equipment is a 2000 line transportable exchange building also used for housing rural exchanges. Since the building is transportable it has a torsionally rigid base frame suitable for lifting onto trucks and then placing on blocks on site. Therefore the building is able to accept a reasonable degree of movement. However it does sit on a concrete base slab with penetrations around the building for cable entries, earthing cables and waveguides to the tower transmission aerials. Therefore these penetrations into the building should be monitored along with any obvious movement of the slab and supporting blocks to ensure the building is adequately supported at all times.

The Risk Factor for the Tower and Infrastructure is considered as Moderate an unlikely event with moderate consequences.

Plate 7:
View of Hut at Tower base housing all the transmission equipment for the support of the Mobile Telephone Tower. There is a very heavy battery array at the north end and a check should be maintained that the building is adequately supported at all times

2.3.1) f) Associated manholes pits and conduits supporting the above optical fibre and copper cable network.
(Likelihood – Moderate, Consequence- Major, Risk Assessment **- High)**

As discussed above, the Sydney Melbourne optical fibre cable is installed in 100mm PVC conduit and then in 32mm polyethylene sub-duct which passes through reinforced concrete joint housing pits within the eastern goaf area of LW301. As shown in Appendix A there are three manholes present in the study area, one within LW301, one within 70m of the eastern goaf edge and the third approximately 250m south of the finishing ends of the longwalls. The manhole outside the goaf area contains an optical fibre cable joint FAP 'CF' and the one south another joint at 'CE'. The cable joint section then extends approximately 1500m from the south side of the cable crossing of the Princes Highway to the north through to the joint on the eastern side of LW301

This section of conduit supporting the Major Sydney-Melbourne optical fibre cable will be fully impacted by the predicted ground strains along and across LW301. Although there is a reasonable degree of protection should significant ground movement cause movement of the 1.5 tonne manholes then serious damage could result on the cable. Hence due to the importance of this interstate cable and the critical transmission systems it carries the Risk Assessment for this part of the network is **High** with a Likelihood of Moderate combined with a Major consequence.

The conduit and pit network supporting the CAN optical fibre and copper cables through the Hospital grounds to the north of the longwalls is considered to be at a significantly reduced risk of damage. This is primarily due to the fact that this network only crosses into the goaf area by around 50m and is only within the Study Area for an additional 350m to the north where ground strains are significantly reduced.
There are two sections of the cable route shown in Appendix A which could not be located. See Appendix A. It is assumed the southern and western sections of these cables have been abandoned as

there are no existing structures in use in these areas where the cables terminate. Therefore the Risk Factor for this section of the network is considered as being **Low**, unlikely event with a minor consequence.

2.3.1) g) Proposed Subsidence Monitoring

MCPL is to establish new survey monitoring lines for Optical Fibre / Water, Garrawarra Lines and Tower Monitoring as indicated in Risk Analysis meeting with Telstra. The new lines are to be set prior to mining commencing and are to provide survey data on subsidence, strain and tilt, cumulative and incremental changes along the survey lines for the lines identified above. See Appendix C for layout of proposed monitoring lines.
It is also proposed that MCPL establish real-time data collection for two tiltmeters to be installed at the base of the Telstra Tower plus establish survey lines for subsidence, tilt and ground strain around the tower base prior to subsidence impact occurring.

3.0) Control Procedure

As identified in Item 2.3.1) a) to 2.3.1) f) above it is considered there is a **High** risk associated with mine subsidence impacts on some elements of the Telstra network. This is accepting that the systematic subsidence impacts predicted are relatively low yet there is still potential for anomalous ground movement which can account for much higher strain levels and the possibility of localised differential movement around this major telecommunications network.

See the following table, Table 2, which presents a Summary of the Telecommunications Plant, Risk Factor, Monitoring and Actions required for items of plant which may be impacted by mine subsidence. Note that in the Table items of plant have been grouped according to the monitoring technique proposed and the items as identified in 2.3.1 a) to 2.3.1) g) above.

Table 2 - Summary of Monitoring Procedures and Actions Proposed For Telstra Network

ITEM OF PLANT	Risk Factor	Monitoring & proposed Action				Actions & Responsibilities
		Method	Detail	Frequency	Trigger Levels	
a) Major Interstate Trunk Optical Fibre Cable F KNST 2005 ENGA-HBGH 80f, CAN Optical Fibre Cables b) F ENGA 3001 & c) F ENGA 3005	High Moderate	a)Continuous RFMS both cables b) Physically monitor cable line during LW301 to LW303 impacts c) MCPL to Survey. See g) below	a)Consult with Telstra Technical Specialist to set up RFMS if spare fibre avail. on F KNST 2005. CNS P/L Complete initial OTDR testing at 1625nm on spare fibres from ENGA Exchange b) CNS P/L Complete initial OTDR testing at 1625nm on F ENGA 3001 & 3005 on spare fibres from ENGA Exchange c) Physically check cable movement during critical periods for LW301 to 303 impacts.	a)Continuous monitor, Telstra Alarm, set @ 1.0dB initial loss level for F KNST 2005. Separate OTDR testing by CNS P/L for 3 cables from ENGA Exchange b) Physical monitoring in field during mining for a period covering 100m prior to crossing the cable and 400m past the cable line	a) Inspection during mining @ critical locations on longwalls. b) CNS determine loss present. Levels 0.3dB inspection & Uncover Cable, 1dB replace cable c) Ground movement detected check transmission monitoring	Telstra & CNS P/L to discuss with MCPL access requirements for F KNST 2005 through catchment area. C Dove physical inspection & advise any field impacts likely to adversely impact performance of cables. Telstra to maintain remote OTDR test F KNST 2005@1dB trigger, CNS monitor F DGPK 102 @ 0.3dB trigger. NIS, Team Leader, NSW (Mark Schneider) to activate mitigation strategy dependant on loss levels on test fibres. Telstra to advise of alarm condition or advise of damage reports to GOC. Mark Schneider to advise Plan Review Meeting. of proposed action on any of the three OF cables, i.e. uncover cable, emergency cutover or replace full length joint to joint
CAN Local Cables **d)** Copper Cable Network supplying customer services throughout Garrawarra Hospital and residential area. Includes cable in conduit and aerial distribution	Moderate	a) Physical cable inspection b) MCPL to Survey. See g) below	Physical Inspection of cable line, aerial cables & conduit and pit network to be carried out at critical subsidence times for each longwall as it impacts along the cable	The physical inspections regime for each longwall to be agreed between members of the Plan Review Meeting	Indication of damage identified along cable line then test cable and repair	MCPL to advise Mark Schneider & Colin Dove two weeks prior to each longwall crossing Telstra cable. Telstra consultant to monitor survey results provided from MCPL survey data. Physical Inspection of cable line during critical subsidence periods, details reported by Telstra consultant to Plan Review Meeting & proposed action to be agreed if impacts occur.

e) Mobile Telephone Tower and associated Infrastructure.	Moderate	a) MCPL establish survey lines around base b) MCPL install and maintain two tiltmetres at base of tower c) OTDR monitoring of cable line & physically monitor tower during LW302 & 303 impacts	a) Telstra specified tilt of 1 degree as trigger level. Survey regime & tiltmeters established @ base and on tower structure. Monitor data b) OTDR monitoring of cable line during LW302 303 impacts. Physically check cable and tower structure during LW302 & 303 passing tower	During commencing 400m of extraction from LW302 and LW303	Tilt of 1 degree and OTDR loss on cable 0.3dB	C Dove to liaise with Telstra specialist consultants and advise of progress of longwalls and impacts from survey data and tiltmetres. C Dove to advise Mark Schneider of any impacts for discussion & resolution at Plan Review Meetings
f) Conduit and pit network supporting cable	High to Low dependant on cable supported	As above for a) to e)	As above a) to e)	As above a) to e)	As above a) to e)	As above a) to e)
g) Subsidence Survey	N/A	Ground Survey of subsidence marks agreed with Telstra	MCPL to survey Telstra cable lines prior to, during and following each subsidence event. Survey lines to be established Optical Fibre/Water, Garrawarra Line & Tower Monitoring	As agreed during critical periods impacting each section of the network as mining progresses	As Above	MCPL to report survey results to Telstra within 48hrs following each individual survey, provide data on subsidence , ground strain and tilt to establish if there is any anomalous ground movement indicated

4.0) Geological fault:

Refer to the discussion in Section 1.2) above identifying the fault lines present to the north and south of the Study Area which both cross the Southern Freeway There is an area immediately south of the longwalls where fault lines are present in the vicinity of the cable line F KNST 2005 near the Princes Highway underpass which have the potential to intersect with the cable line and may cause differential movement at the structures along the cable line. Should any detailed evidence of anomalous surface movement be detected during survey monitoring in this area, this information should be reported to Telstra immediately to consider the implications for the Telstra network in the area.

5.0) Resources

Resources required to carry out the monitoring as identified in Section 3) above are to be provided by Telstra. The costs associated with the monitoring work required for the protection of the Telstra network are to be accepted by MCPL. As well MCPL will provide the survey resources required for the line and tower surveys to determine incremental subsidence, strain and tilt during the operation of the management plan, at agreed intervals, as each longwall approaches the cable line. Should survey results show any anomalous ground movement in the area of the cables then Telstra is to be advised, to complete immediate inspections and to be able to review current survey information and amend the monitoring regime on the network as required.

In the event of unforeseen impacts on the Telstra network, prior to commencing any proposed repair work, Telstra Network Integrity representatives will detail the extent of the proposed work and the associated costs to MCPL. A meeting should be called with representatives of Telstra Network Integrity, MCPL, and the Mine Subsidence Board to discuss 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 system outage is involved, the work will be carried out by Telstra immediately to protect their customer network, while the discussion and resolution of the dispute regarding costs will continue.

6.0) Functions

The physical cable monitoring of the telecommunications network required by this management plan is to be carried out by a suitably qualified consultant experienced with both mine subsidence issues and the behaviour of optical fibre and copper cables during mine subsidence impacts. The cost for this work is the responsibility of MCPL. Regular discussions are to take place between Telstra, their consultants and MCPL who are to provide regular updates of the mine progress, present relevant survey information and to resolve any issues raised during the mine subsidence events relating to mining in LW301 to LW303. The current understanding of the status of the subsidence relative to the predictions and any change in potential risk to the Telstra network is to be used to determine the frequency of contact on mining related issues.

The representatives of the authorities involved in discussions involving potential impacts on the Telstra network are:-

Jon Degotardi, Technical Services Manager, Metropolitan Colliery.
Mark Schneider, Team Manager, Telstra Network Integrity.
Matthew Montgomery, District Manager, Mine Subsidence Board
Peter DeBono, Project Manager, Mine Subsidence Engineering Consultants
Colin Dove, Consultant Telecommunications Engineer.

Should significant risk be identified to the Telstra network then either party involved may call for a meeting of the interested parties, with one day's notice, to discuss proposed action and to keep other parties informed of developments in the monitoring and or protection of the Telstra network.

7.0) Audit and Review

It is anticipated that this plan will be in place for approximately 2 years from the commencement of LW301 operations or for a minimum period of three months following final ground settlement after completion of mining in LW303.

Should an audit of the management plan be required during its period of operation then a representative is to be appointed by Telstra, MCPL and the Mine Subsidence Board to review the operation of the plan and report to a meeting of the interested parties.

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.
- Significant movement identified at the geological fault lines

8.0) Associated Documents

8.1) References:

Reference No 1.- Mine Subsidence Engineering Consultants (MSEC) Report
" Metropolitan Colliery – Proposed Longwalls 301 to 303,
– Subsidence Predictions and Impact Assessments
for the Telstra Infrastructure" dated 12th July 2016.

8.2) Appendices

Appendix A.-
Telstra & Nextgen Cable Route,
Showing Metropolitan Coal Longwalls LW301 to LW303
(Google Earth 2016) Sheet 1 of 1

Appendix B -
"Metropolitan Coal Pty Ltd, Metropolitan Colliery
Longwalls 301 to 303, Telstra Infrastructure"
MSEC Dwg – MSEC844-04 rev D Sheet 1 of 1

Appendix C -
"Metropolitan Coal Pty Ltd, Metropolitan Colliery
Proposed Monitoring Lines LW301 to LW303"
MSEC Drawing Sheet 1 of 1

9.0) Contact List.

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Email cdove@bigpond.com.au,

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Appendices

Appendix A.-

Telstra & Nextgen Cable Route,
Showing Metropolitan Coal's
Longwalls LW301 to LW303
(Google Earth 2016) Sheet 1 of 1

Appendix B -

"Metropolitan Coal Pty Ltd, Metropolitan Colliery
Longwalls 301 to 303, Telstra Infrastructure"
MSEC Dwg – MSEC844-04 rev D Sheet 1 of 1

Appendix C -

"Metropolitan Coal Pty Ltd, Metropolitan Colliery
Proposed Monitoring Lines LW301 to LW303"
MSEC Drawing Sheet 1 of 1

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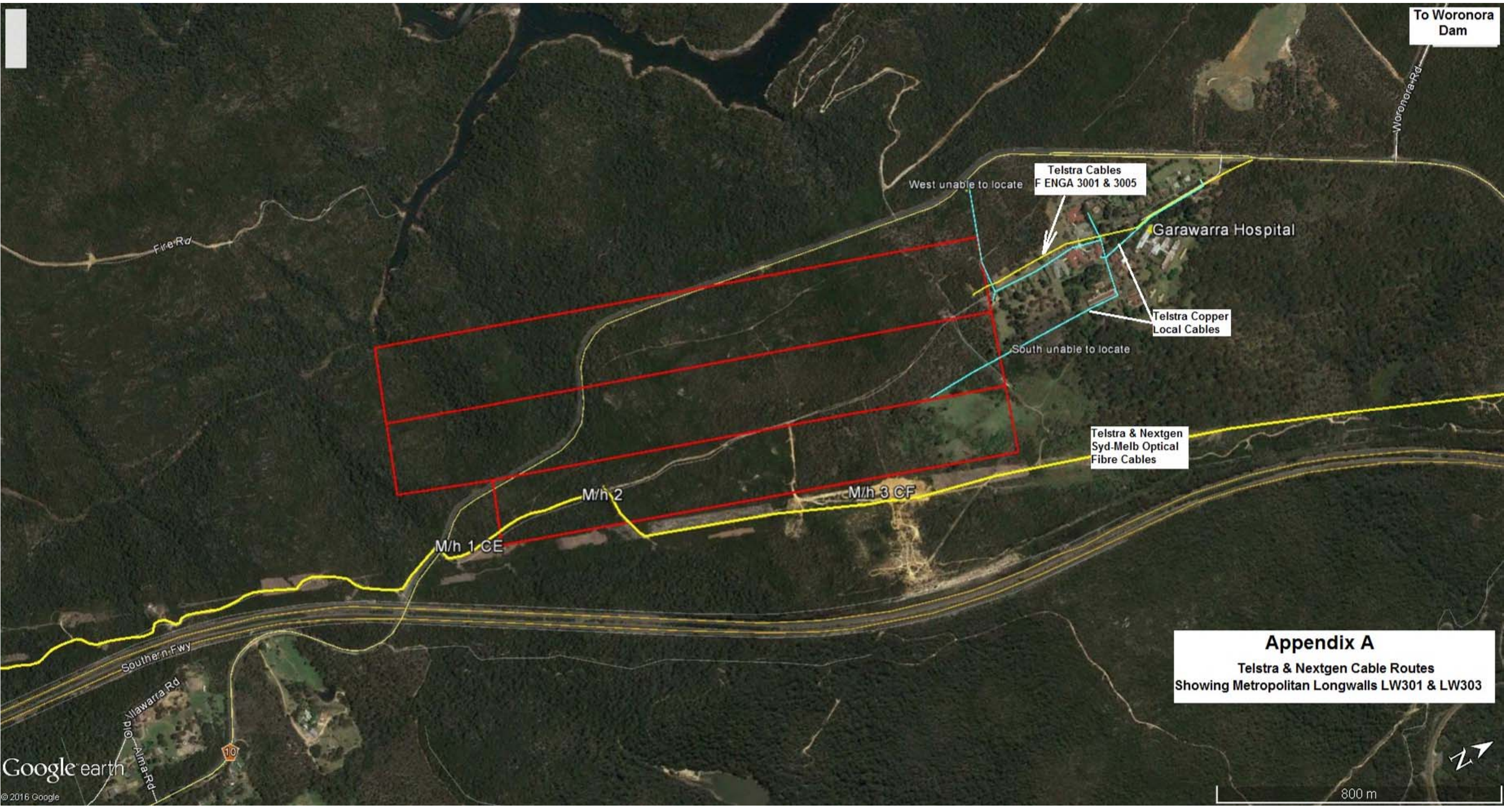
To Woronora Dam
Woronora Rd
West unable to locate
Telstra Cables
F ENGA 3001 & 3005
Garawarra Hospital
Fire Rd
Telstra Copper
Local Cables
South unable to locate
Telstra & Nextgen
Syd-Melb Optical
Fibre Cables
M/h 2
M/h 3 CF
M/h 1 CE
Southern Fwy
Illawarra Rd
Old Illawarra Rd
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Appendix A
Telstra & Nextgen Cable Routes
Showing Metropolitan Longwalls LW301 & LW303

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METROPOLITAN COLLIERY
LONGWALLS 301 TO 303
TELSTRA INFRASTRUCTURE

DATE:	SCALE:	DRAWING No:	Rev No
26 Aug 2016	1:12500	MSEC844-04	D

Grid to MGA co-ordinates

6 218 000
312 000
314 000
6 216 000

LEGEND
OPTICAL FIBRE
LOCAL CABLE

STUDY AREA
PREDICTED 20mm SUBSIDENCE CONTOUR
20
20
LW303
LW302
LW301
TELSTRA OPTICAL FIBRE CABLE 2
TELSTRA OPTICAL FIBRE CABLE 1
TELSTRA TELECOMMUNICATIONS TOWER
METROPOLITAN FAULT
MAIN WEST FAULT
POWELL FAULT
FAULT
CAWLEY ROAD OVERPASS
CAWLEYS CK
M1 PRINCES MOTORWAY
WORONORA RESERVOIR
OLD PRINCES HWY
NEXTGEN
OPTUS
OPTUS
WILSONS CK
PRINCES HIGHWAY UNDERPASS 2

APPENDIX B

GEOLOGICAL STRUCTURES
FAULTS
DYKES

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