METROPOLITAN COAL LONGWALLS 305-307

BUILT FEATURES MANAGEMENT PLAN




Peabody

METROPOLITAN COAL

LONGWALLS 305-307

BUILT FEATURES MANAGEMENT PLAN

WOLLONGONG CITY COUNCIL [OLD PRINCES HIGHWAY]

ME-TSE-MNP-0093

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DPE Approval Date
All	LW305-307 BFMP_WCC-R01-A	Original	WCC, DRG and DPIE	-
New Appendix 2 and minor edits	LW305-307 BFMP_WCC-R01-B	Addition of Traffic Control Plans and minor edits to address WCC comments	WCC and DPIE	16 March 2020
All	LW305-307 BFMP_WCC-R01-C	Updated to reflect 50 m extension to Longwall 307	WCC and DPIE	6 September 2021
Longwall 307 Monitoring	LW305-307 BFMP_WCC-R01-D	Additional monitoring at commencement of Longwall 307	WCC, MEG and DPE	

February 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF PLATES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

The Metropolitan Coal Mine is owned and operated by Metropolitan Coal Pty Ltd (Metropolitan Coal), which is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody). The Metropolitan Coal Mine is located adjacent to the township of Helensburgh, approximately 30 kilometres (km) north of Wollongong in New South Wales (NSW) (Figure 1).

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 (Longwalls 20-27 and Longwalls 301-317) and surface facilities at Metropolitan Coal. Longwalls 305-307 are situated to the west of Longwalls 301-304 and define the next mining sub-domain within the Project underground mining area (Figures 1, 2 and 3). Longwall 311 will be subject to future Extraction Plans.

1.1 PURPOSE AND SCOPE

In accordance with Condition 6(f), Schedule 3 of the Project Approval, this Built Features Management Plan – Wollongong City Council (BFMP-WCC) has been developed to manage the potential consequences of longwall extraction on the Wollongong City Council assets.

The relationship of this BFMP-WCC to the Metropolitan Coal Environmental Management Structure is shown on Figure 4.

This BFMP-WCC includes post-mining monitoring and management of Wollongong City Council assets subject to the previously approved Metropolitan Coal Longwall 304 Extraction Plan.

In accordance with Condition 6, Schedule 3 of the Project Approval, the suitably qualified and experienced experts that have prepared this BFMP-WCC, namely representatives from Mine Subsidence Engineering Consultants (MSEC) and Metropolitan Coal were endorsed by the Secretary of the Department of Planning and Environment (DP&E) (now the NSW Department of Planning and Environment[1] [DPE]). This BFMP-WCC has been prepared in consultation with Wollongong City Council, including consideration of prior consultation during the development of the previously approved Built Features Management Plans.

1.2 STRUCTURE OF THE BFMP-WCC

The remainder of the BFMP-WCC is structured as follows:

Section 2: Describes the review and update of the BFMP-WCC.

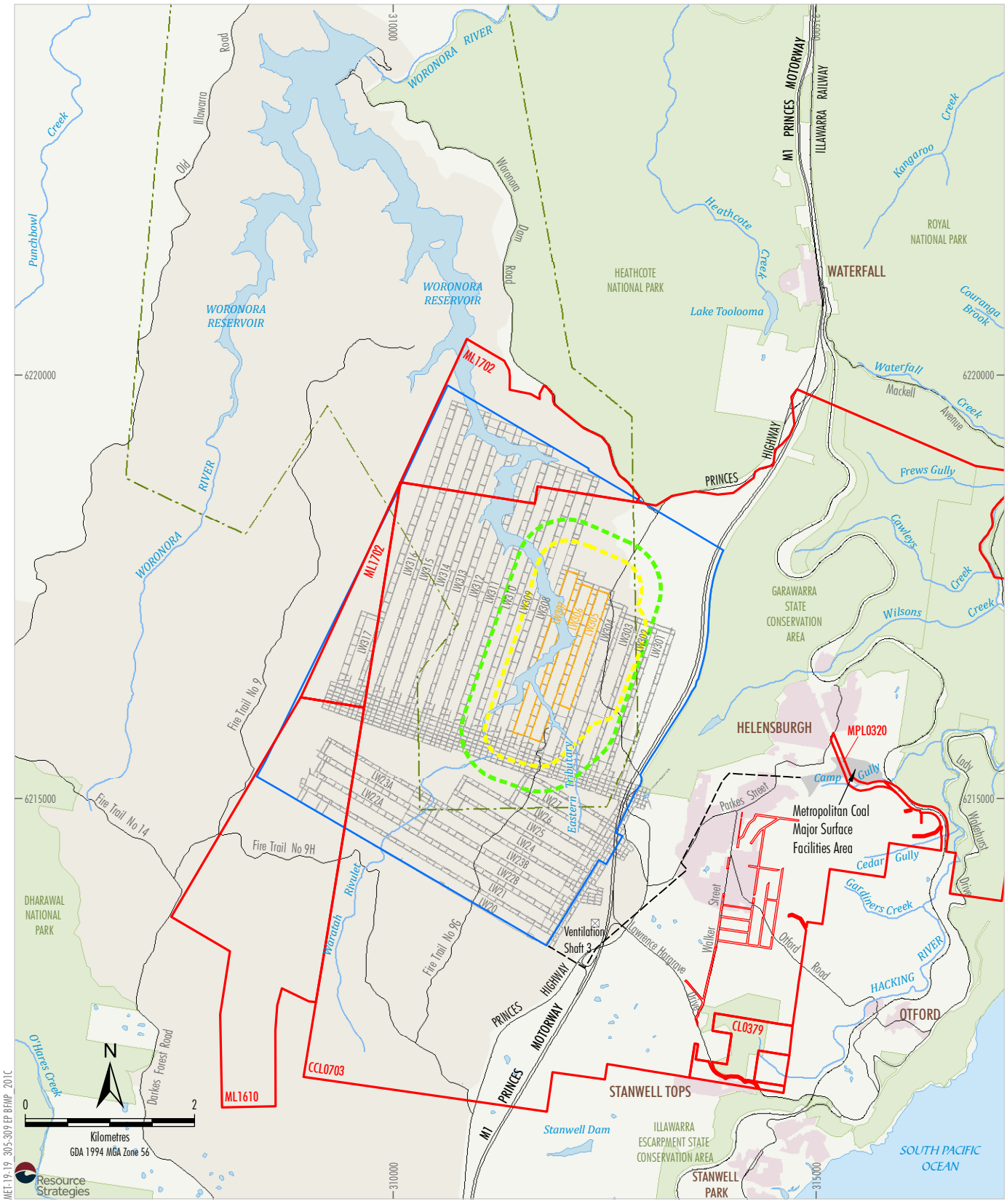
Section 3: Outlines the statutory requirements applicable to the BFMP-WCC.

Section 4: Provides a revised assessment of the potential subsidence impacts and environmental consequences for Longwalls 305-307.

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

Section 6: Provides the detailed baseline data.

[1] The former Department of Planning, Industry and Environment (DPIE) was renamed to the Department of Planning and Environment (DPE) on 21 December 2021. References to DPIE have been retained throughout the remainder of this document.



LEGEND

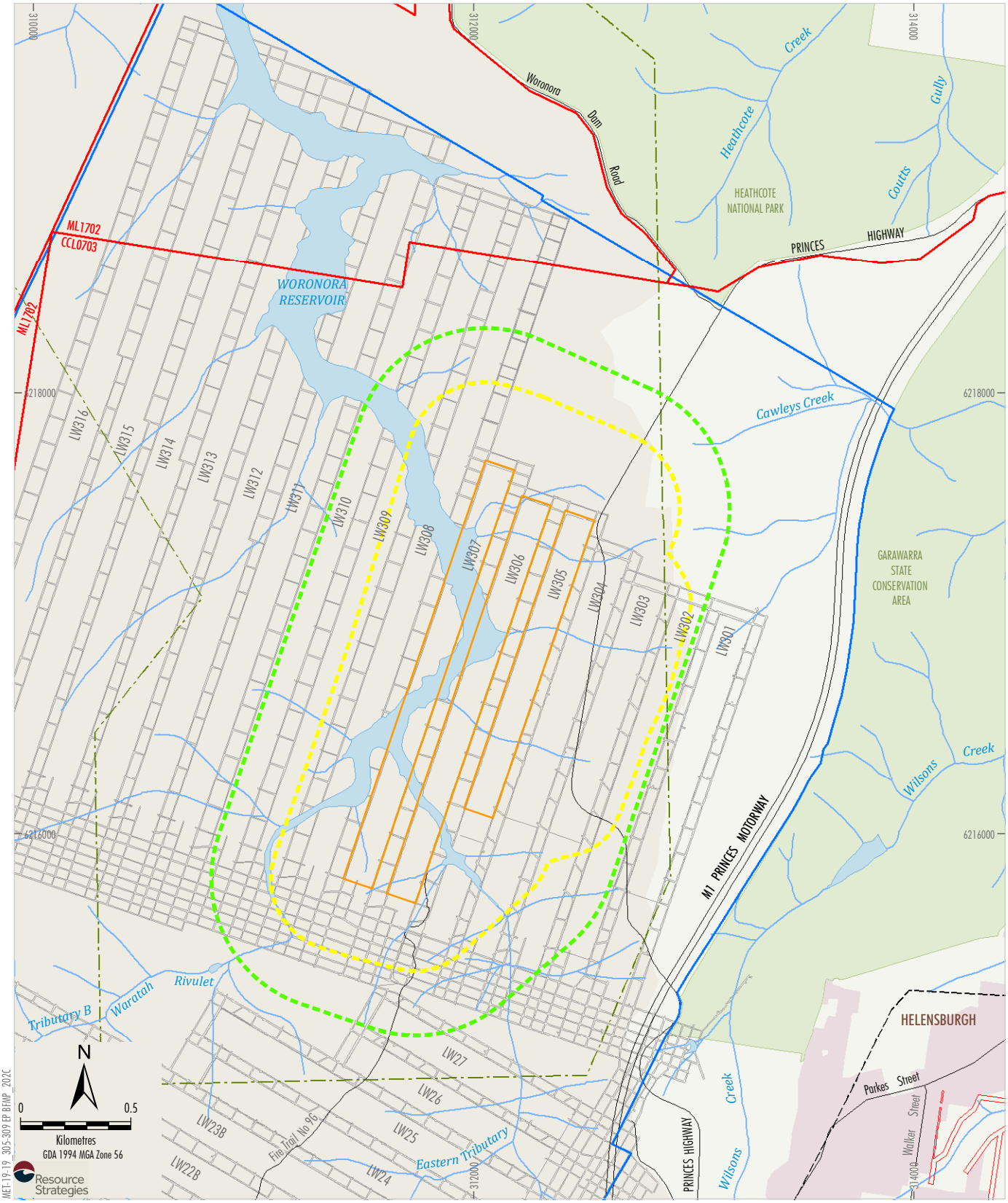
- Mining Lease Boundary
- Woronora Special Area
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 305-307 Secondary Extraction
- Longwalls 305-307 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Longwalls 305-307 Secondary Extraction
- Woronora Notification Area
- Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2019); MSEC (2019)

Peabody
METROPOLITAN COAL

Longwalls 305-307 and Project Underground Mining Area

Figure 1



LEGEND

- Mining Lease Boundary
- Woronora Special Area
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 305-307 Secondary Extraction
- Longwalls 305-307 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Longwalls 305-307 Secondary Extraction
- Woronora Notification Area
- Existing Underground Access Drive (Main Drift)

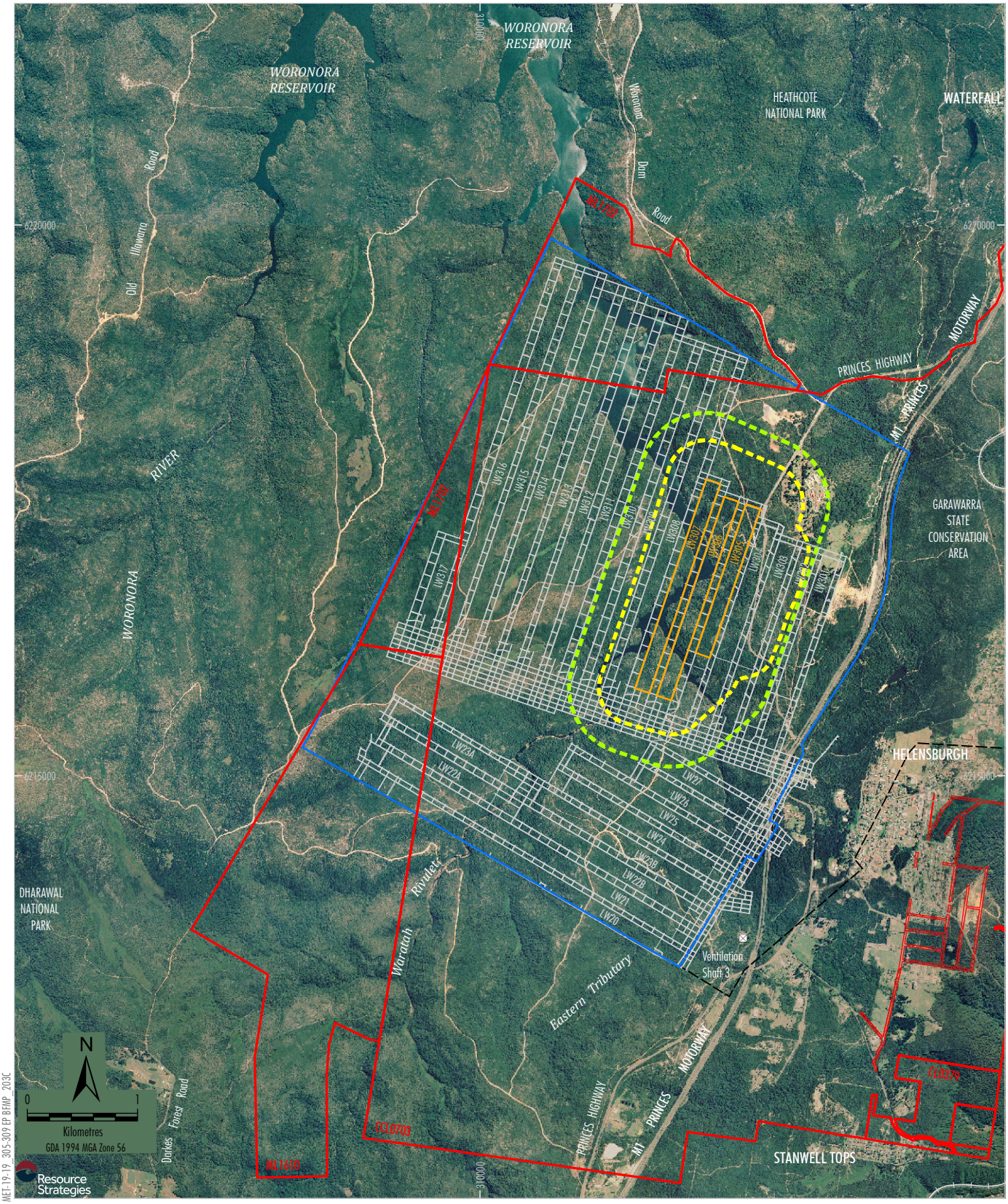
Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2019); MSEC (2019)

Peabody

METROPOLITAN COAL

Longwalls 305-307 Layout

Figure 2



MET-19-19 305-309 EP BHMP 203C

LEGEND

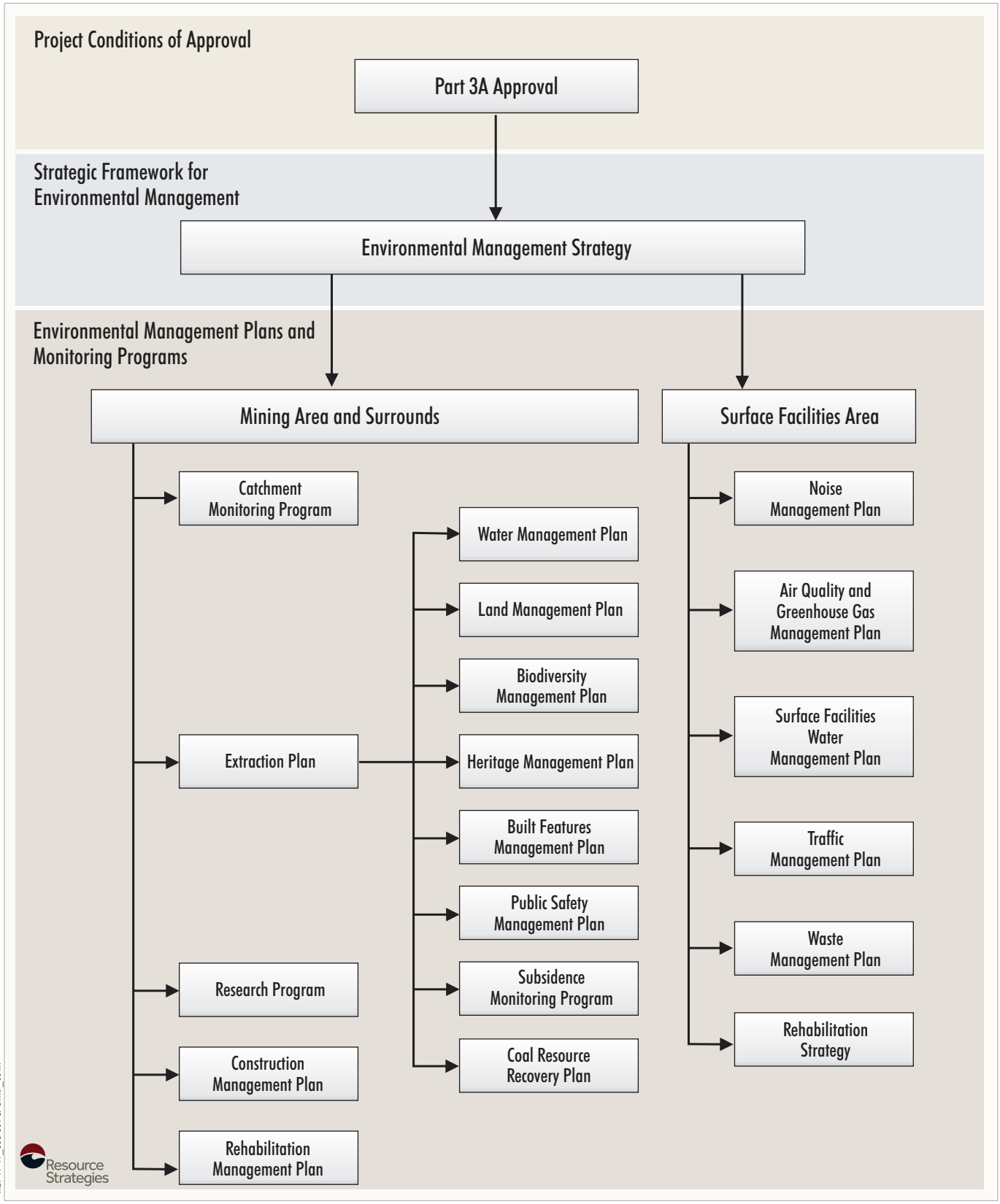
- Mining Lease Boundary
- Railway
- Project Underground Mining Area
  Longwalls 20-27 and 301-317
- Longwalls 305-307 Secondary Extraction
- Longwalls 305-307 35° Angle of Draw and/or
  Predicted 20 mm Subsidence Contour
- 600 m from Longwalls 305-307
  Secondary Extraction
- Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Date of Aerial Photography 1998; Department of Industry (2015); Metropolitan Coal (2019); MSEC (2019)

Peabody
METROPOLITAN COAL

Longwalls 305-307 and Project Underground Mining Area- Aerial Photograph

Figure 3



MET-19-19_305-309 EP BFMP_001A

Peabody
METROPOLITAN COAL

Environmental Management Structure

Figure 4

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 BFMP-WCC.

2 BFMP-WCC REVIEW AND UPDATE

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

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

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

This BFMP-WCC will also be reviewed within three months of approval of any Project modification and if necessary, revised to the satisfaction of the DPIE.

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

Revisions to any documents listed within this BFMP-WCC 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 BFMP-WCC publicly available on the Peabody website. A hard copy of the BFMP-WCC 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 BFMP-WCC, 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 BFMP-WCC 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 Metropolitan Coal's computer system and the 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), 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 BFMP-WCC. Table 1 indicates where each component of the conditions is addressed within this BFMP-WCC.

Table 1
Management Plan Requirements

Project Approval Condition	BFMP-WCC 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 and Appendix 4
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 and Appendix 4
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 and Appendix 4

3.2 LICENCES, PERMITS AND LEASES

In addition to the Project Approval, all activities at or in association with the 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 Geoscience (DRG) (now Mining, Exploration and Geoscience [MEG]), 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 320).
- The *Metropolitan Coal Mining Operations Plan 1 October 2021 to 30 September 2023* approved by the Resources Regulator .
- 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 NSW Department of Industry – Water (now DPIE – 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 the Resources Regulator and WorkCover NSW.
- Supplementary approvals obtained from WaterNSW 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)[2]:

- *Biodiversity Conservation Act 2016;*
- *Biosecurity Act 2015;*
- *Contaminated Land Management Act 1997;*
- *Crown Land Management Act 2016;*
- *Dams Safety Act 2015;*
- *Dangerous Goods (Road and Rail Transport) Act 2008;*
- *Energy and Utilities Administration Act 1987;*
- *Fisheries Management Act 1994;*
- *Mining Act 1992;*
- *Protection of the Environment Operations Act 1997;*
- *Rail Safety (Adoption of National Law) Act 2012;*

[2] The list of potentially applicable Acts has been updated to reflect changes to the Acts that were in force at the time of submission of the Metropolitan Coal Project Environmental Assessment (Project EA) (HCPL, 2008).

- *Roads Act 1993;*
- *Water Act 1912;*
- *Water Management Act 2000;*
- *Water NSW Act 2014;*
- *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 EXTRACTION LAYOUT

Longwalls 305-307 and the area of land within 600 metres (m) of Longwalls 305-307secondary extraction are shown on Figures 2 and 3. Longwall extraction will occur from north to south. The Longwall 305 layout includes a 138 m panel width (void), a 45 m tailgate pillar width and a 70 m maingate pillar width. The longwall layout of Longwalls 306 and 307 includes 138 m panel widths (void) and 70 m pillars (solid).

The provisional extraction schedule for Longwalls 305-307 is provided in Table 2.

Table 2
Provisional Extraction Schedule

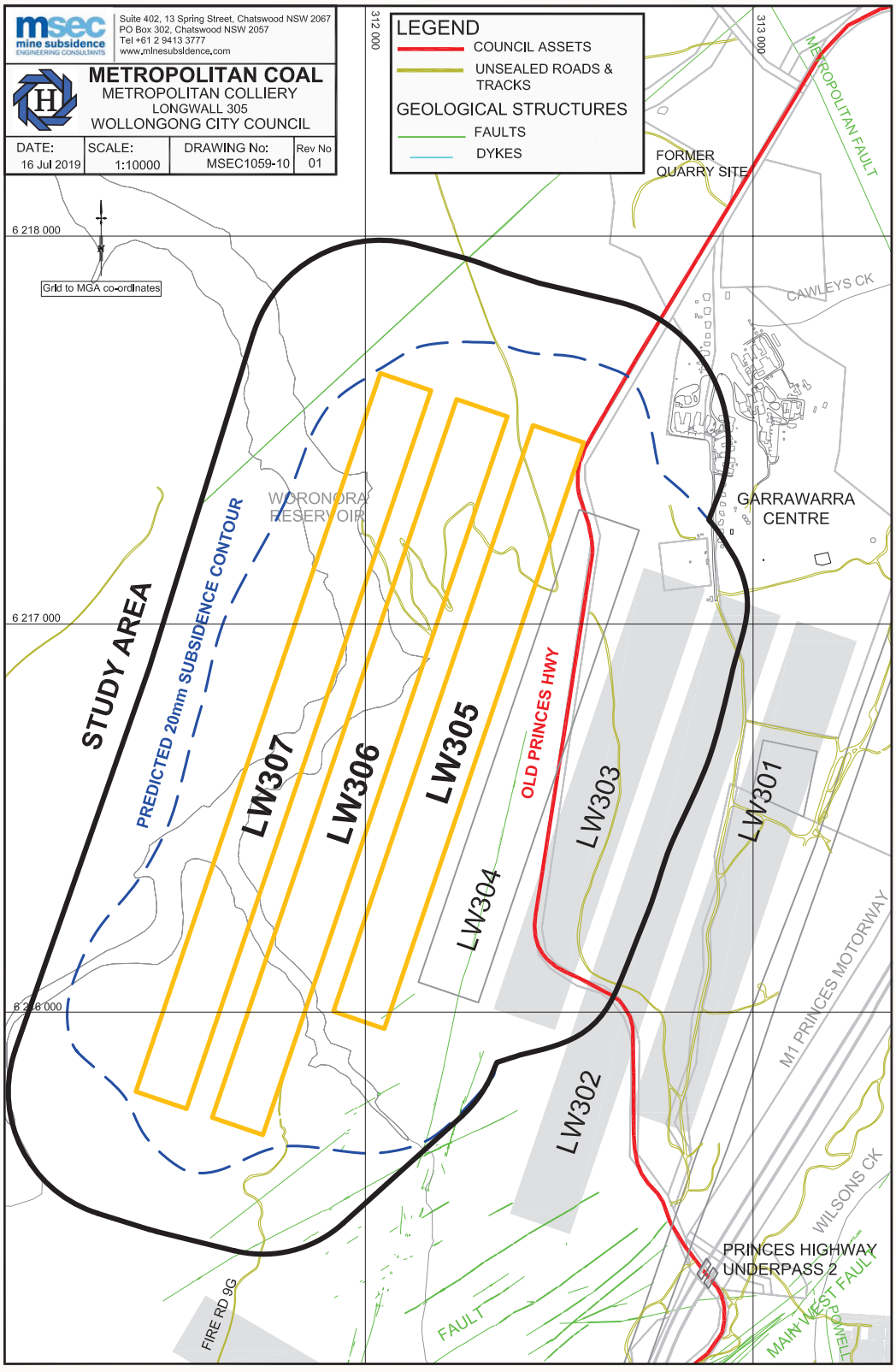
Longwall	Estimated Start Date	Estimated Duration	Estimated Completion Date
Longwall 305	April 2020	8 Months	November 2020
Longwall 306	June 2021	11 Months	April 2022
Longwall 307	May 2022	8 Months	December 2022

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 Wollongong City Council Assets

Figure 5 illustrates the Wollongong City Council assets in relation to Longwalls 305-307 extraction. The assets include:

- Old Princes Highway, including
  - pavement;
  - drainage structures (e.g. pipes, culverts); and
  - guard rails, marker posts and signage.



MET-19-19_305-309 EP BFMP_0108

Source: MSEC (2019)

Peabody

METROPOLITAN COAL

Wollongong City Council Assets
(Old Princes Highway)

Figure 5

4.2 REVISED SUBSIDENCE AND IMPACT PREDICTIONS

4.2.1 Revised Subsidence Predictions

Subsidence predictions for Longwalls 20-44 in relation to the Wollongong City Council 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 305-307 on Wollongong City Council assets were conducted by MSEC and reported in MSEC (2019) (Appendix 1).

In relation to subsidence predictions for Longwalls 305-307, MSEC (2019) make the following conclusions:

- The Old Princes Highway crosses directly above previous Longwalls 301 to 304, and passes close to the commencing end of Longwall 305, but does not cross directly above Longwalls 305-307. This section of the highway comprises single and dual carriageway with a flexible asphalt pavement and grass verges.
- The maximum predicted conventional tilt for the Old Princes Highway after the extraction of Longwalls 305-307 is 3.0 mm/m (i.e. 0.3 %, or 1 in 330). An increase in the predicted tilt by a factor of three would still be less than 1 %. The predicted tilt is much less than the typical gradients along the alignment of the Old Prince Highway and is unlikely to result in adverse impacts on the serviceability or surface water drainage for the highway. If additional localised ponding or adverse changes in surface water drainage were to occur as the result of mining, the highway could be repaired using normal road maintenance techniques.
- The maximum predicted conventional curvatures for the highway are 0.05 km^{-1} hogging and 0.07 km^{-1} sagging, which equate to minimum radii of curvature of 20 km and 14 km 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. The maximum predicted curvatures and the range of potential strains for the Old Princes Highway are similar to those typically experienced elsewhere in the Southern Coalfield. Longwalls in the Southern Coalfield have been successfully mined directly beneath roads with bitumen and asphaltic pavements.
- Approximately 770 m of the Old Princes Highway have been mined beneath by Longwalls 301-303. No adverse impacts or anomalous movements have been identified along the Old Princes Highway during the extraction of Longwalls 301-303.
- It is expected that the highway can be maintained in safe and serviceable conditions with the implementation of the appropriate monitoring and management strategies.

4.2.2 Risk Assessment

In accordance with the *Guidelines for the Preparation of Extraction Plans* (DP&E and DRE, 2015) a risk assessment meeting was held for Longwall 301-303 on 15 August 2016. Attendees at Longwalls 301-303 risk assessment meeting included representatives from Metropolitan Coal, Wollongong City Council, MSEC and Axys Consulting (risk assessment facilitator).

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

- identification of Wollongong City Council assets;
- review of the revised subsidence predictions and potential impacts on Wollongong City Council assets (including consideration of experience from Longwall 301-303 extraction); and
- development of a monitoring plan and management decision tree.

A number of risk control measures and procedures were identified during the initial risk assessment in 2016 which considered the extraction of coal beneath the Wollongong City Council assets. The risk control measures and procedures were incorporated into the Longwalls 301-303 BFMP.

The risk control measures and procedures identified and implemented during the risk assessment for Longwalls 301-303 were continued for the extraction of Longwalls 304-307. At the request of the Wollongong City Council, the Longwalls 305-307 BFMP-WCC included a traffic control plan to divert traffic off the Princes Hwy due to any unforeseen circumstances. This traffic control plan is provided in Appendix 2.

A review for Longwall 305-307 was held on 2 October 2019, attendees at the risk review included representatives from Metropolitan Coal, Wollongong City Council and MSEC. The risk control measures and procedures in place for Longwall 301-304 will be continued for the extraction of Longwall 305-307.

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:

- no pavement cracking exceeding 5 mm, or other defects of the road pavement resulting in deterioration of ride quality;
- no ponding of water on the road surface as a result of changes in grade from subsidence associated with Longwalls 305-307;
- no joint displacement or cracking or other defects of the drainage structure (e.g. pipes/culverts) in excess of 5 mm; and
- serviceability of guard rails, marker posts and signage is maintained.

Section 7 of this BFMP-WCC describes the monitoring that will be conducted to assess the Project against the above performance indicators and performance measure. Sections 8 and 9 of this BFMP-WCC provides management measures and a Contingency Plan in the event the performance measure is exceeded.

6 BASELINE DATA

The Old Princes Highway is shown on Plate 1.

Plate 1 – Old Princes Highway (Source: MSEC, 2016)

A visual audit of the Old Princes Highway and drainage structure (e.g. pipes/culverts) will occur prior to the longwall face approaching within 400 m of the Old Princes Highway (or as otherwise agreed with Wollongong City Council) to establish the condition of the roadway and pipes/culverts. The visual audit will be conducted by representatives of Wollongong City Council and include:

- recording of existing defects using detailed road surface photography (video), i.e. one photograph every 2 m; and
- recording of existing pipe/culvert condition using CCTV video.

A copy of the visual audit record will be provided to Metropolitan Coal on request. Other road pavement baseline records (e.g. deflectograph survey, video) would also be provided to Metropolitan Coal if available.

A third party will be engaged by Metropolitan Coal to conduct a dilapidation survey of the pavement, guard rails, marker posts and signage. The dilapidation survey reporting will include photo evidence, in addition to notes.

6.1 KEY CONTACTS LIST

The list of key contacts for Peabody and Wollongong City Council during the development and implementation of this BFMP are provided in Table 4.

Table 4
List of Key Contacts

Company	Position	Contact
Peabody (Metropolitan Coal)	Jon Degotardi Technical Services Manager	Metropolitan Coal 24hr Control Room **02 4294 7333**
Wollongong City Council	Nur Joy Civil Asset Management Unit Leader	Wollongong City Council 24hr Contact Number **02 4227 7111**
	Peter Tobin Senior Geotechnical Engineer	
	Alan Davis City Maintenance Manager	
	Fred Siasat Civil Coordinator - North Works	
	Alan Davis Manager - Maintenance	
	Fred Siasat Co-ordinator North	
Traffic Logistics	Afterhours Call Out Traffic Control	Traffic Logistics 24hr **02 4271 4999**
Roadworx	Afterhours Call Out Road works	Roadworx **02 4224 0222**
NSW Police	Emergency Call Centre	Police 24hr **000**

In event of an emergency situation from a sudden major subsidence impact and the Princes Highway is not safely trafficable due to the impact, the following contacts would be notified;

1. NSW Police (000) to temporarily apply and enforce a speed restriction or road closure until traffic control can be implemented.
2. Traffic Control Company, (Traffic Logistics 02 4271 4999), to setup pre planned speed reduction controls or road closure/traffic diversion to enable road restoration works.
3. Metropolitan Coal to organise highway repair, (Roadworx 02 4224 0222), to restore pavement to normal trafficable conditions.
4. Wollongong City Council, (Local Emergency Manager 4227 7111), would be notified of situation.

7 MONITORING

A monitoring program will be implemented to monitor the impacts of the Project on the Wollongong City Council assets. Table 5 summarises the BFMP-WCC monitoring components.

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

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

Table 5
BFMP-WCC Monitoring Program Overview

Program	Aspect	Method	How	Why	Timing	Frequency
Baseline	Ground	Survey	Adjacent Old Princes Highway subsidence line points at approximately 20 m spacing	Establish base conditions Full extents of Old Princes Hwy subsidence line	Prior to Longwall 305 extraction	Complete
	Pavement	Photography and other available baseline information		Establish base condition	Prior to Longwall 305 extraction	Complete
	Drainage structures & other road furniture	Visual inspection of the drainage structures, guard rails, marker posts and signage		Establish base condition	Prior to Longwall 305 extraction	Complete
During mining	Ground	Survey	Adjacent Old Princes Highway subsidence line points at approximately 20 m spacing within zone of active subsidence	Monitor subsidence effects during mining (subsidence, tensile strain, compressive strain)	Weekly on commencement of LW305 and LW306 for first 400 m extraction and then until subsidence reduces to less than survey accuracy. Fortnightly for LW307 at PH30 & PH32 to confirm no sustained increase in incremental tensile strain. At the completion of each of Longwalls 305, 306 and 307	Once per longwall
			Full extents of Old Princes Hwy subsidence line			

Table 5 (Continued)
BFMP-WCC Monitoring Program Overview

Program	Aspect	Method	Why	Timing	Frequency
During Mining (continued)	Pavement, drainage structures & other road furniture	Visual inspection by Metropolitan Coal Visual inspection of highway ±400 m of longwall face coinciding with ground survey extents	Pavement to identify the development of, or changes in existing pavement including cracks, buckling and stepping. Drainage structures to identify changes to the visible surfaces of the structures including cracking, buckling, shearing, and collapse, and impacts to furniture	Weekly on commencement of LW305, LW306 for first 400 m extraction and then until subsidence reduces to less than survey accuracy. At the completion of each of Longwalls 305, 306 and 307 Full extents of Old Princes Hwy subsidence line	Once per longwall
		Routine programmed visual inspection by Wollongong City Council		During the extraction of Longwalls 305, 306, and 307	Quarterly
Post Mining	Ground	Survey Adjacent Old Princes Highway subsidence line points at approximately 20 m spacing within zone of active subsidence Full extents of Old Princes Hwy subsidence line	Determine level of impact of mining (if any)	Within 3 months of the completion of Longwall 307	Once
	Pavement, drainage structures and other furniture	Visual inspection and condition report by Metropolitan Coal Full extents of Old Princes Hwy subsidence line	Determine level of impact of mining (if any)	Within 3 months of the completion Longwall 307	Once
		Visual inspection during Wollongong City Council routine inspections	Validation	Next scheduled post Longwall 307	Once

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 BFMP-WCC.

7.1 SUBSIDENCE PARAMETERS

Subsidence parameters (i.e. subsidence, tensile strain, compressive strain, absolute horizontal translation) associated with mining will be measured in accordance with the Longwall 305-307 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 Wollongong City Council assets include the survey line along the Old Princes Highway. These surveys will monitor the general movement about the longwalls and the data will allow evaluation of the likely ground movements about the Old Princes Highway (by comparison between measured and predicted movements).

7.2 SUBSIDENCE IMPACTS

7.2.1 Pavement

Metropolitan Coal will provide weekly visual inspections when the longwall is operating within 400m of the Princes Highway. Metropolitan Coal will provide the weekly visual inspections report to Wollongong City Council for review.

Subsidence impacts will be monitored extending from the Old Princes Highway Underpass (Bridge 2) to the entrance to the Garrawarra Centre Complex. Subsidence monitoring will increase to weekly when the longwall face approaches within 400m of the Princes Highway.

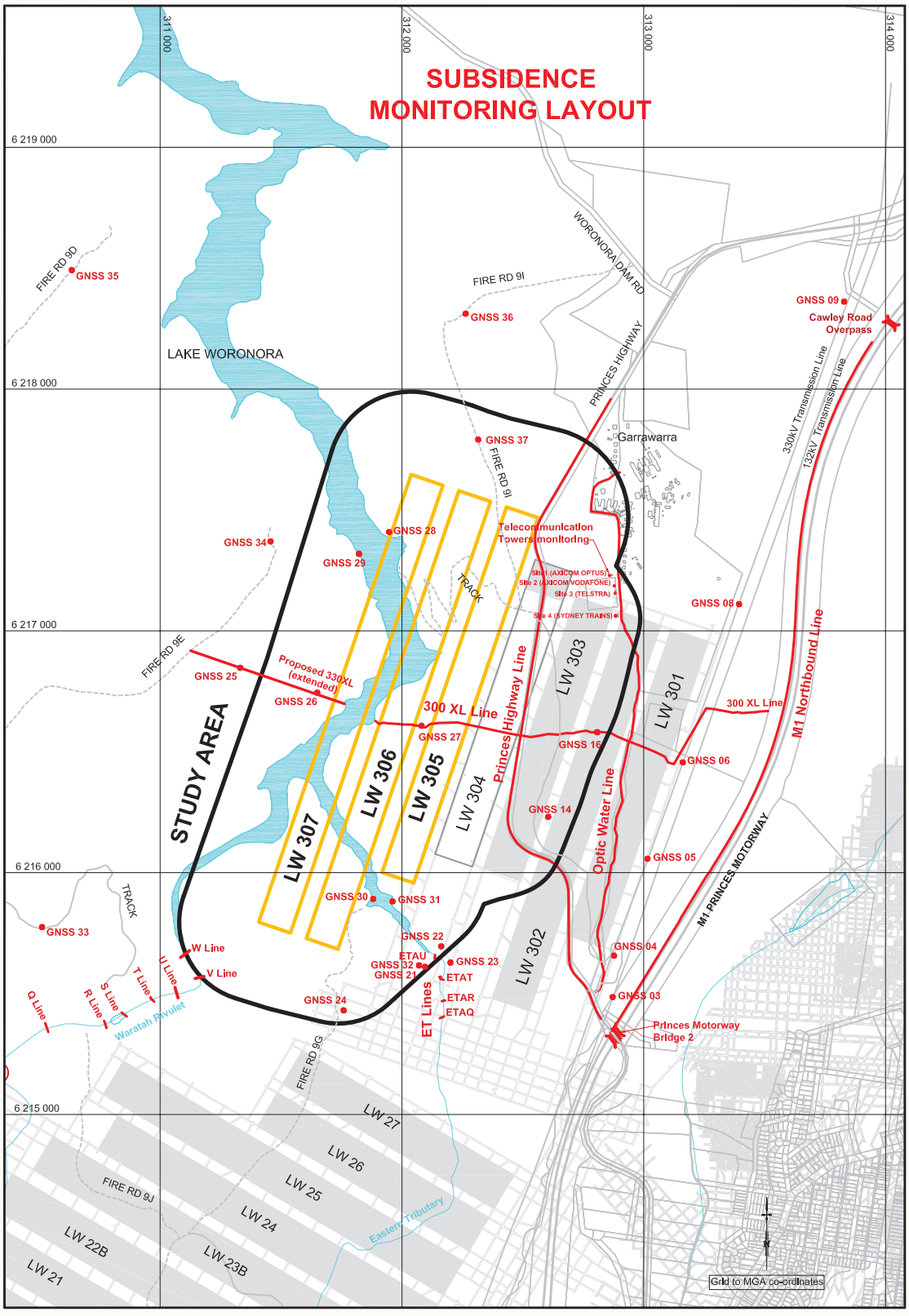
Metropolitan Coal will undertake an inspection of the pavement prior to the commencement of Longwall 305 and 306 and thereafter remain at weekly frequency whilst Longwall 305 & 306 are operating within 400 m of the Old Princes Highway (or as otherwise agreed with Wollongong City Council). An inspection of the full extents of the pavement monitoring, Garrawarra to Bridge 2, will occur within three months of the completion of each Longwall 305, 306 & 307.

Wollongong City Council will conduct additional observations of subsidence impacts during routine works and routine (quarterly) road condition inspections if deemed required by Wollongong City Council.

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 3) and reported in accordance with the Project Approval conditions.



MEF-19-19_305-309 EP BEMP_017A

Source: MSEC (2019)

Peabody

METROPOLITAN COAL

Subsidence Monitoring Layout

Figure 6

7.2.2 Drainage Structures (Pipes/Culverts)

A CCTV inspection of the drainage structures (e.g. pipes/culverts) within the Study area will be carried out to provide an assessment of the baseline condition of these features prior to the longwall face approaching within 400 m of the Old Princes Highway, i.e. prior to commencement of Longwall 305 (or as otherwise agreed with Wollongong City Council). The inspections will be organised by Metropolitan Coal with the inspection footage and report to be supplied to the Wollongong City Council. The inspection will include:

- recording of existing cracks; and
- recording of other defects such as joint displacement and general condition.

Metropolitan Coal will organise another CCTV inspection to assess changes to the pipes/culverts from the baseline condition as a result of the extraction of Longwalls 305-307. A site inspection of the pipes/culverts will also occur following the completion of Longwalls 305-307. The visual assessment will be carried out by representative(s) from the Wollongong City Council and representative(s) from the Metropolitan Coal, if deemed required by Wollongong City Council.

The information will be recorded in the Built Features Management Plan - Subsidence Impact Register (Appendix 3) and reported in accordance with the Project Approval conditions.

7.2.3 Guard Rails, Marker Posts and Signage

Pre and post audits of guard rails, marker posts and signage will be conducted using the results of the dilapidation survey described in Section 6 and recorded following the completion of Longwalls 305-307 to assess changes from the baseline condition.

7.3 ENVIRONMENTAL CONSEQUENCES

Metropolitan Coal will compare the results of the subsidence impact monitoring against the built features performance measure and performance indicators. Wollongong City Council will review and endorse the findings of the comparison. In the event the observed subsidence impacts exceed the performance measure or performance indicators, Metropolitan Coal will assess the consequences of the exceedance in accordance with the Contingency Plan described in Section 9. Metropolitan Coal will inform of the exceedance to and propose treatment measure to Wollongong City Council. Wollongong City Council will review and endorse the treatment plan.

8 MANAGEMENT MEASURES

A number of potential management measures in relation to pavement, drainage structures and other furniture are considered to be applicable and are described below.

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).

8.1 ROAD PAVEMENTS

The potential management measures in relation to the Old Princes Highway pavement include:

- mill and/or replace pavement layers; and
- crack sealing/repair.

In the event that repairs are required, traffic control measures such as contra-flow of traffic or partial carriageway closures may be used to divert traffic off one carriageway, lane or shoulder. Repairs would be carried out as soon as practicable in consultation with the Wollongong City Council.

8.2 DRAINAGE STRUCTURES (PIPES/CULVERTS)

The potential management measures in relation to drainage structures (pipes/culverts) include:

- point repairs;
- replace sections of pipe/culvert; and
- grouting/sealing of cracks.

In the event that repairs are required, traffic control measures such as contra-flow of traffic or partial carriageway closures may be used to divert traffic off one carriageway, lane or shoulder. Repairs would be carried out as soon as practicable in consultation with the Wollongong City Council.

8.3 GUARD RAILS, MARKER POSTS AND SIGNAGE

The potential management measures in relation to guard rails, marker posts and signage include repairs and/or replacement of furniture.

In the event that repairs are required, traffic control measures such as contra-flow of traffic or partial carriageway closures may be used to divert traffic off one carriageway, lane or shoulder. Repairs would be carried out as soon as practicable in consultation with the Wollongong City Council.

9 CONTINGENCY PLAN

In the event the subsidence impacts observed exceed the performance measure or performance indicators detailed in Section 5 of this BFMP-WCC, Metropolitan Coal will implement the following Contingency Plan (Appendix 4):

- The observation will be reported to the Technical Services Manager within 24 hours.
- The observation will be recorded in the Built Features Management Plan - Subsidence Impact Register (Appendix 3) consistent with the monitoring program described in Section 7 of this BFMP-WCC.
- Metropolitan Coal will report any exceedance of the performance measure or performance indicators to the DPIE and Wollongong City Council 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 305-307 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.
- Contingency measures are provided in Section 9.1.
- Metropolitan Coal will submit the proposed course of action to the DPIE for approval.
- Metropolitan Coal will implement the approved course of action to the satisfaction of the DPIE.

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 Secretary of DPIE if either the contingency measures implemented by Metropolitan Coal have failed to remediate the impact or the Secretary determines that it is not reasonable or feasible to remediate the impact.

Metropolitan Coal will comply with the NSW *Coal Mine Subsidence Compensation Act 2017* in the event that property damages occur as a result of mining Longwalls 305-307.

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).

Contingency measures that could be considered in the event the performance measure for the Old Princes Highway is exceeded are summarised in Table 6. The decision trees for the contingency measures are shown in Appendix 4.

Table 6
Contingency Measures – Old Princes Highway

Environmental Consequence	Contingency Measures	
	Measure	**Description**
Impact on:		
Pavement	Rebuild road.	• Temporary closure of the road and reconstruction of pavement.
Pipes/Culverts	Replace pipe. Rebuild culvert.	• Construction of temporary drainage pipe/culvert and reconstruction or replacement of original pipe/culvert.
Other Furniture (Guard Rail, Marker Posts, Signage)	Replace furniture.	• Replace section of guard rail, marker post or signage.

Temporary road closure and speed reduction traffic control plans are included in the appendices.

10 TARP – MANAGEMENT TOOL

The framework for the various components of the BFMP-WCC are summarised in the BFMP-WCC TARP shown in Table 7. The BFMP-WCC TARP illustrate 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
Trigger Action Response Plan – Old Princes Highway

Performance Measure	Performance Indicator	Monitoring Site(s)	Parameters	Frequency	Analysis Methodology	Error Types		Significance Levels/ Triggers			Action/Response
Safe, serviceable and repairable	Subsidence parameters.	Old Princes Hwy	Subsidence Strains Tensile & Compressive	After each longwall Weekly when LW is within 400 m of the asset	Comparison between predicted and measured subsidence	Subsidence measurement accuracy.	**Level 1**	**LW 305**	**LW 306[1]**	**LW 307[2]**	**Measured subsidence parameters generally in accordance with predictions**
							Subsidence	< 1050 mm	< 1050 mm	No discernible change from EOP LW306 measurements	Continue monitoring and reporting.
							Tensile strain	< 0.9 mm/m	< 0.9 mm		
							Compressive strain	< 1.6 mm/m	< 1.6 mm		
							Visual	Negligible visible impact to pavement or drainage structures.			
	Integrity of the pavement and drainage structures (pipes, culverts and other furniture).		Direct signs of movement, about the pavement of drainage structures	After each longwall Weekly when LW is within 400 m of the asset	Photography Visual inspection	Consistency of photography and experienced person inspecting road	**Level 2**	**LW 305**	**LW 306**	**LW 307**	**Subsidence effects up to 15% more than predicted**
							Subsidence	> 1050 mm < 1200 mm	> 1050 mm < 1200 mm	> than survey tolerance measured incrementally beyond EOP LW306	**Metropolitan Coal** Resurvey area within 1 week to confirm results. Engage subsidence expert to assess results. Inform and provide report to WCC of subsidence results. Collaboratively share information with WCC to monitor situation. **WCC** Assess information provided by Metropolitan Coal.
							Tensile strain	> 0.9 mm/m < 1.0 mm/m	> 0.9 mm/m < 1.0mm/m		
							Compressive strain	> 1.6 mm/m < 1.8 mm/m	> 1.6 mm/m < 1.8 mm/m		
							Visual	Negligible visible impact to pavement or drainage structures			
							Level 3	**LW 305**	**LW 306**	**LW 307**	**Anomalous subsidence greater than 15% above predictions**
							Subsidence	> 1200 mm	> 1200 mm	> than survey tolerance measured incrementally beyond EOP LW306 and Level 3 visual impact observed.	**Metropolitan Coal** Immediately assess area of highway for continued safe operation NSW Police apply and enforce speed restriction, and determine if a detour is necessary. Inform WCC and NSW Principal Subsidence Engineer of subsidence results (immediately following awareness of trigger). Request WCC assess asset condition. Increase frequency of subsidence line surveys to weekly in affected area. Report monitoring data to NSW Principal Subsidence Engineer Review the subsidence monitoring program and update the program where appropriate. Provide report on issue to both WCC and DPIE. **WCC** In conjunction with Metropolitan Coal, inspect road pavement, assess condition and determine appropriate response (e.g. greater monitoring data or frequency, or schedule maintenance on the road pavement/structure).
							Tensile strain	> 1.0 mm/m	> 1.0 mm/m		
							Compressive strain	> 1.8 mm/m	> 1.8 mm/m		
							Visual	Visible subsidence impact: • Pavement cracking > 10 mm; • Minor water ponding; • Drainage structure cracking ~ 5 mm; and • Greater than minor defects to guard railing, marker posts, or signage.			
							Level 4	**Trigger**	**Response**		
								Significant subsidence impact to highway pavement or drainage structure or other roadway furniture that affects the safe operation of the highway requiring partial carriageway closure or change to posted speed limits.	**Metropolitan Coal** Implement Contingency Plan as per BFMP Section 9. In event of an emergency situation from a sudden major subsidence impact and the Princes Highway is not safely trafficable due to the impact, the following contacts would be notified by Metropolitan Coal; 1. NSW Police (000) to temporarily apply and enforce a speed restriction or road closure until traffic control can be implemented. 2. Traffic Control Company, (Traffic Logistics 02 4271 4999), to setup pre planned speed reduction controls or road closure/traffic diversion to enable road restoration works. 3. Metropolitan Coal to organise highway repair, (Roadworx 02 4224 0222), to restore pavement to normal trafficable conditions. 4. Wollongong City Council, (Local Emergency Manager 4227 7111), would be notified of situation. Metropolitan will also notify Wollongong City Council civil asset management unit leader, NSW Principal Subsidence Engineer, DPIE and Subsidence Advisory NSW of the Level 4 situation within 24hrs. Update the 'Built Features Management Plan – Subsidence Impact Register'. Investigate root cause of incident and determine appropriate future control measures.
											WCC WCC will review and endorse the root cause and future control measure determined by Metropolitan Coal. Metropolitan Coal will be responsible for implementation of endorsed control measure.

Table 7 (continued)
Trigger Action Response Plan – Old Princes Highway

Performance Measure	Performance Indicator	Monitoring Site(s)	Parameters	Frequency Sample Size	Analysis Methodology	Error Types	Significance Levels/ Triggers		Action/Response
	The serviceability of the access roads and tracks are maintained.	Access roads and tracks in the vicinity of the WCC assets.	Cracking about access road/tracks.	After LW 305, 306, 307	Visual observations of access roads/tracks will also be conducted by Metropolitan Coal within 600 m of Longwalls 305-307 extraction as described in the Metropolitan Coal Land Management Plan.		Level 1	Minor cracking.	**<u>Continue monitoring.</u>** Consider whether any actions are required (e.g. implementation of management measures as outlined in the Land Management Plan, initiation of the Contingency Plan as outlined in the Longwalls 305-307 LMP, incident notification, implementation of appropriate safety controls, review of public safety, etc.).
							Level 2	Moderate cracking (i.e. cracking that requires implementation of management measures).	Implement management measures as outlined in the Longwalls 305-307 LMP.
							Level 3	Greater than moderate cracking.	Implement contingency measures as outlined in the Longwalls 305-307 LMP.

[1] No further measurable subsidence is predicted beyond Longwall 306 for future longwall extractions (i.e. Longwalls 307 on).

[2] Survey positional accuracy is ±30 mm for vertical and 0.5 mm/m for strains.

11 FUTURE EXTRACTION PLANS

In accordance with Condition 7, Schedule 3 of the Project Approval, Metropolitan Coal will collect baseline data for the next Extraction Plan (i.e. Longwalls 308 on). The collection of baseline data will be consistent with the baseline data collected for Longwalls 301-307. However, for the Old Princes Highway, the baseline (and post-mining) data collected for Longwalls 305-307 will be used as baseline for Longwalls 308 onward.

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 BFMP-WCC will inform the appropriate type and frequency of monitoring of the assets relevant to the next Extraction Plan.

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, the BFMP-WCC 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 Secretary of DPIE 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 Secretary of DPIE and any relevant agencies with a detailed report on the incident.

Wollongong City Council 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 Environment & Community Superintendent 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 Environment & Community Superintendent 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 Environment & Community Superintendent.

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 Environment & Community Superintendent 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 Environment & Community Superintendent 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-COMPLIANCE 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 Technical Services Manager and/or Environment & Community Superintendent 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 Secretary of the DPIE 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 Secretary of the DPIE 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 Secretary of the DPIE 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 Secretary of the DPIE.

16 REFERENCES

Department of Planning & Environment and Division of Resources and Energy (2015) *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 (2019) *Metropolitan Colliery – Proposed Longwalls 305 to 307 - Subsidence Predictions and Impact Assessments for the Wollongong City Council Infrastructure.*

APPENDIX 1

MSEC (2019) METROPOLITAN COLLIERY – PROPOSED LONGWALLS 305 TO 307 – SUBSIDENCE PREDICTIONS AND IMPACT ASSESSMENTS FOR THE WOLLONGONG CITY COUNCIL INFRASTRUCTURE

Suite 402, Level 4, 13 Spring Street
Chatswood NSW 2067
PO Box 302
Chatswood NSW 2057
Tel +61 2 9413 3777
enquiries@minesubsidence.com
www.minesubsidence.com

22nd July 2019

Jon Degotardi
Peabody Energy Australia
Metropolitan Colliery
PO Box 402
Helensburgh NSW 2508

Ref: MSEC1059-10

Dear Jon,

RE: Metropolitan Colliery – Proposed Longwalls 305 to 307 - Subsidence Predictions and Impact Assessments for Wollongong City Council Infrastructure

This letter report summarises the predicted subsidence movements and the assessed subsidence impacts for the Wollongong City Council (WCC) infrastructure resulting from the extraction of the proposed Longwalls 305 to 307 at Metropolitan Colliery.

The locations of the WCC infrastructure and the proposed Longwalls 305 to 307 are shown in the attached Drawing No. MSEC1059-10. A Study Area is shown in Drawing No. MSEC1059-10 and is based on the outer limits of a 35° angle of draw line from Longwalls 305 to 307 and the predicted 20mm subsidence contour for Longwalls 305 to 307. The Old Princes Highway crosses directly above previous Longwalls 301 to 304, and passes close to the commencing end of Longwall 305, but does not cross directly above the proposed Longwalls 305 to 307. This section of the highway comprises single and dual carriageway with a flexible asphalt pavement and grass verges. A photograph of the Old Princes Highway is provided in Figure 1.

Figure 1 Old Princes Highway

There are also local roads and bridges located outside of, but in the vicinity of the Study Area, within the township of Helensburgh to the south-east of the longwalls and to the north-east of the longwalls. These local roads are located at a minimum distance of 1.6 kilometres from Longwall 305. It is unlikely therefore that these roads would experience adverse impacts as a result of the proposed Longwalls 305 to 307. A bridge is located above the Princes Highway at the crossing with the M1 Princes Motorway, at approximately 1 km from Longwall 305. The bridge is maintained by Roads and Maritime Services (RMS) and therefore the assessments and management for the bridge are outlined in reports for the RMS infrastructure.

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

Conventional Subsidence Parameters for the WCC Infrastructure

The following provides summaries of the maximum predicted conventional movements for the WCC infrastructure following the extraction of Longwall 304 and after the extraction of Longwalls 305 to 307. 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 predicted profiles of total conventional subsidence, tilt and curvature along the alignment of the Old Princes Highway, following the extraction of Longwall 304 and after the extraction of Longwalls 305 to 307, are shown in the attached Fig. A.01. 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.

A summary of the maximum predicted values of total subsidence, tilt and curvature for the Old Princes Highway, following the extraction of Longwall 304 and after the extraction of Longwalls 305 to 307, is provided in Table 1. The values are the maxima anywhere along the highway at any time during or after the extraction of the longwalls.

Table 1 Maximum Predicted Total Subsidence, Tilt and Curvature for the Old Princes Highway after from the Extraction of Longwalls 304 to 307

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 LW304	925	2.5	0.05	0.03
After LW305	1050	2.5	0.05	0.07
After LW306	1050	3.0	0.05	0.07
After LW307	1050	3.0	0.05	0.07

The maximum predicted total subsidence for the Old Princes Highway, following the extraction of Longwall 304 and after the extraction of Longwalls 305 to 307, is 1,050 mm. The maximum predicted conventional tilt for the highway after the extraction of Longwall 307 is 3.0 mm/m (i.e. 0.3 %, or 1 in 330). The maximum predicted conventional curvatures are 0.05 km^{-1} hogging and 0.07 km^{-1} sagging, which equate to minimum radii of curvature of 20 km and 14 km 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 WCC 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 Old Princes Highway is partially located above the proposed Longwall 304 and also crosses 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.

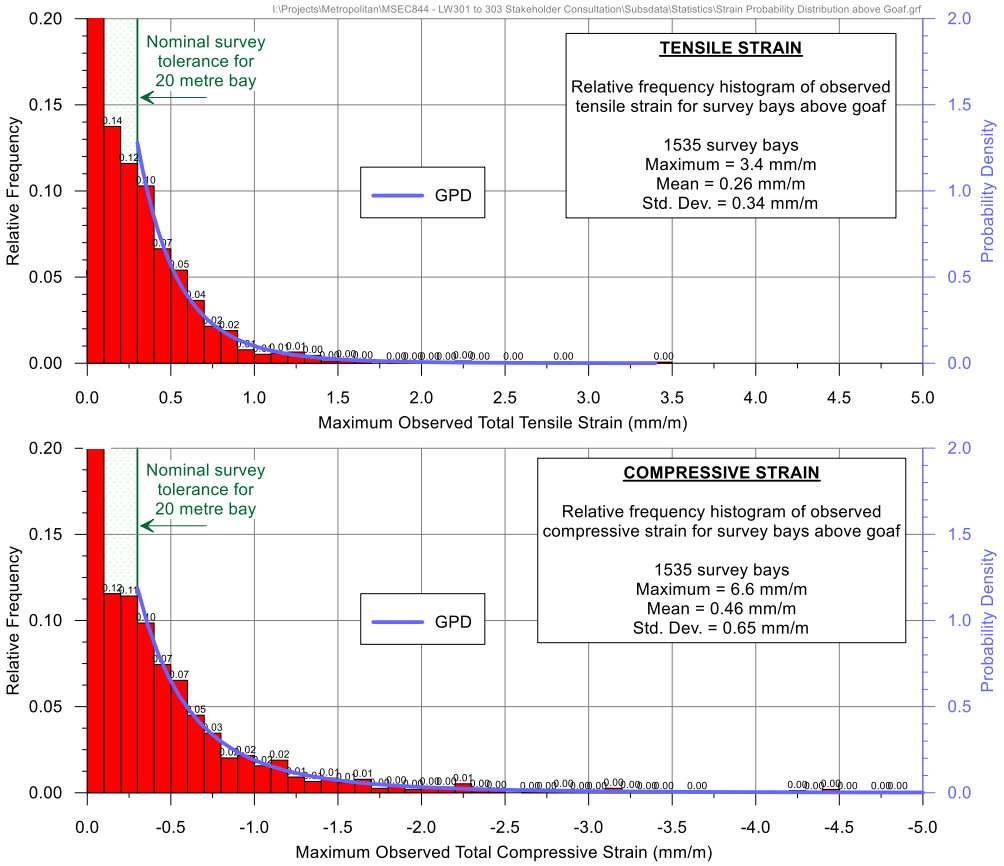


Figure 2 Distributions of the Measured Maximum Tensile and Compressive Strains during the Extraction of Previous Longwalls in the Southern Coalfield Above Goaf

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 2.

Table 2 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 at seam level and the major streams are shown in Drawing No. MSEC1059-10. There are no mapped faults located within the Study Area that extend beneath the Old Princes Highway. It is possible that the Old Princes Highway could experience localised and elevated strains due to unknown geological structures (i.e. anomalies). Non-conventional or anomalous movements have not been identified during the extraction of Longwalls 301 to 303. The range of strains provided in the previous section include those resulting from irregular anomalous movements.

The Old Princes Highway does not cross any major streams within the Study Area. The highway, therefore, is not expected to experience any measurable valley closure effects.

Impact Assessments for the Old Princes Highway

The maximum predicted conventional tilt for the Old Princes Highway after the extraction of Longwall 304 is 3.0 mm/m (i.e. 0.3 %, or 1 in 330). The predicted changes in grade are small, less than 1 %, and therefore are unlikely to result in adverse impacts on the serviceability or surface water drainage for the highway. If additional localised ponding or adverse changes in surface water drainage were to occur as the result of mining, the highway could be repaired using normal road maintenance techniques.

The maximum predicted conventional curvatures for the highway are 0.05 km^{-1} hogging and 0.07 km^{-1}sagging, which equate to minimum radii of curvature of 20 km and 14 km 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.

The maximum predicted curvatures and the range of potential strains for the Old Princes Highway are similar to those typically experienced elsewhere in the Southern Coalfield. Longwalls in the Southern Coalfield have been successfully mined directly beneath roads with bitumen and asphaltic pavements.

For example, at Tahmoor Colliery, Longwalls 22 to 31 have mined beneath approximately 28 kilometres of local roads. A total of 52 impact sites have been observed and, therefore, this equates to an average of one impact for

every 540 metres of pavement. The majority of the impacts were minor and did not present a public safety risk. The potential impacts due to conventional subsidence movements include minor cracking, rippling, bumps and stepping in the road surface. The nature of potential impacts to the pavement is also affected by the type of construction of the road pavement.

Approximately 770 metres of the Old Princes Highway have been mined beneath by Longwalls 301 to 303. Potential impacts on the Old Princes Highway are being managed using monitoring (visual and/or ground survey lines) and impacts can be remediated during active subsidence using normal road maintenance techniques. Final repair of the highway would be undertaken at the completion of the longwalls. No adverse impacts or anomalous movements have been identified along the Old Princes Highway during the extraction of Longwalls 301 to 303.

It is recommended that monitoring and management strategies developed for the extraction of Longwalls 304 are updated and continued, in consultation with Wollongong City Council, to manage potential impacts on the Old Princes Highway. It is expected that the highway can be maintained in safe and serviceable conditions with the implementation of the appropriate monitoring and management strategies.

Summary

The Old Princes Highway does not cross directly above proposed Longwalls 305 to 307. Previous experience from the Southern Coalfield has found that potential impacts on bitumen seal and asphaltic pavements can be managed with the implementation of suitable monitoring and management strategies.

It is expected that the highway can be maintained in safe and serviceable conditions with the implementation of the appropriate monitoring and management strategies.

Yours sincerely

Peter DeBono

Attachments:

Drawing No. MSEC1059-10 – Longwalls 305 to 307 – WCC Infrastructure

Fig. A.1 Predicted Profiles of Conventional Subsidence, Tilt and Curvature for the Old Princes Highway after LW304 and after LW305 to 307

I:\Projects\Metropolitan\MSEC1059 - LW305 to 307 Stakeholder Consultation\AcadData\MSEC1059-10 Wollongong City Council.dwg

msec mine subsidence ENGINEERING CONSULTANTS
Suite 402, 13 Spring Street, Chatswood NSW 2067
PO Box 302, Chatswood NSW 2057
Tel +61 2 9413 3777
www.minesubsidence.com

METROPOLITAN COAL

METROPOLITAN COLLIERY
LONGWALL 305
WOLLONGONG CITY COUNCIL

DATE:	SCALE:	DRAWING No:	Rev No
16 Jul 2019	1:10000	MSEC1059-10	01

LEGEND

- COUNCIL ASSETS
- UNSEALED ROADS & TRACKS

GEOLOGICAL STRUCTURES

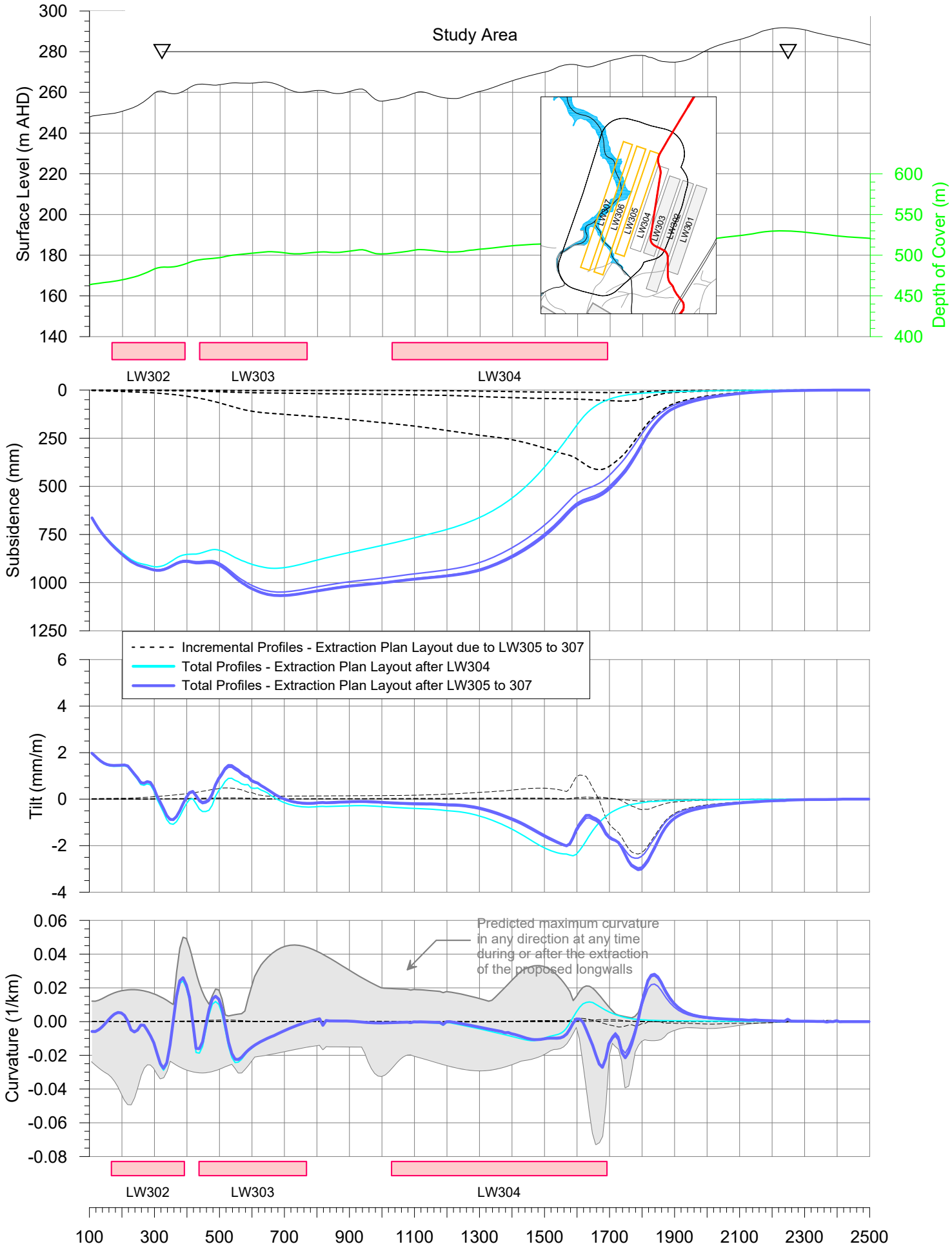
- FAULTS
- DYKES

312 000
313 000
6 218 000
6 217 000
6 216 000

Grid to MGA co-ordinates

METROPOLITAN FAULT
FORMER QUARRY SITE
CAWLEYS CK
GARRAWARRA CENTRE
WORONORA RESERVOIR
STUDY AREA
PREDICTED 20mm SUBSIDENCE CONTOUR
LW307
LW306
LW305
LW304
LW303
LW302
LW301
OLD PRINCES HWY
M1 PRINCES MOTORWAY
WILSONS CK
PRINCES HIGHWAY UNDERPASS 2
FIRE RD 9G
FAULT
MAIN WEST FAULT
POWELL

Predicted Profiles of Conventional Subsidence, Tilt and Curvature along the Old Princes Highway due to LW305 to 307



msec

Fig. A.01

APPENDIX 2

TRAFFIC CONTROL PLANS

www.invarion.com

Advanced Warning on approach to Garrawarra Plan

TRAFFIC LOGISTICS

Email: info@traffic-logistics.com.au
Web: www.traffic-logistics.com.au
Phone: Wollongong - 1300 001 599
Sydney - 02 4648 2200
Newcastle - 02 4050 0336

Client: Metropolitan Coal

Location: Princes Highway Waterfall

Tcp No: TLTCP-AS-78871 REV: A

Scope Of Works: Road Closure

Tcp(s) Used as a Guide: 54, 57, 101

Tcp Designed Date: 09/10/2019

Tcp Expire Date: 09/10/2021

Designed by: M Hayward

Cert. No: 0046246153

Signature:

N W E S

TCP IS NOT TO SCALE

Approximate speed of traffic	Traffic control at beginning of taper	Lateral shift taper	Merge taper
45 or less	15	0	15
46 - 55	15	15	30
56 - 65	30	30	60
66 - 75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
Greater than 105	N/A	110	180

D = THE SPEED OF TRAFFIC MEASURED IN KM/H
EG: 80KM = 80M
70KM = 70M
60KM = 60M
50KM = 50M

This TCP design is based on TCAWS Manual 2018 - Version 5.0 and AS 1742.3

Traffic Logistics do not accept responsibility of this traffic control plan if it is not implemented by Traffic Logistics

This TCP is to be setup and packed up by qualified traffic controllers with minimum current Implement Traffic Control Plans (Yellow Card). Any modifications to this TCP is to be made by suitably qualified personnel. All modifications to be signed off on this TCP along with certification number

Implemented By

Name -

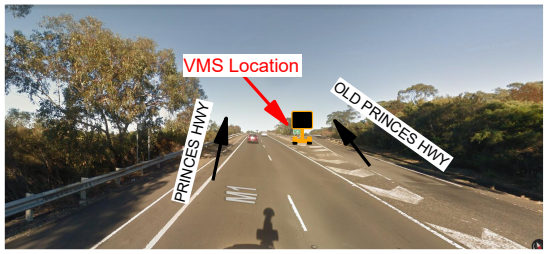
Cert No -

Date -

Signed -

Screen 1: Old Princes HWY Closed

Screen 2: Access to Garrawarra Only



Legend

VMS Board

1) *Traffic Control Plan for road closure and detour.*

2) *Traffic Controllers to manage traffic and pedestrians safely around work area*

3) *Traffic Controllers to only control one lane of traffic at any time IE: one Traffic Controller required for each live lane of traffic*

4) *Traffic Controllers to be relieved every 2hrs when on stop/slow (or suitable change of duties as per TCAWS)*

5) *Traffic Controllers to ensure they have an escape route at all times and wear appropriate PPE*

6) *Minimum lane width of 3.0 m to be maintained at all times*

7) *Cone spacing's to comply with TCAWS table 5.1, taper lengths to comply with TCAWS table 5.2*

8) *Minimum width of 1.2 m shall be maintained at all times for pedestrians to pass unhindered*

9) *Pedestrians shall not be directed onto roadway unless traffic controllers are used to control site and proper measures are put in place to conform with AS 1742.3*

MetroPolitian Coal

Old Princes Highway Garrawarra Speed Reduction TCP

1) *Traffic Control Plan for Speed reduction. In the event of a partial Failure.*

2) *Traffic Controllers to manage traffic and pedestrians safely around work area*

3) *Traffic Controllers to only control one lane of traffic at any time IE: one Traffic Controller required for each live lane of traffic*

4) *Traffic Controllers to be relieved every 2hrs when on stop/slow (or suitable change of duties as per TCAWS)*

5) *Traffic Controllers to ensure they have an escape route at all times and wear appropriate PPE*

6) *Minimum lane width of 3.0 m to be maintained at all times*

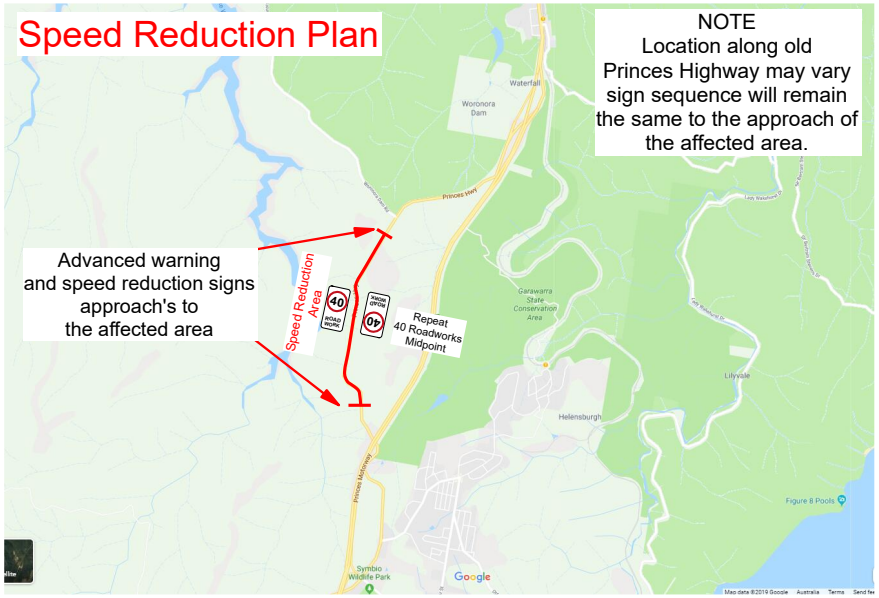
7) *Cone spacing's to comply with TCAWS table 5.1, taper lengths to comply with TCAWS table 5.2*

8) *Minimum width of 1.2 m shall be maintained at all times for pedestrians to pass unhindered*

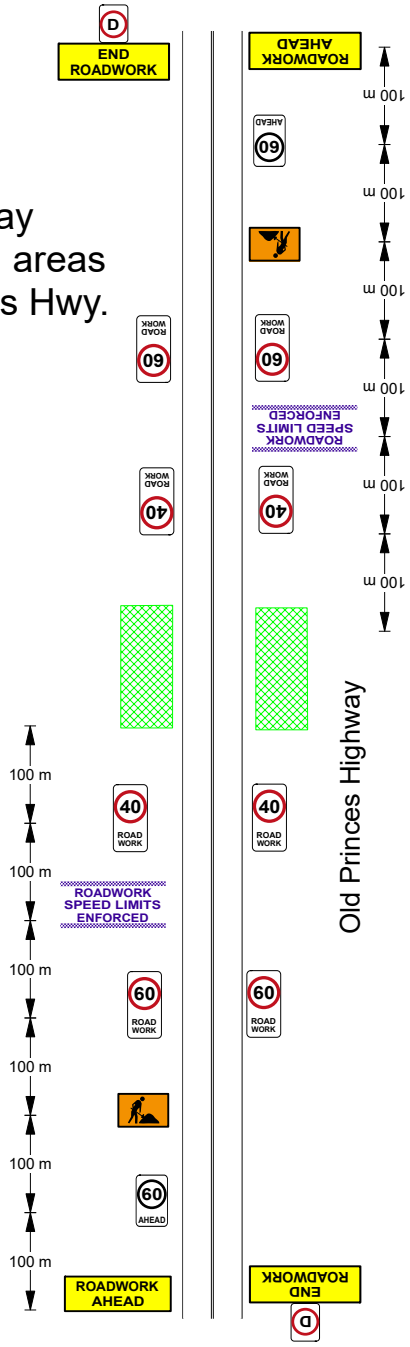
9) *Pedestrians shall not be directed onto roadway unless traffic controllers are used to control site and proper measures are put in place to conform with AS 1742.3*

NOTE
Speed Reduction may vary to were the affected areas may be along Old Princes Hwy.

Speed Reduction Plan



NOTE
Location along old Princes Highway may vary sign sequence will remain the same to the approach of the affected area.



TRAFFIC LOGISTICS

Email: info@traffic-logistics.com.au
Web: www.traffic-logistics.com.au
Phone: Wollongong - 1300 001 599
Sydney - 02 4648 2200
Newcastle - 02 4050 0336

Client: Metropolitan Coal

Location: Old Princes Hwy Garrawarra

Tcp No: TLTCP-AS-78872 REV: A

Scope Of Works: Speed Reduction

Tcp(s) Used as a Guide: 57

Tcp Designed Date: 09/10/2019

Tcp Expire Date: 09/10/2021

Designed by: M Hayward

Cert. No: 0046246153

Signature:

TCP IS NOT TO SCALE

Approximate speed of traffic	Traffic control at beginning of taper	Lateral shift taper	Merge taper
45 or less	15	0	15
46 - 55	15	15	30
56 - 65	30	30	60
66 - 75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
Greater than 105	N/A	110	180

D = THE SPEED OF TRAFFIC MEASURED IN KM/H
80KM = 80M
EG: 70KM = 70M
60KM = 60M
50KM = 50M

This TCP design is based on TCAWS Manual 2018 - Version 5.0 and AS 1742.3

Traffic Logistics do not accept responsibility of this traffic control plan if it is not implemented by Traffic Logistics

This TCP is to be setup and packed up by qualified traffic controllers with minimum current Implement Traffic Control Plans (Yellow Card). Any modifications to this TCP is to be made by suitably qualified personnel. All modifications to be signed off on this TCP along with certification number

Implemented By

Name -

Cert No -

Date -

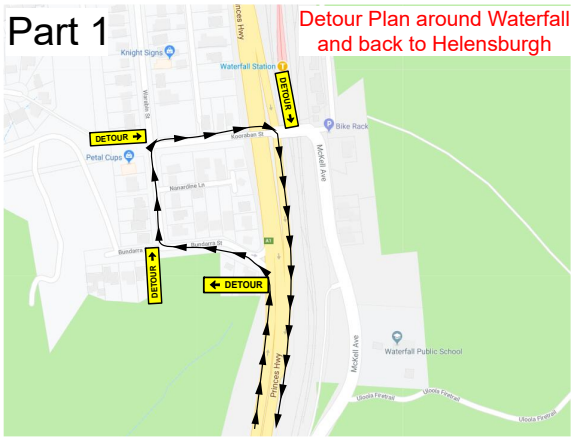
Signed -

Old Princes Highway Garrawarra Road Closure TCP

MetroPolitian Coal

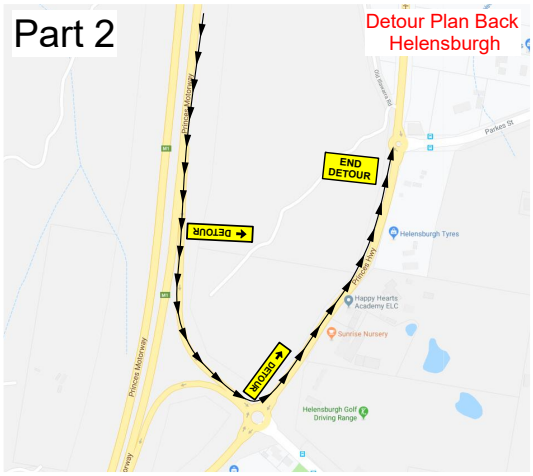
Part 1

Detour Plan around Waterfall and back to Helensburgh



Part 2

Detour Plan Back Helensburgh



NOTE
1 Team leader
to float between closures

TRAFFIC LOGISTICS

Email: info@traffic-logistics.com.au
Web: www.traffic-logistics.com.au
Phone: Wollongong - 1300 001 599
Sydney - 02 4648 2200
Newcastle - 02 4050 0336

Client:	Metropolitan Coal
Location:	Old Princes Highway Garrawarra
Tcp No: TLTCP-AS-78871	REV: A
Scope Of Works:	Road Closure
Tcp(s) Used as a Guide:	54, 57
Tcp Designed Date:	10/10/2019
Tcp Expire Date:	10/10/2021
Designed by:	M Hayward
Cert. No:	0046246153
Signature:	

N W E S

TCP IS NOT TO SCALE

Approximate speed of traffic	Traffic control at beginning of taper	Lateral shift taper	Merge taper
45 or less	15	0	15
46 - 55	15	15	30
56 - 65	30	30	60
66 - 75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
Greater than 105	N/A	110	180

D = THE SPEED OF TRAFFIC MEASURED IN KM/H
80KM = 80M
EG: 70KM = 70M
60KM = 60M
50KM = 50M

This TCP design is based on TCAWS Manual 2018 - Version 5.0 and AS 1742.3

Traffic Logistics do not accept responsibility of this traffic control plan if it is not implemented by Traffic Logistics

This TCP is to be setup and packed up by qualified traffic controllers with minimum current Implement Traffic Control Plans (Yellow Card). Any modifications to this TCP is to be made by suitably qualified personnel. All modifications to be signed off on this TCP along with certification number

Implemented By

Name -

Cert No -

Date -

Signed -

MetroPolitian Coal

Page 2 of 2

Old Princes Highway Helensburgh South Closure TCP

TRAFFIC LOGISTICS
Email: info@traffic-logistics.com.au
Web: www.traffic-logistics.com.au
Phone: Wollongong - 1300 001 599
Sydney - 02 4648 2200
Newcastle - 02 4050 0336

Client: Metropolitan Coal

Location: Old Princes highway Helensburg

Tcp No: TLTCP-AS-78871 REV: A

Scope Of Works: Road Closure

Tcp(s) Used as a Guide: 54, 57, 101

Tcp Designed Date: 09/10/2019

Tcp Expire Date: 09/10/2021

Designed by: M Hayward

Cert. No: 0046246153

Signature:

N W E S

TCP IS NOT TO SCALE

Approximate speed of traffic	Traffic control at beginning of taper	Lateral shift taper	Merge taper
45 or less	15	0	15
46 - 55	15	15	30
56 - 65	30	30	60
66 - 75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
Greater than 105	N/A	110	180

D = THE SPEED OF TRAFFIC MEASURED IN KM/H
EG: 80KM = 80M
70KM = 70M
60KM = 60M
50KM = 50M

This TCP design is based on TCAWS Manual 2018 - Version 5.0 and AS 1742.3

Traffic Logistics do not accept responsibility of this traffic control plan if it is not implemented by Traffic Logistics

This TCP is to be setup and packed up by qualified traffic controllers with minimum current Implement Traffic Control Plans (Yellow Card). Any modifications to this TCP is to be made by suitably qualified personnel. All modifications to be signed off on this TCP along with certification number

Implemented By

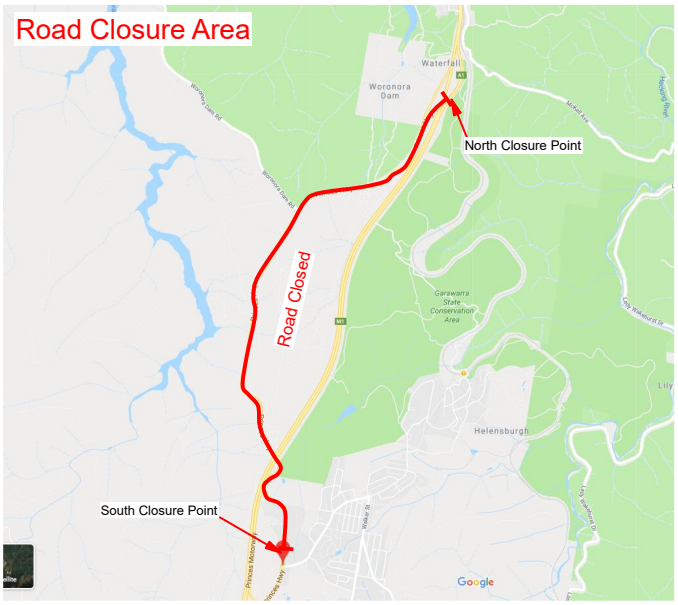
Name -

Cert No -

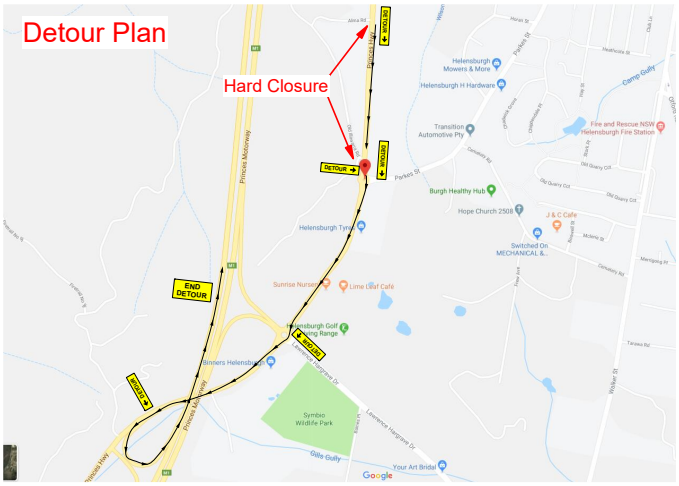
Date -

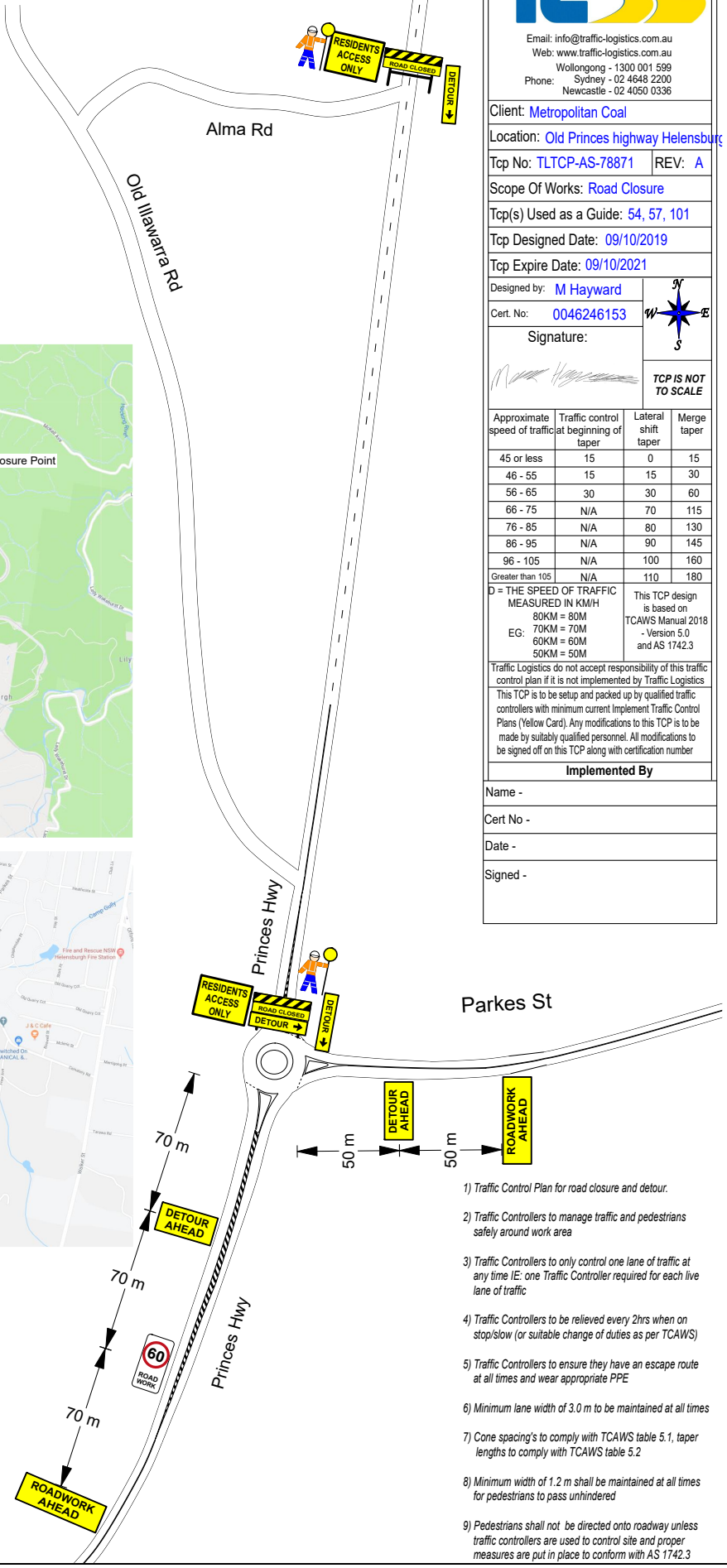
Signed -

Road Closure Area



Detour Plan





1) Traffic Control Plan for road closure and detour.

2) Traffic Controllers to manage traffic and pedestrians safely around work area

3) Traffic Controllers to only control one lane of traffic at any time IE: one Traffic Controller required for each live lane of traffic

4) Traffic Controllers to be relieved every 2hrs when on stop/slow (or suitable change of duties as per TCAWS)

5) Traffic Controllers to ensure they have an escape route at all times and wear appropriate PPE

6) Minimum lane width of 3.0 m to be maintained at all times

7) Cone spacing's to comply with TCAWS table 5.1, taper lengths to comply with TCAWS table 5.2

8) Minimum width of 1.2 m shall be maintained at all times for pedestrians to pass unhindered

9) Pedestrians shall not be directed onto roadway unless traffic controllers are used to control site and proper measures are put in place to conform with AS 1742.3

APPENDIX 3

BUILT FEATURES MANAGEMENT PLAN – SUBSIDENCE IMPACT REGISTER

Built Features Management Plan - Subsidence Impact Register

Impact Register Number[1]	Built Feature[2]	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. road pavement, guard rail, etc.).

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 culvert, 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:

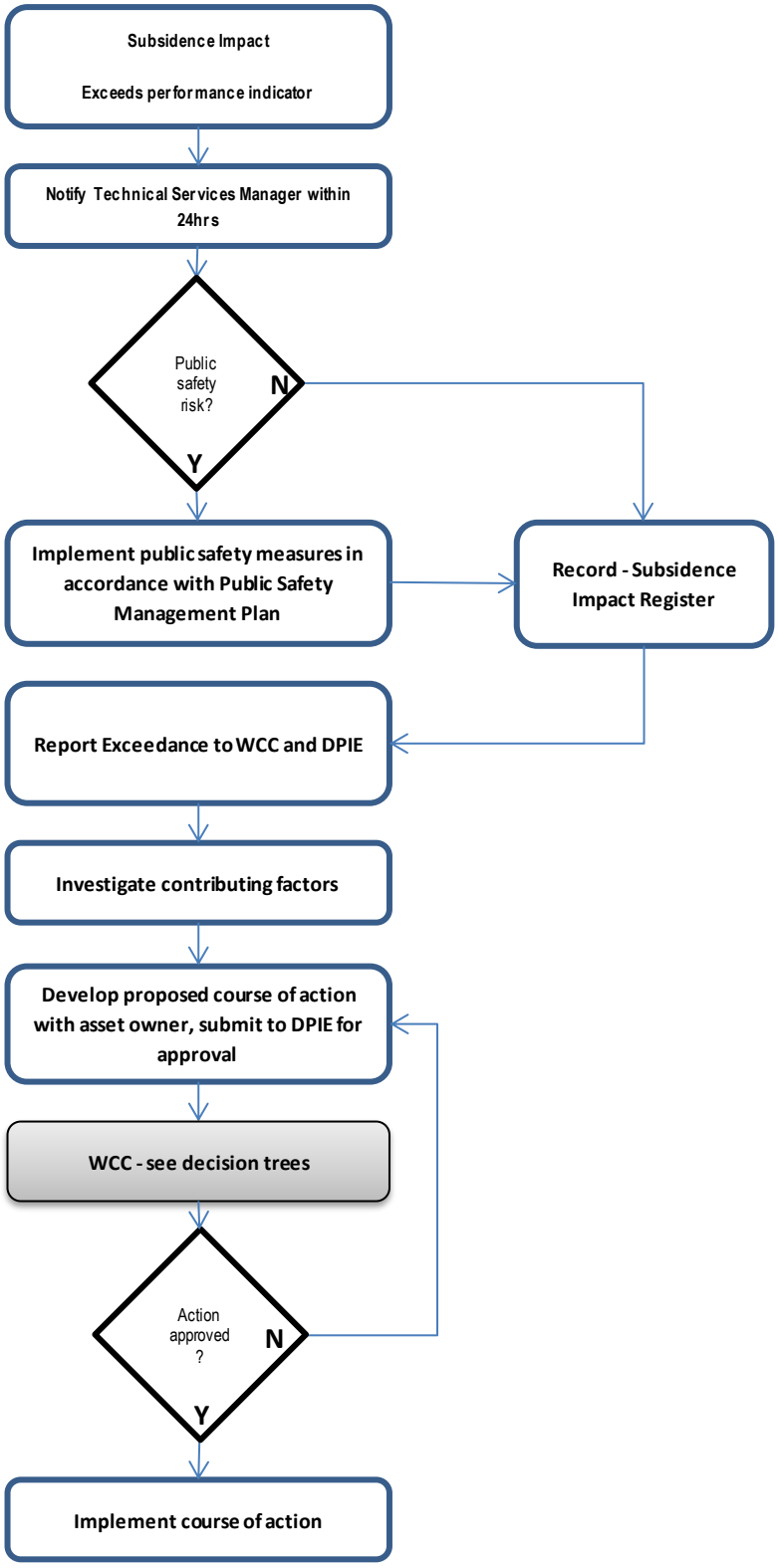
Actions Required:	Contingency Plan Initiated	☐
	Incident Notification	☐
	Safety Measures/Public Safety Management Plan Requirements	☐

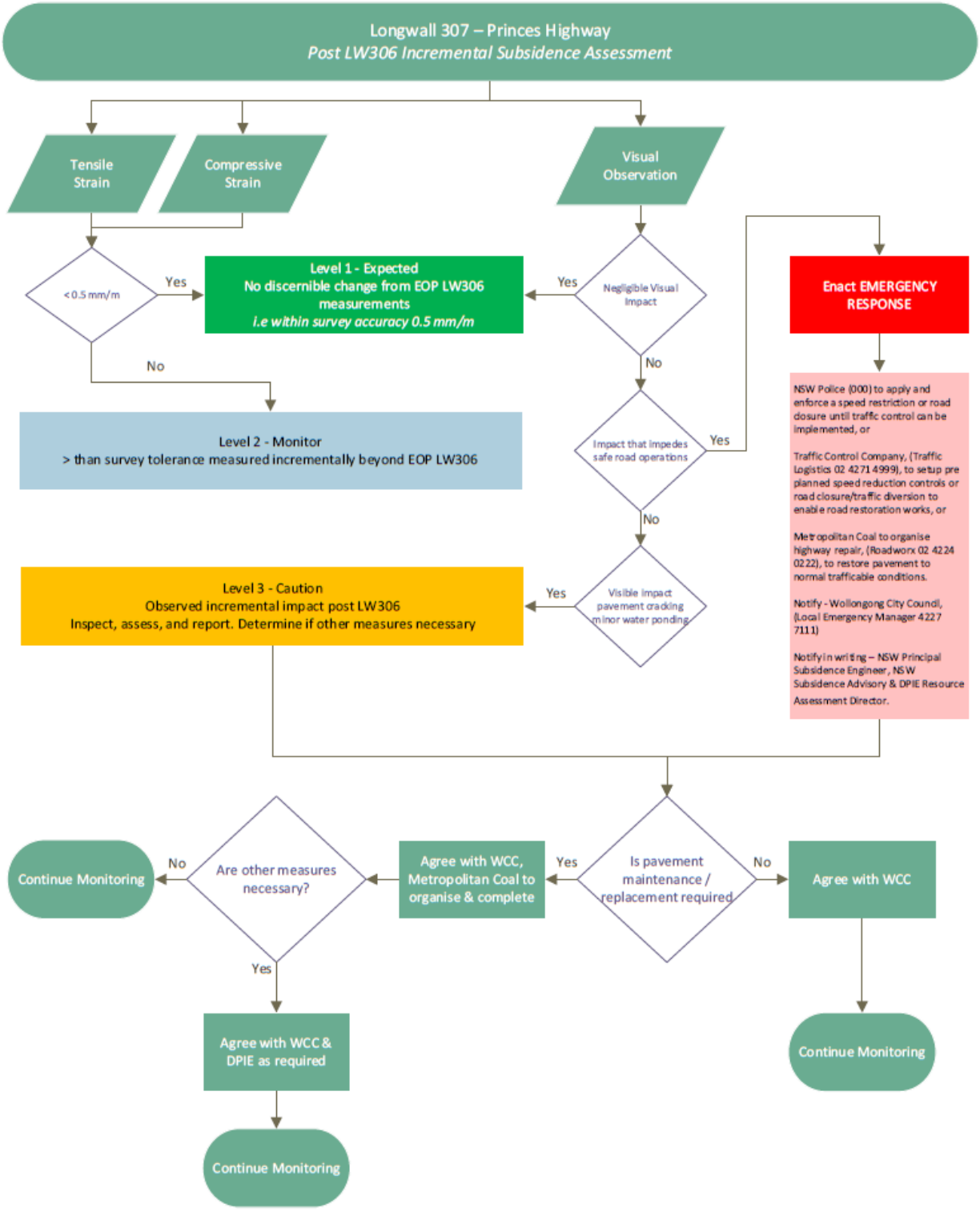
Management or Contingency Measures Implemented:

Effectiveness of Management or Contingency Measures:

APPENDIX 4

CONTINGENCY PLAN PROCEDURE AND DECISION TREE


Subsidence Impact
Exceeds performance indicator
Notify Technical Services Manager within 24hrs
Public safety risk?
N
Y
Implement public safety measures in accordance with Public Safety Management Plan
Record - Subsidence Impact Register
Report Exceedance to WCC and DPIE
Investigate contributing factors
Develop proposed course of action with asset owner, submit to DPIE for approval
WCC - see decision trees
Action approved ?
N
Y
Implement course of action


Longwall 307 – Princes Highway
Post LW306 Incremental Subsidence Assessment
Tensile Strain
Compressive Strain
Visual Observation
<0.5 mm/m
Yes
Level 1 - Expected
No discernible change from EOP LW306 measurements
i.e within survey accuracy 0.5 mm/m
Negligible Visual Impact
Yes
No
Enact EMERGENCY RESPONSE
NSW Police (000) to apply and enforce a speed restriction or road closure until traffic control can be implemented, or
Traffic Control Company, (Traffic Logistics 02 4271 4999), to setup pre planned speed reduction controls or road closure/traffic diversion to enable road restoration works, or
Metropolitan Coal to organise highway repair, (Roadworx 02 4224 0222), to restore pavement to normal trafficable conditions.
Notify - Wollongong City Council, (Local Emergency Manager 4227 7111)
Notify in writing – NSW Principal Subsidence Engineer, NSW Subsidence Advisory & DPIE Resource Assessment Director.
No
Level 2 - Monitor
> than survey tolerance measured incrementally beyond EOP LW306
Impact that impedes safe road operations
Yes
No
Level 3 - Caution
Observed incremental impact post LW306
Inspect, assess, and report. Determine if other measures necessary
Visible impact pavement cracking minor water ponding
Yes
Is pavement maintenance / replacement required
Yes
No
Agree with WCC, Metropolitan Coal to organise & complete
Agree with WCC
Are other measures necessary?
No
Continue Monitoring
Yes
Agree with WCC & DPIE as required
Continue Monitoring
Continue Monitoring