METROPOLITAN COAL LONGWALLS 305-307

BUILT FEATURES MANAGEMENT PLAN




Peabody

METROPOLITAN COAL

LONGWALLS 305-307

BUILT FEATURES MANAGEMENT PLAN

GARRAWARRA CENTRE COMPLEX

ME-TSE-MNP-0086

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DPIE Approval Date
All	LW305-307 BFMP_GAR-R01-A	Original	NSW Health, DRG and DPIE	16 March 2020

October 2019

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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 (Longwalls 20-27 and Longwalls 301-317) and surface facilities at Metropolitan Coal. The underground mining longwall layout is shown on Figure 1. 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 to 3).

1.1 PURPOSE AND SCOPE

In accordance with Condition 6(f), Schedule 3 of the Project Approval, this Built Features Management Plan – Garrawarra Centre Complex (BFMP-GAR) has been developed to manage the potential consequences of longwall extraction on the Garrawarra Centre Complex.

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

This BFMP-GAR includes post-mining monitoring and management of Garrawarra Centre Complex 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-GAR, namely representatives from Mine Subsidence Engineering Consultants (MSEC) and Metropolitan Coal were endorsed by the Secretary of the NSW Department of Planning and Environment (DP&E) (now the NSW Department of Planning, Industry and Environment [DPIE]).

This BFMP-GAR has been prepared in consultation with NSW Health.

1.2 STRUCTURE OF THE BFMP-GAR

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

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

Section 3: Outlines the statutory requirements applicable to the Plan.

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.

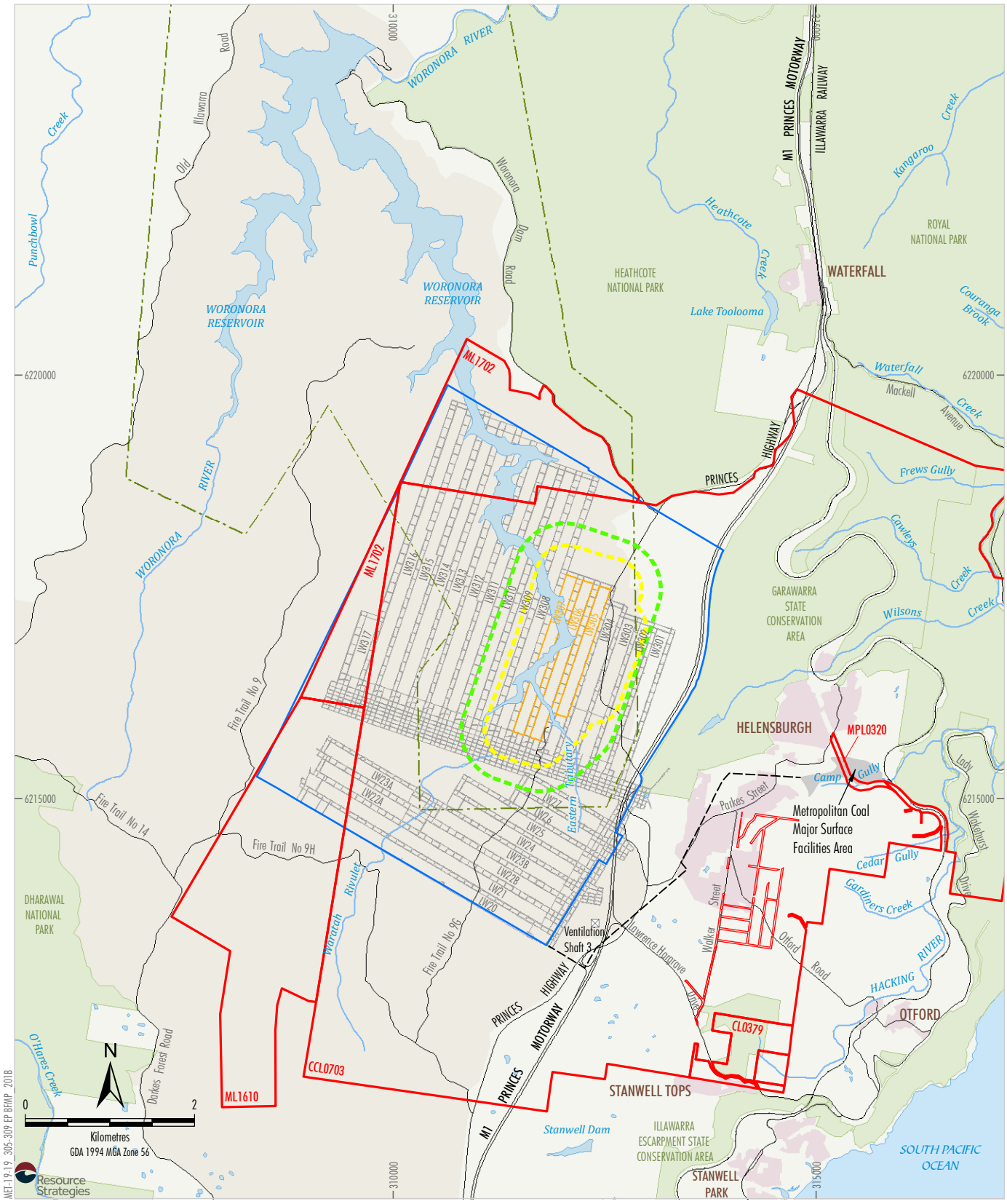
Section 6: Provides the detailed baseline data.

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.



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)

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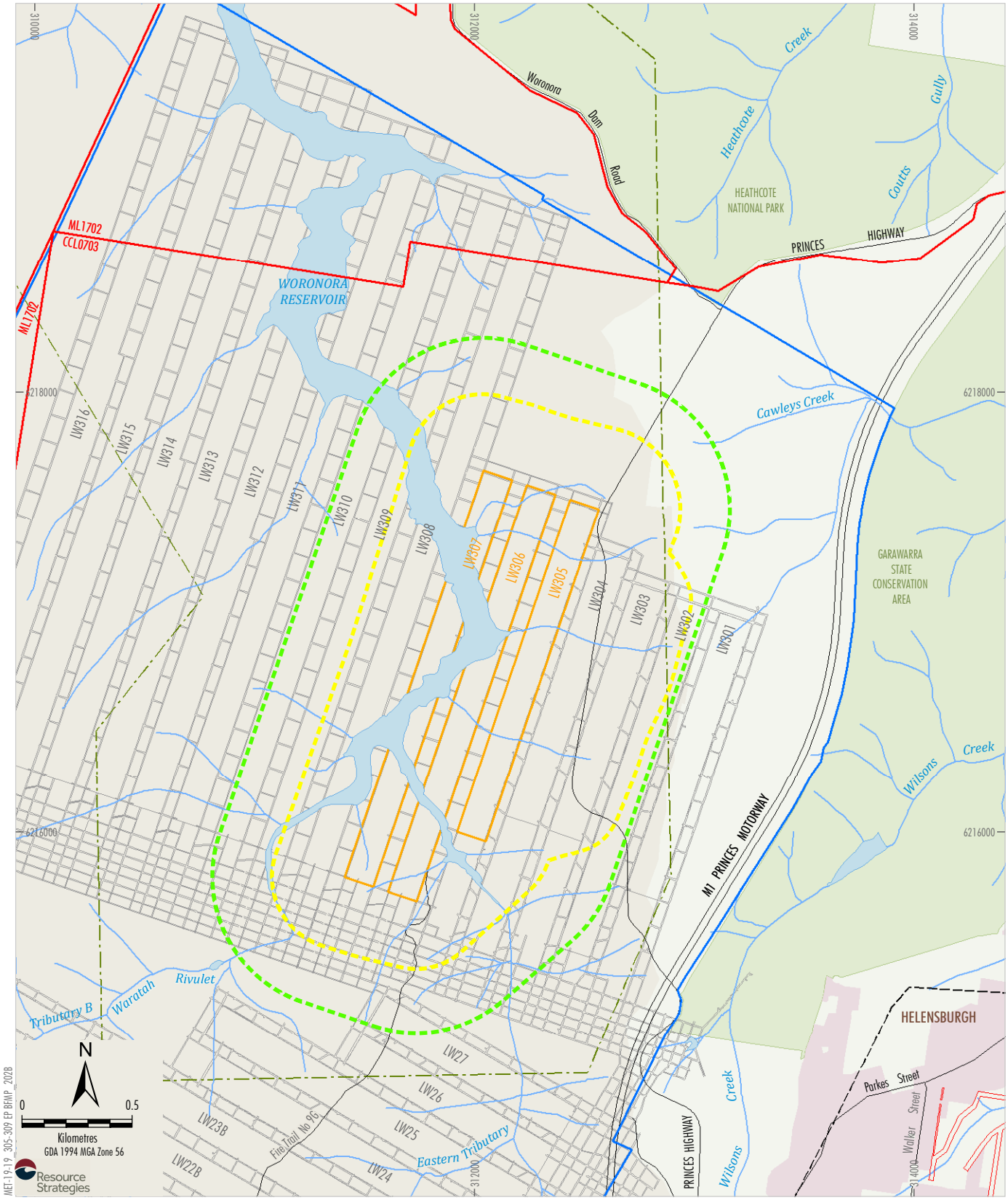
Longwalls 305-307 and Project Underground Mining Area

Figure 1



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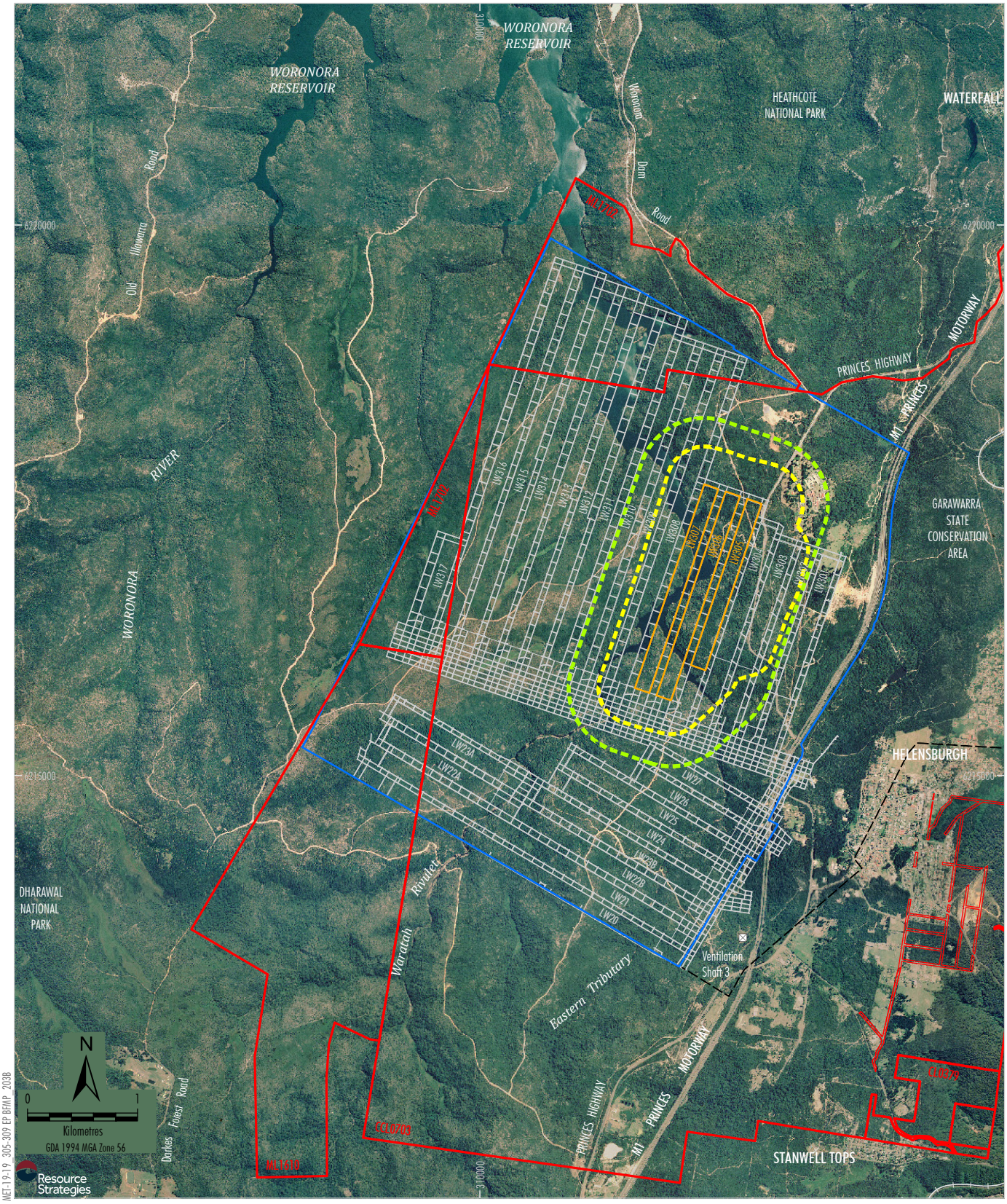
Longwalls 305-307 Layout

Figure 2



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)

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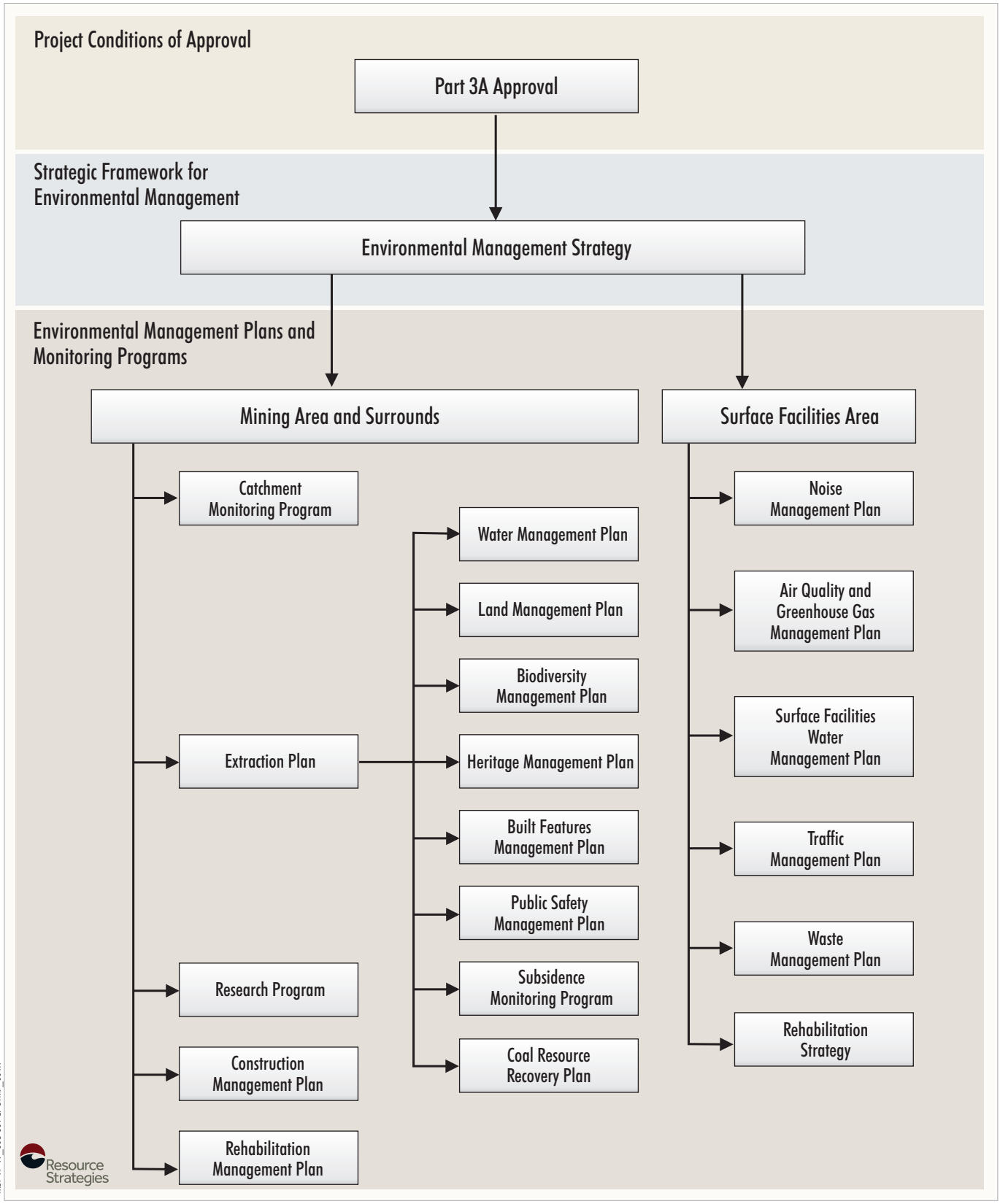
Longwalls 305-307 and Project Underground Mining Area- Aerial Photograph

Figure 3



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Environmental Management Structure

Figure 4

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-GAR.

2 BFMP-GAR REVIEW AND UPDATE

In accordance with Condition 4, Schedule 7 of the Project Approval, this BFMP-GAR 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 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-GAR. The distribution register for controlled copies of the BFMP-GAR is described in Section 2.1.

Revisions to any documents listed within this BFMP-GAR 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-GAR publicly available on the Peabody website. A hard copy of the BFMP-GAR 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-GAR, 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-GAR 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 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-GAR. Table 1 indicates where each component of the conditions is addressed within this BFMP-GAR.

Table 1
Management Plan Requirements

Project Approval Condition	BFMP-GAR 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 3
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 3
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 3

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), 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 the DRG.
- 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 Industry – 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 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)[1]:

- *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;*

[1] 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).

- *Protection of the Environment Operations Act, 1997;*
- *Rail Safety (Adoption of National Law) Act, 2012;*
- *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 305-307 secondary extraction are shown on Figures 2 and 3. Longwall extraction occurs 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 layout of Longwalls 306 and 307 includes 138 m panel widths (void) and 70 m pillar widths (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	March 2020	7 Months	October 2020
Longwall 306	November 2020	8 Months	July 2021
Longwall 307	August 2021	8 Months	April 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 NSW Health Assets - Garrawarra Centre Complex

Figures 5, 6 and 7 illustrate the NSW Health assets at the Garrawarra Centre Complex within and in proximity to the Study area for Longwalls 305-307. The assets comprise approximately 85 building structures, including:

- abandoned (and fenced) hospital buildings (A01a-A01k and B03a-B03l) and lodge (A01l);
- aged care building structures (B01a-B01j and B02a-B02h) and other associated structures (B01k-B01q and B02i-B02j);
- houses (A01m, A02a-A09a and B04a-B09a) and other associated structures (A02b, A03b-A03d, A06b, A08b-A08f and A09b);
- water storage tanks (B01t01, B01t02, B14t01, B14t02, B16t01-B16t03, B17t01 and B18t01) and a trickle filter tank (B15t01);
- gas storage tank (B01t03);
- kiln (F01b); and
- telecommunications towers and associated compounds (B06b and B10a-B12a)[2].

Other built features and services at the Garrawarra Centre Complex include private access roads/tracks, potable water and sewer pipelines[3], powerlines[4] and telecommunications cables[5].

4.2 REVISED SUBSIDENCE AND IMPACT PREDICTIONS

4.2.1 Revised Subsidence Predictions

Subsidence predictions for Longwalls 20-44 in relation to the Garrawarra Centre Complex 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:

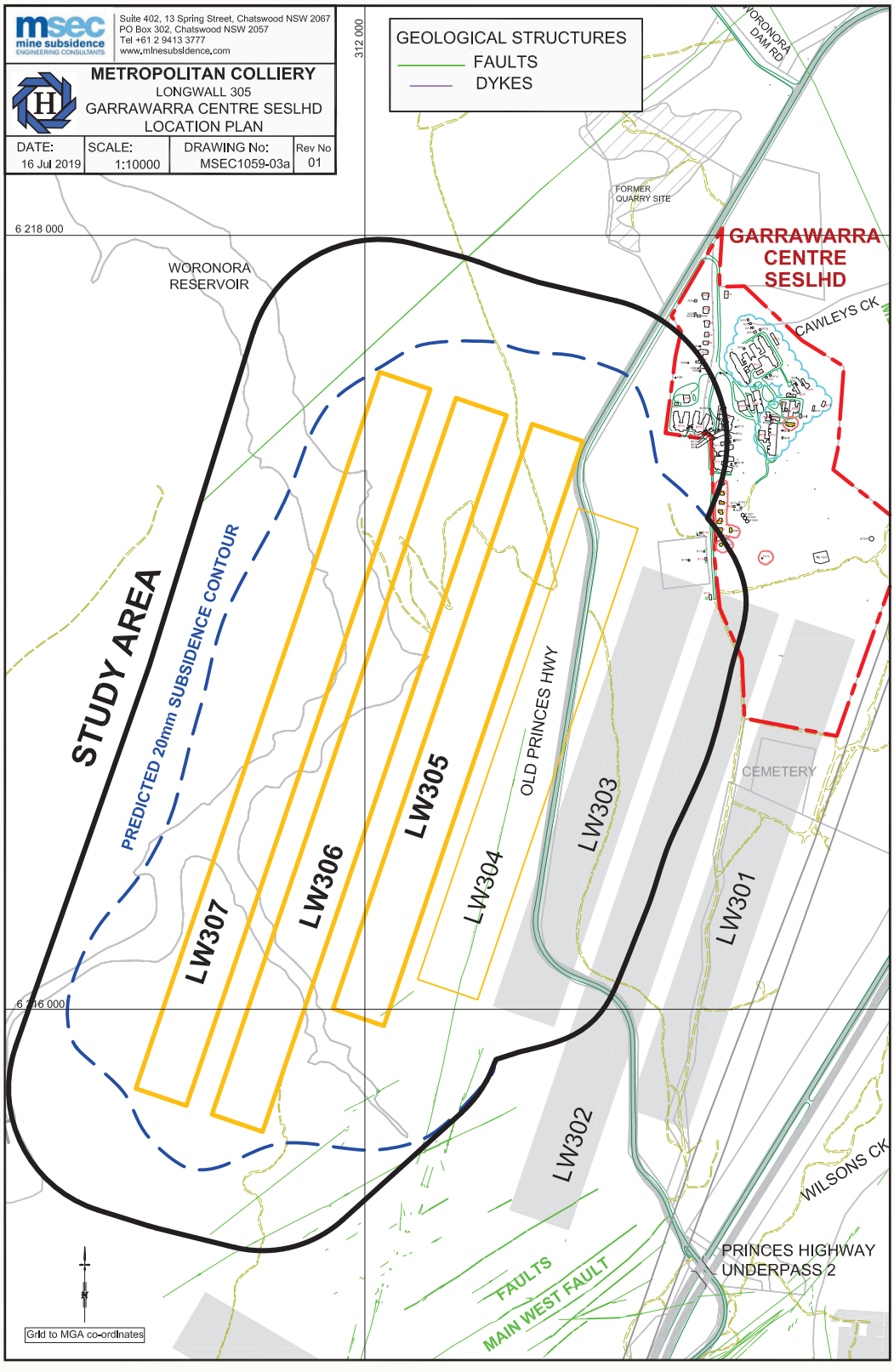
- maximum predicted incremental subsidence (vertical movement);
- maximum predicted incremental tilt along alignment;
- maximum predicted incremental tilt across alignment;
- maximum predicted incremental tensile strain; and
- maximum predicted incremental compressive strain.

[2] Separate BFMPs for the telecommunication towers and compounds were developed in consultation with the relevant asset owners (i.e. Axicom, Telstra, Sydney Trains).

[3] A separate BFMP was developed in consultation with Sydney Water for relevant water infrastructure / services owned by Sydney Water.

[4] A separate BFMP was developed in consultation with Endeavour Energy for relevant electricity infrastructure / services owned by Endeavour Energy.

[5] A separate BFMP was developed in consultation with Telstra for relevant telecommunication services owned by Telstra.



MEF-19-19_305-309 EP BFMP_019B

Source: MSEC (2019)

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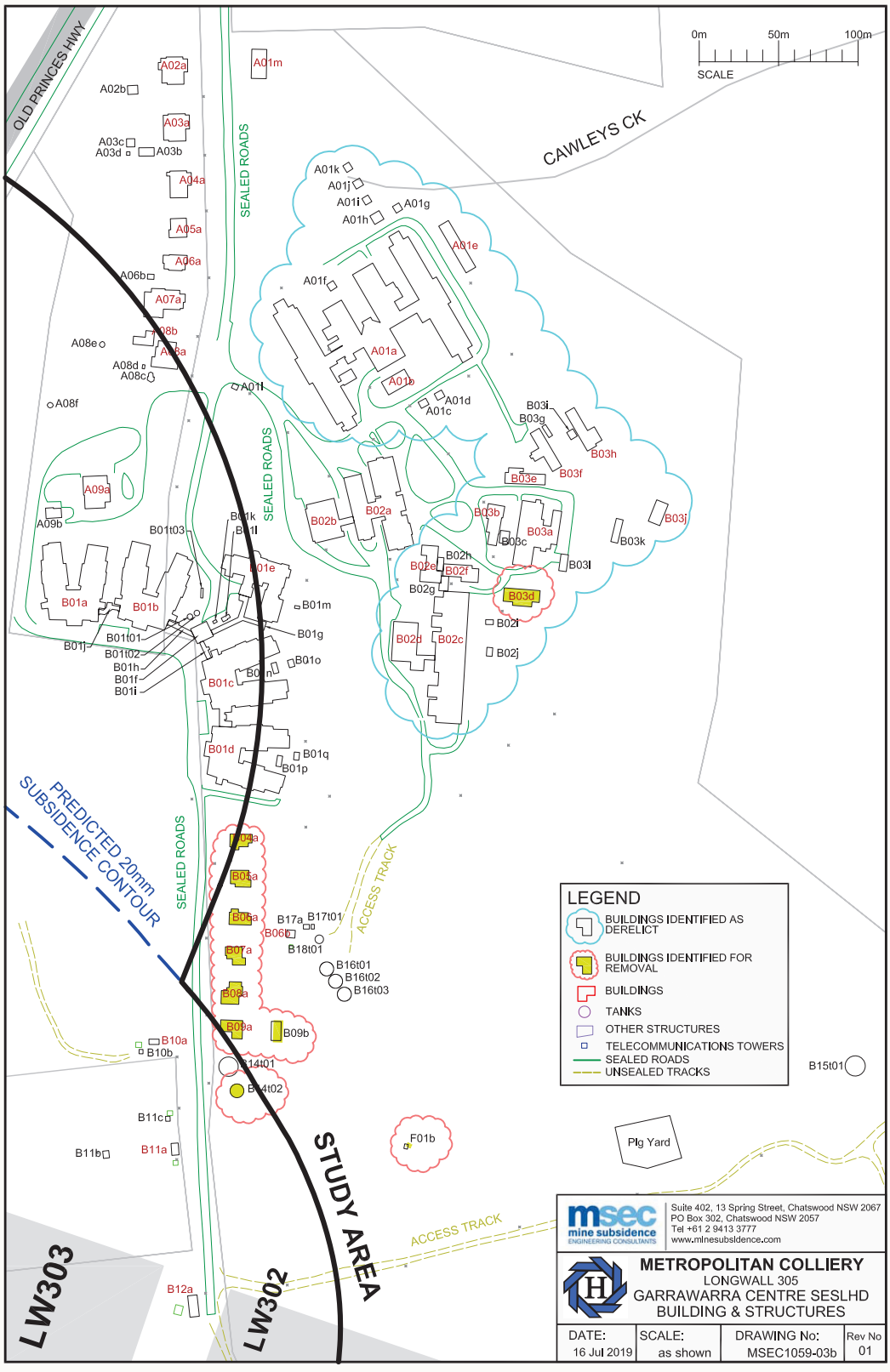
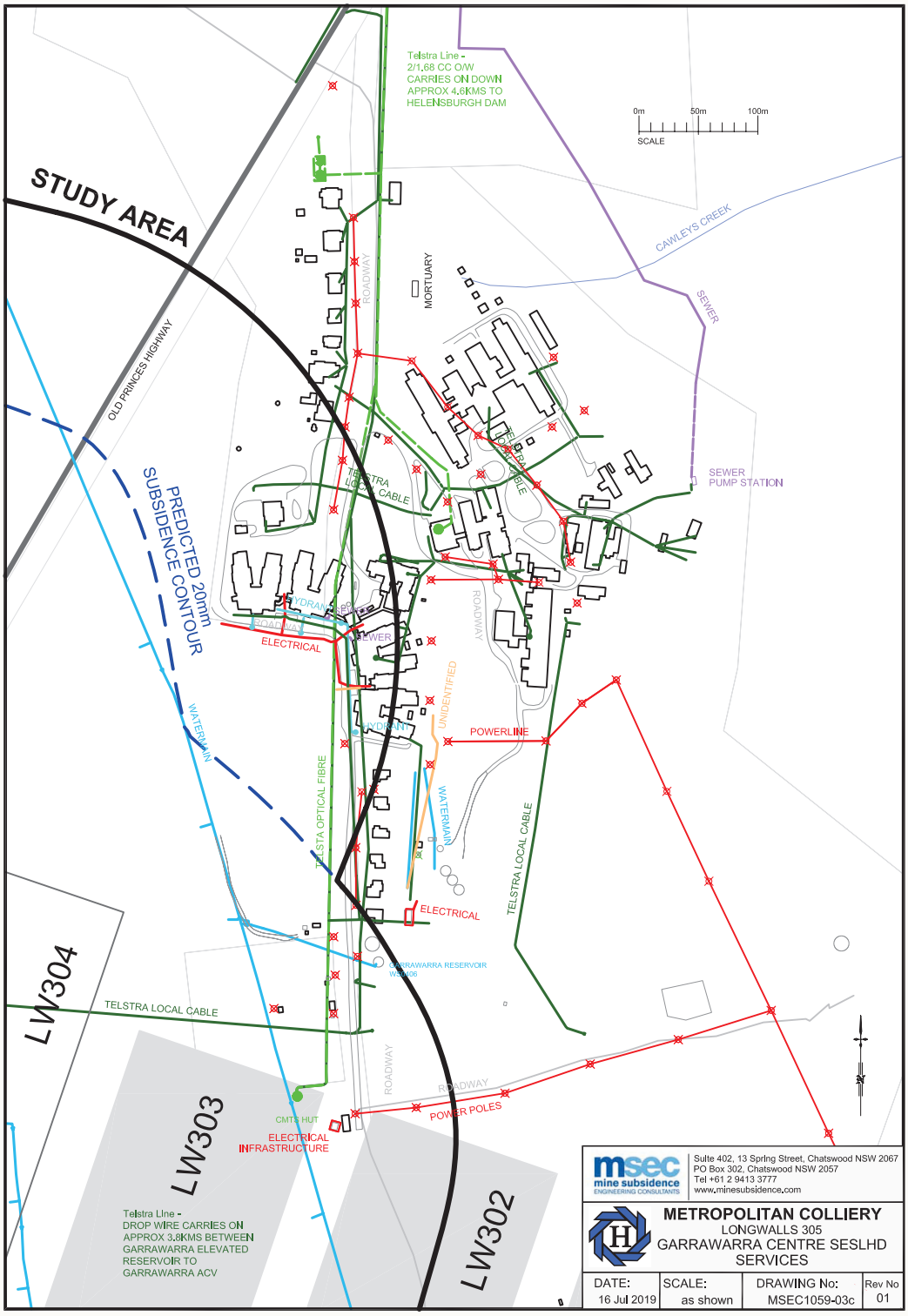
Garrawarra Centre Complex - Location Plan

Figure 5



Source: MSEC (2019)



MEF-19-19_305-309 EP BFMP_016B

Source: MSEC (2019)

Figure 7

It is noted that the commencing ends of Longwalls 302, 303 and 304 were modified in order to minimise predicted subsidence movements at the Garrawarra Centre Complex building structures which house aged care patients and administrative support (e.g. B01a-B01e) by limiting the predicted conventional curvature to less than 0.01 km^{-1}.

In relation to subsidence predictions for Longwalls 301-303, John Matheson and Associates (JMA) (2016) and MSEC (2016) made the following conclusions summarised for each building / structure in Table 3.

Table 3
Summary of Revised Predictions for Buildings / Structures

Building (MSEC, 2016, JMA, 2016 and Howard Tanner & Associates, 1993)		Predictions and Exceedance Probabilities (MSEC, 2016 and JMA, 2016)			
		Probability of Exceedance			Commentary
		Nil – Category 0 [Hairline Crack <0.1 mm]	< Category 1 [Fine Crack <1 mm not requiring repair]	Category 2 or greater [e.g. 2 mm Crack]	
Hospital Buildings (Abandoned)					
A01a	Former Male Wards* (Wards 1-8)	Refer below	Refer below	Refer below	Refer below
	• Building A01a-i*	20%	1%	Unlikely	Possible (up to 3 mm cracks) if strain concentrates at pre-existing rock joints
	• Building A01a-ii*	7%	Unlikely	Remote	-
	• Building A01a-iii*	2%	Remote	Remote	-
	• Building A01a-iv*	<1%	Remote	Remote	-
	• Building A01a-v*	20%	0.01%	Remote	Possible (up to 3 mm cracks) if strain concentrates at pre-existing rock joints
	• Building A01a-vi*	2%	Remote	Remote	-
	• Building A01a-vii (Pharmacy – A01b)	0.1%	Remote	Remote	Pharmacy A01b as described in MSEC (2016)
	• Small Adjoining Buildings	0.01%	Remote	Remote	-
A01b	Pharmacy	0.1%	Remote	Remote	-
A01c	Chalet^	0.1%	Remote	Remote	-
A01d	Chalet^	0.1%	Remote	Remote	-
A01e	PWD Workshop	4%	Unlikely	Remote	-
A01f	Chalet^	0.1%	Remote	Remote	-
A01g	Chalet^	0.1%	Remote	Remote	-
A01h	Chalet^	0.1%	Remote	Remote	-
A01i	Chalet^	0.1%	Remote	Remote	-
A01j	Chalet^	0.1%	Remote	Remote	-
A01k	Chalet^	0.1%	Remote	Remote	-
A01l	Gatehouse / Lodge*	0.1%	Remote	Remote	-
B03a	Laundry / Boilerhouse^	45%	10%	1%	-

Table 3 (Continued)
Summary of Revised Predictions for Buildings / Structures

Building (MSEC, 2016, JMA, 2016 and Howard Tanner & Associates, 1993)		Predictions and Exceedance Probabilities (MSEC, 2016 and JMA, 2016)			
		Probability of Exceedance			Commentary
		Nil – Category 0 [Hairline Crack <0.1 mm]	< Category 1 [Fine Crack <1 mm not requiring repair]	Category 2 or greater [e.g. 2 mm Crack]	
Hospital Buildings (Abandoned) (Continued)					
B03b	Outdoor Staff	5%	Unlikely	Remote	-
B03c	Substation	0.1%	Remote	Remote	-
B03d	Seamstress	15%	Unlikely	Remote	Pre-existing pier tilt monitoring recommended
B03e	Transport Services	15%	Unlikely	Remote	-
B03f	Workshops	5%	Remote	Remote	-
B03g	Workshops	0.1%	Remote	Remote	-
B03h	Workshops	5%	Remote	Remote	-
B03i	Workshops	0.1%	Remote	Remote	-
B03j	Painters Workshop#	5%	Remote	Remote	-
B03k	Shed	5%	Remote	Remote	-
B03l	Shed	5%	Remote	Remote	-
Aged Care Buildings					
B01a	Administration	20%	1%	Remote	20% (higher if plasterboard does not have a matching joint)
B01b	Administration	20%	1%	Remote	20% (higher if plasterboard does not have a matching joint)
B01c	Administration	20%	1%	Remote	20% (higher if plasterboard does not have a matching joint)
B01d	Administration	20%	1%	Remote	20% (higher if plasterboard does not have a matching joint)
B01e	Nurses Quarters / Administration*,^	Refer below	Refer below	Refer below	Refer below
	• Original Building*	25%	1%	Unlikely	-
	• Stage 2^ & 3 Additions	15%	1%	Unlikely	-
B01f	Link Building	10%	1%	Unlikely	-
B01g	Link Building	10%	1%	Unlikely	-
B01h	Link Building	10%	1%	Unlikely	-
B01i	Link Building	10%	1%	Unlikely	-
B01j	Link Building	10%	1%	Unlikely	-
B01k	Shed	Unlikely	Unlikely	Unlikely	-
B01l	Shed	Unlikely	Unlikely	Unlikely	-
B01m	Shed	Unlikely	Unlikely	Unlikely	-

Table 3 (Continued)
Summary of Revised Predictions for Buildings / Structures

Building (MSEC, 2016, JMA, 2016 and Howard Tanner & Associates, 1993)		Predictions and Exceedance Probabilities (MSEC, 2016 and JMA, 2016)			
		Probability of Exceedance			Commentary
		Nil – Category 0 [Hairline Crack <0.1 mm]	< Category 1 [Fine Crack <1 mm not requiring repair]	Category 2 or greater [e.g. 2 mm Crack]	
Aged Care Buildings (Continued)					
B01n	Shed	Unlikely	Unlikely	Unlikely	-
B01o	Shed	Unlikely	Unlikely	Unlikely	-
B01p	Shed	Unlikely	Unlikely	Unlikely	-
B01q	Shed	Unlikely	Unlikely	Unlikely	-
B02a	Administration / Kitchen Group*	35%	1%	Unlikely	Possible (1 mm opening and closure) between buildings [Further investigation recommended]
	Dining and Recreation (Activities 1)*,^	15%	Unlikely	Remote	Possible (1 mm opening and closure) between buildings
B02b	Administration / Kitchen Group*	15%	Unlikely	Remote	Possible (2 mm opening and closure) between buildings [More detailed analysis of brick arches recommended]
B02c	Former Female Wards (Wards 9-12)*	45%	10%	1%	Possible (up to 3 mm cracks) if strain concentrates at pre-existing rock joints
B02d	Library / Canteen / Female Dining Room*	15%	0.01%	Unlikely	-
B02e	X-Ray Block	15%	0.01%	Unlikely	-
B02f	Activities 2 / Open Air Ward	15%	0.01%	Unlikely	-
B02g	Shed	5%	Unlikely	Unlikely	-
B02h	Shed	5%	Unlikely	Unlikely	-
B02i	Amenities	1%	Unlikely	Remote	-
B02j	Amenities	1%	Unlikely	Remote	-
Houses					
A01m	Staff Cottage	5%	Unlikely	Remote	-
A02a	Doctor's Residence*	5%	Unlikely	Remote	-
A02b	Shed	Remote	Remote	Remote	-
A03a	Doctor's Residence*	5%	Unlikely	Remote	-
A03b	Shed	Remote	Remote	Remote	-
A03c	Shed	Remote	Remote	Remote	-
A03d	Shed	Remote	Remote	Remote	-

Table 3 (Continued)
Summary of Revised Predictions for Buildings / Structures

Building (MSEC, 2016, JMA, 2016 and Howard Tanner & Associates, 1993)		Predictions and Exceedance Probabilities (MSEC, 2016 and JMA, 2016)			
		Probability of Exceedance			Commentary
		Nil – Category 0 [Hairline Crack <0.1 mm]	< Category 1 [Fine Crack <1 mm not requiring repair]	Category 2 or greater [e.g. 2 mm Crack]	
Houses (Continued)					
A04a	Doctor's Residence*	5%	Unlikely	Remote	-
A05a	Staff Cottage	5%	Unlikely	Remote	-
A06a	Staff Cottage#	5%	Unlikely	Remote	-
A06b	Shed	Remote	Remote	Remote	-
A07a	Staff Cottage#	5%	Unlikely	Remote	-
A08a	Medical Officer's Residence#	5%	Unlikely	Remote	-
A08b	Shed	5%	Unlikely	Remote	-
A08c	Shed	Remote	Remote	Remote	-
A08d	Shed	Remote	Remote	Remote	-
A08e	Shed	Remote	Remote	Remote	-
A08f	Shed	Remote	Remote	Remote	-
A09a	Palmer House*	25%	0.1%	Unlikely	-
A09b	Palmer House - Garage / Stable*	5%	Unlikely	Remote	-
B04a	Staff Cottage	1%	Unlikely	Remote	-
B05a	Staff Cottage	1%	Unlikely	Remote	-
B06a	Staff Cottage	1%	Unlikely	Remote	-
B06b	Shed	Remote	Remote	Remote	-
B07a	Staff Cottage	1%	Unlikely	Remote	-
B08a	Staff Cottage	1%	Unlikely	Remote	-
B09a	Staff Cottage	1%	Unlikely	Remote	-
B09b	Shed	1%	Unlikely	Remote	-
B14t01	Reservoir	50%	20%	5%	-
B14t02	Reservoir (no water)#	50%	20%	5%	-
B15t01	Trickle Filter Tank	50%	20%	5%	-
B16t01	Below Ground Tank	50%	20%	5%	-
B16t02	Below Ground Tank	50%	20%	5%	-
B16t03	Below Ground Tank	50%	20%	5%	-
B17a	Pump House	Unlikely to be affected			
B17t01	Fire Water Tank	Unlikely to be affected			
B18t01	Tank	Unlikely to be affected			
B01t01	Rainwater Tank	Unlikely to be affected			
B01t02	Rainwater Tank	Unlikely to be affected			
Gas Storage Tank					
B01t03	Gas Storage Tank	Unlikely to be affected			
Other					
F01b	Kiln	Tilt may add to pre-existing tilt – barrier fence recommended			

After: JMA (2016) and Howard Tanner & Associates (1993)
* Items of Exceptional Cultural Significance (Howard Tanner & Associates, 1993)
^ Items of High Cultural Significance (Howard Tanner & Associates, 1993)
# Items of Some Cultural Significance (Howard Tanner & Associates, 1993)

The predicted subsidence parameters for the structures after Longwall 305-307 were generally unchanged or similar to those assessed in the report by JMA (2016) and the resulting assessments for the structures in relation to Longwall 305-307 did not change (MSEC, 2019a). The buildings are expected to remain safe and serviceable and potential impacts could be repaired using normal building maintenance techniques (MSEC, 2019a). A detailed assessment of the structural assessments is provided in JMA (2016).

Revised subsidence and impact predictions for the extraction of Longwalls 305-307 on the Garrawarra Centre Complex were conducted by MSEC and reported in MSEC (2019b) (provided in Appendix 1).

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

- The majority of structures are not expected to experience measurable conventional vertical subsidence, tilt or curvatures.
- For the ***Building Structures***, the maximum predicted tilts resulting from Longwalls 305-307 increase only at the southern houses, which are fenced off for demolition. The predicted tilt curvatures do not increase with the extraction of Longwalls 305-307. While there is a slight increase in the predicted subsidence due to Longwalls 305 to 307, the building structures are not expected to experience any measurable tilt and curvature.

  A detailed discussion of the structural assessments is provided in the report by JMA (2016). Since the preparation of the structural assessment report, Longwalls 301-303 were shortened by 90 m. The predicted subsidence parameters for the structures after Longwalls 305-307 are generally unchanged or similar to those assessed in the report by JMA (2016) and the resulting assessments for the structures do not change. The buildings are expected to remain safe and serviceable and potential impacts could be repaired using normal building maintenance techniques.
- For the ***Water Tanks and Trickle Filter Tank***, the tanks are located at distances of 300 m or greater from Longwall 305. The maximum predicted tilts for the water tanks and trickle filter tank are 1.0 mm/m (i.e. 0.1 %, or 1 in 1000) and curvatures are 0.01 km-1 hogging and less than 0.01 km-1 sagging. The predicted tilt increases slightly at tanks B15t01 to t03. The predicted tilt at the remaining tanks and trickle filter tank do not change and curvatures do not increase with the extraction of Longwalls 305-307. While there is a slight increase in the predicted subsidence due to Longwalls 305-307, the water tanks and trickle filter tank are not expected to experience any measurable tilt and curvature.

  As assessment of the tanks was undertaken by JMA (2016). A summary of the results of the structural inspection is provided in Table 3. The assessment is based on predicted subsidence parameters for Longwall 301-303 and indicates that the likelihood of greater than negligible damage developing in the water storage tanks is 20% for Category 1 damage (i.e. fine cracks of less than 1 mm) of 1% or less. Since the preparation of the structural assessment report, the Longwalls 301-303 were shortened by 90 m.

  The predicted subsidence parameters for the structures after Longwall 305-307 are unchanged or less than those assessed in the report by JMA (2016) and the resulting assessments for the structures do not change. The tanks are expected to remain safe and serviceable and potential impacts could be repaired using normal building maintenance techniques.

- For the ***Gas Storage Tank***, which is located more than 330 m from Longwall 305, the maximum predicted subsidence parameters are negligible and unlikely to adversely impact the tank.

  The maximum predicted conventional curvatures are less than 0.01 km-1 for both hogging and sagging curvature, which equate to minimum radii of curvature of greater than 100 km. The predicted strains are less than 0.5 mm/m tensile and compressive based on the 95 % confidence level. The gas storage tank is supported on a concrete slab above the ground and is unlikely to experience the mining induced curvatures and strains.

  It is unlikely that the storage tank and pipework would experience adverse impacts as a result of the extraction of Longwalls 305-307.

- For the ***Private Roads and Services***, the private roads in the complex with bitumen seals, and private services within the complex, are located outside the extents of Longwalls 305-307. Experience from the Southern Coalfield indicates that impacts on these roads and services are unlikely.

  Short lengths of road comprising chip seal or gravel surface are located above previous Longwall 302. The roads are not well maintained. Potential impacts to these roads include minor and isolated cracks. Impacts can be managed using monitoring (visual or ground survey lines) during active subsidence and remediation using normal road maintenance techniques.

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 for Longwalls 301-303 was held on 20 October 2016. Attendees at the risk assessment meeting included representatives from Metropolitan Coal, NSW Health, MSEC, John Matheson and Associates, Resource Strategies and Axys Consulting (risk assessment facilitator).

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

- preliminary identification of NSW Health assets;
- review of the revised subsidence predictions and potential impacts on NSW Health 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 land within the Study area and in proximity to the NSW Health assets.

The risk control measures and procedures identified during the risk assessment for Longwalls 301-303 were reviewed and continued for the extraction of Longwall 304. Metropolitan Coal considers all risk control measures and procedures to be feasible to manage all identified risks.

Subsequent to the Longwalls 301-303 risk assessment, an agreement was reached between South Eastern Sydney Local Health District and Metropolitan Coal to remove designated Garrawarra centre assets as part of risk mitigation process. The Memorandum of Understanding – signed 31 August 2017 details that Cottages B04a-B09a, water tank B14t02, Kiln F01b and building B03d will be removed subject to Wollongong City Council development approval. These features have been securely fenced awaiting development approval.

A review of subsidence performance and monitoring at Garrawarra and surrounding infrastructure results was undertaken at a meeting held on 30 July 2019. Attendees at the review meeting included representatives from Metropolitan Coal, Garrawarra Centre Complex and NSW Health. The review confirmed that the existing risk control measures and monitoring program remained applicable for the extraction of Longwalls 305-307. Subject to monitoring on Longwall 304, the frequency of monitoring will continue for Longwall 305 to confirm subsidence parameters are at or below the level of survey accuracy. The monitoring system will be continued from that established for Longwalls 301-304 extraction.

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.*

Of specific relevance to the Garrawarra Centre Complex, a subsidence impact performance measure outlined in Table 1 of Condition 1, Schedule 3 in relation to items of historical or heritage significance at the Garrawarra Centre is:

> *Negligible damage (that is fine or hairline cracks that do not require repair), unless the owner of the item and the appropriate heritage authority agree otherwise in writing.*

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

- no greater tilt impact to buildings than Category A or B (i.e. mining induced ground tilt of less than 7 mm/m) for items of historical or heritage significance (i.e. either 'high' or 'exceptional' in the *Conservation Plan for the Garrawarra Centre for Aged Care* [Howard Tanner & Associates, 1993]);
- no greater strain impact to buildings than Category 0 or 1 (i.e. crack width of less than 1 mm) for items of historical or heritage significance (i.e. either 'high' or 'exceptional' in the *Conservation Plan for the Garrawarra Centre for Aged Care* [Howard Tanner & Associates, 1993]);
- no more than repairable (minor) defects (cracks, etc.) in the structural integrity for all other buildings, houses, structures and other services (including telecommunications towers and compounds, powerlines, pipelines and associated connections) due to mining;
- the electrical clearance from vegetation is maintained;
- serviceability of the private roads and access roads/tracks has been maintained; and
- the land in general is expected to experience minor cracking consistent with that observed during the extraction of previous longwalls at Metropolitan Coal (i.e. no more than minor cracking).

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

6 BASELINE DATA

An audit on the occupied NSW Health assets at the Garrawarra Centre Complex (i.e. houses and aged care buildings) was conducted within the Study area prior to extraction of Longwall 301 to document the current condition of building structures.

John Matheson and Associates (JMA) (2016) prepared a preliminary structural inspection report for the Garrawarra Centre Complex and includes the construction type of different buildings/structures, including abandoned (non-occupied) buildings. A copy of the report has been provided to NSW Health.

6.1 HOSPITAL BUILDINGS (ABANDONED)

The locations of the hospital building structures (A01a-A01k and B03a-B03l) at the Garrawarra Centre Complex are shown on Figure 6.

No abandoned hospital buildings will be directly undermined by Longwalls 301-307. The abandoned hospital buildings are located more than 375 m away from the nearest longwall. No hospital buildings (including Former Male Wards [i.e. Wards 1 to 8 and Dining Room], Former Female Wards [i.e. Wards 1 to 9 and Library/Canteen], Laundry/Boilerhouse or Workshops nor the Gatehouse and Gate Piers are within the predicted 20 mm subsidence contour for Longwalls 301-303, Longwall 304 or Longwalls 305-307.

Photographs of the abandoned hospital building structures are shown on Plates 1 to 4.

Plates 1 & 2 – Abandoned Hospital Buildings [A01a] {Former Male Wards}
(Source: MSEC, 2016)


Plates 3 & 4 – Abandoned Hospital Buildings [B03a] {Laundry / Boilerhouse}
(Source: MSEC, 2016)

6.2 AGED CARE BUILDINGS

The locations of the aged care building structures (B01a-B01j and B02a-B02h) and other associated structures (B01k-B01q and B02i-B02j) at the Garrawarra Centre Complex are shown on Figure 6.

No aged care building structures will be directly undermined by Longwalls 301-307. The aged care buildings are located more than 250 m away from the nearest longwall. No aged care buildings (including the Nurses Quarters and Administration/Kitchen Group) are within the predicted 20 mm subsidence contour for Longwalls 301-303, Longwall 304 or Longwalls 305-307.

Photographs of the aged care building structures are shown on Plates 5 to 10.


Plates 5 & 6 – Aged Care Building Structures [B01a-B01d] {Administration}
(Source: MSEC, 2016)


Plates 7 & 8 – Aged Care Building Structures [B01e] {Nurses Quarters} (Source: MSEC, 2016)


Plates 9 & 10 – Aged Care Building Structures [B02a & B02b] {Administration/Kitchen Group} (Source: MSEC, 2016)

6.3 HOUSES

No houses will be directly undermined by Longwalls 301-307.

The locations of the houses (A01m, A02a-A09a and B04a-B09a) and other associated structures (A01l, A02b, A03b-A03d, A06b, A08b-A08f and A09b) at the Garrawarra Centre Complex are shown on Figure 6.

Houses A01m and A02a-A08a are located outside the Study area for Longwalls 301-303, Longwall 304 (more than 600 m from the nearest longwalls) and Longwalls 305-307. House A09a & A09b {Palmer House and adjacent garage/stable} is located outside the predicted 20 mm subsidence contour for Longwalls 301-303, Longwall 304 and Longwalls 305-307.

Houses B04a-B09a are within the predicted 20 mm subsidence contour for Longwalls 301-303, Longwall 304 and Longwalls 305-307. Subsequent to the Longwalls 301-303 risk assessment, an agreement was reached between South Eastern Sydney Local Health District and Metropolitan Coal to remove cottages B04a-B09a as part of risk mitigation process. The Memorandum of Understanding – signed 31 August 2017 details the structures to be removed subject to Wollongong City Council development approval. These abandoned house structures will be fenced until development approval is granted.

Plates 11 & 12 – Houses [A09a & A09b] {Palmer House and Adjacent Garage/Stable} (Source: MSEC, 2016)

Plates 13 & 14 – Houses [B06a & B08a] {Staff Residences} (Source: MSEC, 2016)

6.4 WATER STORAGE TANKS

No water storage tanks will be directly undermined by Longwalls 301-303, Longwall 304 or Longwalls 305-307. Water storage tanks B14t01 and B14t02 are within the predicted 20 mm subsidence contour for Longwalls 301-303, Longwall 304 and Longwalls 305-307.

The locations of the water storage tanks (B01t01, B01t02, B14t01, B14t02, B16t01-B16t03, B17t01 and B18t01) and the trickle filter tank (B15t01) at the Garrawarra Centre Complex are shown on Figure 6.

It is understood that while the water storage tanks within the Garrawarra Centre Complex (including Garrawarra Reservoir WS0406 and connecting pipelines) are used by Sydney Water, the assets are owned by NSW Health.

The two large water storage tanks (B14t01 and B14t02) and the below ground water storage tanks (B16t01-B16t03) are shown on Plates 15 and 16. It is noted that no water is currently stored in the elevated tank structure (Plate 15 - reservoir on the left).

Subsequent to the Longwalls 301-303 risk assessment, an agreement was reached between South Eastern Sydney Local Health District and Metropolitan Coal to remove derelict water tank B14t02 as part of risk mitigation process. The Memorandum of Understanding – signed 31 August 2017 details the structures to be removed subject to Wollongong City Council development approval. This derelict structure will be fenced during active subsidence effect periods or until removed.

Plates 15 & 16 – Large Water Storage Tanks (Source: MSEC, 2016)

The fire water tank and steel tank adjacent the pump house (B17t01 and B18t01), and the trickle filter tank (B15t01) are shown on Plates 17 and 18.

Plates 17 & 18 – Fire Water Tank and Steel Tank Adjacent Pump House, and Trickle Filter Tank (Source: MSEC, 2016)

Temporary fencing was erected around the large water storage tanks (B14t01 and B14t02) and the Kiln chimney (F01b) during the active extraction period of Longwalls 302, 303 and 304. This fencing was kept in place when there was a potential for measurable subsidence movements to occur. This fencing will be removed for Longwall 305 as predicted subsidence parameters do not change after Longwall 304 given increasing distance away from mining.

6.5 GAS STORAGE TANK

The location of the gas storage tank (B01t03) at the Garrawarra Centre Complex is shown on Figure 6.

The gas storage tank will not be directly undermined by Longwalls 301-307. The gas storage tank is located more than 310 m away from the nearest longwall. The gas storage tank is not within the predicted 20 mm subsidence contour for Longwalls 301-303, Longwall 304 or Longwalls 305-307.

The gas storage tank is shown on Plate 19.

Plate 19 – Gas Storage Tank (Source: MSEC, 2016)

A baseline audit has been conducted to confirm the system of connection between gas storage tank and associated pipeline(s) at the Garrawarra Centre Complex is a flexible connection.

6.6 KILN

Subsequent to the Longwalls 301-303 risk assessment an agreement was reached between South Eastern Sydney Local Health District and Metropolitan Coal to remove derelict structure F01b as part of risk mitigation process. The Memorandum of Understanding – signed 31 August 2017 details the structures to be removed subject to Wollongong City Council development approval. This derelict structure will be fenced during active subsidence effect periods or until removed.

The kiln is shown on Plate 20.

Plate 20 – Kiln (Source: JMA, 2016)

6.7 TELECOMMUNICATIONS TOWERS AND COMPOUNDS

The locations of the telecommunications towers and associated compounds (B06b and B10a-B12a) at the Garrawarra Centre Complex are shown on Figure 6.

Separate BFMPs for the telecommunication towers and compounds have been developed in consultation with the relevant asset owners (i.e. Axicom, Sydney Trains and Telstra).

6.8 OTHER SERVICES

The locations of other built features and services at the Garrawarra Centre Complex include private access roads/tracks, potable water and sewer pipelines, powerlines and telecommunications cables at the Garrawarra Centre Complex are shown on Figure 6.

Separate BFMPs have been developed in consultation with:

- Sydney Water for relevant water infrastructure / services owned by Sydney Water.
- Endeavour Energy for relevant electricity infrastructure / services owned by Endeavour Energy.
- Telstra for relevant telecommunication services owned by Telstra.

6.9 KEY CONTACT LIST

The list of key contacts for Peabody and NSW Health 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)	Technical Services Manager Jon Degotardi	Metropolitan Coal 24hr Control Room 02 4294 7333
NSW Health	General Manager/Nurse Unit Manager Jan Heiler	Garrawarra Centre (office hours) 02 8545 4700

7 MONITORING

A monitoring program will be implemented to monitor the impacts of the Project on the Garrawarra Centre Complex as determined in consultation with NSW Health. Table 5 summarises the BFMP-GAR monitoring components.

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

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

South Eastern Sydney Local Health District will continue to have primary responsibility for existing hazardous material monitoring as per Garrawarra Hazardous Material Management Plan (HMMP) 2017. Monitoring of asbestos will be undertaken by SESLHD, unless otherwise agreed.

The frequency of monitoring will be further 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-GAR.

Table 5
BFMP-GAR Monitoring Program Overview

Program	Aspect	Method	How	Why	Timing	Frequency
Baseline	Garrawarra Centre Complex site	Survey	Adjacent optic / water subsidence line points at approximately 20 m spacing	Establish base conditions	Prior to Longwall 301 extraction	Complete
	Garrawarra Centre Complex buildings	Condition Report (Preliminary Structural Inspection Report)		Establish base condition	Prior to Longwall 301	Complete
		Pre-mining Inspection (Buildings within predicted subsidence > 20 mm)		Establish base condition	Prior to Longwall 302	Complete
	Private roads and access roads/tracks	Visual inspection (including notes on general condition of access roads/tracks)		Establish base condition	Prior to Longwall 302	Complete
During Mining	Garrawarra Centre Complex site	Survey (subsidence, tilt, strain)	Adjacent optic / water subsidence line points at approximately 20 m spacing	Monitor subsidence effects during mining	Specifically for Longwall 305	Weekly on commencement of Longwall 305 extraction until subsidence reduces below level of survey accuracy.
					Within 3 months of the completion of each longwall	Once per longwall
	Garrawarra Centre Complex (aged care buildings)	Visual inspection of: Building structures (B01a-B01e) (Figure 6). Administration / Kitchen Group (Buildings B02a and B02b) (Figure 6). Palmer House (A09a) (Figure 6).		Monitor structural integrity and cracking at pre-existing rock joints. Monitor opening and closing of joints (between Buildings B02a and B02b only).	At the completion of Longwall 307	Once

Table 5 (Continued)
BFMP-GAR Monitoring Program Overview

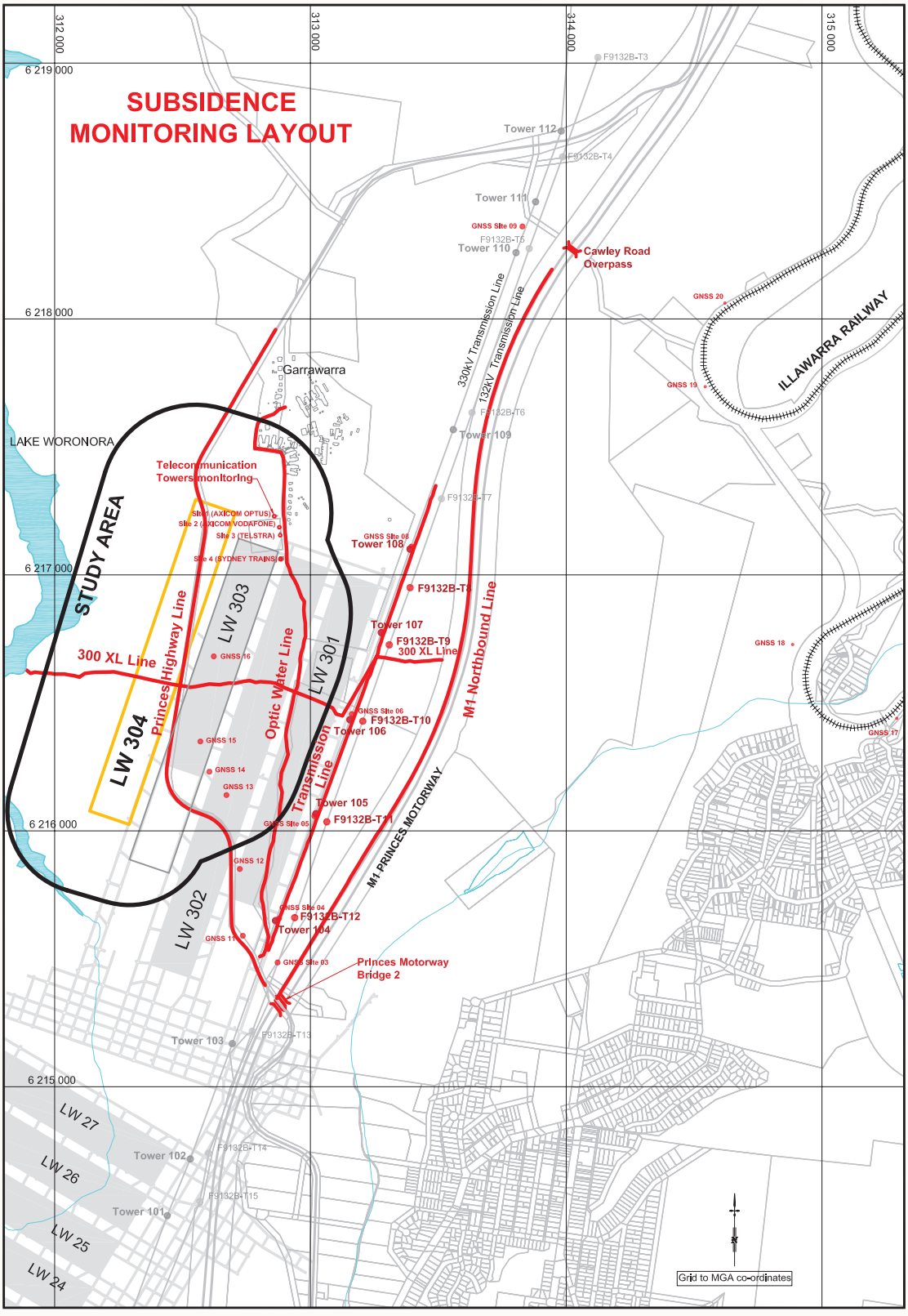
Program	Aspect	Method	How	Why	Timing	Frequency
During Mining (Cont.)	Garrawarra Centre Complex (water storage tanks)	Visual inspection of: Water storage tanks (B14t01, B14t02, B16t01-B16t03, B17t01 and B18t01) and trickle filter tank (B15t01) (Figure 6).		Monitor structural integrity, leaks, and cracking in columns, elevated ring beam or central access shaft (B14t01).	At the completion of Longwall 307	Once
	Telecommunications Services and Towers	As per Telstra, Axicom and Sydney Trains BFMPs				
	Other Services (powerlines, poles and water pipelines)	Visual inspection of: Powerlines, poles and water pipelines (Figures 7 and 8)		Monitor for cracks or leakage in the pipelines and surface ground cracks and degradation or movement of powerlines and poles.	At the completion of Longwall 307	Once
		As per Sydney Water BFMP				
	Private roads and access roads/tracks	Visual inspection (including notes on general condition of access roads/tracks)		Monitor for surface cracks, buckling and general safety	At the completion of Longwall 307	Once
					As per Longwalls 305-307 LMP	
Post Mining	Garrawarra Centre Complex site and buildings	Condition Report		Determine level of impact of mining (if any)	Within 3 months of the completion Longwall 307 (or as otherwise agreed with NSW Health subject to future longwall extraction)	Once

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 305-307 Subsidence Monitoring Program (Figure 8).

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 Garrawarra Centre Complex will be measured by a single survey line along the nearby optic / water line, and by survey of telecommunications towers (as a component of separate BFMPs).



MEF-19-19_305-309 EP BFMP_018A

Source: MSEC (2019)

Peabody

METROPOLITAN COAL

Subsidence Monitoring Layout

Figure 8

7.2 SUBSIDENCE IMPACTS

7.2.1 Garrawarra Centre Complex

Visual inspections will be conducted at the Garrawarra Centre Complex at the buildings and structures, and private roads prescribed in Table 5 or as otherwise determined in consultation with NSW Health.

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 Access Roads/Tracks

Visual inspection of the access roads/tracks to the NSW Health assets were undertaken prior to the commencement of Longwall 302, and will be conducted following extraction of each longwall panel.

Visual observations of access roads/tracks would occur as part of routine works and inspections within 600 m of Longwalls 305-307 secondary extraction as described in the Metropolitan Coal Longwalls 305-307 Land Management Plan (Longwalls 305-307 LMP).

Specific details that will be noted and/or photographed that are relevant to the NSW Health 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 the access road/track to the NSW Health asset;
- whether any actions are required (e.g. implementation of management measures as outlined in the Longwalls 305-307 LMP, 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.); 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 305-307 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 305-307 LMP) and to identify required management measures. Management measures are discussed in the Longwalls 305-307 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 305-307 Public Safety Management Plan.

7.3 ENVIRONMENTAL CONSEQUENCES

Metropolitan Coal and NSW Health 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 NSW Health 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 the Garrawarra Centre Complex are considered to be applicable.

For buildings or houses requiring repairs, normal building maintenance techniques could be applied in consultation with NSW Health and relevant authorities.

For the water storage tanks, if the tank base or lower sections of the tank walls were to develop leakage or if pre-existing leakage were to increase, the tank could be temporarily drained and lined with high-density polyethylene (HDPE) to establish a watertight envelope. For water pipelines, leaks could be remediated by locally exposing the pipeline and repairing or replacing the affected section.

A list of potential water suppliers (and key contact details) to temporarily supply water to the Garrawarra Centre Complex (if required) is provided below:

- Aquarius (02 4776 2496); and
- CAC Transport (0418 386 177).

For powerlines and poles, management measures may include alteration of conductor tensions or strengthening of timber poles footings.

Where significant subsidence impacts on access roads/tracks are detected (e.g. those that affect the serviceability) or at any time Metropolitan Coal, NSW Health or the landholder considers that the integrity of the access roads/tracks may be compromised, the following management measures will be implemented. Where significant cracks are detected, the cracks would be repaired as soon as practicable in consultation with the landholder. This may include the use of earthmoving equipment if considered the most appropriate means of repair. Appropriate sedimentation controls will be implemented during repair works. Management measures for access roads/tracks will be implemented in accordance with the Longwalls 305-307 Land Management Plan.

For the kiln, a barrier fence was erected to maintain an exclusion zone with a radius of 1.5 times the chimney height during active mining (i.e. which may result in impact on the kiln, up to Longwall 304). Management measures for other services at the Garrawarra Centre Complex have also been developed separately with each asset owner (e.g. Endeavour Energy, Sydney Water, Telstra, Axicom and Sydney Trains).

Follow-up inspections will be conducted to assess the effectiveness of the management measures implemented and the requirement for any additional management measures. As at the end of extraction of Longwall 303 no subsidence impacts have been recorded at Garrawarra. 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 BFMP, Metropolitan Coal will implement the following Contingency Plan (Appendix 3):

- The observation will be reported to the Metropolitan Coal Technical Services Manager 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 BFMP-GAR.
- If relating to an access road/track, the observation will be recorded in the Metropolitan Coal Longwalls 305-307 Land Management Plan – Subsidence Impact Register.
- Metropolitan Coal will report any exceedance of the performance measure or indicators to the DPIE and NSW Health 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 measures or indicators are exceeded are summarised in Table 6. The decision trees for the contingency measures are shown in Appendix 3.

Table 6
Contingency Measures

Environmental Consequence	Contingency Measures	
	Measure	**Description**
Impact on:		
Buildings or houses	Repair of building	• Building maintenance techniques (in consultation with the relevant authorities). • Installation of supports.
Items of historical or heritage significance	Repair of building	• Building maintenance techniques (in consultation with the relevant heritage authorities).
Water storage tanks	Redundancy	• Alternate water storage tanks in Helensburgh.
Water pipelines	Replacement	• Construction of new section of water main.
	Contingency	• Alternative water supply provided to service properties while repair of the water main is in progress.
Timber poles	Stabilisation	• Installation of supports.
	Rebuilding	• Construction of new pole(s) or emergency structures.
Powerline wires	Stabilisation	• Sheaving of conductors and/or earth wires.
	Rebuilding	• Construction of new powerlines.
Telecommunication towers	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	• Alternate phone towers nearby.
Building compounds	Repair of building	• Building maintenance techniques. • Replacement of building compound.
Kiln	Stabilisation techniques	• Installation of supports.
Fibre Optic Cable (Telstra)	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.

10 TARP – MANAGEMENT TOOL

The framework for the various components of the BFMP-GAR are summarised in the BFMP-GAR TARPs shown in Tables 7 and 8. The BFMP-GAR TARPs 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
Trigger Action Response Plan – Buildings/Structures (Excluding Services)

NSW HEALTH – Garrawarra Centre Complex Buildings/Structures		
NSW Health – Garrawarra Centre Complex Buildings/Structures	*Risk: Subsidence effect on buildings/structures resulting in damage (beyond baseline conditions).*	
	TRIGGER LEVEL	**RESPONSE**
	Level 1 - Normal **Expected subsidence conditions**	
	Subsidence • less than 150 mm Tilt • less than 1.0 mm/m Tensile strain • less than 0.9 mm/m Compressive strain • less than 1.6 mm/m	**Normal Operations** • Negligible impact to Garrawarra Centre Complex buildings/structures – safe and serviceable (or as per baseline conditions). • Continue monitoring activities as planned. Level 1 normal operations include: • Fine or hair line cracks that do not require repair for items of historical or heritage significance at the Garrawarra Centre Complex (i.e. large buildings which have important heritage values), and/or • Cracking at pre-existing rock joints, columns, opening and closing of joints, or tilting of piers or water tank leaks
	Level 2 - Monitor **Subsidence elevated up to +15% of predicted but condition normal**	
	Subsidence • between 150 and 172 mm	**Continue operations but report on subsidence anomaly** • Negligible impact to Garrawarra Centre Complex buildings/structures – safe and serviceable (or as per baseline conditions). **Metropolitan Coal** • Immediately resurvey subsidence line to confirm results. • Engage subsidence expert to assess results. • Confirm results are consistent with other subsidence lines. • Compare and critically analyse measured versus predicted subsidence. • Inform and provide report to NSW Health of subsidence results. • Collaboratively share information with NSW Health to monitor situation. **NSW Health** • Assess information provided by Metropolitan Coal.

Table 7 (Continued)
Trigger Action Response Plan – Buildings/Structures (Excluding Services)

NSW HEALTH – Garrawarra Centre Complex Buildings/Structures		
NSW Health – Garrawarra Centre Complex Buildings/Structures	*Risk: Subsidence effect on buildings/structures resulting in damage (beyond baseline conditions).*	
	TRIGGER LEVEL	**RESPONSE**
	Level 3 - Cautionary **Anomalous service condition detected or Subsidence beyond +15% of predicted**	
	Subsidence • greater than 172 mm	**Investigate & Resolve** • Negligible impact to Garrawarra Centre Complex buildings/structures – safe and serviceable (or as per baseline conditions). **Metropolitan Coal** • Steps as per Level 2 event, plus: ○ Increase frequency of subsidence line surveys to weekly in affected area. ○ In conjunction with NSW Health identify impact location and work with NSW Health to resolve. ○ Review the subsidence monitoring program and update the program where appropriate. ○ Provide report on issue to both NSW Health and DPIE. **NSW Health** • In conjunction with Metropolitan Coal identify impact location; and determine if maintenance/restoration works are to be carried out. • Make determination if other measures necessary to avoid further impact (e.g. stabilisation, lining of water tanks, etc.).
	Level 4 – Restoration **Building Damage (greater than negligible)**	
	Buildings Damage (beyond baseline conditions) • Structural integrity compromised	**Implement Contingency Plan** • As per BFMP Section 9 and Appendix 4. **Metropolitan Coal** • As per Level 3 event, plus: ○ General Manager to be involved in all decision making processes. ○ Assess public safety implications and where appropriate implement safety measures in accordance with Metropolitan Coal Longwall Public Safety Management Plan. ○ Report exceedance of the performance measure or indicators to the DPIE and NSW Health as soon as practicable. ○ Update the 'Built Features Management Plan – Subsidence Impact Register'. ○ Investigate circumstances of the damage and determine requirement for adaptive management of mining operations prior to future operations in vicinity of the Garrawarra Centre Complex buildings/structures. **NSW Health** • As per Level 3 event, plus: ○ Determine appropriate course of action for restoration and repairs works. ○ Work in conjunction with Metropolitan Coal to investigate root cause of incident and determine appropriate future control measures.

Table 8
Trigger Action Response Plan – Services

NSW HEALTH – Services		
NSW Health – Services	*Risk: Subsidence effect on buildings/structures resulting in damage (beyond baseline conditions).*	
	TRIGGER LEVEL	**RESPONSE**
	Level 1 - Normal **Expected subsidence conditions**	
	Subsidence less than 350 mm Tilt less than 3.0 mm/m Tensile strain less than 0.9 mm/m Compressive strain less than 1.6 mm/m	**Normal Operations** • Negligible impact to services – safe and serviceable (or as per baseline conditions). • Continue monitoring activities as planned.
NSW HEALTH – Services		
NSW Health – Services	*Risk: Subsidence effect on buildings/structures resulting in damage (beyond baseline conditions).*	
	TRIGGER LEVEL	**RESPONSE**
	Level 2 – Monitor **Subsidence elevated up to +15% of predicted but condition normal**	
	Subsidence between than 350 and 400 mm	**Continue operations but report on subsidence anomaly** • Negligible impact to services – safe and serviceable (or as per baseline conditions). **Metropolitan Coal** • Immediately resurvey subsidence line to confirm results. • Engage subsidence expert to assess results. • Confirm results are consistent with other subsidence lines. • Compare and critically analyse measured versus predicted subsidence. • Inform and provide report to NSW Health of subsidence results. • Collaboratively share information with NSW Health to monitor situation. **NSW Health** • Assess information provided by Metropolitan Coal.

Table 8 (Continued)
Trigger Action Response Plan – Services

NSW HEALTH – Services		
NSW Health – Services	*Risk: Subsidence effect on buildings/structures resulting in damage (beyond baseline conditions).*	
	TRIGGER LEVEL	**RESPONSE**
	Level 3 - Cautionary **Anomalous service condition detected or Subsidence beyond +15% of predicted**	
	Subsidence greater than 400 mm	**Investigate & Resolve** • Negligible impact to services – safe and serviceable (or as per baseline conditions). **Metropolitan Coal** • Steps as per Level 2 event, plus: o Increase frequency of subsidence surveys to weekly in affected area. o In conjunction with NSW Health identify impact location and work with NSW Health to resolve. o Review the subsidence monitoring program and update the program where appropriate. o Provide report on issue to both NSW Health and DPIE. **NSW Health** • In conjunction with Metropolitan Coal identify impact location; and determine if maintenance/restoration works are to be carried out. • Make determination if other measures necessary to avoid further impact (e.g. stabilisation).
	Level 4 – Restoration **Fault Occurs or service outage**	
	• Fault occurs (also refer to separate TARPs in BFMPs for Telstra, Endeavour Energy, Sydney Trains, Sydney Water and Axicom)	**Implement Contingency Plan** • As per BFMP Section 9 and Appendix 4. **Metropolitan Coal** • As per Level 3 event, plus: o General Manager to be involved in all decision making processes. o Assess public safety implications and where appropriate implement safety measures in accordance with Public Safety Management Plan. o Report exceedance of the performance measure or indicators to the DPIE and NSW Health as soon as practicable. o Update the 'Built Features Management Plan – Subsidence Impact Register'. o Investigate circumstances of the fault and determine requirement for adaptive management of mining operations prior to future operations in vicinity of the Garrawarra Centre Complex services. **NSW Health** • As per Level 3 event, plus: o Determine appropriate course of action for restoration and repairs works (in consultation with relevant service provider). o Work in conjunction with Metropolitan Coal to investigate root cause of incident and determine appropriate future control measures.

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 baseline (and post-mining) data collected for Longwalls 301-307 will be used as baseline for Longwalls 308 onward as longwall mining progressively moves further away from the Garrawarra Centre Complex.

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-GAR will inform the appropriate type and frequency of monitoring 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, this BFMP 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.

NSW Health 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*.

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

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

Howard Tanner & Associates (1993) *Conservation Plan for the Garrawarra Centre for Aged Care.*

John Matheson and Associates (2016) *Garrawarra: R0295-Rev 2 Preliminary Structural Inspection Report*. 30 September 2016.

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 Garrawarra Complex*, dated 24 October 2016.

Mine Subsidence Engineering Consultants (2019a) *Metropolitan Colliery – Proposed Longwall 304 Subsidence Predictions and Impact Assessments for the Garrawarra Complex*.

Mine Subsidence Engineering Consultants (2019b) *Metropolitan Colliery – Proposed Longwalls 305 to 307 Subsidence Predictions and Impact Assessments for the Garrawarra Complex*.

APPENDIX 1

MSEC (2019) METROPOLITAN COLLIERY – PROPOSED LONGWALLS 305 TO 307 – SUBSIDENCE PREDICTIONS AND IMPACT ASSESSMENTS FOR THE GARRAWARA COMPLEX

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29th July 2019

Jon Degotardi
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Ref: MSEC1059-03

Dear Jon,

RE: Metropolitan Colliery – Proposed Longwalls 305 to 307 - Subsidence Predictions and Impact Assessments for the Garrawarra Complex

This letter report summarises the predicted subsidence movements and the assessed subsidence impacts for the built features of the Garrawarra Complex resulting from the extraction of the proposed Longwalls 305 to 307 at Metropolitan Colliery. Several services within the Garrawarra Complex are owned by other stakeholders and will be assessed and managed as necessary, through consultation with the relevant owners.

The locations of the Garrawarra Complex and the proposed longwalls are shown in the attached Drawing No. MSEC1059-03a, 03b and 03c. A Study Area is shown in the drawings 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 type and size of the building structures are shown in the attached Table A.1 at the end of this letter report. There are a total of 86 building structures on the complex, comprising 57 residential or hospital buildings and 29 ancillary structures. All residential and hospital buildings are located outside the footprint of the proposed longwalls. There are also nine water storage tanks and a number of telecommunications towers located within the complex.

The *hospital* building structures are Refs. A01a to A01k and B03a to B03l. These structures are located outside the extents of the longwalls at a minimum distance of 440 m from Longwall 305. The buildings are not currently in use and have been fenced off. Photographs of the main hospital building structures are provided in Figure 1 and Figure 2.

Figure 1 Hospital Building Structure (Ref. A01a)

Figure 2 Hospital Building Structure (Ref. B03a)

The main *aged care* building structures are Refs. B01a to B01j and B02a to B02h. The other buildings associated with the aged care are Refs. B01k to B01q, B02i and B02j.

Structure Refs. B01a to B01d are located over 240 m to the north-east of Longwall 305. These buildings comprise single storey structures founded on a combination of ground slabs, strip footings and pad footings. The external walls are brick-veneer and the internal walls are of lightweight construction. The roofs are steel framed with metal sheeting. Photographs of these structures are provided in Figure 3.

Figure 3 Aged Care Building Structure Refs. B01a to B01d

Structure Ref. B01e is located 350 m to the north-east of Longwall 305. This building is a double storey brick structure founded on a ground slab with a tiled roof. Photographs of this structure are provided in Figure 4.

Figure 4 Aged Care Building Structure Ref. B01e

Structure Refs. B02a to B02h are located outside the Study Area. These buildings comprise one and two storey structures founded on strip footings and ground slabs. The perimeter walls are double brick, but in some cases the upper levels have timber framed walls. The suspended floors are timber framed and in some cases are supported on steel frames. The tiled roofs are supported by timber frames. Photographs of two of these structures are provided in Figure 5.

Figure 5 Aged Care Building Structure Refs. B02a and B02b

The *houses* are Refs. A01m, A02a to A09a and B04a to B09a. The other buildings associated with the houses are Refs. A01l, A02b, A03b to A03d, A06b, and A08b to A08f.

Structure Refs. A01m, A02a to A06a are located outside the Study Area. Structure Refs. A07a and A08a are partially located within the Study Area boundary, and Structure Ref. A09a is located within the Study Area. This building is a two storey double brick structure on strip footings with timber floor and a tiled roof. Photographs of this house and the associated structure A09b are provided in Figure 6.

Figure 6 House Structure Ref. A09a (left side) and A09b (right side)

Structure Refs. B04a to B09a are located 360 m to 400 m to the east of Longwall 305. These houses are one storey structures founded on brick piers and low-level perimeter brick walls with timber floors, fibro walls and tiled roofs. Photographs of two of these houses are provided in Figure 7. The houses are currently vacant and have been fenced off in preparation for demolition.

Figure 7 Houses Structure Refs. B06a (left side) and B08a (right side)

The other main structures on the complex include water storage tanks (Refs. B14t01, B14t02, B15t01 to B15t03, B17t01, and B18t01), above ground gas storage tank (Ref. B01t03), and trickle filter tank B16t01. Photographs of these features are provided in Figure 8 to Figure 11.

Figure 8 Water Storage Tanks Refs. B14t01 and B14t02 (left side) and Refs. B15t01 to B15t03 (right side)

Figure 9 Water Storage Tanks Refs. B17t01 (poly tank) and B18t01 (steel tank)

Figure 10 Gas Storage Tank B01t03

Figure 11 Trickle Filter Tank B16t01

Other built features on the complex include telecommunications towers and compounds (Refs. B06b and B10a to B12a), potable water and sewer pipelines, powerlines and telecommunications cables.

The predictions and impact assessments for the built features in the Garrawarra Complex are provided in the following sections.

Conventional Subsidence Parameters for the Built Features

The following provides summaries of the maximum predicted conventional movements for the built features resulting from 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 maximum predicted subsidence, tilt and curvature for each of the building structures and tanks, after the extraction of Longwall 304 and after the extraction of Longwall 305 to 307, are provided in Table A.1 at the end of this letter report. The values are the maxima within a distance of 20 metres from the mapped extents of these features.

Summaries of the maximum predicted values of total subsidence, tilt and curvature are provided in: Table 1 for the hospital building structures; Table 2 for the aged care building structures; Table 3 and Table 4 for the houses; Table 5 for the water storage tanks; and Table 6 for the above ground gas storage tank.

Table 1 Maximum Predicted Total Subsidence, Tilt and Curvature for the Hospital Building Structures (Refs. A01a to A01k and B03a to B03l)

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	< 20	< 0.5	< 0.01	< 0.01
After LW305	< 20	< 0.5	< 0.01	< 0.01
After LW306	< 20	< 0.5	< 0.01	< 0.01
After LW307	< 20	< 0.5	< 0.01	< 0.01

Table 2 Maximum Predicted Total Subsidence, Tilt and Curvature for the Aged Care Building Structures (Refs. B01a to B01q, and B02a to B02j)

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	30	< 0.5	< 0.01	< 0.01
After LW305	40	< 0.5	< 0.01	< 0.01
After LW306	40	< 0.5	< 0.01	< 0.01
After LW307	40	< 0.5	< 0.01	< 0.01

Table 3 Maximum Predicted Total Subsidence, Tilt and Curvature for the Northern Houses (Refs. A01m and A02a to A09a)

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	< 20	< 0.5	< 0.01	< 0.01
After LW305	< 20	< 0.5	< 0.01	< 0.01
After LW306	< 20	< 0.5	< 0.01	< 0.01
After LW307	< 20	< 0.5	< 0.01	< 0.01

Table 4 Maximum Predicted Total Subsidence, Tilt and Curvature for the Southern Houses (Refs. B04a to B09a)

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	90	0.5	< 0.01	< 0.01
After LW305	125	1.0	< 0.01	< 0.01
After LW306	125	1.0	< 0.01	< 0.01
After LW307	125	1.0	< 0.01	< 0.01

Table 5 Maximum Predicted Total Subsidence, Tilt and Curvature for the Water Tanks and Trickle Filter Tank (Refs. B14t01, B14t02, B15t01 to B15t03, B16t01, B17t01, B18t01)

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	125	1.0	0.1	< 0.01
After LW305	150	1.0	0.1	< 0.01
After LW306	150	1.0	0.1	< 0.01
After LW307	150	1.0	0.1	< 0.01

Table 6 Maximum Predicted Total Subsidence, Tilt and Curvature for the Gas Storage Tank (Ref. B01t03)

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	< 20	< 0.5	< 0.01	< 0.01
After LW305	< 20	< 0.5	< 0.01	< 0.01
After LW306	< 20	< 0.5	< 0.01	< 0.01
After LW307	< 20	< 0.5	< 0.01	< 0.01

A large proportion of the building structures are located outside or close to the Study Area boundary and are not expected to experience measurable conventional vertical subsidence (< 20 mm), tilts (< 0.5mm/m) or curvatures (<0.01 km^{-1}).

The private roads and the services directly associated with the hospital and residential building structures are located outside the footprint of proposed Longwalls 305 to 307 and are therefore expected to experience low levels of predicted movements, consistent with the above tables. A summary of the maximum predicted subsidence, tilt and curvature for the private roads and services, resulting from the extraction of Longwall 303 and 304, is provided in Table 7.

Table 7 Maximum Predicted Total Subsidence, Tilt and Curvature for the Private Roads and Services on the Garrawarra Complex

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	300	3.0	0.03	< 0.01
After LW305	325	3.0	0.03	< 0.01
After LW306	350	3.0	0.03	< 0.01
After LW307	350	3.0	0.03	< 0.01

The maximum predicted total subsidence for the private roads and services is 350 mm. The maximum predicted conventional tilt is 3.0 mm/m (i.e. 0.3 %, or 1 in 330). The maximum predicted conventional curvatures are 0.03 km^{-1} hogging and < 0.01 sagging, which equate to minimum radii of curvature of 33 km and 100 km respectively.

It can be seen from the attached Table A.1 that with the exception of the predicted tilt for the southern houses inand water tanks B16t01 to t03, the predicted conventional tilt and curvatures do not change after the extraction of Longwall 304. While some increase in observed subsidence is predicted, the majority of the surface features within the Garrawarra Complex are not expected to experience measurable conventional tilt and curvatures due to the extraction of Longwalls 305 to 307. The surface features could experience low level far-field horizontal movement. The far-field horizontal movements are expected to be similar to those observed for previous longwall mining in the Southern Coalfield, which tend to be bodily movements towards the extracted goaf area and are accompanied by very low levels of strain.

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 below.

The observed incremental far-field horizontal movements, resulting from the extraction of longwalls in the Southern Coalfield, are provided in Figure 12. The data is based on survey marks located outside of the mining area (i.e. above solid coal).

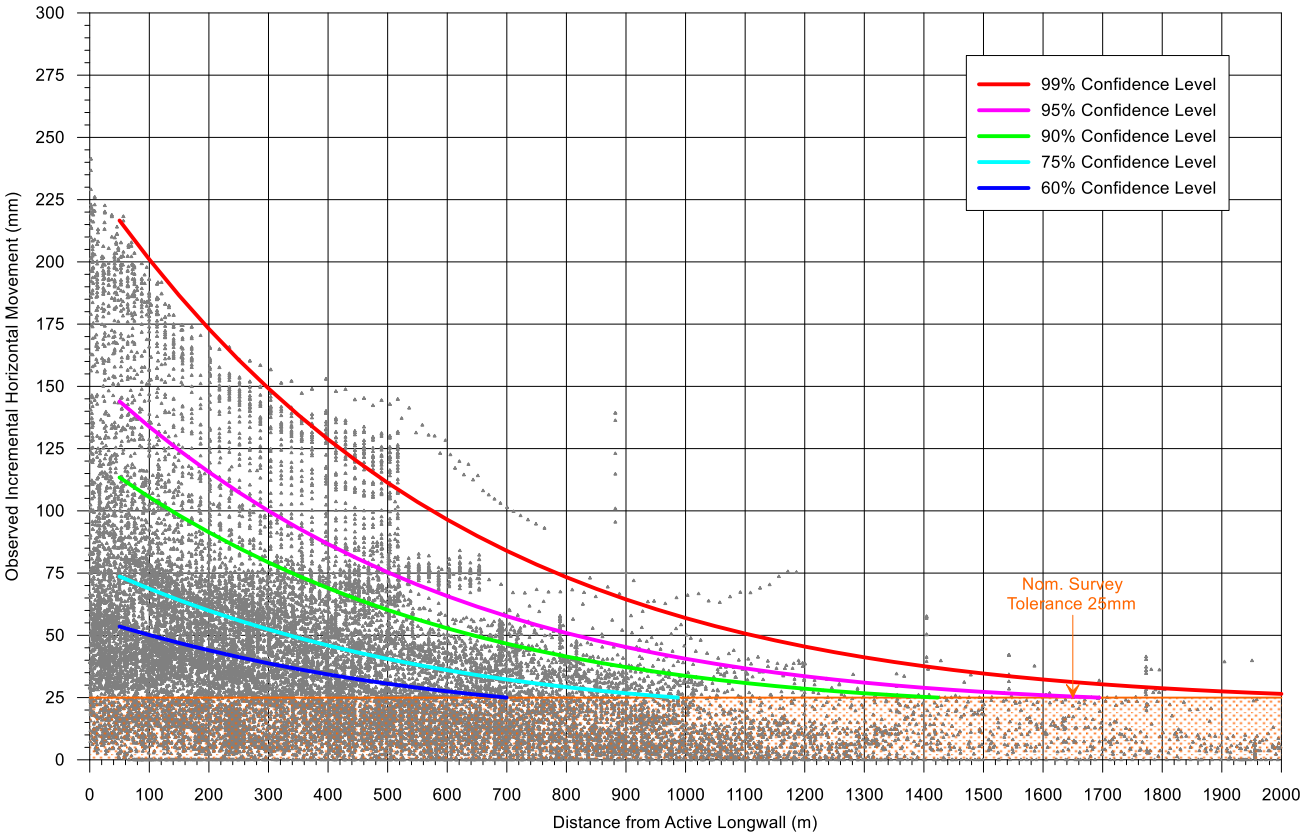

Figure 12 Observed Incremental Far-field Horizontal Movements from the Southern Coalfield (Solid Coal)

The nearest building (B01a) is located 240 m from Longwall 305. The absolute incremental horizontal movements measured at distances greater than 240 m from mining are in the order of 110 mm based on the 95% confidence level. The observed far-field horizontal movements are expected to reduce with increasing distance from Longwall 305. The absolute incremental horizontal movements at the furthest structures (650 m) are in the order of 65 mm based on the 95% confidence level.

The Far-field horizontal movements tend to be bodily movements orientated towards the mining area. The strains associated with these low level horizontal movement are not expected to be measurable.

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 built features 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.

Where features are located outside the proposed longwalls, as is the case for the majority of the structures at the Garrawarra complex, the database has been analysed to extract the maximum tensile and compressive strains outside the longwalls, referred to as '*above solid coal'*. The majority of building structures are greater than 100 metres from the longwalls and, therefore, the database has been analysed to extract the maximum tensile and compressive strains that have been measured at any time during the extraction of the previous longwalls in the Southern Coalfield, for survey bays that were located outside and within 100 metres to 250 metres of the nearest longwall goaf edge.

A histogram of the maximum observed tensile and compressive strains measured in survey bays located above solid coal, for monitoring lines in the Southern Coalfield, is provided in Figure 13. The probability distribution functions, based on a fitted *Generalised Pareto Distribution (GPD)*, have also been shown in this figure.

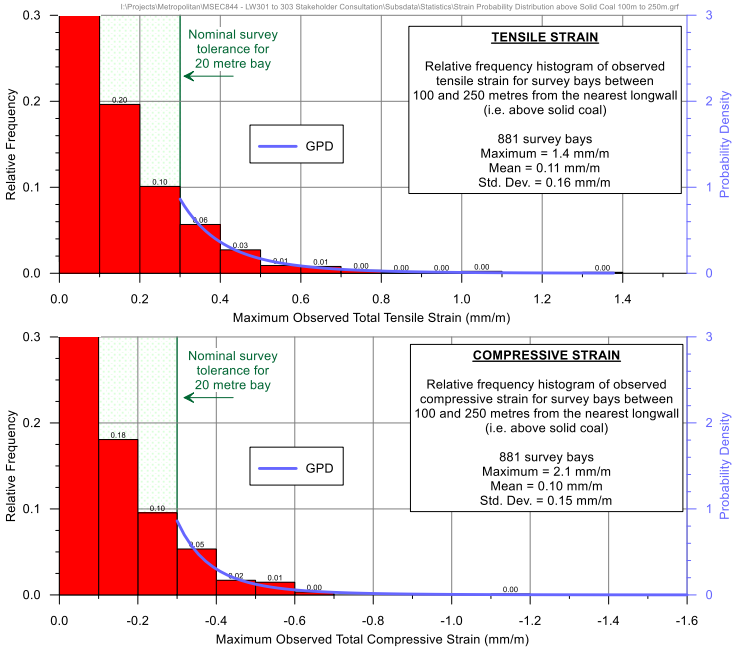

Figure 13 Distributions of the Measured Maximum Tensile and Compressive Strains during the Extraction of Previous Longwalls in the Southern Coalfield Above Solid Coal (100 to 250 metres)

The 95 % confidence intervals for the maximum total strains that the individual survey bays above solid coal (100 to 250 metres) experienced at any time during mining are 0.4 mm/m tensile and compressive. The 99 % confidence intervals for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.7 mm/m tensile and 0.6 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. MSEC1059-03a. There are no mapped faults located within the Study Area that extend beneath the Garrawarra Complex. It is possible that structures 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.

There are no major streams located within the complex. The built features, therefore, are not expected to experience any measurable valley closure effects.

Impact Assessments for the Building Structures

Longwall layouts have been modified in order to minimise predicted subsidence movements at the Garrawarra building structures B01a to B01e, which house aged care patients and administrative support.

The maximum predicted tilts resulting from Longwalls 305 to 307 increase only at the southern houses, which are fenced off for demolition. The predicted tilt curvatures do not increase with the extraction of Longwalls 305 to 307. While there is a slight increase in the predicted subsidence due to Longwalls 305 to 307, the building structures are not expected to experience any measurable tilt and curvature.

The 95 % confidence intervals for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.4 mm/m tensile and compressive. The 99 % confidence intervals for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.7 mm/m tensile and 0.6 mm/m compressive.

A structural assessment of the building structures within the Garrawarra Complex was undertaken by John Matheson and Associates Pty Ltd (JMA 2016). A summary of the results of the structural inspection is provided in Table 3 of JMA (2016). The assessment is based on predicted subsidence parameters for Longwall 301 to 303 and indicates that the likelihood of greater than negligible damage developing in the building structures is low, with an assessed probability of exceedance for Category 1 damage (i.e. fine cracks of less than 1mm) of 1% or less for all buildings with the exception of Building B02c. The abandoned building B02c has a probability of exceedance of 10% for Category 1 damage and a probability of exceedance of 1% for a 2 mm crack in Category 2. The assessed probability exceedance of 1% is generally associated with large masonry structures. The assessed probability exceedance for the smaller building structures is generally unlikely to remote. A detailed discussion of the structural assessments is provided in the report by JMA (2016). Since the preparation of the structural assessment report, the Longwalls 301 to 303 were shortened by 90 m. The predicted subsidence parameters for the structures after Longwall 305 to 307 are generally unchanged or similar to those assessed in the report by JMA (2016) and the resulting assessments for the structures do not change. The buildings are expected to remain safe and serviceable and potential impacts could be repaired using normal building maintenance techniques.

A detailed discussion of the structural assessments is provided in the report by JMA (2016).

Impact Assessments for the Water Tanks and Trickle Filter Tank

The maximum predicted tilts for the water tanks and trickle filter tank are 1.0 mm/m (i.e. 0.1 %, or 1 in 1000) and curvatures are 0.01 km^{-1} hogging and less than 0.01 km^{-1} sagging. The predicted tilt increases slightly at tanks B15t01 to t03. The predicted tilt at the remaining tanks and trickle filter tank do not change and curvatures do not increase with the extraction of Longwalls 305 to 307. While there is a slight increase in the predicted subsidence due to Longwalls 305 to 307, the water tanks and trickle filter tank are not expected to experience any measurable tilt and curvature.

The tanks are located at distances of 300 m or greater from Longwall 305. The 95 % confidence intervals for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.4 mm/m tensile and compressive. The 99 % confidence intervals for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.7 mm/m tensile and 0.6 mm/m compressive.

As assessment of the tanks was undertaken by John Matheson and Associates Pty Ltd (JMA 2016). A summary of the results of the structural inspection is provided in Table 3 of JMA (2016). The assessment is based on predicted subsidence parameters for Longwall 301 to 303 and indicates that the likelihood of greater than negligible damage developing in the water storage tanks is 20% for Category 1 damage (i.e. fine cracks of less than 1mm) of 1% or less. Since the preparation of the structural assessment report, the Longwalls 301 to 303 were shortened by 90 m. The predicted subsidence parameters for the structures after Longwall 305 to 307 are unchanged or less than those assessed in the report by JMA (2016) and the resulting assessments for the structures therefore do not change. The tanks are expected to remain safe and serviceable and potential impacts could be repaired using normal building maintenance techniques.

It is recommended that monitoring and management strategies developed for the extraction of Longwalls 301 to 304 are updated, in consultation with the infrastructure owner, to manage potential impacts on the water storage tanks and trickle filter tank. It is expected that these tanks can be maintained in safe and serviceable conditions with the implementation of the appropriate monitoring and management strategies.

Impact Assessments for the Gas Storage Tank

The gas storage tank is located more than 330 m from Longwall 305. The maximum predicted subsidence parameters are negligible and therefore unlikely to adversely impact the tank.

The maximum predicted conventional curvatures are less than 0.01 km^{-1} for both hogging and sagging curvature, which equate to minimum radii of curvature of greater than 100 km. The predicted strains are less than 0.5 mm/m tensile and compressive based on the 95 % confidence level.

The gas storage tank is supported on a concrete slab above the ground and therefore is unlikely to experience the mining induced curvatures and strains.

At this distance, it is unlikely that the storage tank and pipework would experience adverse impacts as a result of the extraction of Longwalls 305 to 307.

Impact Assessments for the Private Roads and Services

The private roads in the complex with bitumen seals, and private services within the complex ,are located outside the extents of proposed Longwalls 305 to 307. Experience from the Southern Coalfield indicates that impacts on these roads and services are unlikely.

Short lengths of road comprising chip seal or gravel surface are located above previous Longwall 302. The roads are not well maintained. Potential impacts to these roads include minor and isolated cracks. Impacts can be managed using monitoring (visual or ground survey lines) during active subsidence and remediation using normal road maintenance techniques.

It is expected that the private roads and services can be maintained in safe and serviceable conditions with the development of the appropriate monitoring and management plans.

Summary

The building structures and services associated with the Garrawarra Complex are located to the north-east of Longwall 305. The main patient wards are located more than 230 metres from Longwall 305. Assessments of the building structures were carried out by JMA (2016) and indicate that the structures can be maintained in a safe and serviceable condition.

It is expected that potential impacts on the building structures and services could be managed with the implementation of the appropriate monitoring and management strategies.

Yours sincerely

Peter DeBono

Attachments:
Drawing No. MSEC1059-03a – Longwalls 305 to 307 – Location Plan
Drawing No. MSEC1059-03b – Longwalls 305 to 307 – Buildings and Structures
Drawing No. MSEC1059-03c – Longwalls 305 to 307 – Services

Table A.1 Predicted Subsidence, Tilt and Curvature for the Building Structures

References:

John Matheson and Associates (JMA 2016), Garrawarra:R0295-Rev 3 *Preliminary Structural Inspection Report.* 10 October 2016

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METROPOLITAN COLLIERY
LONGWALL 305
GARRAWARRA CENTRE SESLHD
LOCATION PLAN

DATE:	SCALE:	DRAWING No:	Rev No
16 Jul 2019	1:10000	MSEC1059-03a	01

312 000

GEOLOGICAL STRUCTURES
FAULTS
DYKES

WORONORA DAM RD

FORMER QUARRY SITE

6 218 000

WORONORA RESERVOIR

GARRAWARRA CENTRE SESLHD

CAWLEYS CK

STUDY AREA

PREDICTED 20mm SUBSIDENCE CONTOUR

LW307

LW306

LW305

LW304

OLD PRINCES HWY

LW303

LW301

CEMETERY

6 216 000

LW302

WILSONS CK

FAULTS

MAIN WEST FAULT

PRINCES HIGHWAY UNDERPASS 2

Grid to MGA co-ordinates

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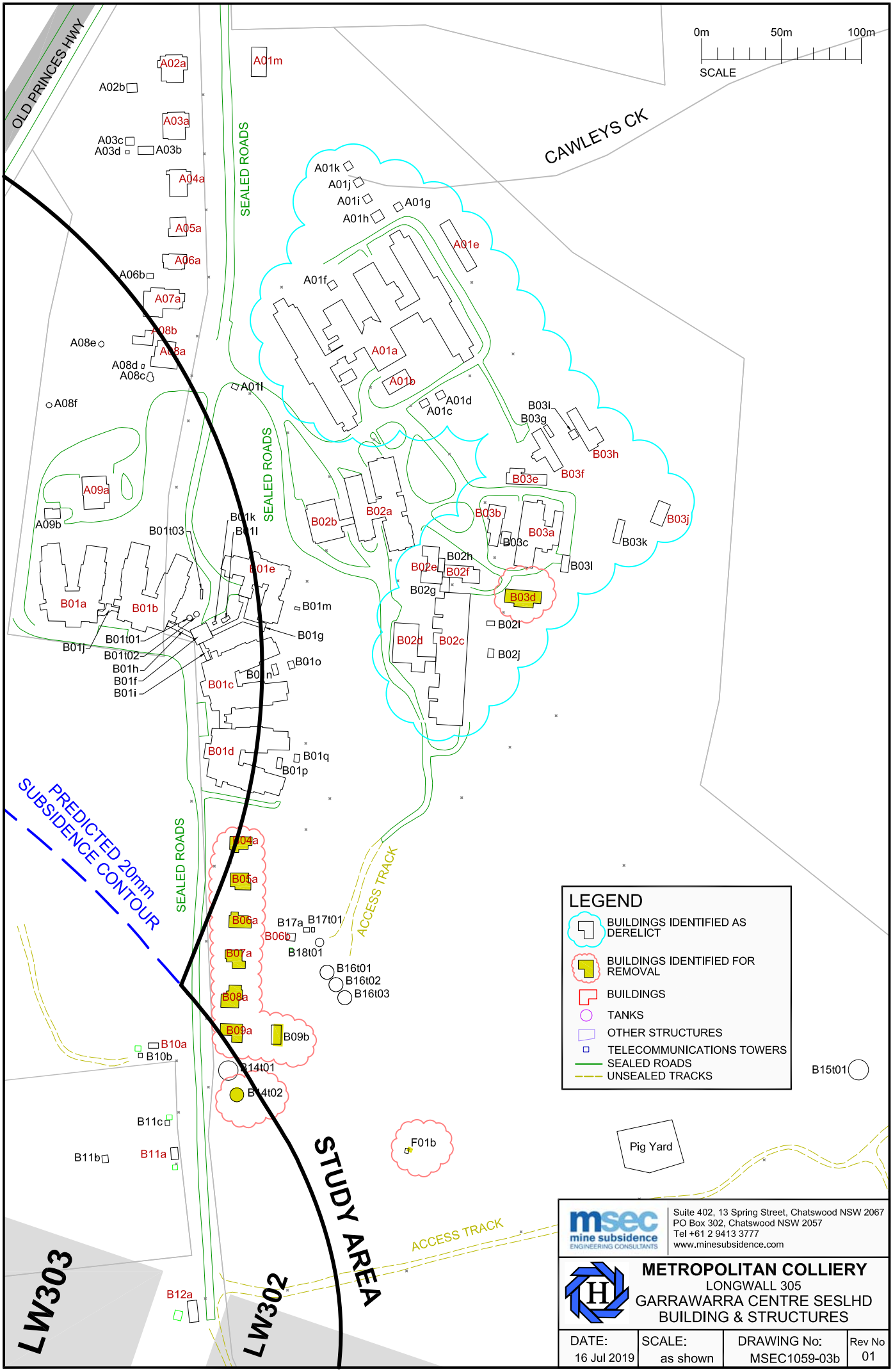

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METROPOLITAN COLLIERY
LONGWALL 305
GARRAWARRA CENTRE SESLHD
BUILDING & STRUCTURES

DATE:	SCALE:	DRAWING No:	Rev No
16 Jul 2019	as shown	MSEC1059-03b	01

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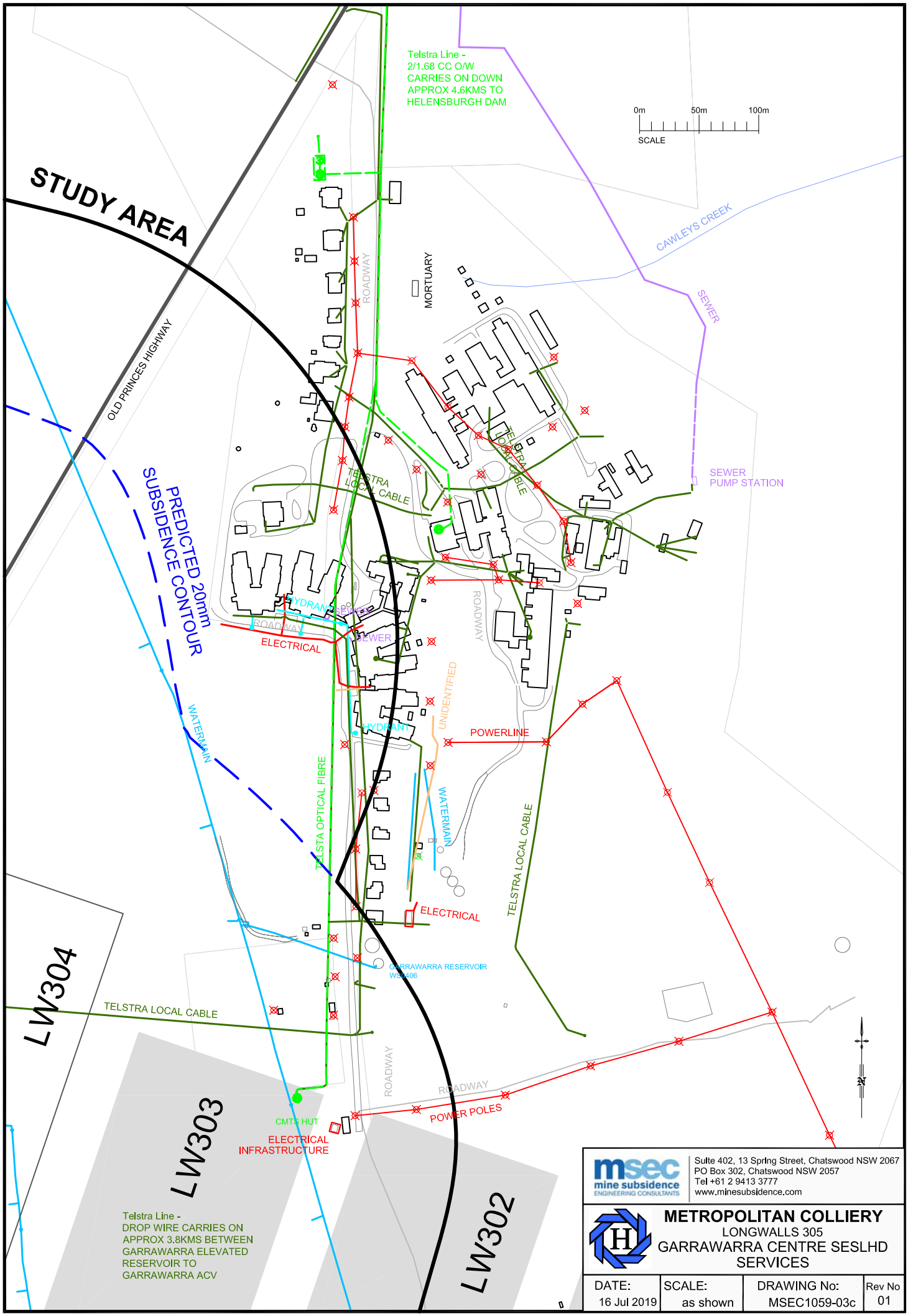

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METROPOLITAN COLLIERY
LONGWALLS 305
GARRAWARRA CENTRE SESLHD SERVICES

DATE:	SCALE:	DRAWING No:	Rev No
16 Jul 2019	as shown	MSEC1059-03c	01

Table A.01 - Maximum Predicted Subsidence Parameters for the Building Structures

Ref.	Description	Maximum Dimension (m)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW304 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW305 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW306 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW307 (mm)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW304 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW305 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW306 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW307 (mm/m)
A01a	Hospital	38	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01b	Hospital	17	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01c	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01d	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01e	Hospital	34	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01f	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01g	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01h	Hospital	7	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01i	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01j	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01k	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01l	Shed	4	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A01m	House	18	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A02a	House	11	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A02b	Shed	6	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A03a	House	16	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A03b	Shed	10	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A03c	Shed	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A03d	Shed	2	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A04a	House	14	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A05a	House	12	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A06a	House	11	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A06b	Shed	4	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A07a	House	16	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A08a	House	17	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A08b	Shed	13	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A08c	Shed	3	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A08d	Shed	3	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A08e	Shed	2	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A08f	Shed	2	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A09a	House	15	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
A09b	Shed	10	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01a	Retirement Home	14	*< 20*	20	30	30	< 0.5	< 0.5	< 0.5	< 0.5
B01b	Retirement Home	14	*< 20*	20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B01c	Retirement Home	14	*20*	30	30	30	< 0.5	< 0.5	< 0.5	< 0.5
B01d	Retirement Home	15	*30*	40	40	40	< 0.5	< 0.5	< 0.5	< 0.5
B01e	Retirement Home	19	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5

Table A.01 - Maximum Predicted Subsidence Parameters for the Building Structures

Ref.	Description	Maximum Dimension (m)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW304 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW305 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW306 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW307 (mm)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW304 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW305 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW306 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW307 (mm/m)
B01f	Retirement Home	11	*< 20*	20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B01g	Retirement Home	21	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01h	Retirement Home	19	*< 20*	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B01i	Retirement Home	12	*< 20*	20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B01j	Retirement Home	6	*< 20*	20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B01k	Shed	3	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01l	Shed	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01m	Shed	3	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01n	Shed	7	*< 20*	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B01o	Shed	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01p	Shed	7	*30*	30	30	30	< 0.5	< 0.5	< 0.5	< 0.5
B01q	Shed	5	*20*	30	30	30	< 0.5	< 0.5	< 0.5	< 0.5
B01t01	Tank	4	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01t02	Tank	4	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B01t03	Tank	6	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02a	Retirement Home	40	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02b	Retirement Home	21	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02c	Retirement Home	83	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02d	Retirement Home	25	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02e	Retirement Home	15	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02f	Retirement Home	18	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02g	Retirement Home	9	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02h	Retirement Home	8	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02i	Shed	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B02j	Shed	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03a	Hospital	41	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03b	Hospital	11	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03c	Hospital	8	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03d	Hospital	23	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03e	Hospital	25	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03f	Hospital	28	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03g	Hospital	8	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03h	Hospital	28	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03i	Hospital	5	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03j	Hospital	14	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03k	Hospital	15	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B03l	Hospital	11	*< 20*	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5
B04a	House	14	*40*	50	50	50	< 0.5	< 0.5	< 0.5	< 0.5

Table A.01 - Maximum Predicted Subsidence Parameters for the Building Structures

Ref.	Description	Maximum Dimension (m)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW304 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW305 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW306 (mm)	Maximum Predicted Total Subsidence based on the Extraction Plan Layout after LW307 (mm)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW304 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW305 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW306 (mm/m)	Maximum Predicted Total Tilt based on the Extraction Plan Layout after LW307 (mm/m)
B05a	House	11	*50*	60	60	60	< 0.5	0.5	0.5	0.5
B06a	House	14	*60*	70	70	70	< 0.5	0.5	0.5	0.5
B06b	Shed	5	*50*	60	60	60	< 0.5	0.5	0.5	0.5
B07a	House	11	*70*	80	80	80	0.5	0.5	0.5	0.5
B08a	House	11	*80*	100	100	100	0.5	1.0	1.0	1.0
B09a	House	14	*90*	125	125	125	0.5	1.0	1.0	1.0
B09b	Shed	14	*90*	100	100	100	0.5	1.0	1.0	1.0
B10a	Shed	6	*125*	150	175	175	1.0	1.5	1.5	1.5
B10b	Shed	3	*125*	175	175	175	1.0	1.5	1.5	1.5
B11a	Shed	7	*175*	225	225	225	2.0	2.0	2.0	2.0
B11b	Shed	5	*225*	275	300	300	2.5	2.5	2.5	2.5
B11c	Shed	3	*150*	200	200	200	1.5	1.5	1.5	1.5
B12a	Shed	14	*400*	425	450	450	3.5	3.5	3.5	3.5
B14t01	Reservoir	12	*100*	125	150	150	1.0	1.0	1.0	1.0
B14t02	Reservoir	8	*125*	150	150	150	1.0	1.0	1.0	1.0
B15t01	Tank	13	*20*	20	20	20	< 0.5	< 0.5	< 0.5	< 0.5
B16t01	Tank	9	*60*	70	70	70	< 0.5	0.5	0.5	0.5
B16t02	Tank	9	*60*	70	70	70	< 0.5	0.5	0.5	0.5
B16t03	Tank	9	*60*	70	70	70	0.5	0.5	0.5	0.5
B17a	Pump house	4	*50*	60	60	60	< 0.5	< 0.5	< 0.5	< 0.5
B17t01	Fire water tank	3	*50*	60	60	60	< 0.5	< 0.5	< 0.5	< 0.5
B18t01	Tank	5	*50*	60	60	60	< 0.5	< 0.5	< 0.5	< 0.5
F01b	Kiln	3	*100*	125	125	125	1.0	1.0	1.0	1.0

Table A.01 - Maximum Predicted Subsidence Parameters for the Building Structures

Ref.	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW304 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW305 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW306 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW307 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW304 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW305 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW306 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW307 (1/km)
A01a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01c	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01d	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01e	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01f	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01h	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01i	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01j	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01k	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A01m	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A02a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A02b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A03a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A03b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A03c	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A03d	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A04a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A05a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A06a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A06b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A07a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A08a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A08b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A08c	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A08d	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A08e	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A08f	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A09a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
A09b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01c	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01d	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01e	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Table A.01 - Maximum Predicted Subsidence Parameters for the Building Structures

Ref.	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW304 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW305 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW306 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW307 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW304 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW305 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW306 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW307 (1/km)
B01f	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01h	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01i	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01j	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01k	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01m	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01n	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01o	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01p	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01q	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01t01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01t02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B01t03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02c	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02d	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02e	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02f	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02h	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02i	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B02j	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03c	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03d	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03e	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03f	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03g	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03h	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03i	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03j	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03k	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B03l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B04a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Table A.01 - Maximum Predicted Subsidence Parameters for the Building Structures

Ref.	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW304 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW305 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW306 (1/km)	Maximum Predicted Total Hogging Curvature based on the Extraction Plan Layout after LW307 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW304 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW305 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW306 (1/km)	Maximum Predicted Total Sagging Curvature based on the Extraction Plan Layout after LW307 (1/km)
B05a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B06a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B06b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B07a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B08a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B09a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B09b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B10a	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
B10b	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
B11a	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01
B11b	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01
B11c	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01
B12a	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01
B14t01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B14t02	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
B15t01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B16t01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B16t02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B16t03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B17a	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B17t01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
B18t01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
F01b	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

APPENDIX 2

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. transmission line, tower, 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 tower, 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:

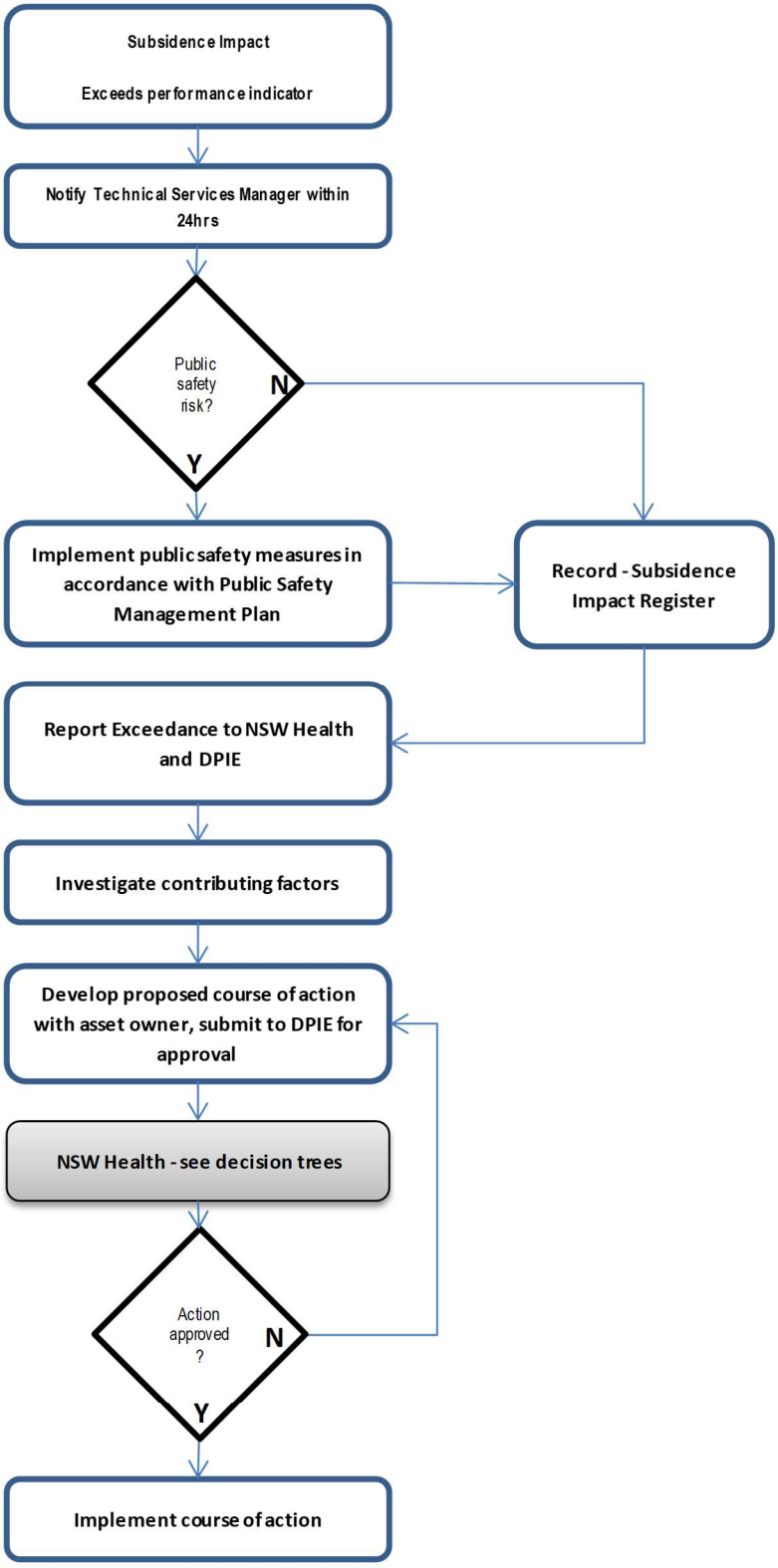
Actions Required:	Contingency Plan Initiated	☐
	Incident Notification	☐
	Safety Measures/Public Safety Management Plan Requirements	☐

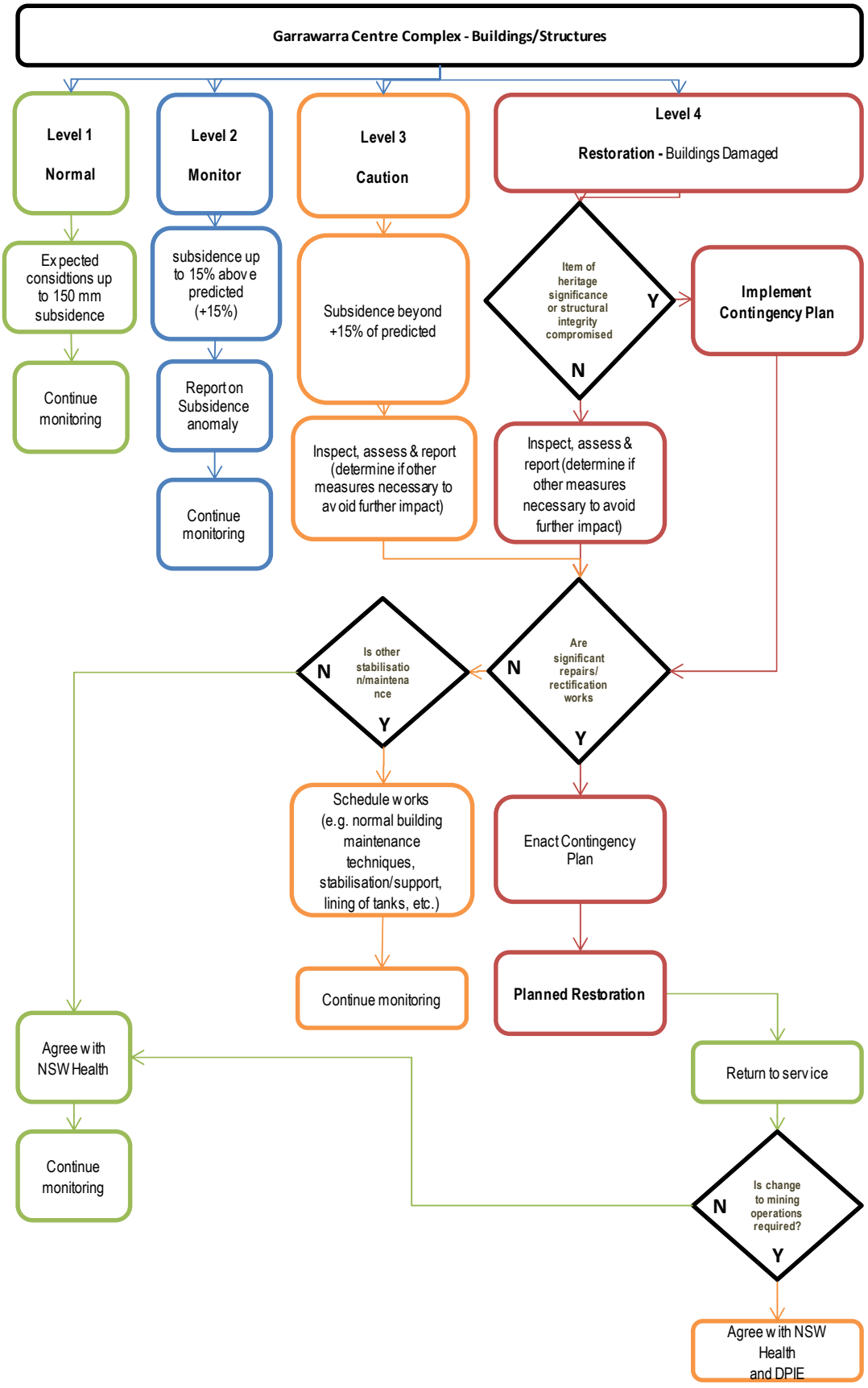
Management or Contingency Measures Implemented:

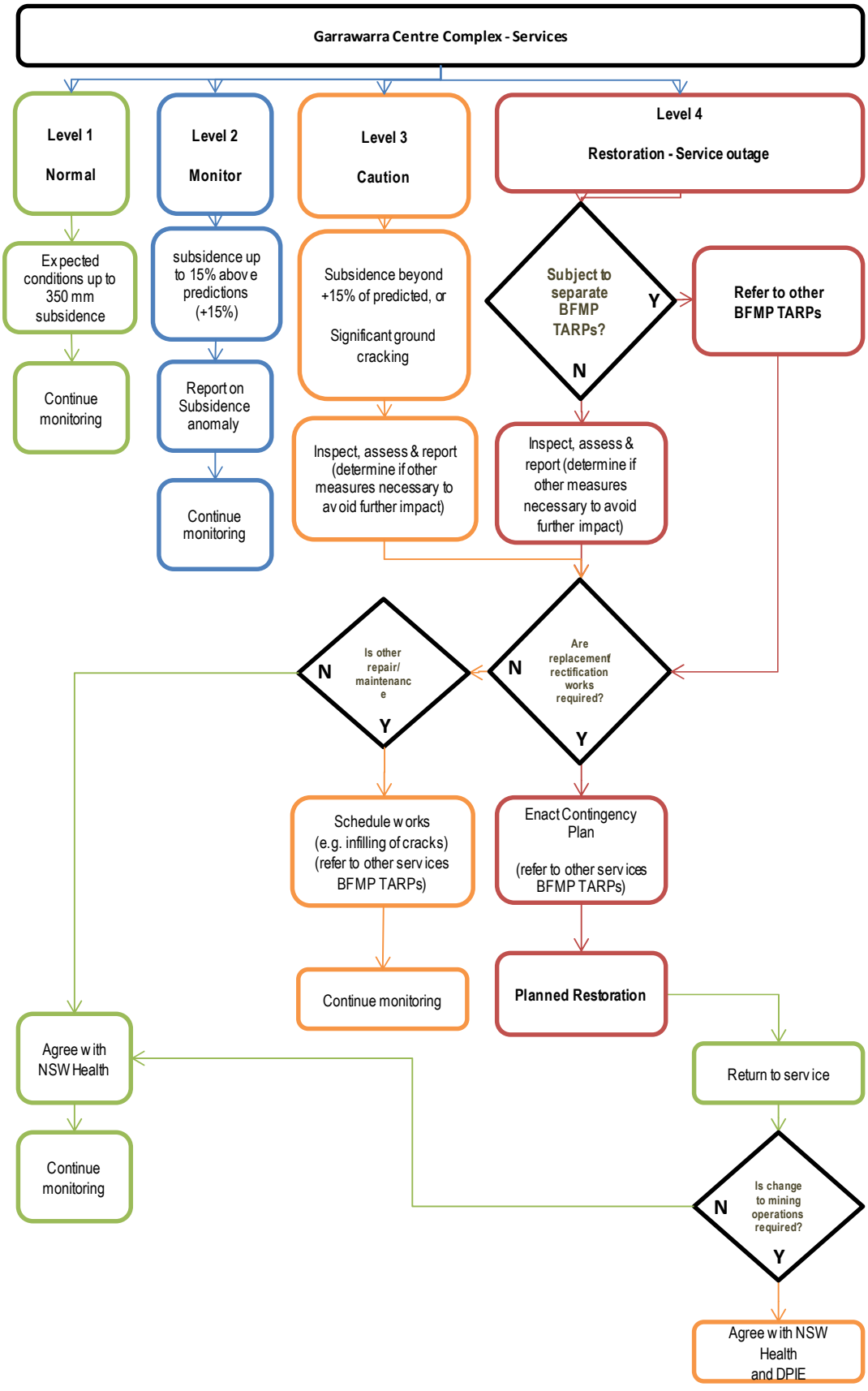
Effectiveness of Management or Contingency Measures:

APPENDIX 3

CONTINGENCY PLAN PROCEDURE AND DECISION TREES


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 NSW Health and DPIE
Investigate contributing factors
Develop proposed course of action with asset owner, submit to DPIE for approval
NSW Health - see decision trees
Action approved ?
N
Y
Implement course of action


Garrawarra Centre Complex - Buildings/Structures
Level 1
Normal
Level 2
Monitor
Level 3
Caution
Level 4
Restoration - Buildings Damaged
Expected consitions up to 150 mm subsidence
subsidence up to 15% above predicted (+15%)
Subsidence beyond +15% of predicted
Item of heritage significance or structural integrity compromised
Y
N
Implement Contingency Plan
Continue monitoring
Report on Subsidence anomaly
Inspect, assess & report (determine if other measures necessary to avoid further impact)
Inspect, assess & report (determine if other measures necessary to avoid further impact)
Continue monitoring
Is other stabilisation/maintenance
N
Y
Are significant repairs/ rectification works
N
Y
Schedule works (e.g. normal building maintenance techniques, stabilisation/support, lining of tanks, etc.)
Enact Contingency Plan
Continue monitoring
Planned Restoration
Agree with NSW Health
Return to service
Continue monitoring
Is change to mining operations required?
N
Y
Agree with NSW Health and DPIE


Garrawarra Centre Complex - Services
Level 1
Normal
Level 2
Monitor
Level 3
Caution
Level 4
Restoration - Service outage
Expected conditions up to 350 mm subsidence
subsidence up to 15% above predictions (+15%)
Subsidence beyond +15% of predicted, or
Significant ground cracking
Subject to separate BFMP TARPs?
Y
N
Refer to other BFMP TARPs
Continue monitoring
Report on Subsidence anomaly
Inspect, assess & report (determine if other measures necessary to avoid further impact)
Inspect, assess & report (determine if other measures necessary to avoid further impact)
Continue monitoring
Is other repair/ maintenance
N
Y
Are replacement/ rectification works required?
N
Y
Schedule works (e.g. infilling of cracks) (refer to other services BFMP TARPs)
Enact Contingency Plan
(refer to other services BFMP TARPs)
Continue monitoring
Planned Restoration
Agree with NSW Health
Return to service
Continue monitoring
Is change to mining operations required?
N
Y
Agree with NSW Health and DPIE