

**Illawarra Coal**



**bhpbilliton**  
resourcing the future



# Extraction Plan

**West Cliff Area 5  
Longwalls 37 and 38  
Rev: B**

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## Review History

Revision	Description of Changes	Date	Approved
P0	New Document	August 2012	GB
P1	Document for review	March/April 2013	GB
A	Draft for Agency Comment	June 2013	GB
A	Final, consultation updated	August 2013	GB
B	Revisions to address feedback from DoPI	March 2014	GB

Persons involved in the development of this document include:

Name	Title	Company
Daniel Thompson	Environmental Planner	Cardno
Danyil Skora	Senior Environmental Planner	Cardno
Gary Brassington	Manager Approvals (Mining)	BHP Billiton Illawarra Coal

## 1 INTRODUCTION

### 1.1 PROJECT BACKGROUND

BHP Billiton Illawarra Coal (BHPBIC) operates the Bulli Seam Operations (BSO) (Appin and West Cliff Collieries) extracting hard coking coal used for steel production.

On 22 December 2011 the Planning and Assessment Commission (PAC), under delegation of the Minister for Planning, approved BSO (MP 08\_0150) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to continue these mining operations until 2041.

As a condition of this Project Approval, BHPBIC is required to prepare an Extraction Plan to manage the potential subsidence effects, impacts and/or environmental consequences associated with the extraction of coal from the approved areas.

This Extraction Plan has been prepared to support the extraction of coal from Longwalls 37 and 38 of the West Cliff Area 5 mining domain. The Extraction Plan has utilised the findings from previous assessments of the Study Area undertaken as part of the BSO Environmental Assessment (EA) in combination with current surveys, reports, and stakeholder consultation. The Extraction Plan structure is illustrated in **Figure 1**.

### 1.2 SCOPE

This Extraction Plan has been prepared by Cardno on behalf of BHPBIC in accordance with the BSO Approval (MP 08\_0150) *Condition 5, Schedule 3* as follows:

5. *The Proponent shall prepare and implement an **Extraction Plan** for first and second workings within each longwall mining domain to the satisfaction of the Director-General. Each extraction plan must:*
  - a. *be prepared by a team of suitably qualified and experienced persons whose appointment has been endorsed by the Director-General;*
  - b. *be approved by the Director-General before the Proponent carries out any of the second workings covered by the plan;*
  - c. *include detailed plans of existing and proposed first and second workings and any associated surface development;*
  - d. *include detailed performance indicators for each of the performance measures in Tables 1 and 2;*
  - e. *provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this approval.*
  - f. *describe the measures that would be implemented to ensure compliance with the performance measures in Tables 1 and 2, and manage or remediate any impacts and/or environmental consequences;*
  - g. *include a **Built Features Management Plan**, which has been prepared in consultation with DRE and the owners of affected public infrastructure, to manage the potential subsidence and/or environmental consequences of the proposed second workings, and which:*
    - *address in appropriate detail all items of key public infrastructure and other public infrastructure and all classes of other built features;*
    - *has been prepared following consultation with the owner/s of potentially affected feature/s;*
    - *recommends appropriate pre-mining migratory measures to reduce subsidence impacts*



- recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner; and ;
  - in the case of all key public infrastructure, and other public infrastructure except roads, trails and associated structures, reports external auditing for compliance with ISO1300 (or alternative standard agreed with the infrastructure owner) and provides for annual auditing of compliance and effectiveness during extraction of longwalls which may impact the infrastructure;
- h.* include a **Water Management Plan**, which has been prepared in consultation with OEH, SCA and NOW, which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on watercourses and aquifers, including:
- surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources and quality;
  - a program to monitor and report stream flows and assess any changes resulting from subsidence impacts;
  - a program to monitor and report groundwater inflows to underground workings; and
  - a program to predict, manage and monitor impacts on groundwater bores on privately owned land;
- i.* include a **Biodiversity Management Plan**, which has been prepared in consultation with OEH and DPI (Fisheries), which provides for the management of the potential impacts and/or environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species, populations and their habitats, endangered ecological communities, and water dependant ecosystems, including (for Appin Areas 7, 8 and 9):
- Additional targeted surveys for threatened species, sufficient to identify any actions required to protect significant populations from potential impacts.
- j.* include a **Land Management Plan**, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general, with a specific focus on cliffs and steep slopes;
- k.* include a **Heritage Management Plan**, which has been prepared in consultation with OEH and relevant stakeholders for both Aboriginal and historic heritage, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage sites and which:
- includes additional investigations (such as surveys and current register searches) for Aboriginal heritage items (including previously known sites) and historic heritage items, sufficient to identify the significance (including 'special significance') of all sites which may be impacted by subsidence and to identify any actions required to ensure that the performance measures in Table 1 are met ; and
  - is prepared in accordance with the relevant requirements for preparation of the Heritage Management Plan required under condition 23 of Schedule 4;
- l.* include a **Public Safety Management Plan**, which has been prepared in consultation with DRE, to ensure public safety in the mining area;
- m.* include a **Subsidence Monitoring Program**, which has been prepared in consultation with DRE, OEH, and SCA, to:
- provide data to assist with the management of the risks associated with subsidence;
  - validate the subsidence predictions;
  - analyse the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and

- inform the contingency plan and adaptive management process;
- n. include a **regional seismic event monitoring program**, which has been prepared in consultation with DRE, and which includes analysis of outcomes and proposed triggers for review of potential correlations with mining operations;
- o. include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 1 and 2, or where any such exceedance appears likely.

### 1.3 OBJECTIVES

The objectives of this Extraction Plan are to identify sensitive environmental and built features within the Longwalls 37 and 38 Study Area and to manage the potential impacts and/or environmental consequences of the proposed first and second workings to ensure compliance with the BSO Approval Conditions, including the Performance Measures for natural and heritage features (*Condition 1, Schedule 3*) and built features (*Condition 3, Schedule 3*) as follows:

Watercourses	
Nepean River	Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• <i>negligible</i> diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• <i>negligible</i> gas releases and iron staining; and</li> <li>• <i>negligible</i> increase in water cloudiness.</li> </ul>
Georges River	Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• <i>negligible</i> diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• <i>negligible</i> gas releases and iron staining; and</li> <li>• <i>negligible</i> increase in water cloudiness,</li> </ul> over at least 80% of the stream length subject to vertical subsidence >20 mm. No subsidence impact or environmental consequence greater than minor.
Other Watercourses	No greater subsidence impact or environmental consequences than predicted in the EA and PPR.
Land	
Dharawal State Conservation Area	Negligible environmental consequences.
Cliffs of “special significance” (ie cliffs longer than 200m and/or higher than 40m; and cliff-like rock faces higher than 5m that constitute waterfalls)	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).
Other cliffs flanking the Nepean River	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within any longwall mining domain).
Other cliffs	Minor environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain).

<b>Biodiversity</b>	
Threatened species, threatened populations, or endangered ecological communities	Negligible environmental consequences.
<b>Aboriginal heritage</b>	
Sites determined to hold "special significance" as a result of studies required for Extraction Plans	Negligible impact or environmental consequence.
Sites determined to hold high or moderate significance as a result of studies required for Extraction Plans	Less than 10% of such sites across the mining area are affected by subsidence impacts (other than negligible impacts or environmental consequence).
Other Aboriginal heritage sites	Less than 10% of such sites (or 1 such site, whichever is the greater) within any longwall mining domain are/is affected by subsidence impacts (other than minor impacts or environmental consequence).
<b>Historic heritage</b>	
St James Church (Menangle) St Mary's Tower (Douglas Park)	Negligible loss of heritage value. Negligible impact on structural integrity or external fabric.
Broughtons Pass Weir	Negligible loss of heritage value.
Other buildings or structures of State or National heritage significance	Negligible loss of heritage value. Negligible impact on structural integrity or external fabric, unless the owner of the feature agrees otherwise in writing.
Other buildings or structures of identified heritage significance	No loss of heritage value greater than predicted under a Heritage Management Plan prepared under condition 6 below.
<b>Mine workings</b>	
First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible impact, negligible consequence or negligible loss (including main headings under the Georges River)	To remain longterm stable and non-subsiding.
Second workings	To be carried out only within longwall mining domains, in accordance with an approved Extraction Plan.
<b>Built features</b>	
Key public infrastructure: Main Southern Railway; Hume Highway; and Key SCA infrastructure (Nepean Tunnel, Cataract Tunnel, Upper Canal, Broughtons Pass Weir and other weirs)	Always safe and serviceable. Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.
Other public infrastructure (including water supply pipelines; high pressure gas pipelines and the gas distribution network; electricity)	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repaired or fully compensated, or else the damaged built feature or damaged infrastructure component must be



transmission and distribution lines; telecommunications cables and optical fibre networks; roads, trails and associated structures). Houses, industrial premises, swimming pools, farm dams and other built features or improvements	replaced.
<b>Public safety</b>	
Public Safety	Negligible additional risk.

## 1.4 STUDY AREA

The location of West Cliff Longwalls 37 and 38 Study Areas within the BSO Project Area is shown in **Figure 2** – Bulli Seam Operations. The Study Area (**Figure 3**) for the Extraction Plan is defined in accordance with MSEC (2013) as the surface area predicted to be affected by the proposed mining of Longwalls 37 and 38 and encompasses the area bounded by, whichever is the greater of, the following limits:

- 35° Angle of Draw for the maximum depth of cover, which equates to a horizontal distance of between 320 m and 380 m outside the limit of the proposed extraction area); and
- The 20 mm predicted limit of vertical subsidence, which is generally within the 35° Angle of Draw.
- Additionally, features sensitive to far-field movements, which includes potential horizontal, valley closure and valley upsidence movements, which may be outside the 20 mm subsidence zone or 35° Angle of Draw have been assessed including:
  - Watercourses (including the Georges River);
  - Wedderburn Airport;
  - Groundwater bores; and
  - Survey control marks.

## 2 REPORT STRUCTURE

The Extraction Plan is comprised of a main report and supporting Management Plans, prepared by Cardno on behalf of BHPBIC.

Each Management Plan is also supported by specialist consultant reports. A list of the consultants and relevant reports is provided in **Table 5.1**.

The relationship between these documents is shown in **Figure 1**.

### 3 THE RESOURCE

The West Cliff Area 5 mining domain lies in the southern part of the Permo-Triassic Sydney Basin with the main coal bearing sequence the Illawarra Coal Measures of late Permian age. The Illawarra Coal Measures contain several seams, the uppermost of which is the Bulli Seam.

BHPBIC plan to extract high quality coking coal from the Bulli Seam within West Cliff Area 5, as detailed in the BSO EA (see Figure 2). A typical stratigraphic section of the Study Area and further description of the resource can be found in **Annex A**.

#### 3.1 LONGWALL LAYOUT

The layout (as shown in Figure 3) and dimensions of the proposed longwalls have been modified from the Base Case layout of the BSO EA. Two important objectives formed part of the longwall layout optimization:

- Setback from the Georges River and the cliffs within the valley, so as to minimise potential for impact, and
- Minimisation of the volume of sterilised coal, which could be efficiently extracted while meeting the stream impact minimisation criteria from the BSO EA and the requirements of the Project Approval.

The depth of cover to the Bulli Seam within the Study Area varies between a minimum of 455m, in the base of the Georges River valley, and a maximum of 540m, in the south western part of the Study Area. Surface depth contours can be found in MSEC (2013) Drawing No. 553-02 **Annex A**.

The Bulli Seam floor within the Study Area generally dips from the east to the west. The seam thickness within the proposed longwall goaf areas varies between 2.2m near the western end of Longwall 37, and 2.7m near the southern end of Longwall 38. The proposed dimensions are provided in **Table 3.1**.

**Table 3.1 – Geometry of the Proposed Longwalls 37 and 38**

Longwall	Overall Void Length Including Installation Heading (m)	Overall Void Width Including First Workings (m)	Overall Tailgate Chain Pillar Width (m)
LW37	1795	282	32
LW38	2575	305	-

#### 3.2 EXTRACTION SEQUENCE

Extraction of longwalls will occur in a staged process commencing with Longwall 37 and continuing to Longwall 38. An estimate of the schedule for mining of Longwalls 37 and 38 is provided below in **Table 3.2**.

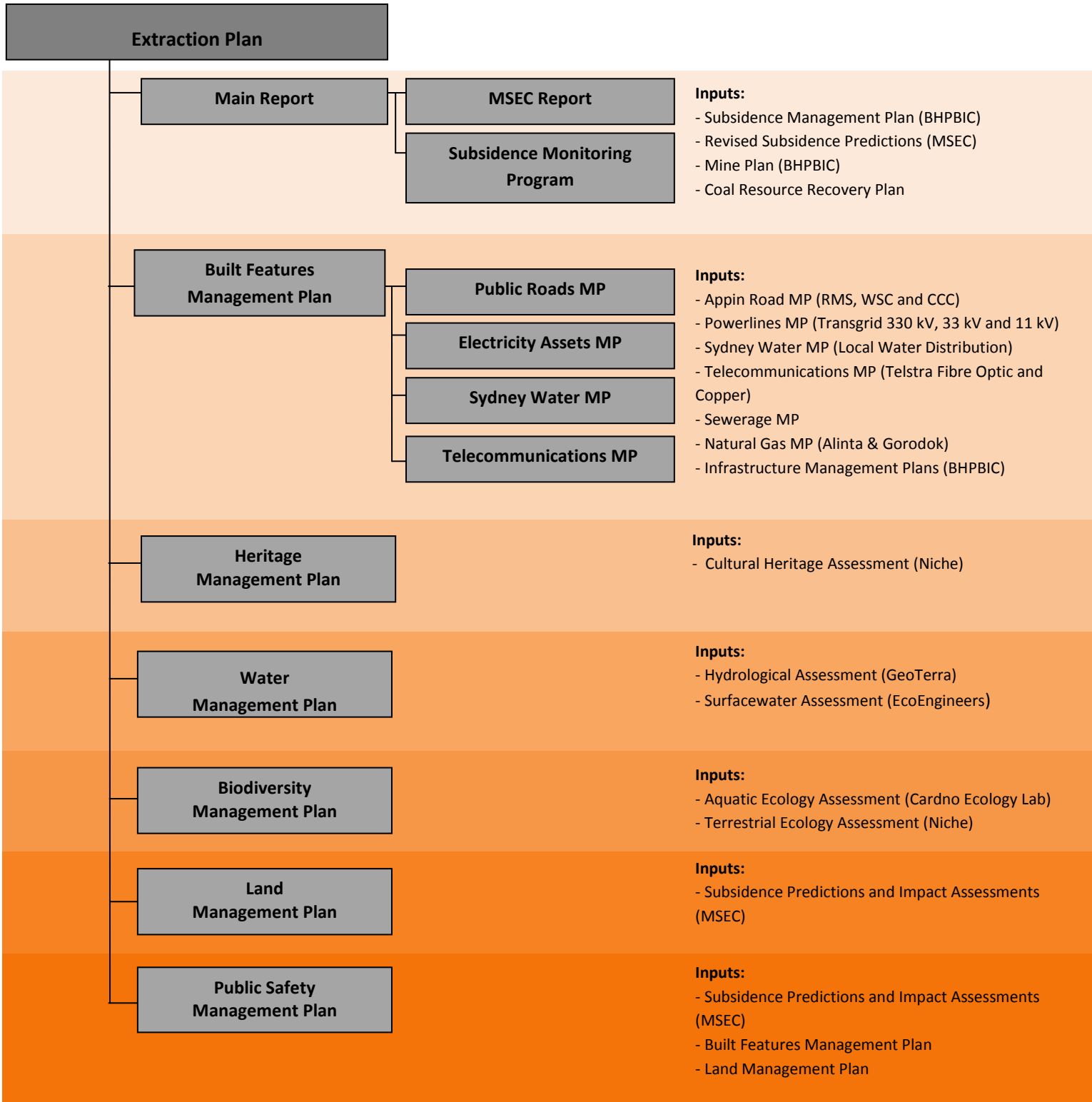
**Table 3.2 – Expected Schedule for Longwall Extraction 37 and 38**

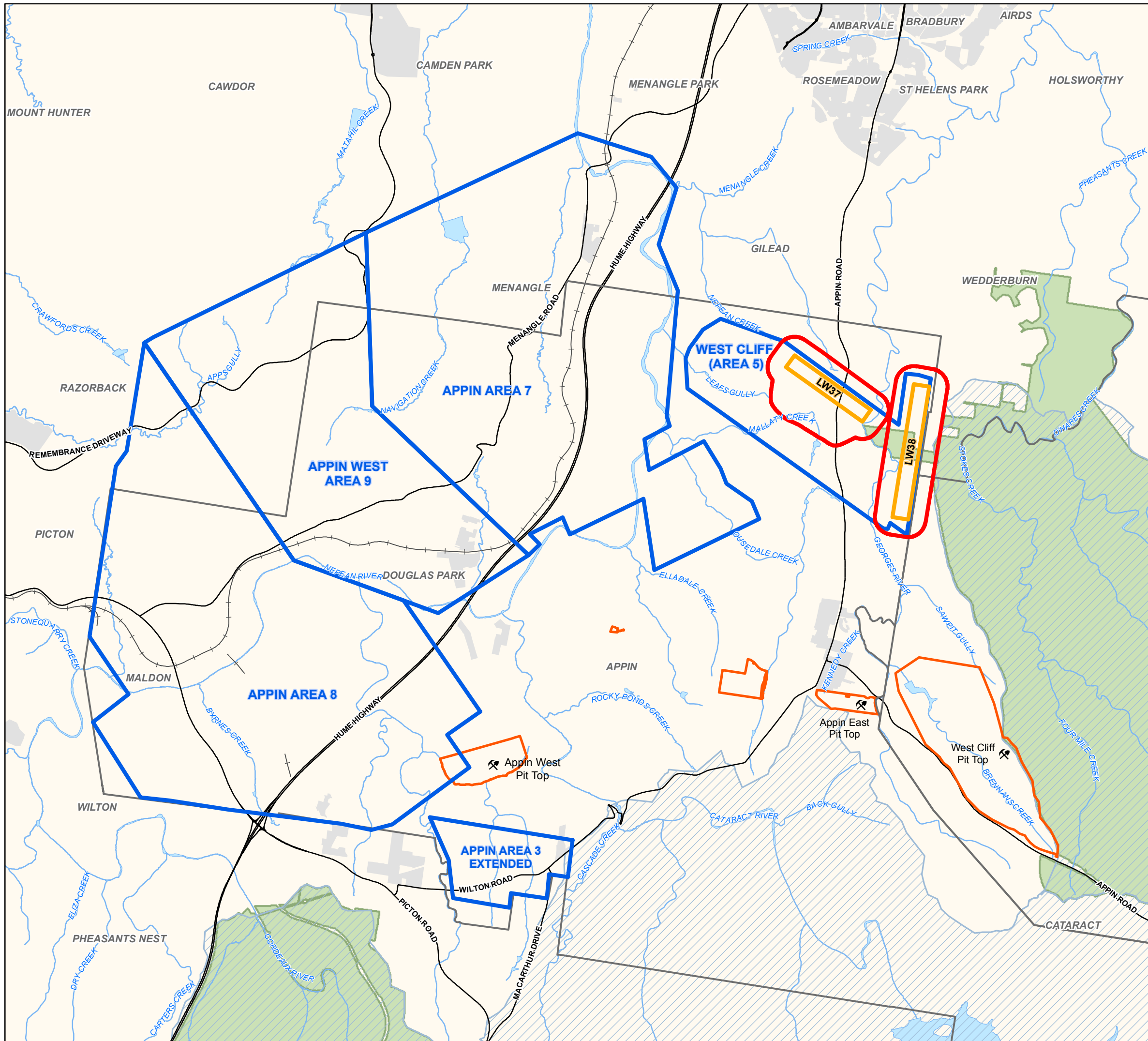
Longwall	Start	End	Characteristics (void length and width)
37	April 2014	February 2015	1795 x 282 m
38	April 2015	April 2016	2575 x 305 m

Longwalls 37 and 38 contain approximately 5.71 million tonnes of coal resource which includes approximately 0.37 million tonnes of coal from roadway development.

Note: the above figures quoted are representative of tonnages recorded as of March 2013.

Figure 1 – Extraction Plan Structure





# Bulli Seam Operations

WEST CLIFF AREA 5

- Legend**
- Study Area
  - Pit Top
  - Railway (LPI)
  - Major Roads (LPI)
  - Major Watercourses (LPI)
  - CCLs
  - Surface Lease Boundary
  - Built Up Areas (LPI)
  - NPWS Reserve (LPI)
  - Major Waterbodies (LPI)
  - Extent of Longwall Mining Area
  - West Cliff LW 37 and 38 (BHPIC 2013)
  - Metropolitan Special Area (SCA)

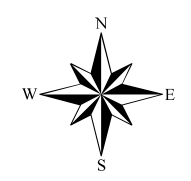
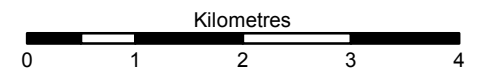


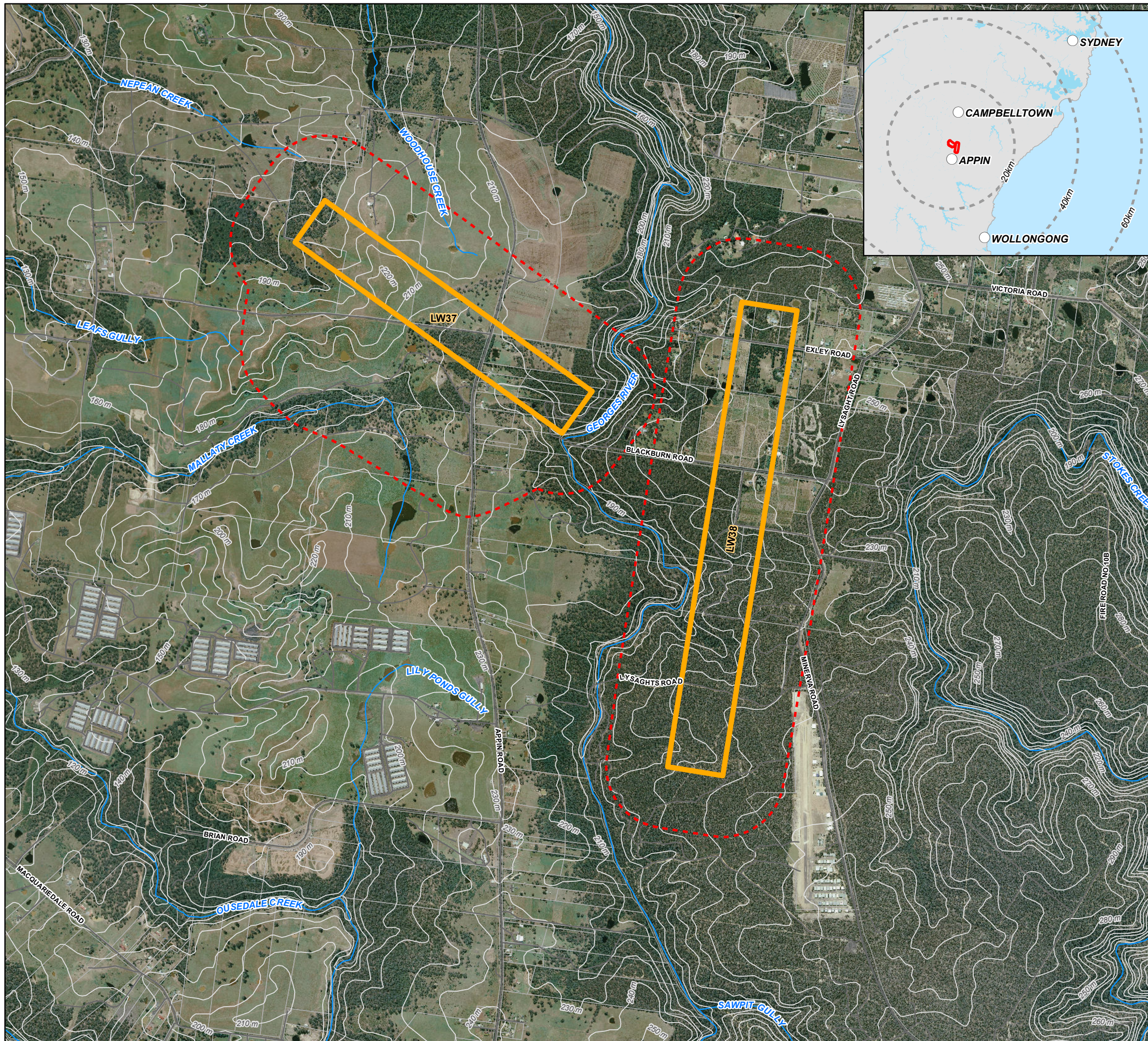
FIGURE 2

Scale 1:70,000 (at A3)



Map Produced by Cardno NSW/ACT Pty Ltd (WOL)  
 Date: 29/05/2013  
 Coordinate System: GDA 1994 MGA Zone 56  
 Project: 112054-01  
 Map: G1001\_WestCliff\_MiningAreas.mxd 05



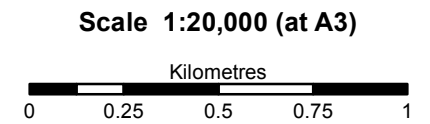


**West Cliff Area 5  
Study Areas  
(LW37 and 38)**

- Legend**
- - - Study Area
  - Local Roads (LPI)
  - 10m Contours (LPI)
  - Watercourses (LPI)
  - Cadastre (LPI)
  - West Cliff LW 37 and 38 (BHPBIC 2013)



FIGURE 3



Map Produced by Cardno NSW/ACT Pty Ltd (WOL)  
Date: 14/03/2013  
Coordinate System: GDA 1994 MGA Zone 56  
Project: 112054-01  
Map: G1002\_WCA5\_ExtractionPlan.mxd 03  
Aerial imagery supplied by BHPBIC (2007 and 2009)



### 3.3 POSSIBLE EFFECTS ON OTHER SEAMS

The Bulli Seam is the top seam in the Illawarra Coal Measures and consequently, mining this seam does not preclude future extraction of the seams below. There are currently no workings in other seams in the area.

There are five coal seams below the Bulli Seam ranging in thickness from 0.8 to 9.0 m. The adjacent Balgownie seam is from 5.0 to 10.0 m below the Bulli seam, but is approximately 1.2 m thick and is not considered economically viable to mine. The mining of Longwalls 37 and 38 will not preclude the future mining of the lower seams.

Using available technology, the Bulli Seam is currently the only economic seam in the area and there are no existing plans for mining other seams in the future.

## 4 STATUTORY REQUIREMENTS

### 4.1 BSO APPROVAL (EP&A ACT)

*Condition 5, Schedule 3* of the BSO Approval requires the preparation and implementation of an Extraction Plan for first and second workings within each mining domain to the satisfaction of the Director-General of the Department of Planning and Infrastructure (DP&I). This Plan has been prepared in accordance with the requirements of this Condition. Each Management Plan (annexed to this report) also addresses relevant Performance Measures (*Condition 1 & 3, Schedule 3*) and has been prepared in accordance with the requirements for Management Plans detailed in *Condition 2, Schedule 6*. The required reporting and review of the Management Plans is also documented in each Plan and is in accordance with the requirements of *Conditions 3 to 10, Schedule 6*.

Notwithstanding the above, due consideration has been given to all the BSO Approval Conditions in the preparation of this Extraction Plan, including those relating to auditing, rehabilitation and environmental management.

### 4.2 LEGISLATION AND GUIDELINES

This Extraction Plan has been designed to conform to the requirements of the relevant advisory documents and guidelines and any other legislation that is applicable under the EP&A Act. The following Acts may be applicable:

- *Contaminated Land Management Act, 1997*
- *Dangerous Goods Act, 1975*
- *Mining Act, 1992*
- *Noxious Weeds Act, 1993*
- *Rail Safety Act, 2002*
- *Road and Rail Transport (Dangerous Goods) Act, 1997*
- *Roads Act, 1993*
- *Protection of the Environment Operations Act, 1997*
- *Threatened Species Conservation Act, 1995*
- *National Parks and Wildlife Act, 1974*
- *Environmental Protection Biodiversity and Conservation Act, 2000*
- *Sydney Water Catchment Management Act, 1998*

- *Coal Mine Health and Safety Act, 2002*
- *Crown Lands Act, 1989*
- *Dams Safety Act, 1978*
- *Energy and Utilities Administration Act, 1987*
- *Fisheries Management Act, 1994*
- *Water Act, 1912*
- *Water Management Act, 2000*
- *Work Health and Safety Act, 2011.*

Further details of advisory documentation and guidelines can be found in the relevant Management Plans annexed to this document.

### 4.3 RELEVANT LEASES AND LICENSES

The following licences or permits may be applicable to BHPBIC's operations in West Cliff Area 5:

- Mining Leases as per **Table 4.1**.
- Environmental Protection Licence (EPL) 2504 which applies to BSO, including Appin and West Cliff Mines. A copy of the licence can be accessed at the EPA website via the following link <http://www.environment.nsw.gov.au/poeo>.
- Bulli Seam Mining Operations Plan (MOP) November 2012 to September 2019.
- All relevant OH&S and HSEC approvals.
- Any additional leases, licences or approvals resulting from the BSO Approval.

**Table 4.1 – West Cliff Leases, Licences & other Reference Documents**

<b>Mining Lease - Document Number</b>	<b>Issue Date</b>	<b>Expiry Date/ Anniversary Date</b>
CCL 724	4 July 1991	26 October 2011 (renewal pending)
Part CCL 767	29 October 1991	8 July 2031
CCL 381	24 October 1991	23 October 2012 (renewal pending)
ML 1678	27 September 2012	26 September 2033
MPL 200	13 January 1982	13 January 2024
MPL 201	13 January 1982	13 January 2024

The project is located within the existing mining tenements listed in **Table 4.1**.

## 5 PLAN ADMINISTRATION

Each Management Plan contains its own provisions relating to the review of that plan and the roles and responsibilities associated with the plan. This section provides generic guidance about the administration of the Extraction Plan.

### 5.1 CONSULTANT SUITABILITY AND ENDORSEMENT

In accordance with *Condition 5 (a), Schedule 3*, the suitably qualified and experienced experts that have prepared this Extraction Plan and supporting Management Plans are listed in **Table 5.1**.

**Table 5.1 – List of Specialist Consultants**

Consultant	Contribution
Cardno	Lead Consultant
Mine Subsidence Engineering Consultants (MSEC)	Subsidence Impact Assessment
Niche Environment and Heritage	Terrestrial Ecology and Heritage Assessments
Cardno Ecology Lab	Aquatic Biodiversity Assessment
EcoEngineers	Surface Water Assessment
GeoTerra	Ground Water Assessment

Cardno is the principal consultant for the preparation of the Extraction Plan. Cardno has in-depth knowledge of the coal mining industry and extensive experience gained through working on mining related projects including preparation of Major Project Approvals, MOPs, Annual Environmental Management Reports (AEMRs), Subsidence Management Plans (SMPs) and Rehabilitation and Closure Plans.

Cardno is ISO9001-2008 certified and applies a systematic approach employing requisite policies concerning Project Engagement, Safe Work Methods, Document and Cost Control and both Local and Group Work Instructions to ensure quality at all times.

Once this Extraction Plan becomes an active operational document it will be implemented and updated under BHPBIC's quality and document control systems.

### 5.2 DISTRIBUTION

BHPBIC will make the Extraction Plan and other relevant documentation publicly available on the BHPBIC website (*Condition 11, Schedule 6*).

Individual Management Plans will be developed in consultation with, and copies will be provided to, the relevant agencies and stakeholders as detailed in the Plan.

The consultation process is ongoing and includes these events as follows:

- 26 March 2013 – Illawarra Coal provided an overview to the Community Consultative Committee (CCC) on the proposed mining of Longwalls 37 and 38;
- 8 April 2013 – letters to directly affected landholders were distributed to initiate BHPBIC's Landholder Relations process;
- 8 April 2013 (ongoing) – contact with directly affected landholders; and meeting with landholders to provide a copy of Built Features Management Plan for each property identified;

- 22 April 2013 – community newsletter distributed to Wedderburn and a copy of the newsletter emailed direct to CCC members;
- 5 September 2013 – public display period for Extraction Plan application commenced. Call for comments advertised until 30 September 2013; and
- 24 September 2013 – updated overview on Extraction Plan provided to CCC with discussion at subsequent meetings on 26 November 2013 and 4 February 2014.

### **5.3 REVIEW AND UPDATE**

This Extraction Plan will be reviewed on a regular basis to ensure that it incorporates any recommended measures to improve the environmental performance of the project.

A comprehensive review of the objectives and targets associated with the BSO is undertaken on an annual basis via the BHPBIC Balanced Planning (one year outlook) and Balanced Strategy (five year outlook) processes. These reviews, which include involvement from senior site management and other key site personnel, assess the performance of the mine over the previous year and develop goals and targets for the following period.

An annual review of the environmental performance of the BSO will also be undertaken in accordance with *Condition 4, Schedule 6*.

If deficiencies in the Environmental Management System or this Extraction Plan are identified in the interim period, the plans will be modified as required. This process has been designed to ensure that all environmental documentation continues to meet current requirements, including changes in technology and operational practice, and the expectations of stakeholders.

## **Annex A – Subsidence Predictions and Impact Assessment (MSEC)**



## **Annex B – Subsidence Monitoring Program**

## **Annex C – Water Management Plan**

## **Annex D – Biodiversity Management Plan**

## **Annex E – Land Management Plan**

## **Annex F – Heritage Management Plan**



## **Annex G – Public Safety Management Plan**

## **Annex H – Built Features Management Plan**