



**GUJARAT NRE Wonga Pty Ltd**

**NRE WONGAWILLI COLLIERY**

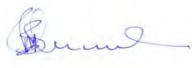
**NEBO LONGWALLS N1-N6**

**EXTRACTION PLAN**

**NOVEMBER 2012- REVISION 1**

**FOR THE NSW DEPARTMENT OF PLANNING AND  
INFRASTRUCTURE**

## DOCUMENT CONTROL

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### **Attachment A**

MSEC Drawings

### **Attachment B**

Trigger Action Response Plan (TARPs)

### **Attachment C**

Project Approval

### **Attachment D**

Plans

### **Attachment E**

Consultation Documentation and Correspondence

## SUMMARY

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Gujarat NRE Wonga Pty Ltd (NRE) has recently received Part 3A Project Approval (of MP 09\_0161) from the Department of Planning and Infrastructure (DoPI) for the continuation of mining in its leases in the Southern Coalfield of NSW.

This Extraction Plan has been prepared pursuant to Schedule 3 Condition 7 and other relevant Conditions of the Project Approval. It seeks approval for secondary extraction of coal in the Wongawilli Seam from NRE's Longwalls N1 to N6.

### Overview

This proposal will extend the longwall mining system currently utilised at NRE Wongawilli Colliery which involves a recovery of remnant coal resources in previously mined areas of ML1596 and therefore maximises utilisation of the State's coal reserves. The mining method results in a predicted maximum of 400mm of surface subsidence, which will occur above the pillars between Longwalls N1 and N5. Subsidence predictions for this Project are based on an extracted height of up to 3.6 m.

The surface tenure over the proposed Nebo longwall area is owned by the SCA. Natural surface features of the area include Wattle Creek and Little Wattle Tree Creek, rocky outcrops and steep slopes. There are two upland swamps (No.22 and No.39) southwest of the Nebo area but are outside the potential subsidence footprint. The man made features include 4WD tracks and fire trails, two 33 kV power lines, two historic sites. The Upper Cordeaux No.1 and No.2 Reservoir are located to the east of the proposed longwalls but are located outside the predicted 20 mm subsidence contour.

The depth of cover between the mine workings and the surface varies between a minimum of 100 metres, over the northwest corner of Longwall N2, and a maximum of 345 metres, beneath the southern end of Longwalls N1 and N5.

In its Part 3A application, NRE has undertaken land tenure studies, legal reviews, ongoing community consultation, subsidence prediction studies, baseline desktop and field environmental studies, and impact assessments of rock features, flora, fauna, archaeology, heritage, surface water and groundwater.

Due to the relatively small predicted subsidence movements, impacts on the environment and infrastructure are predicted to be negligible or very minor.

The specific management plans in this Extraction Plan present management objectives, impact predictions, mitigation strategies, proposed monitoring and management programs for managing subsidence impacts. They outline future monitoring to be undertaken to substantiate the models on which this mine design and impact prediction has been developed.

### **Mine Schedule**

NRE will require Extraction Plan approval by DoPI prior to December 2012 to permit the secondary extraction of the Nebo longwalls as per the current mine schedule. Extraction in the Nebo Area is expected to be completed by the start of 2016 if the schedule proceeds as anticipated.

# 1 INTRODUCTION

---

## 1.1 Background

Gujarat NRE Wonga Pty Ltd (NRE) owns NRE Wongawilli Colliery, an underground longwall extraction mine that commenced operations in 1975. Currently, the Colliery is operated by Gujarat NRE Coking Coal Ltd (GNCCL) and is capable of producing approximately 2Mtpa of predominantly coking coal from the Wongawilli seam.

NRE is a wholly owned subsidiary of Gujarat NRE Coking Coal Limited, which is listed on the Australian Securities Exchange (ASX code: GNM). NRE Wongawilli Colliery consists of leases CCL766, ML1565 and ML1596 covering 14,767 hectares is owned by NRE and operated by GNCCL. The ultimate holding company Gujarat NRE Coke Limited (GNCL) is an Indian based company listed on the Bombay Stock Exchange (BSE) and the Indian National Stock Exchange (NSE). GNCL is India's largest independent manufacturer of low ash metallurgical coke

NRE received Project Approval of its Part3A Project Application MP 09\_0161 on 2 November 2011 from the Department of Planning and Infrastructure (DoPI), for longwall extraction mining activities within Longwalls N1 to N6 at NRE Wongawilli Colliery.

This Extraction Plan has been prepared in order to obtain approval to conduct second workings (Longwall extraction), from DoPI (as required by the consent conditions of the MP 09\_0161 Section 75J Project Approval).

The proposed mining layout is shown on **Drawing No. MSEC412-01 (Attachment A)**.

## 1.2 Scope

This Extraction Plan has been prepared for the Project in accordance with Conditions 7 and 8 of Schedule 3 of the Project Approval.

The Condition states:

### ***Extraction Plans***

*7. The Proponent shall prepare and implement an Extraction Plan for all second workings on site, to the satisfaction of the Director-General. The 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) provide revised predictions of the conventional and non-conventional subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this approval;*

- (e) *include detailed performance indicators for each of the performance measures in Tables 1 and 2;*
- (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 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;*
- (h) *include the following to the satisfaction of DRE:*
  - *a subsidence monitoring program to:*
    - ☐ *provide data to assist with the management of the risks associated with subsidence;*
    - ☐ *validate the subsidence predictions;*
    - ☐ *monitor the integrity of the overlying strata, particularly the Cordeaux Crinanite; and*
    - ☐ *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;*
  - *a coal resource recovery plan that demonstrates effective recovery of the available resource;*
  - *a Built Features Management Plan, which has been prepared in consultation with the owners of such features, to manage the potential impacts and consequences of subsidence on any built features;*
  - *a Public Safety Management Plan to ensure public safety in the mining area; and*
  - *appropriate revisions to the Rehabilitation Management Plan required under condition 26 of schedule 4; and*
- (i) *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:*
    - o *surface and groundwater impact assessment criteria, based on at least 2 years of baseline data, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;*
    - o *a program to monitor and report groundwater inflows to underground workings; and*
    - o *a program to predict, manage and monitor impacts on any groundwater bores on privately-owned land;*
  - *Biodiversity Management Plan, which has been prepared in consultation with OEH and DRE, 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 dependent ecosystems;*

- *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; and*
  - *Heritage Management Plan, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage sites or values; and*
- (j) *include a program to collect sufficient baseline data for future Extraction Plans.*

*Note: An SMP that is substantially consistent with this condition and which is approved by DRE prior to 31 December 2011 is taken to satisfy the requirements of this condition.*

8. *The Proponent shall ensure that the management plans required under condition 7(i) above include:*
- (a) *an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval;*
  - (b) *a detailed description of the measures that would be implemented to remediate predicted impacts; and*

This document addresses each relevant requirement of the Project Approval consent conditions, including those other conditions that require provision of certain information within the management plans within this document. These other conditions include:

- Schedule 3, Conditions 1, 2 (requiring performance indicators be defined for the approved Subsidence Impact Performance Measures set out in Tables 1 and 2 of the approval).
- Schedule 4, Conditions 26 (rehabilitation objectives).
- Schedule 6, Condition 2 (Management Plan Requirements).

The Project Approval conditions are provided in **Attachment C**.

### **1.3 Structure of the Extraction Plan and Compliance with the Approval**

This document is structured to address and comply with each relevant requirement of the Project Approval consent conditions referred to in Section 1.2 above.

**Table 1.1** outlines the consent conditions and where they are addressed in the document.



|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                      |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| (i) | <p>include a:</p> <ul style="list-style-type: none"> <li>• <i>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:</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> <i>surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;</i></li> <li><input type="checkbox"/> <i>a program to monitor and report groundwater inflows to underground workings; and</i></li> <li><input type="checkbox"/> <i>a program to predict, manage and monitor impacts on any groundwater bores on privately-owned land;</i></li> </ul> </li> <li>• <i>Biodiversity Management Plan, which has been prepared in consultation with OEH and DRE, 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 dependent ecosystems;</i></li> <li>• <i>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; and</i></li> <li>• <i>Heritage Management Plan, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage sites or values;</i></li> </ul> | <p>Section 7</p> <p>Section 8</p> <p>Section 9</p> <p>Section 10</p> |
| (j) | include a program to collect sufficient baseline data for future Extraction Plans.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Section 11                                                           |
| 8.  | <b>The Proponent shall ensure that the management plans required under condition 5(h) above include:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                      |
| (a) | an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Sections 5-11                                                        |
| (b) | a detailed description of the measures that would be implemented to remediate predicted impacts ;and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Sections 5-11                                                        |

## 1.4 Extraction Plan Team

The following suitably qualified and experienced specialists have contributed to this Extraction Plan through the assessments of predicted subsidence impacts provided for the Part 3A Project Approval.

|                                       |                                         |
|---------------------------------------|-----------------------------------------|
| <b>NRE</b>                            | Mine planning and subsidence management |
| <b>Andrew Nesbitt</b>                 | Survey                                  |
| <b>SCT</b>                            | Geotechnical Assessment                 |
| <b>MSEC</b>                           | Mine Subsidence Prediction              |
| <b>GeoTerra</b>                       | Groundwater & Surface Water             |
| <b>Cardno Ecology Lab</b>             | Aquatic Ecology                         |
| <b>ERM</b>                            | Terrestrial Ecology                     |
| <b>ERM</b>                            | Cultural Heritage                       |
| <b>ERM</b>                            | Part 3A Environmental Assessment        |
| <b>Biosis Research</b>                | Biodiversity and Heritage Monitoring    |
| <b>Niche Environment and Heritage</b> | Extraction Plan Preparation             |

The approved Part 3A Project Environmental Assessment was prepared by this team of suitably qualified and experienced persons to satisfy the requirements of the Director-General, as required by Schedule 3, Condition 7a of of the Project Approval. NRE have previously written to DoPI advising of the project team.

Other specialists may be engaged to conduct monitoring activities outlined in this extraction plan.

## **1.5 Extraction Plan Review and Update**

In accordance with Condition 4, Schedule 6 of the Project Approval, strategies, plans and programs included in this Extraction Plan will be reviewed and if necessary revised, within three months of:

- (a) the submission of an annual review under Schedule 6 condition 3;
- (b) the submission of an incident report under Schedule 6 condition 6;
- (c) the submission of an audit report under Schedule 6 condition 8; and
- (d) any modification to the conditions of this approval (unless the conditions require otherwise),

to the satisfaction of the Director-General of the NSW Department of Planning (DoPI).

The revision status of this Extraction Plan is indicated on the title page of each copy.

## **1.6 Consultation**

Consultation has been conducted with the primary stakeholders who own and/or manage land or infrastructure in the Application Area.

The Sydney Catchment Authority has been consulted over a 3 month period (early December 2011 to early March 2012) and invited to review the Draft Extraction Plan. Subsequently, comments have been received, and the monitoring and TARP's have been revised as appropriate to incorporate the SCA comments. Specifically, the subsidence monitoring program, the Built Features Monitoring and TARP's and the Water Management Plan Monitoring and TARP's have been modified as appropriate to incorporate the SCA comments. Specific correspondence is attached in Attachment E.

Sydney Water (who own a power transmission line in the Application Area) have been consulted and have agreed to the proposed monitoring and management program as outlined in Section 5, Built Features Monitoring and TARP's. Specific correspondence is attached in Attachment E.

The Dam Safety Committee (DSC) have been consulted verbally. The DSC advised that the groundwater monitoring program outlined in the Extraction Plan would probably suffice to meet most of the DSC's concerns and that any data gaps would be identified as they process the application for DSC approval.

Consultation on the project with relevant Agencies also occurred during the Part 3A Project Approval process.

## 2 EXTRACTION PLAN

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This section addresses Schedule 3 Condition 7 (c) of the Project Approval..... *“include detailed plans of existing and proposed first and second workings and any associated surface development”*. It also addresses the Schedule 3 Condition 7 (h) requirement to provide a Coal Resource Recovery Plan.

### 2.1 Background

NRE proposes to continue coal mining operations at NRE Wongawilli Colliery in the Southern Coalfield of New South Wales by extracting the proposed Longwalls N1 to N6 within the Wongawilli Seam in the Nebo Area.

The locations of the proposed Longwalls N1 to N6, and the previously extracted longwalls and workings are shown in **Drawing No. MSEC412-01**, which together with all other MSEC drawings for the Nebo Longwalls, is included in Attachment A.

Mine Subsidence Engineering Consultants Pty Ltd (MSEC) were commissioned by NRE to study the mining proposals, to identify all natural features and surface infrastructure, and to prepare subsidence predictions and impact assessments for all features which may be affected by the proposed longwalls. Their full report is appended in Volume 2 of the Part 3A Continuing Operations Environmental Assessment. Much of the data in Section 2 is extracted directly from MSEC 412.

The location of the proposed Longwalls N1 to N6, have been overlaid on an aerial photograph of the area and a topographic map of the area, as shown in **Figure 2.1** and **Figure 2.2** respectively.

It can be noted from these figures that the surface areas within the General Application Area are predominantly natural bushland and have not been developed. These surface areas are part of the Metropolitan Special Area catchment that is managed by the Sydney Catchment Authority (SCA) with no public access in order to protect the catchment areas that supply clean drinking water to the Sydney region. Heavy fines apply for unauthorised or illegal access in these Special Areas.

To support this Extraction Plan, plans included in **Attachment D** have been prepared in accordance with DPI (2003) Guideline for Application of Subsidence Management Approvals. These plans are appended in **Attachment D** and include:

Plan 1: Existing and Proposed Workings.

Plan 2: Natural and Man Made Surface Features.

Plan 3: Geological and Seam Data.

Plan 5: Mining Titles and Land Ownership.

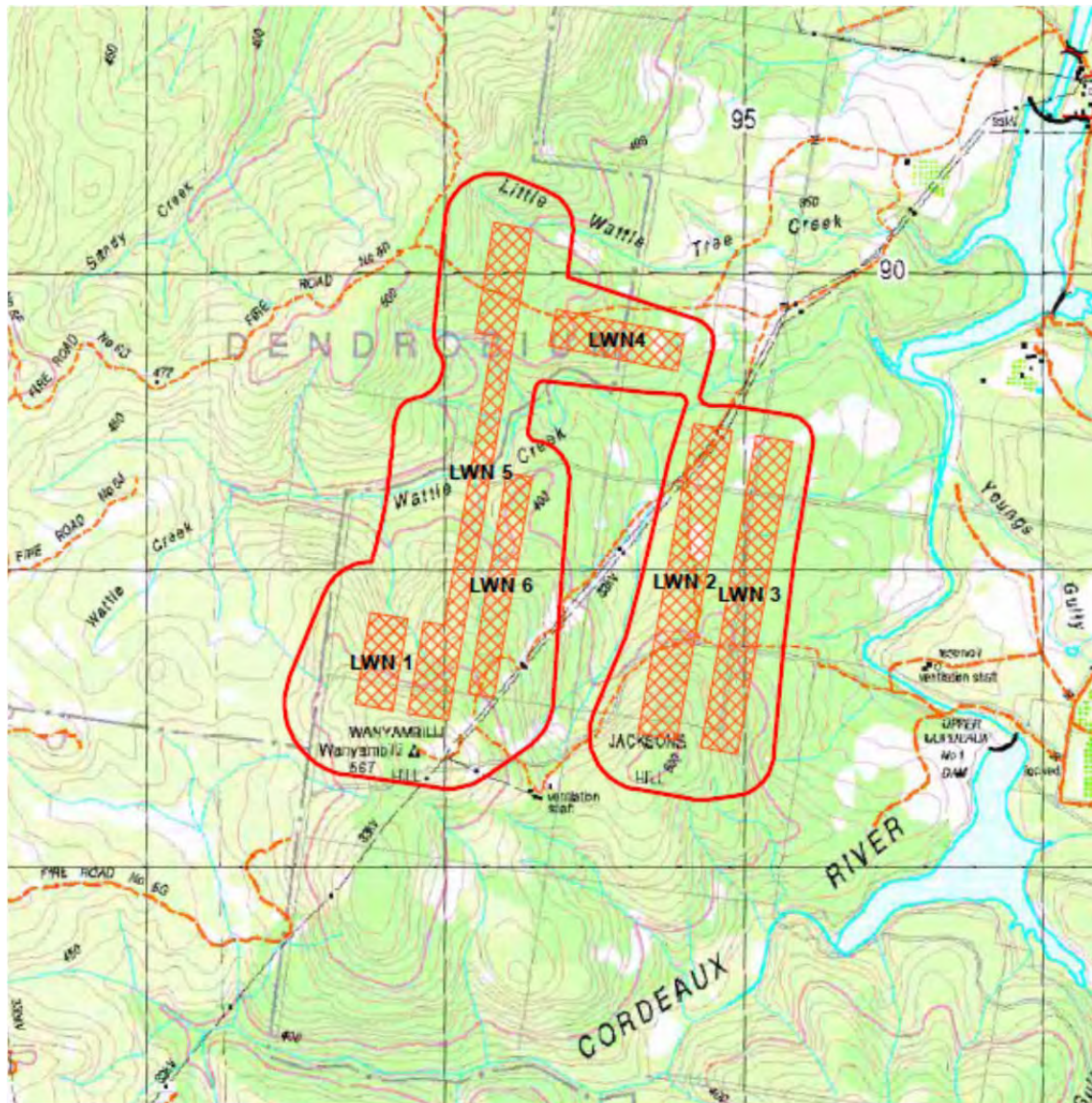
Plan 6: Stratigraphic Section

**Figure 2.1     Aerial Photograph Showing Proposed Longwalls N1 to N6**



Source: MSEC 2010

**Figure 2.2 Topographic Map Showing Proposed Longwalls N1 to N6**



## **2.2 Mine Planning Overview**

The Nebo area of the mine represents an opportunity to extract an available remnant reserve whilst expansion of the mine is undertaken via the Western development.

However, due to the lack of coal clearance and men and material transport systems, major investment is required to access the area to win coal as pillar extraction activities were last conducted in this part of the Mine in 1992.

All the existing workings required for this proposal are accessible and have been recently inspected. Given their age, the roadways and pillars are stable and in good condition. The geological structure and geotechnical environments are well

understood. The area can be described as low in gas (methane and carbon dioxide) and is not prone to outburst or spontaneous combustion.

Recent inspection has assessed that the workings are dry, with a thinner seam section than the Elouera area. The absence of stone rolls contributes to the good coal quality.

Due to the unique geology (Cordeaux Crinanite), the depth of cover, proximity of stored waters and civil structures, continuous miner pillar extraction was initially considered however, even with the proposed reduced longwall dimensions and resultant relocation costs, the economics are driven by the fact that the Colliery can extract four times as much coal for the same operating costs.

Without the proposed layout and sequencing it is unlikely any of the remaining coal in this area would be mined due to the size of the resource, the restrictions on the amount of extraction, the lack of suitable infrastructure and services to the area.

Because of the hazards and economics, the Mining Plan presented does not plan to extract all of the available resource.

The proposed longwall configuration is controlled by the surface and in-seam geology, shallow depth of cover, surface features, existing workings, coal quality, water and gas regimes, and existing underground services (ventilation, power, water).

Hydrology and hydrogeology studies as well as geotechnical investigations into the groundwater and fracturing/caving characteristics of the Cordeaux Crinanite together with avoidance of undermining the higher order surface watercourses and maintaining set-back distances from the reservoirs and infrastructure have been major longwall layout design parameters.

Other surface features such as the powerline easements have been considered in the layout.

Although the available longwall equipment measures 180m wide, the current layout has longwalls varying in width from approx 60m to 120m with substantial barrier/chain pillars in the lower depth of cover areas to reduce subsidence impacts.

Reference to the longwall mining dimensions in adjacent areas “where the effects of complex geological conditions and shallow depth of cover may have contributed to previous water inflows and some significant mining induced surface deformations/fractures” have also been taken into account.

The current layout has evolved through a series of various geometries starting initially with conservative “Reynolds Report” guidelines via the inputs of geotechnical engineering (providing preliminary subsidence predictions) and consultation with the Dams Safety Committee officers.

## 2.3 Mining Geometry

**Drawing No. MSEC412-01** shows the location of the proposed Longwalls N1 to N6 in the Nebo Area with respect to previous pillar extraction workings in both the Bulli and Wongawilli Seams and previously extracted longwalls in the Wongawilli Seam. The pillar extraction areas were extracted more than twenty years ago and the previously extracted longwalls in the Elouera Area were mined progressively from 1993 to 2007.

The locations of the proposed longwalls in the Nebo Area are shown in **Drawing No. MSEC412-02** and details are provided in **Table 2.1**.

**Table 2.1 Dimensions of Proposed Longwalls N1 to N6 in the Nebo Area**

| Longwall | Length (m) | Overall Void Width including headings (m) | Chain Pillar Width excluding headings (m) |
|----------|------------|-------------------------------------------|-------------------------------------------|
| LWN1     | 311        | 127                                       | 0                                         |
| LWN2     | 1054       | 130                                       | 0                                         |
| LWN3     | 1064       | 125                                       | 84                                        |
| LWN4     | 440        | 125                                       | 0                                         |
| LWN5     | 1672       | 130 (66)*                                 | 54                                        |
| LWN6     | 753        | 87                                        | 54                                        |

\* Note: Longwall N5 varies in width as shown in Drawing No. MSEC412-02. The width of the narrow section of the longwall is provided in brackets.

The surface level contours, seam floor contours, seam thickness contours, and depth of cover contours for the Nebo Area are shown in **Attachment A, Drawings Nos. MSEC412-03, MSEC412-04, MSEC412-05 and MSEC412-06**, respectively.

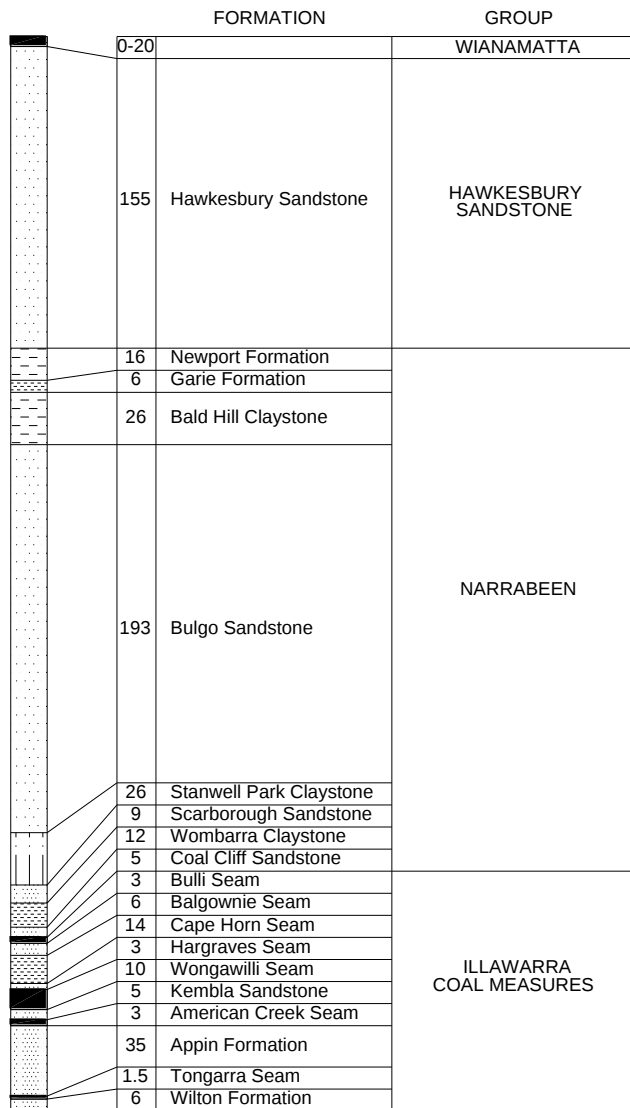
The depth of cover to the Wongawilli Seam above the proposed longwalls in the Nebo Area varies between a minimum of 100 metres, over the north east corner of Longwall N2, and a maximum of 345 metres, beneath the southern end of Longwalls N1 and N5. The overall thickness of the Wongawilli Seam is about 11 metres of which the bottom 2 to 4 metres is commonly mined. The seam thickness contours shown in Drawings No. MSEC412-05 were calculated between particular bands and these contours show a minimum seam thickness of 3.19 metres, at the north east corner of Longwall N3, and a maximum seam thickness of 3.55 metres, at the western side of Longwall N1. The existing Nebo roadways are approximately 5.0 metres wide by 2.8 metres high (dictated by roof support hardware and machine specifications). The proposed development roadways will be 5.0 metres wide by 3.3 metres high. The longwalls will extract a 3.6 metre high seam section, which has been used for subsidence predictions.

Geology has been comprehensively described in Volume 2 of the Part 3A Continuing Use Environmental Assessment, in MSEC412 and other supporting reports. Therefore this section will only briefly address the relevant localised geological feature of Cordeaux Crinanite which is predicted to have a mitigating effect on surface subsidence. The surface geology within the General Application Area can be seen in **Figure 2.3** which shows the proposed longwalls overlaid on a part of the 1:100,000 scale Geological Series Sheet 9029-9129.

The map displays a topographic representation of the study area. Elevation contours are shown in brown, with labels such as 200, 250, 300, 350, and 400. Water bodies, including rivers and lakes, are depicted in blue. Land use zones are color-coded and labeled with codes: Rh (light pink), Rnz (light blue), Rnc (light green), Rnbu (light orange), Qs (light yellow), and Pis (light purple). A blue line, likely representing a proposed road or path, runs through the lower left portion of the map. A legend in the top right corner, titled 'GENERAL APPLICATION AREA', shows a stylized map of the region with different colored areas corresponding to the labels on the main map.

It can be seen from **Figure 2.3** that the surface geology within the General Application Area around Longwalls N1 to N6 predominantly comprises Cordeaux Crinanite (Tc) with isolated areas of Hawkesbury Sandstone (Rh), Bulgo Sandstone (Rnbu) and Bald Hill Claystone/Newport and Garie Formations (Rnz).

**NRE Wongawilli Colliery Nebo Longwalls N1-N6**  
Extraction Plan- Revision 1



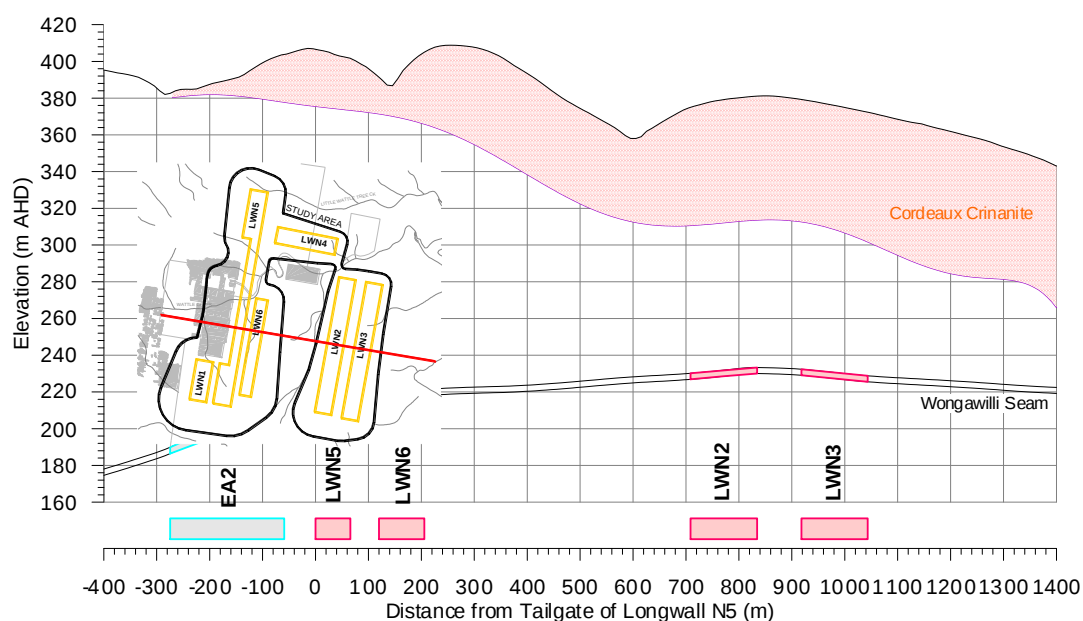
**Figure 2.4 Typical Stratigraphic Section - Southern Coalfield**

Source: MSEC 2010

The Cordeaux Crinanite is a large igneous sill intrusion which intruded into the Triassic sediments of both the Narrabeen Group and the Hawkesbury Sandstone. The Cordeaux Crinanite extends over the proposed Longwalls N2 to N6 as is shown in **Drawing No. MSEC413-07**. This figure also shows a contour plot of the thickness of the Cordeaux Crinanite that has been prepared by NRE from the available exploration boreholes. As shown in this figure, the main body of the Cordeaux Crinanite is generally 50 to 80 metres thick.

A cross section through the General Application Area is presented in **Figure 2.5** showing the thickness of the Cordeaux Crinanite and an elevation of the Wongawilli Seam. This section shows that the Cordeaux Crinanite becomes thinner towards the western side of the General Application Area, along with an associated increase in the depth of cover.

Exploration drilling indicates the crinanite has also intruded the overburden above the Wongawilli seam. These “fingers” of intruded crinanite, where present, have the potential to reduce the predicted magnitude and extent of subsidence, particularly in respect of Longwall N1. The thickness of the crinanite over the western side of the intrusion is based on interpolated contours from the available borehole data, hence the interpolated thickness of the crinanite over the proposed Longwalls N1, N5 and N6 is considered conservative and may be thicker than indicated.



**Figure 2.5 Longitudinal Cross-Section through the Application Area**

Source: MSEC 2010

The effects of undermining the Cordeaux Crinanite has been investigated by Strata Control Technologies (SCT) and their conclusions and findings are presented in a separate report. Refer Volume 2 of the EA.

The Cordeaux Crinanite intrusion is much stronger than the usual Southern Coalfield sedimentary overburden, with a reported unconfined compressive strength in excess of 300MPa [SCT (2010)]. As a result, the Cordeaux Crinanite can span over small mined voids, which was observed by SCT Operations over a previously mined 120 metre wide panel located between the proposed Longwall N4 and N6. The details of these investigations, which include downhole video footage are provided in the report by SCT (2010). SCT advised that the crinanite effectively bridged across this 120 metres goaf with little to no disturbance to the upper part of the crinanite.

Based on the borehole investigations and associated analyses, SCT have predicted that the Cordeaux Crinanite can span over the proposed 125 metre wide goaf over Longwall N2 to N5, where the crinanite is greater than 30 metres without causing perceptible surface subsidence. SCT also advised that extracting the proposed 125 metre wide goaf over Longwall N2 to N5, where the crinanite is greater than 30

metres thick, can be undertaken without impacting perceptibly on the shallow, groundwater system within the crinanite.

The interpolated thickness of the Cordeaux Crinanite above Longwall N6 shows that the crinanite may thin to less than 30 metres thick in areas. The interpolated thickness of the crinanite over Longwall N6 is considered conservative and may be thicker than indicated. It is not anticipated that the extraction of Longwall N6 will result in perceptible surface subsidence.

The proposed Longwall N1 is located partly outside the mapped and interpreted extent of the Cordeaux Crinanite and is anticipated to result in goafing and subsidence consistent with the sedimentary strata in the Southern Coalfield.

## 2.5 Resource Recovery and Project Schedule

The Nebo area layout contains approximately 3.3Mt of coal. Longwall mining is proposed to commence in the Nebo area in December 2012. Mining is expected to proceed as per the indicative schedule outlined in Table 2.2 Indicative Mining Schedule Proposed Longwalls N1 to N6.

**Table 2.2 Indicative Mining Schedule Proposed Longwalls N1 to N6**

| Longwall | Coal Extracted (tonnes) | Estimated Start Date | Estimated Finish Date |
|----------|-------------------------|----------------------|-----------------------|
| LWN2     | 690,000                 | December 2012        | August 2013           |
| LWN3     | 695,000                 | November 2013        | May 2014              |
| LWN4     | 290,000                 | July 2014            | September 2014        |
| LWN5     | 745,000                 | November 2014        | June 2015             |
| LWN1     | 200,000                 | July 2015            | August 2015           |
| LWN6     | 310,000                 | October 2015         | December 2015         |

## 2.6 Effects on Future Resource Recovery

The proposed mining will prevent future extraction of the overlying Bulli seam in the area, as it will become subsided and goafed. It is not expected to impede any future mining of the lower seams. However, the Bulli seam at Nebo is regarded as uneconomic due to its thinner seam thickness. Similarly, the underlying American Creek and Tongarra coal seams at Nebo have excessively high ash content which makes extraction uneconomic.

## 2.7 Future Mine Plans

When mining is completed in the Nebo area, NRE plan to continue mining in the western area, subject to approvals being granted.

## 3 SUBSIDENCE MANAGEMENT MEASURES

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### 3.1 Compliance with the Approval

**This section addresses Schedule 3 Condition 7 (e) and (f) of the Project Approval.....**

- (e) *include detailed performance indicators for each of the performance measures in Tables 1 and 2;*
- (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;*

Schedule 3 Condition 7 (e) is addressed in the Monitoring and TARPS table outlined in **Section 3.5** and provided in their entirety as **Attachment B**. This table summarises the monitoring commitments, action triggers, actions and reporting protocols for the relevant natural and man made features. The table essentially summarises NRE's monitoring and management program.

The monitoring parameters outlined in the Monitoring and TARPS table essentially represents the performance indicators for the performance measures outlined in **Tables 1 and 2**, (Schedule 3 Conditions 1 and 4) of the Project Approval.

Further detail on the monitoring parameters are contained within the specific management plans (for the relevant natural and man made features) provided in the following sections of this document.

Schedule 3 Condition 7 (f) is addressed within the Monitoring and TARPS table outlined in **Section 3.5**, because this table outlines what monitoring and management actions will be undertaken to ensure compliance with DoPI's performance measures. Further detail on "*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*" are provided in this Section, and within the specific management plans (for the relevant natural and man made features) provided in the following sections of this document.

### 3.2 Approved Performance Measures

The Project Approval Schedule 3 Conditions 1 and 4 outline the approved subsidence performance measures for natural and man made features and are provided on the following two pages.

## Schedule 3 Condition 1

### SUBSIDENCE

#### Performance Measures - Natural and Heritage Features, etc

1. The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 1, to the satisfaction of the Director-General.

Table 1: Subsidence Impact Performance Measures

| <b>Water Resources</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catchment yield to the Upper Cordeaux Reservoirs (No. 1 and No. 2) and Avon Reservoir | Negligible reduction to the quality or quantity of water resources reaching the reservoirs<br><br>No connective cracking between the surface and the mine                                                                                                                                                                                                                                            |
| Upper Cordeaux Reservoirs (No. 1 and No. 2) and Avon Reservoir                        | Negligible leakage from the reservoirs<br><br>Negligible reduction in the water quality of reservoirs                                                                                                                                                                                                                                                                                                |
| <b>Watercourses</b>                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Wattle Creek, Little Wattle Tree Creek, Cordeaux River, Gallaghers Creek              | Negligible environmental consequences, including: <ul style="list-style-type: none"> <li>• negligible diversion of flows or changes in the natural drainage behaviour of pools;</li> <li>• negligible gas releases and iron staining; and</li> <li>• negligible increase in water cloudiness</li> </ul>                                                                                              |
| Other watercourses                                                                    | No greater subsidence impact or environmental consequences than predicted in the EA                                                                                                                                                                                                                                                                                                                  |
| Upland Swamps (No 22 and No 39)                                                       | Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• negligible change in the size of swamps;</li> <li>• negligible change in the functioning of swamps;</li> <li>• negligible change to the composition or distribution of species within swamps; and</li> <li>• negligible drainage of water from swamps, or redistribution of water within swamps</li> </ul> |
| <b>Land</b>                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Illawarra Escarpment State Conservation Area, Metropolitan Special Area               | Negligible environmental consequences.                                                                                                                                                                                                                                                                                                                                                               |
| Cliffs                                                                                | 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 the longwall mining area)                                                                                                                                             |
| <b>Biodiversity</b>                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Threatened species, threatened populations, or endangered ecological communities      | Negligible environmental consequences                                                                                                                                                                                                                                                                                                                                                                |
| <b>Heritage Features</b>                                                              |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Aboriginal heritage sites                                                             | Negligible impact or environmental consequence                                                                                                                                                                                                                                                                                                                                                       |
| Non-Aboriginal heritage sites (including 'Historic 1', 'Historic 2' and 'Historic 3') | Negligible loss of heritage value                                                                                                                                                                                                                                                                                                                                                                    |

**Notes to Table 1:**

- The Proponent will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this approval (see condition 7(i) of schedule 3 and conditions 20 - 21 of schedule 4 below).
- Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Director-General will be the final arbiter.
- In the case of the Illawarra Escarpment State Conservation Area, the Director-General's satisfaction can only be expressed following consultation with OEH.
- In the case of the Metropolitan Special Area, the Director-General's satisfaction can only be expressed following consultation with SCA.
- The requirements of this condition only apply to the impacts and consequences of mining operations, construction or demolition undertaken following the date of this approval.

### Schedule 3 Condition 4

4. The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Director-General of DRE.

Table 2: Subsidence Impact Performance Measures

| <b>Built Features</b>                                                                                                                                                                                            |                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key public infrastructure: including SCA infrastructure (Avon Dam, Upper Cordeaux No.1 and No.2 dams, water supply pipelines), high pressure gas pipelines, electricity transmission lines, fibre optic networks | <p>Always safe and serviceable.</p> <p>Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.</p>                                                                                            |
| Gas distribution pipelines, electricity distribution lines, roads, fire trails, other public infrastructure, other built features                                                                                | <p>Always safe.</p> <p>Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.</p> <p>Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.</p> |
| <b>Public Safety</b>                                                                                                                                                                                             |                                                                                                                                                                                                                                                  |
| Public safety                                                                                                                                                                                                    | No additional risk                                                                                                                                                                                                                               |

Notes to Table 2:

- The Proponent will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this approval (see condition 7 below).
- Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Director-General will be the final arbiter.
- The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of this approval.
- Any breach of this condition is taken to be a breach of this approval, and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.
- Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.

## 3.3 NRE's Subsidence Management Measures

### 3.3.1 Subsidence Management Measures

The measures that NRE employs to manage subsidence can be described in the following six categories:

**Baseline Assessment** – natural features and infrastructure have been identified within the vicinity of the longwalls, including SCA dams and associated infrastructure, steep slopes, roads, survey marks and transmission lines. A comprehensive description of the surface and subsurface features is provided in the

Part 3A Environmental Assessment (EA) and MSEC subsidence reports (Volume 2 of the EA).

**Baseline Monitoring** - monitoring has been undertaken in accordance with the various baseline studies that supported the Part 3A Environmental Assessment. Baseline monitoring programs have been revised and updated as part of the development of this extraction plan.

#### **Informed Mine Planning**

Section 2 outlined the major constraints in the mining area and explained how mine plans have been specifically designed to maximise the extraction of the resource and reduce the risk of subsidence impacts to sensitive natural and man made features.

Therefore, the exercise of mine planning guided by subsidence predictions and impact assessments is considered to be one of the major preventative measures to ensure compliance with the approved subsidence performance measures outlined in the Draft Project Approval Schedule 3 Conditions 1 and 4.

**Impact Assessment** - associated with the development was initially described in the Part 3A Environmental Assessment and MSEC subsidence reports.

**Impact Monitoring** - is based on knowledge gained from previous studies and management of subsidence associated with the extraction of previous areas in the district. Techniques used in previous mining areas are equally applicable to the current monitoring program. The proposed monitoring programs are summarised in the following sections and detailed in the following feature specific management plans within this document.

**Subsidence Management** - provides a basis for the design and implementation of any mitigation and remediation. Monitoring provides key data when determining any requirement for mitigation or rehabilitation. Baseline data is compared with monitoring results to determine any remediation that may be required.

Descriptions of potential mitigation and rehabilitation options are detailed in the following feature specific management plans within this document and Contingency Plan is provided in **Section 12**.

### **3.3.2 Extraction Plan Performance Indicators**

Indicators that this Extraction Plan is effective in managing subsidence impacts include:

- ☐ Subsidence impacts and risks are managed in a timely manner to the satisfaction of key stakeholders;
- ☐ Compliance with all monitoring commitments and TARPS during the extraction of the proposed longwalls
- ☐ Subsidence monitoring mechanisms provide appropriate data for ongoing analysis and implementation of management actions in a timely manner; and
- ☐ Any impacts outside of predictions are identified and managed appropriately in a timely manner.

Performance will be monitored and reported in End of Panel reports and the Annual Review. Should performance not be satisfactory, NRE will liaise with authorities to address issues as they arise.

### 3.4 Reporting

This section identifies the requirements for incident and ongoing management reporting as required by the Project Approval. The management of reporting includes the following:

- ☐ Incident Reporting;
- ☐ Annual Review; and
- ☐ Extraction Plan Annual Review (required within 3 months of the Annual Review referred to above).

#### 3.4.1 Incident Reporting

Incident Reporting shall be conducted as per Schedule 6, Condition 6 of the Project Approval:

*“The Proponent shall notify the Director-General and any other relevant agencies of any incident that has caused, or has the potential to cause, significant risk of material harm to the environment, at the earliest opportunity. For any other incident associated with the project, the Proponent shall notify the Director-General and any other relevant agencies as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.”*

*“Incidents”* are defined in the approval and discussed further in Section 12.

### 3.4.2 Annual Review

An Annual Review shall be prepared as per Schedule 6, Condition 3 of the Project Approval:

#### **Annual Review**

3. *By the end of December each year (or other such timing as agreed by the Director-General), the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:*
- (a) describe the works (including any rehabilitation) carried out in the past year, and the works proposed to be carried out over the next year;*
  - (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes 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;*
  - (c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;*
  - (d) identify any trends in the monitoring data over the life of the project;*
  - (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and*
  - (f) describe what measures will be implemented over the next year to improve the environmental performance of the project.*

### 3.4.3 Annual Review of Extraction Plan

An Annual Review of this Extraction Plan shall be prepared as per Schedule 6, Condition 4 of the Project Approval:

#### **Revision of Strategies, Plans and Programs**

4. *Within 3 months of:*
- (a) the submission of an annual review under condition 3 above;*
  - (b) the submission of an incident report under condition 6 below;*
  - (c) the submission of an audit report under condition 8 below; and*
  - (d) any modification to the conditions of this approval (unless the conditions require otherwise),*
- the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.*

### END OF PANEL REPORT

An “End of Panel Report” report, or other report as determined appropriate by DoPI, will be prepared to the satisfaction of the Director General which will be submitted within four (4) months of the completion of each longwall panel or other period as determined by the Director General.

The report will include the following:

1. a summary of the subsidence and environmental monitoring results for the applicable longwall panel;
2. include an analysis of these monitoring results against relevant:
  - a. impact assessment criteria;
  - b. monitoring results from previous panels; and
  - c. predictions in the SMP;
3. identify any trends in the monitoring results over the life of mining activity; and
4. describe what actions were taken to ensure adequate management of any potential subsidence impacts due to longwall mining.

It is expected that the End of Panel Reports will be provided to all relevant agencies (viz. DRE NSW, SCA, DSC, MSB, DECCW, NOW and DoPI) and will be made available for viewing on the website.

### **3.5 Monitoring and TARP's Table**

The Trigger Action Response Plan (TARPs) relate to identifying, assessing and responding to identified subsidence impacts.

The TARPs represent actions to be taken as each defined trigger level is reached and provide a basis for the design and implementation of any mitigation and remediation.

Monitoring of environmental aspects of the area will provide key data when determining any requirement for mitigation or rehabilitation. The triggers are based on comparison of baseline with monitoring results. Specific triggers will be reviewed and if necessary continue to develop as the impact monitoring matures.

Refinement of triggers will be in consultation with key stakeholders and subject to approval by DoPI.

The complete Monitoring and TARP's table for Nebo Longwalls N1 to N6 is provided in Attachment B. The relevant section of the TARP's table is also provided within each feature specific Management Plan in this document.

## 4 SUBSIDENCE MONITORING PROGRAM

### 4.1 Subsidence Monitoring Objectives

The objectives of the subsidence monitoring program are to:

- ☐ provide data to assist with the management of the risks associated with subsidence;
- ☐ validate the subsidence predictions;
- ☐ monitor the integrity of the overlying strata, particularly the Cordeaux Crinanite;
- ☐ analyse the relationship between the subsidence effects and impacts under the extraction plan and any ensuing environmental consequences; and
- ☐ satisfy the requirements of the Project Approval, all agencies and address the expectations of the community.

### 4.2 Summary of Predicted Subsidence

A summary of the maximum predicted total systematic subsidence parameters within the potential subsidence footprint and along each prediction line, resulting from the extraction of the proposed Longwalls N1 to N6, is provided in **Table 4.1**. Predicted subsidence contours are shown on **MSEC 412-14 (Attachment A)**.

**Table 4.1 Maximum Predicted Total Subsidence, Tilt and Strain within the Potential Subsidence footprint**

| Location            | Maximum Predicted Total Subsidence (mm) | Maximum Predicted Total Tilt (mm/m) | Maximum Predicted Total Tensile Strain (mm/m) | Maximum Predicted Total Comp. Strain (mm/m) |
|---------------------|-----------------------------------------|-------------------------------------|-----------------------------------------------|---------------------------------------------|
| Prediction Line 1   | 400                                     | 2.2                                 | 0.5                                           | 0.3                                         |
| Prediction Line 2   | 310                                     | 3.1                                 | 0.7                                           | 1.1                                         |
| Prediction Line 3   | 55                                      | 0.2                                 | <0.1                                          | <0.1                                        |
| Prediction Line 4   | 230                                     | 1.7                                 | 0.3                                           | 0.5                                         |
| Prediction Line 5   | 110                                     | 1.2                                 | 0.4                                           | 0.5                                         |
| Prediction Line 6   | 105                                     | 0.8                                 | 0.2                                           | 0.3                                         |
| Source: MSEC (2010) |                                         |                                     |                                               |                                             |

Due to the presence of the Cordeaux Crinanite, the predicted subsidence due to extraction of the Nebo longwalls is low. The maximum predicted total subsidence within the mining footprint is 400 mm which occurs above the pillar between

longwalls N1 and N5. As a result impacts to sensitive natural and manmade features are not likely (MSEC 2010).

Minor cracking may occur at surface over part of Longwall N1, as the remaining longwalls are overlain by Cordeaux Crinanite, which is predicted to span the longwall goafs without observable fracturing. Tensile fracturing in exposed sandstone is anticipated to coincide with maximum tensile strains, however open fractures could also occur due to buckling of surface beds subject to compressive strains.

Due to the low in-situ horizontal stresses that are expected above the Cordeaux Crinanite, the likelihood of valley upsidence and closure movement along the creeks overlying the proposed Mining Area is considered to be low. A maximum of 80mm upsidence and 50mm closure is predicted for Wattle Creek.

### **4.3 Monitoring Program**

The area overlying the proposed Mining Area is wholly within the Metropolitan Catchment Area "Special Area 1" and has no impact on privately owned or occupied lands. There are no significant private or public operating activities within the proposed mining area.

The proposed subsidence monitoring lines shown in **Figure 4.1** have been planned by NRE in consultation with Mine Subsidence Engineering Consultants (MSEC). The suggested monitoring lines (NM1,NM2,NM3,NM4) are shown in thick yellow lines in the drawing. There are four monitoring lines that cross the longwalls and will enable comparison with predicted subsidence parameters. Three of the lines are on 4WD tracks while the line NM4, on the south end of N1 and N6 may need clearing in some locations as it traverses bushland.

The NM2 survey line will assess subsidence/upsidence data in Wattle Tree Creek at the point that it passes over the creek. Being off the end of both Longwall 4 and 2 it is unlikely to suffer any statistically valid movement (i.e. outside survey tolerance).

Further monitoring lines and far field monitoring survey marks will be installed on a needs basis following a review of data collected and also in consultation with key stakeholders.

The establishment of these lines will involve the establishment of monitoring stations at nominally 15m centres, such marks being either star pickets driven to ground level or bolts drilled and anchored into rock faces as conditions dictate.

These marks will be measured to determine level values for each station and the distance between each station will be measured to allow determination of horizontal strain between adjoining marks.

Measurements will be undertaken using a Trimble S8 Total Station (or equivalent) with a stated accuracy of 1mm plus ppm for distance measurement and 1" of arc for angular measurement.

The results from subsidence monitoring will report the parameters of total and incremental subsidence and variation in horizontal strain.

**Table 4.2** outlines the nature and frequency of monitoring and the actions proposed to manage impacts resulting from subsidence monitoring.

**Table 4.2 Subsidence Monitoring and Management**

| Management Period               | Monitoring Proposed                                                                                                                                                                                                                                                                                                                             | Trigger                                                                                | Response                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Baseline prior to mining</b> | <ul style="list-style-type: none"> <li>2D Survey once prior to mining: <ul style="list-style-type: none"> <li>Total subsidence;</li> <li>Incremental subsidence;</li> <li>Variation in horizontal strain.</li> </ul> </li> <li>Report as appropriate</li> </ul>                                                                                 | Documentation of pre-mining conditions                                                 | Document and report as appropriate                                                                                                                                                                                                                                                                                        |
| <b>During Mining</b>            | <ul style="list-style-type: none"> <li>2D Survey required only if regular visual inspections indicate impacts appear to fall outside predictions</li> </ul>                                                                                                                                                                                     | Major surface cracking (>10mm)                                                         | <ul style="list-style-type: none"> <li>Notify Principal Subsidence Engineer – DRE and DoPI;</li> <li>Conduct subsidence survey and review against predictions;</li> <li>Review mining options</li> </ul>                                                                                                                  |
| <b>Post Mining</b>              | <ul style="list-style-type: none"> <li>2D Survey on completion of each longwall block of: <ul style="list-style-type: none"> <li>Total subsidence;</li> <li>Incremental subsidence;</li> <li>Variation in horizontal strain.</li> </ul> </li> <li>Survey measurement comparison with predictions</li> <li>Reported in Survey Reports</li> </ul> | Check against predictions within MSEC report to enable ongoing modeling of predictions | <ul style="list-style-type: none"> <li>End of Panel Summary report to Principal Subsidence Engineer – DRE, and DoPI within four (4) months after completion of each longwall block;</li> <li>Conduct subsidence survey and review against predictions;</li> <li>Document actual subsidence against predictions</li> </ul> |

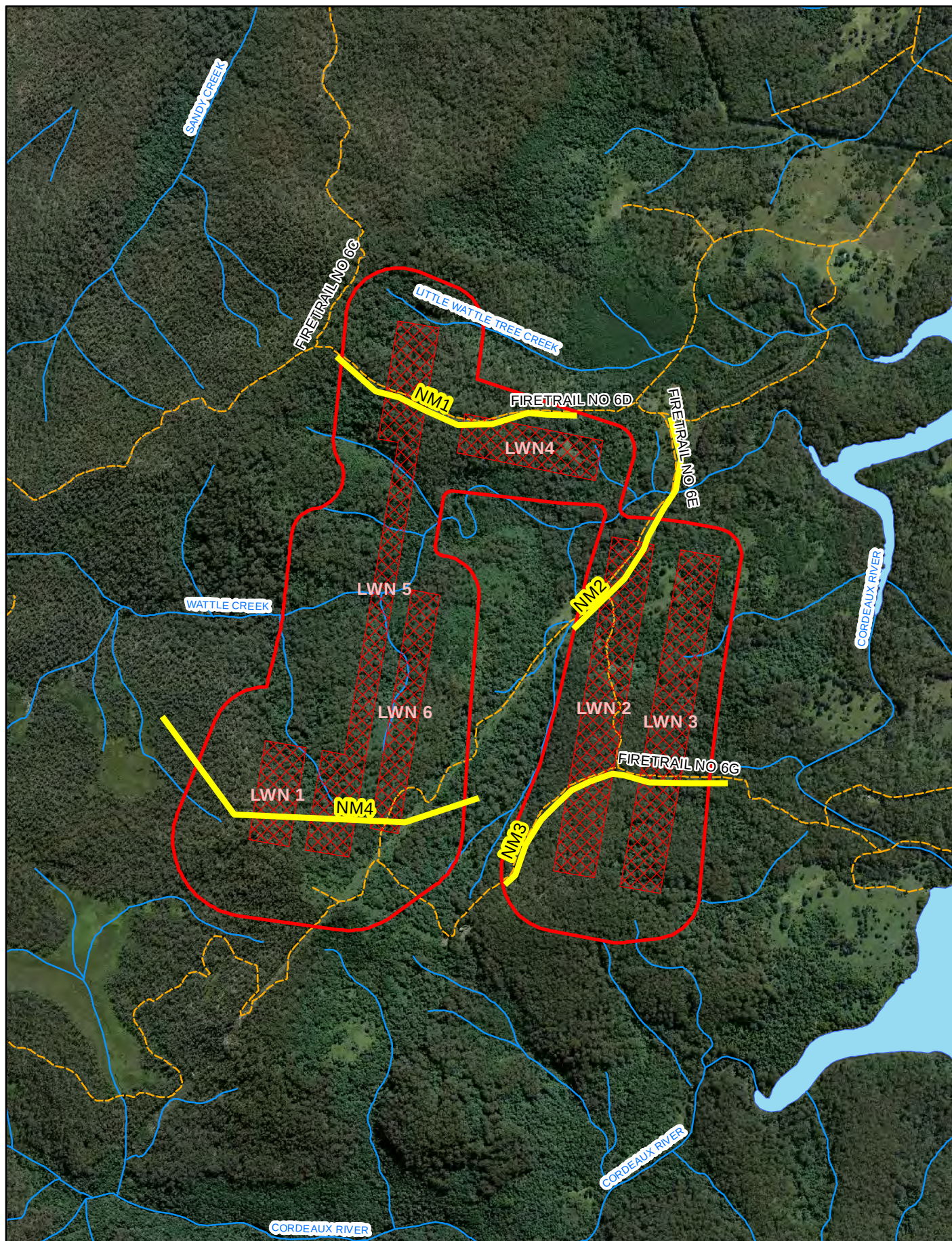


Figure 4.1: Subsidence Monitoring Plan

1098 Nebo Extraction Plan

Drawn by: RJ

Project Mgr: CM

Date: 22/11/2012

- Subsidence Monitoring Lines
- Application Area
- Longwalls



Meters  
0 100 200 300 400

**niche**  
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## 5 BUILT FEATURES MANAGEMENT PLAN

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### 5.1 Objectives

The objectives of this management plan are to:

- ☐ provide a framework to manage the potential impacts and consequences of subsidence on any built features;
- ☐ satisfy the requirements of the Project Approval, all agencies and address the expectations of the community.

The monitoring program will specifically:

- ☐ visually monitor surface ground movements;
- ☐ undertake regular observational monitoring for impact and serviceability;
- ☐ compare actual movements and impacts with predicted movements and impacts.

### 5.2 Summary of Predicted Impacts on Man Made Features

#### Manmade Features

The following manmade features occur within or near the subsidence footprint and will be considered in the Extraction Plan:

- ☐ 4WD tracks (refer **Drawing MSEC 412-10**);
- ☐ 33 kV power lines(refer **Drawing MSEC 412-11**);
- ☐ Survey Marks(refer **Drawing MSEC 412-13**);
- ☐ Exploration Boreholes(refer **Drawing MSEC 412-13**);
- ☐ The Upper Cordeaux No. 1 and No. 2 Reservoirs (refer **Drawing MSEC 412-08**).

#### 4wd Tracks and Fire Trails

There are no tracks over the area of maximum predicted subsidence, which is between Longwalls N1 and N5. The greatest subsidence parameters on 4WD track and Fire Trails are expected to occur where the 4WD track crosses Longwalls N2 and N3. The maximum predicted subsidence parameters for this 4WD track will be similar to the subsidence profiles for Prediction Line 4, which has a maximum predicted tensile and compressive strain of 0.3 mm/m and 0.5 mm/m respectively.

It is unlikely therefore, that the maximum predicted tilts would have any significant impacts on the track and trails, as they are an order of magnitude smaller than the existing grades.

The tracks are unsealed and it is unlikely that the maximum predicted strains along the tracks would result in noticeable tensile cracking or compressive rippling of the track surfaces.

### **Electrical Services**

There are two 33 kV power lines within the potential subsidence footprint, which cross directly above the north west corner of Longwall N2 and close to the south east corner of N6. One power line is owned by Sydney Water and supplies power to the Avon pump station. The other (Line 6-94) is owned by NRE and supplies power to the Nebo #4 Shaft of NRE Colliery.

The maximum predicted subsidence along these power lines is 40mm and the maximum tilt is 0.1 mm/m. The maximum tilt across the power lines is <0.1mm/m.

These predicted subsidence parameters are very small and the probability of impacts to the power lines is negligible. The power lines are supported on timber poles, which are relatively straightforward to repair or adjust if required.

### **Survey Control Marks**

The locations of the survey control marks within the vicinity of the proposed longwalls are shown in **Drawing No. MSEC412-13**. There is one survey control mark, No. TS4621, within the General Application Area. The survey mark is approximately 130 metres from the nearest proposed longwall.

The predicted total subsidence at the survey mark is less than approximately 50 mm and the marks will be subjected to negligible horizontal movement of less than approximately 5 mm. It will be necessary on completion of the proposed longwalls, when the ground has stabilised, to re-establish these survey control marks. Consultation between NRE and the Department of Lands will be required throughout the mining period to ensure that these survey control marks are reinstated at an appropriate time, as required.

If the predicted subsidence parameters were increased by factors of 1.25 to 2 times, the extent of any required remedial measures would not be significantly increased. It is anticipated that any impacts on the survey control marks will be insignificant.

### **Exploration Bores in the Nebo Area of the NRE Wongawilli Colliery**

The locations of the exploration bores are shown in **Drawing No. MSEC412-13**. There are two exploration bores within the Application Area, S0188 and Nebo 4. Bore No. S0188 is an historical bore, drilled approximately 45 to 50 years ago. Nebo 4 was drilled as part of the exploration for this project. There are several

other exploration bores in the vicinity of but outside the General Application Area, most of which are located to the north east and east.

The maximum predicted total tensile and compressive strains at the bores are both less than 0.1 mm/m, and the associated minimum radii of curvature are greater than 150 kilometres.

It is unlikely that the bores would be impacted by these magnitudes of strains and curvatures. This is based on the crinanite spanning the goaf of the extracted longwalls. The sedimentary strata layers below the crinanite will be subjected to normal goafing and subsidence and therefore any boreholes extending below the crinanite could incur fracturing and breakout within the bore.

The exploration bores outside the General Application Area are unlikely to be affected by the extraction of the proposed longwalls.

#### **Upper Cordeaux No.1 and No.2 Reservoir**

The distance from the upstream end of the nearest of these dams, that is, the waters of the Upper Cordeaux No. 1 Reservoir, to the nearest proposed longwall is approximately 660 metres from Longwall N3. The Upper Cordeaux No. 1 dam wall is approximately 820 metres from Longwall N3.

The distance from the upstream end of the reservoir of the Upper Cordeaux No. 2 Reservoir, to the nearest proposed longwall is approximately 440 metres from Longwall N3. The Upper Cordeaux No. 2 dam wall is approximately 1.4 kilometres, from Longwall N4.

These are well outside the predicted 20 mm subsidence contour, resulting from the extraction of the proposed longwalls.

Hence, it is unlikely that the proposed extraction of the NRE Longwalls N1 to N6 will cause measurable ground movements at and around the Upper Cordeaux No.1 Dam Wall and the Upper Cordeaux No.2 Dam Wall. It would be unlikely, therefore, that the reservoir would experience any significant systematic subsidence impacts, resulting from the extraction of the proposed longwalls, even if the predictions were increased by factors of 1.25 to 2 times (MSEC 2010).

The Dam safety Committee (DSC) has defined Notification Areas around all prescribed dams and storages, which it considers may be affected by mining. Prior to the commencement of mining within a Notification Area, mining companies must receive the consent of the Minister administering the Mining Act. The DSC advises the Minister on the extent and type of mining to be permitted and on any special conditions which should apply. The north eastern corner of LWN3 falls within the Cordeaux Notification Area and therefore the DSC have been consulted during the mine approval process for the Nebo area.

### 5.3 Monitoring and Management Program

**Table 5.1** outlines the monitoring commitments proposed for man made features. The monitoring program includes fire roads and 4WD tracks and the 33kV transmission lines. Survey point and exploration boreholes monitoring is generally not required as the Survey Point will be re-established in consultation with the Department of Lands. The borehole will be destroyed by goafing and is no longer required by NRE.

Ground movements will be monitored as mining occurs, to measure the extent to which the actual movements may differ from those predicted. Any predicted impacts will be periodically reviewed in the light of additional data.

Power lines will be inspected by a suitably qualified person, to determine the existing condition, and whether any preventive measures are required prior to mining. Management strategies will be developed in liaison with the owners of the power lines (Sydney Water and NRE) so they can be maintained in a safe condition throughout the mining period.

Ongoing discussions with infrastructure owners are underway and appropriate management and monitoring plans have been developed where determined necessary. Appropriate plans, where required, are being implemented. These plans include trigger points for appropriate actions and remediation works.

#### **The Upper Cordeaux No. 1 and 2 Dam Walls and Reservoirs**

Survey and monitoring results are regularly reviewed by SCA between the Mining and Infrastructure and Survey Groups, and during regular meetings with the mining company. At such meetings, the measured parameters are reviewed in terms of their historic behaviour. Trends and magnitude of movements are assessed as to their likely impacts on the SCA infrastructure.

Where any unusual displacements, changes in monitored behaviours, and movements exceeding the trigger levels are detected in the field, or during the acquisition and processing of data, the SCA (Senior Manager Asset Capability and Senior Manager Mining), and Dams Safety Committee shall be advised accordingly.

The following procedures shall be observed for the specific trigger levels applicable to monitoring in the vicinity of Upper Cordeaux No. 1 and 2 Dams and its associated surface infrastructures including the stored waters. It should be noted that some trigger levels are less than survey tolerance. If a trigger is exceeded, but is within survey tolerance, a resurvey should be considered to confirm actual movements.

**Table 5.1 Built Features Monitoring and Management Summary**

| Feature                                                                                     | Monitoring Commitments                                                                                                                                                                |                                                                                                                                                                                      |                                                                                                                                                                                                         | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                             | Prior to Mining                                                                                                                                                                       | During Mining                                                                                                                                                                        | Post Mining and Future Monitoring                                                                                                                                                                       | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Upper Cordeaux 1 and 2 Dam Walls</b><br><b>SCA Inspections and subsidence monitoring</b> | <input type="checkbox"/> Visual inspection by SCA prior to mining<br><input type="checkbox"/> Annual subsidence surveys by SCA along Upper Cordeaux 1 and 2 Dam walls prior to mining | <input type="checkbox"/> Visual inspection by SCA during mining<br><input type="checkbox"/> Bi-Annual subsidence surveys by SCA along Upper Cordeaux 1 and 2 Dam walls during mining | <input type="checkbox"/> Visual inspection by SCA up to 1 year post mining<br><input type="checkbox"/> Annual subsidence surveys by SCA along Upper Cordeaux 1 and 2 Dam walls up to 1 year post mining | <input type="checkbox"/> >10mm change in RL<br><input type="checkbox"/> >10mm Upsidence or >2mm differential vertical movement between any 2 adjacent marks<br><input type="checkbox"/> >20mm horizontal movement or >2mm differential horizontal movement between any 2 adjacent marks<br><input type="checkbox"/> >2mm Closure between readings<br><input type="checkbox"/> Crack Widths >3mm differential movement in 3 dimension (Upper Cordeaux No.2 Dam) | <input type="checkbox"/> Notification to SCA immediately, then to DoPI, DSC, DRE NSW<br><input type="checkbox"/> Additional monitoring as agreed with SCA and as per DSC Management Plans.<br><input type="checkbox"/> 6 Monthly 3-D crack monitoring where agreed with SCA.<br><input type="checkbox"/> Make area safe as soon as practicable including warning signs<br><input type="checkbox"/> Proposal for rectification within 1 week upon approval from SCA<br><input type="checkbox"/> Completion of any required works following approval from SCA |
| <b>Cordeaux Reservoir Stored Waters (SCA)</b>                                               | <input type="checkbox"/> Survey of lake foreshores by SCA                                                                                                                             | <input type="checkbox"/> 6-monthly survey of lake foreshores by SCA                                                                                                                  | <input type="checkbox"/> 6-monthly survey of lake foreshores by SCA up to 1 year post mining                                                                                                            | <input type="checkbox"/> >20mm change in RL<br><input type="checkbox"/> >20mm horizontal movement                                                                                                                                                                                                                                                                                                                                                              | <input type="checkbox"/> Notification to SCA immediately, then to DoPI, DSC, DRE NSW<br><input type="checkbox"/> Additional monitoring as agreed with SCA and as per DSC Management Plans.                                                                                                                                                                                                                                                                                                                                                                  |

- ☐ Liaise with the SCA and develop appropriate strategies and management plans.

|                                                                     |                                                                                                                                                                                                                                          |                                                                                                                                                         |                                                                                                                                                                                                                                                          |                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>33kV Transmission Lines</b><br>(Owned by Sydney Water and NRE)   | <ul style="list-style-type: none"> <li><input type="checkbox"/> Observation of tower condition</li> <li><input type="checkbox"/> Survey measurement for later comparison</li> <li><input type="checkbox"/> Once before mining</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Fortnightly observation of tower condition</li> </ul>                                   | <ul style="list-style-type: none"> <li><input type="checkbox"/> Observation of tower condition</li> <li><input type="checkbox"/> Survey measurement once following mining</li> </ul>                                                                     | <ul style="list-style-type: none"> <li><input type="checkbox"/> Observation of unsafe tower conditions as noted by NRE or consultant engineer.</li> </ul>                                                 | <ul style="list-style-type: none"> <li><input type="checkbox"/> Report condition to Infrastructure owner and Mine Subsidence Board</li> <li><input type="checkbox"/> Document in end of panel reports</li> <li><input type="checkbox"/> Infrastructure owner to undertake remediation as necessary</li> </ul>                                                                                                                                                                                                                                                                                           |
| <b>Fire Roads and 4WD Tracks</b><br>(Fortnightly visual inspection) | <ul style="list-style-type: none"> <li><input type="checkbox"/> Observation of road condition once prior to mining</li> <li><input type="checkbox"/> Reported in End of panel reports and AEMR</li> </ul>                                | <ul style="list-style-type: none"> <li><input type="checkbox"/> Fortnightly observation of roads, tracks and area within 10m of roads/tracks</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Monthly observation of roads, tracks and area within 10m of roads/tracks for 6 months post mining</li> <li><input type="checkbox"/> reported in End of panel reports and AEMR</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Minor cracking on roads and tracks (&lt;10mm)</li> <li><input type="checkbox"/> Major cracking (&gt;10mm) or traffic impedence</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Notification to SCA within 24 hrs, using photographic record</li> <li><input type="checkbox"/> Notification to SCA immediately, then to DoPI, DRE NSW and MSB</li> <li><input type="checkbox"/> Make area safe as soon as practicable including warning signs</li> <li><input type="checkbox"/> Proposal for rectification within 1 week upon approval from SCA</li> <li><input type="checkbox"/> Completion of works following approval from SCA</li> <li><input type="checkbox"/> Additional monitoring as agreed with SCA</li> </ul> |

## 6 PUBLIC SAFETY MANAGEMENT PLAN

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### 6.1 Objectives

The objectives of this Public Safety Management Plan are to:

- ☐ to provide a framework to manage the potential public safety risks due to subsidence on any built or natural features;
- ☐ satisfy the requirements of the Project Approval, all agencies and the expectations of the community.

### 6.2 Summary of Public Safety Considerations

As outlined in the previous section, no buildings, structures or notable infrastructure occurs within the approved mining area other than two 33kV transmission lines and the existing 4WD tracks. As predicted impacts to these features are negligible, it is therefore determined that no specific prevention or mitigation measures require implementation to address hazards or safety risks associated with these features.

Natural features potentially impacted by mining within the approved mining area include rocky outcrops and steep slopes. These features occur across the mining area, however no rock falls or tension cracks are predicted to occur. The relative safety risk from subsidence impacts on these features is considered low.

No cliffs occur in the mining area.

The approved mining area is within the Restricted Area of the Sydney Catchment Authority (SCA) and public access to the mining area is already limited under SCA terms.

Regular monitoring of these 4WD tracks and Fire trails before, during and after extraction will ensure coverage of any mining related surface impacts. In the event that such minor mining related impacts should occur, the hazard will be addressed.

Should observations show deterioration in surface conditions arising from mining within the application area, safety and remediation measures will be implemented to include timely notification of all relevant stakeholders.

### 6.3 Monitoring and Management Program

**Table 6.1** outlines the Public Safety Management Plan Monitoring and TARPs Summary. The type and frequency of monitoring in the Public Safety Management Plan is consistent with previous Subsidence Management Plan submissions determined through consultation with key stakeholders.

Monitoring of the key items will be undertaken as part of regular and routine assessments within the approved mining area. In the unlikely event that impacts are observed, the program will support development of any mitigation or rehabilitation plans required which would typically involve the following:

- ☐ Warning signs to be erected.
- ☐ Notify of any entry restrictions in consultation with key stakeholders.
- ☐ Any unstable areas to be secured and isolated as appropriate.
- ☐ Timely notification of mining to the community and key stakeholders where management of public safety is required.
- ☐ Prompt remediation of any affected infrastructure.

**Table 6.1 Public Safety Monitoring and TARPs Summary**

| Feature                                                 | Monitoring Commitments                                                                                                                            |                                                                                                                                                            |                                                                                                                                                                    | TARPS                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         | Prior to Mining                                                                                                                                   | During Mining                                                                                                                                              | Post Mining and Future Monitoring                                                                                                                                  | Trigger                                                                                                                                         | Response                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Public Safety</b><br>(fortnightly during extraction) | <input type="checkbox"/> Observation of rocky outcrops and steep slopes; Fire roads; 4WD tracks;<br><input type="checkbox"/> Once prior to mining | <input type="checkbox"/> Observation of rocky outcrops and steep slopes; Fire roads; 4WD tracks;<br><input type="checkbox"/> Fortnightly during extraction | <input type="checkbox"/> Observation of rocky outcrops and steep slopes; Fire roads; 4WD tracks;<br><input type="checkbox"/> Monthly following mining for 6 months | <input type="checkbox"/> Minor cracking (<10mm)<br><input type="checkbox"/> Major Cracking (>10mm), noticeable instability or traffic impedence | <input type="checkbox"/> Notification to SCA & DoPI within 24 hrs, using photographic record<br><input type="checkbox"/> Notification to SCA& DoPI immediately<br><input type="checkbox"/> Make area safe as soon as practicable<br><input type="checkbox"/> Proposal for rectification within 1 week<br><input type="checkbox"/> Completion of works following approval from SCA<br><input type="checkbox"/> Additional monitoring as agreed |

## 7 WATER MANAGEMENT PLAN

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### 7.1 Objectives

The objectives of this Water Management Plan are to:

- ☐ provide a framework to monitor and manage the potential impacts and/or environmental consequences of subsidence over the proposed longwalls on watercourses and aquifers, including:
  - surface and groundwater impact assessment criteria based on at least 2 years of baseline data, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;
  - a program to monitor and report groundwater inflows to underground workings; and
  - a program to predict, manage and monitor impacts on any groundwater bores on privately-owned land;
- ☐ satisfy the requirements of the Project Approval, all agencies and address the expectations of the community.

### 7.2 Summary of Predicted Impacts

#### 7.2.1 Surface Water

##### Introduction

A catchment surface water assessment was undertaken for the Project by GeoTerra Pty Ltd (GeoTerra). GeoTerra (2010a) monitored the existing baseline status and addressed potential surface water impacts relating to the proposed extraction of the Nebo area longwalls.

##### Existing Environment

The thin soil of the Berkeley landscape overlying the crininite has been observed to provide limited duration baseflow seepage into the local streams following sufficient rainfall. However the soil profile dries out relatively quickly and seepage discontinues after a few weeks.

There are no valley infill or headwater swamps in the potential subsidence area.

The potential subsidence area contains the catchments of Wattle Creek and Little Wattle Tree Creek, both of which drain into Upper Cordeaux No.2 Reservoir within the Sydney Catchment Authority managed, Metropolitan Special Area.

The creeks are assessed to be “connected gaining streams” where shallow groundwater in the soil and crinanite can maintain a base flow during and after extended wet periods.

Seepage has been observed to support a continuous flow in the 3<sup>rd</sup> order channel of Wattle Creek, with the flow volume being dependant on the interaction between rainfall runoff / recharge and groundwater seepage applying at any one time.

The 2<sup>nd</sup> order channel of Little Wattle Tree Creek does not have permanent stream flow in the vicinity of the proposed workings.

### **Wattle Creek**

Wattle Creek is characterised by interspersed pools containing exposed crinanite bedrock and crinanite boulder or cobble accumulations in the main channel.

Generally small pools are developed upstream of elevated rock bars or boulder / cobble accumulations, often with less than 0.5m drop between the pools. The pools are generally small due to the steep gradient of the creek bed.

The channel of Wattle Creek has been previously undermined and overlies three pillar extraction areas as well some access drives.

Three monitoring sites were initiated in Wattle Creek in June 2009;

- WC1 in the 2<sup>nd</sup> order tributary between LWN2 and LWN6 (known colloquially as Jacksons Creek)
- WC2 in the 2<sup>nd</sup> order channel upstream of the WC1 junction, and
- WC3 in the 3<sup>rd</sup> order channel downstream of the WC1 junction, at the access track culvert

A further upstream control site (WC4) has been established in the headwaters of Wattle Creek.

The 2<sup>nd</sup> order channel upstream, and the 3<sup>rd</sup> order channel downstream of the WC1 / WC2 junction have been continuously flowing since monitoring began in June 2009, whilst the 1<sup>st</sup> order tributaries, as well as the 2<sup>nd</sup> order WC1 tributary have ephemeral to intermittent flow.

No subsidence cracks have been observed in the outcropping, vertically columnar jointed crinanite stream bed of Wattle Creek over the previous pillar extraction areas.

No significant ferruginous seeps are present in Wattle Creek over the previously subsided pillar extraction areas, and no enhanced stream bed or bank erosion has been observed over or downstream of the pillar extraction areas.

Wattle Creek stream monitoring site details are listed in Table 7.1 **Wattle Creek Stream Monitoring Sites** and shown on **Figure 7.1**.

**Table 7.1 Wattle Creek Stream Monitoring Sites**

| Site                     | Easting | Northing | Description                                                                                             |
|--------------------------|---------|----------|---------------------------------------------------------------------------------------------------------|
| WC1                      | 294560  | 6189435  | 2nd order tributary draining off Jacksons / Wanyambilli Hill                                            |
| WC2                      | 294530  | 6189470  | 2nd order tributary draining over LWN5                                                                  |
| WC3                      | 294875  | 6189570  | 3rd order channel downstream of WC1 / WC2 junction                                                      |
| WC4                      | 293225  | 6189250  | Upstream site on 1 <sup>st</sup> order tributary just north of Fire Trail 6J at downstream end of swamp |
| Source: GeoTerra (2010a) |         |          |                                                                                                         |

Volumetric stream flow monitoring has been conducted at Site WC3 since November 2009.

A summary of water quality results is available in **Table 7.2 Wattle Creek Water Quality**. Further details regarding water quality are provided in *Annex G* to the EA.

**Table 7.2 Wattle Creek Water Quality**

| pH                       | Salinity       | Iron          | Sulfate    |
|--------------------------|----------------|---------------|------------|
| 5.7 to 7.5               | 117 - 185µS/cm | generally low | 3 – 11mg/L |
| Source: GeoTerra (2010a) |                |               |            |

Monitoring indicates Wattle Creek is within the acceptable range for potable water. However it can exceed the ANZECC 2000 95% Species Protection Level for Freshwater Aquatic Ecosystem Guidelines for the following parameters, depending on the flow conditions at the time of sampling:

- ☐ filtered copper and / or zinc, very occasionally at all sites; and
- ☐ total nitrogen as well as total phosphorous at all sites, occasionally, with no regular pattern.

### **Little Wattle Tree Creek**

Little Wattle Tree Creek is characterised by a series of small boulder and cobble based pools as well as small pools developed on exposed columnar jointed crininite, often with less than a 0.5m drop between the pools. The stream gradient is relatively steep at its headwaters and reduces gradually with distance downstream.

The stream is well defined with steeply sloping banks up to 10m high. Well developed rainforest exists along the banks and there is no apparent erosion or bank instability.

The channel of Little Wattle Tree Creek has not been previously undermined.

One stream monitoring site was installed in June 2009 at LWTC1, downstream of the proposed longwalls LWN4 and LWN5 on the Fire Road 6 crossing. Due to the creek being generally dry or ponded during the majority of the study period, no stream flow or pool height monitoring has been initiated at this site.

**Table 7.3 Little Wattle Creek Stream Monitoring Sites**

| Site                     | Easting | Northing | Description                                                                                                         |
|--------------------------|---------|----------|---------------------------------------------------------------------------------------------------------------------|
| LWTC1                    | 294920  | 6190020  | Downstream of the proposed longwalls LWN4 and LWN5 on the Fire Road 6 crossing. This site is for water quality only |
| Source: GeoTerra (2010a) |         |          |                                                                                                                     |

A summary of water quality results is presented in Table 7.3. Further details regarding water quality are provided in *Annex G* of the EA.

**Table 7.4 Little Wattle Tree Creek Water Quality**

| pH                       | Salinity      | Iron          | Sulfate   |
|--------------------------|---------------|---------------|-----------|
| 5.5 to 6.6               | 95 - 134µS/cm | generally low | 2 – 7mg/L |
| Source: GeoTerra (2010a) |               |               |           |

Monitoring indicates Little Wattle Tree Creek is within the acceptable range for potable water. However it can exceed the ANZECC 2000 95% Species Protection Level for Freshwater Aquatic Ecosystem Guidelines for the following parameters, depending on the flow conditions at the time of sampling:

- filtered zinc very occasionally at all sites;
- total nitrogen, in all samples to date; and
- total phosphorous, infrequently.

### **Predicted Impacts on Surface Water Features, Flow and Quality**

It is predicted that surface subsidence and the associated tilts and strains will be relatively minor due to the presence of the Cordeaux Crinanite (MSEC, 2010).

Based on geotechnical, hydrological and hydrogeological investigations within the potential subsidence footprint, it was assessed that the crinanite has retarded the

surface expression of subsidence as well as restricted the generation of connective hydraulic fracture pathways between Wattle Creek and the sedimentary overburden that underlies the crinanite. Refer *Annex G* of the EA for further details.

Based on the ability of the Cordeaux Crinanite to maintain its aquitard integrity following subsidence, it is anticipated that no significant adverse effects will be observed in the creek bed or catchment of Wattle Creek or Little Wattle Tree Creek including:

- negligible effects on water quality;
- negligible change in stream bed or bank stability;
- negligible effect on stream pools; and
- negligible gas emissions at the surface.

No adverse effect on the shallow groundwater system is anticipated as the crinanite is expected to maintain its aquitard status.

#### **Stream Flow Loss**

Transfer of stream flow to subsurface fracture flow is not anticipated over the proposed workings due to the low predicted subsidence and strains.

#### **Upper Cordeaux No.2 Reservoir**

Although the northern portion of Longwall N3 lies within the Cordeaux Dam Notification Area, neither the Upper Cordeaux No.2 Reservoir or dam wall are anticipated to be adversely affected.

Upper Cordeaux No.2 Reservoir and the Upper Cordeaux No.2 dam wall are not anticipated to experience loss of stored water as there will be no predicted connected hydraulic fracture pathway between the proposed longwalls and the reservoir as the crinanite is expected to maintain its aquitard status.

Due to the lack of subsidence, streambed cracking and associated stream flow changes in Wattle Creek or Little Wattle Tree Creek, negligible effect on Upper Cordeaux No.1 or No.2 Reservoirs' water quality is anticipated.

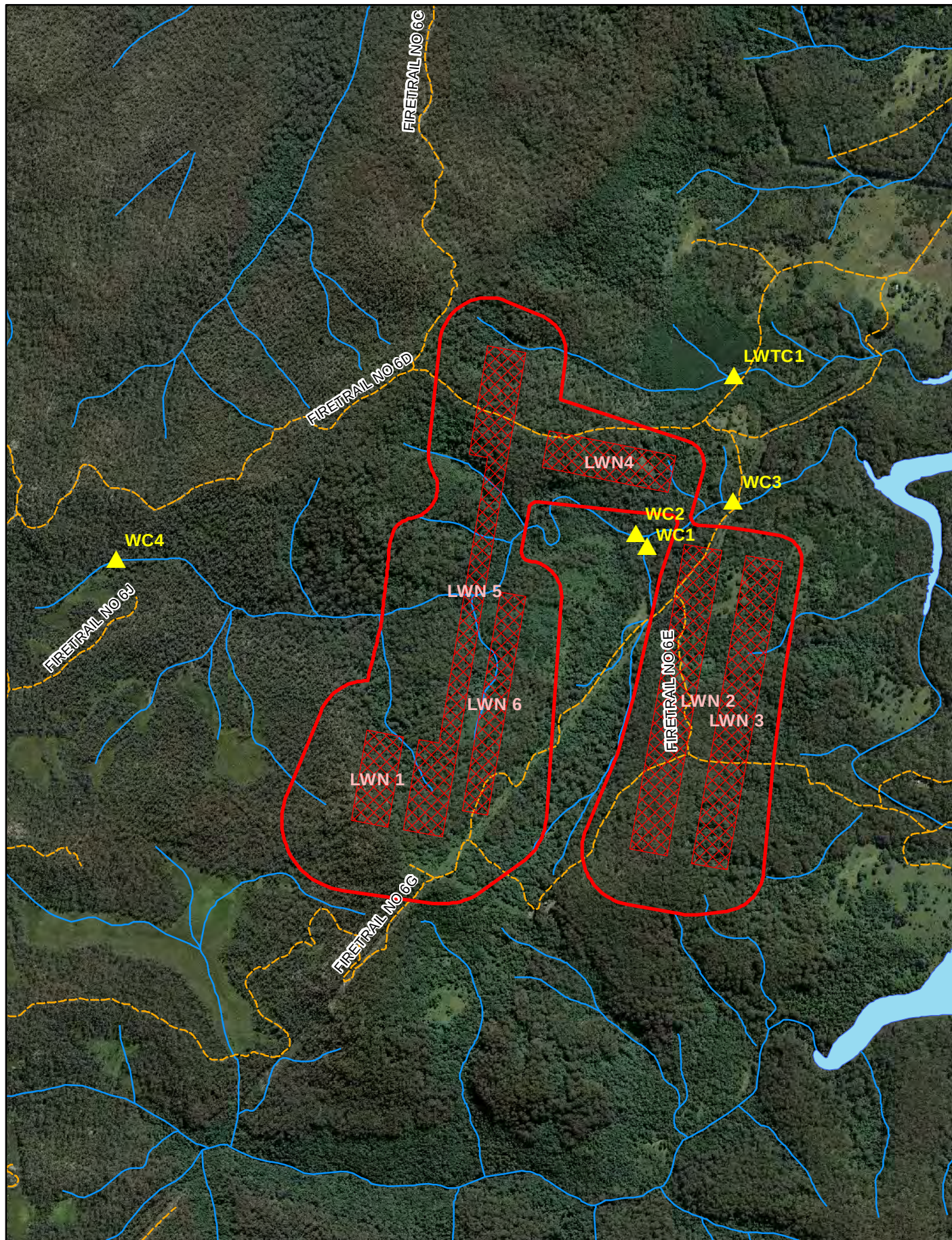


Figure 7.1: Surface Water Monitoring Plan

1098 Nebo Extraction Plan

Drawn by: RJ

Project Mgr: CM

Date: 2/05/2012



Surface Water Monitoring Locations



Application Area



Longwalls



Meters

0 50 100 200 300 400

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## 7.2.2 Groundwater

### Introduction

GeoTerra (2010b) provide a baseline, pre-mining assessment of the potentially affected groundwater systems and associated subsidence of the Wongawilli seam, with further details provided in *Annex I* of the EA.

### Existing Environment

#### Hydrology

Due to the Cordeaux Crinanite, the hydrogeology of the Nebo area is markedly different to other underground mines in the Southern Coalfield.

The crinanite is up to 90m thick and has a very low permeability, thereby acting as an aquitard that hydraulically separates the shallow soil and creek beds from the sedimentary overburden under the crinanite.

Underneath the Cordeaux Crinanite, two aquifer systems are present:

- ❑ the dual porosity Narrabeen group sedimentary units; and
- ❑ the remnant Bulli / Balgownie and Wongawilli seam dual porosity coal seams and interburden.

The Narrabeen group is an assemblage of aquifers, aquitards and aquicludes with very low primary hydraulic conductivities. The sandstones provide porous storage with limited fracture flow and have very low transmitting capacity, whilst the mudstones, siltstones and shales effectively impede vertical flow.

Very minor groundwater supplies are obtained from the Narrabeen Group due to its generally deeper cover and very low permeability.

Groundwater is generally observed within the coal seams where cleats provide enhanced secondary permeability.

Previous access drives and first workings have essentially depressurised the Wongawilli seam at Nebo. Also, due to the radial nature of depressurisation away from the structural dome in the Wongawilli Seam, as well as the higher relative elevation of the Nebo longwalls, any depressurisation of the Dendrobium Area 2 workings would be unlikely to have significant lateral transgression into the proposed Nebo workings.

Due to the regional depressurisation in and above the existing Nebo workings, no notable groundwater bearing strata is anticipated in the crinanite or underlying sedimentary units above the proposed panels.

Water quality varies within and between Illawarra Coal Measures and the interburden due to the complex nature of the groundwater flow systems, whilst the coal seams are mostly brackish to saline.

The Balgownie, Bulli and Wongawilli seams do not outcrop within the Nebo or Western Driveage areas, however they are exposed along the basal section of the Illawarra Escarpment.

No direct vertical recharge occurs where the crinanite is present, whilst recharge to the seams occurs where they outcrop or subcrop along the escarpment.

There is no direct hydraulic connection between the seams and creeks in the Nebo area due to the crinanite.

### **Wongawilli Mine Inflow and Groundwater Access Licensing**

An average annual inflow of 1 518ML/year has been measured into the entire NRE Wongawilli Colliery workings, of which Nebo and the Western Driveage are comparatively small components. Mine water inflows are comprised of

- ☐ groundwater inflow;
- ☐ surface water seeping through subsidence cracks following extraction of Elouera Longwalls 6 and 7; and
- ☐ surface water seeping into the previously extracted shallow collapsed workings near the Illawarra Escarpment.

The current Nebo workings are reported to be dry.

### **Existing Groundwater Monitoring Data**

NRE installed six open standpipe piezometers (Nebo1S, 1D, 2S, 2D, 3 and 4) along with four multi-level vibrating wire piezometer arrays (Nebo 6, 7, 8 and 8A) at Nebo in January 2010.

Two multi-level vibrating wire piezometer arrays (WW11, WW20B) were installed in the Western Driveage area in March 2009.

Monitoring sites are shown on Figure 7.2.

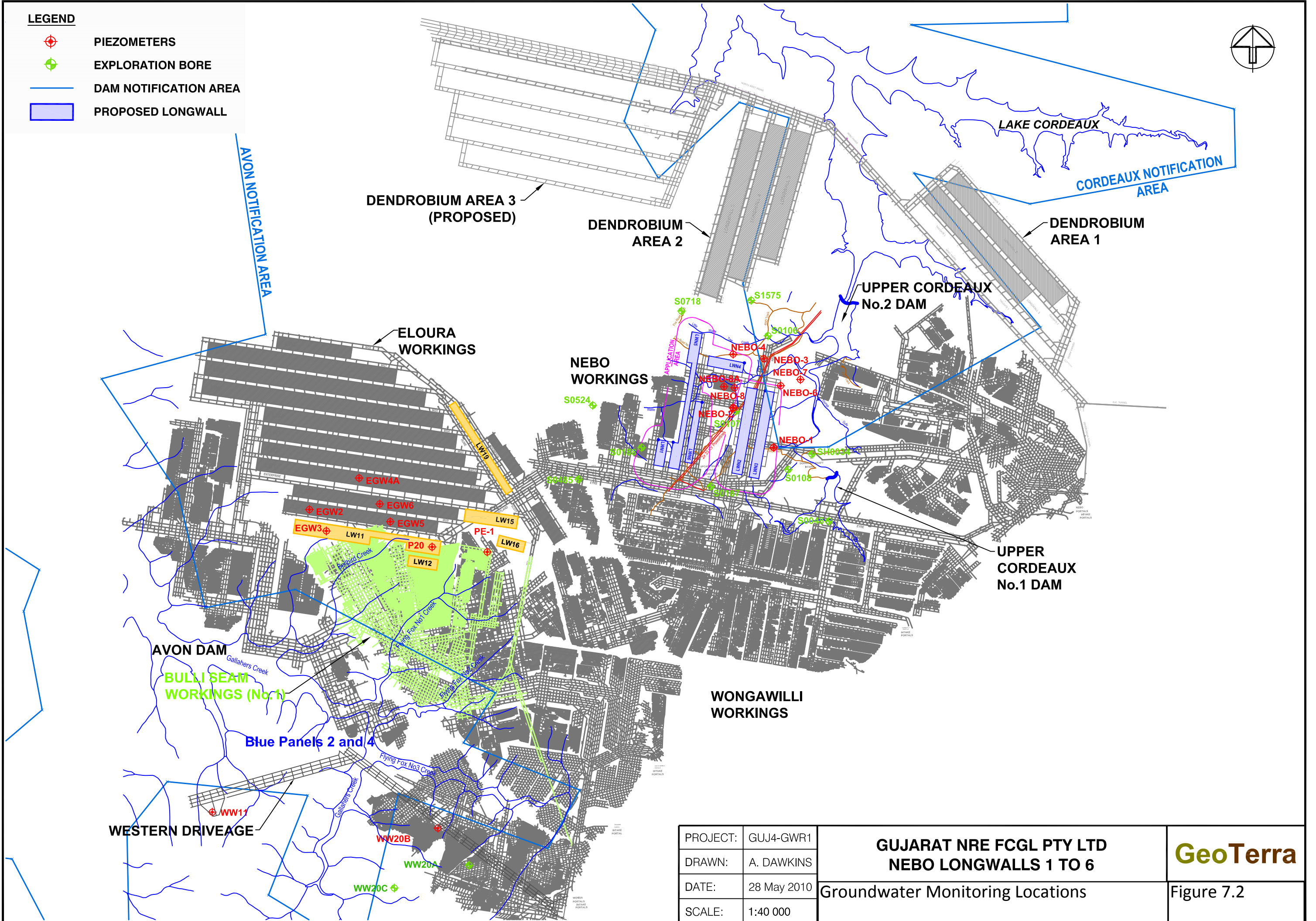
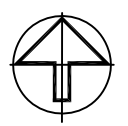
### **Water Levels**

Monitoring at Nebo indicates the following water levels below surface:

- ☐ soil 1 - 5.5m;
- ☐ crinanite 1 - 13m;
- ☐ Narrabeen Group 44 - 45m; and
- ☐ Bulli seam 82 - 90m.

LEGEND

- PIEZOMETERS
- EXPLORATION BORE
- DAM NOTIFICATION AREA
- PROPOSED LONGWALL



|          |             |                                                   |            |
|----------|-------------|---------------------------------------------------|------------|
| PROJECT: | GUJ4-GWR1   | GUJARAT NRE FCGL PTY LTD<br>NEBO LONGWALLS 1 TO 6 | GeoTerra   |
| DRAWN:   | A. DAWKINS  |                                                   |            |
| DATE:    | 28 May 2010 | Groundwater Monitoring Locations                  | Figure 7.2 |
| SCALE:   | 1:40 000    |                                                   |            |

A summary of the open standpipe and vibrating wire piezometers is shown in **Table 7.5** and **Table 7.6** below.

**Table 7.5 NSW Office of Water Registered Open Standpipe Piezometers**

| Piezometer | License    | E      | N       | RL mAHD | TD mbg | Intake (mbgl) |
|------------|------------|--------|---------|---------|--------|---------------|
| Nebo 1 (S) | 10BL603365 | 295153 | 6188762 | 366.4   | 6.0    | 5.0 – 6.0     |
| Nebo 1 (D) | 10BL603365 | 295152 | 6188761 | 366.5   | 97.6   | 85.6 – 97.6   |
| Nebo 2 (S) | 10BL603365 | 294662 | 6189246 | 347.7   | 6.5    | 5.5 – 6.5     |
| Nebo 2 (D) | 10BL603365 | 294662 | 6189237 | 348.5   | 31.0   | 19.0 – 31.0   |
| Nebo 3     | 10BL603365 | 295033 | 6189838 | 356.7   | 33.6   | 21.6 – 33.6   |
| Nebo 4     | 10BL603365 | 294661 | 6189893 | 374.1   | 110.0  | 107.5 – 109.5 |

**NOTE:** n/a - not available                      mbg - metres below ground                      SWL - standing water level  
mbtoc - metres below top of casing                      Nebo 5 was not drilled                      all bores drilled in Dec 2009

**Table 7.6 Multi Level Vibrating Wire Piezometer Bores**

| Piezometer | Installed | E      | N       | RL mAHD | TD mbg | VWP Intakes (mbgl)                   |
|------------|-----------|--------|---------|---------|--------|--------------------------------------|
| Nebo 6     | Dec 2009  | 295237 | 6189510 | 354.2   | 119    | 60, 80, 100 (CC), 119 (KS)           |
| Nebo 7     | Dec 2009  | 295477 | 6189585 | 336.4   | 92     | 30, 45, 63 (CC), 90 (WW)             |
| Nebo 8     | Dec 2009  | 294679 | 6189485 | 343.4   | 91     | 15, 35, 52 (CC), 72 (SS)             |
| Nebo 8A    | Jan 2010  | 294549 | 6189499 | 359.6   | 69     | 25, 45, (CC)                         |
| PE1        | Nov 2009  | 291676 | 6187507 | 515.7   | 173.4  | 90 (HS) 135 (BHCS) 150 (BS) 165 (BS) |
| WW 11      | Mar 2009  | 288343 | 6184339 | 467.1   | 330.4  | 60 (HS) 90 (BHCS) 104 (BS) 125 (BS)  |
| WW 20B     | Feb 2009  | 291099 | 6184158 | 488.2   | 231.6  | 33 (HS) 60 (BHCS) 75 (BS) 135 (BS)   |

**NOTE:** CC – Cordeaux Crinanite                      BS - Bulgo Sandstone                      SS - Scarborough Sandstone  
SPCS - Stanwell Park Claystone                      BCS – Bulli Coal Seam                      WW – Wongawilli Coal Seam  
KS – Kembla Sandstone                      HS – Hawkesbury Sandstone                      BHCS – Bald Hill Claystone

## Groundwater Quality

Regular field and laboratory testing of the groundwater quality at Nebo has been conducted since January 2010. A summary of pH and electrical conductivity (EC) is presented in Table 7.7.

**Table 7.7 Nebo Groundwater Quality Summary**

| Source                    | pH           | EC $\mu$ S/cm |
|---------------------------|--------------|---------------|
| Soil                      | 6.54 – 8.65  | 268 - 1042    |
| Crinanite                 | 6.66 – 12.23 | 234 - 7060    |
| Narrabeen Group Siltstone | 7.60 – 10.44 | 587 - 958     |
| Bulli seam                | 8.05 – 8.16  | 798 - 851     |
| Source: GeoTerra (2010b)  |              |               |

GeoTerra (2010b) indicates that the groundwater at Nebo is generally within the acceptable range for potable water. However it can be outside the ANZECC 2000 South Eastern Australia Upland Stream criteria for pH during extended dry periods.

The groundwater can also exceed ANZECC 2000 95% Species Protection Level for Freshwater Aquatic Ecosystem Guidelines for the following parameters:

- ☐ filtered copper lead and zinc; and
- ☐ total nitrogen and phosphorous.

### Predicted Groundwater Impacts

Table 7.8 Predicted Groundwater Impacts Due to Mining at Nebo presents a summary of the predicted groundwater impacts in the Nebo area.

**Table 7.8 Predicted Groundwater Impacts Due to Mining at Nebo**

| Unit                                        | Predicted Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cordeaux Crinanite                          | <ul style="list-style-type: none"> <li>No adverse hydraulic connection between the crinanite and the underlying Narrabeen Group and Illawarra Coal Measures aquifers and aquitards due to subsidence</li> <li>No temporary lowering of the crinanite piezometric surface</li> <li>No adverse effect on the crinanite groundwater quality is anticipated</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Narrabeen group and Illawarra Coal Measures | <ul style="list-style-type: none"> <li>Hydraulic interconnection and depressurisation of the sedimentary overburden under the crinanite following subsidence above the proposed longwalls, which will be tempered by the existing depressurisation regime from previous mining effects</li> <li>Lowering of the sedimentary overburden piezometric surface due to strata dilation and connection with the Nebo workings.</li> <li>Underground mine water inflows will not substantially rise as the Wongawilli seam and the sedimentary overburden are already depressurised.</li> <li>Potential limited iron hydroxide precipitation and acidification of the interstitial water due to exposure to atmospheric oxygen within shallow subsidence cracked Hawkesbury Sandstone or Narrabeen Group lithologies.</li> </ul> |
| Source: GeoTerra (2010b)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

No adverse water quantity or quality impacts are predicted to occur on Upper Cordeaux No.1 or No.2 Reservoirs based on the factors discussed in previous sections.

## 7.3 Monitoring and Management Program

### 7.3.1 Surface Water Monitoring and Management

Tables 7.9 to 7.11 outline the proposed Water Management Plan monitoring and TARPs. If impacts are identified, appropriate responses will be triggered as per the TARP summary outlined in Table 7.11 below.

**Table 7.9 Surface Water Monitoring Program**

| Monitoring Type                                                                                                                                                                                                   | Method                                                 | Site                         | Frequency                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water level – automatic monitoring                                                                                                                                                                                | Water level logger                                     | WC1, WC2, WC3, WC4           | 1 hourly data log intervals, with monthly download during mining under creeks. Minimum 6 hour data log intervals and bi-monthly downloads during baseline and post mining. |
| Standing water level – manual monitoring                                                                                                                                                                          | Manual measure against surveyed benchmark              | WC1, WC2, WC3, WC4           | Bi-monthly pre-mining<br>Weekly preceding and during active undermining of creeks<br>Bi-monthly post-mining                                                                |
| Field Water quality analysis – EC, pH                                                                                                                                                                             | Grab sample field meter readings                       | WC1, WC2, WC3, WC4 and LWTC1 | Bi-monthly pre-mining<br>Weekly preceding and during active undermining of creeks<br>Bi-monthly post-mining                                                                |
| Laboratory Water quality analysis – (EC, pH) + TDS, Na, K, Ca, Mg, F, Cl, SO <sub>4</sub> , HCO <sub>3</sub> , NO <sub>3</sub> , Total N, Total P, hardness, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd (metals filtered) | Grab sample for laboratory analysis                    | WC1, WC2, WC3, WC4 and LWTC1 | Every 4 months pre-mining<br>Monthly preceding and during active undermining of creeks<br>Every 4 months post-mining                                                       |
| Observations of creek condition: erosion, pooling, iron hydroxide staining, rockbars, bedrock.                                                                                                                    | Visual observations assisted by photo point monitoring | WC1, WC2, WC3, WC4 and LWTC1 | Bi-monthly pre-mining<br>Weekly preceding and during active undermining of creeks<br>Bi-monthly post-mining                                                                |

Water level and flow monitoring will involve:

- ❑ automated monitoring of stream depth and volumetric flow at WC1 (upstream) and WC3, which will be compared to local rainfall. Automated monitoring of stream depth at WC2 and WC4. Monitoring of stream depth at 1 hourly log intervals during active undermining of stream during extraction; 6 hourly log intervals during baseline and post mining.
- ❑ water quality monitoring will include;
  - monthly monitoring before and after extraction occurs under Wattle Creek (at WC1,WC2,WC3,WC4) and Little Wattle Tree Creek (at LWTC1);
  - weekly monitoring in Wattle Creek during the period of extraction under the creek by longwall LWN5 at WC1,WC2,WC3,WC4;
  - weekly monitoring at LWTC1 whilst longwall LWN5 is within 100m of Little Wattle Tree Creek;
  - water quality monitoring will include the following parameters;
    - field pH, electrical conductivity, dissolved oxygen, oxidation / reduction potential and temperature;
    - total dissolved solids;
    - Na / Ca / K / SO<sub>4</sub> /Mg / Cl / F;
    - total alkalinity;
    - dissolved organic carbon;
    - total / filterable Fe, Mn, Al;
    - filterable Ni, As, Li, Ba, Sr, Cu, Pb, Zn;
    - total nitrogen and total phosphorous;
  - collection and analysis of samples will be conducted according to the ANZECC 2000 Guidelines for Water Quality Monitoring and Reporting;
  - setting of trigger values for selected parameters within the context of a Trigger Action Response Plan (TARP). Where trigger values are exceeded, the cause and effect of the exceedance will be investigated and a management plan developed if the cause is directly related to subsidence and requires management;
  - surface water TARPs are outlined in **Table 7.11**;

- TARPs will be reviewed annually and adjusted, if required, to account for the natural variability of stream water quality as indicated by additional data. Additional water quality monitoring sites may also need to be established as the monitoring program progresses;
- ☐ photographic recording of site conditions, including bed and banks, during site visits in Wattle Creek and Little Wattle Tree Creek;
- ☐ visual and photo point monitoring of bank stability, bedload movement and riparian vegetation after significant stream flow events in Wattle Creek and Little Wattle Tree Creek;
- ☐ measurement of daily water pumped into and out of the Nebo / Wongawilli workings;
- ☐ measurement of rainfall daily at the Colliery and nearest Bureau of Meteorology weather station for the duration of mining;
- ☐ preparation of an End of Panel summary report for each panel, which summarises all monitoring over the period; and
- ☐ Annual review of all data and an updating of the monitoring and remediation program if required.

In the event that on going monitoring indicates there has been a significant adverse hydrologic or aquatic ecotoxic effect, then management and mitigation measures may be required. Management measures may involve alteration to the extent of extraction.

The surface water monitoring program will be extended beyond the active mine life in order to assess longer term stream flow and water quality for an agreed period after closure of the relevant operations following consultation with NOW, SCA and OEH.

### **Potential Stream Remediation and Contingency Options**

No adverse effects are anticipated on the surface water system due to the proposed extraction of the Nebo longwalls.

The following discussion is provided in the unlikely event that adverse hydrologic or aquatic ecotoxic effects occur, and that management and mitigation measures are required.

All relevant rehabilitation actions will be derived in association with the DoPI, DRE, NOW and SCA, and will be acted upon as outlined in the TARP.

Contingency plans will be developed if the observed impact exceeds the predicted impact on significant natural features, and approved adaptive management strategies will be used if geological disturbances or dissimilarities are recognised.

Monitoring will be used to measure the actual versus predicted impact and to measure the effectiveness of any management strategies that may be adopted. A Contingency Plan that provides for adaptive management is provided in Section 12.

Possible mitigation measures to reduce the potential impacts of subsidence on significant features may involve adaptive management measures through:

- ☐ restriction of ground movement by reducing mining height or longwall width or increasing the pillar width;
- ☐ isolation of ground movement - by constructing slots at strategic locations adjacent to a feature to concentrate ground strain. This measure is still in a development stage and is generally considered to be expensive;

In addition, the following measures may be appropriate;

- ☐ maintenance responses - measures used to maintain the physical state and function of a feature that may be impacted by subsidence;
- ☐ toleration of subsidence impacts - no action taken to control or remediate the impacts. Tolerance would be used where subsidence effects are insufficient to warrant remediation and dissipate gradually over a large area or for locations that have no significant sub-surface or surface features, or;
- ☐ Additional options such as offsets or compensation as well as adaptive management may be required if impacts exceed predictions and are required to compensate for unacceptable environmental consequences.

Remediation will not be used as a forward management strategy for highly-significant features. However, it may be required as a contingency measure if actual subsidence impacts exceed predictions. Remediation measures may include:

- ☐ backfilling and/or grouting of cracks and fracture networks - grout can be either cement-based or composed of plastic or resin, such as polyurethane which is injected into a fracture network, or;
- ☐ fractures may “self heal” or be anthropogenically filled in. Fractures may heal naturally in watercourses that have a moderate to high sediment load, with the success of natural remediation depending on the extent of damage and the type of watercourse.

### **7.3.2 Groundwater Monitoring and Management**

The proposed groundwater monitoring program for the Project is summarised in **Table 7.10**.

**Table 7.10 Groundwater Monitoring Program**

| Monitoring Required                                                                                                                                                                           | Method                                | Site                          | Frequency                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------|
| Standing water level – automatic monitoring                                                                                                                                                   | Water level logger                    | Nebo1S, 1D, 2S, 2D, 3, 4      | Twice daily, with bi-monthly download                                                                  |
| Standing water level – manual monitoring                                                                                                                                                      | Dip meter                             | Nebo1S, 1D, 2S, 2D, 3, 4      | Bi-monthly                                                                                             |
| Pressure head – automatic monitoring                                                                                                                                                          | Vibrating wire piezometer             | Nebo 6, 7, 8, 8A, WW11, WW20B | Twice daily, with quarterly download                                                                   |
| Water quality – EC, pH                                                                                                                                                                        | Pumped field meter readings           | Nebo 1S, 1D, 2S, 2D, 3, 4     | Bi-monthly                                                                                             |
| Water quality – (EC, pH) + TDS, Na, K, Ca, Mg, F, Cl, SO <sub>4</sub> , HCO <sub>3</sub> , NO <sub>3</sub> , Total N, Total P, hardness, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd (metals filtered) | Pumped sample for laboratory analysis | Nebo 1S, 1D, 2S, 2D, 3, 4     | At the start and finish of each panel for piezometers adjacent to a panel, otherwise 1 sample per year |

The groundwater monitoring program will be extended beyond the active mine life in order to assess longer term groundwater level recovery and water quality for an agreed period after closure of the relevant operations following consultation with NOW, SCA OEH and DoPI.

The volume of water pumped into and out of the NRE Wongawilli Colliery workings will be monitored daily to enable groundwater seepage into the workings to be assessed. If assessment of the groundwater make into the Nebo workings is not possible due to logistical constraints in the overall Wongawilli colliery, then semi-quantitative observations of the mine roof, floor and wall seepage will be reported.

Daily rainfall data will be obtained from the SCA Cordeaux No.2 dam weather station for the duration of mining at Nebo.

All results will be reviewed after each panel is completed and should the need arise, an update to the monitoring and remediation program will be undertaken in consultation with NOW, SCA and DRE.

Quality assurance will be attained by calibrating all measuring equipment, ensuring that sampling equipment is suitable for the intended purpose, using NATA registered laboratories for chemical analyses. This will ensure that site inspections and reporting follow procedures outlined in the ANZECC 2000 Guidelines for Water Quality Monitoring and Reporting.

### Trigger Action Response Plan (TARP) and Trigger Levels

The Trigger Action Response Plan (TARP) provides guidance on the procedures and actions required to manage potential impacts on the groundwater systems at Nebo. The methodology for deriving trigger levels is described below.

Trigger levels for investigation of potential impacts to groundwater will be set prior to mining. Exceedances of these trigger levels will be investigated by a qualified hydrogeologist as outlined in **Table 7.11**.

Performance indicators will be identified and a statistical assessment will be undertaken to detect when, or if, a significant change has occurred in the groundwater system, and to benchmark the natural variation in groundwater quality and water levels.

### Groundwater Level Triggers

The investigation trigger groundwater level will be a 10m or greater fall in standing water level or water head pressure over at least a 2 month period in the basement piezometers, or a greater than 10% reduction of the unconfined alluvial aquifer thickness over at least a 2 month period, as long as the reduction is greater than the pre-mining water level variability in the aquifer.

If a water level trigger is exceeded, the rate of change will be investigated to determine whether it is subsidence induced or due to other factors.

If a significant increase in the rate of water level decline is noted, then an assessment will be conducted to determine the cause of the change and to consider potential contingency measures that may be adopted.

### Groundwater Quality Triggers

Groundwater quality trigger levels are based on the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 2000) for Aquatic Ecosystems as shown in **Error! Reference source not found..**

If a groundwater quality investigation is triggered after there is a prolonged exceedance at a particular piezometer over at least 4 months, then:

- ☐ the significance of the impact/s will be assessed;
- ☐ measures to minimise the impacts will be investigated; and
- ☐ measures to reduce, minimise, mitigate or remediate impacts will be provided and agreed to by the Director-General, as well as NOW and the Sydney Catchment Authority and implemented as required.

### **Contingency Procedures**

Contingency procedures will be developed as required to manage any adverse impacts identified by monitoring.

Activation of contingency procedures will be linked to the assessment of monitoring results and exceedance of trigger levels.

A Contingency Plan that provides for adaptive management is provided in Section 12.

### **Reporting**

Following completion of extraction of each panel, an End of Panel report will be prepared that summarises all relevant monitoring to date.

The report will outline any changes in the groundwater system over the relevant mining area and will contain an interpretation of the data along with:

- ☐ a basic statistical analysis (mean, range, variable, standard deviation) of the data;
- ☐ an interpretation of water quality and standing water level changes supported with graphs or contour plots; and
- ☐ an interpretation and review of the results in relation to the trigger levels.

**Table 7.11 Water Management Plan Monitoring and TARPs Summary**

| Feature                                                            | Monitoring Commitments                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                  | TARPS                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                    | Prior to Mining                                                                                                                                                                                                                                                                                                                                                                               | During Mining                                                                                                                                                                                                                                                                                       | Post Mining and Future Monitoring                                                                                                                                                                                                                                                                                                | Trigger                                                                                                                                                                                                                                                                                                                                                                                         | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Rainfall</b>                                                    | <input type="checkbox"/> Daily rainfall monitoring at NRE Wongawilli Colliery and SCA Cordeaux No. 2 Dam weather station                                                                                                                                                                                                                                                                      | <input type="checkbox"/> Continuous                                                                                                                                                                                                                                                                 | <input type="checkbox"/> Continuous                                                                                                                                                                                                                                                                                              | <input type="checkbox"/> Significant departure from standard rainfall – runoff relationship in extraction area creeks.                                                                                                                                                                                                                                                                          | <input type="checkbox"/> Visual inspection of creek lines for cracking or water loss.<br><input type="checkbox"/> Contract hydrologist investigate and report on changes identified<br><input type="checkbox"/> Inform SCA, DoPI, OEH & DRE NSW of results of investigation<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required |
| <b>Stream Water Quality</b><br>Sites WC1, WC2,, WC3, WC4 and LWTC1 | <input type="checkbox"/> Field Analysis (EC, pH, DO, ORP, temp)<br><input type="checkbox"/> <u>Laboratory Analysis</u><br>TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Li, Ba, (filtered) DOC,tot. Alkalinity.<br><input type="checkbox"/> Observable iron hydroxide staining using photo points<br><input type="checkbox"/> Monthly for at least | <input type="checkbox"/> Weekly Field Analysis during active undermining of the main channel of Wattle Creek over LWN5<br><input type="checkbox"/> Monthly Lab analysis during active mining<br><input type="checkbox"/> Weekly observations during active undermining of stream using photo points | <input type="checkbox"/> Field Analysis every 2 months for one year after Nebo mining is completed<br><input type="checkbox"/> Lab analysis every four months for one year after Nebo mining is completed<br><input type="checkbox"/> Observations every 2 months for one year after Nebo mining is completed using photo points | <b>NORMAL</b><br><b>No change in water quality variability compared to baseline period</b><br><b>WITHIN PREDICTIONS</b><br><b>Temporary reduction in water quality over less than 2 months at any site compared to baseline period, i.e.</b><br><input type="checkbox"/> Observable increase in iron hydroxide precipitation in creek, banks, or bed)<br><input type="checkbox"/> EC < 250uS/cm | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR                                                                                  |

| Feature | Monitoring Commitments                                                                                                     |               |                                   | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------|----------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Prior to Mining                                                                                                            | During Mining | Post Mining and Future Monitoring | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|         | <p>two months prior to mining (for all parameters)</p> <p><input type="checkbox"/> Baseline monitoring commenced 2009.</p> |               |                                   | <p><input type="checkbox"/> pH &lt; 1.5 drop from minimum baseline value</p> <p><input type="checkbox"/> Fe (Tot) &lt; 10mg/L</p> <p><input type="checkbox"/> Mn (tot) &lt; 0.2mg/L</p> <p><input type="checkbox"/> Al (tot) &lt; 0.2mg/L</p> <p><input type="checkbox"/> Zn (filt) &lt; 0.2mg/L</p> <p><input type="checkbox"/> SO<sub>4</sub> (filt) &lt; 15mg/L</p> <p><b>EXCEEDS PREDICTIONS</b></p> <p><b>Temporary reduction in water quality over more than 2 months at any site compared to baseline period, i.e</b></p> <p><input type="checkbox"/> Long term increase in iron hydroxide precipitation in creek, banks, or bed)</p> <p><input type="checkbox"/> EC &gt; 300uS/cm</p> <p><input type="checkbox"/> pH &gt; 1.5 drop from minimum baseline value</p> <p><input type="checkbox"/> Fe (Tot) &gt; 10mg/L</p> <p><input type="checkbox"/> Mn (tot) &gt; 0.2mg/L</p> <p><input type="checkbox"/> Al (tot) &gt; 0.2mg/L</p> <p><input type="checkbox"/> Zn (filt) &gt; 0.2mg/L</p> <p><input type="checkbox"/> SO<sub>4</sub> (filt) &gt;15mg/L</p> | <p><input type="checkbox"/> Inform SCA, OEH &amp; DRE immediately</p> <p><input type="checkbox"/> Repeat water quality sampling and initiate laboratory water quality sampling on a monthly basis</p> <p><input type="checkbox"/> Contract specialist to investigate and report on changes identified</p> <p><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required</p> <p><input type="checkbox"/> Report in the Annual Review</p> |

| Feature                                                                                                                                                                                               | Monitoring Commitments                                                                                                                                                                                                                 |                                                                                                                       |                                                                                                                 | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <b>Stream Flow</b><br>Automated monitoring of Water Depth / Flow monitoring at WC3 and WC1 (upstream) which will be compared to local rainfall<br>Automated monitoring of water depth at WC2 and WC4. | <input type="checkbox"/> Minimum 6 hourly prior to mining, with 2 monthly downloads<br><input type="checkbox"/> Minimum hourly for 1 month before LWN5 undermines Wattle Creek<br><input type="checkbox"/> Baseline data from Nov 2009 | <input type="checkbox"/> Minimum hourly with weekly downloads for 1 month before / after LWN5 undermines Wattle Creek | <input type="checkbox"/> Minimum 2 hourly with downloads every two months for one year after Nebo mining ceases | <b>NORMAL</b><br><b>No change in stream flow or pool level variability compared to baseline period</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Temporary reduction in stream flow of &gt;20% over less than 2 months compared to the baseline variability at any site, i.e.</b><br><input type="checkbox"/> Small cracks developed<br><input type="checkbox"/> No observable loss of stream flow, pool height or stream connectivity, compared to baseline regime<br><br><b>EXCEEDS PREDICTIONS</b><br><b>Long term reduction in stream flow of &gt;20% compared to the baseline variability at any site, i.e.</b><br><input type="checkbox"/> Observable loss of stream flow, pool height or stream connectivity, compared to baseline regime | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrology and ecology specialists immediately<br><input type="checkbox"/> Site visit with stakeholders<br><input type="checkbox"/> Take photographic record immediately<br><input type="checkbox"/> Contract specialist to investigate and report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional |

| Feature         | Monitoring Commitments                                                                                       |                                                                                                                       |                                                                                                                     | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                 |                                                                                                              |                                                                                                                       |                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable.<br><input type="checkbox"/> Report in Annual Report                                                                                                                                                                                                                                                                                                         |
| <b>Flooding</b> | <input type="checkbox"/> Observations every month for at least two months prior to mining using photo points | <input type="checkbox"/> Observations every week during active undermining of Wattle Creek by LWN5 using photo points | <input type="checkbox"/> Observations every 2 months for one year after Nebo mining is completed using photo points | <b>NORMAL</b><br><b>No change in flood extent variability compared to baseline period</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Temporary increase in flood extent over less than 2 months compared to the baseline variability at any site</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Long term reduction in flood extent over more than 2 months compared to the baseline variability at any site, i.e.</b><br><input type="checkbox"/> Increased extent of flooded stream reach in excess of baseline conditions – identified | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrology and ecology specialists immediately<br><input type="checkbox"/> Site visit with stakeholders<br><input type="checkbox"/> Take photographic record |

| Feature                                | Monitoring Commitments                                                                                       |                                                                                                                                                     |                                                                                                                     | TARPS                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                                        | Prior to Mining                                                                                              | During Mining                                                                                                                                       | Post Mining and Future Monitoring                                                                                   | Trigger                                                                                                                                                                            | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                        |                                                                                                              |                                                                                                                                                     |                                                                                                                     | by increased flooding within the terrestrial habitat compared to baseline variability                                                                                              | <p>immediately</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Contract specialist to investigate and report on changes identified</li> <li><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required</li> <li><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required</li> <li><input type="checkbox"/> Report on mitigation as soon as practicable.</li> <li><input type="checkbox"/> Report in Annual Report</li> </ul> |
| <b>Erosion of stream bed and banks</b> | <input type="checkbox"/> Observations every month for at least two months prior to mining using photo points | <input type="checkbox"/> Observations every month during active undermining of 1 <sup>st</sup> and 2 <sup>nd</sup> order streams using photo points | <input type="checkbox"/> Observations every 2 months for one year after Nebo mining is completed using photo points | <b>NORMAL</b><br><b>No change in stream, bed or bank erosion compared to baseline period</b>                                                                                       | <ul style="list-style-type: none"> <li><input type="checkbox"/> Continue monitoring program</li> <li><input type="checkbox"/> Report in end of panel report</li> <li><input type="checkbox"/> Summarise all actions and monitoring in AEMR</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |
|                                        |                                                                                                              |                                                                                                                                                     |                                                                                                                     | <b>WITHIN PREDICTIONS</b><br><b>Minor decrease in stream, bed or bank stability compared to baseline period</b><br>i.e, small cracks with no observable change in stream stability | <ul style="list-style-type: none"> <li><input type="checkbox"/> Continue monitoring program</li> <li><input type="checkbox"/> Report in end of panel report</li> <li><input type="checkbox"/> Summarise all actions and monitoring in AEMR</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |
|                                        |                                                                                                              |                                                                                                                                                     |                                                                                                                     | <b>EXCEEDS PREDICTIONS</b>                                                                                                                                                         | <ul style="list-style-type: none"> <li><input type="checkbox"/> Inform SCA, OEH &amp; DRE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Feature                                                                         | Monitoring Commitments                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                        | TARPS                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                                                                                 |                                                                                                                                                                                                                                     |                                                                                                                                                 |                                                                                                                                                                        | <b>Major decrease in stream, bed or bank stability compared to baseline period</b><br><br>i.e. Cracks or other physical damage with permanent change in stream stability | immediately<br><br><input type="checkbox"/> Notify hydrology and ecology specialists immediately<br><input type="checkbox"/> Site visit with stakeholders<br><input type="checkbox"/> Take photographic record immediately<br><input type="checkbox"/> Contract specialist to investigate and report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable.<br><input type="checkbox"/> Report in Annual Report |
| <b>Groundwater quality</b><br><br>Using piezometers<br>Nebo1S, 1D, 2S, 2D, 3, 4 | <input type="checkbox"/> Field water quality (EC, pH) every 2 months<br><br><input type="checkbox"/> Laboratory analysis – every four months<br><br><input type="checkbox"/> Lab Parameters-- TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, | <input type="checkbox"/> Field water quality – monthly during extraction<br><br><input type="checkbox"/> Laboratory analysis – every two months | <input type="checkbox"/> Field water quality – every two months<br><br><input type="checkbox"/> Laboratory analysis – every four months until Nebo mining is completed | <b>NORMAL</b><br><br><b>No change in groundwater quality variability compared to baseline period</b>                                                                     | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Feature | Monitoring Commitments                                                |               |                                   | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|         | Prior to Mining                                                       | During Mining | Post Mining and Future Monitoring | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|         | NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, (filtered) |               |                                   | <b>WITHIN PREDICTIONS</b><br><b>Reduction in groundwater quality which extends for less than 2 months and does not persist after significant recharge (or lack of) events with the water having the following change above baseline variability;</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> EC &lt;20% increase above baseline maximum</li> <li><input type="checkbox"/> pH &lt; 1.5 drop below minimum baseline value</li> <li><input type="checkbox"/> Fe (Tot), Mn (tot), Al (filt), Zn (filt), SO4 (filt) &lt; 20% increase above baseline maximum</li> <li><input type="checkbox"/> Total N, Total P &lt; 20% increase above baseline maximum</li> </ul> <b>EXCEEDS PREDICTIONS</b><br><b>Reduction in groundwater quality which extends for more than 2 months and persists after significant recharge (or lack of) events with the water having the following change above baseline variability;</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> EC &gt;20% increase above baseline maximum</li> </ul> | <input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrogeology specialist immediately<br><input type="checkbox"/> Contract specialist to investigate and report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable. |

| Feature                                                                                                                                                                         | Monitoring Commitments                                                                                                                               |                                                                                                                                                  |                                                                                                                                                      | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|                                                                                                                                                                                 | Prior to Mining                                                                                                                                      | During Mining                                                                                                                                    | Post Mining and Future Monitoring                                                                                                                    | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                 |                                                                                                                                                      |                                                                                                                                                  |                                                                                                                                                      | <input type="checkbox"/> pH < 2.0 drop below minimum baseline value<br><input type="checkbox"/> Fe (Tot), Mn (tot), Al (filt), Zn (filt), SO4 (filt) > 20% increase above baseline maximum<br><input type="checkbox"/> Total N, Total P > 20% increase above baseline maximum                                                                                                                                                                                                                                                          | <input type="checkbox"/> Report in Annual Report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Ground Water Levels</b><br>Using vibrating wire piezometers Nebo 6, 7, 8, 8A, WW11, WW20B and dip meters/ transducers in open standpipe piezometers Nebo1S, 1D, 2S, 2D, 3, 4 | <input type="checkbox"/> Minimum 12 hourly in VWP and open standpipe piezometers<br><br><input type="checkbox"/> Bi- monthly downloads and dip meter | <input type="checkbox"/> Minimum 12 hourly in VWP and open standpipe piezometers<br><br><input type="checkbox"/> Monthly downloads and dip meter | <input type="checkbox"/> Minimum 12 hourly in VWP and open standpipe piezometers<br><br><input type="checkbox"/> Bi- monthly downloads and dip meter | <b>NORMAL</b><br><b>No change in groundwater level variability compared to baseline period</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Reduction in groundwater level which extends for less than 2 months, or does not persist after significant recharge (or lack of) events and is within baseline variability;</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Reduction in groundwater level which extends for more than 2 months, or persists after significant recharge (or lack of) events and is outside baseline variability;</b> | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrogeology specialist immediately<br><input type="checkbox"/> Contract specialist to investigate and |

| Feature                                                                                                           | Monitoring Commitments                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                     | TARPS                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|                                                                                                                   |                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                         | report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable.<br><input type="checkbox"/> Report in annual report                             |
| <b>Inflow into mine workings or hydraulic connectivity between stream/s and the workings during active mining</b> | <input type="checkbox"/> Daily volumetric flow monitoring of mine inflow and discharge<br><input type="checkbox"/> Water quality analysis of any anomalous inflow event | <input type="checkbox"/> Daily monitoring of mine inflow and discharge<br><input type="checkbox"/> Water quality analysis of any anomalous inflow event , with the sampling method and assessment parameters to be defined depending on what is being investigated, (i.e. major / minor elements, isotopes, algae etc.) | <input type="checkbox"/> Daily monitoring of mine inflow and discharge<br><input type="checkbox"/> Water quality analysis of any anomalous inflow event (as required) with the sampling method and assessment parameters to be defined depending on what is being investigated, (i.e. major / minor elements, isotopes, algae etc.) | <input type="checkbox"/> Increase in water discharge of > 1ML/day for 7 successive days from active longwall or pillar extraction areas, which are suspected to be as a result of mine subsidence and excluding elevated inflows due to high rain events over the entire Wongawilli workings<br><input type="checkbox"/> Note: the typical discharge from the overall Wongawilli underground is 6ML/day | <input type="checkbox"/> Engage hydrogeologist to investigate and report on changes identified<br><input type="checkbox"/> Inform relevant agencies of investigation<br><input type="checkbox"/> Investigation initiated within one week of trigger exceedance being observed<br><input type="checkbox"/> Monthly updates of investigation process to SCA, NOW<br><input type="checkbox"/> Report on mitigation as soon as practicable to SCA, NOW<br><input type="checkbox"/> Report in Annual Review |

## 8 BIODIVERSITY MANAGEMENT PLAN

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### 8.1 Objectives

The objectives of this Biodiversity Management Plan are to:

- ☐ provide a framework to monitor and manage 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 dependent ecosystems.
- ☐ satisfy the requirements of the Project Approval, all agencies and the expectations of the community.

### 8.2 Summary of Predicted Impacts

#### 8.2.1 Aquatic Ecology

##### Introduction

An aquatic ecology assessment was undertaken for the Project by Cardno Ecology Lab Pty Ltd (Cardno). Cardno prepared two reports, the first a description of the aquatic biota and habitats of the Nebo area and the second provided an assessment of the likelihood and significance of potential impacts on aquatic habitat and biota. Refer to Volume 2, Annexures of the EA.

##### Existing Environment

Wattle Creek runs directly above the northern extent of the proposed Nebo longwalls where it is classified as a 3<sup>rd</sup> order stream immediately north of Longwalls N2 and N3. The balance of Wattle Creek, within the potential subsidence footprint is classified as a 2<sup>nd</sup> order stream in a steep valley dominated by rainforest vegetation with Eucalypt dominated vegetation on the valley sides. Vegetation extends to the edge of the watercourse to create considerable shading of the creek (Cardno, 2009).

The channel of Wattle Creek has a moderate gradient and continuous flow that is characterised by relatively small, shallow pools separated by frequent short riffle sequences. The stream banks consist mainly of well vegetated sandy soil or large boulders with little erosion or undercutting evident. There are numerous in-stream

habitat features including snags, tree roots and organic detritus (Cardno, 2009). Aquatic macrophytes have been observed within the stream channel (Biosis 2011).

A small tributary of Wattle Creek that runs along the south-eastern edge of the potential subsidence footprint was also inspected and found to contain very little aquatic habitat. Some water was observed in shallow shaded pools in the lower reaches of the tributary however no flow and diminishing pools were observed in a brief inspection of the upper reaches (Cardno, 2009).

The aquatic habitat in Wattle Creek was assessed to be in an excellent and relatively undisturbed condition with suitable habitat for an extensive suite of aquatic biota characteristic of ephemeral or intermittent streams in the area (Cardno, 2009).

One small section of the upper reach of Little Wattle Tree Creek is within the potential subsidence footprint. The creek is a 1<sup>st</sup> order watercourse at this location and becomes a 2<sup>nd</sup> order water course further downstream.

There is limited aquatic habitat within Little Wattle Tree Creek, apart from some small ephemeral pools separated by narrow shallow riffles, neither of which is expected to persist through prolonged dry periods.

### **Threatened Species**

Cardno (2009) indicated that three threatened species could potentially occur within the potential subsidence footprint. These species are:

- ☐ Adam's Emerald Dragonfly (*Archaeophya adamsi*), listed as vulnerable under the FM Act;
- ☐ Sydney Hawk Dragonfly (*Austrocordulia leonardi*), listed as endangered under the FM Act; and
- ☐ Macquarie Perch (*Macquaria australasica*), listed as vulnerable under the FM Act and as endangered under the EPBC Act.

### **Impact Assessment**

MSEC concluded that due to the low predicted subsidence and strain values, fracture of the bedrock along the watercourses and any observable loss of surface water is unlikely. MSEC (2010) also noted that predicted changes in stream gradient are much smaller than the natural stream gradients within the potential subsidence footprint, so are unlikely to cause additional ponding, flooding or scouring.

Subsidence arising from the extraction of the Nebo area longwalls is not expected to have any adverse effects on water quality in the sections of Wattle Creek or Little Wattle Tree Creek within the potential subsidence footprint (Geoterra 2010).

As subsidence arising from the mining of Nebo area longwalls is not expected to have any adverse effects on stream flow or water quality and it is highly unlikely

that there would be any observable flow-on effects on aquatic habitats or their biota within or immediately downstream of the potential subsidence footprint.

### **Adams Emerald Dragonfly**

Adam's Emerald Dragonfly is extremely rare, having been collected only in small numbers at four locations in New South Wales. There are no records of this species occurring within Wattle Creek, Little Wattle Tree Creek or Cordeaux River catchment. No specimens were found in the creeks surveyed during the baseline studies. The Upper Cordeaux River does however fall into what is understood as the historical range for this species.

Field investigations indicate that there is suitable habitat for Adam's Emerald Dragonfly, albeit of limited extent, within Wattle Creek. Although the current distribution records suggest that this species is unlikely to occur within the potential subsidence footprint, as a precautionary approach, a Seven-Part Test was prepared for this species (*Annex L of the EA*). The test concluded that Adam's Emerald Dragonfly is unlikely to be present within this habitat. In the unlikely case that this species is present within the potential subsidence footprint, it is further highly unlikely that the proposed mining would have any significant impact on this species.

### **Sydney Hawk Dragonfly**

Sydney Hawk Dragonfly is extremely rare, having originally been collected in small numbers at only a few locations in a small area south of Sydney. There are no records of this species occurring within Wattle Creek, Little Wattle Tree Creek or the Cordeaux River catchment.

The nearest watercourse to the Nebo area containing suitable habitat for the Sydney Hawk Dragonfly is likely to be the Cordeaux River, which is outside the potential subsidence footprint.

### **Macquarie Perch**

The upper Cordeaux River (upstream of the Number 2 dam) contains extensive suitable habitat for the Macquarie Perch, and is within what is understood as the historical range for the species. It is therefore considered possible that a remnant population of this species could exist in this sub-catchment.

The lower reaches of Wattle Creek and Little Wattle Tree Creek contain suitable spawning habitat, including pools and riffles, for this species. If a remnant population is present within the Number 2 dam, it is possible that the lower reaches of these creeks may be utilised by this species. However barriers to passage in the form of road causeways are present between the potential subsidence footprint and the reservoir and it is therefore considered highly unlikely

that this utilisation would extend into the potential subsidence footprint. There are also very few persistent pools that could provide habitat for this species.

No Macquarie Perch were found during the Spring 2009 survey undertaken in Wattle Creek.

On the basis of current distribution records, available habitat, and barriers to passage, it is considered that this species is highly unlikely to occur within the potential subsidence footprint. Furthermore the predicted subsidence should not impact on these creeks.

### 8.2.2 Terrestrial Ecology

A terrestrial flora and fauna assessment was undertaken for the Project by ERM and included desktop investigations and field survey. Desktop research included analysis of relevant literature, databases and existing vegetation mapping for the ecology study area. Field surveys assessed the distribution and condition of habitat for threatened species, populations and ecological communities, and surveyed for threatened flora and fauna. Seasonal surveys were undertaken by two ecologists between 21 to 24 July, 30 November to 3 December and 14 to 17 December 2009.

#### Existing Environment

##### Flora

The vegetation communities identified within the ecology study area are listed below:

- ☐ Moist Gully Gum Forest;
- ☐ Tall Open Peppermint-Blue Gum Forest;
- ☐ Coachwood Warm Temperate Rainforest;
- ☐ Tall Open Gully Gum Forest;
- ☐ Exposed Sandstone Scribbly Gum Woodland;
- ☐ Sandstone Gully Peppermint-Blue Gum Forest;
- ☐ Moist Blue Gum - Blackbutt Forest;
- ☐ Upland Swamp: Sedgeland-Heath Complex (Swamp 22 and Swamp 39);
- ☐ Upland Swamp: Tea-tree Thicket (Swamp 22);
- ☐ Upland Swamp: Banksia Thicket; and
- ☐ Rock-Plate Heath-Mallee.

Two rare plant species listed on the RoTAP register, *Darwinia grandiflora* (listed as 2RCi) and *Boronia fraseri* (listed as 2RCa) were recorded during the field survey.

In addition it is recognised that potential habitat is available for the following 12 rare and threatened flora species:

- ☐ Deane's Melaleuca (*Melaleuca deanei*);
- ☐ *Epacris coriacea*;
- ☐ *Epacris purpurascens* var. *purpurascens*;
- ☐ Fern-leaf Grevillea (*Grevillea longifolia*);
- ☐ Lizard Orchid (*Burnettia cuneata*);
- ☐ Prickly Bush-pea (*Pultenaea aristata*);
- ☐ River Mat-Rush (*Lomandra fluviatilis*);
- ☐ Rufous Pomaderris (*Pomaderris brunnea*);
- ☐ Shiny-leaf Guinea Flower (*Hibbertia nitida*);
- ☐ Thick Lip Spider Orchid (*Caladenia tessellate*);
- ☐ White-flowered Wax Plant (*Cynanchum elegans*); and
- ☐ Woronora Beard-heath (*Leucopogon exolasius*).

One EEC listed under the TSC Act is mapped as occurring within the ecology study area; Illawarra Subtropical Rainforest in the Sydney Basin Bioregion. This EEC was not confirmed to occur within the ecology study area during field investigations.

## Fauna

A total of 62 fauna species were identified during the survey, including three threatened species listed under the TSC Act. A full list of fauna species recorded within the ecology study area is provided in *Annex M of the EA*.

### Frogs

Five frog species were recorded from direct observations of adults and tadpoles, and through auditory identification. No species listed on the TSC Act or EPBC Act were recorded, although suitable habitat for the Giant Burrowing Frog (*Heleioporus australiacus*), Red-crowned Toadlet (*Pseudophryne australis*), Littlejohn's Tree Frog (*Litoria littlejohni*) and Stuttering Barred Frog (*Mixophyes balbus*) was recorded.

### Reptiles

Five reptile species were recorded within the ecology study area. One individual Rosenberg's Goanna, which is listed as vulnerable under the TSC Act, was recorded to the west of the ecology study area. Suitable habitat containing west-facing rock ledges and overhangs is located west of the ecology study area where the species was recorded during field investigations. However, it is not expected that species

would occur east of the sandstone ridgeline due to occurrence of deep gullies and moist forests.

The Broad-headed Snake is expected to occur within the western portion of the ecology study area, as exfoliating sandstone suitable for use as shelter habitat was recorded. However, the habitat recorded is confined to a small area and would not be likely to contain a significant population.

#### Insects

One threatened insect species was recorded within the ecology study area during field investigations (see *Figure 16.6*). The Giant Dragonfly is listed as endangered under the TSC Act and was recorded within the Swamp 22: Sedgeland-Heath Complex. Nine individuals and one mating pair were recorded during the December survey period

#### Birds

Twenty eight bird species were recorded within the ecology study area including the threatened Powerful Owl (*Ninox strenua*) and Beautiful Firetail (*Stagonopleura bella*) as well as the Southern Emu Wren (*Stipiturus malachurus*) which was identified as susceptible to subsidence by DoP (2008). The majority of the species recorded are widespread and/or abundant species that commonly occur in woodland, heathland, regrowth vegetation and various other habitats. A full list of bird species recorded is provided in *Annex M of the EA*. However, the location of where the Beautiful Firetail was recorded is not available due to the record being incidental.

Suitable habitat for the Eastern Ground Parrot (*Pezoporus wallicus wallicus*) was recorded in the Swamp 22: Sedgeland-Heath Complex within upper Cordeaux River. Habitat for the Black Bittern (*Ixobrychus flavicollis*) was recorded within some areas of dense upland swamp and Upper Cordeaux No. 1 Reservoir and Upper Cordeaux No. 2 Reservoir. Call broadcasting and searches of suitable habitat failed to detect any evidence of either species.

#### Mammals

Macropod scats were found within all habitats, with the most commonly observed species being the Swamp Wallaby. Wombat scats were also common across the ecology study area. Sugar Gliders (*Petaurus breviceps*) were recorded within the forested portions of the ecology study area during spotlighting.

Potential habitat for the Koala was identified within the ecology study area associated with Tall Open Peppermint – Blue Gum Forest. The Koala is a threatened species listed under the TSC Act and was heard calling within tall open forest to the north of Fire Road 6D. However, the species was unable to be visually identified.

Nine microchiropteran species were recorded from Anabat recordings, including the Eastern Bentwing-bat which is listed as vulnerable under the TSC Act.

Habitat searches recorded suitable habitat for the Spotted-tailed Quoll although no latrine sites, scats or dens of the species were recorded. Suitable sheltering and foraging habitat was recorded for the Brush-tailed Rock Wallaby, listed as endangered under the TSC Act and vulnerable under the EPBC Act. The Brush-tailed Wallaby has previously been recorded approximately 2km west of Longwall N5. However, searches of suitable habitat failed to detect evidence of the species.

Searches of rocky outcrops, overhangs and road culverts did not detect any bat roosts. There were no records of flying-foxes and no camps were detected within the ecology study area, although suitable habitat does occur.

### **Impact Assessment**

MSEC (2010) advises that as a result of the strength and bridging capacity of the Cordeaux Crinanite, the predicted subsidence values are significantly lower than the typical subsidence values that have been observed in normal sedimentary strata in the Southern Coalfield. Therefore, the potential impacts to sensitive areas are low.

Potential direct and indirect impacts from subsidence are summarised in **Table 8.1 Potential Impacts to Flora and Fauna from Subsidence TARPs Summary**. Further detail is provided in *Annex M of the EA*.

**Table 8.1 Potential Impacts to Flora and Fauna from Subsidence TARPs Summary**

| Natural Feature                        | Subsidence Impact                                        | Potential Effect on Flora/Fauna                                                                                                                  | Potential to Occur within the ecology study area                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rivers (creeks, streams, tributaries). | Surface cracking due to subsidence.                      | Loss of surface flows or water levels (increased frequency, duration and magnitude of drying aquatic habitats).                                  | Low - The maximum predicted subsidence along the creeks is approximately 250mm which occurs above Longwall N5. The predicted subsidence movements and valley related movements along the creeks are predicted to be very low (MSEC 2010). GeoTerra (2010) anticipate that no significant adverse effects will be observed in the creek bed or catchment of Wattle Creek or Little Wattle Tree Creek. Consequently the potential for related impacts on flora and fauna will be low. |
|                                        |                                                          | Drying of river pools, in-stream macrophyte beds and wetlands leading to loss of aquatic or in-stream habitats                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                                          | Loss of longitudinal connectivity (connectivity between pools and riffles) may reduce fauna migration opportunities                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                                          | Changes to water quality (increased iron oxides, manganese, sulphides and electrical conductivity, and lower dissolved oxygen).                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                                          | Reduced diversity of in-stream habitat due to the growth of iron-oxidising bacteria which can also be seen as a rusty-coloured mass in the water |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                                          | Release of gas into the water column - oxidation of gas may lead to death of riparian vegetation and in-stream fauna                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        | Water-rock chemical interactions along new flow pathways | Changes in water quality / quantity in streams and creeks including increased iron-oxidisation and bacteria flocculation                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        | Tilting of stream beds.                                  | Stream bank erosion altering aquatic and riparian habitat                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        | Ponding in subsidence troughs                            | Inundation of vegetation.                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Natural Feature | Subsidence Impact                                                                                                                              | Potential Effect on Flora/Fauna                                                                                                                                                                                                                                                              | Potential to Occur within the ecology study area                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vegetation      | Permanent tree tilt due to subsidence.                                                                                                         | Tree tilt/ fall causing damage to adjacent vegetation and loss of fauna habitat.                                                                                                                                                                                                             | Low – Tree tilt and fall has potential to occur within terrestrial habitats.                                                                                                                                                                                                                                                              |
|                 | Depressurisation of groundwater from extraction of the coal seam                                                                               | Lowering of the watertable beyond the reach of plants, causing degradation of vegetation communities                                                                                                                                                                                         | Low – The maximum subsidence prediction is within rainforest communities including Coachwood Warm Temperate Rainforest and Moist Gully Gum Forest. The potential for impacts on the water table in this locality are expected to be low. As a result the potential for associated consequences for flora and fauna are expected to be low |
| Upland Swamps   | Draining of perched water table and loss of swamp soil moisture due to cracking of clay or shale seals which typically underlie upland swamps. | Loss of swamp vegetation dependent on high soil moisture or change of species composition                                                                                                                                                                                                    | Low – Swamp No.22 and Swamp No.39 are at least 40m from the predicted subsidence footprint and over 400m from the greatest predicted subsidence. The potential for the predicted subsidence to impact on upland swamps is therefore expected to be low.                                                                                   |
|                 |                                                                                                                                                | Loss of fauna, including threatened species dependent on swamp ecosystems                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                           |
|                 |                                                                                                                                                | Loss of water purification and flow regulation function for downstream ecosystems                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                           |
|                 |                                                                                                                                                | Increased susceptibility to fire which may increase impacts to swamp dependent species                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                           |
|                 |                                                                                                                                                | Gullying and erosion of swamps, exacerbating the draining of water from swamp soils                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                           |
|                 |                                                                                                                                                | Increased fire frequency due to drying events                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                           |
|                 |                                                                                                                                                | Potential drop in perched water table leading to: <ul style="list-style-type: none"> <li>loss of standing water, removing habitat for freshwater dependant flor and fauna;</li> <li>change in swamp vegetation communities.</li> <li>draining/ drying of springs, soaks and dams.</li> </ul> |                                                                                                                                                                                                                                                                                                                                           |

| Natural Feature | Subsidence Impact                               | Potential Effect on Flora/Fauna                                                                                                                                                                                                                                          | Potential to Occur within the ecology study area                                     |
|-----------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Rocky habitats  | Surface cracking, rock falls and cave collapse  | Loss of habitat for cave dependent species                                                                                                                                                                                                                               | Low - There are no rock faces or rocky areas within the zone of greatest subsidence. |
|                 |                                                 | Short term damage to riparian vegetation an in-stream habitats                                                                                                                                                                                                           |                                                                                      |
|                 |                                                 | Loss of shelter sites for wintering reptiles and other animals                                                                                                                                                                                                           |                                                                                      |
|                 | Surface cracking within cliffs                  | Loss of habitat for cliff dependent species and damage to riparian vegetation.                                                                                                                                                                                           |                                                                                      |
|                 |                                                 | Large cracks may act as temporary pitfall for reptiles and small mammals.                                                                                                                                                                                                |                                                                                      |
|                 | Cliff collapse and rock fall                    | Loss of habitat for cliff dependent species (eg loss of roosts for bats and nest sites for cliff-nesting birds).                                                                                                                                                         |                                                                                      |
|                 | Cracking and movement within rocks below swamps | Potential drop in perched water table leading to: <ul style="list-style-type: none"> <li>• loss of standing pools, with impacts on amphibians;</li> <li>• change in swamp vegetation communities; and</li> <li>• draining/ drying of springs, soaks and dams.</li> </ul> |                                                                                      |
|                 | Surface cracking                                | Alter and possibly destroy rock shelters and burrows.                                                                                                                                                                                                                    |                                                                                      |

## Assessments of Significance

Section 5A of the EP&A Act sets out seven factors that need to be considered in determining whether a proposed action will, or is likely to, have a significant impact on a threatened species, endangered population or endangered ecological community listed under the schedules of the *Threatened Species Conservation Act 1995* (TSC Act).

The decision to assess a threatened species under Section 5A of the EP&A Act is based on a combination of the likelihood of occurrence within the potential subsidence footprint, and vulnerability of the species to subsidence. Four species were assessed using the seven-part test of significance (see *Annex M*).

The results of the seven-part test assessments are listed in **Table 8.2 Summary of Findings In Regard To Significance Impacts**

**Table 8.2 Summary of Findings In Regard To Significance Impacts**

| Species                                                                | Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stuttering Barred Frog<br>( <i>Mixophyes balbus</i> )                  | <ul style="list-style-type: none"> <li>no significant impacts to species habitat or its life cycle;</li> <li>the proposed action does not constitute a Key Threatening Process (KTP); and</li> <li>if the species does occur within the ecology study area, Wattle Creek and Little Wattle Tree Creek would be important breeding habitat in the local and regional context due to the marked decline in distribution and abundance of the species in Australia.</li> </ul>                                     |
| Eastern Bentwing-bat<br>( <i>Miniopterus schreibersii oceanensis</i> ) | <ul style="list-style-type: none"> <li>no significant impacts to species habitat or its life cycle;</li> <li>the proposed action does not constitute a KTP; and</li> <li>due to the species being recorded within the ecology study area and quality of potential habitat observed during field surveys, the rocky outcrops and cliff lines are important roosting habitat for the Eastern Bentwing-bat in the local and regional context.</li> </ul>                                                           |
| Woronora Beard-heath<br>( <i>Leucopogon exolasius</i> )                | <ul style="list-style-type: none"> <li>no significant impacts to species habitat or its life cycle;</li> <li>the proposed action does not constitute a KTP; and</li> <li>if the species occurred within the ecology study area, the Tall Open Peppermint-Blue Gum Forest, Sandstone Gully Peppermint Forest and Exposed Sandstone Scribbly Gum Forest would be important habitat within the local context due to its connectivity and being located within SCA land which is a protected area.</li> </ul>       |
| Rufous Pomaderris<br>( <i>Pomaderris brunnea</i> )                     | <ul style="list-style-type: none"> <li>no significant impacts to species habitat or its life cycle;</li> <li>the proposed action does not constitute a KTP; and</li> <li>if the species occurred within the ecology study area, the Moist Gully Gum Forest along Wattle Creek and Little Wattle Tree Creek would be important habitat within the local context due to the good quality of the community identified during field surveys and being located within SCA land which is a protected area.</li> </ul> |

### Commonwealth Threatened and Migratory Species

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires approval for actions that may have a significant impact on matters of national environmental significance or Commonwealth land. There are no World Heritage properties, National Heritage Places, Ramsar wetlands, Commonwealth marine areas or nuclear actions in or near the ecology study area.

### Endangered Ecological Communities

No Commonwealth listed endangered ecological communities were considered to have the potential to occur within the ecology study area, or within 10 km from the ecology study area and none were recorded during field investigations.

### Threatened Species

Twenty one Commonwealth listed threatened species have been recorded or have a high likelihood of occurring in the ecology study area. The proposed action is not predicted to have a significant impact on any threatened species or their habitat, listed under the EPBC Act.

### Migratory Species

Four migratory bird species have been identified as having the potential to occur within the ecology study area. The proposed action is not predicted to constitute a significant impact on any species listed as migratory under the EPBC Act.

### **No Significant Impact to Threatened Flora or Fauna**

MSEC (2010) predicts the systematic subsidence and valley related movements to be very low. The maximum predicted subsidence within the ecology study area resulting from the extraction of LWN1 to N6 is 410mm. Therefore, the Project is not predicted to have a significant impact on any threatened flora and fauna species or their habitat, listed under the TSC Act and EPBC Act.

## 8.3 Monitoring and Management Program

### 8.3.1 Aquatic Monitoring Program

The aquatic monitoring program, including site selection and development of methodology, has been prepared by Biosis Research Pty. Ltd., in consultation with Gujarat NRE Wonga Pty. Ltd. Biosis Research have provided the following data.

The existing program for aquatic monitoring for the Nebo Area includes the following sites:

Aquatic Sites (Refer Figure 8.1)

Eight creekline sites:

- ☐ Little Wattle Creek (LWC-AQ1);
- ☐ Little Wattle Creek (LWC-AQ2);
- ☐ Wattle Creek (WAC-AQ1);
- ☐ Wattle Creek (WAC-AQ2);
- ☐ Wattle Creek (WAC-AQ3);
- ☐ Wattle Creek (WAC-AQ4);
- ☐ Wattle Creek (WAC-AQ5); and ,
- ☐ Wattle Creek (WAC-AQ6).

Four Reference creekline sites:

- ☐ Kentish Creek Tributary (KCT-AQ1);
- ☐ Kentish Creek (KEC-AQ1);
- ☐ Meemi Creek (MEC-AQ1); and,
- ☐ Morans Gully Creek (MGC-AQ1).

Aquatic monitoring, including collection of baseline data, commenced in May 2011. Aquatic monitoring will be undertaken in each Autumn and Spring as per the methods described below.

#### Aquatic Methodology

As freshwater streams are naturally variable and highly responsive to changes in broader environmental conditions (such as rainfall), it is important that a monitoring program has the potential to distinguish between changes in a waterway that are due to a putative impact (i.e. longwall mining) or due to an outside factor such as changed rainfall conditions or another disturbance such as sedimentation or runoff. This requires the addition of “reference” sampling sites that can be compared to the “impact” site downstream of the development. Reference sites are typically sites of

similar altitude, topography and with similar riparian condition that can be reasonably compared to the potential impact site. If a change is detected at the impact site, but is also detected at the reference sites, this suggests that a more regional impact - such as changes in aquatic ecology due to rainfall - has occurred. Conversely, a change in an impact site that is not reflected in the surrounding reference sites suggests that a localised impact has occurred, which may be due to the longwall mining operations.

#### Aquatic Habitat and AUSRIVAS Monitoring

The NSW AUSRIVAS rapid assessment method is currently being used for each of the sampling sites. This method involves the collection of aquatic macroinvertebrate samples to measure the diversity and community structure, which is used to assess the overall ecological health of the site. By collecting regular samples from multiple sites, the ecological stability and response of biota to ecological disturbance at any given site can be quickly assessed. The AUSRIVAS computer model is designed to be applied for samples collected throughout the autumn and spring seasons only (15th March to 15th June, 15th September to 15th December). It is recommended that samples be collected biannually during these two seasons in order to maximise the value of the monitoring program.

General site assessments would also be conducted in combination with AUSRIVAS sampling. These would typically involve descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality, all of which would be used in the interpretation of biological sampling results.

#### Photo point monitoring

Photo point monitoring will be conducted at all monitored sites that will be mined beneath. Photographs will be taken at each site at a fixed location and view angle. These photos will be used to directly compare habitat condition from one year to the next. Photo point monitoring will be conducted in autumn and spring and will supplement the aquatic habitat and AUSRIVAS monitoring by providing a visual representation of the monitored sites. Fixed point photography will also be established to monitor the presence of iron oxidising bacteria and surface water levels at AUSRIVAS monitoring sites.

#### Reference Sites

The BACI (Before-After/Control-Impact) approach is a widely used method for measuring the potential impact of a discharge, disturbance, or event on the aquatic invertebrates of a stream. Such effects can be analysed by measuring conditions before a planned activity and then comparing the findings to those conditions measured after. This approach is applicable for comparing the effects of anticipated

future activities. If it is an existing activity, it may not be possible to measure the before conditions. In these cases, studies often make use of an unaffected or control stream reach and use those data for comparisons to an affected or impacted reach.

### 8.3.2 Terrestrial Monitoring Program

The terrestrial monitoring program, including site selection and development of methodology, has been prepared by Biosis Research Pty. Ltd., in consultation with Gujarat NRE Wonga Pty. Ltd. Biosis Research have provided the following data.

Two creekline sites (**Figure 8.1**) are proposed:

- ☐ Wattle Tree Creek (WTC); and,
- ☐ Little Wattle Tree Creek (LWTC).

In addition to four reference sites:

- ☐ Easement Creek (EC);
- ☐ 8I Creek (8Ic);
- ☐ Donalds Castle Tributary; and,
- ☐ Flying Fox Creek 3#.

There are no significant swamp or ridgeline features in the vicinity of the proposed Nebo Area longwalls.

Terrestrial monitoring, including collection of baseline data, commenced in December 2010. Terrestrial monitoring will be undertaken in each Autumn and Spring as per the methods described below.

### Terrestrial Methodology

The following section describes the existing terrestrial ecological monitoring methodology for Nebo Collieries.

**Table 8.3 Summary of Terrestrial Monitoring Methodology** Table 8.3 below represents a summary of this terrestrial ecological monitoring methodology and follows the same suite of methods that have been developed in consultation with the consent authorities (e.g. OEH) for other ecological monitoring programs in the Southern Coalfields.

### Table 8.3 Summary of Terrestrial Monitoring Methodology and Frequency

NRE Wongawilli Colliery Nebo Longwalls N1-N6

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| Survey Type and Frequency                             | Creeklines                                                                      |                                                                                        |
|-------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
|                                                       | Sites                                                                           | Methods                                                                                |
| <b>Vegetation</b><br>Spring and Autumn                | Three 20 m x 20 m quadrats ~150-200m apart per creekline                        | Species inventory and modified Braun Blanquette cover Abundance score for each species |
| <b>Amphibians</b><br>Spring and Autumn                | Three locations ~150-200m apart along each creekline conducted twice per season | 50 m nocturnal stream searches and tadpole surveys                                     |
| <b>Winter Threatened Amphibian Surveys*</b><br>Winter | Wattle Creek and Little Wattle Tree Creek                                       | Nocturnal stream searches and tadpole survey along length of creekline                 |

Source: (Biosis Research Pty. Ltd.)

### Vegetation

Vegetation surveys will continue to be conducted in riparian vegetation along creek lines in spring and autumn (Table 3). Monitoring points have been permanently established in the field using star pickets and wooden stakes to mark out corner points of quadrats. The main point, marked using a star picket, is recorded using a handheld GPS unit and mapped on aerials.

Conducting vegetation surveys over both the spring and autumn season will account for the variation in optimal detection times for different plant species, and therefore, allow for the collection of a more complete spectrum of flora species. This methodology strengthens statistical analysis when comparing vegetation communities.

Photo point monitoring is undertaken during creek line surveys to provide a visual representation of changes in vegetation density and cover of the monitored sites.

### Autumn and Spring Amphibian Monitoring

Amphibian surveys will continue to be conducted along creek lines in autumn and spring. Three monitoring points per site are surveyed twice per season (spring and autumn) to account for seasonal variability in species and ensure statistical adequacy.

Creek line surveys consist of 50 m nocturnal stream searches at fixed locations. Monitoring points have been permanently established in the field using wooden stakes and recorded using a handheld GPS unit. The monitoring points are then mapped on aerials.

Photo point monitoring is undertaken to complement the creek line amphibian monitoring by visually comparing amphibian habitats seasonally and annually.

### Winter Threatened Amphibian Species Targeted Surveys

Due to the detection of a large population of the threatened species Littlejohn's Tree Frog within the Southern Coalfields area, targeted surveys for this species have been carried out annually in winter months, when the species is most detectable.

The aim of these targeted surveys is to monitor known locations of this threatened species of amphibian in order to detect any potential changes in distribution and abundance. In addition to surveying known locations of Littlejohn's Tree Frog, annual targeted surveys also aim to identify new areas of habitat for this species (during diurnal habitat assessments). Where suitable areas of Littlejohn's Tree Frog habitat are identified, they are then incorporated into future nocturnal targeted surveys.

The current standardised transects will be continued in order to maintain repeatable survey effort at the reference sites and at sites that are yet to be mined beneath. This will enable direct comparison of the numbers of individuals recorded at each site from one year to the next.

In the process of these surveys, opportunistic survey for other threatened amphibian species will be undertaken, including searches for the Red-crowned Toadlet and the Giant Burrowing Frog given the high number tadpoles of this species in previous winter surveys. Opportunistic searches for new sites where the Giant Burrowing Frog has the potential to occur in future impact areas will continue.

#### Photo Point Monitoring

Photo point monitoring is undertaken in autumn and spring to complement the vegetation and fauna monitoring by providing a visual representation of the monitored sites. The photos are used to directly compare habitat condition from one year to the next.

Two photos are taken at each creek line vegetation quadrat from the marked star picket. Two fauna photo points are taken upstream and downstream in creek lines sites. In order to compare with previous years, photos are taken from the same perspective each season.

Photo point monitoring will be conducted at all monitored sites (reference and impact sites). Photographs will be taken at each site at a fixed location and view angle.

#### Statistical Analysis

A hierarchical approach to statistical analyses will be undertaken, commencing with assessment of global community composition and data visualisation. Following this tests for impact will be undertaken followed by more in depth analysis of any areas where impacts have been detected.

The analysis will compare control sites with impacts sites and pre-mining data with post-mining data, as a part of the BACI design.

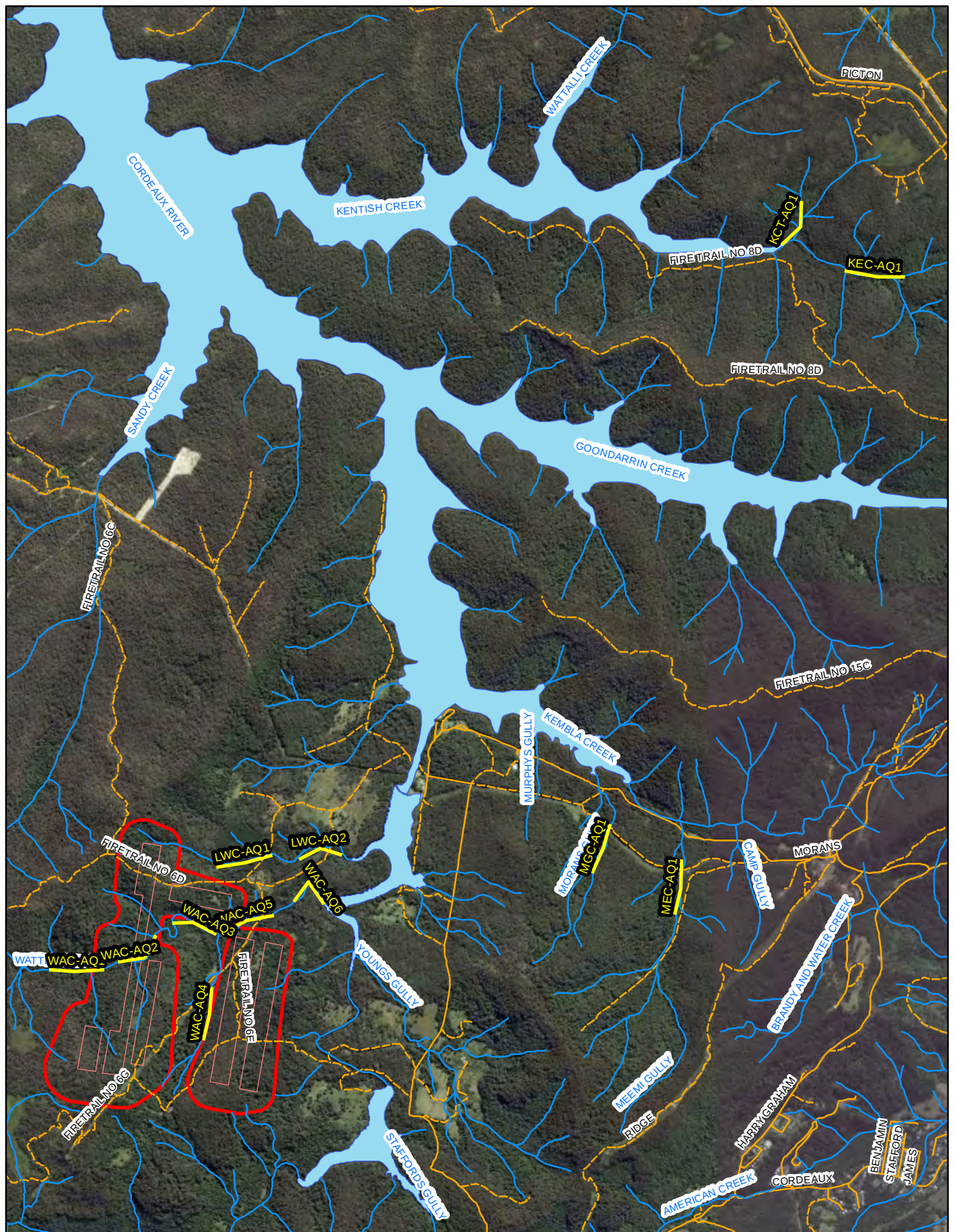


Figure 8.1 Aquatic Monitoring Plan

1098 Nebo Extraction Plan

Drawn by: RJ

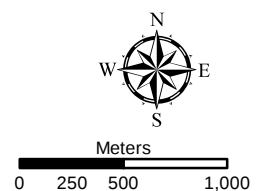
Project Mgr: CM

Date: 2/05/2012

— Aquatic Monitoring Lines

□ Application Area

□ Longwalls



**niche**  
Environment and Heritage

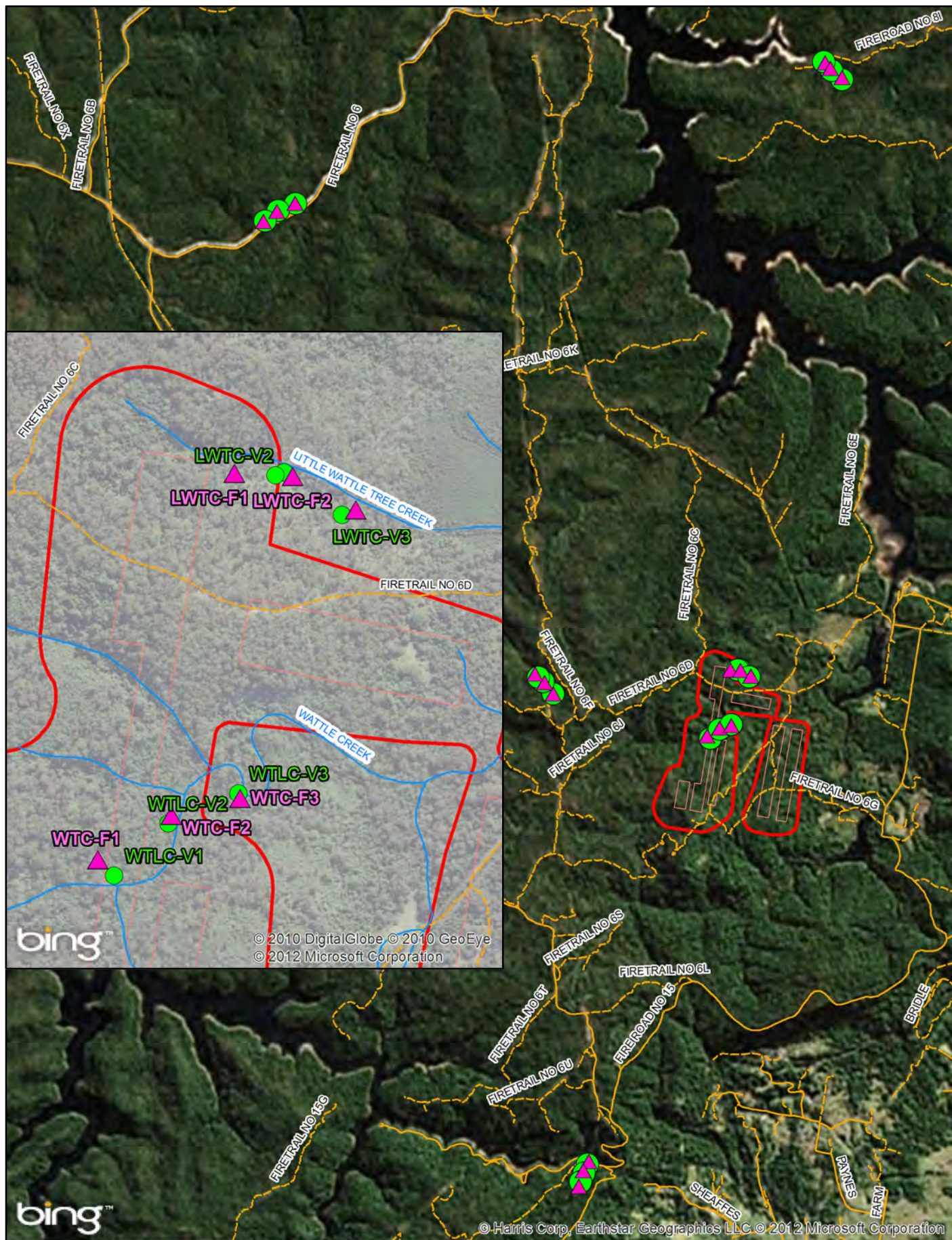


Figure 8.2 Flora and Fauna Monitoring Plan

1098 Nebo Extraction Plan

Drawn by: RJ

Project Mgr: CM

Date: 23/11/2012

▲ Fauna Monitoring Sites

● Flora Monitoring Sites

Application Area

Longwalls



Meters  
0 250 500 1,000 1,500

**niche**  
Environment and Heritage

**Table 8.4 Biodiversity Monitoring and TARPs Summary**

| Feature                                                                                                                       | Monitoring Commitments                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | TARPS                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                               | Prior to Mining                                                                                                                                                                                                                                                                                                                                                                                    | During Mining                                                                                                                                                                                                                                                                                                                                                                                                                  | Post Mining and Future Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Trigger                                                                                                                                                                                                                                                                                                                                                                                                         | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Aquatic Ecology</b><br>6 Monitoring sites on Wattle Tree Creek<br>2 sites on Little Wattle Tree Creek<br>4 Reference sites | <input type="checkbox"/> Observational monitoring for presence/absence of aquatic habitat during water quality monitoring regime<br><br><input type="checkbox"/> AUSRIVAS macroinvertebrate sampling of reference and impact sites. Descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality (Biannually in Autumn and Spring) | <input type="checkbox"/> Observational monitoring for presence/absence of aquatic habitat during water quality monitoring regime<br><br><input type="checkbox"/> AUSRIVAS macroinvertebrate sampling of reference and impact sites. Descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality (Biannually in Autumn and Spring) Ongoing seasonal monitoring | <input type="checkbox"/> Observational monitoring for presence/absence of aquatic habitat during water quality monitoring regime for a minimum of one year post-mining (in consultation with key regulators)<br><br><input type="checkbox"/> AUSRIVAS macroinvertebrate sampling of reference and impact sites. Descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality for a minimum of one year post-mining (in consultation with key regulators) (Biannually in Autumn and Spring) | <b>NORMAL</b><br><b>No change in aquatic biota compared to baseline observed</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Water flow and quality results within predictions. Survey results within baseline variability</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Water flow and quality results exceed predictions.</b><br><b>Statistically significant change observed in survey results against baseline</b> | <input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Notification to SCA/DoPI/OEH immediately<br><input type="checkbox"/> Proposal for any proposed additional monitoring and management measures within 1 week if required<br><input type="checkbox"/> Completion of agreed management task following approval from SCA/DoPI/OEH<br><input type="checkbox"/> Additional monitoring as required by the relevant government agencies<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Reporting in Incident and Annual Review |

| Feature                                                                                     | Monitoring Commitments                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                      | TARPS                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                             | Prior to Mining                                                                                                                                                                                                                                                                                                                                                                                                         | During Mining                                                                                                                                                                                                                                                                                                                                                                           | Post Mining and Future Monitoring                                                                                                                                                                                                                                                                                    | Trigger                                                                                                                                                                                                                                                                                                                                                   | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Terrestrial Ecology</b><br><br><b>Amphibians</b>                                         | <input type="checkbox"/> Baseline ecological assessment.<br><br><input type="checkbox"/> Observational monitoring– 50 m nocturnal stream searches and tadpole surveys at three locations ~150-200m apart along Wattle Creek and Little Wattle Tree Creek conducted Autumn and Spring<br><br><input type="checkbox"/> Targeted Threatened Amphibian searches each Winter along Wattle Creek and Little Wattle Tree Creek | <input type="checkbox"/> Observational monitoring– 50 m nocturnal stream searches and tadpole surveys at three locations ~150-200m apart along Wattle Creek and Little Wattle Tree Creek conducted Autumn and Spring during entire extraction period<br><br><input type="checkbox"/> Targeted Threatened Amphibian searches each Winter along Wattle Creek and Little Wattle Tree Creek | <input type="checkbox"/> Observational monitoring– Autumn and Spring for a minimum of one year post-mining (in consultation with key regulators)<br><br><input type="checkbox"/> Targeted Threatened Amphibian searches in Winter period for a minimum of one year post-mining (in consultation with key regulators) | <b>NORMAL</b><br><b>No change as compared to baseline observed</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Survey results within baseline variability</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Observed physical impacts to habitat.</b><br><b>Statistically significant decrease in population numbers and/or species composition against baseline</b> | <input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Notification to SCA/DoPI/OEH immediately<br><input type="checkbox"/> Proposal for threatened species management within 1 week if required<br><input type="checkbox"/> Completion of management task following approval from agencies<br><input type="checkbox"/> Additional monitoring as required by the relevant government agencies<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Reporting in Incident and Annual Reviews |
| <b>Riparian vegetation</b><br><br>Three 20 m x 20 m quadrats ~150-200m apart per creek line | <input type="checkbox"/> Species inventory and modified Braun Blanquette cover Abundance for each species.<br><br><input type="checkbox"/> At least once prior to mining (conducted Autumn and Spring)                                                                                                                                                                                                                  | <input type="checkbox"/> Species inventory and modified Braun Blanquette cover Abundance for each species.<br><br><input type="checkbox"/> Autumn and spring during entire extraction period                                                                                                                                                                                            | <input type="checkbox"/> Species inventory and modified Braun Blanquette cover Abundance for each species.<br><br><input type="checkbox"/> Autumn and Spring for a minimum of one year post-mining (in consultation with key regulators)                                                                             | <b>NORMAL</b><br><b>No change as compared to baseline observed</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Survey results within baseline variability</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Observed deterioration in vegetation health against baseline surveys</b>                                                                                 | <input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Notification to SCA/DoPI/OEH immediately                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Feature | Monitoring Commitments |               |                                   | TARPS                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|------------------------|---------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | Prior to Mining        | During Mining | Post Mining and Future Monitoring | Trigger                                                                                                                                                                | Response                                                                                                                                                                                                                                                                                                                                                                                                                      |
|         |                        |               |                                   | <p>Significant change/decline in cover abundance against baseline surveys.</p> <p>Statistically significant change in species composition against baseline surveys</p> | <p><input type="checkbox"/> Proposal for management within 1 week if required</p> <p><input type="checkbox"/> Completion of management task following approval from agencies</p> <p><input type="checkbox"/> Additional monitoring as required by the relevant government agencies</p> <p><input type="checkbox"/> Report in end of panel report</p> <p><input type="checkbox"/> Reporting in Incident and Annual Reviews</p> |

## 9 LAND MANAGEMENT PLAN

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### 9.1 Objectives

The objectives of this management plan are to:

- ☐ provide a framework to manage the potential impacts of subsidence on land in general with a specific focus on cliffs and steep slopes;
- ☐ satisfy the requirements of the Project Approval, all agencies and the expectations of the community.

### 9.2 Summary of Predicted Impacts on Land Features

#### Land Features

The following land features occur within or near the subsidence footprint and will be considered in the Extraction Plan:

- ☐ Rock outcrops (refer **Drawing MSEC 412-09**);
- ☐ Steep Slopes (refer **Drawing MSEC 412-09**);
- ☐ No cliffs were identified in the application area.

#### Predicted Impacts to Rock Outcrops

Rock outcrops are located across the extent of the Application Area and, therefore, will be subjected to the full range of predicted systematic subsidence movements.

Based on the maximum predicted tilts and strains in the Nebo Area, it is unlikely that fracturing of the bedrock will occur as a result of the extraction of the proposed longwalls and, hence, the probability of impacts to the rock outcrops is very low.

#### Predicted Impacts to Steep Slopes

The locations of the steep slopes within the Nebo Area are shown in Drawing No MSEC412-09. The majority of the slopes are stabilised by the natural vegetation.

The steep slopes are distributed over much of the Application Area with the exception of the vicinity of Longwall N4 and the central and northern portions of N2 and N3 Application Area and are likely, therefore, to experience the full range of predicted systematic subsidence movements resulting from the extraction of the longwalls.

The maximum predicted total tensile and compressive strains are unlikely to result in surface cracking or slippage of soils down the steep slopes. If tension cracks

occurred and if they were left untreated it is possible that minor soil erosion could occur.

It is unlikely that mine subsidence would result in any large-scale slope failure since such failures have generally not been observed as a result of mining in the Southern Coalfield.

The steep slopes located outside the goaf areas of the proposed longwalls will not experience any significant systematic subsidence movements. It is unlikely, therefore, that the proposed longwalls would result in any significant impacts to these slopes, even if the predictions were increased by factors of 1.25 to 2 times.

### **9.3 Monitoring and Management Program**

Table 9.1 outlines the Land Management Plan Monitoring and TARPs Summary proposed for land features. The monitoring program focuses on rock outcrops and steep slopes.

Ground movements will be monitored as mining occurs, to measure the extent to which the actual movements may differ from those predicted. Any predicted impacts will be periodically reviewed in the light of additional data.

Rock outcrops and steep slopes will be monitored by suitably qualified persons by random meander survey methods across the area once before mining, then on a monthly basis during mining and for six months after mining. Specific photo points to compare pre and post mining conditions of rock outcrops and steep slopes are not proposed for this extraction plan due to predictions indicating no or negligible impacts will be experienced.

In the event that cracks were to form on steep slopes, minor remediation could be implemented to ensure that any mining induced soil slippage does not result in the formation of soil erosion channels. However, considering the relatively low values of predicted strains within the Application Area, it is unlikely that the steep slopes would require any remedial works.

If cracking or rock falls are identified in rocky outcrops, appropriate responses will be triggered as per the TARPs in Table 9.1 below. Such events would also trigger management responses in accordance with the Public Safety Management Plan TARPs.

**Table 9.1 Land Management Plan Monitoring and TARPs Summary**

| Feature                                                                                        | Monitoring Commitments                                                                                                  |                                                             |                                                            | TARPS                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                | Prior to Mining                                                                                                         | During Mining                                               | Post Mining and Future Monitoring                          | Trigger                                                                    | Response                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Steep Slopes and Rock Outcrops</b><br><br>Note: There are no cliffs identified in the area. | <input type="checkbox"/> Observation and documentation of steep slope and rock outcrop condition - Once prior to mining | <input type="checkbox"/> Monthly observations during mining | <input type="checkbox"/> Monthly observations for 6 Months | <input type="checkbox"/> Minor cracking on roads and tracks (<10mm)        | <input type="checkbox"/> Notification to SCA, DoPI, and DRE NSW within 24 hrs, using photographic record<br><input type="checkbox"/> Warning sign/s erection<br><input type="checkbox"/> Reported in Annual Review                                                                                                                                                                                     |
|                                                                                                |                                                                                                                         |                                                             |                                                            | <input type="checkbox"/> Major cracking (>10mm) or traffic impedence       | <input type="checkbox"/> Notification to SCA , DoPI, DRE Immediately<br><input type="checkbox"/> Make area safe immediately including erection of warning sign/s and barrier fencing<br><input type="checkbox"/> Incident Report and Mitigation Proposal to Agencies within a week.<br><input type="checkbox"/> Mitigation Report and Annual Review.<br><input type="checkbox"/> Review mining options |
|                                                                                                |                                                                                                                         |                                                             |                                                            | <input type="checkbox"/> Major cliff/rock collapse or steep slope movement | <input type="checkbox"/> Notification to SCA/DoPI/DRE<br><input type="checkbox"/> Make area safe immediately including warning sign/s erection and barrier fencing<br><input type="checkbox"/> Proposal for rectification within 1 week<br><input type="checkbox"/> Completion of works following approval from Agencies<br><input type="checkbox"/> Additional monitoring as agreed                   |

- 
- ☐ Mitigation Report and Annual Report.
  - ☐ Review mining options
  - ☐ Reported in Annual Review
-

## 10 HERITAGE MANAGEMENT PLAN

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### 10.1 Objectives

The objectives of this management plan are to:

- ☐ provide a framework to manage the potential impacts of subsidence on Aboriginal and non Aboriginal heritage sites or values;
- ☐ satisfy the requirements of the Project Approval, all agencies and the expectations of the community.

### 10.2 Summary of Predicted Impacts on Heritage Sites

The locations of the archaeological sites within or near the General Application Area are shown in **Drawing No. MSEC412-13**. There are two historic sites located within the Application Area, Cordeaux River Historic Site 2 and Cordeaux River Historic Site 3. There are no Aboriginal archaeological sites located within the General Application Area.

Cordeaux River Historic Site 2 and Cordeaux River Historic Site 3 both include non-native floral species gardens, the remains of building foundations and historical artefact scatters of glass, metal and ceramics. The scientific significance for these sites has been assessed as low.

The low levels of subsidence predicted at the sites are not expected to result in any impacts to the Cordeaux River Historic Site 2 and Cordeaux River Historic Site 3.

### 10.3 Monitoring and Management Program

**Table 10.1** outlines the Heritage Management Plan Monitoring and TARPs proposed. Ground movements will be monitored as mining occurs, to measure the extent to which the actual movements may differ from those predicted. Any predicted impacts will be periodically reviewed in the light of additional data.

The sites will be monitored by suitably qualified persons once prior to, once during and once after mining to ascertain if any impacts have occurred. Specific photo points will be used to compare pre and post mining conditions of the sites.

In the unlikely event that impacts are detected, appropriate responses will be triggered as per the TARPs in **Table 10.1** below. Any remedial work will be collaboratively designed in consultation with the relevant stakeholders. However, considering the relatively low values of predicted strains within the Application Area, it is unlikely that the sites would require any remedial works.

**Table 10.1 Heritage Management Plan Monitoring and TARPs Summary**

| Feature                                                                                                                                                       | Monitoring Commitments                                                                                                                                                                                                    |                                                                                                    |                                                      | TARPS                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                               | Prior to Mining                                                                                                                                                                                                           | During Mining                                                                                      | Post Mining and Future Monitoring                    | Trigger                                                                                                                                                                                       | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Heritage Sites:</b><br><br>Two sites : Cordeaux River Historic 1 and Cordeaux River Historic 3<br><br>No Aboriginal Heritage sites in the application area | <input type="checkbox"/> Record significant heritage items once prior to mining<br><br><input type="checkbox"/> Two historic artefact scatters of low significance are present within the predicted subsidence footprint. | <input type="checkbox"/> Once for any observed impacts such as: surface cracking, damage, erosion. | <input type="checkbox"/> Once 3-6 months post mining | <input type="checkbox"/> Observation of unstable conditions or damage, cracking or tree falls<br><br><input type="checkbox"/> Subsidence movement exceeding the expected maximum predictions. | <input type="checkbox"/> Report impacts as required<br><br><input type="checkbox"/> if subsidence movement occurs above the expected maximum predictions in the SMP then site inspections of Dendrobium 5 and Wanyambilli Hill 1 (located outside the application area) should occur in consultation with Registered Aboriginal stakeholders, including the Illawarra LALC and CBNTCAC<br><br><input type="checkbox"/> Notify OEH, DoPI, DRE NSW, SCA<br><br><input type="checkbox"/> Review and undertake remediation options as agreed with Agencies<br><br><input type="checkbox"/> Report in Mitigation report, End of panel report and Annual Review |

## 11 INVESTIGATIONS FOR FUTURE EXTRACTION PLANS

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NRE is currently conducting investigations in the Avon Area to collect baseline data for a future Extraction Plan in this Area. The program can be summarised as follows:

### **Exploration**

Preliminary mine plans based on existing exploration data have been developed and will be revised as exploration continues.

### **Geotechnical**

- Completed initial geotechnical assessment to identify sensitive features such as cliff lines and waterfalls .

### **Surface Water**

Sampling occurs bi-monthly and includes:

- 9 grab sample sites
- 5 in-stream piezometers
- 2 swamp piezometers

### **Groundwater**

Sampling occurs bi-monthly and includes:

- 3 existing groundwater piezometers (2 of which are related to the Ventilation Shaft)
- 3 further proposed groundwater piezometers

### **Ecology**

- Initial rapid assessment of Flora and Fauna completed for the area (by Niche) in Autumn 2011
- Monitoring plans for Terrestrial and Aquatic monitoring are being developed and will be finalized by end October 2011.
- Aquatic and Terrestrial ecology monitoring to commence Spring 2011 and to be ongoing.

### **Archaeology**

- Baseline Archaeological Surveys will be planned with a view to commence in 2012.

## 12 CONTINGENCY PLAN AND POTENTIAL REMEDIATION MEASURES

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### 12.1 Objectives

The objectives of this Contingency Plan are to:

- ☐ provide a framework that allows for adaptive management of any unforeseen or unexpected impacts of subsidence;
- ☐ satisfy the requirements of the Project Approval, all agencies and the expectations of the community.

### 12.2 Relevant Approval Conditions

There are several conditions in the Project Approval that relate to preparation of a Contingency Plan. These are:

#### Schedule 3 Condition 2

*The Proponent must assess and manage project-related risks to ensure that there are no exceedances of the performance measures in Table 1. Any exceedance of these performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation, notwithstanding actions taken pursuant to paragraphs (a)-(c) or condition 3 below.*

*Where any exceedance of these performance measures has occurred, the Proponent must, at the earliest opportunity:*

- a. take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;*
- b. consider all reasonable and feasible options for remediation and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and*
- c. implement remediation measures as directed by the Director-General, to the satisfaction of the Director-General.*

#### Schedule 3 Condition 3

##### Offsets

*If the Proponent exceeds the performance measures in Table 1 and the Director-General determines that:*

- a. it is not reasonable or feasible to remediate the impact or environmental consequence; or*

- b. remediation measures implemented by the Proponent have failed to satisfactorily remediate the impact or environmental consequence;*

*then the Proponent shall provide a suitable offset to compensate for the impact or environmental consequence, to the satisfaction of the Director-General.*

*Note: Any offset required under this condition must be proportionate with the significance of the impact or environmental consequence.*

**Schedule 3 Condition 7 (g)**

*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;*

The Approval Conditions outlined above provide the framework for the Contingency Plan, and a compensatory offset mechanism which could be used if remediation of any impacts was unfeasible. The Contingency Plan below addresses the requirements for a Contingency Plan outlined in the Conditions above.

## **12.3 Contingency Plan**

The monitoring programs outlined in this Extraction Plan will identify subsidence impacts. Predicted impacts will be managed as outlined in the TARP's within this Extraction Plan. Contingency and emergency response options are available and will be implemented if environmental or public safety impacts are demonstrated to be greater than predictions.

An incident is defined in the Project Approval 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 6 of the Project Approval. NRE will notify the Director-General of the DoP and any other relevant agencies of any incident associated with the Project as soon as practicable after NRE becomes aware of the incident. Within seven days of the date of the incident, NRE will provide the Director-General of the DoP and any relevant agencies with a detailed report on the incident.

In the event that subsidence management responses outlined in the TARPs and NRE's Rehabilitation Management Plan prove inadequate, or where agreed rehabilitation objectives are not met, NRE will implement the Contingency Plan described below.

- ☐ NRE will report the reasons the management objective has not been met to DoP, DRE NSW and other relevant stakeholders.

- ☐ Impacts and corresponding contingency measures will be assessed and considered based on the significance, extent, scale or longevity of impact and practical aspects of mitigation/rehabilitation.
- ☐ NRE will identify an appropriate course of action with respect to the management objectives, in consultation with specialists and relevant agencies, as necessary.
- ☐ After stakeholder consultation, NRE will implement the agreed contingency measures.
- ☐ NRE is committed to implementing such agreed contingency measures within the shortest practical timeframe.
- ☐ NRE will review the effectiveness of the contingency measures within the shortest practical timeframe and report back to all stakeholders.
- ☐ This Contingency Plan provides for an adaptive approach with consultation and input from relevant Agencies and stakeholders.

## 13 CONCLUSION

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The extraction of coal from Nebo Longwalls N1 to N6 is not expected to result in significant impacts to any natural or man made feature.

This Extraction Plan has outlined mine planning considerations to mitigate impacts, and various measures to monitor and manage the subsidence impacts predicted. It also outlines contingency measures in case impacts are monitored, which exceed the impact predictions.

The Extraction Plan satisfies relevant Conditions of the Project Approval and provides a framework for NRE to continue monitoring in the Nebo area, and to satisfactorily manage any impacts identified when mining proceeds.

## 14 REFERENCES

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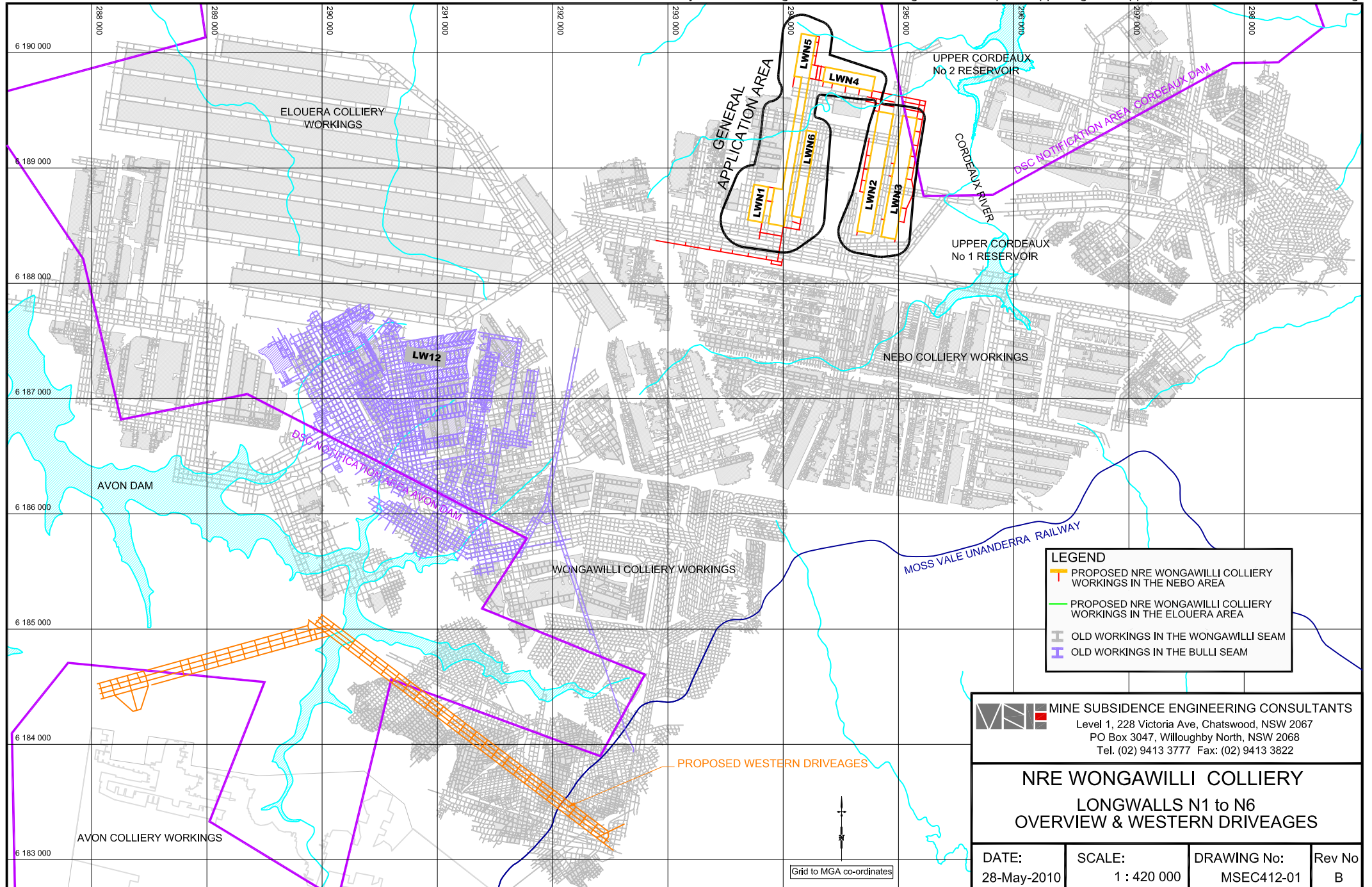
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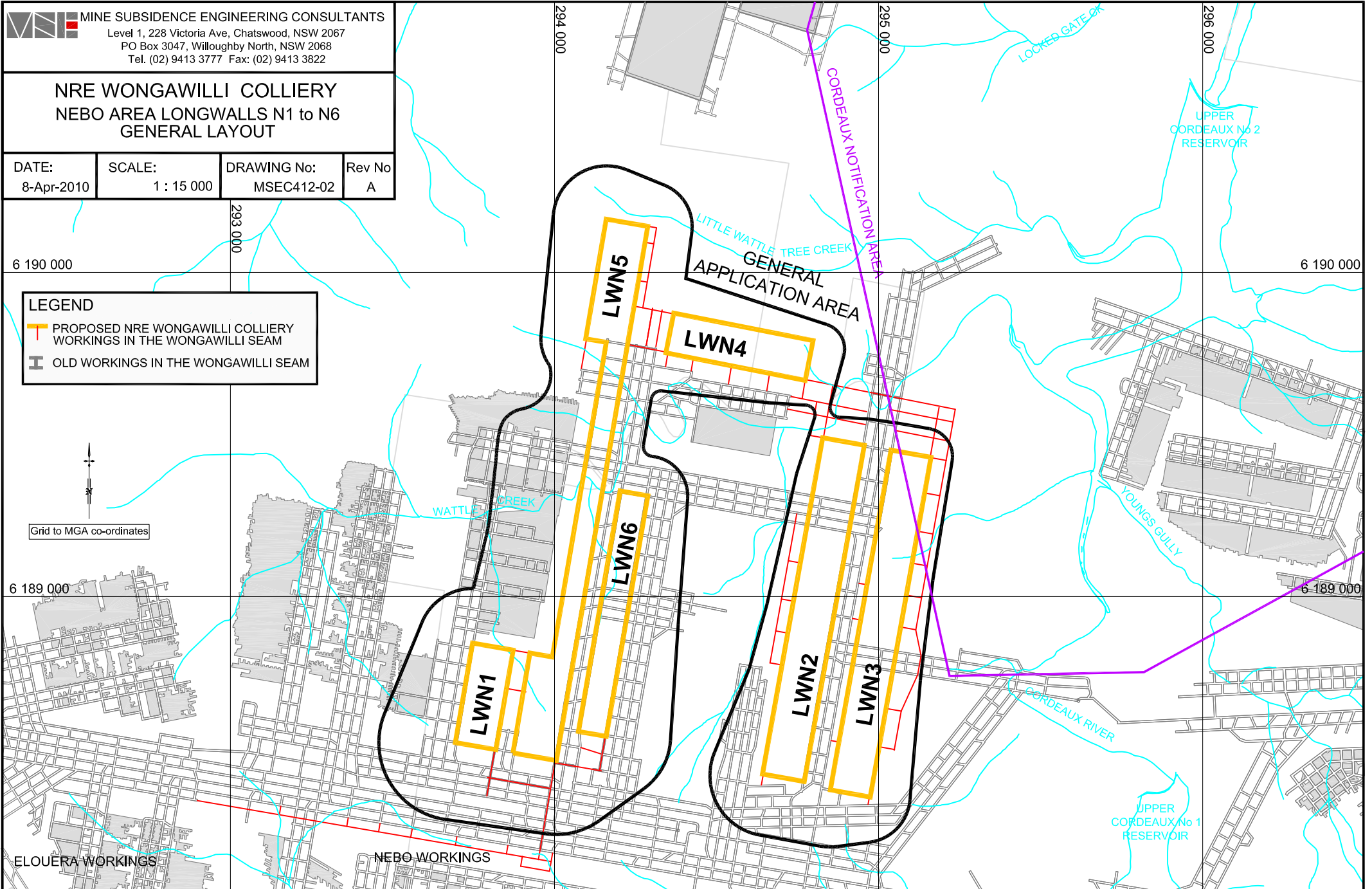
# ATTACHMENTS

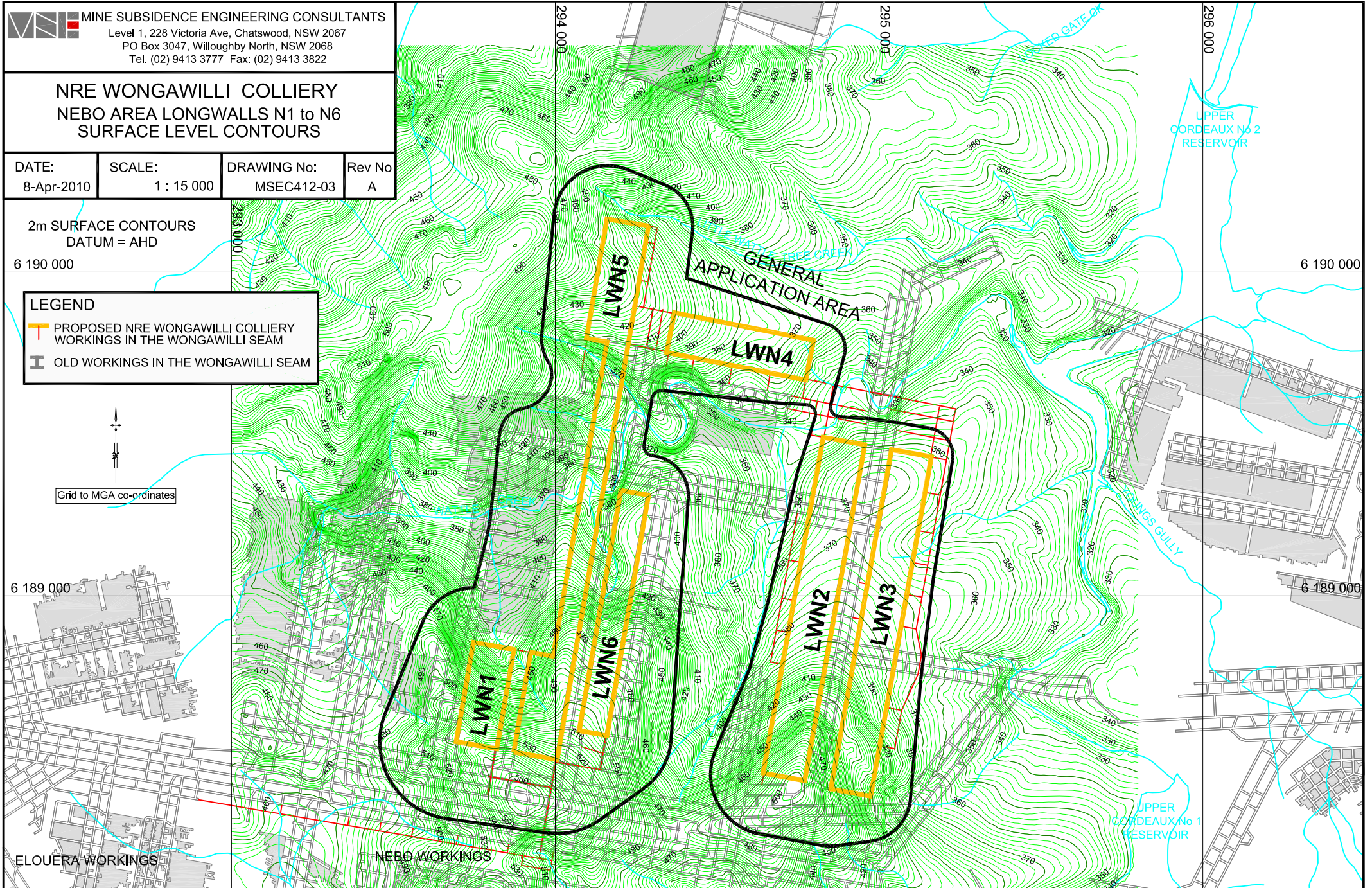
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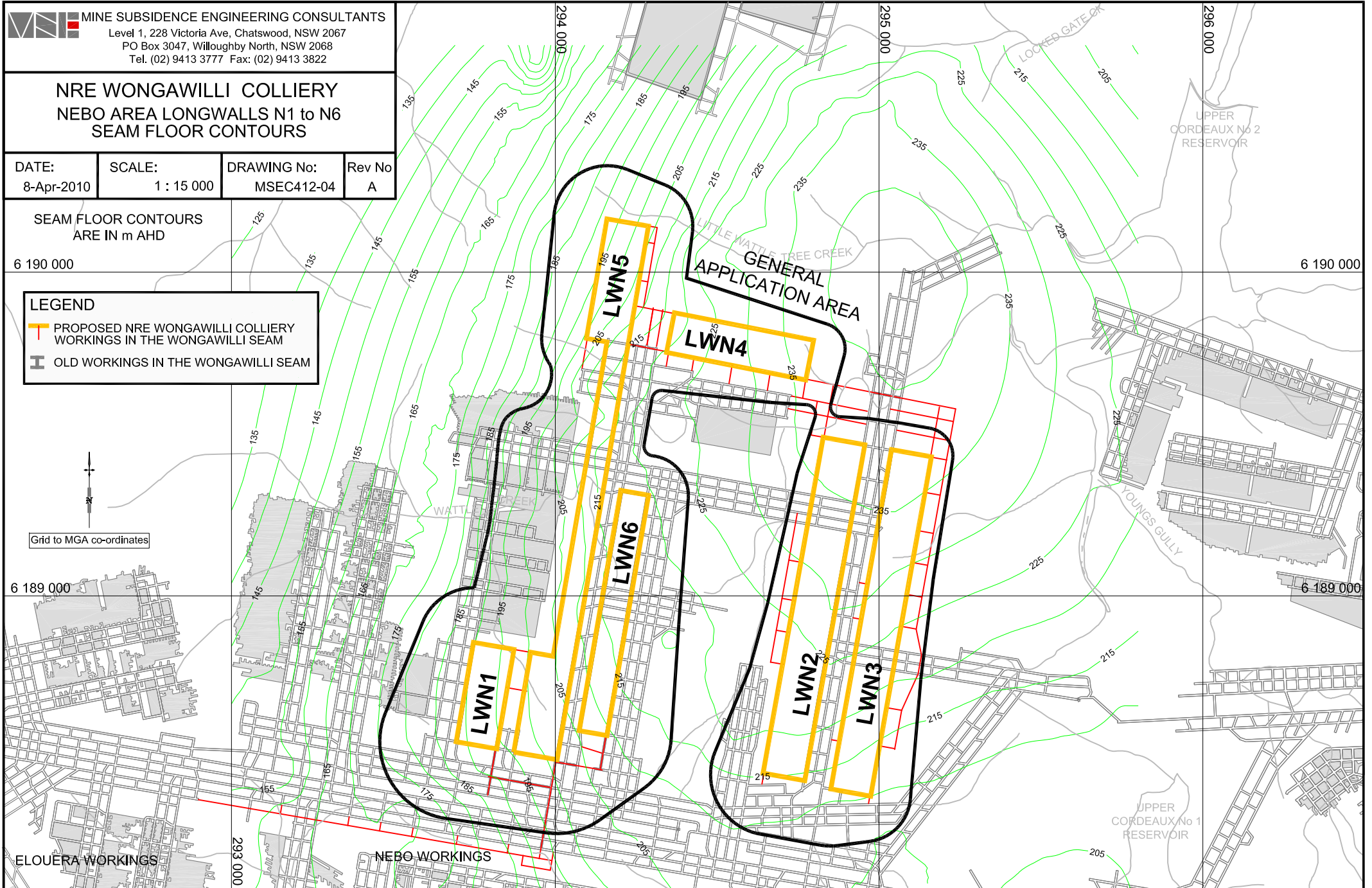
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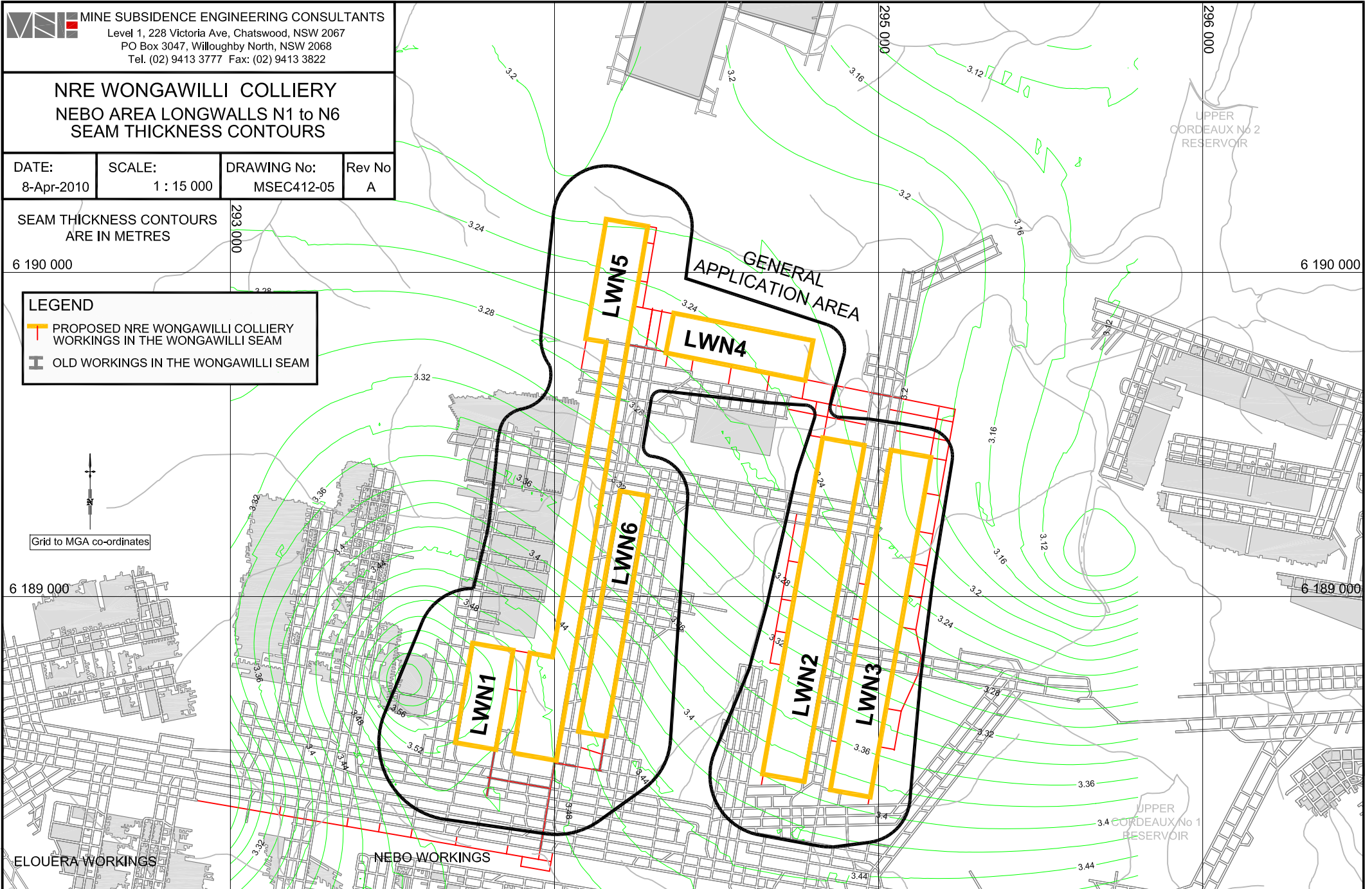
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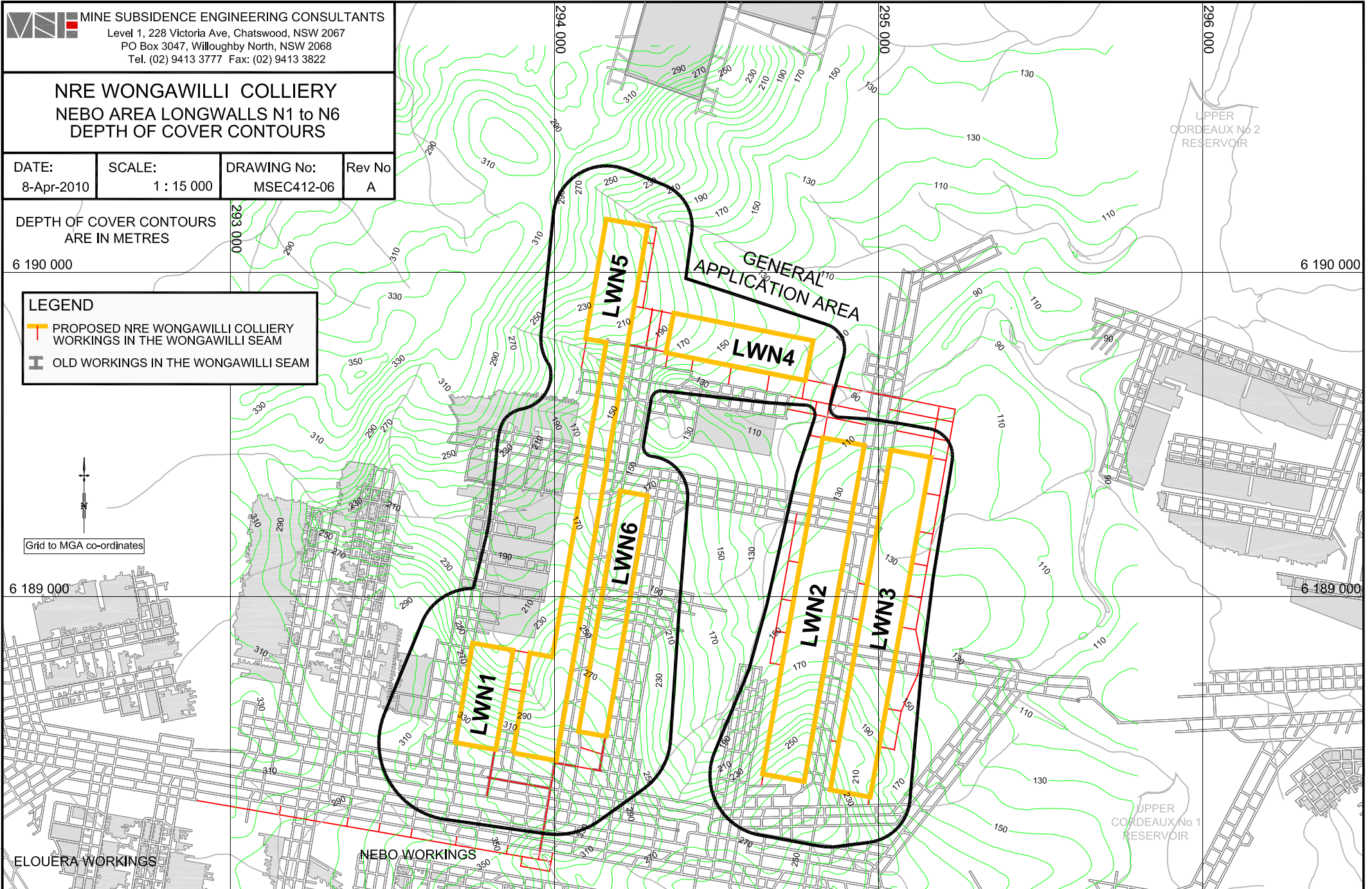


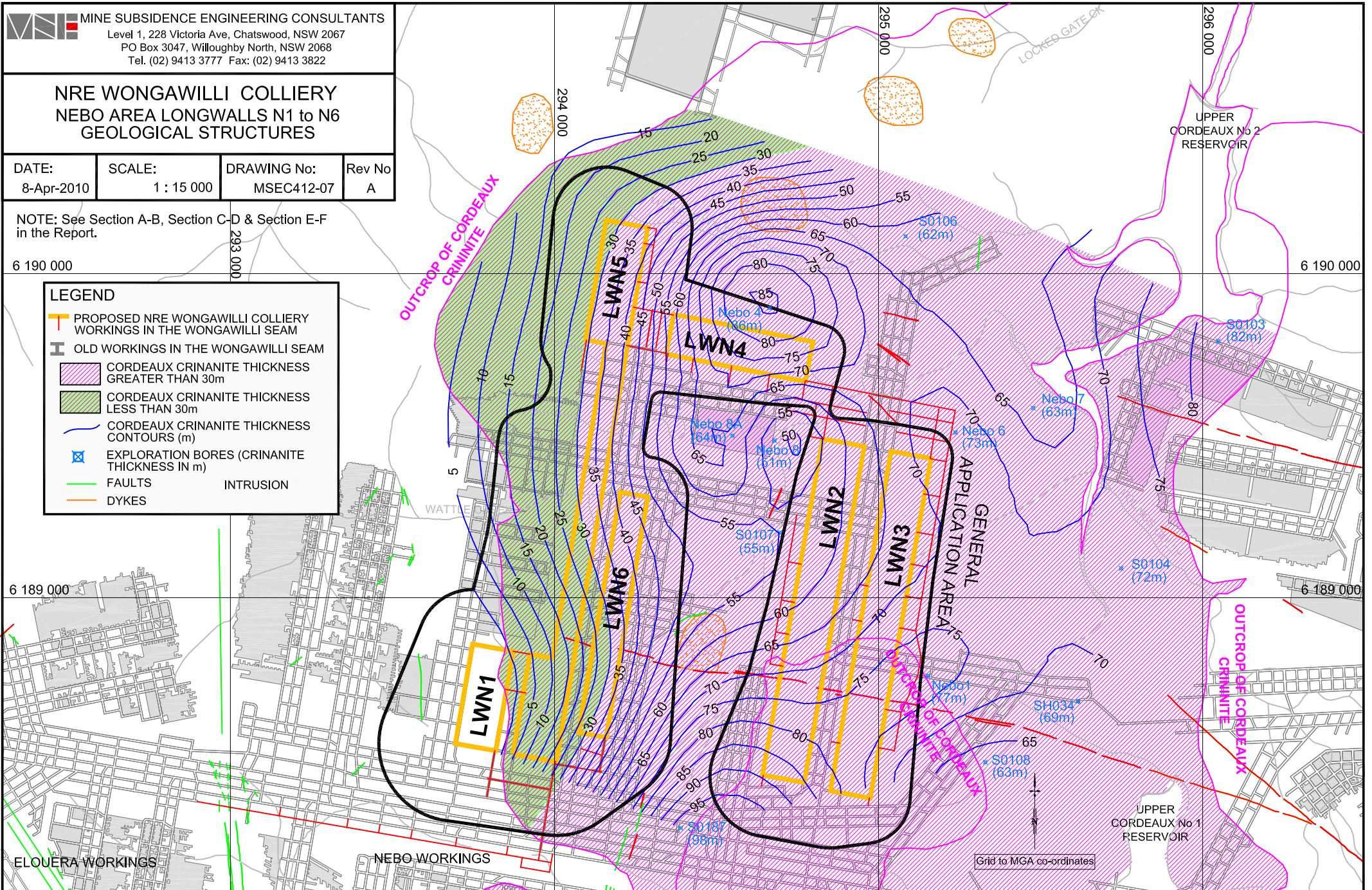


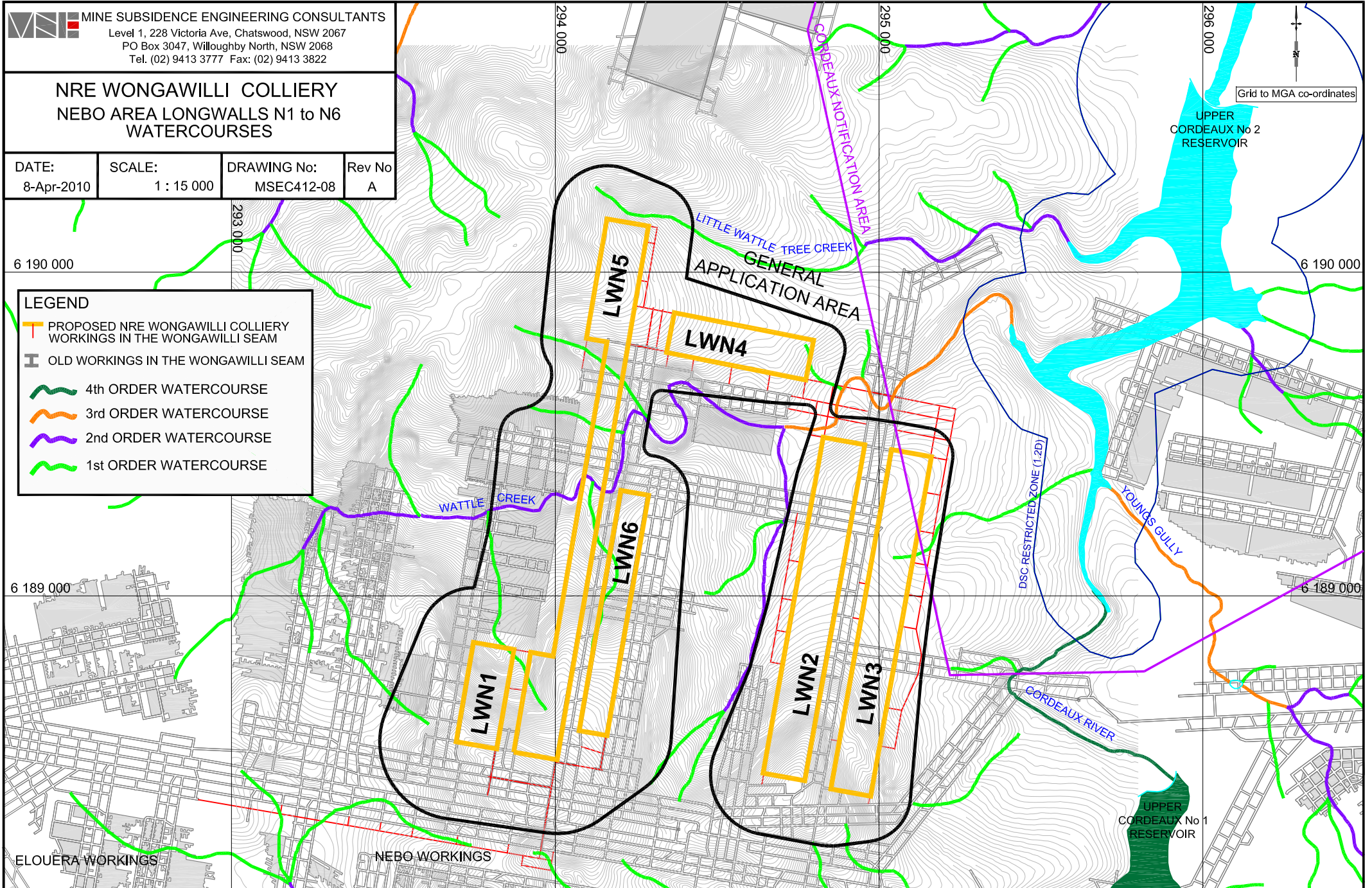


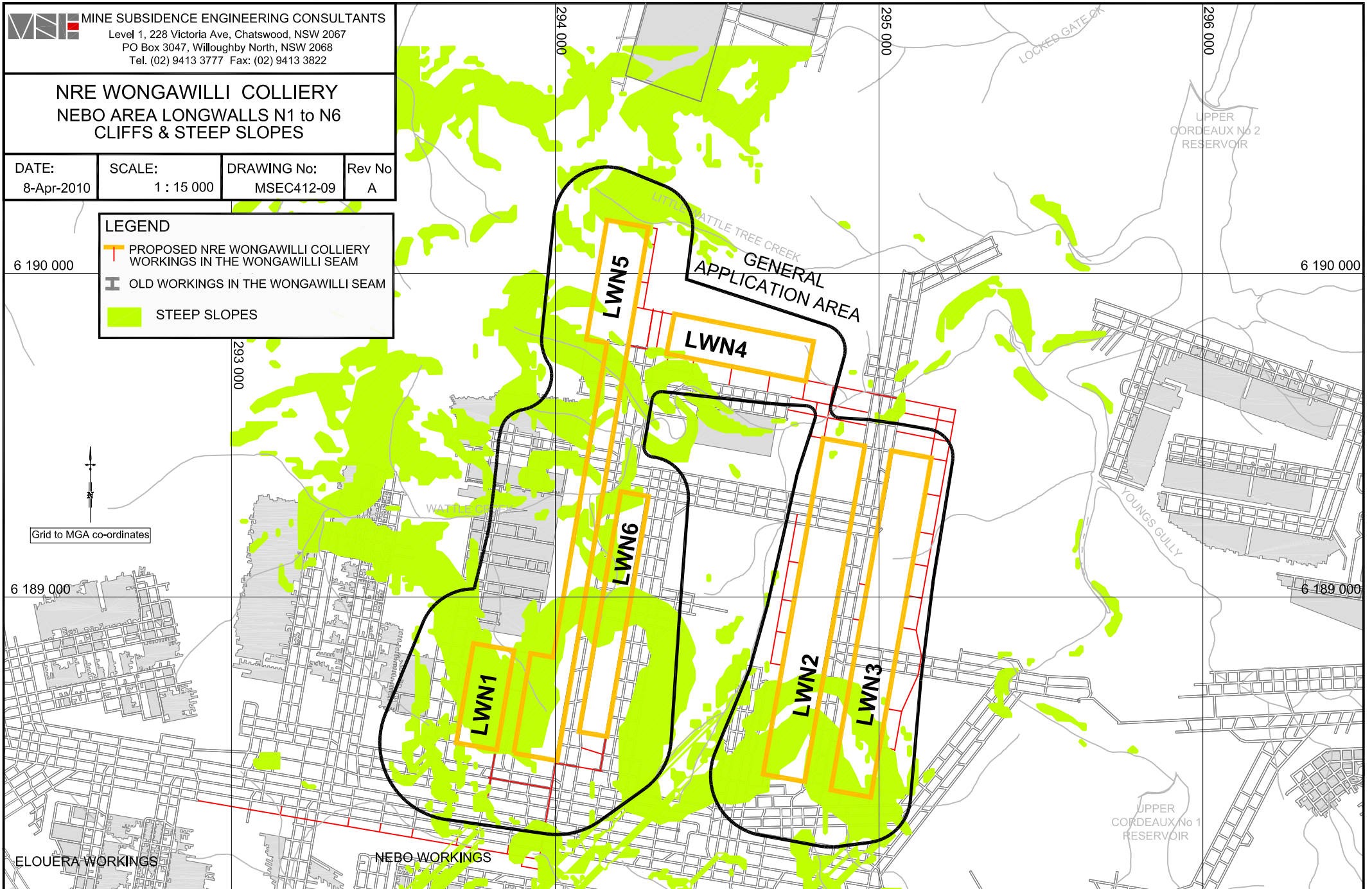


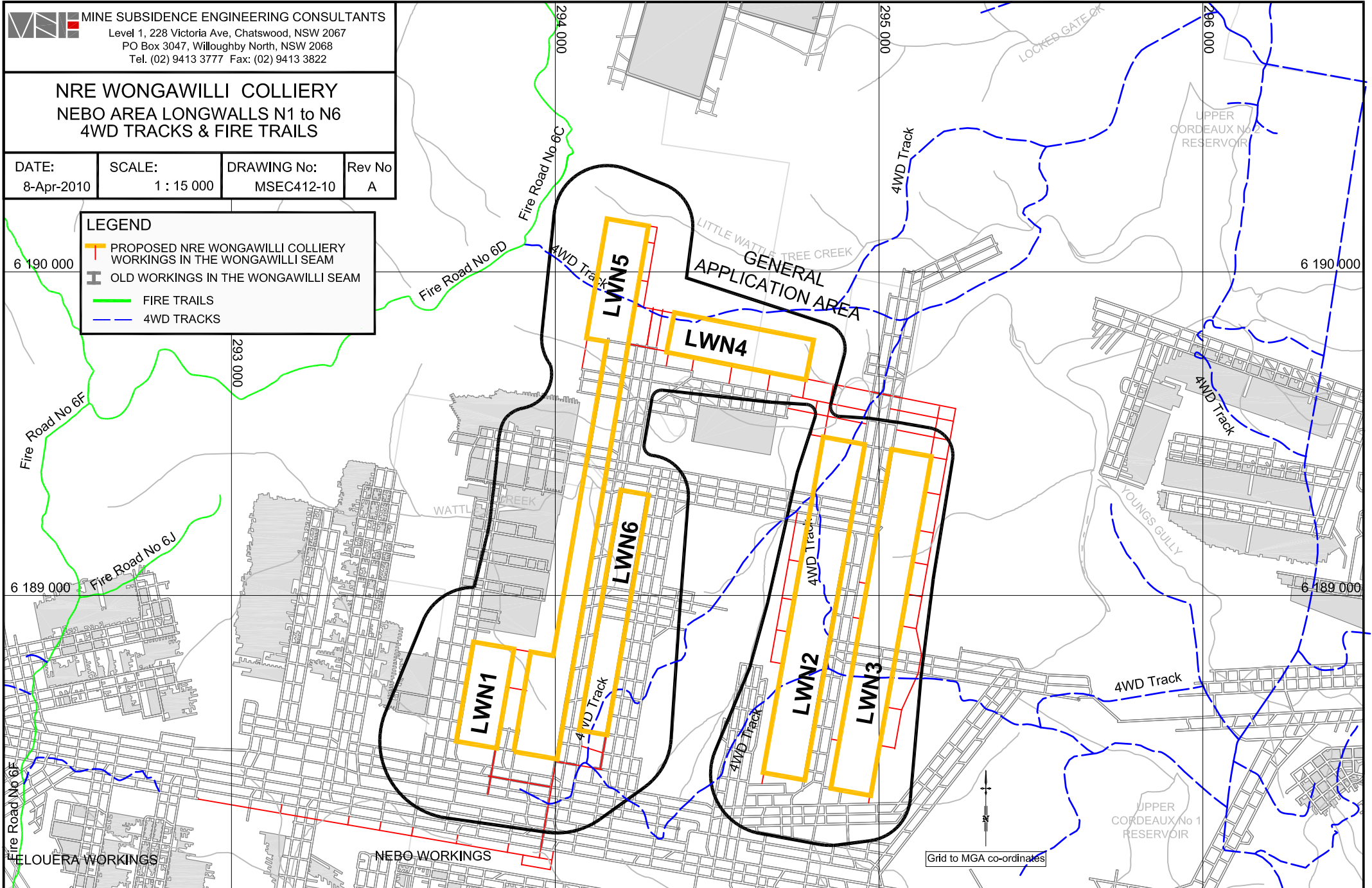












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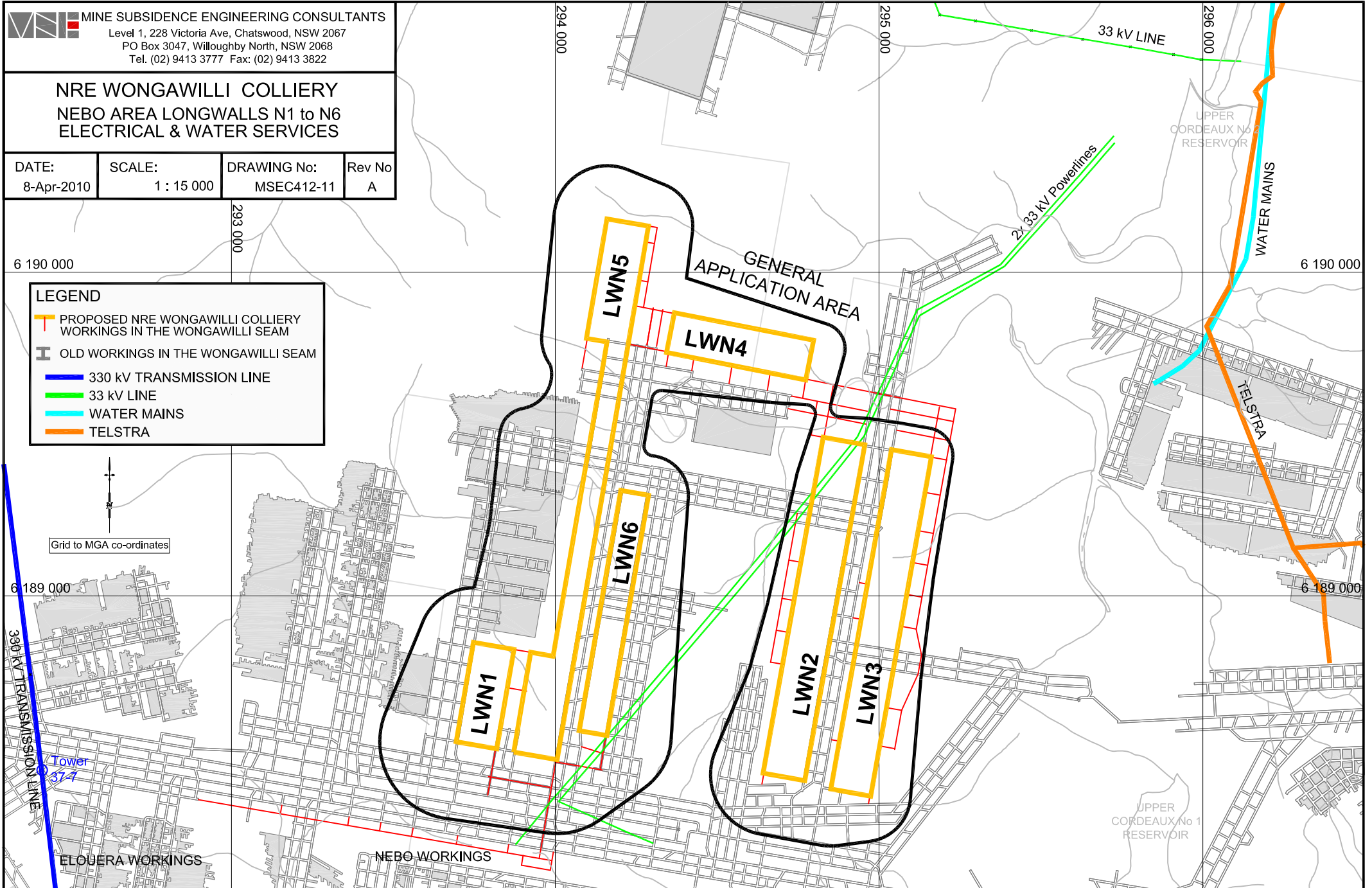
**NRE WONGAWILLI COLLIERY**  
**NEBO AREA LONGWALLS N1 to N6**  
**ELECTRICAL & WATER SERVICES**

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| DATE:<br>8-Apr-2010 | SCALE:<br>1 : 15 000 | DRAWING No:<br>MSEC412-11 | Rev No<br>A |
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**LEGEND**

- PROPOSED NRE WONGAWILLI COLLIERY WORKINGS IN THE WONGAWILLI SEAM
- OLD WORKINGS IN THE WONGAWILLI SEAM
- 330 kV TRANSMISSION LINE
- 33 kV LINE
- WATER MAINS
- TELSTRA

Grid to MGA co-ordinates



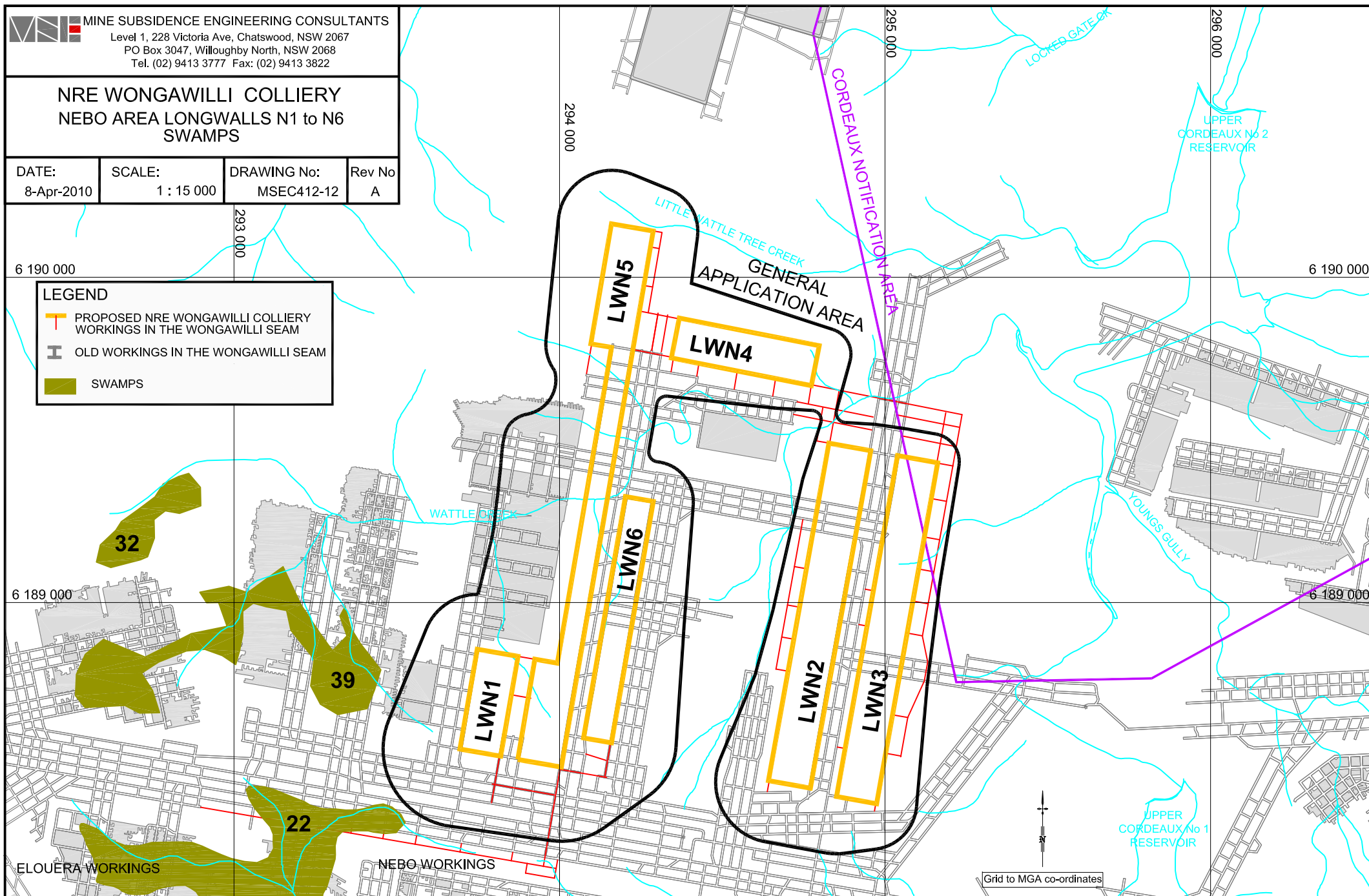
 MINE SUBSIDENCE ENGINEERING CONSULTANTS  
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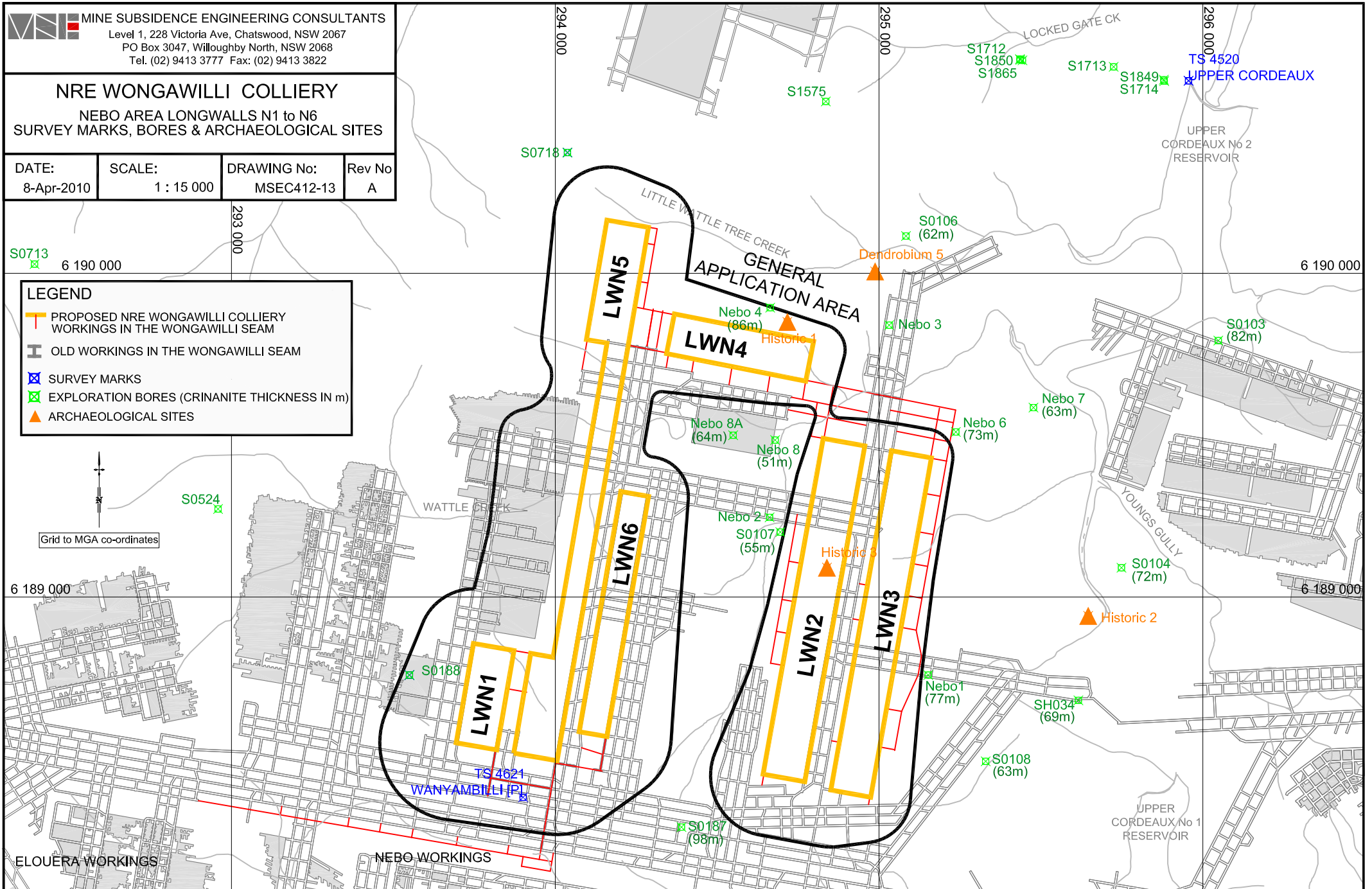
**NRE WONGAWILLI COLLIERY  
NEBO AREA LONGWALLS N1 to N6  
SWAMPS**

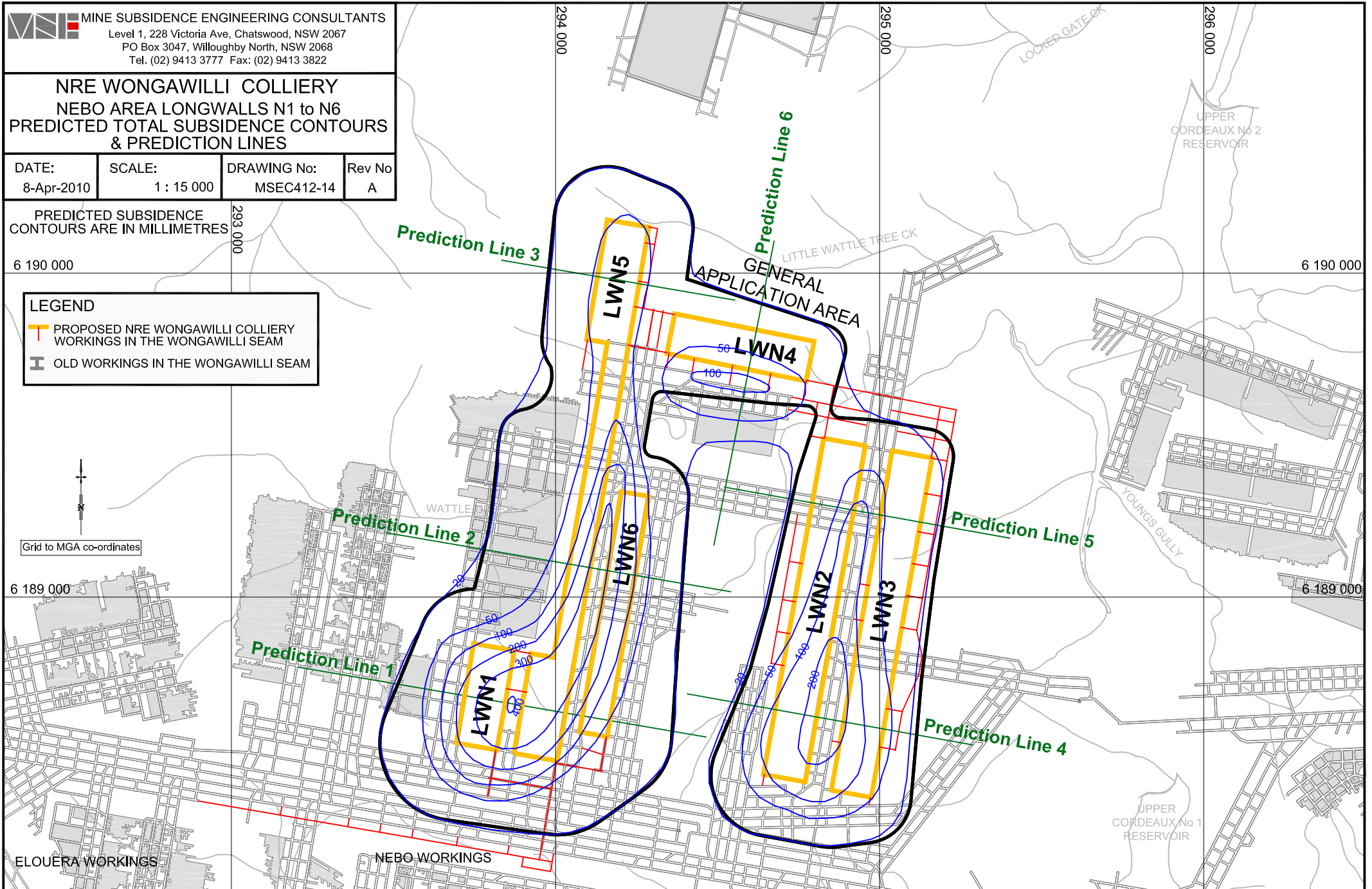
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**LEGEND**

-  PROPOSED NRE WONGAWILLI COLLIERY WORKINGS IN THE WONGAWILLI SEAM
-  OLD WORKINGS IN THE WONGAWILLI SEAM
-  SWAMPS







## ATTACHMENT B

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### Trigger Action Response Plan (TARPs)

## Built Features Monitoring and Management Summary

| Feature                                                                                         | Monitoring Commitments                                                                                                                                                                    |                                                                                                                                                                                          |                                                                                                                                                                                                             | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|                                                                                                 | Prior to Mining                                                                                                                                                                           | During Mining                                                                                                                                                                            | Post Mining and Future Monitoring                                                                                                                                                                           | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Upper Cordeaux 1 and 2 Dam Walls</b><br><br><b>SCA Inspections and subsidence monitoring</b> | <input type="checkbox"/> Visual inspection by SCA prior to mining<br><br><input type="checkbox"/> Annual subsidence surveys by SCA along Upper Cordeaux 1 and 2 Dam walls prior to mining | <input type="checkbox"/> Visual inspection by SCA during mining<br><br><input type="checkbox"/> Bi-Annual subsidence surveys by SCA along Upper Cordeaux 1 and 2 Dam walls during mining | <input type="checkbox"/> Visual inspection by SCA up to 1 year post mining<br><br><input type="checkbox"/> Annual subsidence surveys by SCA along Upper Cordeaux 1 and 2 Dam walls up to 1 year post mining | <input type="checkbox"/> >10mm change in RL<br><br><input type="checkbox"/> >10mm Upsidence or >2mm differential vertical movement between any 2 adjacent marks<br><br><input type="checkbox"/> >20mm horizontal movement or >2mm differential horizontal movement between any 2 adjacent marks<br><br><input type="checkbox"/> >2mm Closure between readings<br><br><input type="checkbox"/> Crack Widths >3mm differential movement in 3 dimension (Upper Cordeaux No.2 Dam) | <input type="checkbox"/> Notification to SCA immediately, then to DoPI, DSC, DRE NSW<br><br><input type="checkbox"/> Additional monitoring as agreed with SCA and as per DSC Management Plans.<br><br><input type="checkbox"/> 6 Monthly 3-D crack monitoring where agreed with SCA.<br><br><input type="checkbox"/> Make area safe as soon as practicable including warning signs<br><br><input type="checkbox"/> Proposal for rectification within 1 week upon approval from SCA<br><br><input type="checkbox"/> Completion of any required works following approval from SCA |
| <b>Cordeaux Reservoir Stored Waters (SCA)</b>                                                   | <input type="checkbox"/> Survey of lake foreshores by SCA                                                                                                                                 | <input type="checkbox"/> 6-monthly survey of lake foreshores by SCA                                                                                                                      | <input type="checkbox"/> 6-monthly survey of lake foreshores by SCA up to 1 year post mining                                                                                                                | <input type="checkbox"/> >20mm change in RL<br><br><input type="checkbox"/> >20mm horizontal movement                                                                                                                                                                                                                                                                                                                                                                          | <input type="checkbox"/> Notification to SCA immediately, then to DoPI, DSC, DRE NSW<br><br><input type="checkbox"/> Additional monitoring as agreed with SCA and as per DSC Management Plans.<br><br><input type="checkbox"/> Liaise with the SCA and develop                                                                                                                                                                                                                                                                                                                  |

|                                                                     |                                                                             |                                                                                                       |                                                                                                                            |                                                                                                         |                                                                                             | appropriate strategies and management plans. |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------|
| <b>33kV Transmission Lines</b><br>(Owned by Sydney Water and NRE)   | <input type="checkbox"/> Observation of tower condition                     | <input type="checkbox"/> Fortnightly observation of tower condition                                   | <input type="checkbox"/> Observation of tower condition                                                                    | <input type="checkbox"/> Observation of unsafe tower conditions as noted by NRE or consultant engineer. | <input type="checkbox"/> Report condition to Infrastructure owner and Mine Subsidence Board |                                              |
|                                                                     | <input type="checkbox"/> Survey measurement for later comparison            |                                                                                                       | <input type="checkbox"/> Survey measurement once following mining                                                          |                                                                                                         | <input type="checkbox"/> Document in end of panel reports                                   |                                              |
|                                                                     | <input type="checkbox"/> Once before mining                                 |                                                                                                       |                                                                                                                            |                                                                                                         | <input type="checkbox"/> Infrastructure owner to undertake remediation as necessary         |                                              |
| <b>Fire Roads and 4WD Tracks</b><br>(Fortnightly visual inspection) | <input type="checkbox"/> Observation of road condition once prior to mining | <input type="checkbox"/> Fortnightly observation of roads, tracks and area within 10m of roads/tracks | <input type="checkbox"/> Monthly observation of roads, tracks and area within 10m of roads/tracks for 6 months post mining | <input type="checkbox"/> Minor cracking on roads and tracks (<10mm)                                     | <input type="checkbox"/> Notification to SCA within 24 hrs, using photographic record       |                                              |
|                                                                     | <input type="checkbox"/> Reported in End of panel reports and AEMR          |                                                                                                       | <input type="checkbox"/> reported in End of panel reports and AEMR                                                         | <input type="checkbox"/> Major cracking (>10mm) or traffic impedence                                    | <input type="checkbox"/> Notification to SCA immediately, then to DoPI, DRE NSW and MSB     |                                              |
|                                                                     |                                                                             |                                                                                                       |                                                                                                                            |                                                                                                         | <input type="checkbox"/> Make area safe as soon as practicable including warning signs      |                                              |
|                                                                     |                                                                             |                                                                                                       |                                                                                                                            |                                                                                                         | <input type="checkbox"/> Proposal for rectification within 1 week upon approval from SCA    |                                              |
|                                                                     |                                                                             |                                                                                                       |                                                                                                                            |                                                                                                         | <input type="checkbox"/> Completion of works following approval from SCA                    |                                              |
|                                                                     |                                                                             |                                                                                                       |                                                                                                                            |                                                                                                         | <input type="checkbox"/> Additional monitoring as agreed with SCA                           |                                              |

## Public Safety Monitoring and TARPs Summary

| Feature                                                 | Monitoring Commitments                                                                           |                                                                                                  |                                                                                                  | TARPS                                                                                        |                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         | Prior to Mining                                                                                  | During Mining                                                                                    | Post Mining and Future Monitoring                                                                | Trigger                                                                                      | Response                                                                                                                                                                                                                                                                                                                                      |
| <b>Public Safety</b><br>(fortnightly during extraction) | <input type="checkbox"/> Observation of rocky outcrops and steep slopes; Fire roads; 4WD tracks; | <input type="checkbox"/> Observation of rocky outcrops and steep slopes; Fire roads; 4WD tracks; | <input type="checkbox"/> Observation of rocky outcrops and steep slopes; Fire roads; 4WD tracks; | <input type="checkbox"/> Minor cracking (<10mm)                                              | <input type="checkbox"/> Notification to SCA & DoPI within 24 hrs, using photographic record                                                                                                                                                                                                                                                  |
|                                                         | <input type="checkbox"/> Once prior to mining                                                    | <input type="checkbox"/> Fortnightly during extraction                                           | <input type="checkbox"/> Monthly following mining for 6 months                                   | <input type="checkbox"/> Major Cracking (>10mm), noticeable instability or traffic impedance | <input type="checkbox"/> Notification to SCA& DoPI immediately<br><input type="checkbox"/> Make area safe as soon as practicable<br><input type="checkbox"/> Proposal for rectification within 1 week<br><input type="checkbox"/> Completion of works following approval from SCA<br><input type="checkbox"/> Additional monitoring as agreed |

## Water Management Plan Monitoring and TARPs Summary

| Feature                                                            | Monitoring Commitments                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                  | TARPS                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                                                                    | Prior to Mining                                                                                                                                                                                                                                                                                                                                                                               | During Mining                                                                                                                                                                                                                                                                                       | Post Mining and Future Monitoring                                                                                                                                                                                                                                                                                                | Trigger                                                                                                                                                                                                                                                                                                                                                                                         | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Rainfall</b>                                                    | <input type="checkbox"/> Daily rainfall monitoring at NRE Wongawilli Colliery and SCA Cordeaux No. 2 Dam weather station                                                                                                                                                                                                                                                                      | <input type="checkbox"/> Continuous                                                                                                                                                                                                                                                                 | <input type="checkbox"/> Continuous                                                                                                                                                                                                                                                                                              | <input type="checkbox"/> Significant departure from standard rainfall – runoff relationship in extraction area creeks.                                                                                                                                                                                                                                                                          | <input type="checkbox"/> Visual inspection of creek lines for cracking or water loss.<br><input type="checkbox"/> Contract hydrologist investigate and report on changes identified<br><input type="checkbox"/> Inform SCA, DoPI, OEH & DRE NSW of results of investigation<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required |
| <b>Stream Water Quality</b><br>Sites WC1, WC2,, WC3, WC4 and LWTC1 | <input type="checkbox"/> Field Analysis (EC, pH, DO, ORP, temp)<br><input type="checkbox"/> <u>Laboratory Analysis</u><br>TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Li, Ba, (filtered) DOC,tot. Alkalinity.<br><input type="checkbox"/> Observable iron hydroxide staining using photo points<br><input type="checkbox"/> Monthly for at least | <input type="checkbox"/> Weekly Field Analysis during active undermining of the main channel of Wattle Creek over LWN5<br><input type="checkbox"/> Monthly Lab analysis during active mining<br><input type="checkbox"/> Weekly observations during active undermining of stream using photo points | <input type="checkbox"/> Field Analysis every 2 months for one year after Nebo mining is completed<br><input type="checkbox"/> Lab analysis every four months for one year after Nebo mining is completed<br><input type="checkbox"/> Observations every 2 months for one year after Nebo mining is completed using photo points | <b>NORMAL</b><br><b>No change in water quality variability compared to baseline period</b><br><b>WITHIN PREDICTIONS</b><br><b>Temporary reduction in water quality over less than 2 months at any site compared to baseline period, i.e.</b><br><input type="checkbox"/> Observable increase in iron hydroxide precipitation in creek, banks, or bed)<br><input type="checkbox"/> EC < 250uS/cm | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR                                                                                  |

| Feature | Monitoring Commitments                                                                                                     |               |                                   | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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|         | Prior to Mining                                                                                                            | During Mining | Post Mining and Future Monitoring | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|         | <p>two months prior to mining (for all parameters)</p> <p><input type="checkbox"/> Baseline monitoring commenced 2009.</p> |               |                                   | <p><input type="checkbox"/> pH &lt; 1.5 drop from minimum baseline value</p> <p><input type="checkbox"/> Fe (Tot) &lt; 10mg/L</p> <p><input type="checkbox"/> Mn (tot) &lt; 0.2mg/L</p> <p><input type="checkbox"/> Al (tot) &lt; 0.2mg/L</p> <p><input type="checkbox"/> Zn (filt) &lt; 0.2mg/L</p> <p><input type="checkbox"/> SO4 (filt) &lt; 15mg/L</p> <p><b>EXCEEDS PREDICTIONS</b></p> <p><b>Temporary reduction in water quality over more than 2 months at any site compared to baseline period, i.e</b></p> <p><input type="checkbox"/> Long term increase in iron hydroxide precipitation in creek, banks, or bed)</p> <p><input type="checkbox"/> EC &gt; 300uS/cm</p> <p><input type="checkbox"/> pH &gt; 1.5 drop from minimum baseline value</p> <p><input type="checkbox"/> Fe (Tot) &gt; 10mg/L</p> <p><input type="checkbox"/> Mn (tot) &gt; 0.2mg/L</p> <p><input type="checkbox"/> Al (tot) &gt; 0.2mg/L</p> <p><input type="checkbox"/> Zn (filt) &gt; 0.2mg/L</p> <p><input type="checkbox"/> SO4 (filt) &gt;15mg/L</p> | <p><input type="checkbox"/> Inform SCA, OEH &amp; DRE immediately</p> <p><input type="checkbox"/> Repeat water quality sampling and initiate laboratory water quality sampling on a monthly basis</p> <p><input type="checkbox"/> Contract specialist to investigate and report on changes identified</p> <p><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required</p> <p><input type="checkbox"/> Report in the Annual Review</p> |

| Feature                                                                                                                                                                                               | Monitoring Commitments                                                                                                                                                                                                                 |                                                                                                                       |                                                                                                                 | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|                                                                                                                                                                                                       | Prior to Mining                                                                                                                                                                                                                        | During Mining                                                                                                         | Post Mining and Future Monitoring                                                                               | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Stream Flow</b><br>Automated monitoring of Water Depth / Flow monitoring at WC3 and WC1 (upstream) which will be compared to local rainfall<br>Automated monitoring of water depth at WC2 and WC4. | <input type="checkbox"/> Minimum 6 hourly prior to mining, with 2 monthly downloads<br><input type="checkbox"/> Minimum hourly for 1 month before LWN5 undermines Wattle Creek<br><input type="checkbox"/> Baseline data from Nov 2009 | <input type="checkbox"/> Minimum hourly with weekly downloads for 1 month before / after LWN5 undermines Wattle Creek | <input type="checkbox"/> Minimum 2 hourly with downloads every two months for one year after Nebo mining ceases | <b>NORMAL</b><br><b>No change in stream flow or pool level variability compared to baseline period</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Temporary reduction in stream flow of &gt;20% over less than 2 months compared to the baseline variability at any site, i.e.</b><br><input type="checkbox"/> Small cracks developed<br><input type="checkbox"/> No observable loss of stream flow, pool height or stream connectivity, compared to baseline regime<br><br><b>EXCEEDS PREDICTIONS</b><br><b>Long term reduction in stream flow of &gt;20% compared to the baseline variability at any site, i.e.</b><br><input type="checkbox"/> Observable loss of stream flow, pool height or stream connectivity, compared to baseline regime | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrology and ecology specialists immediately<br><input type="checkbox"/> Site visit with stakeholders<br><input type="checkbox"/> Take photographic record immediately<br><input type="checkbox"/> Contract specialist to investigate and report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional |

| Feature         | Monitoring Commitments                                                                                       |                                                                                                                       |                                                                                                                     | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                 | Prior to Mining                                                                                              | During Mining                                                                                                         | Post Mining and Future Monitoring                                                                                   | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                 |                                                                                                              |                                                                                                                       |                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable.<br><input type="checkbox"/> Report in Annual Report                                                                                                                                                                                                                                                                                                         |
| <b>Flooding</b> | <input type="checkbox"/> Observations every month for at least two months prior to mining using photo points | <input type="checkbox"/> Observations every week during active undermining of Wattle Creek by LWN5 using photo points | <input type="checkbox"/> Observations every 2 months for one year after Nebo mining is completed using photo points | <b>NORMAL</b><br><b>No change in flood extent variability compared to baseline period</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Temporary increase in flood extent over less than 2 months compared to the baseline variability at any site</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Long term reduction in flood extent over more than 2 months compared to the baseline variability at any site, i.e.</b><br><input type="checkbox"/> Increased extent of flooded stream reach in excess of baseline conditions – identified | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrology and ecology specialists immediately<br><input type="checkbox"/> Site visit with stakeholders<br><input type="checkbox"/> Take photographic record |

| Feature                                | Monitoring Commitments                                                                                       |                                                                                                                                                     |                                                                                                                     | TARPS                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                                        | Prior to Mining                                                                                              | During Mining                                                                                                                                       | Post Mining and Future Monitoring                                                                                   | Trigger                                                                                                                                                                            | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                        |                                                                                                              |                                                                                                                                                     |                                                                                                                     | by increased flooding within the terrestrial habitat compared to baseline variability                                                                                              | <p>immediately</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Contract specialist to investigate and report on changes identified</li> <li><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required</li> <li><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required</li> <li><input type="checkbox"/> Report on mitigation as soon as practicable.</li> <li><input type="checkbox"/> Report in Annual Report</li> </ul> |
| <b>Erosion of stream bed and banks</b> | <input type="checkbox"/> Observations every month for at least two months prior to mining using photo points | <input type="checkbox"/> Observations every month during active undermining of 1 <sup>st</sup> and 2 <sup>nd</sup> order streams using photo points | <input type="checkbox"/> Observations every 2 months for one year after Nebo mining is completed using photo points | <b>NORMAL</b><br><b>No change in stream, bed or bank erosion compared to baseline period</b>                                                                                       | <ul style="list-style-type: none"> <li><input type="checkbox"/> Continue monitoring program</li> <li><input type="checkbox"/> Report in end of panel report</li> <li><input type="checkbox"/> Summarise all actions and monitoring in AEMR</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |
|                                        |                                                                                                              |                                                                                                                                                     |                                                                                                                     | <b>WITHIN PREDICTIONS</b><br><b>Minor decrease in stream, bed or bank stability compared to baseline period</b><br>i.e, small cracks with no observable change in stream stability | <ul style="list-style-type: none"> <li><input type="checkbox"/> Continue monitoring program</li> <li><input type="checkbox"/> Report in end of panel report</li> <li><input type="checkbox"/> Summarise all actions and monitoring in AEMR</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |
|                                        |                                                                                                              |                                                                                                                                                     |                                                                                                                     | <b>EXCEEDS PREDICTIONS</b>                                                                                                                                                         | <ul style="list-style-type: none"> <li><input type="checkbox"/> Inform SCA, OEH &amp; DRE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| Feature                                                                         | Monitoring Commitments                                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                                                                        | TARPS                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                                                                                 | Prior to Mining                                                                                                                                                                                                                     | During Mining                                                                                                                                   | Post Mining and Future Monitoring                                                                                                                                      | Trigger                                                                                                                                                                  | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                 |                                                                                                                                                                                                                                     |                                                                                                                                                 |                                                                                                                                                                        | <b>Major decrease in stream, bed or bank stability compared to baseline period</b><br><br>i.e. Cracks or other physical damage with permanent change in stream stability | immediately<br><br><input type="checkbox"/> Notify hydrology and ecology specialists immediately<br><input type="checkbox"/> Site visit with stakeholders<br><input type="checkbox"/> Take photographic record immediately<br><input type="checkbox"/> Contract specialist to investigate and report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable.<br><input type="checkbox"/> Report in Annual Report |
| <b>Groundwater quality</b><br><br>Using piezometers<br>Nebo1S, 1D, 2S, 2D, 3, 4 | <input type="checkbox"/> Field water quality (EC, pH) every 2 months<br><br><input type="checkbox"/> Laboratory analysis – every four months<br><br><input type="checkbox"/> Lab Parameters-- TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, | <input type="checkbox"/> Field water quality – monthly during extraction<br><br><input type="checkbox"/> Laboratory analysis – every two months | <input type="checkbox"/> Field water quality – every two months<br><br><input type="checkbox"/> Laboratory analysis – every four months until Nebo mining is completed | <b>NORMAL</b><br><br><b>No change in groundwater quality variability compared to baseline period</b>                                                                     | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Feature | Monitoring Commitments                                                |               |                                   | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|         | Prior to Mining                                                       | During Mining | Post Mining and Future Monitoring | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|         | NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, (filtered) |               |                                   | <b>WITHIN PREDICTIONS</b><br><b>Reduction in groundwater quality which extends for less than 2 months and does not persist after significant recharge (or lack of) events with the water having the following change above baseline variability;</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> EC &lt;20% increase above baseline maximum</li> <li><input type="checkbox"/> pH &lt; 1.5 drop below minimum baseline value</li> <li><input type="checkbox"/> Fe (Tot), Mn (tot), Al (filt), Zn (filt), SO4 (filt) &lt; 20% increase above baseline maximum</li> <li><input type="checkbox"/> Total N, Total P &lt; 20% increase above baseline maximum</li> </ul> <b>EXCEEDS PREDICTIONS</b><br><b>Reduction in groundwater quality which extends for more than 2 months and persists after significant recharge (or lack of) events with the water having the following change above baseline variability;</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> EC &gt;20% increase above baseline maximum</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Summarise all actions and monitoring in AEMR</li> <li><input type="checkbox"/> Inform SCA, OEH &amp; DRE immediately</li> <li><input type="checkbox"/> Notify hydrogeology specialist immediately</li> <li><input type="checkbox"/> Contract specialist to investigate and report on changes identified</li> <li><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required</li> <li><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required</li> <li><input type="checkbox"/> Report on mitigation as soon as practicable.</li> </ul> |

| Feature                                                                                                                                                                         | Monitoring Commitments                                                                                                                               |                                                                                                                                                  |                                                                                                                                                      | TARPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|                                                                                                                                                                                 | Prior to Mining                                                                                                                                      | During Mining                                                                                                                                    | Post Mining and Future Monitoring                                                                                                                    | Trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                 |                                                                                                                                                      |                                                                                                                                                  |                                                                                                                                                      | <input type="checkbox"/> pH < 2.0 drop below minimum baseline value<br><input type="checkbox"/> Fe (Tot), Mn (tot), Al (filt), Zn (filt), SO4 (filt) > 20% increase above baseline maximum<br><input type="checkbox"/> Total N, Total P > 20% increase above baseline maximum                                                                                                                                                                                                                                                          | <input type="checkbox"/> Report in Annual Report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Ground Water Levels</b><br>Using vibrating wire piezometers Nebo 6, 7, 8, 8A, WW11, WW20B and dip meters/ transducers in open standpipe piezometers Nebo1S, 1D, 2S, 2D, 3, 4 | <input type="checkbox"/> Minimum 12 hourly in VWP and open standpipe piezometers<br><br><input type="checkbox"/> Bi- monthly downloads and dip meter | <input type="checkbox"/> Minimum 12 hourly in VWP and open standpipe piezometers<br><br><input type="checkbox"/> Monthly downloads and dip meter | <input type="checkbox"/> Minimum 12 hourly in VWP and open standpipe piezometers<br><br><input type="checkbox"/> Bi- monthly downloads and dip meter | <b>NORMAL</b><br><b>No change in groundwater level variability compared to baseline period</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Reduction in groundwater level which extends for less than 2 months, or does not persist after significant recharge (or lack of) events and is within baseline variability;</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Reduction in groundwater level which extends for more than 2 months, or persists after significant recharge (or lack of) events and is outside baseline variability;</b> | <input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Continue monitoring program<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Summarise all actions and monitoring in AEMR<br><br><input type="checkbox"/> Inform SCA, OEH & DRE immediately<br><input type="checkbox"/> Notify hydrogeology specialist immediately<br><input type="checkbox"/> Contract specialist to investigate and |

| Feature                                                                                                           | Monitoring Commitments                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                     | TARPS                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                   | Prior to Mining                                                                                                                                                         | During Mining                                                                                                                                                                                                                                                                                                           | Post Mining and Future Monitoring                                                                                                                                                                                                                                                                                                   | Trigger                                                                                                                                                                                                                                                                                                                                                                                                 | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                   |                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                         | report on changes identified<br><input type="checkbox"/> Review monitoring program within 2 weeks and implement additional monitoring if required<br><input type="checkbox"/> Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act if required<br><input type="checkbox"/> Report on mitigation as soon as practicable.<br><input type="checkbox"/> Report in annual report                             |
| <b>Inflow into mine workings or hydraulic connectivity between stream/s and the workings during active mining</b> | <input type="checkbox"/> Daily volumetric flow monitoring of mine inflow and discharge<br><input type="checkbox"/> Water quality analysis of any anomalous inflow event | <input type="checkbox"/> Daily monitoring of mine inflow and discharge<br><input type="checkbox"/> Water quality analysis of any anomalous inflow event , with the sampling method and assessment parameters to be defined depending on what is being investigated, (i.e. major / minor elements, isotopes, algae etc.) | <input type="checkbox"/> Daily monitoring of mine inflow and discharge<br><input type="checkbox"/> Water quality analysis of any anomalous inflow event (as required) with the sampling method and assessment parameters to be defined depending on what is being investigated, (i.e. major / minor elements, isotopes, algae etc.) | <input type="checkbox"/> Increase in water discharge of > 1ML/day for 7 successive days from active longwall or pillar extraction areas, which are suspected to be as a result of mine subsidence and excluding elevated inflows due to high rain events over the entire Wongawilli workings<br><input type="checkbox"/> Note: the typical discharge from the overall Wongawilli underground is 6ML/day | <input type="checkbox"/> Engage hydrogeologist to investigate and report on changes identified<br><input type="checkbox"/> Inform relevant agencies of investigation<br><input type="checkbox"/> Investigation initiated within one week of trigger exceedance being observed<br><input type="checkbox"/> Monthly updates of investigation process to SCA, NOW<br><input type="checkbox"/> Report on mitigation as soon as practicable to SCA, NOW<br><input type="checkbox"/> Report in Annual Review |

## Biodiversity Monitoring and TARPs Summary

| Feature                                                                                                                       | Monitoring Commitments                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | TARPS                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                               | Prior to Mining                                                                                                                                                                                                                                                                                                                                                                                    | During Mining                                                                                                                                                                                                                                                                                                                                                                                                                  | Post Mining and Future Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                            | Trigger                                                                                                                                                                                                                                                                                                                                                                                                         | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Aquatic Ecology</b><br>6 Monitoring sites on Wattle Tree Creek<br>2 sites on Little Wattle Tree Creek<br>4 Reference sites | <input type="checkbox"/> Observational monitoring for presence/absence of aquatic habitat during water quality monitoring regime<br><br><input type="checkbox"/> AUSRIVAS macroinvertebrate sampling of reference and impact sites. Descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality (Biannually in Autumn and Spring) | <input type="checkbox"/> Observational monitoring for presence/absence of aquatic habitat during water quality monitoring regime<br><br><input type="checkbox"/> AUSRIVAS macroinvertebrate sampling of reference and impact sites. Descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality (Biannually in Autumn and Spring) Ongoing seasonal monitoring | <input type="checkbox"/> Observational monitoring for presence/absence of aquatic habitat during water quality monitoring regime for a minimum of one year post-mining (in consultation with key regulators)<br><br><input type="checkbox"/> AUSRIVAS macroinvertebrate sampling of reference and impact sites. Descriptions of instream habitat, algal levels, riparian condition, presence/absence of litter, flow level and water quality for a minimum of one year post- | <b>NORMAL</b><br><b>No change in aquatic biota compared to baseline observed</b><br><br><b>WITHIN PREDICTIONS</b><br><b>Water flow and quality results within predictions. Survey results within baseline variability</b><br><br><b>EXCEEDS PREDICTIONS</b><br><b>Water flow and quality results exceed predictions.</b><br><b>Statistically significant change observed in survey results against baseline</b> | <input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Notification to SCA/DoPI/OEH immediately<br><input type="checkbox"/> Proposal for any proposed additional monitoring and management measures within 1 week if required<br><input type="checkbox"/> Completion of agreed management task following approval from SCA/DoPI/OEH<br><input type="checkbox"/> Additional monitoring as required by the relevant government agencies<br><input type="checkbox"/> Report in end of panel report |

| Feature                    | Monitoring Commitments                                                                                                                                                                                               |                                                                                                                                                                                                                      |                                                                                                                                                              | TARPS                                                                                                       |                                                                                                |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|                            | Prior to Mining                                                                                                                                                                                                      | During Mining                                                                                                                                                                                                        | Post Mining and Future Monitoring                                                                                                                            | Trigger                                                                                                     | Response                                                                                       |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      | mining (in consultation with key regulators)<br>(Biannually in Autumn and Spring)                                                                            |                                                                                                             | <input type="checkbox"/> Reporting in Incident and Annual Review                               |
| <b>Terrestrial Ecology</b> | <input type="checkbox"/> Baseline ecological assessment.                                                                                                                                                             | <input type="checkbox"/> Observational monitoring– 50 m nocturnal stream searches and tadpole surveys at three locations ~150-200m apart along Wattle Creek and Little Wattle Tree Creek conducted Autumn and Spring | <input type="checkbox"/> Observational monitoring– Autumn and Spring for a minimum of one year post-mining (in consultation with key regulators)             | <b>NORMAL</b>                                                                                               | <input type="checkbox"/> Continue monitoring                                                   |
| <b>Amphibians</b>          | <input type="checkbox"/> Observational monitoring– 50 m nocturnal stream searches and tadpole surveys at three locations ~150-200m apart along Wattle Creek and Little Wattle Tree Creek conducted Autumn and Spring | <input type="checkbox"/> Targeted Threatened Amphibian searches each Winter along Wattle Creek and Little Wattle Tree Creek                                                                                          | <input type="checkbox"/> Targeted Threatened Amphibian searches in Winter period for a minimum of one year post-mining (in consultation with key regulators) | <b>No change as compared to baseline observed</b>                                                           | <input type="checkbox"/> Report in end of panel report                                         |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              | <b>WITHIN PREDICTIONS</b>                                                                                   | <input type="checkbox"/> Continue monitoring                                                   |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              | <b>Survey results within baseline variability</b>                                                           | <input type="checkbox"/> Report in end of panel report                                         |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              | <b>EXCEEDS PREDICTIONS</b>                                                                                  | <input type="checkbox"/> Notification to SCA/DoPI/OEH immediately                              |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              | <b>Observed physical impacts to habitat.</b>                                                                | <input type="checkbox"/> Proposal for threatened species management within 1 week if required  |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              | <b>Statistically significant decrease in population numbers and/or species composition against baseline</b> | <input type="checkbox"/> Completion of management task following approval from agencies        |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              |                                                                                                             | <input type="checkbox"/> Additional monitoring as required by the relevant government agencies |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              |                                                                                                             | <input type="checkbox"/> Report in end of panel report                                         |
|                            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              |                                                                                                             | <input type="checkbox"/> Reporting in Incident and Annual Reviews                              |
| <b>Riparian vegetation</b> | <input type="checkbox"/> Species inventory and modified Braun Blanquette cover Abundance for each                                                                                                                    | <input type="checkbox"/> Species inventory and modified Braun Blanquette cover Abundance for each                                                                                                                    | <input type="checkbox"/> Species inventory and modified Braun Blanquette cover Abundance for each                                                            | <b>NORMAL</b>                                                                                               | <input type="checkbox"/> Continue monitoring                                                   |
| Three 20 m x 20            |                                                                                                                                                                                                                      |                                                                                                                                                                                                                      |                                                                                                                                                              | <b>No change as compared to baseline observed</b>                                                           | <input type="checkbox"/> Report in end of panel report                                         |

| Feature                                         | Monitoring Commitments                                                                           |                                                                                        |                                                                                                                                    | TARPS                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | Prior to Mining                                                                                  | During Mining                                                                          | Post Mining and Future Monitoring                                                                                                  | Trigger                                                                                                                                                                                                                                                                                                                                                                  | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| m quadrats<br>~150-200m apart<br>per creek line | species.<br><input type="checkbox"/> At least once prior to mining (conducted Autumn and Spring) | species.<br><input type="checkbox"/> Autumn and spring during entire extraction period | species.<br><input type="checkbox"/> Autumn and Spring for a minimum of one year post-mining (in consultation with key regulators) | <b>WITHIN PREDICTIONS</b><br><b>Survey results within baseline variability</b><br><b>EXCEEDS PREDICTIONS</b><br><b>Observed deterioration in vegetation health against baseline surveys</b><br><b>Significant change/decline in cover abundance against baseline surveys.</b><br><b>Statistically significant change in species composition against baseline surveys</b> | <input type="checkbox"/> Continue monitoring<br><input type="checkbox"/> Report in end of panel report<br><br><input type="checkbox"/> Notification to SCA/DoPI/OEH immediately<br><input type="checkbox"/> Proposal for management within 1 week if required<br><input type="checkbox"/> Completion of management task following approval from agencies<br><input type="checkbox"/> Additional monitoring as required by the relevant government agencies<br><input type="checkbox"/> Report in end of panel report<br><input type="checkbox"/> Reporting in Incident and Annual Reviews |

## Land Management Plan Monitoring and TARPs Summary

| Feature                                                                                        | Monitoring Commitments                                                                                                  |                                                             |                                                            | TARPS                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                | Prior to Mining                                                                                                         | During Mining                                               | Post Mining and Future Monitoring                          | Trigger                                                                    | Response                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Steep Slopes and Rock Outcrops</b><br><br>Note: There are no cliffs identified in the area. | <input type="checkbox"/> Observation and documentation of steep slope and rock outcrop condition - Once prior to mining | <input type="checkbox"/> Monthly observations during mining | <input type="checkbox"/> Monthly observations for 6 Months | <input type="checkbox"/> Minor cracking on roads and tracks (<10mm)        | <input type="checkbox"/> Notification to SCA, DoPI, and DRE NSW within 24 hrs, using photographic record<br><input type="checkbox"/> Warning sign/s erection<br><input type="checkbox"/> Reported in Annual Review                                                                                                                                                                                     |
|                                                                                                |                                                                                                                         |                                                             |                                                            | <input type="checkbox"/> Major cracking (>10mm) or traffic impedence       | <input type="checkbox"/> Notification to SCA , DoPI, DRE Immediately<br><input type="checkbox"/> Make area safe immediately including erection of warning sign/s and barrier fencing<br><input type="checkbox"/> Incident Report and Mitigation Proposal to Agencies within a week.<br><input type="checkbox"/> Mitigation Report and Annual Review.<br><input type="checkbox"/> Review mining options |
|                                                                                                |                                                                                                                         |                                                             |                                                            | <input type="checkbox"/> Major cliff/rock collapse or steep slope movement | <input type="checkbox"/> Notification to SCA/DoPI/DRE<br><input type="checkbox"/> Make area safe immediately including warning sign/s erection and barrier fencing<br><input type="checkbox"/> Proposal for rectification within 1 week<br><input type="checkbox"/> Completion of works following approval from Agencies<br><input type="checkbox"/> Additional monitoring as agreed                   |

- ☐ Mitigation Report and Annual Report.
- ☐ Review mining options
- ☐ Reported in Annual Review

## Heritage Management Plan Monitoring and TARPs Summary

| Feature                                                                                                                        | Monitoring Commitments                                                                                                                                                                                                    |                                                                                                    |                                                      | TARPS                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                | Prior to Mining                                                                                                                                                                                                           | During Mining                                                                                      | Post Mining and Future Monitoring                    | Trigger                                                                                                                                                                                       | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Heritage Sites:</b><br><br>Two sites :Historic 1 and Historic 3<br><br>No Aboriginal Heritage sites in the application area | <input type="checkbox"/> Record significant heritage items once prior to mining<br><br><input type="checkbox"/> Two historic artefact scatters of low significance are present within the predicted subsidence footprint. | <input type="checkbox"/> Once for any observed impacts such as: surface cracking, damage, erosion. | <input type="checkbox"/> Once 3-6 months post mining | <input type="checkbox"/> Observation of unstable conditions or damage, cracking or tree falls<br><br><input type="checkbox"/> Subsidence movement exceeding the expected maximum predictions. | <input type="checkbox"/> Report impacts as required<br><input type="checkbox"/> if subsidence movement occurs above the expected maximum predictions in the SMP then site inspections of Dendrobium 5 and Wanyambilli Hill 1 should occur in consultation with Registered Aboriginal stakeholders, including the Illawarra LALC and CBNTCAC<br><br><input type="checkbox"/> Notify OEH, DoPI, DRE NSW, SCA<br><input type="checkbox"/> Review and undertake remediation options as agreed with Agencies<br><input type="checkbox"/> Report in Mitigation report, End of panel report and Annual Review |

## ATTACHMENT C

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### Project Approval:

# Project Approval

## Section 75J of the *Environmental Planning and Assessment Act 1979*

As delegate of the Minister for Planning and Infrastructure, the Planning Assessment Commission of New South Wales (the Commission) approves the project application referred to in Schedule 1, subject to the conditions in Schedules 2 to 6.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.



Member of the Commission



Member of the Commission

Sydney

2 November 2011

### SCHEDULE 1

|                     |                                             |
|---------------------|---------------------------------------------|
| Application Number: | 09_0161                                     |
| Proponent:          | Gujarat NRE FCGL Pty Ltd                    |
| Approval Authority: | Minister for Planning and Infrastructure    |
| Land:               | See Appendix 1                              |
| Project:            | NRE Wongawilli Colliery – Nebo Area Project |

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## DEFINITIONS

|                                      |                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adaptive management                  | Adaptive management includes monitoring subsidence effects and impacts and, based on the results, modifying the mining plan as mining proceeds to ensure that the effects, impacts and/or associated environmental consequences remain within predicted and/or designated ranges and in compliance with the conditions of this approval                                   |
| Annual Review                        | The review required by condition 3 of schedule 6                                                                                                                                                                                                                                                                                                                          |
| Approved mine plan                   | The mine plans depicted in the figures in Appendix 2                                                                                                                                                                                                                                                                                                                      |
| BCA                                  | Building Code of Australia                                                                                                                                                                                                                                                                                                                                                |
| Built features                       | Includes any building or work erected or constructed on land, and includes dwellings and infrastructure such as any formed road, street, path, walk, or driveway; any pipeline, water, sewer, telephone, gas or other service main                                                                                                                                        |
| CCC                                  | Community Consultative Committee                                                                                                                                                                                                                                                                                                                                          |
| Cliffs                               | Continuous rock face, including overhangs, having a minimum height of 10 metres and a minimum slope of 2 to 1, ie having a minimum angle to the horizontal of 63°.                                                                                                                                                                                                        |
| Conditions of this approval          | Conditions contained in schedules 2 to 6 inclusive                                                                                                                                                                                                                                                                                                                        |
| Construction                         | The demolition of buildings or works, carrying out of works and erection of buildings covered by this approval                                                                                                                                                                                                                                                            |
| Council                              | Wollongong City Council                                                                                                                                                                                                                                                                                                                                                   |
| Day                                  | The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays                                                                                                                                                                                                                                                                           |
| Department                           | Department of Planning and Infrastructure                                                                                                                                                                                                                                                                                                                                 |
| Director-General                     | Director-General of the Department, or delegate                                                                                                                                                                                                                                                                                                                           |
| DRE                                  | Division of Resources and Energy, within the Department of Trade & Investment, Regional Infrastructure & Services                                                                                                                                                                                                                                                         |
| DSC                                  | Dams Safety Committee                                                                                                                                                                                                                                                                                                                                                     |
| EA                                   | Environmental assessment titled <i>NRE Wongawilli Colliery Nebo Area Environmental Assessment, Volumes 1-2</i> , dated October 2010, including the associated response to submissions                                                                                                                                                                                     |
| Environmental consequences           | The environmental consequences of subsidence impacts, including: damage to infrastructure, buildings and residential dwellings; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls; damage to Aboriginal heritage sites; impacts on aquatic ecology; and ponding |
| EP&A Act                             | <i>Environmental Planning and Assessment Act 1979</i>                                                                                                                                                                                                                                                                                                                     |
| EP&A Regulation                      | <i>Environmental Planning and Assessment Regulation 2000</i>                                                                                                                                                                                                                                                                                                              |
| EPL                                  | Environment Protection Licence issued under the POEO Act                                                                                                                                                                                                                                                                                                                  |
| Executive Director Mineral Resources | Executive Director Mineral Resources within DRE                                                                                                                                                                                                                                                                                                                           |
| Evening                              | The period from 6pm to 10pm                                                                                                                                                                                                                                                                                                                                               |
| Feasible                             | Feasible relates to engineering considerations and what is practical to build or to implement                                                                                                                                                                                                                                                                             |
| First workings                       | Development of main headings, longwall gate roads, related cut throughs and the like                                                                                                                                                                                                                                                                                      |
| Incident                             | 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 this approval                                                                                                                                                                                        |
| Land                                 | In general, the definition of land is consistent with the definition in the EP&A Act. However, in relation to the noise and air quality conditions in schedule 4 it means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval                                         |
| Material harm to the environment     | Harm to the environment is material if it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial                                                                                                                                                                                                                  |
| Minister                             | Minister for Planning and Infrastructure, or delegate                                                                                                                                                                                                                                                                                                                     |
| Mining operations                    | Includes all overburden removal and coal extraction, processing, handling, storage and transportation activities carried out on site                                                                                                                                                                                                                                      |
| Minor                                | Small in quantity, size and degree given the relative context                                                                                                                                                                                                                                                                                                             |
| Mitigation                           | Activities associated with reducing the impacts of the project prior to or during those impacts occurring                                                                                                                                                                                                                                                                 |
| MSB                                  | Mine Subsidence Board                                                                                                                                                                                                                                                                                                                                                     |
| Negligible                           | Small and unimportant, such as to be not worth considering                                                                                                                                                                                                                                                                                                                |
| Night                                | The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays                                                                                                                                                                                                                                                                         |
| NOW                                  | NSW Office of Water                                                                                                                                                                                                                                                                                                                                                       |
| OEH                                  | Office of Environment and Heritage                                                                                                                                                                                                                                                                                                                                        |
| POEO Act                             | <i>Protection of the Environment Operations Act 1997</i>                                                                                                                                                                                                                                                                                                                  |

|                                |                                                                                                                                                                                                                                                      |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Privately-owned land           | Land that is not owned by a public agency, or a mining company (or its subsidiary)                                                                                                                                                                   |
| Project                        | The project described in the EA                                                                                                                                                                                                                      |
| Proponent                      | Gujarat NRE FCGL Pty Ltd, or its successors in title                                                                                                                                                                                                 |
| Reasonable                     | Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements             |
| Reasonable costs               | The costs agreed between the Department and the Proponent for obtaining independent experts to review the adequacy of any aspects of the extraction plan, or where such costs cannot be agreed, the costs determined by a dispute resolution process |
| Rehabilitation                 | The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment                                                                                                            |
| Remediation                    | Activities associated with partially or fully repairing or rehabilitating the impacts of the project or controlling the environmental consequences of this impact                                                                                    |
| ROM coal                       | Run-of-mine coal                                                                                                                                                                                                                                     |
| RTA                            | Roads and Traffic Authority                                                                                                                                                                                                                          |
| Safe, serviceable & repairable | Safe means no danger to users who are present, serviceable means available for its intended use, and repairable means damaged components can be repaired economically                                                                                |
| SCA                            | Sydney Catchment Authority                                                                                                                                                                                                                           |
| Second workings                | Extraction of coal from longwall panels, mini-wall panels or pillar extraction                                                                                                                                                                       |
| Site                           | The land referred to in schedule 1, and listed in Appendix 1                                                                                                                                                                                         |
| Statement of commitments       | The Proponent's commitments in Appendix 3                                                                                                                                                                                                            |
| Steep slopes                   | An area of land having a gradient between 1 in 3 (33% or 18.3°) and 2 in 1 (200% or 63.4°)                                                                                                                                                           |
| Subsidence                     | The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts                                                                                                                                          |
| Subsidence effects             | Deformation of the ground mass due to mining, including all mining-induced ground movements, such as vertical and horizontal displacement, tilt, strain and curvature                                                                                |
| Subsidence impacts             | Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs           |
| Surface facilities sites       | The Wongawilli and Avondale pit top areas; all ventilation shaft sites; sites used for gas drainage or for other mining purposes infrastructure; and any other site subject to existing or proposed surface disturbance associated with the project  |

## SCHEDULE 2 ADMINISTRATIVE CONDITIONS

### OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

### TERMS OF APPROVAL

2. The Proponent shall carry out the project generally in accordance with the:

- (a) EA;
- (b) statement of commitments; and
- (c) conditions of this approval.

#### Notes:

- The general layout of the project is shown in Appendix 2.
- The statement of commitments is reproduced in Appendix 3.
- The Department notes that approval of the Western Driveage component of the project does not indicate or imply any approval of future mining in the Western Area (as defined in the EA), which will be subject to a separate planning process and full merit assessment.

3. If there is any inconsistency between the above documents, the more recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.
4. The Proponent shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
  - (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted in accordance with this approval; and
  - (b) the implementation of any actions or measures contained in these documents.

### LIMITS ON APPROVAL

#### Mining Operations

5. Mining operations for the project may take place until 31 December 2015.

*Note: Under this approval, the Proponent is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Director-General or the Executive Director Mineral Resources. Consequently this approval will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.*

#### Coal Production & Transport

6. The Proponent shall:
  - (a) not transport coal from the site by road (except in an emergency situation and with the prior approval of the Director-General in consultation with Council);
  - (b) restrict coal processing and transport to/from the site to a maximum of 2 million tonnes of ROM coal per calendar year; and
  - (c) restrict train movements to/from the site to a maximum of (except with the prior approval of the Director-General):
    - 8 train movements (calendar year average) a day;
    - 10 train movements (maximum weekly rolling average) a day;
    - 2 train movements a night during normal operations; and
    - 4 train movements a night during advertised campaigns, with a maximum of 10 such campaigns a year.

#### Notes:

- For the purposes of this condition:
  - o each train entering and exiting the site is classified as 2 train movements; a day refers to the 24 hours from midnight to midnight the next day; and (notwithstanding the general definition of "night" under this approval) a night refers to the period from 11:00pm to 7:00am;
  - o an advertised campaign means a short term increase in train movements (up to 11 days) for ship-loading that has been advertised in accordance with the procedures in the Noise Management Plan (see condition 8 of schedule 4);
- The Proponent is required to review the maximum number of train movements, particularly at night, as part of the Noise Audit (see condition 7 of schedule 4).

#### Hours of Operation

7. The Proponent shall restrict loading and unloading to/from the coal stockpile as follows:

- (a) normal operations:
  - 7am to 6pm Monday to Friday;
  - 8am to 4pm Saturdays; and
  - at no time on Sundays and public holidays;
- (b) during longwall change-outs:
  - 7am to 10pm Monday to Saturday; and
  - at no time on Sundays and public holidays.

At least 7 days prior to undertaking longwall change-outs involving extended hours of operation as allowed in (b) above, the Proponent shall provide written notification of the works to the Department, OEH, Council, the CCC and adjacent and affected residents, to the satisfaction of the Director-General.

*Note: Underground mining operations, coal transport and other surface facilities operation may be undertaken at any time.*

## **SURRENDER OF CONSENTS AND APPROVALS**

8. Within 6 months of this approval, or as otherwise agreed by the Director-General, the Proponent shall surrender all existing development consents and project approvals for mining operations relied on by the Proponent for the site (other than this approval) in accordance with Sections 75YA and 104A of the EP&A Act.

*Note: This requirement does not extend to the surrender of construction and occupation certificates for existing and proposed building works under Part 4A of the EP&A Act. Surrender of a consent or approval should not be understood as implying that works legally constructed under a valid consent or approval can no longer be legally maintained or used.*

9. Prior to the surrender of these consents and/or approvals, the conditions of this approval (including any notes) shall prevail to the extent of any inconsistency with the conditions of these consents and/or approvals.

## **STRUCTURAL ADEQUACY**

10. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structure, that are part of the project are constructed in accordance with:
  - (a) the relevant requirements of the BCA; and
  - (b) any additional requirements of the MSB where the building or structure is located on land within declared Mine Subsidence Districts.

*Notes:*

- *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*
- *Under Section 15 of the Mine Subsidence Compensation Act 1961, the Proponent is required to obtain the MSB's approval before constructing any improvements within a Mine Subsidence District.*

## **DEMOLITION**

11. The Proponent shall ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

## **OPERATION OF PLANT AND EQUIPMENT**

12. The Proponent shall ensure that all plant and equipment used at the site is:
  - (a) maintained in a proper and efficient condition; and
  - (b) operated in a proper and efficient manner.

## **STAGED SUBMISSION OF STRATEGIES, PLANS OR PROGRAMS**

13. With the approval of the Director-General, the Proponent may submit any strategies, plans or programs required by this approval on a progressive basis.

*Note: The conditions of this approval require certain strategies, plans, and programs to be prepared for the project. They also require these documents to be reviewed and audited on a regular basis to ensure they remain effective. However, in some instances, it will not be necessary or practicable to prepare these documents for the whole project at any one time; particularly as these documents are intended to be dynamic and improved over time. Consequently, the documents may be prepared and implemented on a progressive basis. In doing this however, the Proponent will need to demonstrate that it has suitable documents in place to manage the existing operations of the project.*

### SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS – UNDERGROUND MINING

#### SUBSIDENCE

##### Performance Measures

1. The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 1, to the satisfaction of the Director-General.

Table 1: Subsidence Impact Performance Measures

| <b>Water Resources</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catchment yield to the Upper Cordeaux Reservoirs (No. 1 and No. 2) and Avon Reservoir | Negligible reduction to the quality or quantity of water resources reaching the reservoirs<br><br>No connective cracking between the surface and the mine                                                                                                                                                                                                                                                                        |
| Upper Cordeaux Reservoirs (No. 1 and No. 2) and Avon Reservoir                        | Negligible leakage from the reservoirs<br><br>Negligible reduction in the water quality of reservoirs                                                                                                                                                                                                                                                                                                                            |
| <b>Watercourses</b>                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Wattle Creek, Little Wattle Tree Creek, Cordeaux River, Gallaghers Creek              | 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>                                                                                                     |
| Other watercourses                                                                    | No greater subsidence impact or environmental consequences than predicted in the EA                                                                                                                                                                                                                                                                                                                                              |
| Upland Swamps (No 22 and No 39)                                                       | Negligible environmental consequences including: <ul style="list-style-type: none"> <li>• <i>negligible</i> change in the size of swamps;</li> <li>• <i>negligible</i> change in the functioning of swamps;</li> <li>• <i>negligible</i> change to the composition or distribution of species within swamps; and</li> <li>• <i>negligible</i> drainage of water from swamps, or redistribution of water within swamps</li> </ul> |
| <b>Land</b>                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Illawarra Escarpment State Conservation Area, Metropolitan Special Area               | Negligible environmental consequences.                                                                                                                                                                                                                                                                                                                                                                                           |
| Cliffs                                                                                | 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 the longwall mining area)                                                                                                                                                                         |
| <b>Biodiversity</b>                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Threatened species, threatened populations, or endangered ecological communities      | Negligible environmental consequences                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Heritage Features</b>                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Aboriginal heritage sites                                                             | Negligible impact or environmental consequence                                                                                                                                                                                                                                                                                                                                                                                   |
| Non-Aboriginal heritage sites (including 'Historic 1', 'Historic 2' and 'Historic 3') | Negligible loss of heritage value                                                                                                                                                                                                                                                                                                                                                                                                |

Notes to Table 1:

- The Proponent will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this approval (see condition 7(i) of schedule 3 and conditions 20 - 21 of schedule 4 below).
- Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Director-General will be the final arbiter.
- In the case of the Illawarra Escarpment State Conservation Area, the Director-General's satisfaction can only be expressed following consultation with OEH.
- In the case of the Metropolitan Special Area, the Director-General's satisfaction can only be expressed following consultation with SCA.
- The requirements of this condition only apply to the impacts and consequences of mining operations, construction or demolition undertaken following the date of this approval.

2. The Proponent must assess and manage project-related risks to ensure that there are no exceedances of the performance measures in Table 1. Any exceedance of these performance measures constitutes a breach of this approval and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation, notwithstanding actions taken pursuant to paragraphs (a)-(c) or condition 3 below. Where any exceedance of these performance measures has occurred, the Proponent must, at the earliest opportunity:
  - (a) take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
  - (b) consider all reasonable and feasible options for remediation and submit a report to the Department describing those options and any preferred remediation measures or other course of action; and
  - (c) implement remediation measures as directed by the Director-General,
 to the satisfaction of the Director-General.

## Offsets

3. If the Proponent exceeds the performance measures in Table 1 and the Director-General determines that:
  - (a) it is not reasonable or feasible to remediate the impact or environmental consequence; or
  - (b) remediation measures implemented by the Proponent have failed to satisfactorily remediate the impact or environmental consequence;
 then the Proponent shall provide a suitable offset to compensate for the impact or environmental consequence, to the satisfaction of the Director-General.

*Note: Any offset required under this condition must be proportionate with the significance of the impact or environmental consequence.*

4. The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 2, to the satisfaction of the Director-General.

*Table 2: Subsidence Impact Performance Measures*

| <b>Built Features</b>                                                                                                                                                                                            |                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key public infrastructure: including SCA infrastructure (Avon Dam, Upper Cordeaux No.1 and No.2 dams, water supply pipelines), high pressure gas pipelines, electricity transmission lines, fibre optic networks | <p>Always safe and serviceable.</p> <p>Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.</p>                                                                                            |
| Gas distribution pipelines, electricity distribution lines, roads, fire trails, other public infrastructure, other built features                                                                                | <p>Always safe.</p> <p>Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.</p> <p>Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.</p> |
| <b>Public Safety</b>                                                                                                                                                                                             |                                                                                                                                                                                                                                                  |
| Public safety                                                                                                                                                                                                    | No additional risk                                                                                                                                                                                                                               |

*Notes to Table 2:*

- *The Proponent will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this approval (see condition 7 below).*
  - *Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Director-General will be the final arbiter.*
  - *The requirements of this condition only apply to the impacts and consequences of mining operations undertaken following the date of this approval.*
  - *Any breach of this condition is taken to be a breach of this approval, and may be subject to penalty or offence provisions under the EP&A Act or EP&A Regulation.*
  - *Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.*
5. Any dispute between the Proponent and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 2 is to be settled by the Director-General, following consultation with the MSB and the Executive Director Mineral Resources. Any decision by the Director-General shall be final and not subject to further dispute resolution under this approval.

## First Workings

6. The Proponent may carry out first workings on site, other than in accordance with an approved Extraction Plan, provided that DRE is satisfied that the first workings are designed to remain long-term stable and non-subsiding, except insofar as they may be impacted by approved second workings.

*Note: The intent of this condition is not to require an additional approval for first workings, but to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long term stability, with zero resulting subsidence impacts.*

## Extraction Plan

7. The Proponent shall prepare and implement an Extraction Plan for any second workings on site, to the satisfaction of the Director-General. The plan must:
- (a) be prepared by 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) provide revised predictions of the conventional and non-conventional subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, incorporating any relevant information obtained since this approval;
  - (e) include detailed performance indicators for each of the performance measures in Tables 1 and 2;
  - (f) describe the measures that would be implemented to:
    - ensure compliance with the performance measures in Tables 1 and 2; and
    - manage or remediate subsidence impacts and/or environmental consequences;
  - (g) 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;
  - (h) include the following to the satisfaction of DRE:
    - a subsidence monitoring program to:
      - o provide data to assist with the management of the risks associated with subsidence;
      - o validate the subsidence predictions;
      - o monitor the integrity of the overlying strata, particularly the Cordeaux Crinanite; and
      - o analyse the relationship between the predicted and resulting subsidence effects and predicted and resulting impacts under the plan and any ensuing environmental consequences; and
      - o inform the contingency plan and adaptive management process;
    - a coal resource recovery plan that demonstrates effective recovery of the available resource;
    - a Built Features Management Plan, which has been prepared in consultation with the owners of such features, to manage the potential impacts and consequences of subsidence on any built features;
    - a Public Safety Management Plan to ensure public safety in the mining area; and
    - appropriate revisions to the Rehabilitation Management Plan required under condition 26 of schedule 4; and
  - (i) 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:
      - o surface and groundwater impact assessment criteria based on at least 2 years of baseline data, including trigger levels for investigating any potentially adverse impacts on water resources or water quality;
      - o a program to monitor and report groundwater inflows to underground workings; and
      - o a program to predict, manage and monitor impacts on any groundwater bores on privately-owned land;
    - Biodiversity Management Plan, which has been prepared in consultation with OEH and DRE, 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 dependent ecosystems;
    - 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; and

- Heritage Management Plan, to manage the potential environmental consequences of the proposed second workings on both Aboriginal and non-Aboriginal heritage sites or values; and
- (j) include a program to collect sufficient baseline data for future Extraction Plans.

*Note: An SMP that is substantially consistent with this condition and which is approved by DRE prior to 31 December 2011 is taken to satisfy the requirements of this condition.*

8. The Proponent shall ensure that the management plans required under condition 7(i) above include:
- (a) an assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval; and
  - (b) a detailed description of the measures that would be implemented to remediate predicted impacts.

**Payment of Reasonable Costs**

9. The Proponent shall pay all reasonable costs incurred by the Department to engage suitably qualified, experienced and independent experts to review the adequacy of any aspect of an Extraction Plan.
-

## SCHEDULE 4 SPECIFIC ENVIRONMENTAL CONDITIONS – GENERAL

### NOISE

#### Noise Criteria

- The Proponent shall ensure that the noise generated by the project (including train loading and shunting within the yard but excluding train movements on the Wongawilli rail spur) does not exceed the criteria in Table 3 and Table 4 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 3: Noise Criteria dB(A) – Intrusive Noise Limits – Existing Residences

| Receiver Area                            | Day                | Evening            | Night              |                  |
|------------------------------------------|--------------------|--------------------|--------------------|------------------|
|                                          | $L_{Aeq}$ (15 min) | $L_{Aeq}$ (15 min) | $L_{Aeq}$ (15 min) | $L_{A1}$ (1 min) |
| RA1                                      | 43                 | 43                 | 43                 | 59               |
| RA2                                      | 44                 | 43                 | 43                 | 60               |
| RA3                                      | 40                 | 40                 | 38                 | 48               |
| All other existing residential receivers | 40                 | 40                 | 38                 | 48               |

Table 4: Noise Criteria dB(A) – Amenity Noise Limits – All Residences

| Receiver Area            | Day                 | Evening            | Night              |
|--------------------------|---------------------|--------------------|--------------------|
|                          | $L_{Aeq}$ (11 hour) | $L_{Aeq}$ (4 hour) | $L_{Aeq}$ (9 hour) |
| All privately-owned land | 60                  | 50                 | 45                 |

Notes to Tables 3 and 4:

- To interpret the locations referred to Tables 2 and 3, see Appendix 4.
- Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.

However, these noise criteria do not apply if the Proponent has an agreement with the relevant owner/s of the residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

#### Noise Goals

- The Proponent shall make continual endeavours to reduce the noise generated by the project, with the objective being that noise generated by the project (including train loading and shunting within the yard but excluding train movements on the Wongawilli rail spur) does not exceed the criteria in Table 5 at any existing residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 5: Noise Criteria dB(A) – Intrusive Noise Goals – Existing Residences

| Receiver Area                            | Day                | Evening            | Night              |                  |
|------------------------------------------|--------------------|--------------------|--------------------|------------------|
|                                          | $L_{Aeq}$ (15 min) | $L_{Aeq}$ (15 min) | $L_{Aeq}$ (15 min) | $L_{A1}$ (1 min) |
| RA1                                      | 40                 | 40                 | 38                 | 51               |
| RA2                                      | 40                 | 40                 | 38                 | 51               |
| RA3                                      | 40                 | 40                 | 38                 | 48               |
| All other existing residential receivers | 40                 | 40                 | 38                 | 48               |

Notes:

- To interpret the locations referred to Table 5, see Appendix 4.
- Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.
- The noise goals in Table 5 may be varied by way of direction to the Proponent by the Director-General, following consideration of the results of the noise audit required under condition 7 below.

#### Rail Noise

- The Proponent shall ensure that the noise generated by railway activities on the Wongawilli rail spur outside of the yard limits (excluding any train shunting or when loading is taking place) does not exceed the criteria in Table 6 at any existing residence on privately-owned land.

Table 6: Noise Criteria dB(A) – Rail Noise Limits – Existing residences

| Receiver Area                      | Day                | Night              |
|------------------------------------|--------------------|--------------------|
|                                    | $L_{Aeq}$ (period) | $L_{Aeq}$ (period) |
| All existing residential receivers | 65                 | 60                 |

Note: Noise generated by the railway activities is to be measured in accordance with the relevant requirements, and exemptions of the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects.

However, these noise criteria do not apply if the Proponent has an agreement with the relevant owner/s of the residence or land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

4. By the end of July 2013, or other timing as may be agreed by the Director-General, the Proponent shall use its best endeavours to ensure that its rail spur is only accessed by:
  - (a) locomotives that are approved to operate on the NSW rail network in accordance with noise limits L6.1 to L6.4 in RailCorp's EPL (No. 12208); and
  - (b) trains comprising no less than 30 wagons.
5. The Proponent shall restrict train speeds on the Wongawilli rail spur to a maximum of 20 km/h.

#### Operating Conditions

6. The Proponent shall:
  - (a) implement best practice noise management, including all reasonable and feasible noise mitigation measures to minimise the operational, road traffic and rail noise generated by the project; and
  - (b) regularly assess the results of noise monitoring to ensure compliance with the relevant conditions of this approval,
 to the satisfaction of the Director-General.

#### Noise Audit

7. The Proponent shall prepare and implement a Noise Audit for the project to the satisfaction of the Director-General. The audit must:
  - (a) be prepared by a suitably qualified and experienced expert, whose appointment has been approved by the Director-General;
  - (b) be prepared in consultation with OEH, and be submitted to the Director-General for approval by the end of June 2013;
  - (c) undertake improved background noise monitoring;
  - (d) investigate and evaluate:
    - all reasonable and feasible measures to mitigate operational noise levels to comply with the noise goals in Table 5; and
    - all reasonable and feasible measures to mitigate rail noise associated with the project (eg locomotive use, use of longer trains and 3-pack wagons, track works);
  - (e) review the feasibility of reducing the maximum train length required under condition 4 above; and
  - (f) include an action plan to implement the audit recommendations and a protocol for monitoring the effectiveness of these measures.

#### Noise Management Plan

8. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Director-General. This plan must:
  - (a) be prepared in consultation with OEH and Council, and submitted to the Director-General for approval within 6 months of this approval;
  - (b) describe the noise mitigation measures that would be implemented to ensure compliance with the relevant conditions of this approval;
  - (c) include a protocol for continual improvement of noise performance, and reporting progress in meeting the noise goals in Table 5;
  - (d) include a protocol for notifying residents of advertised campaigns (see condition 6 of schedule 2); and
  - (e) include a noise monitoring program that:
    - uses a combination of attended and unattended monitoring to evaluate the performance of the project; and
    - includes a protocol for determining exceedances of the relevant conditions of this approval.

## AIR QUALITY & GREENHOUSE GAS

### Odour

9. The Proponent shall ensure that no offensive odours are emitted from the site, as defined under the POEO Act, unless otherwise authorised by an EPL.

### Greenhouse Gas Emissions

10. The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Director-General.

*Note: This condition does not extend to Scope 3 emissions, as defined in the National Greenhouse Energy Reporting Guidelines.*

### Air Quality Criteria

11. The Proponent shall implement all reasonable and feasible mitigation measures to ensure that the particulate emissions generated by the project do not exceed the criteria listed in Tables 7, 8 and 9 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

*Table 7: Long term criteria for particulate matter*

| <b>Pollutant</b>                               | <b>Averaging period</b> | <b><sup>d</sup> Criterion</b>     |
|------------------------------------------------|-------------------------|-----------------------------------|
| Total suspended particulate (TSP) matter       | Annual                  | <sup>a</sup> 90 µg/m <sup>3</sup> |
| Particulate matter < 10 µm (PM <sub>10</sub> ) | Annual                  | <sup>a</sup> 30 µg/m <sup>3</sup> |

*Table 8: Short term criterion for particulate matter*

| <b>Pollutant</b>                               | <b>Averaging period</b> | <b><sup>d</sup> Criterion</b>     |
|------------------------------------------------|-------------------------|-----------------------------------|
| Particulate matter < 10 µm (PM <sub>10</sub> ) | 24 hour                 | <sup>a</sup> 50 µg/m <sup>3</sup> |

*Table 9: Long term criteria for deposited dust*

| <b>Pollutant</b>            | <b>Averaging period</b> | <b>Maximum increase in deposited dust level</b> | <b>Maximum total deposited dust level</b> |
|-----------------------------|-------------------------|-------------------------------------------------|-------------------------------------------|
| <sup>c</sup> Deposited dust | Annual                  | <sup>b</sup> 2 g/m <sup>2</sup> /month          | <sup>a</sup> 4 g/m <sup>2</sup> /month    |

*Notes to Tables 7-9:*

<sup>a</sup> Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to other sources);

<sup>b</sup> Incremental impact (ie incremental increase in concentrations due to the project on its own);

<sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method; and

<sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agree to by the Director-General in consultation with OEH.

### Air Quality Acquisition Criteria

12. If the particulate matter emissions generated by the project exceed the criteria in Tables 10, 11, and 12 on a systematic basis at any residence on privately-owned land, or on more than 25 percent of any privately owned land, then upon receiving a written request for acquisition from the landowner the Proponent shall acquire the land in accordance with the procedures in conditions 4-5 of schedule 5.

*Table 10: Long term acquisition criteria for particulate matter*

| <b>Pollutant</b>                               | <b>Averaging period</b> | <b><sup>d</sup> Criterion</b>     |
|------------------------------------------------|-------------------------|-----------------------------------|
| Total suspended particulate (TSP) matter       | Annual                  | <sup>a</sup> 90 µg/m <sup>3</sup> |
| Particulate matter < 10 µm (PM <sub>10</sub> ) | Annual                  | <sup>a</sup> 30 µg/m <sup>3</sup> |

Table 11: Short term acquisition criteria for particulate matter

| Pollutant                                      | Averaging period | <sup>d</sup> Criterion             |
|------------------------------------------------|------------------|------------------------------------|
| Particulate matter < 10 µm (PM <sub>10</sub> ) | 24 hour          | <sup>a</sup> 150 µg/m <sup>3</sup> |
| Particulate matter < 10 µm (PM <sub>10</sub> ) | 24 hour          | <sup>b</sup> 50 µg/m <sup>3</sup>  |

Table 12: Long term acquisition criteria for deposited dust

| Pollutant                   | Averaging period | Maximum increase in deposited dust level | Maximum total deposited dust level     |
|-----------------------------|------------------|------------------------------------------|----------------------------------------|
| <sup>c</sup> Deposited dust | Annual           | <sup>b</sup> 2 g/m <sup>2</sup> /month   | <sup>a</sup> 4 g/m <sup>2</sup> /month |

Notes to Tables 10-12:

<sup>a</sup> Total impact (ie incremental increase in concentrations due to the project plus background concentrations due to other sources);

<sup>b</sup> Incremental impact (ie incremental increase in concentrations due to the project on its own);

<sup>c</sup> Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method; and

<sup>d</sup> Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agree to by the Director-General in consultation with OEH.

### Operating Conditions

13. The Proponent shall:
  - (a) implement best practice air quality management, including all reasonable and feasible measures to minimise off-site odour, fume and dust emissions generated by the project, including from any spontaneous combustion on site,
  - (b) minimise any visible air pollution generated by the project; and
  - (c) regularly assess the real-time air quality monitoring and meteorological forecasting data, and relocate, modify and/or suspend operations to ensure compliance with the relevant conditions of this approval;
 to the satisfaction of the Director-General.

### Air Quality & Greenhouse Gas Management Plan

14. The Proponent shall prepare and implement a detailed Air Quality & Greenhouse Gas Management Plan for the project to the satisfaction of the Director-General. This plan must:
  - (a) be prepared in consultation with OEH, and submitted to the Director-General for approval within 6 months of this approval;
  - (b) describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval, including a real-time air quality management system that employs both reactive and proactive mitigation measures;
  - (c) describe the measures that would be implemented to minimise the greenhouse gas emissions from the site; and
  - (d) include an air quality monitoring program that:
    - uses a combination of real-time monitors and supplementary monitors to evaluate the performance of the project; and
    - includes a protocol for determining exceedances with the relevant conditions of this approval.

### METEOROLOGICAL MONITORING

15. During the life of the project, the Proponent shall ensure that there is a suitable meteorological station operating in the vicinity of the site that:
  - (a) complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline; and
  - (b) is capable of continuous real-time measurement of temperature lapse rate in accordance with the *NSW Industrial Noise Policy*, or as otherwise approved by OEH.

### SOIL & WATER

#### Water Licences

16. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Director-General.

*Note: The Proponent is required to obtain all necessary water licences and approvals for the project under the Water Act 1912 and/or Water Management Act 2000.*

## **Baseflow Offsets**

17. The Proponent shall offset the loss of any baseflow to watercourses caused by the project to the satisfaction of the Director-General. This condition does not apply if the Director-General subsequently determines that the loss of baseflow is negligible.

*Note: Offsets for long-term losses should be provided via the retirement of adequate water entitlements to account for the loss attributable to the project.*

## **Compensatory Water Supply**

18. The Proponent shall provide a compensatory water supply to any landowner of privately-owned land whose water entitlements are adversely impacted (other than an impact that is negligible) as a result of the project, in consultation with NOW, and to the satisfaction of the Director-General.

The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified.

If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

If the Proponent is unable to provide an alternative long-term supply of water, then the Proponent shall provide alternative compensation to the satisfaction of the Director-General.

## **Surface Water Discharges**

19. The Proponent shall ensure that all surface water discharges from the site comply with the discharge limits (both volume and quality) set for the project in any EPL.

## **Surface Water Management Plan**

20. The Proponent shall prepare and implement a Surface Water Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with NOW, OEH and Council, and be submitted to the Director-General for approval within 6 months of this approval, or as otherwise agreed with the Director-General;
  - (b) include a comprehensive water balance for the project, that includes details of:
    - sources of water supply and water make;
    - water use; and
    - water discharges; and
  - (c) management plans for the surface facilities sites, that include:
    - a detailed description of water management systems for each site, including:
      - o clean water diversion systems;
      - o erosion and sediment controls; and
      - o any water storages;
    - measures to minimise potable water use and to reuse and recycle water;
    - measures to comply with surface water discharge limits;
    - measures to manage sewage wastewater in accordance with Council requirements; and
    - monitoring and reporting procedures.

*Note: This plan must be suitably integrated with the Water Management Plans that form part of Extraction Plans.*

## **HERITAGE**

### **Heritage Management Plan**

21. The Proponent shall prepare and implement a Heritage Management Plan for the project to the satisfaction of the Director-General. This plan must:
- (a) be prepared in consultation with OEH, the Aboriginal community, Council and any local historical organisations, and be submitted to the Director-General for approval within 6 months of this approval, or as otherwise agreed with the Director-General;
  - (b) include the following program/procedures for managing Aboriginal heritage management within the project area:
    - conserving, managing and monitoring Aboriginal sites and potential archaeological deposits within the project disturbance area;
    - conserving, managing, and monitoring Aboriginal sites outside the project disturbance area;

- managing the discovery of any new Aboriginal objects or skeletal remains during the project;
  - maintaining and managing access to archaeological sites by the Aboriginal community; and
  - ongoing consultation and involvement of the Aboriginal communities in the conservation and management of Aboriginal cultural heritage within the project area; and
- (c) include the following for managing other historic heritage on site:
- a conservation management plan for the Wongawilli Colliery, that balances heritage management with the operational, safety, and rehabilitation requirements of the mine; and
  - a program/procedures for:
    - o photographic and archival recording of potentially affected heritage items;
    - o protection and monitoring of heritage items outside the project disturbance area; and
    - o additional archaeological excavation and/or recording of any significant heritage items requiring demolition.

*Note: This plan must be suitably integrated with Heritage Management Plans that form part of Extraction Plans.*

## TRANSPORT

### Monitoring of Coal Transport

22. The Proponent shall:
- (a) keep accurate records of the:
- amount of coal transported from the site (on a monthly basis);
  - date and time of each train movement to and from the site; and
- (b) make these records publicly available on its website at the end of each calendar year.

## VISUAL

### Visual Amenity and Lighting

23. The Proponent shall:
- (a) implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the project;
- (b) ensure no unshielded outdoor lights shine above the horizontal; and
- (c) ensure that all external lighting associated with the project complies with *Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*, to the satisfaction of the Director-General.

## WASTE

24. The Proponent shall:
- (a) minimise and monitor the waste generated by the project;
- (b) ensure that the waste generated by the project is appropriately stored, handled and disposed of;
- (c) manage on-site sewage treatment and disposal in accordance with the requirements of Council; and
- (d) report on waste management and minimisation in the Annual Review, to the satisfaction of the Director-General.

## BUSHFIRE

25. The Proponent shall:
- (a) ensure that the project is suitably equipped to respond to fires on site; and
- (b) assist the Rural Fire Service and emergency services as much as possible if there is a fire in the vicinity of the site.

## REHABILITATION

### Rehabilitation Objectives

26. The Proponent shall rehabilitate the site to the satisfaction of the Executive Director Mineral Resources. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA, and comply with the objectives in Table 13.

*Table 13: Rehabilitation Objectives*

| <b>Feature</b>         | <b>Objective</b>                                                                                   |
|------------------------|----------------------------------------------------------------------------------------------------|
| Mine site (as a whole) | Safe, stable & non-polluting.                                                                      |
|                        | Final land use compatible with surrounding land uses.                                              |
| Surface infrastructure | To be decommissioned and removed, unless the Executive Director Mineral Resources agrees otherwise |

| <b>Feature</b>                                                               | <b>Objective</b>                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Portals and vent shafts                                                      | To be decommissioned and made safe and stable.                                                                                                                                                                                                                                                                                      |
|                                                                              | Retain habitat for threatened species (eg bats), where practicable                                                                                                                                                                                                                                                                  |
| Watercourses of 2 <sup>nd</sup> order or above subject to subsidence impacts | Hydraulically and geomorphologically stable                                                                                                                                                                                                                                                                                         |
| Cliffs                                                                       | No additional risk to public safety compared to prior to mining                                                                                                                                                                                                                                                                     |
| Other land affected by the project                                           | Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: <ul style="list-style-type: none"> <li>• local native plant species (unless the Executive Director Mineral Resources agrees otherwise); and</li> <li>• a landform consistent with the surrounding environment</li> </ul> |
| Built features damaged by mining operations                                  | Repair to pre-mining condition or equivalent unless: <ul style="list-style-type: none"> <li>• the owner agrees otherwise; or</li> <li>• the damage is fully restored, repaired or compensated under the <i>Mine Subsidence Compensation Act 1961</i>.</li> </ul>                                                                    |
| Community                                                                    | Ensure public safety.                                                                                                                                                                                                                                                                                                               |
|                                                                              | Minimise the adverse socio-economic effects associated with mine closure                                                                                                                                                                                                                                                            |

*Notes to Table 13:*

- *These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by mining taking place after the date of this approval; and to all project surface infrastructure part of the project, whether constructed prior to or following the date of this approval.*
- *Rehabilitation of subsidence impacts and environmental consequences caused by mining which took place prior to the date of this approval may be subject to the requirements of other approvals (eg under a mining lease or an Subsidence Management Plan approval) or the Proponent's commitments.*

### **Progressive Rehabilitation**

27. The Proponent shall carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance.

### **Rehabilitation Management Plan**

28. The Proponent shall prepare and implement a Rehabilitation Management Plan for the project, to the satisfaction of the Director-General of DRE. This plan must:
- be prepared in consultation with the Department, OEH, NOW, Council and the CCC, and be submitted to the Executive Director Mineral Resources in DRE for approval within 6 months of this approval, or as otherwise agreed with the Director-General;
  - be prepared in accordance with any relevant DRE guideline, and be consistent with the rehabilitation objectives in the EA and in Table 13;
  - build, to the maximum extent practicable, on the other management plans required under this approval; and
  - address all aspects of rehabilitation and mine closure, including final land use assessment, rehabilitation objectives, domain objectives, completion criteria and rehabilitation monitoring.

*Note: The Rehabilitation Management Plan should address all land impacted by the project, whether prior to or following the date of this approval.*

## **SCHEDULE 5 ADDITIONAL PROCEDURES**

### **NOTIFICATION OF LANDOWNERS**

1. As soon as practicable following obtaining monitoring results showing:
  - (a) an exceedance of the relevant criteria in schedule 4, the Proponent shall notify the affected landowner and/or tenants in writing of the exceedance, and provide regular monitoring results to each of these parties until the project is complying with the relevant criteria again; or
  - (b) an exceedance of the relevant criteria in conditions 11 or 12 of schedule 4, the Proponent shall send a copy of the NSW Health fact sheet entitled "Mine Dust and You" (as may be updated from time to time) to the affected landowners and/or existing tenants of the land (including the tenants of any mine-owned land).

### **INDEPENDENT REVIEW**

2. If an owner of privately-owned land considers the project to be exceeding the relevant criteria in schedule 4, then he/she may ask the Director-General in writing for an independent review of the impacts of the project on his/her land.

If the Director-General is satisfied that an independent review is warranted, then within 2 months of the Director-General's decision the Proponent shall:

- (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Director-General, to:
    - consult with the landowner to determine his/her concerns;
    - conduct monitoring to determine whether the project is complying with the relevant criteria in schedule 4; and
    - if the project is not complying with these criteria then identify the measures that could be implemented to ensure compliance with the relevant criteria; and
  - (b) give the Director-General and landowner a copy of the independent review.
3. If the independent review determines that the project is complying with the relevant criteria in schedule 4, then the Proponent may discontinue the independent review with the approval of the Director-General.

If the independent review determines that the project is not complying with the relevant impact assessment criteria in schedule 4, and that the project is primarily responsible for this non-compliance, then the Proponent shall:

- (a) implement all reasonable and feasible mitigation measures, in consultation with the landowner and appointed independent person, and conduct further monitoring until the project complies with the relevant criteria; or
  - (b) secure a written agreement with the landowner to allow exceedances of the relevant criteria, to the satisfaction of the Director-General.

If the independent review determines that any relevant acquisition criteria in schedule 4 are being exceeded and that the project is primarily responsible for this non-compliance, then upon receiving a written request from the landowner, the Proponent shall acquire all or part of the landowner's land in accordance with the procedures in conditions 4-5 below.

### **LAND ACQUISITION**

4. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on:
  - (a) the current market value of the landowner's interest in the land at the date of this written request, as if the land was unaffected by the project, having regard to the:
    - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
    - presence of improvements on the land and/or any approved building or structure which has been physically commenced on the land at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of any additional mitigation measures undertaken by the Proponent on the land;
  - (b) the reasonable costs associated with:
    - relocating within the Wollongong local government area, or to any other local government area determined by the Director-General; and
    - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and
  - (c) reasonable compensation for any disturbance caused by the land acquisition process.

If the Proponent and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired within 28 days after the Proponent makes its written offer, then either party may refer the matter to the Director-General for resolution.

Upon receiving such a request, the Director-General will request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:

- consider submissions from both parties;
- determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
- prepare a detailed report setting out the reasons for any determination; and
- provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Director-General for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Director-General will determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above, the independent valuer's report, the detailed report disputing the independent valuer's determination, and any other relevant submissions.

Within 14 days of this determination, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the Director-General's determination.

If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land shall cease, unless the Director-General determines otherwise.

5. The Proponent shall pay all reasonable costs associated with the land acquisition process described in condition 4 above, including the costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of this plan at the Office of the Registrar-General.
-

## **SCHEDULE 6**

### **ENVIRONMENTAL MANAGEMENT, REPORTING & AUDITING**

#### **ENVIRONMENTAL MANAGEMENT**

##### **Environmental Management Strategy**

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Director-General. This strategy must:
  - (a) be submitted to the Director-General for approval within 6 months of this approval;
  - (b) provide the strategic framework for environmental management of the project;
  - (c) identify the statutory approvals that apply to the project;
  - (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
  - (e) describe the procedures that would be implemented to:
    - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
    - receive, handle, respond to, and record complaints;
    - resolve any disputes that may arise during the course of the project;
    - respond to any non-compliance;
    - respond to emergencies; and
  - (f) include:
    - copies of any strategies, plans and programs approved under the conditions of this approval; and
    - a clear plan depicting all the monitoring required to be carried out under the conditions of this approval.

##### **Management Plan Requirements**

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;
  - (b) a description of:
    - the relevant statutory requirements (including any relevant approval, licence or lease conditions);
    - any relevant limits or performance measures/criteria;
    - 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;
  - (c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;
  - (d) a program to monitor and report on the:
    - 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 and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;
  - (f) a program to investigate and implement ways to improve the environmental performance of the project over time;
  - (g) a protocol for managing and reporting any:
    - incidents;
    - complaints;
    - non-compliances with conditions of this approval and statutory requirements; and
    - exceedances of the impact assessment criteria and/or performance criteria; and
  - (h) a protocol for periodic review of the plan.

*Note: The Director-General may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*

##### **Annual Review**

3. By the end of December each year (or other such timing as agreed by the Director-General), the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:
  - (a) describe the works (including any rehabilitation) carried out in the past year, and the works proposed to be carried out over the next year;
  - (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes 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;

- (c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- (d) identify any trends in the monitoring data over the life of the project;
- (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
- (f) describe what measures will be implemented over the next year to improve the environmental performance of the project.

#### **Revision of Strategies, Plans and Programs**

4. Within 3 months of:
  - (a) the submission of an annual review under condition 3 above;
  - (b) the submission of an incident report under condition 6 below;
  - (c) the submission of an audit report under condition 8 below; and
  - (d) any modification to the conditions of this approval (unless the conditions require otherwise),
 the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Director-General.

*Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.*

#### **Community Consultative Committee**

5. The Proponent shall establish and operate a Community Consultative Committee (CCC) for the project in general accordance with the *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (Department of Planning, 2007, or its latest version), or alternative consultative framework as may be agreed by the Director-General, to the satisfaction of the Director-General. This CCC or alternative framework must be operating within 6 months of this approval.

*Notes:*

- *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval.*
- *In accordance with the guideline, the Committee should be comprised of an independent chair and appropriate representation from the Proponent, Council, recognised environmental groups and the local community.*
- *In establishing the CCC, the Department will accept the continued representation from existing CCC members.*

#### **REPORTING**

##### **Incident Reporting**

6. The Proponent shall notify the Director-General and any other relevant agencies of any incident that has caused, or has the potential to cause, significant risk of material harm to the environment, at the earliest opportunity. For any other incident associated with the project, the Proponent shall notify the Director-General and any other relevant agencies as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Director-General and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

##### **Regular Reporting**

7. The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval.

#### **INDEPENDENT ENVIRONMENTAL AUDIT**

8. By the end of June 2013 (or other such timing as agreed by the Director-General), and every 3 years thereafter, unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
  - (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
  - (b) include consultation with the relevant agencies;
  - (c) assess the environmental performance of the project and assess whether it is complying with the requirements in this approval and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
  - (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and
  - (e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy, plan or program required under these approvals.

*Note: This audit team must be led by a suitably qualified auditor and include experts in any field specified by the Director-General.*

9. Within 6 weeks of the completion of this audit, or as otherwise agreed by the Director-General, the Proponent shall submit a copy of the audit report to the Director-General, together with its response to any recommendations contained in the audit report.

#### **ACCESS TO INFORMATION**

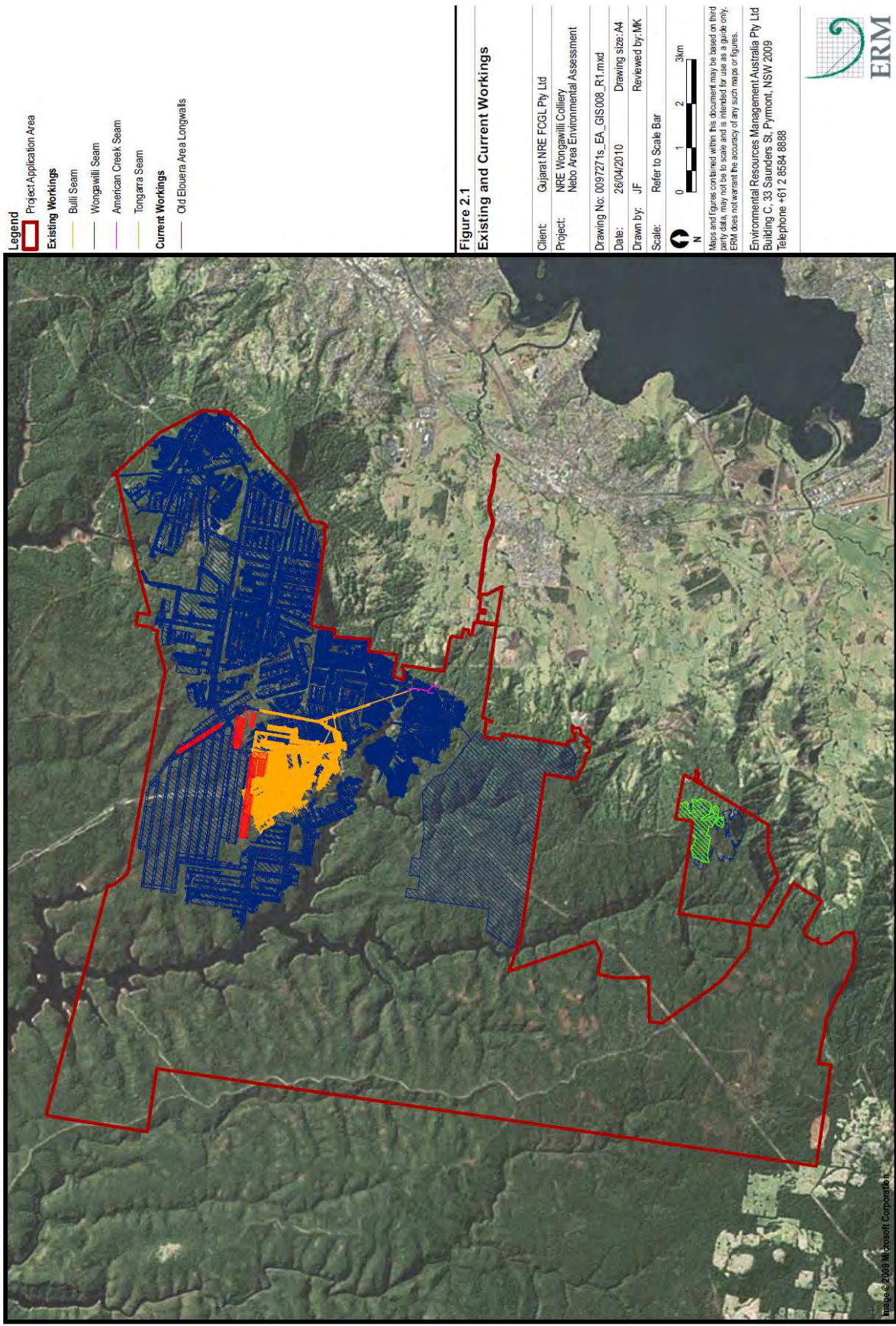
10. From the end of December 2011, the Proponent shall:
- (a) make copies of the following publicly available on its website:
    - the EA;
    - all current statutory approvals for the project;
    - approved strategies, plans and programs required under the conditions of this approval;
    - a comprehensive summary of the monitoring results of the project, which have been reported in accordance with the various plans and programs approved under the conditions of this approval;
    - a complaints register, which is to be updated on a monthly basis;
    - minutes of CCC meetings;
    - the annual reviews of the project;
    - any independent environmental audit, and the Proponent's response to the recommendations in any audit;
    - any other matter required by the Director-General; and
  - (b) keep this information up-to-date, to the satisfaction of the Director-General.
-

**APPENDIX 1:  
SCHEDULE OF LAND**

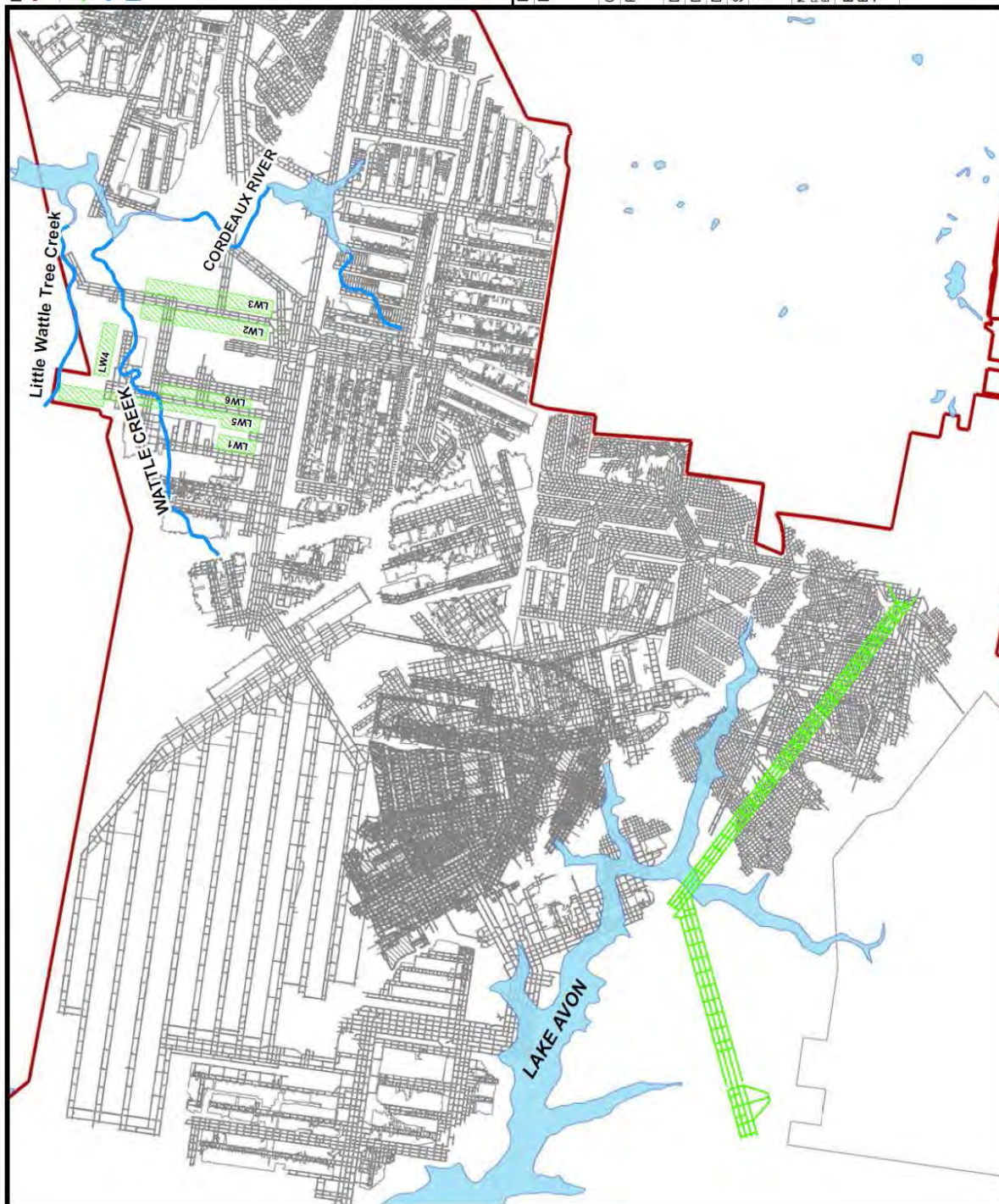
| Property ID / Lot<br>Number | DP Number | Owner                                                                |
|-----------------------------|-----------|----------------------------------------------------------------------|
| <i>Wongawilli - ML1596</i>  |           |                                                                      |
| Lot 1                       | 321054    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 1                       | 44325     | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 1                       | 212322    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 1                       | 216373    | Sydney Water                                                         |
| Lot 2                       | 216373    | Sydney Water                                                         |
| Lot 3                       | 216373    | Lexosu Pty Ltd                                                       |
| Lot 1                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 2                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 3                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 4                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 5                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 6                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 7                       | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 14                      | 255284    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 8                       | 255585    | Krishnaswamy & Uma Ramasamy                                          |
| Lot 12                      | 255285    | Endeavour Coal Pty Ltd                                               |
| Lot 1                       | 383829    | Gujarat NRE FCGL Pty Ltd                                             |
| Lot 14                      | 751278    | DECCW (National park)                                                |
| Lot 16                      | 751278    | DECCW (National park)                                                |
| Lot 171                     | 751278    | DECCW (National park)                                                |
| Lot 196                     | 751278    | Sydney Catchment Authority                                           |
| Part Lot 217                | 751278    | Sydney Catchment Authority                                           |
| Lot 219                     | 751278    | Sydney Catchment Authority                                           |
| Lot 220                     | 751278    | Sydney Catchment Authority                                           |
| Lot 221                     | 751278    | Sydney Catchment Authority                                           |
| Part Lot 275                | 751278    | Dendrobium Coal Pty Ltd                                              |
| Lot 295                     | 751278    | Springhill Farm Company Pty Ltd                                      |
| Lot 281                     | 751278    | Sydney Catchment Authority                                           |
| Lot 282                     | 751278    | DECCW (National park)                                                |
| Lot 298                     | 751278    | DECCW (National park)                                                |
| Lot 303                     | 751278    | Sydney Catchment Authority                                           |
| Lot 304                     | 751278    | Sydney Catchment Authority                                           |
| Lot 2                       | 986776    | Barbara Elaine Marshall, Katrina Jane Marshall, Kim Michele Marshall |
| Part Lot 1                  | 986776    | Barbara Elaine Marshall, Katrina Jane Marshall, Kim Michele Marshall |
| Part Lot 1                  | 1001210   | Sydney Catchment Authority                                           |
| Lot 1                       | 1001212   | Sydney Catchment Authority                                           |

| Property ID / Lot<br>Number | DP Number | Owner                                   |
|-----------------------------|-----------|-----------------------------------------|
| Lot 1                       | 1001213   | Sydney Catchment Authority              |
| Lot 1                       | 1006994   | Sydney Catchment Authority              |
| Lot 301                     | 1087464   | Sydney Catchment Authority              |
|                             |           | Lawrence John Lawson & Dawn Mary        |
| Lot 1                       | 1033422   | Lawson                                  |
| Part Lot 1                  | 1103666   | Dendrobium Coal Pty Ltd                 |
| Part Lot 3                  | 1103666   | Dendrobium Coal Pty Ltd                 |
| Part Lot 1                  | 1103781   | Dendrobium Coal Pty Ltd                 |
| Lot 2                       | 1103781   | Dendrobium Coal Pty Ltd                 |
| Lot 3                       | 1103781   | Dendrobium Coal Pty Ltd                 |
| Part Lot 18                 | 1111734   | Dendrobium Coal Pty Ltd                 |
| Lot 422                     | 1123956   | Gujarat NRE FCGL Pty Ltd                |
| Lot 423                     | 1123956   | Gujarat NRE FCGL Pty Ltd                |
| Lot 424                     | 1123956   | Gujarat NRE FCGL Pty Ltd                |
| Lot 425                     | 1123956   | Gujarat NRE FCGL Pty Ltd                |
| Lot 19                      | 1131362   | Sydney Catchment Authority              |
| Lot 1                       | 1132869   | The Minister for Public Works           |
| <i>Avondale - ML1565</i>    |           |                                         |
| Lot 41                      | 751263    | Sherwood Hamington                      |
| Lot 42                      | 751263    | Gerard Kevin McCue                      |
| Part Lot 43                 | 751263    | Edward Roy Vergan & Kim Pamela Vergan   |
|                             |           | Jason Bernard Voorwinden & Esther Olive |
| Lot 111                     | 751263    | Voorwinden                              |
| Part Lot 140                | 751277    | Sydney Catchment Authority              |
| Part Lot 181                | 751277    | Sydney Catchment Authority              |
| <i>CCL 766</i>              |           |                                         |
| Par Lot 27                  | 3083      | HTT Huntley Heritage Pty Ltd            |
| Part Lot 111                | 585959    | Craig Duren                             |
| Lot 2                       | 751263    | The Council of the City of Wollongong   |
|                             |           | Angelo Vincenzo Di Martino & Sally      |
| Part Lot 40                 | 751263    | Elizabeth Di Martino                    |
| Lot 49                      | 751263    | HTT Huntley Heritage Pty Ltd            |
| Part Lot 55                 | 751263    | HTT Huntley Heritage Pty Ltd            |
| Part Lot 3                  | 852180    | Caroline Joan Forbes                    |
| Lot 10                      | 867347    | HTT Huntley Heritage Pty Ltd            |
| <i>Across all leases</i>    |           |                                         |
| Lot 32                      | 1138149   | Sydney Catchment Authority              |

APPENDIX 2:  
PROJECT LAYOUT PLANS



- Legend**
- Project Application Area
  - Existing Workings
  - Proposed Workings
  - River/Creek
  - Lake/Dam



**Figure 3.3**

**Proposed and Existing Workings**

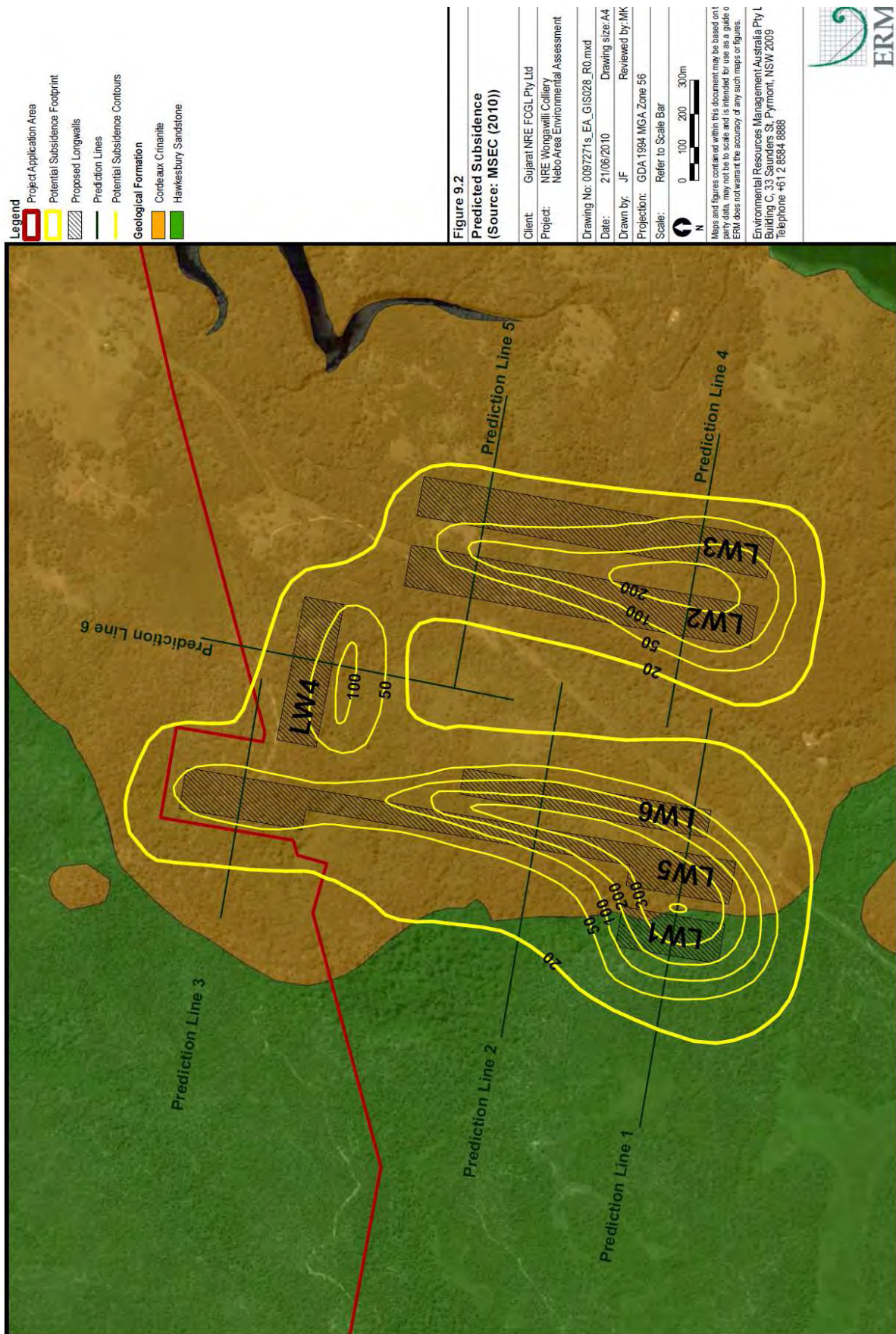
|              |                                                               |
|--------------|---------------------------------------------------------------|
| Client:      | Gujarat NRE FCGL Pty Ltd                                      |
| Project:     | NRE Wongawilli Colliery<br>Nebo Area Environmental Assessment |
| Drawing No:  | 0097271s_EA_GIS038_R0.mxd                                     |
| Date:        | 21/09/2010                                                    |
| Drawn by:    | NS                                                            |
| Reviewed by: | MK                                                            |
| Scale:       | Refer to Scale Bar                                            |



Maps and figures combined within this document may be based on third party data, may not be to scale and is intended for use as a guide only. ERM does not warrant the accuracy of any such maps or figures.

Environmental Resources Management Australia Pty Ltd  
Building C, 33 Saunders St, Pyrmont, NSW 2009  
Telephone +61 2 8594 8888





**APPENDIX 3:  
STATEMENT OF COMMITMENTS**

| Outcome                                                                                          | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Timing                                                   |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Statutory Requirements</b>                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          |
| Compliance with all conditional requirements in all approvals, licenses and leases.              | <ul style="list-style-type: none"> <li>The development will be carried out as outlined in: <ul style="list-style-type: none"> <li>this Environmental Assessment Report (EA);</li> <li>Project Approval;</li> <li>Environment Protection License;</li> <li>Subsidence Management Plans (SMPs);</li> <li>Mining Lease(s); and</li> <li>any other approvals, licenses or leases.</li> </ul> </li> <li>Undertake all activities in accordance with the accepted Mining Operations Plan; environmental procedures; safety management plan and/or site-specific documentation in force at that time.</li> </ul> | Continuous and as required                               |
| All operations conducted in accordance with all relevant documentation.                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Continuous and as required                               |
| <b>Stakeholder Consultation</b>                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          |
| Effective communication/consultation is undertaken throughout the life of the Project.           | <ul style="list-style-type: none"> <li>NRE will conduct regular community liaison meetings and provide regular updates to the community during operation of the Project.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                       | At regular intervals of not less than three times a year |
| <b>Land Use and Resource Management</b>                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          |
| Maintaining the integrity of surrounding resources.                                              | <ul style="list-style-type: none"> <li>A Bushfire Management Plan will be developed with mitigation measures for bush fire impacts including the following: <ul style="list-style-type: none"> <li>slashing, landscaping and vegetation management to manage fuel;</li> <li>maintenance of fire breaks;</li> <li>ongoing communication with the NSW Rural Fire Service; and</li> <li>site fire fighting equipment and emergency response procedures.</li> </ul> </li> </ul>                                                                                                                               | Within 6 months of approval                              |
| <b>Subsidence</b>                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          |
| Potential adverse impacts from subsidence are managed, monitored and remediated where necessary. | <ul style="list-style-type: none"> <li>Ground movements will be monitored as mining occurs, to measure the extent to which the actual movements may differ from those predicted. Any unacceptable impacts can be addressed and appropriate remedial measures implemented, as required.</li> <li>NRE will liaise with SCA, other regulatory authorities, and owners of infrastructure to ensure that the impacts of subsidence are managed to an acceptable standard.</li> </ul>                                                                                                                           | During secondary extraction                              |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | During secondary extraction                              |

| Outcome                                                                                              | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Timing                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                      | <ul style="list-style-type: none"> <li>An Extraction Plan will be developed prior to secondary extraction which will detail the monitoring measures to be implemented to manage subsidence impacts and their consequences on both natural and man made features in the Nebo area. The plan will include details of: <ul style="list-style-type: none"> <li>appropriate triggers and monitoring systems to demonstrate how management strategies have been achieved and where improvements can be made;</li> <li>adaptive management processes for continually detecting impacts and validating predictions;</li> <li>contingency planning for any unpredicted impacts; and</li> <li>remediation of unpredicted impacts.</li> </ul> </li> <li>Powerlines and other man made surface features will be subject to specific management plans developed in consultation with infrastructure owners.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Prior to secondary extraction                                                                                                                                  |
|                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Prior to, during and after secondary extraction                                                                                                                |
| <b>Surface Water</b>                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                |
| Mining operations are managed such that adverse impacts to surface water are prevented or minimised. | <ul style="list-style-type: none"> <li>Provided initial assessments indicate that the flow regimes allow for the collection of meaningful data, additional monitoring sites will be established in the upper reaches of Little Wattle Tree Creek and Wattle Creek.</li> <li>A baseline data report, documenting the existing environment will be submitted one month prior to secondary extraction in the Nebo area. The baseline monitoring report will include two years worth of data. Secondary extraction will not commence prior to all data being collected.</li> <li>A Surface Water Management Plan will be prepared as detailed in <i>Section 10.6.1</i> of the EA and updated by the following. The Plan will include: <ul style="list-style-type: none"> <li>a monitoring program including monthly monitoring conducted prior to, during and for a period of two years post mining;</li> <li>a Trigger Action Response Plan (TARP). Triggers will be determined using baseline data prior to mining, based on ANZECC guidelines; and</li> <li>notification and reporting requirements including reporting exceedances of trigger levels within one week to NOW.</li> </ul> </li> <li>The following SCA performance measures will be adhered to: <ul style="list-style-type: none"> <li>Cordeaux Dam Wall – zero impact;</li> <li>Upper Cordeaux No.1 and No.2 Dam Walls – safe, serviceable and repairable;</li> <li>fire trails – safe, serviceable and repairable;</li> <li>catchment yield – negligible reduction in water quality and quantity;</li> <li>Avon, Cordeaux, Upper Cordeaux No.1 and Upper Cordeaux No.2 Reservoirs – negligible leaking and reduction in water quality; and</li> <li>Wattle Creek and Little Wattle Tree Creek – negligible environmental consequences.</li> </ul> </li> </ul> | <p>Prior to secondary extraction</p> <p>Prior to secondary extraction</p> <p>Prior to secondary extraction, within three months of approval</p> <p>Ongoing</p> |

| Outcome                                                                                                                                        | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Timing                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
|                                                                                                                                                | <ul style="list-style-type: none"> <li>Photographic records of site conditions, including bed and banks will be undertaken for Wattle Creek and Little Wattle Tree Creek.</li> </ul>                                                                                                                                                                                                                                                                                           | Prior to and after secondary extraction  |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>Visual monitoring of bank stability, bedload movement and riparian vegetation in Wattle Creek and Little Wattle Tree Creek.</li> </ul>                                                                                                                                                                                                                                                                                                  | Prior to and after secondary extraction  |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>Mine inflows will be monitored as part of the Extraction Plan</li> </ul>                                                                                                                                                                                                                                                                                                                                                                | During secondary extraction              |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>Rainfall will be monitored daily for the duration of mining using a rainfall gauge at the NRE Wongawilli Pit Top..</li> </ul>                                                                                                                                                                                                                                                                                                           | During secondary extraction              |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>An end of extraction report will be prepared for each panel, which summarises the results of all monitoring over the period.</li> </ul>                                                                                                                                                                                                                                                                                                 | After the mining of each panel           |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>All results will be reviewed one year after each panel has been completed and the monitoring and remediation program will be updated and amended if required.</li> </ul>                                                                                                                                                                                                                                                                | One year after secondary extraction      |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>Contingency plans will be developed where the actual impact exceeds the predicted impact on significant natural features. Possible mitigation measures to reduce the potential impacts of subsidence on significant features will be undertaken if required</li> </ul>                                                                                                                                                                  | Prior and during to secondary extraction |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>Remediation measures will be undertaken if required.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                         | If required                              |
|                                                                                                                                                | <ul style="list-style-type: none"> <li>A Pit Top Water Management Plan will be developed for the pit top including               <ul style="list-style-type: none"> <li>identification of significant water management features;</li> <li>volumes;</li> <li>catchment extents, including extent of clean, dirty and contaminated water on site;</li> <li>where water management can be improved; and</li> <li>consideration of water discharge impacts.</li> </ul> </li> </ul> | Within 6 months                          |
| <b>Groundwater</b><br>Operations are managed such that adverse impacts to local and regional groundwater resources are prevented or minimised. | <ul style="list-style-type: none"> <li>A baseline data report, documenting the existing environment will be submitted one month prior to secondary extraction in the Nebo area. The baseline monitoring report will include two years worth of data.</li> </ul>                                                                                                                                                                                                                | Prior to secondary extraction            |

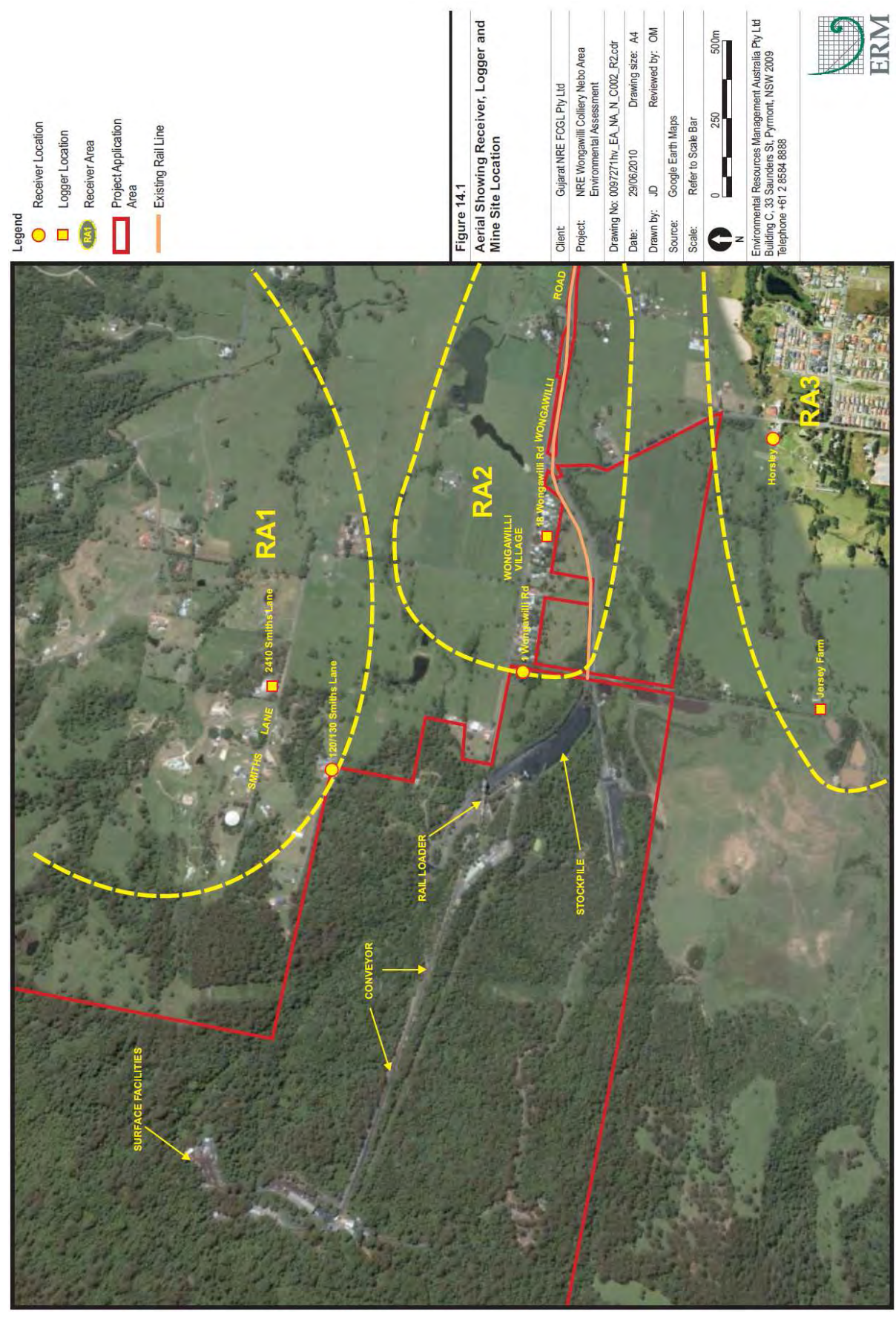
| Outcome                                                                                                        | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Timing                                                                                             |
|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                                                                                                                | <ul style="list-style-type: none"> <li>A Groundwater Management Plan including a TARP will be prepared to provide guidance on the procedures and actions required to manage potential impacts on the groundwater systems in the Nebo area. Trigger levels will be determined using baseline data prior to mining, based on ANZECC guidelines. The Plan will include a monitoring program of monthly sampling conducted prior to, during and for a period of two years post mining.</li> <li>Groundwater modelling will be reviewed annually (unless triggered by an exceedance).</li> <li>Contingency procedures will be developed as required, to manage any impacts identified by monitoring. Activation of contingency procedures will be linked to the assessment of monitoring results, including water quality, aquifer hydrostatic pressure levels and the rate of water level changes. Performance indicators will be identified prior to extraction of the proposed workings.</li> <li>Following completion of extraction of each panel, a report will be prepared for all prior panels that summarises all relevant monitoring to date. The report will outline any changes in the groundwater system over the relevant mining area. And include an interpretation of the data along with: <ul style="list-style-type: none"> <li>a basic statistical analysis of the results for the parameters measured;</li> <li>an interpretation of water quality and standing water level changes; and</li> <li>an interpretation and review of the results in relation to the impact assessment criteria.</li> </ul> </li> </ul> | <p>Prior to and during secondary extraction</p> <p>If required</p> <p>At the end of each panel</p> |
| <b>Air Quality</b>                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                    |
| Operations are managed to minimise potential adverse impacts to the environment, residences and the community. | Water sprays will continue to be used on exposed areas to minimise dust as needs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Continuous                                                                                         |
|                                                                                                                | A high volume dust sampler will be installed in the vicinity of Receptor 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Prior to secondary extraction                                                                      |
|                                                                                                                | Protocol to prevent overfilling of rail wagons is to be adhered to at all times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Continuous                                                                                         |
|                                                                                                                | Subject to monitoring results, additional mitigation measures will be investigated if required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Within 12 months                                                                                   |
|                                                                                                                | Dust deposition gauges will be installed along the rail line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Within 6 months of approval                                                                        |
| <b>Greenhouse Gasses</b>                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                    |
| Manage operations such that greenhouse gas emissions on the environment are minimised.                         | Energy audits will be held when practicable to ensure that the mine is using current practice techniques to minimise energy use and is operating at optimum energy levels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Continuous and as required                                                                         |
|                                                                                                                | Site management will ensure that equipment is maintained to retain high levels of energy efficiency and replaced with energy efficient equipment as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Continuous and as required                                                                         |
|                                                                                                                | The inventory of emissions developed for this assessment will be maintained.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Continuous and as required                                                                         |
|                                                                                                                | Emissions and abatement strategies will be reported annually as part of internal environmental reporting and National Greenhouse and Energy Reporting System obligations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Continuous and as required                                                                         |

| Outcome                                                                                                        | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Timing                                                      |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <b>Acoustics</b>                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                             |
| Operations are managed to minimise potential adverse impacts on the environment, residences and the community. | <ul style="list-style-type: none"> <li>If required as an outcome of the noise monitoring program, acoustic treatment of front end loaders and other stockpile machinery will be undertaken to achieve a sound power level of 103 dBA or less.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Within six months of approval                               |
|                                                                                                                | <ul style="list-style-type: none"> <li>If required as an outcome of the noise monitoring program, noise mitigation options for the coal conveyor system and coal bins will be investigated.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Within six months of approval                               |
|                                                                                                                | <ul style="list-style-type: none"> <li>Implementation of low noise equipment that is correctly maintained to the manufacturer's specification, including the conveyor systems, transfer stations and coal bins.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Continuous and as required                                  |
|                                                                                                                | <ul style="list-style-type: none"> <li>All on-site, fixed and mobile diesel powered plant, excluding road vehicles, will be correctly fitted and maintained to the manufacturer's specifications. Particular attention will be given to engine exhaust systems and the care and maintenance of mufflers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Continuous and as required                                  |
|                                                                                                                | <ul style="list-style-type: none"> <li>Adoption of best practice methods and training of staff as required in regards to minimising noise impacts will be implemented.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Continuous and as required                                  |
| Managing residual noise impact on nearby residences.                                                           | <ul style="list-style-type: none"> <li>An operational Noise Management Plan (NMP) will be developed to specifically address potential noise impacts associated with the proposed operations during the evening and night time periods. This NMP will be used to manage the noise impacts at affected receivers in Wongawilli Village and Horsley in RA1 and RA2. The NMP will outline methods and procedures to manage the following; <ul style="list-style-type: none"> <li>results of the regular noise monitoring program on-site and within the surrounding area;</li> <li>response to any complaints or issues raised by the owner of the affected residence; and</li> <li>noise mitigation measures and operating procedures to achieve compliance with noise goals.</li> </ul> </li> </ul> | Within 12 months of approval and continuous and as required |
|                                                                                                                | <ul style="list-style-type: none"> <li>An operational noise monitoring program will be developed to monitor noise emissions from the proposed operations to determine ongoing compliance with PSNLs and to identify any further feasible noise mitigation measures that can be implemented.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Within 12 months of approval and continuous and as required |
|                                                                                                                | <ul style="list-style-type: none"> <li>The monitoring program will be implemented during evening and night time periods with the objective of confirming the acoustic performance of the proposed operations.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Within 12 months of approval and continuous and as required |
| <b>Aquatic Ecology</b>                                                                                         | <ul style="list-style-type: none"> <li>If following monitoring, further mitigation is required, noise mitigation will be implemented along the appropriate portions of railway track.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | If required                                                 |
|                                                                                                                | <ul style="list-style-type: none"> <li>Provided initial assessments indicate that the flow regimes allow for the collection of meaningful data, eight new aquatic ecology impact monitoring sites will be established in the Nebo area, three on Little Wattle Tree Creek and five on Wattle Creek with three control sites. The site establishment and first monitoring run will be undertaken in Autumn 2011 with monitoring continuing twice a year during Autumn and Spring.</li> </ul>                                                                                                                                                                                                                                                                                                       | Prior to secondary extraction                               |

| Outcome                                                                                                        | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Timing                                                      |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <b>Acoustics</b>                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                             |
| Operations are managed to minimise potential adverse impacts on the environment, residences and the community. | <ul style="list-style-type: none"> <li>If required as an outcome of the noise monitoring program, acoustic treatment of front end loaders and other stockpile machinery will be undertaken to achieve a sound power level of 103 dBA or less.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Within six months of approval                               |
|                                                                                                                | <ul style="list-style-type: none"> <li>If required as an outcome of the noise monitoring program, noise mitigation options for the coal conveyor system and coal bins will be investigated.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Within six months of approval                               |
|                                                                                                                | <ul style="list-style-type: none"> <li>Implementation of low noise equipment that is correctly maintained to the manufacturer's specification, including the conveyor systems, transfer stations and coal bins.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Continuous and as required                                  |
|                                                                                                                | <ul style="list-style-type: none"> <li>All on-site, fixed and mobile diesel powered plant, excluding road vehicles, will be correctly fitted and maintained to the manufacturer's specifications. Particular attention will be given to engine exhaust systems and the care and maintenance of mufflers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Continuous and as required                                  |
|                                                                                                                | <ul style="list-style-type: none"> <li>Adoption of best practice methods and training of staff as required in regards to minimising noise impacts will be implemented.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Continuous and as required                                  |
| Managing residual noise impact on nearby residences.                                                           | <ul style="list-style-type: none"> <li>An operational Noise Management Plan (NMP) will be developed to specifically address potential noise impacts associated with the proposed operations during the evening and night time periods. This NMP will be used to manage the noise impacts at affected receivers in Wongawilli Village and Horsley in RA1 and RA2. The NMP will outline methods and procedures to manage the following: <ul style="list-style-type: none"> <li>results of the regular noise monitoring program on-site and within the surrounding area;</li> <li>response to any complaints or issues raised by the owner of the affected residence; and</li> <li>noise mitigation measures and operating procedures to achieve compliance with noise goals.</li> </ul> </li> </ul> | Within 12 months of approval and continuous and as required |
|                                                                                                                | <ul style="list-style-type: none"> <li>An operational noise monitoring program will be developed to monitor noise emissions from the proposed operations to determine ongoing compliance with PSNLs and to identify any further feasible noise mitigation measures that can be implemented.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Within 12 months of approval and continuous and as required |
|                                                                                                                | <ul style="list-style-type: none"> <li>The monitoring program will be implemented during evening and night time periods with the objective of confirming the acoustic performance of the proposed operations.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                             |
|                                                                                                                | <ul style="list-style-type: none"> <li>If following monitoring, further mitigation is required, noise mitigation will be implemented along the appropriate portions of railway track.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | If required                                                 |
| <b>Aquatic Ecology</b>                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                             |
| Operations are managed such that adverse impacts to native flora and fauna are prevented or minimised.         | <ul style="list-style-type: none"> <li>Provided initial assessments indicate that the flow regimes allow for the collection of meaningful data, eight new aquatic ecology impact monitoring sites will be established in the Nebo area, three on Little Wattle Tree Creek and five on Wattle Creek with three control sites. The site establishment and first monitoring run will be undertaken in Autumn 2011 with monitoring continuing twice a year during Autumn and Spring.</li> </ul>                                                                                                                                                                                                                                                                                                       | Prior to secondary extraction                               |
| <b>Terrestrial Ecology</b>                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                             |
| Operations are managed such that adverse impacts to native flora and fauna are prevented or minimised.         | <ul style="list-style-type: none"> <li>Monitoring will be undertaken post mining, including surveys of the upland swamps and riparian zones to ascertain any impacts resulting from mining.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Post secondary extraction                                   |

| Outcome                                                                                                                                                                                                                           | Commitment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Timing                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>Non-Aboriginal Heritage</b><br>Operations are managed such that adverse impacts to significant heritage items are avoided or minimised.                                                                                        | <ul style="list-style-type: none"> <li>To preserve and enhance the heritage values of the site, NRE will create greater awareness amongst staff of the significance of the heritage items at the Wongawilli pit top and how day to day activities may impact on these items. An education program will be created and implemented via the MOP. NRE will develop a Conservation Management Plan.</li> </ul>                                                                                                                                                                                                                                                                                                                       | Within 6 months of approval,<br>Continuous and as required                     |
| <b>Traffic and Transport</b><br>Operations are managed to ensure minimal impacts on the local road network.                                                                                                                       | <ul style="list-style-type: none"> <li>Current traffic and transport management measures will continue to ensure impacts on local road users from NRE Wongawilli Colliery are minimised. These measures include strict adherence to Council restrictions such as speed limits as well as other safety or warning requirements.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                        | Continuous and as required                                                     |
| <b>Waste</b><br>Avoidance of unnecessary resource consumption; reuse, reprocessing, recycling and energy recovery wherever possible and, where this is not possible, disposal of wastes in an environmentally responsible manner. | <ul style="list-style-type: none"> <li>All waste material will be disposed of in accordance with the provisions of the <i>Protection of the Environment Operations Act 1997</i> and the Waste Classification Guidelines (DECC, 2008).</li> <li>Waste will be reused and recycled where possible or disposed of at an appropriately licensed waste disposal facility.</li> <li>Onsite storage and disposal of different categories of waste will be defined. A sufficient number of covered storage bins will be provided for waste disposal on site, with separate bins for recyclable and non-recyclable waste.</li> <li>All records will be retained as proof of correct disposal for environmental audit purposes.</li> </ul> | Continuous<br>Continuous<br>Continuous<br>Continuous                           |
| <b>Rehabilitation</b><br>Progressive rehabilitation of mine access and disused portals<br>Restoration of disturbed areas with a vegetation cover similar in nature to that of the surrounding bushland                            | <p>The Rehabilitation Plan will be developed, presented and undertaken in accordance with a REMP to the satisfaction of IIN</p> <p>All mine entries surplus to operational requirements will be progressively sealed and rehabilitated.</p> <p>Progressive rehabilitation of all other disused areas and infrastructure will be undertaken where possible.</p>                                                                                                                                                                                                                                                                                                                                                                   | Continuous and as required<br>Within seven years<br>Continuous and as required |

APPENDIX 4:  
RECEIVER LOCATION PLAN



## ATTACHMENT D

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### Plans

SMP APPROVED PLAN

LEGEND

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APPLICATION PROPOSED WORKINGS

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M71 - 2380 - 17/09/73)

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M67 - 2273 - 10/01/68)

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M68 - 6590 - 22/04/69)

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M73 - 5744 - 21/02/75)

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M71 - 2380 - 17/02/74)

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M82 - 4759 - 16/05/83)

NEBO COLLIERY EXTRACTION APPROVAL AREA OUTLINE - (REF: M84 - 1514 - 7/07/88)

ENDORSEMENTS:  
NEBO COLLIERY WORKINGS DIGITISED FROM OLD PLANS  
NEBO COLLIERY EXTRACTION APPROVAL AREAS DIGITISED FROM NEBO COLLIERY ISG MINE PLANS (RT 156)  
CORDEAUX DAM MARGINAL AND RESTRICTED ZONES DIGITISED FROM NEBO COLLIERY ISG MINE PLANS (RT 156)

CERTIFICATION OF ACCURACY

CERTIFICATION OF MANAGER

S. March  
REGISTERED MINING SURVEYOR

P. Coxhead  
MANAGER OF MINING ENGINEERING

Date

| APPLICATION AREA CORNERS |           |             |
|--------------------------|-----------|-------------|
| A                        | E 294 012 | N 6 190 379 |
| B                        | E 294 482 | N 6 190 285 |
| C                        | E 294 437 | N 6 190 002 |
| D                        | E 295 281 | N 6 189 753 |
| E                        | E 295 145 | N 6 188 179 |
| F                        | E 293 391 | N 6 188 284 |
| G                        | E 293 498 | N 6 188 935 |
| H                        | E 293 794 | N 6 189 068 |

WONGAWILLI (No 3)  
SEAM WORKINGS

COLLIERY HOLDING BOUNDARY

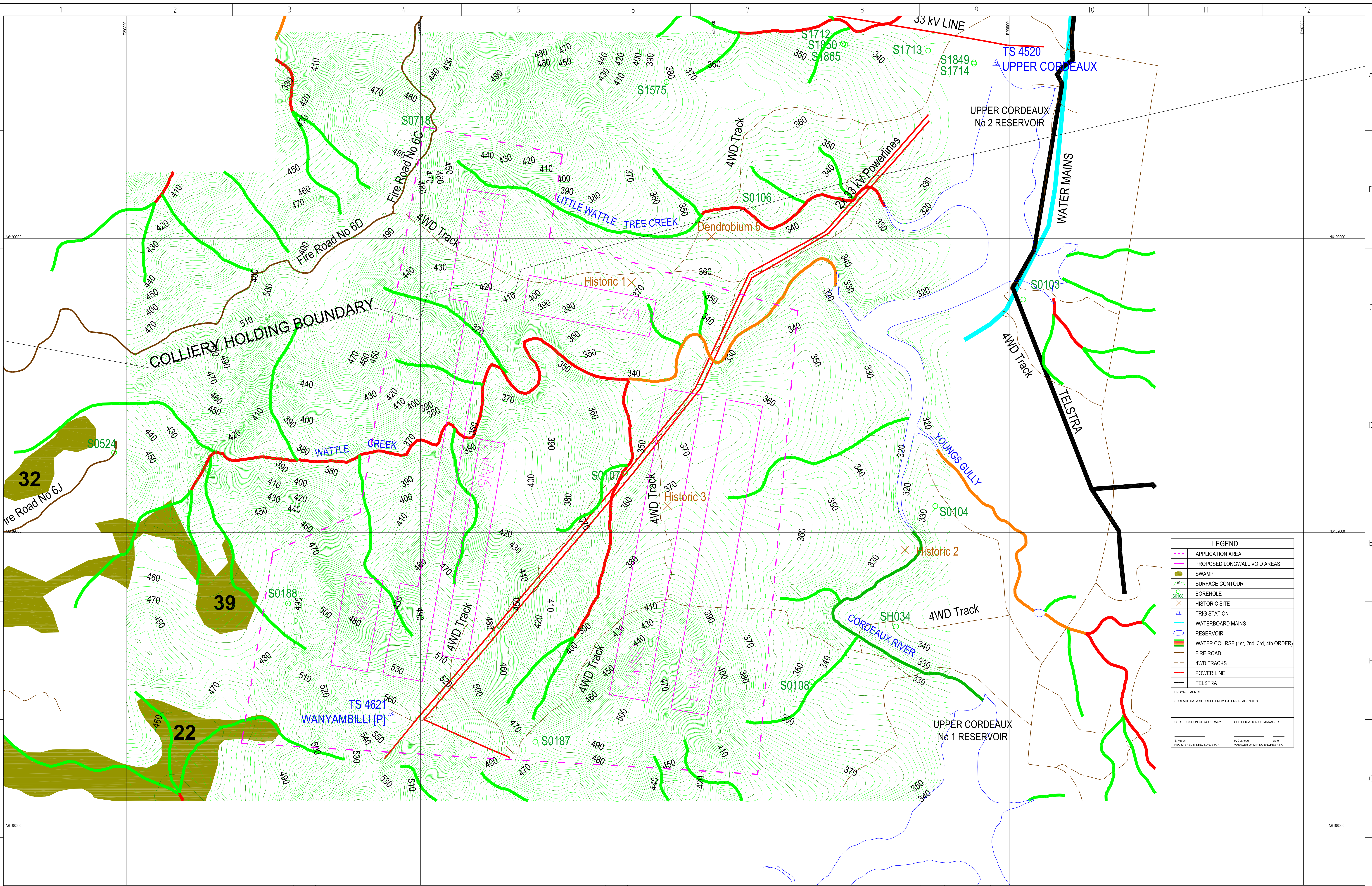
DENDROBIUM COLLIERY  
WORKINGS



**NRE Wongawilli Colliery**  
Gujarat NRE Wonga Pty Ltd  
Wongawilli Road, West Dapto NSW 2530  
ABN 77 111 928 762

|        |          |
|--------|----------|
| Name   | Date     |
| DRN SM | 20/01/11 |
| CKD    |          |
| APP    |          |
| SCALE  | 1:4000   |

|                |                                                                                            |
|----------------|--------------------------------------------------------------------------------------------|
| Title          | EXTRACTION PLAN-SMP APPLICATION<br>PLAN 1 - SMP APPROVED PLAN<br>LWN1, N2, N3, N4, N5 & N6 |
| DRAWING NUMBER | WA0-01-0491                                                                                |
| REV            | 0                                                                                          |



LEGEND

APPLICATION AREA

PROPOSED LONGWALL VOID AREAS

SWAMP

SURFACE CONTOUR

BOREHOLE

HISTORIC SITE

TRIG STATION

WATERBOARD MAINS

RESERVOIR

WATER COURSE (1st, 2nd, 3rd, 4th ORDER)

FIRE ROAD

4WD TRACKS

POWER LINE

TELSTRA

ENDORSEMENTS:

SURFACE DATA SOURCED FROM EXTERNAL AGENCIES

CERTIFICATION OF ACCURACY

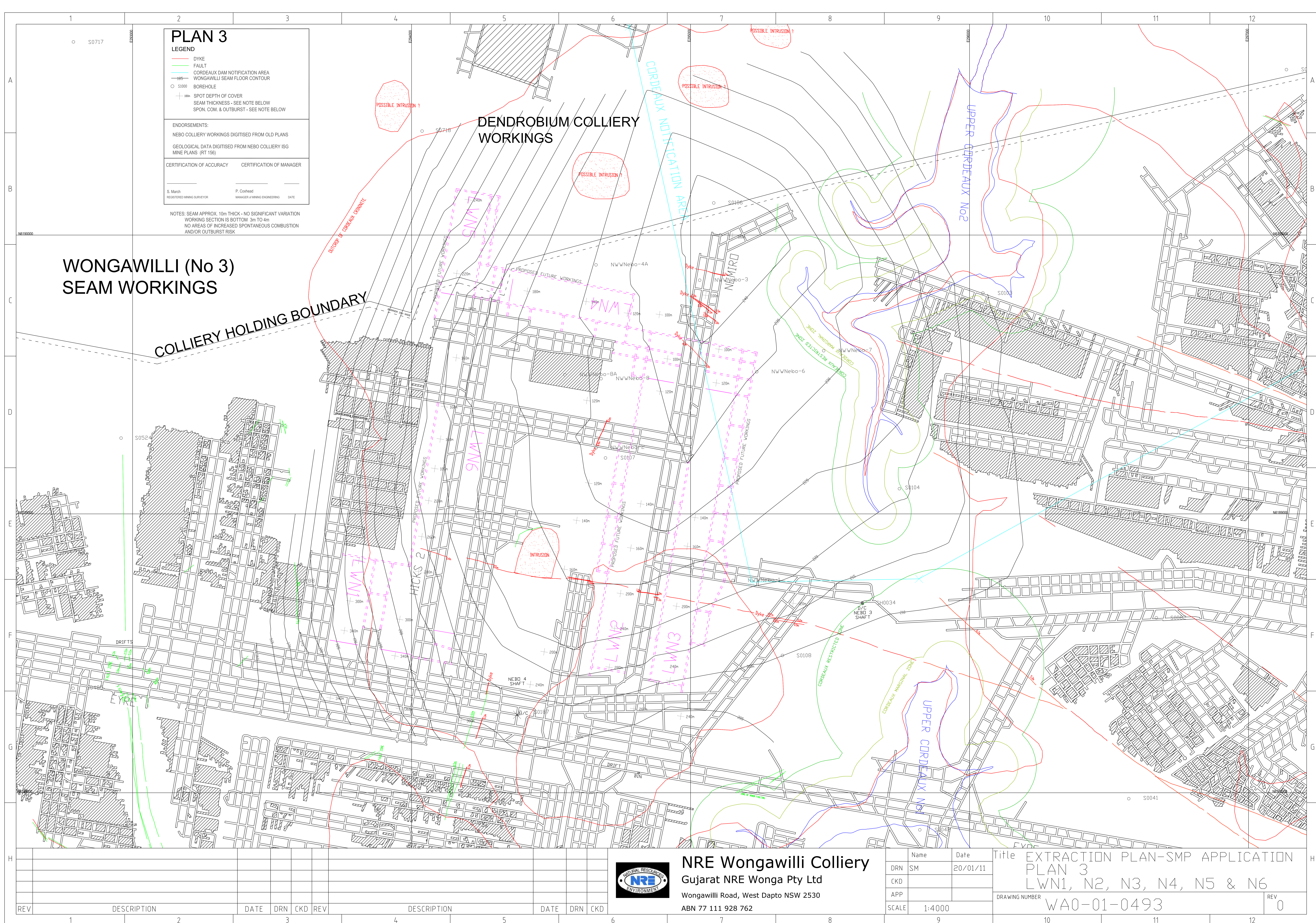
CERTIFICATION OF MANAGER

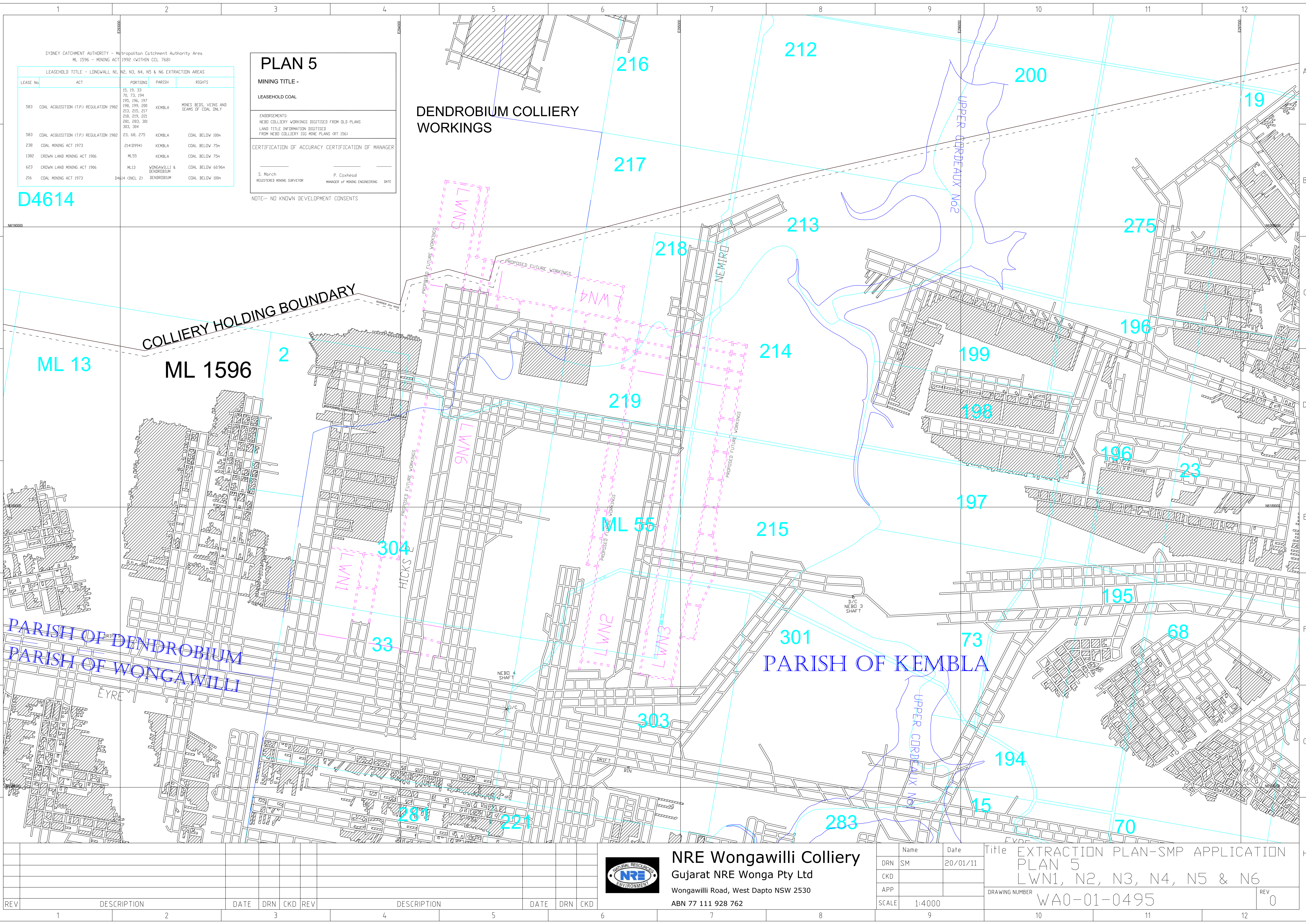
S. Marsh  
REGISTERED MINING SURVEYOR

P. Goshard  
MANAGER OF MINING ENGINEERING

Date

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| LEASEHOLD TITLE - LONGWALL NO. 2, 3, 4, 5 & 6 EXTRACTION AREAS |                                         |                                                                                                                            |                         |                                          |
|----------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------|
| LEASE No.                                                      | ACT                                     | PORTIONS                                                                                                                   | PARISH                  | RIGHTS                                   |
| 583                                                            | COAL ACQUISITION (T.P.) REGULATION 1982 | 15, 19, 33<br>70, 73, 194<br>195, 196, 197<br>198, 199, 200<br>203, 205, 217<br>218, 219, 221<br>281, 283, 301<br>303, 304 | KEMBLA                  | MINES BEDS, VEINS AND SEAMS OF COAL ONLY |
| 583                                                            | COAL ACQUISITION (T.P.) REGULATION 1982 | 23, 68, 275                                                                                                                | KEMBLA                  | COAL BELOW 100m                          |
| 238                                                            | COAL MINING ACT 1973                    | 214(8994)                                                                                                                  | KEMBLA                  | COAL BELOW 75m                           |
| 1382                                                           | CROWN LAND MINING ACT 1906              | ML55                                                                                                                       | KEMBLA                  | COAL BELOW 75m                           |
| 623                                                            | CROWN LAND MINING ACT 1906              | ML13                                                                                                                       | WONGAWILLI & DENDROBIUM | COAL BELOW 60.96m                        |
| 216                                                            | COAL MINING ACT 1973                    | D4614 (INCL 2)                                                                                                             | DENDROBIUM              | COAL BELOW 100m                          |

PLAN 5

MINING TITLE -

LEASEHOLD COAL

ENDORSEMENTS:  
NEBO COLLIERY WORKINGS DIGITISED FROM OLD PLANS  
LAND TITLE INFORMATION DIGITISED  
FROM NEBO COLLIERY ISG MINE PLANS (RT 156)

CERTIFICATION OF ACCURACY CERTIFICATION OF MANAGER

S. March  
REGISTERED MINING SURVEYOR

P. Coxhead  
MANAGER OF MINING ENGINEERING

DATE

NOTE:- NO KNOWN DEVELOPMENT CONSENTS



NRE Wongawilli Colliery  
Gujarat NRE Wonga Pty Ltd  
Wongawilli Road, West Dapto NSW 2530  
ABN 77 111 928 762

|        |          |
|--------|----------|
| Name   | Date     |
| DRN SM | 20/01/11 |
| CKD    |          |
| APP    |          |
| SCALE  | 1:4000   |

|                                                                        |  |                |     |
|------------------------------------------------------------------------|--|----------------|-----|
| Title                                                                  |  | DRAWING NUMBER | REV |
| EXTRACTION PLAN-SMP APPLICATION<br>PLAN 5<br>LWN1, N2, N3, N4, N5 & N6 |  |                |     |
| WA0-01-0495                                                            |  |                | 0   |

| REV | DESCRIPTION | DATE | DRN | CKD | REV | DESCRIPTION | DATE | DRN | CKD |
|-----|-------------|------|-----|-----|-----|-------------|------|-----|-----|
| 1   |             |      |     |     | 3   |             |      |     |     |
| 2   |             |      |     |     | 4   |             |      |     |     |
| 3   |             |      |     |     | 5   |             |      |     |     |
| 4   |             |      |     |     | 6   |             |      |     |     |
| 5   |             |      |     |     | 7   |             |      |     |     |
| 6   |             |      |     |     | 8   |             |      |     |     |
| 7   |             |      |     |     | 9   |             |      |     |     |
| 8   |             |      |     |     | 10  |             |      |     |     |
| 9   |             |      |     |     | 11  |             |      |     |     |
| 10  |             |      |     |     | 12  |             |      |     |     |



## ATTACHMENT E

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### Consultation Documentation and Correspondence

## Chris McEvoy

---

**From:** COX, RODNEY <RODNEY.COX@sydneywater.com.au>  
**Sent:** Tuesday, 27 March 2012 9:10 AM  
**To:** Chris McEvoy  
**Cc:** Ben Samcou (ben.samcou@networksa.com.au) (ben.samcou@networksa.com.au); NAGARAJAN, SUDHAKAR; LAM, KIMSON  
**Subject:** RE: Monitoring and TARP's for Sydney Water's 33kV Powerlines over Nebo Longwalls  
**Attachments:** image001.png; image004.wmz; image005.gif

Hello Chris,

Thankyou for the information. I have asked for feedback from another person in our business however I believe that the proposed Monitoring & Management Summary will be acceptable, however it will need to be formalised in a signed off agreement which, amongst other things, identifies roles & responsibilities along with financial liabilities for repairs of any damage.

Do you have a copy of such an agreement that I can review.

*Rod Cox* | Operations Contracts Team Leader

Operations Treatment | Sydney Water  
Prospect Treatment Office  
PO Box 3405, Wetherill Park NSW 2164  
T 9688 0268  
M 0428 867 528  
[rodney.cox@sydneywater.com.au](mailto:rodney.cox@sydneywater.com.au)

---

**From:** Chris McEvoy [mailto:cmcevoy@niche-eh.com]  
**Sent:** Tuesday, 13 March 2012 9:45  
**To:** COX, RODNEY  
**Cc:** David Clarkson (dclarkson@gujaratnre.com.au)  
**Subject:** Monitoring and TARP's for Sydney Water's 33kV Powerlines over Nebo Longwalls

Hi Rodney.

Thanks for confirming the Timber Poled 33kV Power line is owned by Sydney Water and managed by Veolia Water as I understand.

As discussed:

1. Wongawilli Colliery (NRE) has recently received Part 3A Approval for Continuing operations including extraction of Nebo Longwalls N1-N6 (following approval of an Extraction Plan).
2. Wongawilli Colliery is submitting an Extraction Plan to DoPI for Approval to extract Nebo Longwalls N1-N6 prior Christmas. (An Extraction Plan is similar to a Subsidence Management Plan or SMP). Extraction is planned to commence around June 2012 until July 2014.
3. We need to confirm what monitoring and TARP's Sydney Water prefer to have included in the Extraction Plan **RE the 33kv power line within the potential subsidence footprint, which cross directly above the north west corner of Longwall N2 and close to the south east corner of N6, that supplies power to the Avon pump station.**

Below I attach some suggested standard Monitoring Arrangements and TARP's (Trigger, Action, Response Plans) in red font for your consideration and discussion after you have reviewed the relevant information below. Could you please give me a call after you have reviewed this so we can finalise the Monitoring Arrangements and TARP's for these items. If you are OK with these we will proceed on this basis.

Below, I also attach a Plan of the layout, and extract of the relevant section of the Extraction Plan RE impacts on the powerlines.

### Electrical Services- Impact Assessment

There are two 33 kV power lines within the potential subsidence footprint, which cross directly above the north west corner of Longwall N2 and close to the south east corner of N6. One power line is owned by **Sydney Water** and supplies power to the Avon pump station. The other (Line 6-94) is owned by NRE and supplies power to the Nebo #4 Shaft of NRE Colliery.

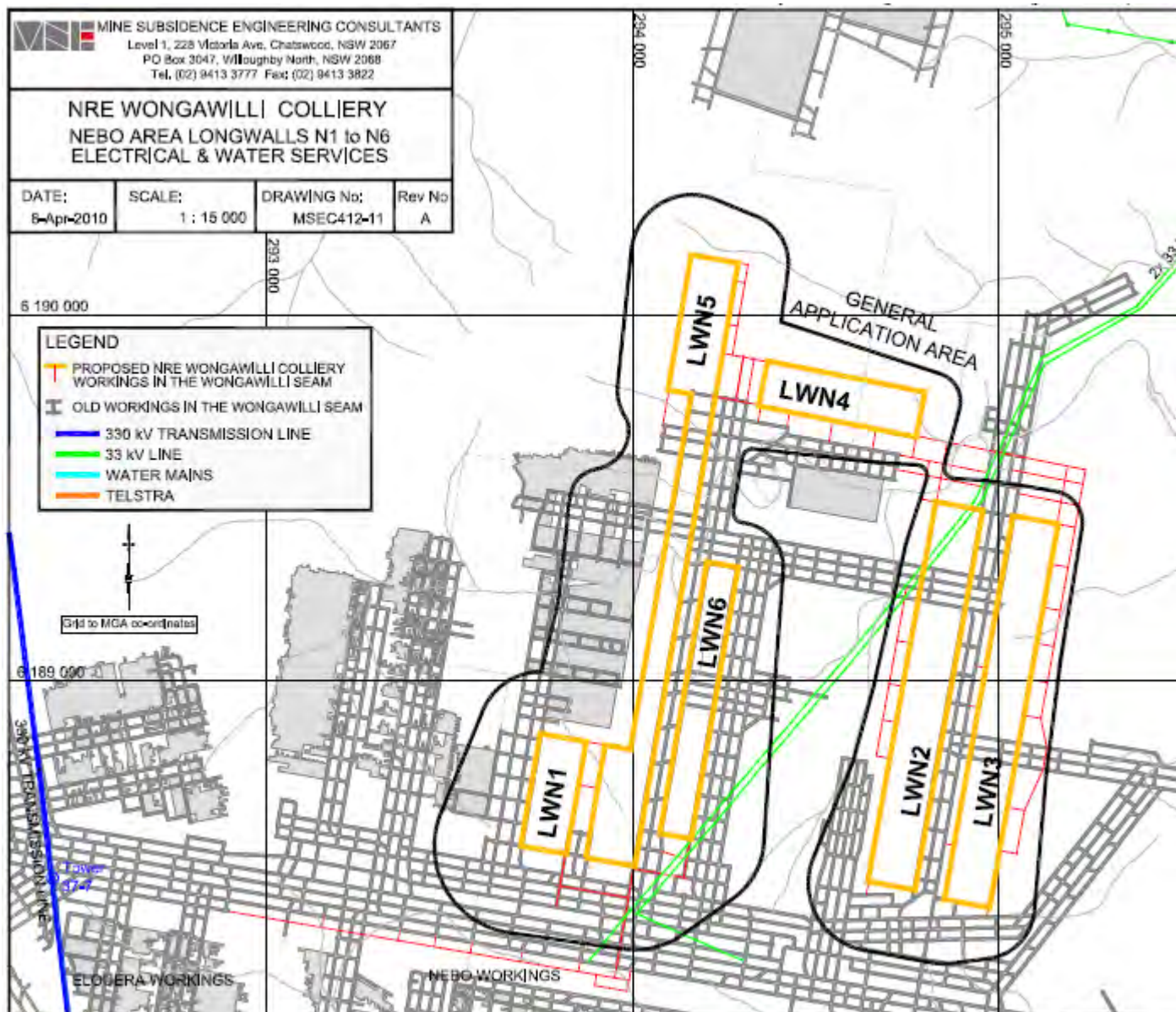
The maximum predicted subsidence along these power lines is 40mm and the maximum tilt is 0.1 mm/m. The maximum tilt across the power lines is <0.1mm/m.

These predicted subsidence parameters are very small and the probability of impacts to the power lines is negligible.

The power lines are supported on timber poles, which are relatively straightforward to repair or adjust if required.

### Monitoring and Management Summary

| Feature                                                                  | Monitoring Commitments                                                                                                                                                     |                                                                     |                                                                                                                              | TARPS                                                                           |                                                                                                                         |
|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|                                                                          | Prior to Mining                                                                                                                                                            | During Mining                                                       | Post Mining and Future Monitoring                                                                                            | Trigger                                                                         | Response                                                                                                                |
| <b>33kV Transmission Lines</b><br><b>(Owned by Sydney Water and NRE)</b> | <input type="checkbox"/> Observation of tower condition<br><input type="checkbox"/> Survey measurement for later comparison<br><input type="checkbox"/> Once before mining | <input type="checkbox"/> Fortnightly observation of tower condition | <input type="checkbox"/> Observation of tower condition<br><input type="checkbox"/> Survey measurement once following mining | <input type="checkbox"/> Observation of unsafe tower conditions as noted by NRE | <input type="checkbox"/> Repair own<br><input type="checkbox"/> Document<br><input type="checkbox"/> NRE need with Line |



Many Thanks

Regards

Chris



**Chris McEvoy (B. Env. Sci., Dip. Ed.)**

Senior Environmental Scientist

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cmcevoy@niche-eh.com Web: www.niche-eh.com  
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## Chris McEvoy

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**From:** Ravi Sundaram <ravi.sundaram@sca.nsw.gov.au>  
**Sent:** Thursday, 16 February 2012 3:27 PM  
**To:** Chris McEvoy  
**Cc:** Girja Sharma; Ross Wallis; Jerzy Jankowski; Maria Dubikova  
**Subject:** RE: Nebo Extraction Plan Monitoring and TARP's - Request for SCA Feedback  
**Attachments:** image003.wmz; image005.gif; image006.png

Chris

Illawarra Coal Dendrobium Mine worked with SCA and other government agencies recently in revising the TARPs for water, swamp and landscape features with regards to Dendrobium Area 3A and 3B SMPs. I suggest that you contact Gary Brassington at Illawarra Coal and see if you can get a copy of these TARP tables and consider them in developing the TARP trigger values, criteria and action plans for the Nebo Extraction Plan where relevant. I have suggested below triggers for water quality pH and Groundwater level based on the Dendrobium example. It is important to develop TARPs for water flow/level in pools and some other water quality parameters like EC.

The Built Features Monitoring and Management is ok with regards to SCA infrastructure and I understand you have already consulted Marlo Vergara at the SCA regarding this.

The SCA has the following comments relating mostly more specifically to the Water Management Plan sub-section:

1. 'End of Panel' reports should be provided to agencies within 2 months of completion of the longwall (rather than 4 as stated on page 29-30) to assist revising triggers, responses and management measures for mining of subsequent panels.
2. Please clarify whether the subsidence monitoring location NM2 will monitor subsidence impacts on Wattle Creek (page 34).
3. Piezometer locations 1A and 2A and WW11, WW20B for groundwater monitoring referred in text on page 51 and monitoring sites 1S, 1D, 2S and 2D referred in Tables 7.8 and 7.10 are not shown in Figure 7.2. Similarly depth of these groundwater monitoring bores has not been provided in the extraction plan.
4. Trigger Action Response for surface water pH has been set to 4.5 (page 57) which appears to be low and falls within very acidic range. Given that the baseline pH of surface water has been monitored to be in the range of 5.5 to 7.5 (pages 48 & 49), the trigger action response for surface water pH should be set as follows:  
Temporary reduction in water quality observed for 2 consecutive months at any site when comparing to the baseline period to mining period for that site, i.e.:  
    Within Prediction (Level 1): pH drop of between 1 and 1.5 units from the baseline value  
    Within prediction (Level 2): pH drop between 1.5 and 2 units from the minimum baseline value  
Reduction in water quality observed for more than 2 consecutive months at any site when comparing to the baseline period to mining period for that site, i.e.:  
    pH drop of > 2 units from the minimum baseline value.
5. Triggers for other surface water monitoring parameters like EC have not been specified in the extraction plan.
6. Trigger Action Response for groundwater pH has been set to 4.5 (page 62) and appears to be very low. Given that the baseline pH of groundwater has been monitored to be in the range of 7.6 to 10.0 (page 54), the trigger action response for groundwater pH should be set in a similar manner as for surface water suggested above. Similarly trigger values for conductivity, nitrogen and phosphorus appears to be optimistic and need to be revised.
7. Groundwater level changes with rainfall and therefore the SCA recommends the triggers for these be set as follows:  
    Within Prediction (Level 1) – Temporary (i.e. effect not persisting after significant groundwater recharge rainfall events) reduction in groundwater level at one site beyond variability determined in baseline monitoring due to rainfall

Within Prediction (Level 2) - Temporary (i.e. effect not persisting after significant groundwater recharge rainfall events) reduction in groundwater level at majority of sites beyond variability determined in baseline monitoring due to rainfall  
Exceeding predicted impact criteria – Long term (i.e. effect persisting after significant groundwater recharge events) reduction in groundwater level at majority of sites beyond variability determined in baseline monitoring due to rainfall.

8. The Contingency Plan does not contain details of all relevant procedures, specifications and actions and responsibilities for implementation of the actions.

Please call if you wish to discuss.

Regards.

Ravi

---

**From:** Chris McEvoy (<mailto:cmcevoy@niche-eh.com>)

**Sent:** Wednesday, 18 January 2012 11:03 AM

**To:** Malcolm Hughes; Ravi Sundaram

**Cc:** Marlo Vergara; David Clarkson ([dclarkson@gujaratnre.com.au](mailto:dclarkson@gujaratnre.com.au)); Chris Irving ([cirving@gujaratnre.com.au](mailto:cirving@gujaratnre.com.au))

**Subject:** FW: Nebo Extraction Plan Monitoring and TARP's - Request for SCA Feedback

Good morning Malcolm and Ravi.

I have been liaising with Marlo Vergara RE the Nebo Extraction Plan Monitoring and TARP's for Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls (refer below).

Marlo suggested I also send this to you for any comment you may have in relation to other issues, prior to us sending the Extraction Plan to DoPI for assessment/approval. I assume most comments would have been addressed during the Part 3A Project Assessment process.

Please find the Draft Extraction Plan attached FYI. Any comments would be appreciated as soon as practical. The doc is in word so track changes/comments may be inserted if you wish.

I will send the MSEC report following this in case you need the drawings to refer to.

Regards

Chris



**Chris McEvoy (B. Env. Sci., Dip. Ed.)**

Senior Environmental Scientist

PO Box 12, Macarthur Square, NSW 2560  
[cmcevoy@niche-eh.com](mailto:cmcevoy@niche-eh.com) **Web:** [www.niche-eh.com](http://www.niche-eh.com)  
**Mob:** 0407 060 163 **Fax:** 02 4017 0071

**From:** Chris McEvoy  
**Sent:** Tuesday, 13 December 2011 9:55 PM  
**To:** 'marlo.vergara@sca.nsw.gov.au'  
**Cc:** 'malcolm.hughes@sca.nsw.gov.au'; David Clarkson ([dclarkson@gujaratnre.com.au](mailto:dclarkson@gujaratnre.com.au))  
**Subject:** Nebo Extraction Plan Monitoring and TARP's for Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls- Request for SCA Feedback

Hi Marlo.

Thanks for your time on the Phone today. As discussed:

1. Wongawilli Colliery (NRE) has recently received Part 3A Approval for Continuing operations including extraction of Nebo Longwalls N1-N6 (following approval of an Extraction Plan).
2. Wongawilli Colliery is submitting an Extraction Plan to DoPI for Approval to extract Nebo Longwalls N1-N6 prior Christmas. (An Extraction Plan is similar to a Subsidence Management Plan or SMP). Extraction is planned to commence around June 2012 until July 2014.
3. A small portion of Longwall N3 lies within the Dam Safety Committee's Cordeaux Notification Area, so Wongawilli Colliery also require DSC approval to mine Nebo Longwalls N1-N6 (refer attached letter from DSC).
4. MSEC predicted there will be no impacts on the Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls
5. We approached the DSC to determine what monitoring and TARP's they prefer to have included in the Extraction Plan RE the Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls.

Bill Ziegler, Executive Engineer at the DSC, advised us today that:

1. The groundwater monitoring program outlined in the Extraction Plan would probably suffice to meet most of the DSC's concerns and that any data gaps would be identified as they process the application for DSC approval.
2. In terms of monitoring dam walls, DSC suggested I contact you (the SCA) and negotiate suitable monitoring and Trigger, Action, Response, Plans (TARPs) for inclusion in the Extraction Plan.
3. Bill indicated he thought SCA either conducts (or conducted) subsidence monitoring on these dam walls (**Can you pls confirm if this is the case**) and that Wongawilli Colliery could perhaps either use this monitoring data and if appropriate contribute to additional subsidence monitoring on the dam walls as agreed with SCA.

Below I attach some Draft Monitoring Arrangements and TARP's (**in red font**) for your consideration and discussion after you have reviewed the relevant information below. Could you please give me a call after you have reviewed this so we can finalise the Monitoring Arrangements and TARP's for these items. Once we finalise the Extraction Plan, we will send the document to the SCA (expected next week).

Below, I also attach a Plan of the layout, and extract of the relevant section of the Extraction Plan Referring to the Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls.

If you would also like a hard copy of the Part 3A Application with all technical reports, let me know.

**Table 5.1** Built Features Monitoring and Management Summary

| Feature                                 | Monitoring Commitments                                            |                                                                 |                                                                            | TARPS                                                                                           |                                     |
|-----------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------|
|                                         | Prior to Mining                                                   | During Mining                                                   | Post Mining and Future Monitoring                                          | Trigger                                                                                         | Response                            |
| <b>Upper Cordeaux 1 and 2 Dam Walls</b> | <input type="checkbox"/> Visual inspection by SCA prior to mining | <input type="checkbox"/> Visual inspection by SCA during mining | <input type="checkbox"/> Visual inspection by SCA up to 1 year post mining | <input type="checkbox"/> Observed cracking or compromised structural integrity of the dam walls | <input type="checkbox"/> Notif DoPI |
| <b>SCA Inspections and</b>              | <input type="checkbox"/> Annual subsidence surveys along Upper    | <input type="checkbox"/> Bi-Annual subsidence surveys           | <input type="checkbox"/> Annual subsidence                                 |                                                                                                 | <input type="checkbox"/> Make       |

| subsidence monitoring                                                  | Cordeaux 1 and 2<br>Dam walls prior to<br>mining                                                                                                                                    | along Upper<br>Cordeaux 1 and 2<br>Dam walls during<br>mining                                                     | surveys along Upper<br>Cordeaux 1 and 2<br>Dam walls up to 1<br>year post mining                                                                                                                                   | <input type="checkbox"/> Measurable<br>subsidence impacts<br>during or after the<br>mining                                                                                                    | inclus<br><input type="checkbox"/> Prop<br>upon<br><input type="checkbox"/> Com<br>from<br><input type="checkbox"/> Addit<br>SCA                                                                                                                       |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>33kV Transmission Lines</b><br>(Owned by Integral and NRE)          | <input type="checkbox"/> Observation of tower<br>condition<br><input type="checkbox"/> Survey<br>measurement for<br>later comparison<br><input type="checkbox"/> Once before mining | <input type="checkbox"/> Fortnightly<br>observation of tower<br>condition                                         | <input type="checkbox"/> Observation of tower<br>condition<br><input type="checkbox"/> Survey<br>measurement once<br>following mining                                                                              | <input type="checkbox"/> Observation of unsafe<br>tower conditions as noted<br>by (the owner and operator<br>of the transmission line<br>who are responsible for<br>observational monitoring) | <input type="checkbox"/> Repa<br>and l<br><input type="checkbox"/> Docu<br><input type="checkbox"/> Infrac<br>reme                                                                                                                                     |
| <b>Fire Roads and 4WD Tracks</b><br>(Fortnightly visual<br>inspection) | <input type="checkbox"/> Observation of road<br>condition once prior<br>to mining<br><input type="checkbox"/> Reported in End of<br>panel reports and<br>AEMR                       | <input type="checkbox"/> Fortnightly<br>observation of roads,<br>tracks and area<br>within 10m of<br>roads/tracks | <input type="checkbox"/> Monthly observation<br>of roads, tracks and<br>area within 10m of<br>roads/tracks for 6<br>months post mining<br><input type="checkbox"/> reported in End of<br>panel reports and<br>AEMR | <input type="checkbox"/> Minor cracking on roads<br>and tracks (<10mm)<br><input type="checkbox"/> Major cracking (>10mm) or<br>traffic impedance                                             | <input type="checkbox"/> Notif<br>photo<br><input type="checkbox"/> Notif<br>DoPI<br><input type="checkbox"/> Make<br>includ<br><input type="checkbox"/> Prop<br>upon<br><input type="checkbox"/> Com<br>from<br><input type="checkbox"/> Addit<br>SCA |



companies must receive the consent of the Minister administering the Mining Act. The DSC advises the Minister on the extent and type of mining to be permitted and on any special conditions which should apply. The north eastern corner of LWN3 falls within the Cordeaux Notification Area and therefore the DSC have been consulted during the mine approval process for the Nebo area.

Many thanks

Regards

Chris



**Chris McEvoy (B. Env. Sci., Dip. Ed.)**

Senior Environmental Scientist

PO Box 12, Macarthur Square, NSW 2560  
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## Chris McEvoy

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**From:** Marlo Vergara <Marlo.Vergara@sca.nsw.gov.au>  
**Sent:** Thursday, 22 December 2011 10:13 AM  
**To:** Chris McEvoy  
**Cc:** David Clarkson (dclarkson@gujaratnre.com.au)  
**Subject:** RE: Nebo Extraction Plan Monitoring and TARP's for Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls- Request for SCA Feedback  
**Attachments:** image003.png; image004.wmz; image005.gif

Hi Chris,

The Part 3A approval specifies the following as the performance measure for the dams – **always safe and serviceable and damage that does not affect safety, or serviceability must be fully repairable, and must be fully repaired** (defined as:– safe means no danger to users who are present, serviceable means available for its intended use and repairable means damaged components can be repaired economically). The Part 3A approval requires extraction plans which include a Built Features Management Plan – and this subplan must be prepared in consultation with owners of such features to manage the potential impacts and consequences of subsidence.

For subsidence monitoring, frequency of survey will depend on the location of the longwall being extracted and the face position, magnitude of movement, trigger levels, visual impact. SCA undertakes dam and ground (immediately around the dam structure) movement monitoring. SCA also monitors cracks on the dam wall and crest. I assume the mining company undertakes a program of ground or surface deformation surveys.

The SCA therefore requires to review the mining company's **Built Features Management Plan or Asset Protection Plan (APP)** that includes a Cordeaux Dam Notification Area Management Plan and the following sub-plans: subsidence monitoring management plan, inrush management plan and mine closure plan and contingency plan. The SCA needs to ensure that its requirements for the performance measure for the dams are being met.

Regards.  
Marlo

### Marlo Vergara | Senior Manager

Mining & Specialist Services | Assets and Major Projects  
SYDNEY CATCHMENT AUTHORITY | [www.sca.nsw.gov.au](http://www.sca.nsw.gov.au)  
Level 4, 2-6 Station Street PENRITH NSW 2750 | PO Box 323 PENRITH NSW 2751  
T: 02 4724 2378 | F: 02 4725 2594 | M: 0425 212 542 | E: [Marlo.Vergara@sca.nsw.gov.au](mailto:Marlo.Vergara@sca.nsw.gov.au)



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**From:** Chris McEvoy [mailto:cmcevoy@niche-eh.com]  
**Sent:** Tuesday, 13 December 2011 9:55 PM  
**To:** Marlo Vergara  
**Cc:** Malcolm Hughes; David Clarkson (dclarkson@gujaratnre.com.au)  
**Subject:** Nebo Extraction Plan Monitoring and TARP's for Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls- Request for SCA Feedback

Hi Marlo.

Thanks for your time on the Phone today. As discussed:

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3. A small portion of Longwall N3 lies within the Dam Safety Committee's Cordeaux Notification Area, so Wongawilli Colliery also require DSC approval to mine Nebo Longwalls N1-N6 (refer attached letter from DSC).
4. MSEC predicted there will be no impacts on the Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls
5. We approached the DSC to determine what monitoring and TARP's they prefer to have included in the Extraction Plan RE the Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls.

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1. The groundwater monitoring program outlined in the Extraction Plan would probably suffice to meet most of the DSC's concerns and that any data gaps would be identified as they process the application for DSC approval.
2. In terms of monitoring dam walls, DSC suggested I contact you (the SCA) and negotiate suitable monitoring and Trigger, Action, Response, Plans (TARPs) for inclusion in the Extraction Plan.
3. Bill indicated he thought SCA either conducts (or conducted) subsidence monitoring on these dam walls (**Can you pls confirm if this is the case**) and that Wongawilli Colliery could perhaps either use this monitoring data and if appropriate contribute to additional subsidence monitoring on the dam walls as agreed with SCA.

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Below, I also attach a Plan of the layout, and extract of the relevant section of the Extraction Plan Referring to the Upper Cordeaux No. 1 and 2 Reservoirs and Dam walls.

If you would also like a hard copy of the Part 3A Application with all technical reports, let me know.

**Table 5.1** Built Features Monitoring and Management Summary

| Feature                                          | Monitoring Commitments                                                                                    |                                                                                                            |                                                                                                                    | TARPS                                                                                           |                                                                                                                                                            |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | Prior to Mining                                                                                           | During Mining                                                                                              | Post Mining and Future Monitoring                                                                                  | Trigger                                                                                         | Response                                                                                                                                                   |
| <b>Upper Cordeaux 1 and 2 Dam Walls</b>          | <input type="checkbox"/> Visual inspection by SCA prior to mining                                         | <input type="checkbox"/> Visual inspection by SCA during mining                                            | <input type="checkbox"/> Visual inspection by SCA up to 1 year post mining                                         | <input type="checkbox"/> Observed cracking or compromised structural integrity of the dam walls | <input type="checkbox"/> Notified DoPI                                                                                                                     |
| <b>SCA Inspections and subsidence monitoring</b> | <input type="checkbox"/> Annual subsidence surveys along Upper Cordeaux 1 and 2 Dam walls prior to mining | <input type="checkbox"/> Bi-Annual subsidence surveys along Upper Cordeaux 1 and 2 Dam walls during mining | <input type="checkbox"/> Annual subsidence surveys along Upper Cordeaux 1 and 2 Dam walls up to 1 year post mining | <input type="checkbox"/> Measurable subsidence impacts during or after the mining               | <input type="checkbox"/> Make inclusion<br><input type="checkbox"/> Propose upon<br><input type="checkbox"/> Com from<br><input type="checkbox"/> Addi SCA |
| <b>33kV Transmission Lines</b>                   | <input type="checkbox"/> Observation of tower                                                             | <input type="checkbox"/> Fortnightly                                                                       | <input type="checkbox"/> Observation of tower                                                                      | <input type="checkbox"/> Observation of unsafe                                                  | <input type="checkbox"/> Rep                                                                                                                               |

(Owned by Integral and NRE)

- condition
- ☐ Survey measurement for later comparison
  - ☐ Once before mining

observation of tower condition

- condition
- ☐ Survey measurement once following mining

tower conditions as noted by (the owner and operator of the transmission line who are responsible for observational monitoring)

- ☐ and l
- ☐ Docu
- ☐ Infra
- ☐ reme

Fire Roads and 4WD Tracks  
(Fortnightly visual inspection)

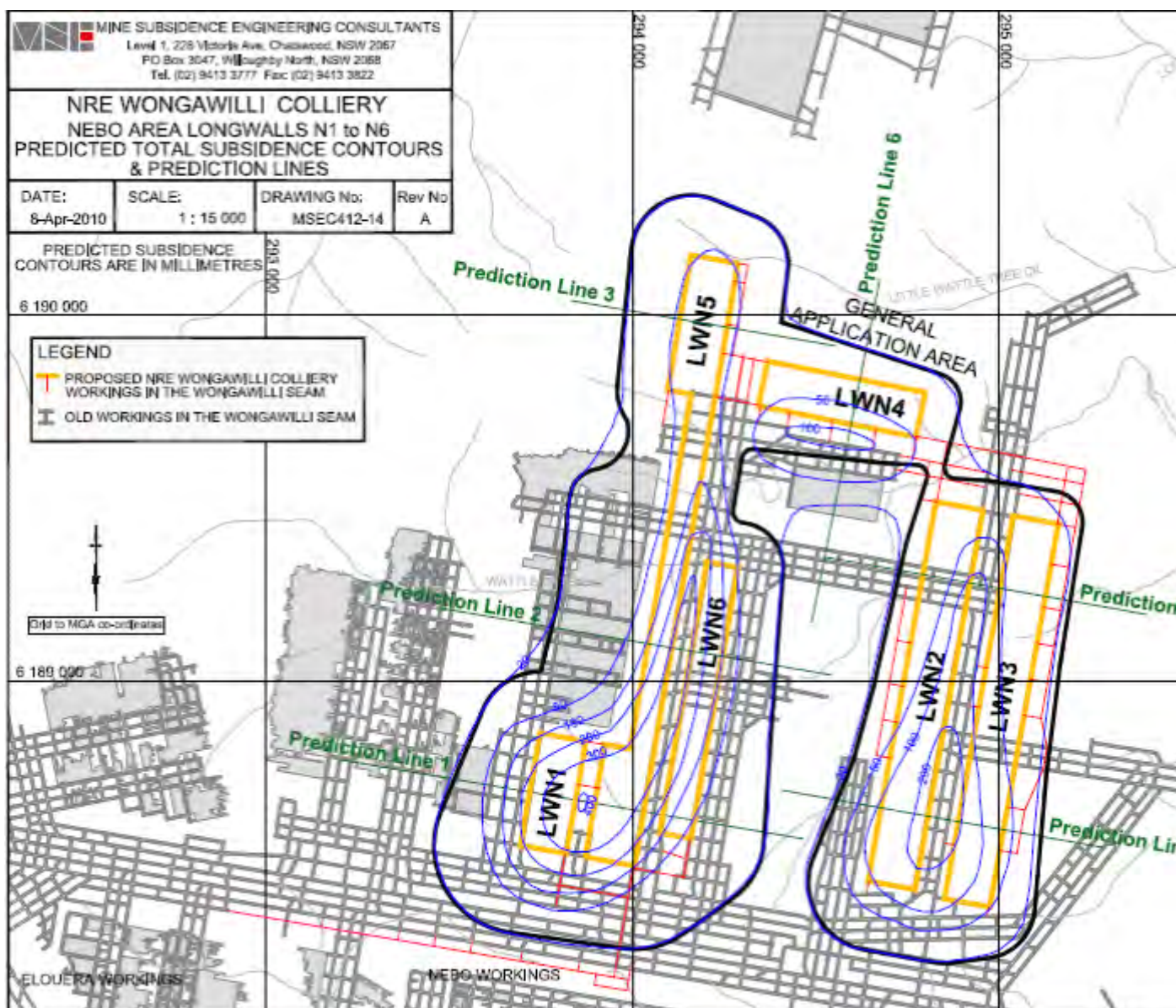
- ☐ Observation of road condition once prior to mining
- ☐ Reported in End of panel reports and AEMR

- ☐ Fortnightly observation of roads, tracks and area within 10m of roads/tracks

- ☐ Monthly observation of roads, tracks and area within 10m of roads/tracks for 6 months post mining
- ☐ reported in End of panel reports and AEMR

- ☐ Minor cracking on roads and tracks (<10mm)
- ☐ Major cracking (>10mm) or traffic impedance

- ☐ Notif
- ☐ photo
- ☐ Notif
- ☐ DoPl
- ☐ Make
- ☐ inclu
- ☐ Prop
- ☐ upon
- ☐ Com
- ☐ from
- ☐ Addi
- ☐ SCA



Upper Cordeaux No.1 and No.2 Reservoir (MSEC 2010)

The distance from the upstream end of the nearest of these dams, that is, the waters of the Upper Cordeaux No. 1 Reservoir, to the nearest proposed longwall is approximately 660 metres from Longwall N3. The Upper Cordeaux No. 1 dam wall is approximately 820 metres from Longwall N3.

The distance from the upstream end of the reservoir of the Upper Cordeaux No. 2 Reservoir, to the nearest proposed longwall is approximately 440 metres from Longwall N3. The Upper Cordeaux No. 2 dam wall is approximately 1.4 kilometres, from Longwall N4.

These are well outside the predicted 20 mm subsidence contour, resulting from the extraction of the proposed longwalls.

Hence, it is unlikely that the proposed extraction of the NRE Longwalls N1 to N6 will cause measurable ground movements at and around the Upper Cordeaux No.1 Dam Wall and the Upper Cordeaux No.2 Dam Wall. It would be unlikely, therefore, that the reservoir would experience any significant systematic subsidence impacts, resulting from the extraction of the proposed longwalls, even if the predictions were increased by factors of 1.25 to 2 times (MSEC 2010).

The Dam safety Committee (DSC) has defined Notification Areas around all prescribed dams and storages, which it considers may be affected by mining. Prior to the commencement of mining within a Notification Area, mining companies must receive the consent of the Minister administering the Mining Act. The DSC advises the Minister on the extent and type of mining to be permitted and on any special conditions which should apply. The north eastern corner of LWN3 falls within the Cordeaux Notification Area and therefore the DSC have been consulted during the mine approval process for the Nebo area.

Many thanks

Regards

Chris



**Chris McEvoy (B. Env. Sci., Dip. Ed.)**

Senior Environmental Scientist

PO Box 12, Macarthur Square, NSW 2560

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**Mob:** 0407 060 163 **Fax:** 02 4017 0071

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## Chris McEvoy

---

**From:** Marlo Vergara <Marlo.Vergara@sca.nsw.gov.au>  
**Sent:** Wednesday, 7 March 2012 4:02 PM  
**To:** Chris McEvoy  
**Cc:** David Clarkson (dclarkson@gujaratnre.com.au)  
**Subject:** RE: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls  
**Attachments:** image002.wmz; image003.gif; image004.png; image005.png; Monitoring Management Summary and Trigger Levels for Nebo LWs 1 to 6.docx

Chris,

Apologies for the delay.

Attached please find SCA Built Features Monitoring Management and TARPS.

Re-33kV: Have not yet received confirmation if it belongs to SCA . Will inform as soon as confirmation is received.

Regards.

### Marlo Vergara | Senior Manager

Mining & Specialist Services | Assets and Major Projects  
SYDNEY CATCHMENT AUTHORITY | [www.sca.nsw.gov.au](http://www.sca.nsw.gov.au)  
Level 4, 2-6 Station Street PENRITH NSW 2750 | PO Box 323 PENRITH NSW 2751  
T: 02 4724 2378 | F: 02 4725 2594 | M: 0425 212 542 | E: [Marlo.Vergara@sca.nsw.gov.au](mailto:Marlo.Vergara@sca.nsw.gov.au)



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**From:** Chris McEvoy [mailto:cmcevoy@niche-eh.com]  
**Sent:** Tuesday, 6 March 2012 11:52 AM  
**To:** Marlo Vergara  
**Cc:** David Clarkson (dclarkson@gujaratnre.com.au)  
**Subject:** FW: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls

Hi Marlo.

Pls see the previous e-mail I sent (below) as just discussed. The MSEC dwg is attached.

Can you pls check if one of the 33kV feeders shown in the application area is a SCA asset-If it is, I assume you will need to review the monitoring and TARP's in the Extraction Plan accordingly.

As per the e-mail below, Endeavour Energy believe it serves the Avon Pump Station.

See the e-mail below.

This is super urgent, as is any comments you have on the Built Features Management Plan in the Draft Extraction Plan previously sent.

We have received the other comments from SCA. If we don't receive your comments by Friday we will have no choice but to submit the Plan to DoPI, as the future mining area will be delayed.

Regards

Chris



**Chris McEvoy (B. Env. Sci., Dip. Ed.)**  
Senior Environmental Scientist

PO Box 12, Macarthur Square, NSW 2560  
cmcevoy@niche-eh.com **Web:** www.niche-eh.com  
**Mob:** 0407 060 163 **Fax:** 02 4017 0071

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**From:** Chris McEvoy  
**Sent:** Thursday, 9 February 2012 6:41 PM  
**To:** marlo.vergara@sca.nsw.gov.au  
**Cc:** Ravi Sundaram <ravi.sundaram@sca.nsw.gov.au> (ravi.sundaram@sca.nsw.gov.au)  
**Subject:** FW: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls

Hi Marlo and Ravi.

We are having trouble identifying who owns one of the 33kV powerlines that runs over the Nebo area.

Endeavour has told us it is not theirs and NRE owns the other one (or soon will, it is an old BHP line).

Can you pls check if it is a SCA asset- if it is, I assume you will need to review the monitoring and TARP's in the Extraction Plan accordingly.

See correspondence below.

Will call to discuss tomorrow.

Regards

Chris



**Chris McEvoy (B. Env. Sci., Dip. Ed.)**  
Senior Environmental Scientist

PO Box 12, Macarthur Square, NSW 2560  
cmcevoy@niche-eh.com **Web:** www.niche-eh.com  
**Mob:** 0407 060 163 **Fax:** 02 4017 0071

---

**From:** Andrew Michielin [mailto:Andrew.Michielin@endeavourenergy.com.au]  
**Sent:** Friday, 3 February 2012 3:27 PM  
**To:** Chris McEvoy  
**Subject:** RE: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls

Chris,

On my screen the feeder is listed as Privately Owned, but given that it serves the Avon Pump Station, it would be more than likely be owned by the Sydney Water Board.

Hope that helps.

Regards,

**Andrew Michielin**  
Transmission Asset Engineer (South)  
**P:** (02) 4252 2616  
**M:** 0478 304135  
[andrew.michielin@endeavourenergy.com.au](mailto:andrew.michielin@endeavourenergy.com.au)  
Cnr Five Islands Rd & Glastonbury Avenue  
Unanderra NSW 2526 AUSTRALIA  
[www.endeavourenergy.com.au](http://www.endeavourenergy.com.au)



---

**From:** Chris McEvoy [mailto:cmcevoy@niche-eh.com]  
**Sent:** Friday, 3 February 2012 3:06 PM  
**To:** Andrew Michielin  
**Subject:** RE: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls

Thanks Andrew.

Do you know whose it is ?

We were told it is owned by Integral Energy (now Endeavour I assume) and supplies power to the Avon pump station?

---

**From:** Andrew Michielin [mailto:Andrew.Michielin@endeavourenergy.com.au]  
**Sent:** Friday, 3 February 2012 2:51 PM  
**To:** Chris McEvoy  
**Cc:** Gary Brennan; Drew Rodwell  
**Subject:** RE: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls

Hi Chris,

In regards to your enquiry below, it has been determined that the 33kV powerlines identified within the subsidence footprint are not Endeavour Energy assets and hence not the responsibility of Endeavour Energy.

The only Endeavour Energy assets on Drawing MSEC412-11 is Feeder 7092/3, highlighted in the attached marked-up drawing, which is outside of the subsidence footprint in any event.

Kind Regards,

**Andrew Michielin**  
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**From:** Chris McEvoy [mailto:cmcevoy@niche-eh.com]  
**Sent:** Monday, 30 January 2012 5:01 PM  
**To:** Gary Brennan  
**Subject:** FW: Monitoring and TARP's for 33kV Powerlines over Nebo Longwalls

Hi Gary

Drew Rodwell has referred you to me as the relevant contact for this enquiry.

As discussed briefly with Drew:

1. Wongawilli Colliery (NRE) has recently received Part 3A Approval for Continuing operations including extraction of Nebo Longwalls N1-N6 (following approval of an Extraction Plan).
2. Wongawilli Colliery is submitting an Extraction Plan to DoPI for Approval to extract Nebo Longwalls N1-N6 prior Christmas. (An Extraction Plan is similar to a Subsidence Management Plan or SMP). Extraction is planned to commence around June 2012 until July 2014.
3. We need to confirm what monitoring and TARP's Endeavour Energy prefer to have included in the Extraction Plan **RE the 33kv power line within the potential subsidence footprint, which cross directly above the north west corner of Longwall N2 and close to the south east corner of N6, that supplies power to the Avon pump station.**

Below I attach some Draft Monitoring Arrangements and TARP's (in red font) for your consideration and discussion after you have reviewed the relevant information below. Could you please give me a call after you have reviewed this so we can finalise the Monitoring Arrangements and TARP's for these items. The Extraction Plan is also attached FYI.

Below, I also attach a Plan of the layout, and extract of the relevant section of the Extraction Plan RE impacts on the powerlines.

If you would also like a hard copy of the Part 3A Application with all technical reports, let me know.

#### Electrical Services- Impact Assessment

There are two 33 kV power lines within the potential subsidence footprint, which cross directly above the north west corner of Longwall N2 and close to the south east corner of N6. One power line is owned by Endeavour Energy and supplies power to the Avon pump station. The other (Line 6-94) is owned by NRE and supplies power to the Nebo #4 Shaft of NRE Colliery.

The maximum predicted subsidence along these power lines is 40mm and the maximum tilt is 0.1 mm/m. The maximum tilt across the power lines is <0.1mm/m.

These predicted subsidence parameters are very small and the probability of impacts to the power lines is negligible. The power lines are supported on timber poles, which are relatively straightforward to repair or adjust if required.

#### Monitoring and Management Summary

| Feature                 | Monitoring Commitments                                  |                                                           |                                                         | TARPS                                                                            |                                     |
|-------------------------|---------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------|
|                         | Prior to Mining                                         | During Mining                                             | Post Mining and Future Monitoring                       | Trigger                                                                          | Response                            |
| 33kV Transmission Lines | <input type="checkbox"/> Observation of tower condition | <input type="checkbox"/> Fortnightly observation of tower | <input type="checkbox"/> Observation of tower condition | <input type="checkbox"/> Observation of unsafe tower conditions as noted by (the | <input type="checkbox"/> Repair and |

(Owned by Integral and NRE)

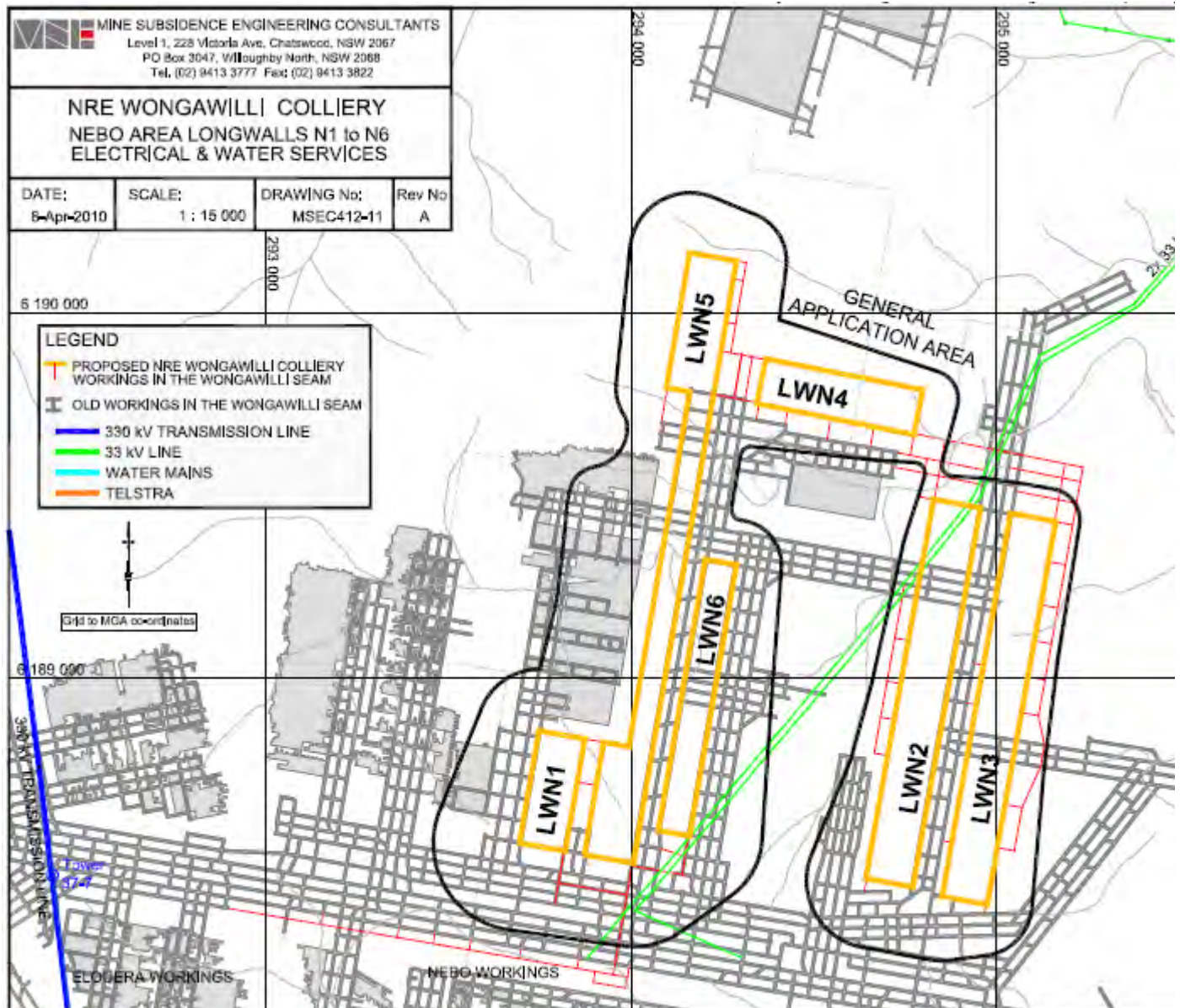
- ☐ Survey measurement for later comparison
- ☐ Once before mining

condition

- ☐ Survey measurement once following mining

owner and operator of the transmission line who are responsible for observational monitoring)

- ☐ Docu
- ☐ Infra
- reme



Many Thanks

Regards

Chris

**niche**  
Environment and Heritage

**Chris McEvoy (B. Env. Sci., Dip. Ed.)**

Senior Environmental Scientist

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## Trigger Levels

Survey and monitoring results are regularly reviewed by SCA between the Mining and Infrastructure and Survey Groups, and during regular meetings with the mining company. At such meetings, the measured parameters are reviewed in terms of their historic behaviour. Trends and magnitude of movements are assessed as to their likely impacts on the SCA infrastructure.

Where any unusual displacements, changes in monitored behaviours, and movements exceeding the trigger levels are detected in the field, or during the acquisition and processing of data, the SCA (Senior Manager Asset Capability and Senior Manager Mining), and Dams Safety Committee shall be advised accordingly.

The following procedures shall be observed for the specific trigger levels applicable to monitoring in the vicinity of Upper Cordeaux No. 1 and 2 Dams and its associated surface infrastructures including the stored waters. It should be noted that some trigger levels are less than survey tolerance. If a trigger is exceeded, but is within survey tolerance, a resurvey should be considered to confirm actual movements.

| Infrastructure (& Responsible Authority) | Predicted Subsidence Impacts                                                                                                                                                                                              | Survey and Inspection Frequency                                                          | Trigger Level                                                                                                                                                                                                                                                                                                                                                                                                                    | Preventative or Remedial Measures                                                                                                                                                                                                                                         |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cordeaux Dam (SCA)                       | <ul style="list-style-type: none"> <li>Subsidence and regional horizontal movements would be negligible.</li> </ul>                                                                                                       | <ul style="list-style-type: none"> <li></li> </ul>                                       | <ul style="list-style-type: none"> <li></li> </ul>                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>No action required.</li> </ul>                                                                                                                                                                                                     |
| Upper Cordeaux No 1 and 2 Dams. (SCA)    | <ul style="list-style-type: none"> <li>Subsidence &lt; 1mm</li> <li>Upsidence = 1mm</li> <li>Differential far-field horizontal movement = 1mm.</li> <li>Closure = 1mm</li> </ul> <p>Check against MSEC prediction!!!!</p> | <ul style="list-style-type: none"> <li>6-monthly survey and visual inspection</li> </ul> | <ul style="list-style-type: none"> <li>&gt;10mm change in RL</li> <li>&gt;10mm Upsidence or &gt;2mm differential vertical movement between any 2 adjacent marks</li> <li>&gt;20mm horizontal movement or &gt;2mm differential horizontal movement between any 2 adjacent marks</li> <li>&gt;2mm Closure between readings</li> <li>Crack Widths &gt;3mm differential movement in 3 dimension (Upper Cordeaux No.2 Dam)</li> </ul> | <ul style="list-style-type: none"> <li>Liaise with the SCA. Notify SCA of any unusual movement</li> <li>Monitor any movements of the dam, in accordance with the survey monitoring plan and the DSC management plans.</li> <li>6-Monthly 3-D Crack Monitoring.</li> </ul> |

| <b>Infrastructure (&amp; Responsible Authority)</b> | <b>Predicted Subsidence Impacts</b>                                                                                                                                                                          | <b>Survey and Inspection Frequency</b>                                                   | <b>Trigger Level</b>                                                                                              | <b>Preventative or Remedial Measures</b>                                                                                                                                                                                                                                |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stored Waters in Cordeaux Reservoir (SCA)           | <ul style="list-style-type: none"> <li>• Max. subsidence of lake foreshore = &lt;5mm.</li> <li>• regional horizontal movement= ? mm</li> <li>• Potential for water losses from Cordeaux Reservoir</li> </ul> | <ul style="list-style-type: none"> <li>• 6-monthly survey of lake foreshores</li> </ul>  | <ul style="list-style-type: none"> <li>• &gt;20mm change in RL</li> <li>• &gt;20mm horizontal movement</li> </ul> | <ul style="list-style-type: none"> <li>• Liaise with the SCA and develop appropriate strategies and management plans.</li> <li>• Preparation of Contingency and Closure Plans, including Triggered Action Response Plans (TARPs).</li> </ul>                            |
| SCA Fire Trails and 4WD Tracks                      | <ul style="list-style-type: none"> <li>• Potential Subsidence impact</li> </ul>                                                                                                                              | <ul style="list-style-type: none"> <li>• Inspection by SCA Catchment Officers</li> </ul> | <ul style="list-style-type: none"> <li>• Damage to tracks and trails</li> </ul>                                   | <ul style="list-style-type: none"> <li>• Liaise with the asset owners.</li> <li>• Conduct initial dilapidation survey and monitor condition of road as mining occurs.</li> <li>• Repair and/or minor regrading as appropriate and necessary as mining occurs</li> </ul> |

Note: A Master Agreement between SCA and GNRE is required to be set up to recompense SCA for any damages to infrastructure and catchment as well as disruption to water supply caused by GNRE's mining activities at NRE's Wongawilli Coal Project.

Marlo Vergara  
07 March 2012