METROPOLITAN COAL
CONSTRUCTION MANAGEMENT PLAN

SURFACE WORKS ASSESSMENT FORM

NSW WATER PIEZOMETER BOREHOLES

November 2015

Metropolitan Coal

Proposed Installation of Deep Groundwater Piezometer Boreholes

Background

WaterNSW (formerly Sydney Catchment Authority) requested at a meeting on 5 June 2015 for shallow groundwater profiling between Woronora Reservoir and the ridge to the east of the reservoir. Metropolitan Coal currently has several shallow and deep monitoring sites along the ridge, but none closer to the reservoir.

WaterNSW nominated five potential drilling sites along Fire Road 9I at approximate northing 6217200 (MGA).

The recommended sites by WaterNSW pass approximately through the middle of the straight north-south stretches of track.

The subject Surface Works Assessment Form seeks endorsement for the installation of boreholes containing single piezometers to obtain monitoring data adjacent to the reservoir. The data will be downloaded monthly as required by the Metropolitan Coal Water Management Plan.

The proposed construction and environmental management works outlined in this Surface Works Assessment Form append the general management measures as outlined in Metropolitan Coal's Construction Management Plan as approved by the Department of Planning & Environment in August 2015

Metropolitan Coal proposes to install piezometer boreholes within the Approved Project Area on land managed by WaterNSW .

SCA Land Piezometer sites:

- T1
- T2
- T3
- T4
- T5

The sites are all located within the Woronora Special Area in the local government area (LGA) of Wollongong City Council. The Woronora Special Area covers a region of approximately 75 square kilometres (km^2) and includes the catchment of Woronora Dam. WaterNSW manages the Woronora Special Area and public access is restricted.

The proposed activities are situated within the Metropolitan Coal mining lease (Consolidated Coal Lease (CCL) 703). The township of Helensburgh is located approximately 5 km to the east.

Boreholes will have a diameter of approximately 100 millimetres (mm) and will be drilled using a track mounted rig and rod handler. Boreholes would be open holed drilled to depths ranging from 21 to 89 metres.

Water Management and Cuttings Containment:

Drilling will occur during forecast dry weather wherever practicable. Water will be the preferred method to clear the drill cuttings. Drill cuttings would be deposited into above ground recirculation tubs and transported off-site for disposal. Tubs will be covered during rain periods to prevent the system from overflowing. 1x 1,000 and 1x 10,000 litre tanks will be situated on site, the former to hold freshwater for drilling and the latter will be empty to contain any water that might arise from the bores hitting artesian strata.

The following chemical, used in previous drilling operations in the catchment will be used to prevent swelling clays, assist in the suspension of solids in the borehole, assist in sediment settlement acceleration, assist in water recirculation loss and associated lubricants used in the drilling process. MSDS are attached:

- KCl
- Liplex EP2
- Thread Grease
- Super Foam
- FS2000
- PAC HV
- Aust Plug
- Gyp Set
- CR-650

Borehole Casing:

A PVC collar will be grouted to approximately three metres in depth. The remainder of the bore will be left open and a lockable monument will cover the collar to prevent vandalism.

Installation and Operation of Equipment:

Water level pressure sensors measuring electrical conductivity, temperature and pressure will be installed in each borehole for water level monitoring, with data downloaded on a monthly basis

Site Rehabilitation:

The sites will be rehabilitated at the cessation of their use in accordance with Metropolitan Coal's Rehabilitation Management Plan.

Fuel Management:

Equipment (e.g. drill rigs, pumps) will be regularly inspected for leaks of oil/fuel/coolant. Impervious bunding will be provided with greater than 110% of the capacity of the item being bunded. Spill containment/treatment resources (i.e. spill kits) will be provided and personnel will be trained in their use. The spill kits will include: absorbent material 40 L bag of Organic Oil/Fuel absorbent; absorbent pads: 20 of 480 X 430 mm pads; garbage bags; shovel; and a bag of rags.

Any spill that occurs will be immediately cleaned up and reported to:

- the site supervisor;
- the MCPL Manager – Safety & Environmental Services; and
- WaterNSW (via the incident Management Number 1800 061 069).

The site supervisor and the MCPL Manager – Safety & Environmental Services will investigate any spills.

8. Human Waste Water:

A portable toilet will be moved to each drill site. The toilet will be serviced fortnightly with a vacuum truck.

Construction Management Plan

Surface Works Assessment Form

Note, this form must be completed in full prior to the commencement of surface disturbance works

Date: 16 November 2015

Name and position: Stephen Love (Environment and Community Coordinator), Patrick Brienen (Environment and Projects Advisor)

Register number (i.e. Number 1, 2, etc.): 10

RMP register number: 6-21, 6-22, 6-23, 6-24, 6-25

Site name:

T1
T2
T3
T4
T5

Site type: Deep Groundwater Piezometers

Site co-ordinates (easting/northing):

T1	312038 6217167
T2	312092 6217199
T3	312189 6217246
T4	312273 6217312
T5	312408 6217377

Expected duration of works: 18 weeks (weather permitting)

Works schedule:

- Describe the activities (including timing) to be conducted during construction works.

- Personnel training and awareness - prior to commencement of activities.
- Establishment and implementation of pre-construction management measures (e.g. erosion and sediment controls, vegetation clearance) - approximately one day.
- Drilling of Boreholes (approximately 2 days per site)
- Installation of Piezometers
- Monitoring during construction - prior to, and following daily construction activities.
- Site clean-up (e.g. removal of equipment, materials and waste) - approximately half a day.
- Monitoring at completion of construction.

Review of baseline information - site features (refer Section 5 of the ConMP)

Are any of the following features located within the proposed disturbance area or immediate surrounds?

Are there occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils EEC in the general area? **No**

Are there occurrences of the O'Hares Creek Shale Forest EEC in the general area? **No**

Are upland swamps located in the general area? **No**

Are there records of known threatened flora species in the general area? **No**

Are there records of known threatened fauna species in the general area? **No**

Are existing (or proposed) monitoring sites located nearby? **No**

What vegetation type is present?

Drill Site	Vegetation Community (NPWS, 2003)		Rare or Threatened Species
	Map Unit	Community Name	
T1	MU25	Sandstone Gully Apple-Peppermint Forest	Nil
T2	MU25	Sandstone Gully Apple-Peppermint Forest	Nil
T3	MU29	Exposed Sandstone Scribbly Gum Woodland	Nil
T4	MU25	Sandstone Gully Apple-Peppermint Forest	*Darwinia diminuta*
	MU29	Exposed Sandstone Scribbly Gum Woodland	
T5	MU25	Sandstone Gully Apple-Peppermint Forest	Nil

Are known Aboriginal heritage sites present? **No**

Is this an area in which disturbance is to be avoided and/or limited? (refer Sections 6.1.1 and 6.1.2 of the ConMP) **No**

- Southern Sydney Sheltered Forest on Transitional Sandstone Soils EEC
- O'Hares Creek Shale Forest EEC
- Upland swamps
- Environmental monitoring sites

If the proposed disturbance area is located in an area to be avoided or limited, relocate site where appropriate in accordance with the requirements of the ConMP

Threatened flora survey (refer Section 6.1.3 of the ConMP)

Date of survey for threatened flora. 13 November 2015

Name of suitably qualified ecologist conducting survey.

Colin Bower

Have any threatened flora been identified within the proposed disturbance area or immediate surrounds.	**No**
Scientific names of threatened flora species recorded.	**NA**
Will works be relocated to avoid or minimise impacts on the threatened flora species?	**NA**
If it is not feasible to relocate the works, have the impacts of the proposed works on the population of the threatened flora species been assessed by a suitably qualified and experienced ecologist?	**NA**

If No, do not proceed

Has the assessment concluded that the proposed surface activities are likely to have a significant impact on a population of the threatened flora species?	**No**

If Yes, the proposed works are to be modified to avoid such an outcome

[Attach any relevant ecological reports to this assessment form]

Flora survey report attached.

Vegetation clearance and site access (refer Section 6.1.6 of ConMP)

Is vegetation clearing required for the construction works? If yes, describe extent (e.g. m^2) and method of clearing (e.g. slashing/lopping branches/removal)? **Yes**

Vegetation disturbance will be kept to a minimum, each site will be approximately 25m^2 in area. Vegetation disturbance/clearing will be limited to the removal of saplings or slashing of vegetation. Where slashing of vegetation is required, soil disturbance will be minimized by cutting the vegetation at ground level and leaving the lower stem and roots in-situ to maximize the potential for natural regrowth. The removal of saplings, slashing of vegetation or lopping of branches will be conducted only where necessary. Lopped branches will be placed in a random pattern to brush matt areas of disturbance.

Describe the access requirements for the construction site (e.g. vehicle/pedestrian/helicopter) and where the access will be from (e.g. which fire road).

Existing powerline easement, seismic survey lines, and catchment access roads will be used for siting/delivery of equipment and for access to sites.

Site	Access
T1	Fire Road 9I
T2	Fire Road 9I
T3	Fire Road 9I
T4	Fire Road 9I
T5	Fire Road 9I

Is vegetation clearing required for site access? If yes, describe the extent and method of clearing? **Yes**

The potential of trimming branches that may impact the mast of the drill rig.

Vegetation management measures to be implemented (refer Section 6.1.4 of the ConMP)

Disturbance would be appropriately limited by the following mitigation measures:

- Particular care would be taken to avoid disturbance to native vegetation.
- Equipment will be transported to the construction site by hand and helicopter to prevent impacts to vegetation from vehicles.
- Existing fire trails, tracks and exposed bedrock will be used for access and placement of equipment.
- There will be no access through, or vegetation clearance within upland swamps.
- No removal, lopping or slashing of vegetation for access to the construction site is required, although lopping of branches may be required.
- Vegetation disturbance at each site would be kept to the minimum necessary.

Site Layout Plan (refer Section 6.1.5 of ConMP)

Has a Site Layout Plan been prepared and attached to the Works Assessment Form? **Yes**

Have the following been indicated on the Site Layout Plan? **Yes**

- Site location

- Works design

- Management measures (e.g. erosion and sediment controls, spill kits)

- Access track/s (indicate type of access, e.g. pedestrian/vehicle. Also indicate location of nearest fire trail where access will be from)

- Areas of vegetation clearance

- Location of equipment (e.g. pump, generator, fuel storage, portable toilets)

- Equipment storage areas

- Safety equipment (e.g. fire extinguisher and first aid kit)

Attach photographs, where appropriate

Description of Photographs:

General Site Location of Bores

Aboriginal heritage pre-clearance survey (refer Section 6.2 of the ConMP)

Date of pre-clearance survey for Aboriginal heritage sites.

T1 T2, T3, T4 and T5 – 11 November 2015

Name of survey attendees.

Renee Regal- Niche Environment and heritage

Are any Aboriginal heritage sites identified within the proposed disturbance area or immediate surrounds? **No**

Description of recorded Aboriginal heritage sites. **N/A**

Will works be relocated to avoid impacts on the Aboriginal heritage site? **N/A**

If it is not feasible to relocate the works to avoid impacts to the Aboriginal heritage site, management and/or mitigation measures to be implemented in accordance with the Metropolitan Mine Heritage Management Plan. Describe measures below.

N/A

Where avoidance is not practicable, has a comprehensive baseline record been obtained and salvage considered in consultation with Aboriginal stakeholders prior to disturbance.

N/A

[Attach any relevant archaeological reports to this assessment form]

Aboriginal heritage preclearance survey report attached.

Known Aboriginal heritage sites located close to surface disturbance works

Details of demarcation (e.g. fencing, sign-posting or temporary flagging) implemented to avoid accidental damage to known Aboriginal heritage sites located close to surface disturbance works.

N/A

Erosion or sediment control measures required?

- Is any erosion or sediment control required? **Yes**
- If yes, has an Erosion and Sediment Control Plan been prepared and attached to the Surface Works Assessment Form? **Yes**

Fuel and spill management measures required?

- Are compressors and pumps bunded and with sufficient capacity? **Yes**
- Where fuels are used, are spill kits available at the construction site? **Yes**
- Have personnel been trained in spill clean-up procedures? **Yes**

List Hazardous Materials and Storage Requirements

- What hazardous materials are required to be used and how will they be stored on site?

Diesel Fuel
Unleaded Fuel

Large quantities of fuel will not be stored on site. Fuel will be transported in a closed purpose built 400 litre fuel tank secured in a 4 wheel drive vehicle. Re-fuelling will be conducted using a low voltage electric pump and bowser. Care will be taken not to spill fuel. Oil/fuel absorbent materials or other containment materials will be made available at the site to prevent contact with the surrounding environment.

Unleaded fuel for pumps will be stored in 10 litre containers and stored in a bunded area

- Are Materials Safety Data Sheets (MSDS) for hazardous materials located at the construction site? **Yes**

Bushfire Preparedness and Management

- Have HCPL staff and contractors been provided with fire awareness and fire safety training? **Yes**
- Has a Hot Work Permit been obtained from the SCA if required? **Yes**

As the Bushfire season has commenced, a Hot Work Permit will be used for any work that involves high temperatures and fire risk. This includes the use of chainsaws and other equipment associated with vegetation management. Metropolitan Coal will use the following measures when conducting any hot work:

- Presence of 2X 16L Firefighting knapsack and a 9L fire extinguisher
- No works will be carried out on a Total Fire Ban day
- A dedicated fire observer will be present at all times during works
- An SCA hot works form will be completed before works commence each day

Figure 1 Site Layout Plan

Figure 2 Site T1

Figure 3 Site T2

Figure 4 Site T3

Figure Site T4

Figure Site T5

Erosion and Sediment Control Plan

Correct location, design of the work site and work practices will minimise the risk of erosion at each of the sites. Effectively managing this issue will be achieved by carrying out the following:

- Minimise the disturbance area of the access trails and work site, this will accordingly reduce the likelihood and severity of erosion needing to be controlled
- Slashing or vegetation disturbance will be conducted following the strategies listed in the vegetation management section above;
- Correct aspect and site location. The sites have been selected in appropriate areas that will minimise the risk of erosion ie flat sites, not on hard rock;
- Sediment control will be managed in accordance with the Blue Book (Volume 1 and Volume 2E), including the installation of sediment fences as per the standard drawing 6-8 of the Blue Book Volume 1;
- Whilst drilling is being conducted, the collar of the drill hole will have a t section installed to allow sediment to be deposited directly into a baffled tank for collection. Cuttings will be removed at the half way point of each drilling program and then again upon completion of the bore;
- All workers will be trained in the appropriate work practices and the drilling operation will be constantly manned whilst in operation.

Attachment 1

Threatened Flora Survey (FloraSearch)

FLORASEARCH

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Telephone: 02 6369 0252
Mobile: 0428 263 274
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Patrick Brienen
Helensburgh Coal Pty. Ltd.
PO Box 402
Helensburgh NSW 2508

14 November 2015

Dear Patrick,

Re: Proposed Groundwater Bores - Threatened Flora Survey

Under the approved Metropolitan Coal Biodiversity Management Plan (BMP), it is required that surveys for threatened flora species, populations, ecological communities and critical habitat are carried out prior to surface works that would disturb native vegetation. Metropolitan Coal proposes to install five groundwater bores in the cleared and mown road verge along Fire Road 9I in the catchment of Woronora Dam (Figure 1). No clearance of undisturbed native bushland is proposed. Only native vegetation regrowth following mowing would be affected at the drill sites and in the immediate vicinity where equipment may be placed and vehicles parked. FloraSearch was commissioned to inspect the proposed drill sites for the presence of threatened flora and prepare this impact assessment report.

The inspections aimed to:

- Determine if any flora species, populations, ecological communities or critical habitat listed as threatened under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are present on or adjacent to the proposed groundwater bore sites. Flora species listed as rare in the *Rare or Threatened Australian Plants* (ROTAP) database (Briggs and Leigh 1996) were also targeted.

- Assess the impact of the proposed disturbance on listed flora species, populations, communities or critical habitat that may be present.

- Recommend strategies to avoid or minimise harm if any listed flora species, populations, communities or critical habitat are present.

SURVEY LOCATIONS AND TIMING

FloraSearch inspected the proposed drill sites and their immediate surrounds (Figure 1) on 13 November 2015:

PREVIOUS FLORA SURVEY

Bangalay Botanical Surveys (2008) (BBS) surveyed the flora and mapped the vegetation communities of the subject area as part of the flora survey and assessment for the Metropolitan Coal Project (Figure 2). The BBS survey mapped the presence of two vegetation communities in the vicinity of the proposed groundwater bore sites (Table 1):

Figure 1. Locations of Proposed Groundwater Bore Sites.

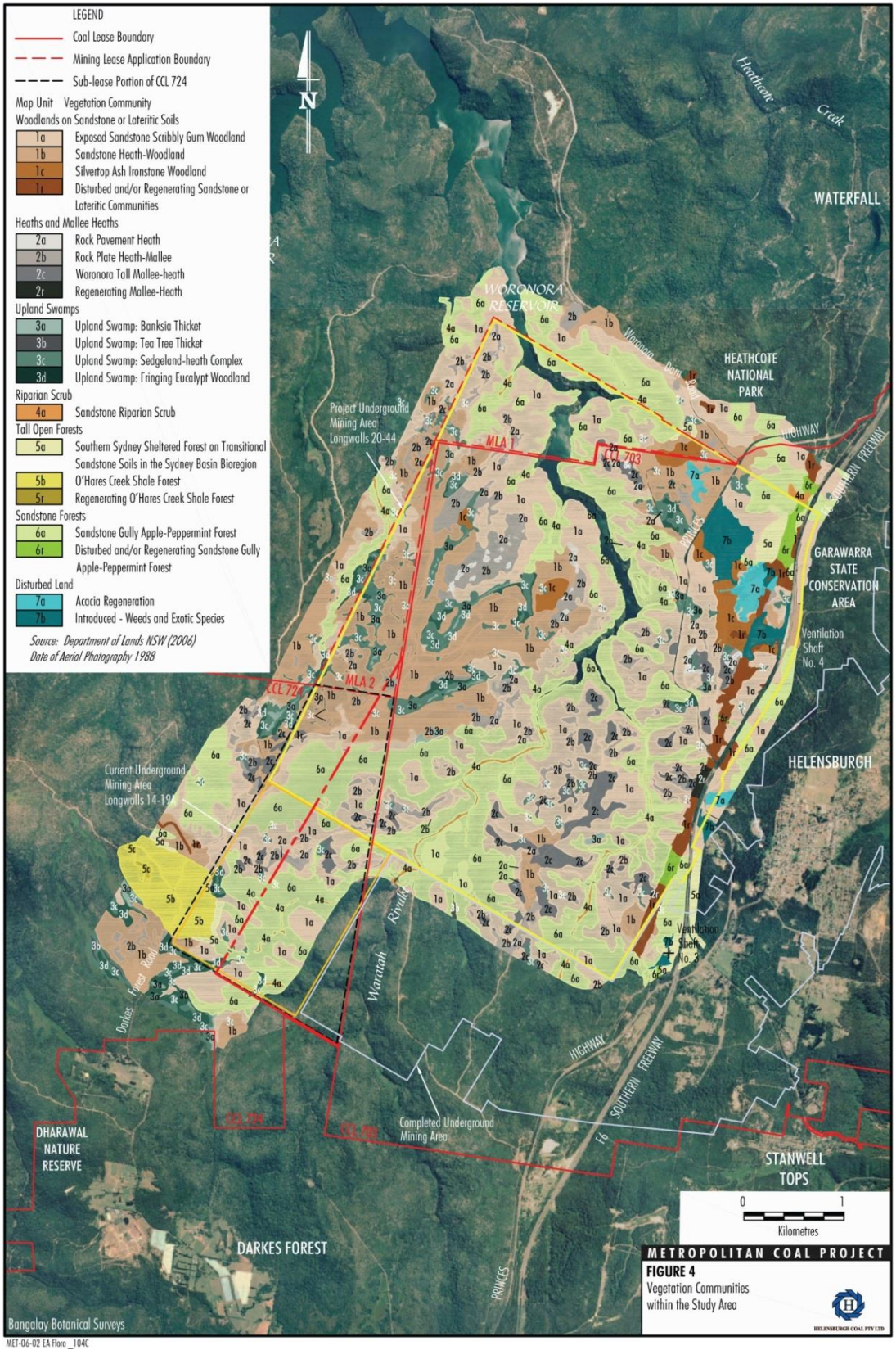

Figure 2. Vegetation Communities of the Metropolitan Coal Project Area (Bangalay Botanical Surveys, 2008).

Table 1.
Vegetation Communities Mapped by Bangalay Botanical Surveys (2008)
at the Proposed Groundwater Bore Sites

Drill Site	Community No.	Community Name
T1	6a	Sandstone Gully Apple – Peppermint Forest
T2	6a	Sandstone Gully Apple – Peppermint Forest
T3	1a	Exposed Sandstone Scribbly Gum Woodland
T4	1a	Exposed Sandstone Scribbly Gum Woodland
T5	6a	Sandstone Gully Apple – Peppermint Forest

The BBS survey also identified a range of threatened flora species and ecological communities with potential to occur on the Metropolitan Coal Project area.

POTENTIAL THREATENED FLORA

The following sections list the threatened flora species, populations, ecological communities and critical habitat that may potentially occur on the disturbance areas for the proposed groundwater bores as identified by BBS (2008). These entities were targeted by this survey.

Threatened species

Threatened flora species that are considered most likely to occur were those found in the baseline flora survey completed over the mining lease (BBS, 2008) and include Prickly Bush Pea (*Pultenaea aristata*), Thick-leaf Star-hair (*Astrotricha crassifolia*), Bynoes Wattle (*Acacia bynoeana*) and Deanes Paperbark (*Melaleuca deanei*) (BBS, 2008) (Table 2). *Acacia baueri* subsp. *baueri* has been found subsequently by Eco Logical Australia Ltd.

Table 2.
Threatened Flora Species with Potential to Occur on the Proposed Groundwater Bore Sites.

Scientific Name	Common Name	Known to Occur	Conservation Status	
			TSC Act	EPBC Act
Acacia baueri subsp. *aspera*	-	✓	V[1]	-
Acacia bynoeana	Bynoe's Wattle	✓	E[1]	V
Astrotricha crassifolia	Thick-leaf Star-hair	✓	V	V
Caladenia tessellata	Tesselated Spider Orchid	-	E	V
Cryptostylis hunteriana	Leafless Tongue Orchid	-	V	V
Eucalyptus camfieldii	Camfield's Stringybark	-	V	V
Genoplesium baueri	Bauer's Midge Orchid	-	V	-
Leucopogon exolasius	Woronora Beard-heath	-	V	V
Melaleuca deanei	Deane's Paperbark	✓	V	V
Persoonia mollis subsp. *maxima*	-	-	E	E
Prasophyllum affine	Jervis Bay Leek Orchid	-	E	E
Pultenaea aristata	Prickly Bush-pea	✓	V	V

[1] E = Endangered, V = Vulnerable

ROTAP species

Ten rare species listed in the ROTAP database (Briggs and Leigh, 1995) may potentially occur on the study sites (Table 3). All these species have been recorded in surveys in the Metropolitan Colliery lease area (BBS, 2008) and consequently have a high potential to occur on the study sites.

Table 3.
ROTAP Flora Species with Potential to Occur on the Proposed Groundwater Bore Sites.

Scientific Name	Common Name	Known to Occur	Risk Code[1]
Boronia serrulata	Native Rose	✓	2RC-
Darwinia diminuta	Small-flower Darwinia	✓	2RC-
Darwinia grandiflora	Prostrate Darwinia	✓	2RC-
Eucalyptus apiculata	Narrow-leaved Mallee Ash	✓	3RC-
Eucalyptus luehmanniana	Yellow Top Mallee Ash	✓	2RCa
Grevillea longifolia	Long-leaved Grevillea	✓	2RC-
Hibbertia nitida	Shining Guinea Flower	✓	2RC-
Lomandra fluviatilis	Cascade Mat-rush	✓	3RCa
Monotoca ledifolia	A Broom-heath	✓	3RC-
Tetratheca neglecta	Neglected Tetratheca	✓	3RC-

[1] 2 = Geographic range in Australia less than 100 km
3 = Geographic range in Australia greater than 100 km
R = Rare: Taxon which is rare in Australia, but which currently does not have any identifiable threat.
C = Conserved: The taxon is reserved in a conservation reserve.
- = Reserved population size is not accurately known.
a = 1000 or more plants are known to occur within a conservation reserve.

Threatened populations

No threatened flora populations are listed under the TSC or EPBC Acts for the study sites or immediate surrounds.

Threatened Ecological Communities

Three endangered ecological communities (EECs) have been recorded in the region around the study sites as follows:

1. *Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion* EEC,

2. *O'Hares Creek Shale Forest* EEC and,

3. *Coastal Upland Swamp in the Sydney Basin Bioregion* EEC.

None of these EECs is known to occur in the immediate vicinity of any of the proposed groundwater bore sites (Figure 2).

Critical Flora Habitat

No critical flora habitat has been declared under the TSC Act or the EPBC Act in the region of the study area.

METHODS

At each proposed groundwater bore site a list was made of the dominant tree and shrub species in the immediate surrounds in order to classify the vegetation communities present (Attachment A). A complete list was also made of the flora species on the disturbance areas (Attachment A). A detailed targeted search was undertaken of each site for threatened flora species that may potentially occur there (Tables 2 and 3).

Disturbance of native vegetation beyond the mown verge on either side of Fire Road 9I is not necessary for installation of the bore sites. Both sides of the road were inspected to determine whether any threatened or rare flora species occur within the mown verge or on the edges of the adjacent undisturbed bushland.

RESULTS AND DISCUSSION

Threatened Flora

The results of the inspections are summarised in Table 4.

Table 4
Vegetation Communities and Rare or Threatened Species on each Drill Site

Drill Site	Vegetation Community (NPWS, 2003)		Rare or Threatened Species
	Map Unit	Community Name	
T1	MU25	Sandstone Gully Apple-Peppermint Forest	Nil
T2	MU25	Sandstone Gully Apple-Peppermint Forest	Nil
T3	MU29	Exposed Sandstone Scribbly Gum Woodland	Nil
T4	MU25	Sandstone Gully Apple-Peppermint Forest	*Darwinia diminuta*
	MU29	Exposed Sandstone Scribbly Gum Woodland	
T5	MU25	Sandstone Gully Apple-Peppermint Forest	Nil

Two vegetation communities were found on the study areas (Table 4); Sandstone Gully Apple-Peppermint Forest occurs on the steeper slopes and gullies, while Exposed Sandstone Scribbly Gum Woodland occupies flatter terrain and ridgetops. Neither of the vegetation communities is listed as threatened. Drill site T4 coincided with an ecotone between the two vegetation types (Table 4).

No flora species listed as threatened under the TSC Act or the EPBC Act was found on the study areas. One flora species, a Darwinia (*D. diminuta*), listed as rare in the ROTAP database (Table 4), was found adjacent to site T4. It is unlikely to be affected by the establishment of the bore site. It would only be at risk if vehicles or equipment entered the bushland. All vehicles and equipment would be confined to the roadside verge, such that *D. diminuta* would not be affected.

Vegetation Floristics and Condition

The five proposed drill sites occur in close proximity to each other on the same west facing slope above Woronora Dam. Accordingly, the vegetation of each site is closely similar. Attachment A lists the dominant tree and shrub species on and around each proposed drill site, and lists the groundcover species in the mown road verge. Many of the groundcovers are shrubs that regenerate between bouts of mowing.

The dominant trees adjacent to the drill sites are Sydney Red Gum (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Red Bloodwood (*Corymbia gummifera*), Broad-leaved Scribbly Gum (*Eucalyptus haemastoma*) and Silvertop Ash (*Eucalyptus sieberi*). A dense mid-layer of tall shrubs is present, comprising Heath-leaved Banksia (*Banksia ericifolia*), Old Man Banksia (*Banksia serrata*), Hairpin Banksia (*Banksia spinulosa*), Yellow Tea-tree (*Leptospermum polygalifolium*), Pink Tea-tree (*Leptospermum squarrosum*), Stiff Tea-tree (*Leptospermum arachnoides*), Pink Kunzea (*Kunzea capitata*), Black She-oak (*Allocasuarina littoralis*), Needlebush (*Hakea sericea*), Dagger Hakea (*Hakea teretifolia*), Woolly Hakea (*Hakea gibbosa*), Broad-leaved Hakea (*Hakea dactyloides*), Sydney Golden Wattle (*Acacia longifolia*), White Wattle (*Acacia linifolia*), Sweet-scented Wattle (*Acacia suaveolens*), Fine-leaf Bush-pea (*Pultenaea stipularis*), *Pultenaea tuberculata*, Christmas Bush (*Ceratopetalum gummiferum*). Common Hop-bush (*Dodonaea triquetra*), Pine-leaved Geebung (*Persoonia pinifolius*), Grey Spider Flower (*Grevillea sphacelata*) *Grevillea diffusa* and Woollsia (*Woollsia pungens*), Also prominent are the Gymea Lily (*Doryanthes excelsa*) and Curly Wig (*Caustis flexuosa*).

The ground cover on the drill sites is determined by the nature of the substrate, whether it is shaded and moisture levels in the soil. Regular mowing allows many small herbs, grasses and sedges to thrive by removing competition from shrubs. However, some shrubs adapt well to mowing, especially Tick Bush (*Kunzea ambigua*), which is much more common on the road verges than it is in the surrounding unmown bushland. Other common species on the verges include; Coral Heath (*Epacris microphylla*), Woollsia (*Woollsia pungens*), Thyme Spurge (*Phyllanthus hirtellus*), Purple Dampiera (*Dampiera stricta*), Narrow-leaf Trigger Plant (*Stylidium lineare*), Mitre Weed (*Mitrasacme polymorpha*), Small Flannel Flower (*Actinotus minor*), Thin Sword-sedge (*Lepidosperma filiforme*), Slender Yellow-eye (*Xyris gracilis*), *Micrantheum ericoides*, Narrow-leaf Platysace (*Platysace linearifolia*), Silky Purple-flag (*Patersonia sericea*), Star Cudweed (*Euchiton involucratus*), Creeping Raspwort (*Gonocarpus micranthus*), Slender Onion Orchid (*Microtis parviflora*), a Rush (*Cyathochaeta diandra*), Wiry Panic (*Entolasia stricta*), Heath Bog-rush (*Schoenus ericetorum*), Twisted Mat-rush (*Lomandra obliqua*), Screw Fern (*Lindsaea linearis*), Swamp Selaginella (*Selaginella uliginosa*), Wattle Mat-rush (*Lomandra filiformis subsp. filiformis*), Slender Stackhousia (*Stackhousia viminea*), Slender Wire-lily (*Laxmannia gracilis*), Brown's Lovegrass (*Eragrostis brownii*), Spreading Nut-heads (*Epaltes australis*) and a Rush (*Lepyrodia scariosa*),

The whole area is dominated by native flora species with only a few introduced species confined to the areas disturbed by the road. Introduced species include; Common Centaury (*Centaurium erythraea*), Spear Thistle (*Cirsium vulgare*), *Juncus articulatus*, Flatweed (*Hypochaeris radicata*) and Purple Cudweed (*Gamochaeta purpurea*).

The vegetation condition is considered to be excellent.

IMPACT ASSESSMENT

Potential Impacts

The proposed activities would result in some loss of native vegetation and damage to plants as follows:

- There would be a small loss of native vegetation around the bore hole itself in an area of up to five m^2. Most of this is expected to regenerate rapidly after the site is vacated.

- Other damage to vegetation would result from vehicle parking and equipment placement on the track verges through which occasional plants may be killed by crushing. However, this is expected to affect a very small part of the overall population of each species and recovery would occur after completion of the activity.

- No loss or damage to trees is expected.

Minimisation of Impacts

A number of strategies would be employed by Metropolitan Coal to minimise the adverse impacts of the proposed activities on flora including;

- The proposed activities are considered unlikely to adversely impact on threatened flora since no threatened ecological communities, flora species, populations, or critical habitat listed under the NSW *Threatened Species Conservation Act 1995* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were located on the proposed groundwater bore sites.

- No trees would be removed on any sites.

- Vegetation disturbance on all sites would be kept to the minimum necessary. No damage to the adjoining bushland would occur sincel disturbance would be confined to road verges.

- All sites would be stabilised and rehabilitated to as close to their original condition as practicable upon completion of work.

CONCLUSIONS

It is concluded that;

1. The works associated with the proposed groundwater bores would have no significant impact on threatened ecological communities, flora species, populations, or critical habitat.

2. Vegetation disturbance on the groundwater bore sites would be temporary; the vegetation is expected to fully recover once the installations have been completed.

REFERENCES

Bangalay Botanical Surveys (2008). *Metropolitan Coal Project Baseline Flora Survey - Proposed Longwall Mining Area*. Final Report to Helensburgh Coal Pty. Ltd.

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Signed:

Colin C Bower PhD
Principal Consultant Botanist

ATTACHMENT A.
Dominant Flora Species Present on each Proposed Drill Site.

Scientific Name	Common Name	Drill Site				
		T1	T2	T3	T4	T5
CLASS FILICOPSIDA						
Gleicheniaceae						
Gleichenia dicarpa	Pouched Coral Fern	●				
Lindsaeaceae						
Lindsaea linearis	Screw Fern	●		●	●	
Selaginellaceae						
Selaginella uliginosa	Swamp Selaginella	●				
CLASS MAGNOLIOPSIDA						
SUBCLASS MAGNOLIIDAE						
Apiaceae						
Actinotus minor	Lesser Flannel Flower	●	●	●	●	●
Platysace linearifolia	Narrow-leaf Platysace	●	●	●		●
Xanthosia pilosa	Woolly Xanthosia				●	●
Asteraceae						
**Cirsium vulgare*	Spear Thistle	●				
Epaltes australis	Spreading Ground-heads	●		●		
Euchiton involucratus	Star Cudweed	●				
**Gamochaeta purpurea*			●			
**Hypochaeris radicata*	Flatweed	●	●			
Lagenophora sp.		●				
Casuarinaceae						
Allocasuarina littoralis	Black Sheoak	●	●	●	●	●
Clusiaceae						
Hypericum gramineum						●
Cunoniaceae						
Bauera rubioides	River Rose					●
Ceratopetalum gummiferum	Christmas Bush		●		●	
Droseraceae						
Drosera sp.	A Sundew	●				
Ericaceae - Styphelioideae						
Epacris microphylla	Coral Heath	●		●		●
Epacris obtusifolia	Blunt-leaf Heath					●
Leucopogon amplexicaulis			●			
Leucopogon microphyllus				●	●	
Styphelia sp.		●				
Woollsia pungens	Woollsia		●	●	●	●
Fabaceae - Faboideae						
Bossiaea heterophylla	Variable Bossiaea	●	●			●
Bossiaea scolopendria	Broom Bossiaea	●	●	●		
Dillwynia retorta			●			
Gompholobium grandiflorum	Large Wedge Pea		●			
Pultenaea stipularis	Handsome Bush-pea				●	●
Pultenaea tuberculata	A Bush-pea	●		●	●	
Fabaceae - Mimosoideae						
Acacia linifolia	White Wattle		●			
Acacia longifolia	Sydney Golden Wattle		●		●	●
Acacia suaveolens	Sweet-scented Wattle	●			●	
Gentianaceae						
**Centaurium erythraea*	Common Centaury	●				●
Goodeniaceae						

Dampiera stricta	Purple Dampiera	●		●	●	
Haloragoraceae						
Gonocarpus micranthus	Spreading Raspwort	●				
Loganiaceae						
Mitrasacme polymorpha		●	●			●
Malvaceae						
Lasiopetalum ferrugineum		●				
Myrtaceae						
Angophora costata	Sydney Red Gum	●	●		●	●
Corymbia gummifera	Red Bloodwood		●	●	●	
Darwinia diminuta[1]	A Darwinia				●	
Eucalyptus haemastoma	Broad-leaved Scribbly Gum		●	●	●	
Eucalyptus piperita	Sydney Peppermint	●	●		●	●
Eucalyptus sieberi	Silvertop Ash		●	●		●
Kunzea ambigua	Tick Bush	●	●	●	●	●
Kunzea capitata		●			●	
Leptospermum arachnoides	Spidery Tea-tree		●	●		●
Leptospermum polygalifolium	Yellow Tea-tree	●	●	●		●
Leptospermum squarrosum	Pink Tea-tree	●	●	●		
Leptospermum trinervium	Flaky-barked Tea-tree			●		●
Picrondendraceae						
Micrantheum ericoides		●		●	●	●
Phyllanthaceae						
Phyllanthus hirtellus				●		●
Plantaginaceae						
Gratiola pedunculata	A Brooklime	●				
Proteaceae						
Banksia ericifolia	Heath-leaved Banksia	●	●	●	●	●
Banksia serrata	Old-man Banksia	●	●	●	●	●
Grevillea diffusa	A Grevillea	●	●	●	●	
Grevillea sphacelata	Grey Spider Flower	●		●	●	
Hakea dactyloides	Finger Hakea	●	●	●	●	
Hakea gibbosa	Needlebush		●			●
Hakea sericea	Needlebush				●	●
Hakea teretifolia	Needlebush					●
Isopogon anemonifolius	Broad-leaf Drumsticks			●		
Lomatia silaifolia	Crinkly Bush				●	
Persoonia levis	Broad-leaved Geebung			●		●
Persoonia pinifolius	Pine-leaf Geebung	●			●	
Petrophile pulchella	Conesticks					●
Rhamnaceae						
Pomaderris andromedifolia		●				
Rubiaceae						
Opercularia diphylla						●
Rutaceae						
Eriostemon australasius				●		
Sapindaceae						
Dodonaea triquetra	Large-leaf Hopbush	●	●	●	●	●
Stackhousiaceae						
Stackhousia viminea	Slender Stackhousia			●		
Stylidiaceae						
Stylidium lineare	Narrow-leaved Triggerplant	●		●		●

SUBCLASS LILIIDAE						
Anthericaceae						
Caesia parviflora				●		
Laxmannia gracilis	Slender Wire Lily	●		●		
Centrolepidaceae						
Centrolepis sp.		●				
Cyperaceae						
Caustis flexuosa	Curly Wig			●		●
Cyathochaeta diandra				●	●	●
Lepidosperma filiforme			●		●	●
Lepidosperma laterale		●	●			
Ptilothrix deusta				●		
Schoenus ericetorum	Heath Bog-rush	●		●	●	
Doryanthaceae						
Doryanthes excelsa	Gymea Lily	●	●		●	●
Iridaceae						
Patersonia sericea	Leafy Purple-flag			●	●	●
Juncaceae						
**Juncus articulatus*		●				
Juncus sp.		●	●			
Luzula sp.		●				
Lomandraceae						
Lomandra filiformis	Wattle Mat-rush			●	●	
Lomandra longifolia	Spiny-headed Matrush	●	●			
Lomandra obliqua				●	●	
Orchidaceae						
Calochilus sp.	A Bearded Orchid		●			
Microtis parviflora	Slender Onion Orchid	●				
Pterostylis sp.					●	
Thelymitra sp.						●
Poaceae						
Aristida sp.	A Wiregrass	●	●			
Entolasia stricta	Wiry Panic		●	●	●	●
Eragrostis brownii	Brown's Lovegrass	●	●	●		
Rytidosperma sp.				●		
Restionaceae						
Lepyrodia scariosa	A Rush	●	●	●		
Chordifex dimorphus	A Rush	●				
Xanthorrhoeaceae						
Xanthorrhoea resinosa	Grass Tree			●		
Xyridaceae						
Xyris gracilis		●		●	●	●

[1] Rare Species: ROTAP: 2RCi

Attachment 2

Aboriginal Heritage Preclearance Survey Report
(Niche Environment and Heritage)

Niche Environment and Heritage
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11 November 2015

Patrick Brienen
Environment & Projects Advisor
Metropolitan Coal-Peabody Energy Australia
PO Box 402
HELENSBURGH NSW 2508

Via email: pbrienen@peabodyenergy.com

Dear Mr Brienen,

Re: Borehole Drilling within Fire Road 9I – Aboriginal Objects Due Diligence Assessment

Niche Environment and Heritage was commissioned by Metropolitan Coal-Peabody Energy Australia, to undertake an Aboriginal Objects Due Diligence Assessment to determine the impact on Aboriginal heritage objects of drilling activities along Fire Road 9I for the purpose of shallow groundwater profiling. Niche understands that the activities involve drilling five boreholes to a maximum depth of 89m, and that all drilling will take place on the side of the road, with no vegetarian clearance required.

The *National Parks and Wildlife Amendment Regulation 2010* (DECCW 2010) ('NPW Regulation') removes the need to follow the due diligence process if the proposed works are defined as a low impact activity. Among those activities which are considered to be low impact, the NPW Regulation includes:

- *Mining exploration work of the following kind on land that has been disturbed:*
  - *Costeaning,*
  - *Bulk sampling,*
  - *Drilling.*

The proposed drilling activities will be carried out on a pre-existing road and therefore on land that has been previously disturbed, as per Clause 80b (4) of the NPW Regulation, which includes "*construction of roads, trails and tracks (including fire trails and tracks and walking tracks)*" as examples of activities that may have disturbed land.

To ensure that the proposed drilling activities would not impact on any known Aboriginal heritage objects, a search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 11 November 2015 (AHIMS Client ID: 198873). One Aboriginal site is recorded approximately 100 m from Fire Road 9I and the proposed drilling activities:

- 52-2-0899, 'Flat Rock Creek 87'. A shelter site with art and artefact deposits.

The proposed drilling activities will not impact on this site, given the distance between the shelter and Fire Road 9I, and the constrained nature of the proposed drilling activities. As such, no further assessments are considered necessary and the proposed works may proceed with caution. In the unlikely event that Aboriginal heritage objects and/or sites are discovered, all work should stop immediately and a suitably qualified Aboriginal heritage specialist be consulted.

Please do not hesitate to contact me should you have any questions or would like to discuss this assessment further.

Yours sincerely,

ALEISHA BUCKLER
Niche Environment and Heritage

Attached: **Figure 1. Location of boreholes and AHIMS search results.**