

Biodiversity

Metropolitan Coal's Longwalls 20-22 Biodiversity Management Plan has been prepared to manage the potential environmental consequences of the Metropolitan Coal Longwalls 20-22 Extraction Plan on aquatic and terrestrial flora and fauna, with a specific focus on swamps.

The biodiversity monitoring program includes monitoring of:

- upland swamp vegetation and groundwater;
- riparian vegetation;
- aquatic biota and their habitats; and
- amphibians.

Upland Swamp Vegetation Monitoring

Eight upland swamps, namely Swamps 16, 17, 18, 20, 23, 24, 25 and 26 have been mapped above or immediately adjacent to Longwalls 20-22 (Figure 1). With the exception of in-valley Swamp 20, which supports Tea Tree Thicket, all swamps over Longwalls 20-22 are small valley-side swamps and comprise Restioid Heath, with intergrades with Banksia Thicket.

Swamps 101, 111a and 125 have been selected as control sites for the Restioid Heath/Banksia Thicket valley side swamps (Figure 1) and Swamps Woronora River 1, Woronora River South Arm and Dahlia Swamp have been selected as control sites for the Tea Tree Thicket vegetation of Swamp 20 (Figure 2).

The upland swamp vegetation monitoring program includes visual monitoring, transect/quadrat monitoring and monitoring of indicator species in autumn and spring.

Upland Swamp Groundwater Monitoring

Groundwater monitoring of upland swamps has involved the use, where practicable, of paired piezometers, one in the swamp substrate and one sandstone piezometer. Piezometers have been installed in the following upland swamps overlying Longwalls 20-22 and in control locations (Figures 1 and 2): Swamps 16/17, Swamp 25, Swamp 101, Swamp 20 and Woronora River 1 (WRSWAMP1).

Riparian Vegetation Monitoring

The riparian vegetation monitoring program includes visual, quadrat, transect and indicator species monitoring of riparian vegetation on the Waratah Rivulet and Eastern Tributary in autumn and spring each year, at the sites shown on Figure 3.

Aquatic Biota and their Habitats

The aquatic ecology monitoring program for Longwalls 20-22 has been designed to:

- monitor subsidence-induced impacts on aquatic ecology (referred to as stream monitoring); and
- monitor the response of aquatic ecosystems to the implementation of stream remediation works (referred to as pool monitoring).

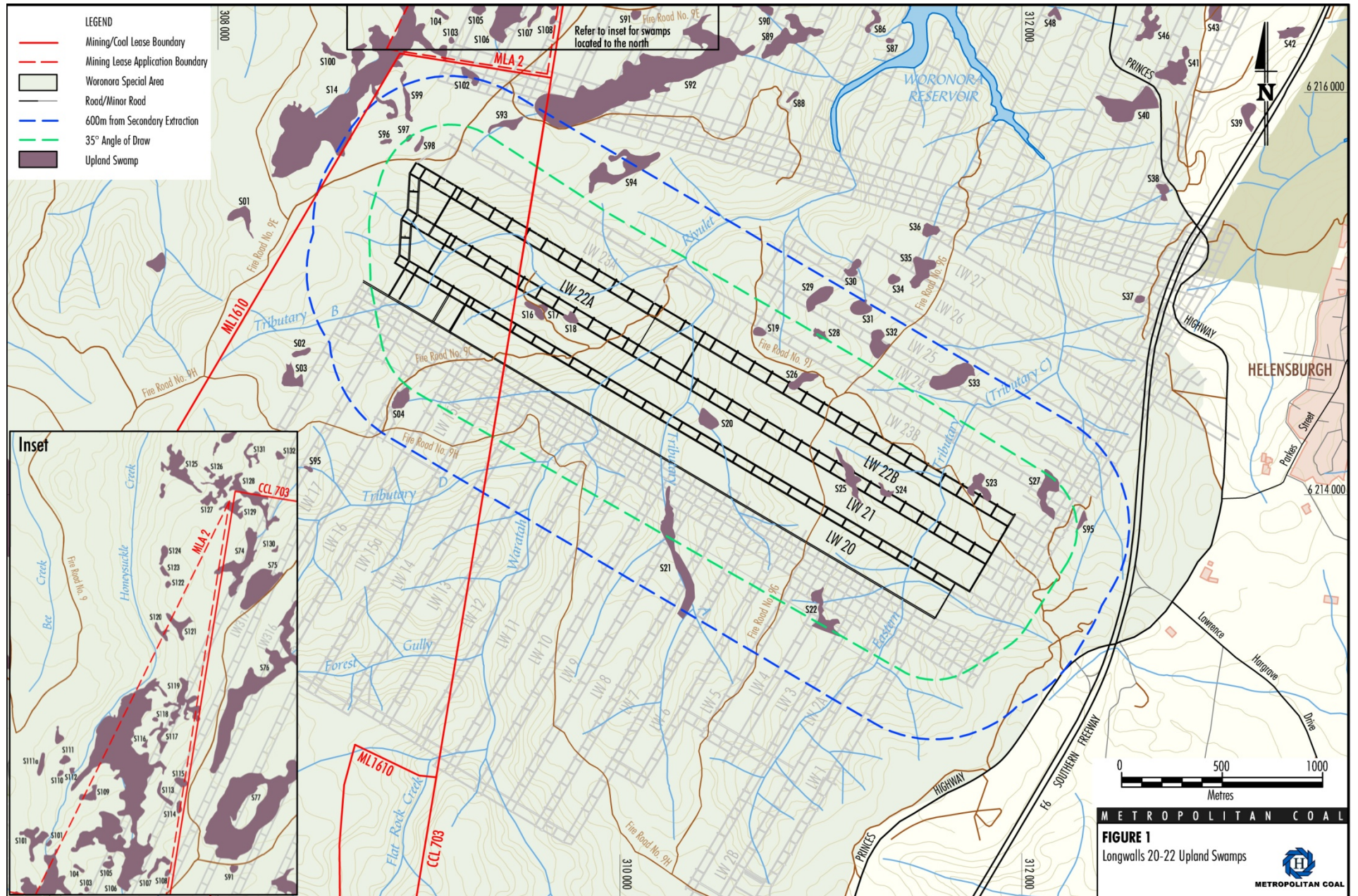
The stream monitoring program includes bi-annual monitoring of aquatic habitat characteristics, water quality, aquatic macroinvertebrates and aquatic macrophytes. The pool monitoring program includes bi-annual monitoring of aquatic macroinvertebrates and macrophytes in each pool at the sites shown on Figure 4.

Amphibian Surveys

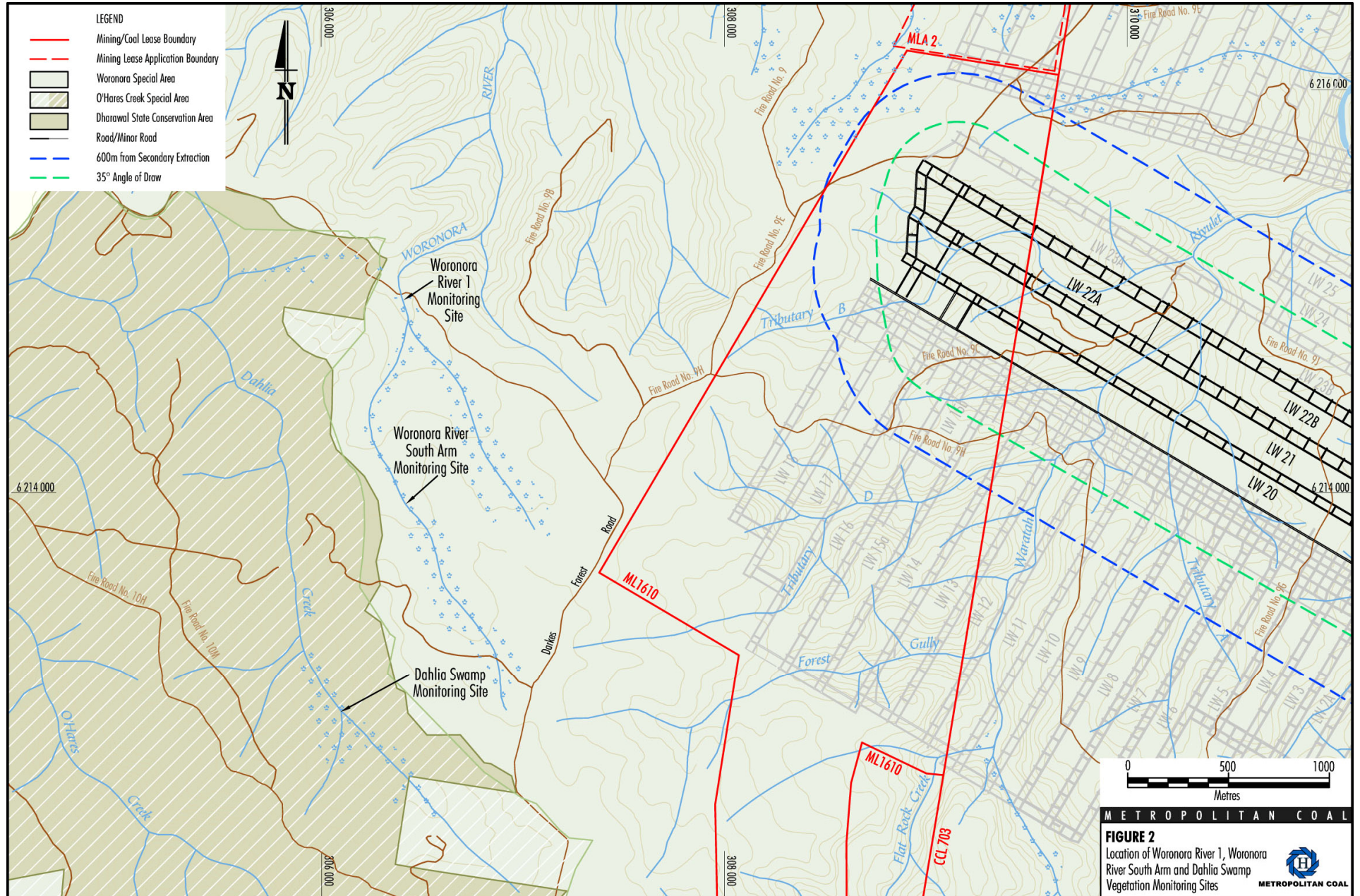
A monitoring program has been developed for Longwalls 20-22 to monitor amphibian species, with a focus on the habitats of the Giant Burrowing Frog (*Heleioporus australiacus*) and Red-crowned Toadlet (*Pseudophryne australis*) associated with tributaries.

Six test sites overlying Longwalls 20-22 and six control sites (Figure 5) are surveyed annually in spring/summer (i.e. October to February) during suitable weather conditions. Each site is surveyed once during a standard one hour general area day search (early morning and late afternoon) supplemented by an evening 60 minute search/playback session using hand held spotlights and head lamps.

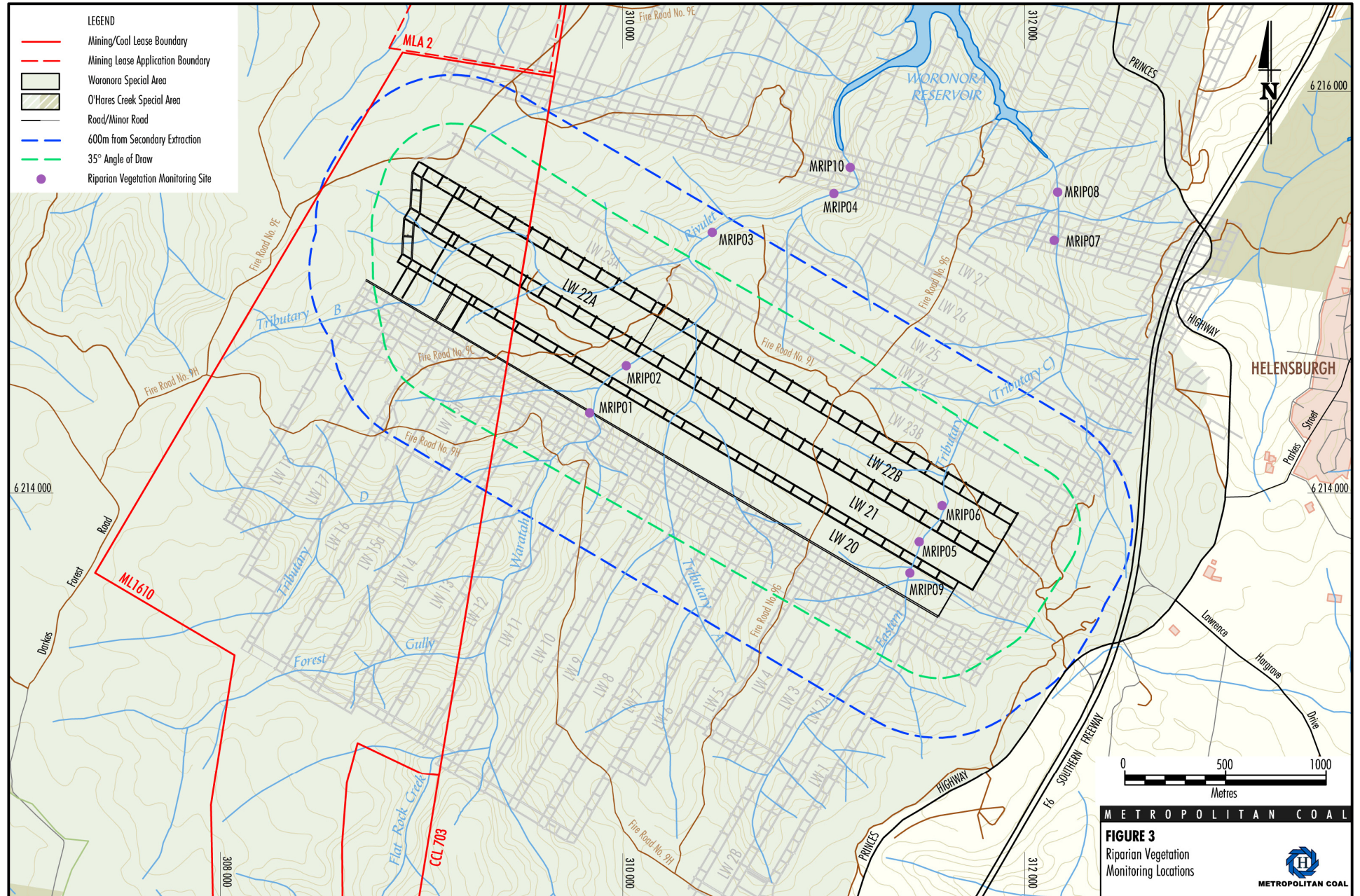
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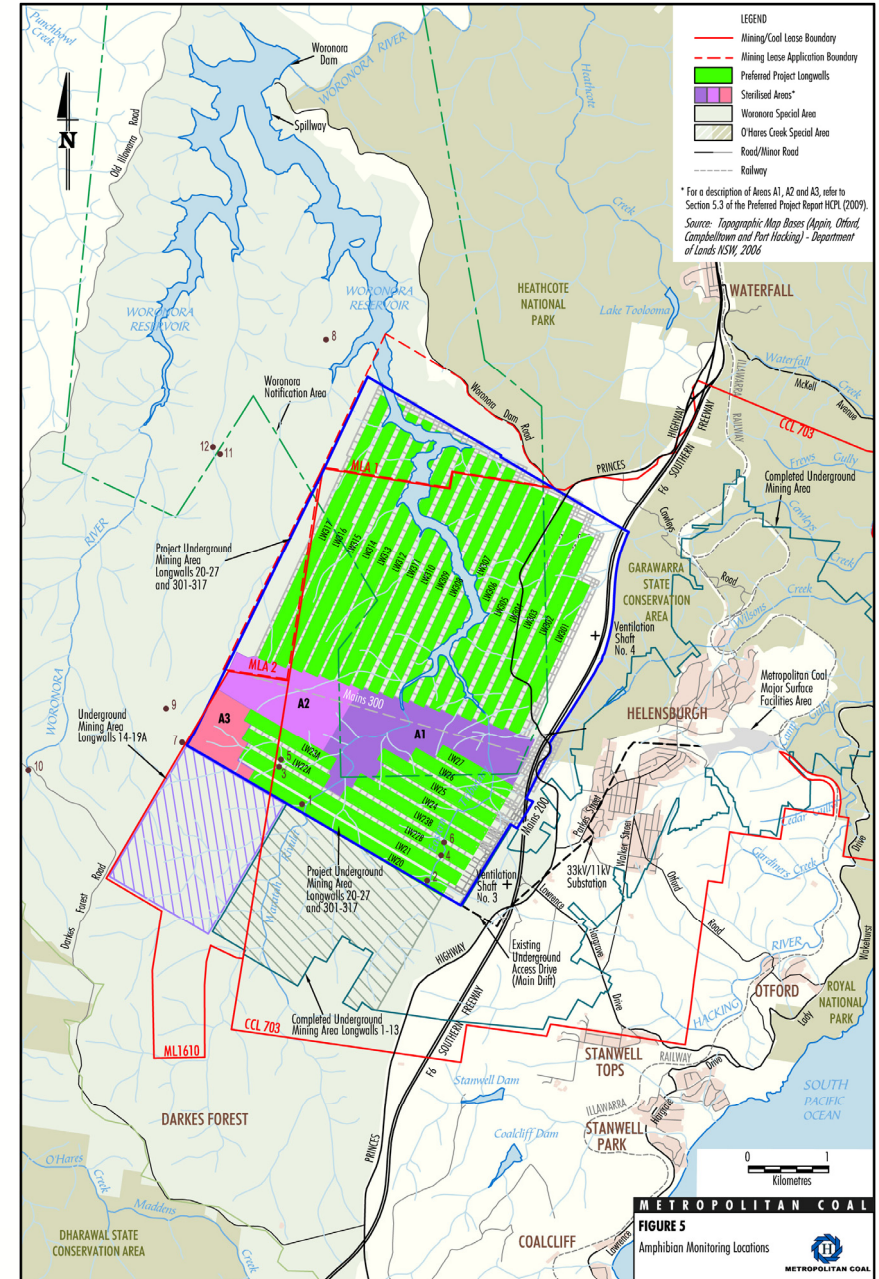
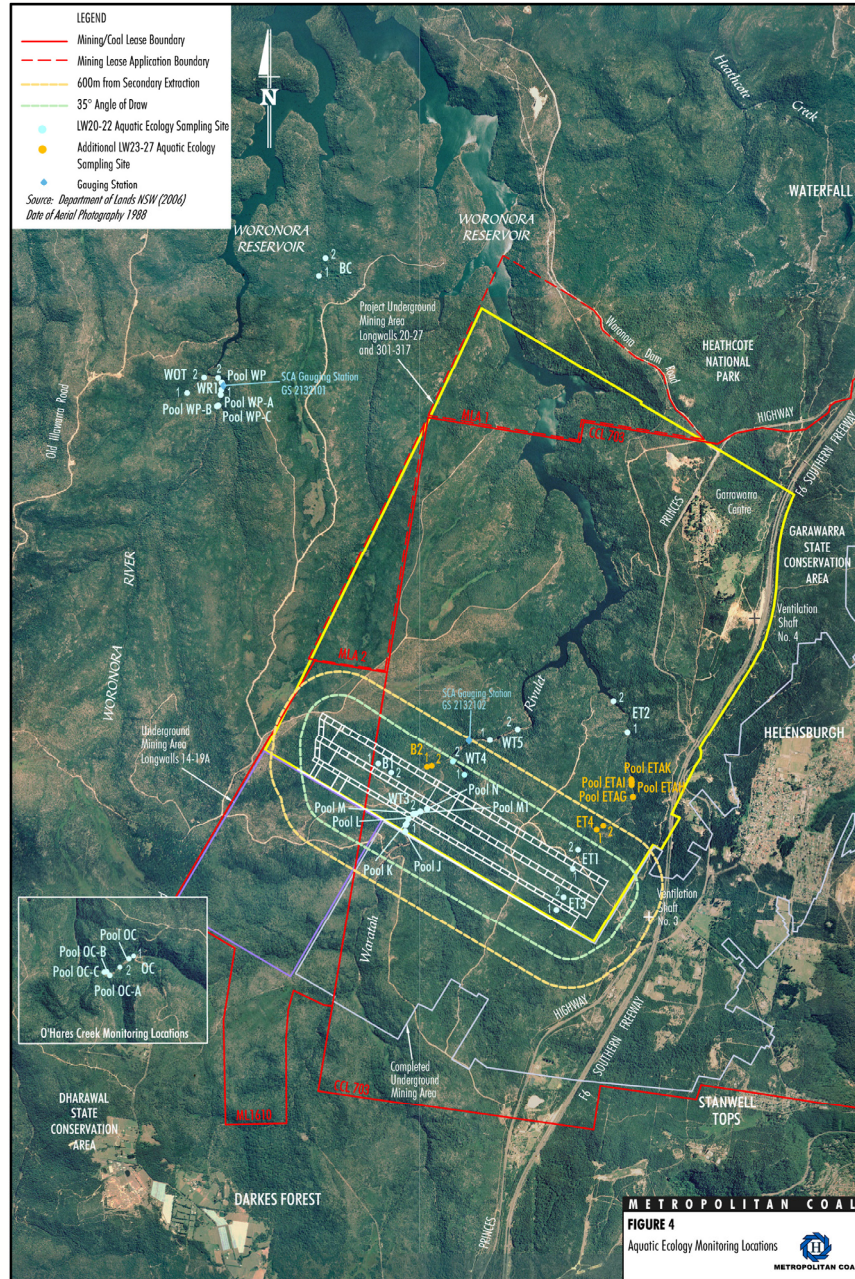
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Assessment of Environmental Performance

The monitoring results were used to assess the Project against the biodiversity performance indicators.

The assessment indicated that the following performance indicators were not exceeded:

- The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps.
- Subsidence effects at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC situated approximately 400 m to the east of Longwalls 20-22 are expected to be negligible.
- The aquatic macroinvertebrate and macrophyte assemblages in streams and pools are not expected to experience long-term impacts as a result of mine subsidence.
- The amphibian assemblage is not expected to experience changes significantly different to the amphibian assemblage at control sites.

The upland swamp groundwater performance indicator, *Surface cracking within upland swamps resulting from mine subsidence is not expected to result in measurable changes to swamp groundwater levels when compared to seasonal variations in water levels experienced by upland swamps prior to mining or control swamps*, was exceeded during the reporting period at Swamp 20 (Figure 1 and Chart 1). During the reporting period, the swamp substrate piezometer changed character from being permanently waterlogged to being periodically waterlogged (Chart 1). In accordance with the Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan, an assessment was made against the subsidence impact performance measure and is discussed further below.

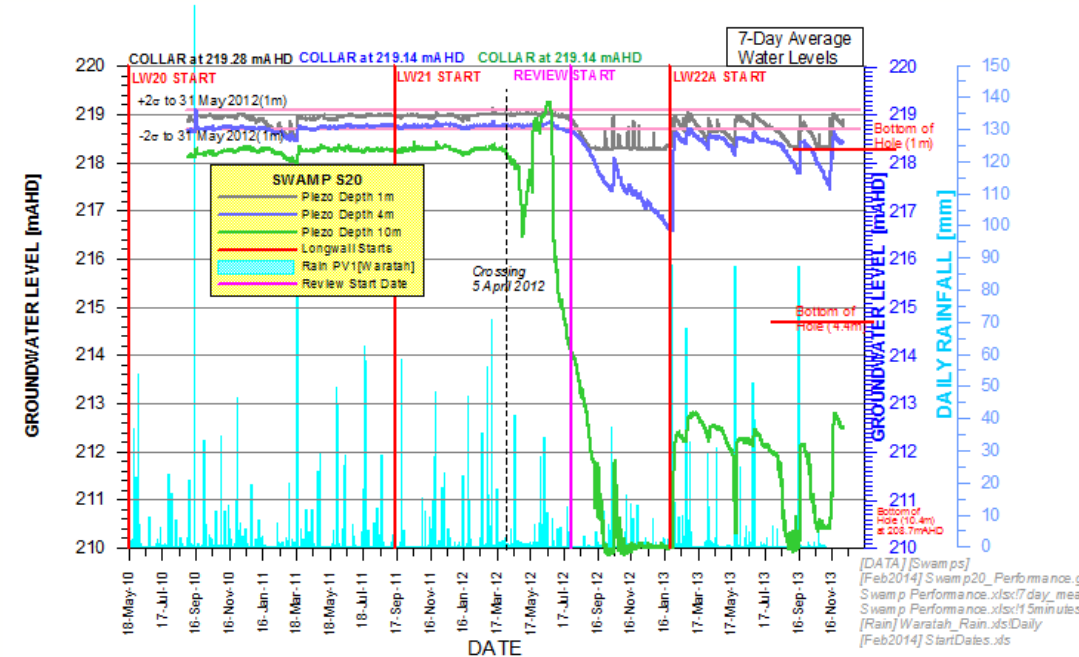


Chart 1 Performance Assessment of Groundwater Hydrographs at Site S20 (Swamp 20)

The riparian vegetation performance indicator, *Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at the Metropolitan Colliery*, was also exceeded during the reporting period at site MRIP02 (Figure 4). Visual inspections of riparian vegetation identified vegetation dieback greater than 50 cm from the Waratah Rivulet at site MRIP02 (Plates 1 and 2). In accordance with the Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan, an assessment was made against the subsidence impact performance measure and is discussed below.

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Plate 1: Eastern Bank of Waratah Rivulet MRIP02 (Photo Point 1), Autumn 2013



Plate 2: Eastern Bank of Waratah Rivulet MRIP02 (Photo Point 2), Autumn 2013

In accordance with the Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan, assessments were made against the subsidence impact performance measure:

Negligible Impact on threatened species and populations.

Consistent with the Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan, the key assessment considerations taken into account to assess whether there has been a greater than negligible impact on threatened species are:

1. *What is the nature of the environmental consequence (e.g. the potential for adverse impacts on upland swamps, riparian vegetation, slopes and ridgetops or aquatic habitats)?*
2. *What are the potential factors that may have contributed to the environmental consequence (e.g. the degree of subsidence effects, ineffective management measures or prevailing climatic conditions)?*
3. *Which threatened species have the potential to be impacted?*
4. *What are the potential impacts on the lifecycle of the potential threatened species (e.g. foraging, breeding/reproduction, nesting, shelter and movement/dispersal)?*
5. *What are the potential impacts on the habitat of the potential threatened species (e.g. area affected)?*
6. *Has the habitat connectivity of the threatened species been affected (e.g. loss of stream pool habitat connectivity)?*
7. *What actions, if any, are most appropriate to mitigate the impacts and/or to minimise future impacts?*

The specialist assessments concluded that the performance measure had not been exceeded, in relation to the upland swamp groundwater levels in Swamp 20 or the riparian vegetation at site MRIP02.