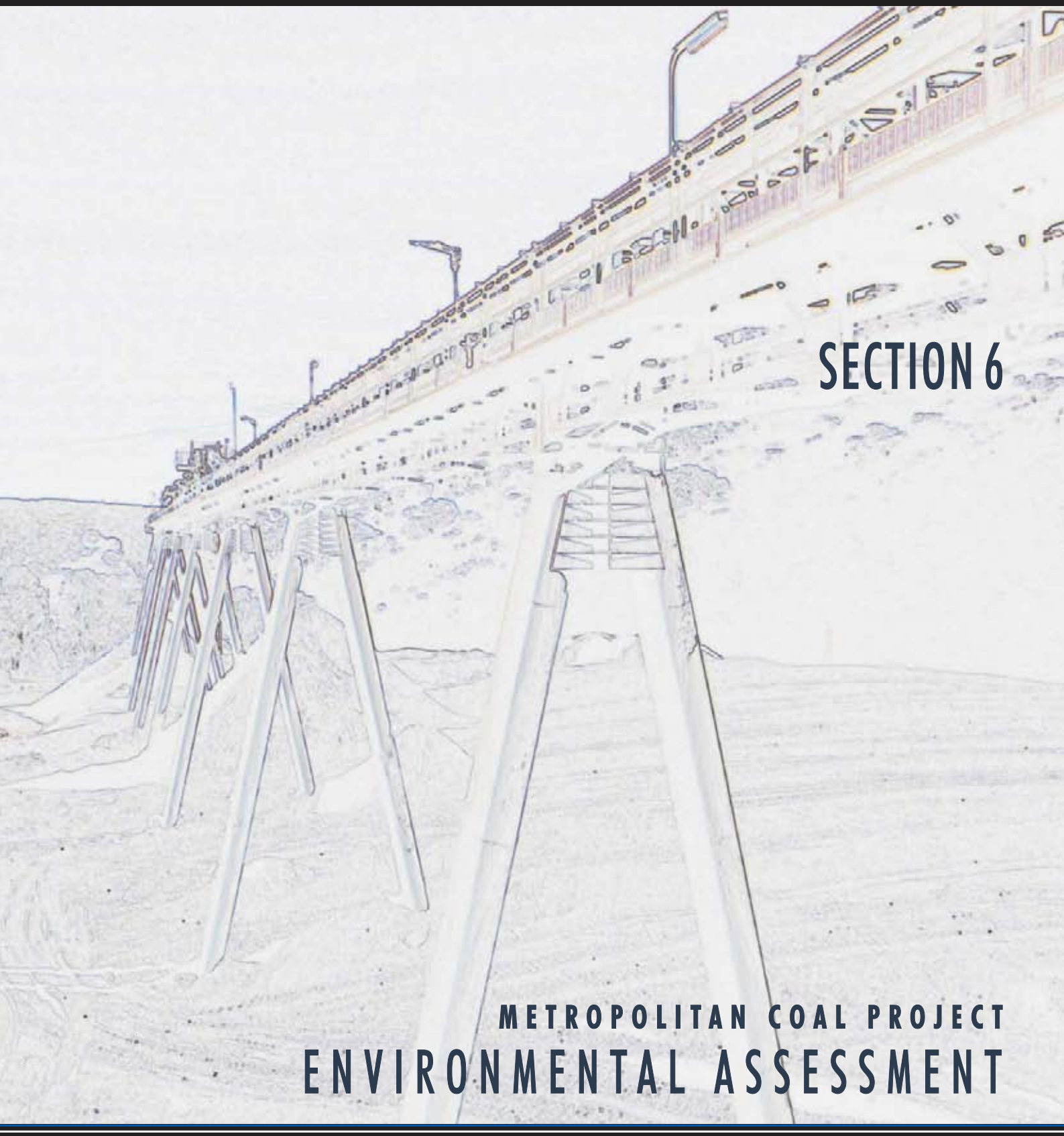

SECTION 6

METROPOLITAN COAL PROJECT

ENVIRONMENTAL ASSESSMENT

STATEMENT OF COMMITMENTS

Environmental Management

Environmental management and mitigation measures to be implemented during the development and operation of the Metropolitan Coal Project (the Project) are described in the following sections of the Environmental Assessment:

- Land Resources, Climate and Bushfire Regime – Section 4.1.
- Subsidence – Section 4.2.
- Groundwater – Section 4.3.
- Surface Water – Section 4.4.
- Aquatic Ecology – Section 4.5.
- Terrestrial Flora – Section 4.6.
- Terrestrial Fauna – Section 4.7.
- Aboriginal Heritage – Section 4.8.
- Non-Aboriginal Heritage – Section 4.9.
- Noise – Section 4.10.
- Air Quality – Section 4.11.
- Transport – Section 4.12.
- Regional Economy – Section 4.13.
- Employment, Population and Community Infrastructure – Section 4.14.
- Hazard and Risk – Section 4.15.
- Visual Character – Section 4.16.

HCPL will prepare and implement a number of new environmental management plans for the Project, namely:

- Subsidence Management Plan(s) (SMP[s]) (for Longwalls 20 to 44 under the separate New South Wales [NSW] Department of Primary Industries-Mineral Resources [DPI-MR] approval process).
- Monitoring, management and response plan(s) for surface infrastructure (to be developed in conjunction with the SMPs).
- Waratah Rivulet Management Plan (WRMP).
- Flora and Fauna Management Plan (FFMP).
- Aboriginal Cultural Heritage Management Plan (ACHMP).
- Conservation Management Plan (CMP).
- Transport Management Plan (TMP).
- Mine Closure Plan (MCP).

In addition, a number of existing Metropolitan Colliery environmental management plans will be reviewed and updated to include Project-related activities, as appropriate:

- Bushfire Preparedness Plan.
- Surface Water Management Plan (SWMP).
- Water Savings Action Plan (WSAP).
- Energy Savings Action Plan (ESAP).
- Noise Pollution Reduction Programme(s) (PRP[s]).
- Air Quality PRP(s).

The abovementioned environmental management plans are described below.

Environmental management plans prepared in accordance with existing Metropolitan Colliery SMP approvals (*viz*. the *Metropolitan Colliery SMP Approval Conditions LW14-17* [DPI-MR, 2006a] and *Subsidence Management Plan Approval Metropolitan LW 18-19A* [DPI-MR, 2008]) for the Current Underground Mining Area will be reviewed, and where appropriate incorporated into the new environmental management plans described above.

HCPL also has a number of management plans relevant to occupational health and safety that will be reviewed and revised, where appropriate (e.g. the Underground Emergency Management Plan, Surface Emergency Management Plan, Fire and Explosion Control Management Plan, Underground Transport Management Plan, Stockpile Management Plan and Contractor Management Plan).

Subsidence Management Plans (SMPs)

HCPL will progressively prepare SMPs and obtain DPI-MR approval for the Project underground mining activities prior to mining being undertaken.

These applications will be prepared in accordance with the *Guideline for Applications for Subsidence Management Approvals* (NSW Department of Mineral Resources [DMR], 2003a) and *New Approval Process for the Management of Coal Mining Subsidence – Policy* (DMR, 2003b). These documents are collectively referred to as the SMP Guideline.

In accordance with the SMP Guideline, a number of SMPs will be required over the life of the Project, as SMP applications are limited to a mining area extending over a maximum of seven years.

The main areas to be addressed by an SMP application include (DMR, 2003a):

1. *The proposed mining system(s) and resource recovery;*
2. *Community consultation;*
3. *Statutory requirements that apply to the Application Area;*
4. *Expected subsidence and its potential impacts on public safety, the environment, community, land use, surface improvements and infrastructure; and*
5. *The proposed Subsidence Management Plan for the expected subsidence impacts.*

Where applicable, the SMP process provides the appropriate venue for the resolution of particular management issues pertaining to individual longwall panels or mining domains. For example, management of potential subsidence effects will be required at a number of structures on the F6 Southern Freeway. When the SMPs that apply to these structures are prepared, consultation with the NSW Roads and Traffic Authority (RTA) and the formulation of site-specific management measures to suitably manage potential subsidence effects on these structures to maintain public safety on the F6 Southern Freeway will be undertaken as a component of the SMP process.

Monitoring, Management and Response Plans

Monitoring, management and response plans will be prepared for:

- the Illawarra Railway to the satisfaction of RailCorp;
- F6 Southern Freeway including bridges to the satisfaction of the RTA;
- Princes Highway to the satisfaction of the Wollongong City Council (WCC);
- electrical services to the satisfaction of electrical services owners;
- optical fibre and copper telecommunications cables to the satisfaction of the cable owners;
- Sydney Water pipelines to the satisfaction of Sydney Water; and
- the Garrawarra Centre to the satisfaction of the Department of Health.

The monitoring, management and response plans will be prepared in conjunction with the relevant SMPs.

The mine design in the vicinity of the Garrawarra Centre will be constrained by performance criteria such that any impacts to the associated structures are negligible (i.e. would not require repair). Specific monitoring of the Garrawarra Centre will be included in relevant SMPs.

Waratah Rivulet Management Plan (WRMP)

A WRMP will be developed in consultation with the relevant authorities.

The WRMP will be developed to the satisfaction of the NSW Department of Planning (DoP) prior to longwall mining within 600 metres (m) of the rock bar on Waratah Rivulet known as WRS5.

The WRMP will be an operational document that will be reviewed and updated to reflect the status of longwall mining, revised subsidence predictions and any advances in stream restoration methods.

The WRMP will comprise the following elements:

- identification of evaluation zones where an adaptive management approach will be implemented (i.e. within 600 m of rock bars WRS5, 6, 7 and 8);
- specific incremental subsidence assessment for each longwall panel within 600 m of these rock bars;
- subsidence measurement for comparison with predictions;
- a TARP with trigger mechanisms that initiate a range of responses (e.g. a higher intensity of monitoring and/or the implementation of response measures) and that identify personnel responsible for implementation of the response measures;
- iterative stream restoration phases at WRS5, 6, 7 and 8 and aesthetic measures that are planned prior to entering each evaluation zone;
- environmental monitoring, environmental control measures (e.g. vegetation management, erosion and sediment control, fuel management and polyurethane (PUR) product management) and reporting for stream restoration works; and
- contingency measures in the event that observed subsidence effects are significantly greater than predicted or if the restoration performance criteria are not being achieved.

Flora and Fauna Management Plan (FFMP)

A FFMP will be developed for the Project and will include the following management measures for aquatic and terrestrial ecology:

- measures to minimise impacts on aquatic ecology, terrestrial flora, terrestrial fauna, and their habitats;
- measures to be implemented in the event monitoring detects significant incidents or variations to the predicted subsidence impacts;
- environmental management of sites where vegetation removal is necessary;
- identification of areas in which specific surface works involving vegetation clearance will be avoided or limited;
- measures to avoid or minimise impacts to threatened flora and fauna;
- soil and weed management measures;
- bushfire management measures;
- natural regeneration and rehabilitation measures;
- *P. cinnamomi* management measures;
- Chytridiomycosis management measures;
- measures to minimise impacts on terrestrial fauna including those relating to fauna traps, vehicle strike and introduced pest species; and
- monitoring programmes for aquatic ecology, terrestrial flora and terrestrial fauna.

The FFMP will be developed in consultation with the NSW Fisheries, the NSW Department of Environment and Climate Change (DECC) and the Sydney Catchment Authority (SCA), and to the satisfaction of the DoP. The FFMP will be prepared prior to the extraction of Longwall 20.

Aboriginal Cultural Heritage Management Plan (ACHMP)

An ACHMP will be developed for the Project in consultation with the Aboriginal community.

The ACHMP will include:

- A protocol for consultation with the Aboriginal community.
- Statutory requirements.
- A protocol/programme for HCPL to sponsor existing or new Aboriginal community projects which benefit the wider Aboriginal community. These may include (for example): Aboriginal community field days; restoration of culturally significant buildings; rehabilitation/protection of areas with high cultural values; and/or potential employment/skill development opportunities. Any such sponsorship would be made available to the wider Aboriginal community with submissions presented to HCPL and projects selected by HCPL based on their individual merit and benefit to the wider Aboriginal community.
- A programme and scope for undertaking additional supplementary Aboriginal heritage fieldwork as part of future SMP applications.
- A programme for further investigation of potential Aboriginal heritage sites identified by members of the Aboriginal community (*viz*. two trees and a stone arrangement).
- A programme for updating site cards.
- Consideration of undertaking invasive recording techniques at select Aboriginal heritage sites.
- A programme for undertaking pre-clearance surveys for required Project surface infrastructure.
- A protocol for managing Aboriginal heritage sites located proximal to required surface disturbance works, including:
  - avoidance of impacts where practicable;
  - demarcation; and
  - developing a comprehensive record where avoidance is not practicable.
- A programme for further investigation of the artwork in sites FRC 93 and FRC 198 against the description of art provided on the Aboriginal Heritage Information Management System (AHIMS) site card.
- A monitoring programme for sites of moderate or high archaeological significance.
- A protocol for the development and implementation of management measure(s) at sites of moderate or high archaeological significance and/or mitigation measure(s) at sites of high archaeological significance.
- An access protocol for members of the Aboriginal community.
- A cultural awareness programme for HCPL staff and contractors as part of site inductions.

- A protocol for registering any new sites identified at the Project as well as updating and maintaining the existing record of Aboriginal heritage sites.
- A protocol that defines actions to be followed in the event that human skeletal material is encountered.

Conservation Management Plan (CMP)

A CMP will be developed for the Metropolitan Colliery to provide guidance for management of heritage items during the detailed design, construction and operational phases of the Project.

The CMP process will include:

1. Further detailed inspection of all items of heritage significance or potentially of heritage significance within the Major Surface Facilities Area and recording of these items.
2. Further literature and archival review to inform the CMP, where relevant.
3. Consultation with relevant agencies including the DoP (Heritage Office) regarding the detailed design of any heritage controls.
4. Consideration of heritage-related requirements of relevant planning instruments (e.g. the *Wollongong Local Environmental Plan, 1990* and *Illawarra Regional Environmental Plan No. 1*).
5. Consideration of contingency measures to address future (i.e. unforeseen) potential effects to heritage.

Noise Pollution Reduction Programmes (PRPs)

The existing and future PRPs for noise would inform the noise management measures for the Project. These include:

- applicable noise criteria from the Project Approval;
- noise monitoring to be undertaken for the Project (i.e. monitoring locations, frequencies, parameters and specifications);
- a description of the Project noise mitigation measures;
- a protocol for the on-going management of noise at the Metropolitan Colliery, including the PRP process;
- procedures to be followed in the event of an exceedance of Project Approval noise criteria, should they occur; and
- complaint response protocols.

Air Quality Pollution Reduction Programmes (PRPs)

The existing and future PRPs for air quality would inform the air quality management measures for the Project. These include:

- air quality monitoring to be undertaken for the Project;
- Project mitigation measures with respect to air quality;
- a protocol for the on-going management of air quality;
- procedures to be followed in the event of an exceedance of criteria should they occur; and
- complaint response protocols.

On-site stockpiles will continue to be managed to reduce the potential for the development of spontaneous combustion in accordance with the existing Stockpile Management Plan.

Transport Management Plan (TMP)

A TMP will be prepared for the Project and will include the following management measures:

- a cap on the Project public road haulage of coal reject at the existing Metropolitan Colliery maximum annual haulage levels;
- maintenance of the existing level of product coal haulage;
- maintenance of the existing Metropolitan Colliery heavy vehicle night-time curfew (i.e. large vehicle access to the site is restricted during night-time hours);
- measures to work with suppliers to minimise the use of heavy vehicles for the delivery of small items to the Major Surface Facilities Area that could be delivered via a light vehicle or van, where practicable;
- measures to encourage the mine operational workforce and Project construction workforce to car-pool and minimise workforce related light vehicle movements to the site;
- liaison with RailCorp to minimise Project night-time train movements as far as practicable within train scheduling restraints; and

- liaison with the Metropolitan Colliery CRG and RailCorp to facilitate the resolution of any particular rail noise or vibration issues (e.g. on-site train whistle noise) that may arise with respect to on-site or off-site rail haulage noise or vibration over the life of the Project, as required.

Access to the Woronora Special Area by HCPL staff and contractors will be undertaken in accordance with SCA requirements (e.g. conditions of entry, speed limits etc).

Mine Closure Plan (MCP)

Prior to the completion of mining operations, a MCP will be developed in consultation with relevant authorities and stakeholders including the WCC, the DoP and the Helensburgh community.

The MCP will describe:

- the final mine closure process;
- the long-term landuse for the Major Surface Facilities Area;
- the removal of infrastructure items;
- measures for landform stability and public safety;
- measures for non-Aboriginal heritage items;
- measures to maintain downstream water quality;
- final rehabilitation works, including the establishment of self-sustaining vegetation;
- post-closure maintenance and monitoring requirements;
- lease relinquishment/completion criteria; and
- mining and coal lease and other statutory requirements.

The MCP will be developed in consideration of relevant strategic landuse planning and resource management plans and policies, as well as rehabilitation and mine closure best practice documents (e.g. the Commonwealth of Australia [2006b] *Mine Rehabilitation* and Commonwealth of Australia [2006c] *Mine Closure and Completion*).

The MCP will also include consideration of amelioration of potential adverse socio-economic effects due to the reduction in employment at Project closure.

Bushfire Preparedness Plan

The existing Bushfire Preparedness Plan for Metropolitan Colliery activities in the Woronora Special Area will be reviewed and where required, revised to incorporate activities relevant to the Project.

The Bushfire Preparedness Plan includes fuel management and general housekeeping measures, procedures to minimise the risk of bushfire, response to bushfire in the Woronora Special Area and evacuation in case of an emergency.

Surface Water Management Plan (SWMP)

The Project water management system will generally be based on the existing water management system, however will be upgraded to address existing water treatment plant quantity limitations and augmented where necessary to address additional Project components.

The existing SWMP has been prepared to meet the requirements of PRP 7 in Environmental Protection Licence (EPL) No. 767. The SWMP will be reviewed and where appropriate, revised to address Project-related activities.

Water Savings Action Plan (WSAP)

During 2006 and 2007, HCPL significantly upgraded the operational water management system to increase recycling and reduce make-up water demand from Sydney Water in accordance with the Metropolitan Colliery WSAP.

The Project will continue to build on the Metropolitan Colliery WSAP initiatives undertaken to date to increase the efficiency of water use and minimise the requirement for make-up water and off-site water releases. The WSAP will be reviewed and revised, where appropriate.

Energy Savings Action Plan (ESAP)

The existing Metropolitan Colliery ESAP will be reviewed and revised for the Project. The ESAP will include an Energy Plan to further improve energy performance and management systems for the Project, having regard to the *Guidelines for Energy Savings Action Plans* (NSW Department of Energy, Utilities and Sustainability, 2005).

Compensatory Measures and Other Ecological Initiatives

In addition to the environmental management and mitigation summarised above, compensatory measures and other ecological initiatives will be implemented for the Project and are summarised in Table SOC-1.

Environmental Monitoring

An overview of the environmental monitoring programmes developed for the Project is provided in Table SOC-2.

This section provides an outline of each component of the monitoring programme.

An Environmental Monitoring Programme (EMP) will be developed and documented for the Project. The monitoring components described below will be described in either the EMP or other relevant management plans (e.g. FFMP and ACHMP).

Meteorology

An automated meteorological monitoring station will be installed at the Project Major Surface Facilities Area to record temperature, relative humidity, net solar radiation, rainfall, wind speed, wind direction and sigma theta (the rate of change of wind direction). Meteorological data will be continuously monitored.

Subsidence

As described above, prior to the commencement of longwall mining and periodically during the life of the Project, SMPs will be developed in consultation with the relevant authorities. The SMPs will document the monitoring of potential subsidence impacts on key surface features.

Subsidence monitoring (subsidence survey lines and/or visual inspections) will be undertaken to quantify subsidence resulting from longwall mining.

Monitoring measures of relevance to potential subsidence impacts on groundwater, surface water, aquatic ecology, terrestrial flora and fauna, Aboriginal heritage, non-Aboriginal heritage and visual character are described in subsequent sections below. HCPL's proposed subsidence monitoring and adaptive management approach with respect to subsidence effects at the Waratah Rivulet are described in Section 5.

Monitoring of infrastructure items will be undertaken as relevant Project longwalls are mined to confirm observed ground movements are consistent with the subsidence predictions and to identify potential impacts and required remedial measures.

Monitoring of infrastructure items if required would include the:

- Illawarra Railway;
- F6 Southern Freeway including bridges;
- Princes Highway;
- Garrawarra Centre;
- electrical services;
- optical fibre and copper telecommunications cables;
- Woronora Dam road, fire trails in the Woronora Special Area and other minor roads;
- Sydney Water pipelines;
- houses in close proximity to the Project Underground Mining Area; and
- rural buildings, tanks and farm dams.

Geological investigations will be undertaken progressively during the life of the Project and will inform subsidence prediction and the development of subsidence management measures where relevant. The geological investigations are described in the section below.

Groundwater

As described above, over the life of the Project SMPs will progressively be prepared. Project geological investigations, groundwater monitoring and response measures will be detailed in these SMPs, where relevant.

<u>Geological Investigation Programme</u>

Geological investigations will be undertaken progressively during the life of the Project. Key components of the Project geological investigations will include:

- long in-seam exploration boreholes to identify any geological anomalies in advance of longwall mining;
- mapping of geological structures intersected by underground workings;
- surface mapping (ground-truthing) of geological characteristics; and
- further analysis of geomorphic expressions.

Table SOC-1
Metropolitan Coal Project Compensatory Measures and Ecological Initiatives

Compensatory Measure or Ecological Initiative	Comment	Financial Contribution
Research Programmes		$250,000
• Research into subsidence effects on streams.	Consistent with the Southern Coalfield Panel Report (SCPR).*	
• Research on techniques for remediating stream bed cracking, including:		
- Crack network identification and monitoring techniques.		
- Technical aspects of remediation, such as matters relating to environmental impacts of grouting operations and grout injection products, life spans of grouts, grouting beneath surfaces which cannot be accessed or disturbed, techniques for the remote placement of grout, cosmetic treatments of surface expressions of cracks and grouting boreholes.	Consistent with SCPR Recommendation 14.*	
• Research comparing the outcomes of interventionist remediation with natural processes of remediation.	Consistent with SCPR.*	
• Research into the refinement of the prediction of non-conventional subsidence effects in the Southern Coalfield and the link to environmental effect. This will focus on valley closure and upsidence mechanisms.	Consistent with SCPR Recommendation 17.*	
	Sub-total Contribution	**$250,000**
Catchment Condition Work		$50,000/year for life of Project
• Financial contribution towards rehabilitation and revegetation works within the Woronora catchment and/or other SCA controlled catchments. This will include project management services as required.	Catchment residual impact offset.	
• Pest Control	Biodiversity initiative.	
- Financial contribution to pest control programmes for pests such as the Red Fox, European Rabbit, Feral Deer, Feral Pig and Feral Cat within the Woronora catchment and/or other SCA controlled catchment.		
• Weed Control	Biodiversity initiative.	
- Financial contribution to weed control programmes for weeds such as Pampas Grass, African Love Grass, Lantana, African Boxthorn, Bridal Veil Creeper, Prickly Pear, Onion Grass and Blackberry within the Woronora catchment and/or other SCA controlled catchment.		
	Subtotal Contribution	**$1,150,000**
Total HCPL Contribution		**$1,400,000**

* DoP (2008).

Table SOC-2
Overview of the Proposed Environmental Monitoring Programme

Monitoring Focus	Section	Monitoring Sites
Meteorology		
Automated meteorological station: • Temperature. • Relative humidity. • Net solar radiation. • Rainfall. • Wind speed. • Wind direction. • Sigma theta (the rate of change of wind direction).	4.1.3	Major Surface Facilities Area or nearby in Helensburgh.

Table SOC-2 (Continued)
Overview of the Proposed Environmental Monitoring Programme

Monitoring Focus	Section	Monitoring Sites
Subsidence • Subsidence ground movements. • Visual inspections.	4.2.4	Natural surface features in the Project Underground Mining Area and surrounds. Infrastructure items in the Project Underground Mining Area and surrounds (Appendix A): • Illawarra Railway. • F6 Southern Freeway. • Princes Highway. • Bridges on the F6 Southern Freeway. • Garrawarra Centre. • Electrical services. • Optical fibre and copper telecommunication cables. • Woronora Dam road, fire trails in the Woronora Special Area and other minor roads. • Sydney Water pipelines. • Houses in close proximity to the Underground Mining Area. • Rural buildings, tanks and farm dams.
Geological Investigations • Long in-seam exploration boreholes. • Mapping of geological structures intersected by underground workings. • Surface mapping (ground-truthing) of geological characteristics. • Further analysis of geomorphic expressions.	4.3.3	Underground Mining Area and Surrounds (Appendix B).
Groundwater • Groundwater level.	4.3.3	WRGW1 to WRGW6. UTGW1 to UTGW3. FGGW1 to FGGW3. SWAMP1 to 3. 9EGW1. 9GGW1. 9HGW1. SWGW1 and SWGW2. RTGW1.
• Groundwater quality – electrical conductivity, pH, total dissolved solids, turbidity, calcium, magnesium, sodium, flouride, potassium, chloride, sulphate, bicarbonate, total nitrogen, ammonium nitrogen, nitrate, total phosphorous, barium, strontium, manganese, iron, zinc, cobalt and aluminium.	4.3.3	WRGW1 to WRGW6. UTGW1 to UTGW3. FGGW1 to FGGW3. 9EGW1. 9GGW1. 9HGW1. RTGW1. (*Note: Monitoring site locations are shown in Appendix B and Figure 4-3*).

Table SOC-2 (Continued)
Overview of the Proposed Environmental Monitoring Programme

Monitoring Focus	Section	Monitoring Sites
Surface Water		
• Rainfall.	4.4.3	PV1 (Waratah Rivulet catchment). PV2 (Woronora River catchment).
• Evaporation.	4.4.3	At or near the Woronora Reservoir.
• Surface water flow.	4.4.3	GS2132102 (Waratah Rivulet) (SCA data). GS2132101 (Woronora River) (SCA data). GS213200 (O'Hares Creek) (NSW Department of Water and Energy [DWE] data).
• Pool water level.	4.4.3	Pools A, B, C, E, F, G, G1, H and I. Major pools on Waratah Rivulet. Two representative pools on Woronora River. Selected pools in the lower reaches of the Eastern Tributary.
• Storage characteristics and cease to flow levels of monitored pools.	4.4.3	Pools A, B, C, E, F, G, G1, H and I. Major pools on Waratah Rivulet. Two representative pools on Woronora River. Selected pools in the lower reaches of the Eastern Tributary.
• Surface water quality - electrical conductivity, pH, redox potential, dissolved oxygen, turbidity, calcium, magnesium, sodium, potassium, chloride, sulphate, bicarbonate, total nitrogen, total phosphorous, nitrate, barium, strontium, manganese, iron, zinc, cobalt and aluminium.	4.4.3	WRWQ1 to 9. Eastern Tributary. Woronora River. Honeysuckle Creek. Bee Creek. Woronora Reservoir (SCA data). (*Note: Monitoring site locations are shown in Appendix C and Figure 4-6*).
• Site water balance.	4.4.3	Major Surface Facilities Area and underground mining.
• Water releases.	4.4.3	Camp Gully.
Coal Reject Geochemical Testwork		
• Coal reject geochemistry.	4.4.3	Major Surface Facilities Area.
Erosion and Sediment Control		
• Stability. • Effectiveness.	4.1.3, 4.4.3 and 4.5.3	Sediment control structures.
Aquatic Ecology		
• Aquatic ecology.	4.5.3	Underground Mining Area and Surrounds.
Terrestrial Flora		
• Riparian vegetation. • Slope/ridgetop vegetation. • Upland swamp vegetation. • Weeds.	4.6.3	Underground Mining Area and Surrounds.
Terrestrial Fauna		
• Sandstone habitats. • Amphibians. • Pests.	4.7.3	Underground Mining Area and Surrounds.
Aboriginal Heritage		
• Aboriginal heritage sites.	4.8.3	Underground Mining Area and Surrounds.

Table SOC-2 (Continued)
Overview of the Proposed Environmental Monitoring Programme

Monitoring Focus	Section	Monitoring Sites
Non-Aboriginal Heritage • Non-Aboriginal heritage items.	4.9.3	Major Surface Facilities Area.
Noise • Attended and unattended noise monitoring.	4.10.3	Major Surface Facilities Area and Helensburgh (Appendix J and Figure 4-19).
Air Quality • Real-time dust monitoring system. • Dust deposition. • High volume sampling (PM_{10}). • Greenhouse gas emissions and energy consumption.	4.11.3	Major Surface Facilities Area. Helensburgh. Helensburgh. Underground Mining Area and Major Surface Facilities Area. (*Note: Monitoring site locations are shown in Appendix K and Figure 4-19*).
Rehabilitation • Erosion and Sediment Control • Revegetation. • Surface cracking (e.g. on fire trails or at Flat Rock Crossing). • Weed control. • Project Infrastructure. • Landform stability and public safety.	5.3, 5.4 and 5.5	Underground Mining Area and/or Major Surface Facilities Area.

The above activities will focus on the identification of potential conduits (e.g. faults, dykes, joint seams) consistent with Recommendation 18 of the SCPR (DoP, 2008) and include extrapolation from areas external to the Project Underground Mining Area.

Groundwater Monitoring

The existing groundwater monitoring programme for Longwalls 14-17 at the Metropolitan Colliery will be augmented by the groundwater monitoring programme developed for Longwalls 18 to 19A in the Current Underground Mining Area which includes:

- three sets of deep multi-level piezometers to the Bulli Seam on ridgelines (i.e. in recharge areas) along Fire Roads 9E, 9G and 9H;
- three sets of deep multi-level groundwater sampling boreholes on ridgelines (i.e. in recharge areas) along Fire Roads 9E, 9G and 9H;
- paired bores at a swamp location (SWGW1 and SWGW2); and
- nested piezometers to approximately 60 m (near the base of the Hawkesbury Sandstone) immediately adjacent to a pool on a tributary stream (RTGW1).

The monitoring of groundwater levels (including those associated with upland swamps) and groundwater quality is described in Table SOC-2.

This groundwater monitoring programme and any supplementary components that may be required for the Project will be detailed in the Project EMP. The frequency, parameters and locations monitored as part of the groundwater quality monitoring programme will also be described in the Project EMP.

Surface Water

Surface Water Monitoring

The current Metropolitan Colliery surface water monitoring programme in the Completed and Current Underground Mining Areas has been developed by HCPL in consultation with the SCA. HCPL has already commenced some pre-mining data collection in the Project Underground Mining Area, however additional surface water monitoring will be conducted to assess localised impacts of the Project on surface water resources.

A surface water monitoring programme will be developed for the Project and detailed in the Project EMP. The frequency, parameters and locations monitored as part of the surface water quality monitoring programme will also be described in the Project EMP. However, it is anticipated that the following will be incorporated in the Project EMP:

- the existing pluviometer (rainfall measurement) network will be maintained over the life of the Project;
- an evaporation pan will be re-established at or near the Woronora Reservoir;
- stream flow gauging stations on Waratah Rivulet, Woronora River and O'Hares Creek will be maintained over the life of the Project;
- the existing water quality monitoring regime conducted by HCPL on Waratah Rivulet will continue and will be supplemented by on-going monitoring in the Eastern Tributary, Woronora River, Honeysuckle Creek and Bee Creek;
- water quality sampling in Woronora Reservoir will continue;
- water level monitoring of major pools on Waratah Rivulet will continue for the life of the Project;
- water levels in two representative pools on Woronora River and in selected pools that occur in the lower reaches of the Eastern Tributary will be monitored using continuous water level monitoring devices; and
- storage characteristics (volume versus level) and cease to flow levels of all monitored pools will be determined by survey.

HCPL's adaptive management approach for Waratah Rivulet and Woronora Reservoir monitoring is described in Section 5.

Site Water Balance

The site water balance will be monitored and reviewed annually to optimise performance and validate predictions.

Water Releases – Camp Gully

Water releases from the Major Surface Facilities Area to Camp Gully will continue to be monitored in accordance with the requirements of EPL No. 767.

Coal Reject Geochemical Testwork

Periodically over the life of the Project, HCPL will test coal reject material that is produced to confirm that the coal reject geochemistry is generally consistent with that observed to date and does not require the implementation of any specific management measures with respect to reject disposal or surface water management.

Aquatic Ecology

Consistent with the SCPR recommendations, the aquatic ecology monitoring programme will be designed to:

(i) monitor subsidence-induced impacts on aquatic ecology; and

(ii) monitor the response of aquatic ecosystems to the implementation of stream restoration works.

The aquatic ecology monitoring programme will be described in detail in the FFMP to be developed for the Project.

Consistent with SCPR recommendations, the aquatic ecology monitoring programme will:

- include monitoring at an appropriate frequency and scale for a period prior to, during, and following the completion of mining;
- include monitoring at an appropriate frequency and scale prior to, during, and following the implementation of stream restoration activities;
- take into account the seasonality and inter-annual variability of the systems under study;
- target the collection of a minimum of two years pre-mining data, where practicable;
- include sites situated within the Project Underground Mining Area, as well as control sites situated in comparable unmined locations (the location of sampling sites will be determined in consideration of the aquatic habitat characteristics, their location relevant to the mine plan and access constraints);
- include the use of quantitative sampling techniques;
- be designed to comprise appropriate sampling replication;

- be designed consistent with best practice impact monitoring (e.g. the use of an experimental design that allows advanced statistical analyses techniques to be employed such as Before, After, Control, Impact [BACI] designed studies);
- be co-ordinated with other monitoring programmes as practicable to assist with determinations of causal relationships (e.g. monitoring of pool water levels, stream flow, groundwater levels and subsidence);
- be developed in consideration of their potential contribution to regional and cumulative data sets on aquatic ecosystems consistent with Recommendation 21 of the SCPR; and
- be peer reviewed by an appropriately qualified specialist.

As described in the section above, surface water quality monitoring will be conducted to monitor subsidence-related impacts on surface water quality and will include parameters of relevance to aquatic ecology including dissolved oxygen, pH, electrical conductivity and turbidity.

Monitoring of subsidence effects on riparian vegetation are described in the section below.

Terrestrial Flora and Fauna

The terrestrial flora and fauna monitoring programmes will be described in detail in the FFMP to be developed for the Project.

Terrestrial flora and fauna will be monitored at an appropriate frequency and scale for a period prior to, during, and following the completion of mining. The monitoring programmes will target the collection of a minimum of two years pre-mining data, where practicable. The monitoring programmes will include sites situated within the Project Underground Mining Area, as well as control sites situated in comparable unmined locations and will be designed to comprise appropriate sampling replication.

The location of sampling sites will be determined in consideration of site characteristics, their location relevant to the Project Underground Mining Area, access and site inspection.

The vegetation and fauna monitoring components will be co-ordinated with other monitoring programmes where practicable to assist with determinations of causal relationships (e.g. monitoring of pool water levels in streams, groundwater levels, swamp gradients, visual monitoring [e.g. of scour pools and erosion features in upland swamps] and subsidence monitoring).

Terrestrial flora monitoring will include monitoring of riparian, upland swamp and slope/ridgetop vegetation. Riparian and slope/ridgetop vegetation will be monitored by visual observations, as well as quantitative sampling.

Monitoring of upland swamp vegetation will target the monitoring of the Sedgeland-Heath complex, as well as monitoring of the Cyperoid Heath/Tea Tree Thicket vegetation. Upland swamp vegetation will be monitored using transects and/or quadrats to obtain quantitative data on flora.

In consideration of the background ecological noise caused by recent wildfire in the Woronora Special Area, the monitoring of terrestrial fauna and their habitats will target specific Project potential impacts, namely, mine subsidence impacts on rocky habitats (e.g. rock fall) and the alteration of water availability.

The terrestrial fauna monitoring programme will include:

- Monitoring of sandstone habitats – monitoring of cliff faces and other sandstone habitats for terrestrial vertebrate fauna to assess the impact of subsidence on rocky habitats and usage by terrestrial vertebrate fauna.
- Monitoring of amphibian species – surveys for amphibians, including threatened species, with a focus on habitats of the Giant Burrowing Frog and Red-crowned Toadlet associated with tributaries.

Aboriginal Heritage

A monitoring programme will be developed in consultation with the Aboriginal community through the SMP process for sites of moderate or high archaeological significance to identify if subsidence has impacted Aboriginal heritage sites and to validate the predicted subsidence movements.

The monitoring programme will be described in the ACHMP and will include:

- the proposed monitoring team (including Aboriginal representation);
- particulars of any further recording of information prior to sites being subject to subsidence;
- tasks to be undertaken during each monitoring round, including:
  - comparison of the baseline record against the status of the site at the time of monitoring;
  - inspections of rock surfaces for cracking and/or exfoliation and/or blockfall;
  - inspection of art motifs for damage or deterioration;
  - subsidence monitoring within and around each site;
  - identification of natural deterioration process (such as fire, vegetation growth and water seepage); and
  - a description (including photos) of any changes noted.
- proposed monitoring schedule;
- proposed reporting requirements; and
- a strategy to undertake on-going consultation with the Aboriginal community.

Non-Aboriginal Heritage

The mine design in the vicinity of the Garrawarra Centre will be constrained by performance criteria developed by Mine Subsidence Engineering Consultants (MSEC) (2008) that result in impacts no greater than hairline cracks or fine cracks of buildings within the Garrawarra Centre which will not require repair. Specific monitoring of the Garrawarra Centre will be included in relevant SMPs.

The CMP to be developed for the Project will include further detailed inspection of all items of heritage significance or potentially of heritage significance within the Major Surface Facilities Area and recording of these items.

Noise

Noise monitoring will be conducted for the Project at the monitoring locations, frequencies, parameters and specifications described in the noise PRPs. Noise monitoring will be conducted in accordance with Australian Standard (AS) 1055 – 1997 *Acoustics – Description and Measurement of Environmental Noise* and the *NSW Noise Policy* (NSW Environment Protection Authority [EPA], 2000).

The results of the noise monitoring will be used to optimise noise controls and validate the noise modelling predictions.

HCPL will continue to maintain a complaints register as part of its environmental management and community relations protocol. The monitoring programme will incorporate mechanisms for responding to noise-related complaints.

Air Quality

Air quality monitoring will be conducted for the Project at the monitoring locations, frequencies, parameters and specifications described in the existing and future PRPs.

The air quality monitoring programme will include a real-time dust monitoring system, which will enable site operators to modify activities, as required to minimise dust emissions and off-site impacts during adverse conditions.

HCPL's current dust monitoring network includes one high volume sampler and six dust deposition gauges. An additional dust gauge has recently been installed at Old Station Road, and another two gauges will be installed at locations proximal to the nearest residences on Parkes Street and Oxley Place for the Project, to further augment the existing monitoring network.

The dust deposition gauges will be analysed for ash content and insoluble solids in accordance with AS 3580.10.1-1991 *Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposited Matter – Gravimetric Method.*

The high volume samplers will monitor particulate matter less than 10 microns in size (PM_{10}) over a six day continuous cycle in accordance with the *Approved Methods for the Sampling and Analysis of Air Pollution in New South Wales* (EPA, 2001).

The results of the air quality monitoring will be used to optimise air quality controls and validate the air quality modelling predictions.

As described above, HCPL will continue to maintain a complaints register as part of its environmental management and community relations protocol. The monitoring programme will incorporate mechanisms for responding to air quality-related complaints.

While no odour impacts are predicted from the Project ventilation shafts, in the event of an issue or complaint arising with respect odour, suitable complaint response and monitoring measures will be developed.

Reporting

Under the *Mining Act, 1992*, environmental protection and rehabilitation are regulated by conditions included in all mining leases, including requirements for the submission of a Mining Operations Plan (MOP) prior to the commencement of operation, and subsequent Annual Environmental Management Reports (AEMR).

Collectively, the MOP and AEMR constitute the *Guidelines to the Mining, Rehabilitation and Environmental Management Process* (MREMP Guidelines) (DPI-MR, 2006b) which has been developed by the DPI-MR.

The MREMP is a framework that aims to facilitate the development of mining in NSW in a safe manner such that operations are safe, the environment is protected, the resources are efficiently extracted and rehabilitation achieves a stable, satisfactory outcome (DPI-MR, 2006b). The structure and content of the Project MOP and AEMR will be developed in accordance with the MREMP Guidelines (DPI-MR, 2006b) and through consultation with various regulatory and advisory agencies including the DPI-MR, DECC, DoP, SCA and WCC.

Mining Operations Plan (MOP)

The existing MOP will be revised and updated as required to include Project-related operations.

The MOP will provide information in regard to the mining, processing and rehabilitation operations, relevant lease and development conditions, licences and other approvals.

The MOP will also describe:

- area(s) to be disturbed;
- mining, rehabilitation and remediation method(s) to be used and their sequence;
- existing surface infrastructure;
- progressive rehabilitation schedules;
- areas of particular environmental sensitivity;
- land and water management systems; and
- resource recovery.

The MOP will be revised periodically, and prior to any significant alteration to Project operations.

Annual Environmental Management Report (AEMR)

An AEMR will be prepared to report on the status of approvals, leases, licences and environmental risk management and environmental control strategies.

For the preceding 12 month period, the AEMR will provide a summary of community relations and liaison, mine development and rehabilitation in relation to the MOP. Project environmental performance in relation to the collective conditions of approvals, leases and licences for the previous 12 month period will also be reported.

The AEMR will also include a review and any proposed improvements in relation to environmental monitoring and management systems (including waste management) and environmental performance and will specify environmental and rehabilitation targets to be achieved during the ensuing 12 month period.

SMP Reporting

In accordance with Metropolitan Colliery's existing SMP approvals (DPI-MR, 2006a; DPI-MR, 2008), HCPL will prepare and submit to relevant authorities a monthly Subsidence Management Status Report, which includes a summary of subsidence development, as well as measured and observed subsidence impacts. The outcomes of the monitoring and management programmes will also be reported in an End of Panel Report. A review process is currently incorporated into the monitoring and management programmes (typically at the completion of each longwall) to allow changes to be made to the programmes if required.

Other Licences and Approvals

HCPL will report to the relevant authorities in accordance with their licences and approvals (e.g. EPL No. 767 requirements, approvals issued by the SCA for surface activities within the Woronora Special Area and occupational health and safety requirements).

Greenhouse Gas Emissions

Greenhouse gas emissions and energy consumption will be reported in accordance with the *National Greenhouse and Energy Reporting Act, 2007* (NGER Act). The NGER Act makes registration and reporting mandatory for corporations whose energy production, energy use or greenhouse gas emissions meet specified thresholds.