

Stratford Extension Project Environmental Impact Statement

SECTION 7

SUMMARY OF MANAGEMENT, MITIGATION, MONITORING AND REPORTING



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7 SUMMARY OF MANAGEMENT, MITIGATION, MONITORING AND REPORTING

7.1 OVERVIEW

This Section provides a consolidated summary of proposed Project environmental management, mitigation and monitoring measures.

7.1.1 Project Environmental Management

Section 4 of this EIS outlines proposed environmental management, mitigation, monitoring and biodiversity offset measures.

These include measures relating to land use, agricultural production, land contamination, groundwater, surface water, geochemistry, geomorphology, noise, blasting and vibration, air quality, greenhouse gas emissions, flora, terrestrial fauna, aquatic ecology, Aboriginal heritage, non-Aboriginal heritage, road transport, visual character, socio-economic impacts, hazards and risk.

Where relevant, Project-specific environmental monitoring programmes are also proposed in Section 4.

Section 5 of this EIS describes how surface disturbance areas would be rehabilitated and presents the Project Rehabilitation Strategy.

The integrated environmental management systems at the Stratford Mining Complex include various environmental management strategies, plans and programmes that have been developed and implemented since operations commenced at the SCM and BRNOC (Section 2.1.9).

SCPL would continue to implement the existing strategies, plans and programmes and where necessary, review, revise and build on them. A summary of these measures and the associated reporting is provided in Table 7-1.

The existing monitoring programmes would also be augmented to address the Project extension to the Stratford Mining Complex.

It is recognised that changes to the Project environmental management, mitigation, monitoring and reporting proposed in this EIS may be considered necessary during further consultation with government agencies in the assessment and approval process of the Project.

Project environmental management, mitigation, monitoring and reporting would be conducted in accordance with finalised Development Consent conditions and associated licences and approvals, with the final monitoring details (locations, parameters and frequencies) to be provided in the relevant management plans and monitoring programmes.

7.1.2 Environment and Community Relations Policy

Yancoal's corporate environment and community relations policy states:

Yancoal accepts its responsibility to conduct its operation in a lawful and environmentally sound manner and to work in consultation with the community and other stakeholders.

We will:

- *Identify, assess and manage potential environmental aspects, impacts and community risks.*
- *Implement and validate an effective documented environment and community relations management system.*
- *Strive for continual improvement in environmental performance.*
- *Provide the resources and training necessary to achieve our goal.*
- *Deliver outcomes that meet or exceed our licenses and approvals.*
- *Comply with applicable legislation and regulations.*
- *Foster positive relationships with regulatory agencies and community representatives.*
- *Be accountable for our actions.*

We will strive for excellence in environmental management and in the establishment of effective and sustainable community relationships.

**Table 7-1
Summary of Project Management, Mitigation, Monitoring and Reporting**

Proposed Management, Monitoring and Reporting	Key EIS Sections and Appendices
Management and Monitoring	
Environmental Management Strategy	Section 2.1.9
Property Management Strategy	Section 4.3 and Appendix K
Water Management Plan [^]	Sections 4.4 and 4.5 and Appendices A and B
• Groundwater Management Plan [^]	Section 4.4 and Appendix A
• Surface Water Management Plan [^]	Section 4.5 and Appendix B
• Site Water Balance	Section 4.5 and Appendix B
Noise Management Plan [^]	Section 4.6 and Appendix C
Blasting/Vibration Management Plan [^]	Section 4.6 and Appendix C
Air Quality and Greenhouse Gas Management Plan (AQGHGMP) [^]	Section 4.7 and Appendix D
Spontaneous Combustion Management Plan	Section 4.7 and Appendix D
Biodiversity Management Plan [^]	Section 4.9.3 and Appendices E and F
Heritage Management Plan [#]	Section 4.12 and Appendix I
Road Closure Management Plan	Section 4.14 and Appendix N
Life of Mine Rejects Disposal Plan [^]	Sections 2.11 and 4.18.2
Rehabilitation Management Plan [^]	Sections 4.9.3 and 5 and Appendix E
• Final Void and Mine Closure Plan [^]	Sections 4.16 and 5
Reporting Requirements	
Annual Environmental Management Report (AEMR) or Annual Review and Mining Operations Plan (MOP) or Rehabilitation Management Plan	Section 6.4.1
Independent Environmental Audit	Section 7.5.3
Development Consent, Licences and Approvals	Section 6, Attachment 5 and Attachment 6
Commonwealth Government EEO Program	Section 4.8.3
Greenhouse Gas Reporting	Sections 4.8.3 and 6.4.2
National Pollutant Inventory	Section 3.3.6

[^] Monitoring programme included in management plan.

^{*} Past offset conditions are within the DCM Biodiversity Management Plan. A new Biodiversity Management Plan would be prepared for the Project.

[#] New management plan to be prepared for the Project.

7.1.3 Environmental Management Responsibilities

Environmental management at the Stratford Mining Complex is the responsibility of all employees, with co-ordination provided by the Environment and Approvals Manager, who reports to the General Manager.

All employees and contractors undertake an induction and environmental awareness programme prior to working independently on-site.

7.2 CONSULTATION AND COMMUNITY

7.2.1 Website and Community Hotline

SCPL maintains a website within the Yancoal web domain (www.yancoal.com.au) for the general public to keep up to date with the operations at the Stratford Mining Complex.

The website would continue to provide information on the environmental management and performance of the Project, including:

- environmental management plans;
- independent environmental audits;
- annual reviews;
- environmental monitoring results;
- CCC meeting minutes; and
- complaints registers.

Yancoal has a dedicated community hotline (1300 658 239) for residents to contact Yancoal with any questions or concerns they may have regarding the Stratford Mining Complex. The community hotline would be continued for the Project.

7.2.2 Community Consultation

A CCC has been established and operated in accordance with the existing Development Consents (DA 23-98/99 and DA 39-02-01) and exploration tenement (EL 6904).

The CCC meets quarterly and the meeting minutes are available publicly on the Yancoal website. Typical agenda items for these meetings include appraisal of the Annual Review, mine progress, complaints register, rehabilitation activities and relevant environmental assessments or management plans. The CCC would continue to operate for the Project.

7.2.3 Community Support

The aim of the Community Support Program is to help benefit a wider range of community needs such as education, environment, health, infrastructure projects, arts, leisure and research.

The Community Support Program would continue to offer funding assistance to a wide range of community groups and projects in the Gloucester Basin.

7.3 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

Key environmental management and mitigation measures include:

- management of agricultural land in the Project area and on adjoining Yancoal-owned lands;

- management of water resources including augmentation/revision of associated existing water management practices/plans;
- minimising operational noise emissions associated with the Project and augmentation/revision of existing noise management practices/plan;
- augmentation/revision of existing blasting management practices/plan;
- augmentation/revision of existing air quality management practices/plan;
- management of biodiversity in the Project area and biodiversity offset areas;
- management of Aboriginal heritage at the Project;
- installation of visual screening in consultation with relevant landowners to minimise the visibility of the Project (including night-lighting);
- population and community infrastructure management measures; and
- progressive rehabilitation of Project disturbance areas, including the reinstatement of key agricultural and ecological values, and implementation of a mine closure strategy.

These are described further below, with reference to the relevant sections of this EIS where further detail is available.

7.3.1 Agricultural Land

The rehabilitation and mine closure strategy for the Project includes restoration of approximately 300 ha of agricultural land (Sections 5 and 7.3.10).

A Property Management Strategy has been prepared by suitably qualified persons to facilitate the management of agricultural land in the Project area and on adjoining Yancoal-owned land.

The implementation of the Property Management Strategy would serve to minimise the potential direct impacts of the Project on agricultural production within the Project area and Yancoal-owned land, and potential indirect impacts (e.g. weeds and pests) on surrounding agricultural lands.

7.3.2 Water Resources

Sections 2.12, 4.4.3 and 4.5.3 describe the Project water management measures. Key components of the proposed Project water management are summarised below.

Up-catchment Diversions

The existing surface water runoff controls to prevent up-catchment runoff water from entering open cut mining operational areas would be generally retained for the Project. Details of additional up-catchment runoff water control structures to be developed for the Project are discussed in Section 2.12.2.

Prior to extension of the existing eastern up-catchment diversion for the Stratford East Open Cut, the longitudinal profile of the tributary of Avondale Creek would be surveyed from the diversion outlet to the junction of Avondale Creek, to define the location and size of all knickpoints (e.g. gully head erosion points). Prior to diversion of the 600 m section of the tributary adjacent the Avon North Open Cut, an investigation would be undertaken to inform the final diversion design.

Contained Water Storages

SCPL would manage and operate the Stratford East Dam and other contained water storages so that no release to downstream watercourses would be required for the Project.

Notwithstanding the above, SCPL is seeking to retain the existing licensed release (EPL 5161) of water from the Stratford East Dam during drought conditions¹ and with the formal written approval of the EPA (i.e. to provide water to local farmers to assist them during adverse climatic conditions should such conditions occur during the life of the Project).

Irrigation Management

Irrigation activities would be managed by limiting irrigation to mine landforms that only drain directly to the contained water storages (i.e. not off-site).

Final Voids

At the cessation of mining, three final voids would remain, *viz.* Avon North, Stratford East and Roseville West final voids. Bunds/embankment walls would be constructed adjacent to the lowest side of each final void, in order to confine each final void waterbody in the event of an extreme wet climate sequence.

Final void design and mine planning would be periodically reviewed in consultation with the relevant government agencies as a component of updating the Rehabilitation Management Plan.

PAF Waste Rock and CHPP Rejects

Consistent with the PAF management procedures adopted at the DCM, PAF waste rock material would be segregated and selectively handled and then placed in either in-pit or out-of-pit engineered PAF waste cells.

For in-pit waste rock emplacement, PAF waste rock material would be placed below the predicted final (post-mining) water table recovery level. PAF waste rock material would be encapsulated within constructed containment cells and capped with a low permeability layer when placed in out-of-pit waste rock emplacements.

During operations, limestone would be placed on the open pit floor and interim waste rock in-pit and out-of-pit waste rock emplacement lifts/faces where PAF material is present, to minimise the release of acid rock drainage products.

Limestone treatment would also continue to be undertaken on CHPP reject material that is deposited subaerially in the Stratford Main Pit and Avon North Open Cut, in accordance with the Life of Mine Rejects Disposal Plan (SCPL, 2009).

Additional geochemical characterisation and investigation would be undertaken over the life of the Project, including waste rock/roof rock PAF/NAF distribution modelling and CHPP reject total sulphur analysis.

The existing Life of Mine Rejects Disposal Plan would be revised to reflect the Project.

Water Management Plan

The existing Water Management Plan, which comprises the Site Water Balance, Groundwater Management Plan and Surface Water Management Plan would be revised to reflect the Project.

Site Water Balance

Review and progressive refinement of the site water balance would continue to be undertaken on a regular basis over the life of the Project to record the status of inflows (water capture), storage and consumption (e.g. CHPP usage, return water from co-disposal areas, dust suppression and irrigation activities) and to optimise water management performance.

¹ If a formal drought declaration is made by the Rural Lands Protection Board.

Groundwater Management Plan

The existing Groundwater Management Plan, which is included in the Water Management Plan would be reviewed and revised to describe any additional monitoring (Section 7.4.1) and measures/procedures that would be implemented over the life of the Project to respond to potential exceedances of groundwater-related criteria.

Surface Water Management Plan

The existing Surface Water Management Plan which is included in the Water Management Plan would be reviewed and revised to describe any additional monitoring (Section 7.4.2) and measures/procedures that would be implemented over the life of the Project to respond to any potential exceedances of surface water related criteria and contingency measures.

Erosion and sediment control plans would be progressively developed and approved over the life of the Project. The plans would be updated periodically and the effectiveness of the plans would also be assessed through monitoring.

7.3.3 Noise

Sections 2.6.4 and 4.6.3 describe the Project noise management measures. Key components of the proposed Project noise management are summarised below.

Operational Noise Mitigation Measures

SCPL would implement the following noise management and mitigation measures to minimise noise emissions associated with the Project:

- implementation of XQ conveyor drives and idlers on fixed infrastructure (e.g. CV01, CV04, CV05, CV22 and CV23);
- implementation of XQ mobile fleet for all new large haul trucks and dozers;
- implementation of management controls on dozers (e.g. restriction of gear usage to first gear only on product stockpiles);
- daytime only operation of the Roseville West Pit Extension;
- Stratford East Open Cut waste rock fleet generally operated daytime only during Years 1 to 5;
- emplacement of Avon North Open Cut waste rock in the Stratford Main Pit during evening and night-time;
- maximising in-pit waste rock emplacement opportunities;
- emplacement of out-of-pit waste rock behind acoustic bunding during Stratford East Open Cut evening and night-time operations (i.e. when in-pit dumping opportunities are not available);
- installation of approximately 8 km of 6 m high acoustic bunds along haul roads; and
- installation of approximately 4 km of 6 m high acoustic bunds around the rail loop.

Noise Management Zone

Depending on the degree of exceedance of the Project-specific noise levels, potential noise impacts in the Noise Management Zone could range from marginal to moderate (in terms of the perceived noise level increase).

In addition to the noise management and mitigation measures described above, management procedures for the Noise Management Zone would include:

- noise monitoring on-site (i.e. measurement of machinery and plant sound power levels) and within the vicinity of the Stratford Mining Complex, including real-time noise monitoring;
- prompt response to any community concerns or complaints;
- refinement of on-site noise management and mitigation measures and operating procedures where practicable; and
- implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air conditioning), in consultation with the relevant landowner, where noise monitoring shows noise levels which are 3 to 5 dBA above Project-specific noise levels.

The above procedures would continue to be documented in the Noise Management Plan and would form part of the adaptive management approach to Project noise management that would include real-time noise monitoring and meteorological forecasting.

Noise Affection Zone

Systemic exposure to noise levels greater than 5 dBA above Project-specific criteria may be considered unacceptable by some landowners. Management procedures for the Noise Affection Zone would include:

- discussions with relevant landowners to identify and assess any concerns or complaints regarding Project noise emissions;
- implementation of reasonable and feasible acoustical mitigation at receivers (which may include measures such as enhanced glazing, insulation and/or air conditioning), in consultation with the relevant landowner, where noise monitoring shows noise levels from the mine which are greater than 5 dBA above Project-specific noise levels; and
- negotiated agreements with landowners where required.

The above procedures would continue to be documented in the Noise Management Plan and would form part of the adaptive management approach to Project noise management that would include real-time noise monitoring and meteorological forecasting.

Noise Management Plan

SCPL would revise the existing Noise Management Plan for the Project to include:

- the Project feasible and reasonable noise mitigation and operational management measures;
- an additional real-time noise monitor in the vicinity of Stratford to augment the existing real-time monitoring and management system;
- implementation and management of a meteorological forecasting system;
- details of revised triggers for the Project real-time monitoring and management system; and
- details of rail noise monitoring, management and mitigation measures associated with the Project.

7.3.4 Blasting

Section 4.6.3 describes the Project blasting management measures. Key components of the proposed Project blasting management are summarised below.

SCPL would revise the existing Blasting/Vibration Management Plan to address changes to blasting practices required by the Project, including the following:

- development and ongoing review of “site laws” (i.e. site-based prediction equations) for ground vibration and airblast;
- safety control measures and notification/closure procedures in relation to blasting within 500 m of Bowens Road, Wenham Cox Road, Wheatleys Lane and Glen Road;
- management of potential flyrock impacts at the following privately-owned properties during blast events within 500 m of the property boundary (Figure 1-3a):
 - 31 (Isaac)²;
 - 15 (Falla)²; and
 - 14 (Wenham)²;
- safety control measures and notification procedures for livestock in proximity to blasting activities; and
- additional blast monitoring requirements/locations.

In addition, SCPL would revise the existing Road Closure Management Plan to reflect the Project blasting regime and road realignments.

7.3.5 Air Quality

Section 4.7.3 describes the Project air quality management measures. The existing Stratford Mining Complex air quality management measures would be revised and implemented during construction and operation of the Project, including:

- specific dust suppression measures to be implemented during Project construction/development activities (e.g. road diversions), such as minimisation of disturbance areas and watering of trafficked areas would be included in the AQGHGMP;
- continued implementation of best practice air quality management measures such as increased haul road watering, in accordance with the PRP under EPLs 5161 and 11745;
- a PM_{2.5} TEOM would be installed in close proximity to Stratford;

² Property subject to an existing landholder agreement.

- a second TEOM would be installed to monitor PM₁₀ and PM_{2.5} concentrations continuously, at a location in close proximity to Craven;
- the AQGHGMP would be updated to include a meteorological forecasting system to work in conjunction with the real-time monitoring and management system, providing an alert for the appropriate personnel to review the real-time data;
- the existing Blasting/Vibration Management Plan would be revised to include measures for the minimisation of fume and particulate matter emissions from Project blasts; and
- the existing Spontaneous Combustion Management Plan would be reviewed or augmented as necessary to address the Project.

7.3.6 Biodiversity

Sections 4.9.3, 4.9.4, 4.10.3, 4.10.4, 4.11.3 and 4.11.4 describe the proposed management of biodiversity and the biodiversity offset strategy for the Project. Key components are summarised below.

Biodiversity Management Plan

SCPL would prepare a Biodiversity Management Plan for the Project, including the following aspects:

- vegetation clearance procedures;
- seed collection;
- weed control;
- bushfire prevention;
- land management – continuation of the biodiversity enhancement area;
- biodiversity offset strategy for the Project;
- timing land clearance to minimise harm of fauna;
- salvage and relocation of logs, vegetative material and rocks;
- salvage and relocation of tree hollows;
- nest box programme;
- seed collection;
- management of exotic animals;
- management of artificial lighting;
- vehicular speed limits;
- measures specific to the New Holland Mouse, Glossy Black-cockatoo and Squirrel Glider;

- construction and design of creek crossings; and
- monitoring aquatic ecology.

Further detail on the Biodiversity Management Plan is provided in Sections 4.9.3, 4.9.4, 4.10.3 and 4.11.3.

Biodiversity Enhancement Area

The biodiversity enhancement area covers approximately 240 ha (Figure 7-1).

The following measures are relevant to the management of the biodiversity enhancement area:

- planting with suitable tree species currently occurring on the Project area from local seed;
- exclusion of stock via maintenance of perimeter fencing around the area undergoing revegetation;
- weed and exotic animal control; and
- nest box programme.

The biodiversity enhancement area (Figure 7-1) would be established within 12 months of Development Consent (i.e. exclusion of stock and commencement of flora/fauna management measures).

Biodiversity Offset Strategy

SCPL commits to offset the residual impacts of the Project on flora and fauna and maintain or improve the biodiversity values of the region in the medium to long-term.

The biodiversity offset strategy for the Project involves conserving areas of land with existing conservation values and providing active management to maintain and enhance their values. SCPL proposes four biodiversity offset areas (Figure 7-1) that contain rainforest, riparian forest, wet sclerophyll forest, grassy woodlands, dry sclerophyll forests and cleared land (or equivalent).

Areas of existing native vegetation communities would be enhanced (approximately 490 ha), areas of cleared land would be revegetated (approximately 435 ha) and 10 ha of existing planted trees would be retained.

A summary of the proposed management of the biodiversity offset areas is outlined in Table 7-2. Offset Areas 3 and 4 include a 132 kV power line. The management of offset lands within the power line easements would be in accordance with the requirements of the power authority.

**Table 7-2
Management of the Biodiversity Offset Areas**

Aspect	Description
Revegetation of cleared land to substantially increase the area of native vegetation in the area and maximise habitat diversity and a range of successional stages.	The aim of revegetation would be to establish a range of habitat niches through revegetation (including canopy, understorey and ground cover). The cleared lands would be actively managed to promote revegetation of native woodland/forest species. This would include, but not necessarily be limited to, removal of weeds, creating disturbance to the introduced grassland (via slashing or low-intensity controlled burning), and planting or seeding of flora species represented in the surrounding native vegetation communities. Local seed sources would be used.
Management of livestock grazing.	Livestock grazing would be excluded from the biodiversity offset areas through the provision of appropriate stock fencing.
Control of weeds to enable natural regeneration of native vegetation.	Weeds (including declared noxious weeds) would be controlled and monitored by an appropriately qualified contractor using standard methods.
Introduced animal management to benefit native wildlife.	Introduced animals would be controlled and monitored by an appropriately qualified contractor using standard methods.
Bushfire management.	Access tracks throughout the proposed biodiversity offset areas would be maintained for fire management. Apply fire regimes that maintain dense understorey vegetation cover. Where fire control is necessary apply mosaic pattern hazard reduction burns so the same areas are not burned continuously.
Controlling vehicular access.	Vehicular access would be controlled by fencing and signing the biodiversity offset areas. Vehicle movements would be predominately on designated vehicle tracks.
Nest box programme.	Install and monitor an appropriate number of nest boxes for the Squirrel Glider and other arboreal animals. This may include salvage of tree hollows during Project vegetation clearance activities. As a minimum a ratio of 1:1 (i.e. 1 nest boxes of appropriate size, to replace 1 hollow of similar size and properties) would be adopted.
Salvage and relocation of logs, vegetative material and rocks.	Habitat features (e.g. large hollows and some suitable logs) would be salvaged during Project vegetation clearance activities and relocated to areas where habitat enhancement is required.

Adapted source: Appendices E and F.

Conservation in Perpetuity

An arrangement would be made to ensure the protection in perpetuity and management of the identified biodiversity offset areas (or equivalent) within 12 months of Development Consent. A voluntary conservation agreement pursuant to section 69B of the *National Parks and Wildlife Act, 1974* or similar arrangement, would be sought.

There is no intention for Yancoal mining or exploration activities to occur within the biodiversity offset areas.

Conservation Bond

SCPL would lodge a conservation bond with the DP&I to ensure availability of funding for implementation of the biodiversity offset strategy, in accordance with the performance and completion criteria of the Biodiversity Management Plan.

7.3.7 Aboriginal Heritage

Section 4.12.3 describes the Project Aboriginal heritage management measures. Key components of the proposed Project Aboriginal heritage management are summarised below.

Where practicable, known Aboriginal heritage sites, would be avoided during Project construction and operation works.

Where avoidance of known Aboriginal heritage sites is not practicable, cultural material would be subject to salvage for safekeeping in consultation with the Aboriginal community.

SCPL would develop a Heritage Management Plan in consultation with the Aboriginal community and the OEH (to the satisfaction of the DP&I) to define, develop and formalise the management and mitigation measures for the Project.

The Heritage Management Plan would be developed and would include a description of the management of sites disturbed by the Project.

7.3.8 Visual Character

Section 4.15.3 describes the Project visual character management measures. Key components are summarised below.

Progressive rehabilitation would be undertaken in order to reduce the contrast between the Project landforms and the surrounding environment (Section 7.3.10).

Upon receiving a request from an owner of any privately-owned dwelling which has significant direct views of the Project, SCPL would implement visual mitigation measures (e.g. vegetation screening) in consultation with the owner to minimise visibility of the Project from the dwelling.

Tree planting parallel to Glen Road would also be undertaken during Year 1 of the Project as part of the Project biodiversity offset strategy and would progressively limit potential views of the Project from Glen Road.

7.3.9 Population and Community Infrastructure

Some population growth would occur as a result of the Project employment and associated flow on effects. Community infrastructure impacts of the Project alone are not likely to be substantial. However, cumulative impacts with the AGL Gloucester Gas Project and the proposed Rocky Hill Coal Project could be more significant.

SCPL would work in partnership with the GSC, the Great Lakes Council and the local community so that the benefits of the projected economic growth in the region are maximised and impacts minimised.

Mitigation and management measures would include:

- early provision of information to the GSC, the Great Lakes Council and relevant State Government agencies regarding employment and population level changes to facilitate early community infrastructure provision responses;
- continuation of the current community sponsorships and community support programmes;
- employment of local residents preferentially where they have the required skills and experience;
- purchase local non-labour inputs to production preferentially where local producers can be cost and quality competitive; and
- a code of conduct for construction workers with regard to behaviour in the induction programme.

7.3.10 Rehabilitation and Mine Closure

Section 5 describes the Project Rehabilitation Strategy and management of mine closure. Key components are summarised below.

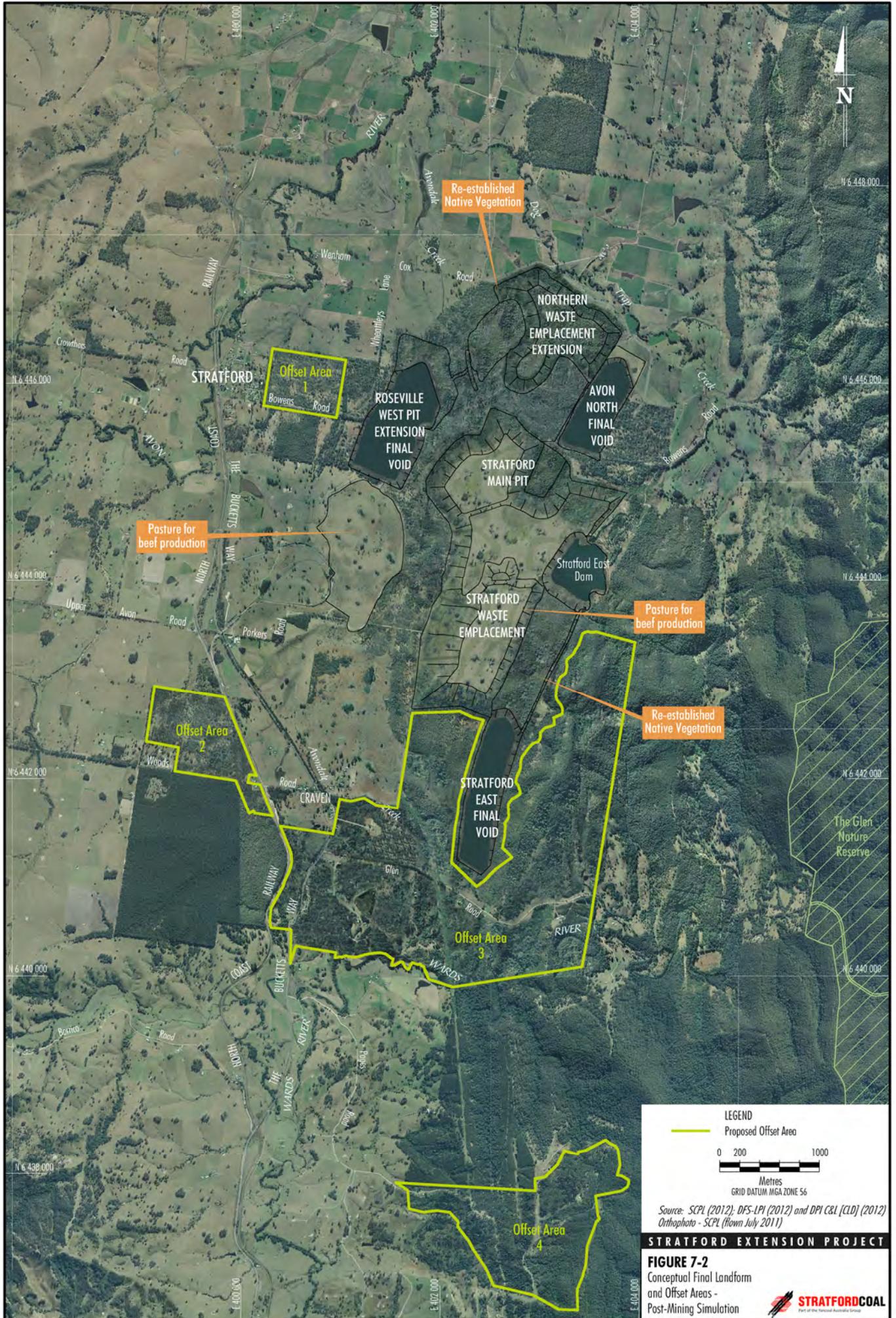
The Project would require the progressive removal of approximately 105 ha of native vegetation communities and 195 ha of introduced or planted vegetation. The disturbance areas associated with the Project would be progressively rehabilitated and revegetated with species characteristic of native woodland/open forest (350 ha) and pasture with scattered trees (300 ha). Figures 7-1 and 7-2 illustrate the proposed Project final landforms, land use and revegetation of the Project area and the biodiversity offset areas.

Revegetation would be subject to regular review, including annual flora surveys by appropriately qualified and experienced persons to identify the success of the rehabilitation programme and identify any additional measures to ensure ongoing rehabilitation success.

The existing Rehabilitation Management Plan would be revised to reflect the Project in consultation with the relevant government agencies, and in accordance with the relevant DRE rehabilitation and mine closure guidelines.

SCPL would develop a mine closure strategy as part of the Rehabilitation Management Plan (i.e. Final Void and Mine Closure Plan) (Section 5.6). The plan would be developed in consultation with the GSC, the Great Lakes Council, the DP&I and the local community, and would include consideration of amelioration of potential adverse socio-economic effects due to the reduction in employment at Project closure.

Key strategic rehabilitation completion criteria would be reviewed and refined as part of the MREMP (Section 6.4.1).



7.4 ENVIRONMENTAL MONITORING

Environmental monitoring to be implemented for the Project is described in Section 4. Table 7-3 provides an overview of the Project environmental monitoring regime. Figure 7-3 depicts the locations of key existing and proposed environmental monitoring sites.

The Project would expand the existing environmental monitoring network including:

- installation of new groundwater monitoring/sampling sites (Figure 7-3);
- installation of new surface water monitoring/sampling sites (Figure 7-3);
- periodic assessment of the geomorphic performance of the tributary of Avondale Creek;
- installation of new noise monitoring sites (Figure 7-3) and adoption of predictive meteorological forecasting;
- installation of a new blast monitoring site (Figure 7-3);
- installation of new air quality monitoring sites (Figure 7-3) and adoption of predictive meteorological forecasting;
- biodiversity monitoring measures;
- monitoring of biodiversity offset and biodiversity enhancement areas; and
- monitoring of rehabilitation and revegetation.

These measures are described further below.

7.4.1 Groundwater

Section 4.4.3 describes the proposed Project groundwater monitoring measures. Key components are summarised below.

The existing Groundwater Monitoring Program which is included in Groundwater Management Plan of the Water Management Plan would be updated and be progressively extended to detect changes in groundwater levels and quality as a result of mining, and improve knowledge of aquifer definition and interactions.

As mining progresses, the existing SCPL network of piezometer installations would be augmented with up to seven additional sites including (Figure 7-3):

- three sites (F1 to F3) to monitor the watertable elevation in waste rock infilling to provide information on recharge rates and mine waste rock permeabilities and to validate groundwater modelling predictions with respect to the emplacements over the life of the Project; and
- four sites (F4 to F7) to monitor west and south of the open cut mining areas.

SCPL would also utilise the results of other groundwater monitoring programmes in the vicinity of the Project (i.e. AGL Gloucester Gas Project and proposed Rocky Hill Coal Project).

Groundwater monitoring results would be reported in the Annual Review.

7.4.2 Surface Water

Section 4.5.3 describes the proposed Project surface water monitoring measures. Key components are summarised below.

Surface Water Monitoring Program

The existing Surface Water Monitoring Program which is included in the Surface Water Management Plan of the Water Management Plan would be generally retained with updates and additional monitoring locations to be installed during the life of the Project, including:

- establishment of a relationship between flow depth and flow rate (i.e. rating) at Site W5 on Avondale Creek (Figure 4-11) so flow rate can effectively be continuously monitored, including ongoing checks/updates on a monthly basis (via manual stream gauging) for at least two years;
- water quality monitoring in new open cut mining areas (Avon North Open Cut and Stratford East Open Cut);
- water quality monitoring in disturbed area dams for parameters including pH, EC, acidity/alkalinity, sulphate, Al, Co, Fe, Mn, Ni and Zn, at a frequency consistent with existing sediment dams;
- installation of gauge boards (with board levels surveyed relative to spillway level) for disturbed area dams;
- monitoring of gauge board levels in disturbed area dams (and whether overflow is occurring) at the time of sampling so that water quality can be related to stored volume; and
- monitoring of water used for irrigation for parameters including pH, EC, RSC and SAR.

**Table 7-3
Summary of the Project Environmental Monitoring Regime**

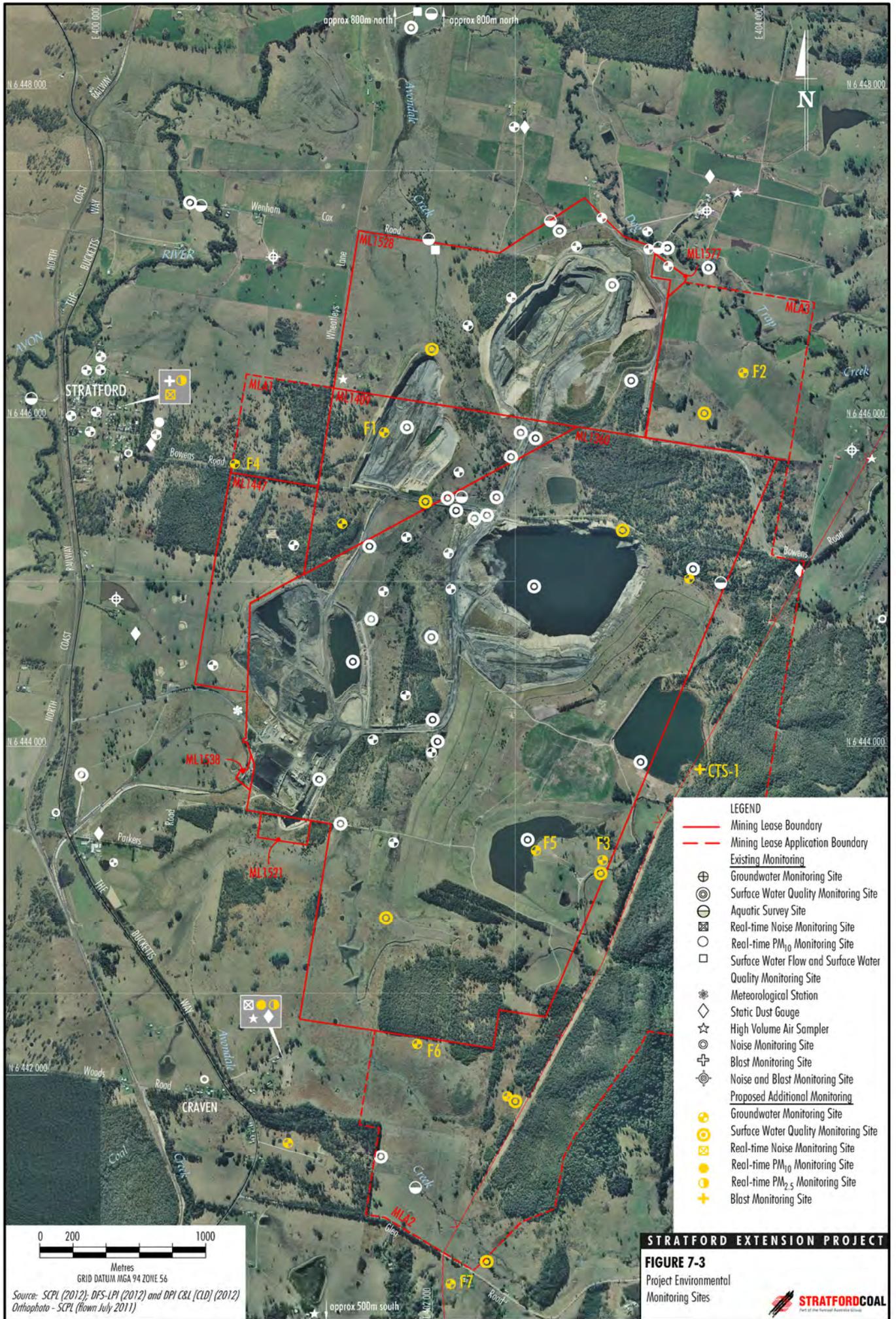
Environmental Aspect	Environmental Monitoring [#]	Frequency [#]
Meteorology	<ul style="list-style-type: none"> <i>Meteorology</i> – On-site meteorological station adjacent to the administration building. 	<ul style="list-style-type: none"> Continuous.
Groundwater	<ul style="list-style-type: none"> <i>Groundwater levels</i> and quality – SCPL Bore, Bramley Bore, Griffin Bore, Stratford Village Bores, RB1, RB2, RB3, GW1, GW2, GW3, GW4, GW5, GW7, GW8, BRWN1, MW1, MW3, MW4, MW6, MW7, MW8, MW11, MW12, GC207, NS246, NS256, NS585, F1, F2, F3, F4, F5, F6 and F7. <i>Groundwater extraction</i> – sumps within the open cuts. 	<ul style="list-style-type: none"> Quarterly. Quarterly.
Surface Water	<ul style="list-style-type: none"> <i>Surface water flow</i> (including ‘nil’ flow records) - W2 and W5/SWQ2. <i>Surface water quality</i> – W1, W2, W3, W3A, W4, W5/SWQ2, W6, W8, W9, W10, SD1, SD2, SD3, SD4, SD7/SWQ5, SD10, SD10A, SD12, SD13, SD14, SD15, SD16, SD17, SD18, Roseville West Pit, BRN pit, BRW, RWD, Eastern Emplacement Area, SED, Stratford Main Pit and Ellis Dam. <i>Structural integrity of dams</i> – all sediment dams and contained water dams. <i>Culverts</i> – debris and plant growth. <i>Up-catchment diversions</i> – integrity/stability. <i>Erosion and sediment control structures.</i> <i>Relevant CHPP Rejects solids volumes and pH.</i> <i>CHPP Rejects</i> - bathymetric survey. 	<ul style="list-style-type: none"> Monthly. Monthly and following 25 mm of rainfall in 24 hours. Quarterly. Annually. Monthly and following 50 mm of rainfall in 24 hours. Quarterly. Monthly. Annually.
Noise	<ul style="list-style-type: none"> <i>Attended noise monitoring</i> – Craven, Ex Bagnall, Isaac, Ex Van Der Drift, Ex Ellis, Ex Clarke, Ex Battaglini, Johnson, Ex Deveraux and Falla residences. <i>Unattended noise monitoring</i> – Craven, Ex Bagnall, Isaac, Ex Van Der Drift, Ex Ellis, Ex Clarke and Falla residences. <i>Real-time (Stratford and Craven)</i> – monitoring and recording at neighbouring private residences and other locations as required. 	<ul style="list-style-type: none"> Quarterly. Quarterly. Continuous 24 hours.
Blasting	<ul style="list-style-type: none"> <i>Blasting</i> – Ex Clarke, Isaac, Ex Ellis, Falla and Ex Judge residences and potential Aboriginal heritage site CTS-1. 	<ul style="list-style-type: none"> Per blast.
Air Quality	<ul style="list-style-type: none"> <i>Dust deposition</i> – D5, D6, D7, D8, D9, D10 and D11. <i>PM₁₀</i> – HVD1, HVD2, HVD3, HVD4 and HVD5 (Cassar residence). <i>Real-time PM_{2.5} and PM₁₀</i> – Stratford and Craven. 	<ul style="list-style-type: none"> Monthly. Continuous six day cycle. Continuous 24 hours.
Biodiversity/ Rehabilitation	<ul style="list-style-type: none"> <i>Weeds and pests</i> – SCPL owned land. <i>Rehabilitation, Biodiversity Enhancement Area and Biodiversity Offset Areas</i> – revegetation/flora. <i>Rehabilitation, Biodiversity Enhancement Area and Biodiversity Offset Areas</i> – fauna usage. <i>Independent audit</i> – biodiversity offset areas. <i>Squirrel Gliders</i> – fitting of radio collars. <i>Nest boxes and glider poles</i> – fauna usage. <i>Aquatic monitoring</i> – macroinvertebrate surveys (W1, W2, W3, W5, W8 and S3). 	<ul style="list-style-type: none"> Annually. Annually. Three yearly. Frequency to be agreed with relevant agencies. Within 12 months of Development Consent. Annually. Annually.

[#] As required by management plans under the Development Consents, EPLs, MLs and Water Licence conditions and on-site investigations.

BRN Pit = Bowens Road North Pit.

BRW = Bowens Road West.

RWD = Roseville West Dam.



- LEGEND**
- Mining Lease Boundary
 - - - Mining Lease Application Boundary
 - Existing Monitoring**
 - Groundwater Monitoring Site
 - Surface Water Quality Monitoring Site
 - Aquatic Survey Site
 - Real-time Noise Monitoring Site
 - Real-time PM₁₀ Monitoring Site
 - Surface Water Flow and Surface Water Quality Monitoring Site
 - Meteorological Station
 - Static Dust Gauge
 - High Volume Air Sampler
 - Noise Monitoring Site
 - Blast Monitoring Site
 - Noise and Blast Monitoring Site
 - Proposed Additional Monitoring**
 - Groundwater Monitoring Site
 - Surface Water Quality Monitoring Site
 - Real-time Noise Monitoring Site
 - Real-time PM₁₀ Monitoring Site
 - Real-time PM_{2.5} Monitoring Site
 - Blast Monitoring Site

STRATFORD EXTENSION PROJECT

FIGURE 7-3

Project Environmental Monitoring Sites



0 200 1000
Metres
GRID DATUM MGA 94 ZONE 56
Source: SCPL (2012); DFS-LPI (2012) and DPI C&L [CLD] (2012)
Orthophoto - SCPL (flown July 2011)

Site Water Balance

Monitoring would be undertaken over the life of the Project to provide data for refinement of the site water balance, including:

- records of pumped water volumes;
- storage levels in contained water storages (weekly basis);
- CHPP water usage rates;
- haul road and waste rock emplacement dust suppression water usage rates; and
- irrigation usage rates.

Annual bathymetric survey of the co-disposed rejects surface within the Stratford Main Pit and the Avon North Open Cut (when commissioned for CHPP rejects disposal) would also be undertaken to enable estimates of stored water volumes and *in situ* rejects density to be made.

Erosion and Sediment Controls/Diversions

The integrity of up-catchment diversion channels/bunds would be visually checked on a monthly basis or after significant rainfall (50 mm or more rainfall in a 24 hour period) to check for any signs of visible erosion or instability to trigger corrective actions.

Quarterly independent geotechnical inspections of open cut mining areas would be used in conjunction with groundwater monitoring results and monthly inspections of up-catchment diversions to monitor the stability of pit walls in the Avon North Open Cut (proximal to Dog Trap Creek), Stratford East Open Cut (proximal to the eastern diversions) and Roseville West Pit Extension (proximal to Avondale Creek and western diversions) during the life of the Project.

The longitudinal profile survey of the tributary of Avondale Creek (Section 7.3.2) would be repeated every two years, with survey data interpreted by a qualified, independent, fluvial geomorphologist to determine whether any measured change is within the normal range of variability, or whether a programme of works is required to stabilise the drainage.

7.4.3 Noise

Section 4.6.3 describes the proposed Project noise monitoring measures. The existing noise monitoring network would continue to be implemented and augmented for the Project. Key additional components are summarised below.

SCPL would establish a real-time monitoring device near Stratford to provide information to guide and manage operations to achieve compliance with relevant noise criteria.

Predictive meteorological forecasting would be used in conjunction with the real-time noise monitoring and management system. The predictive system would provide an alert for the appropriate personnel to review and manage the intensity of upcoming activities for the ensuing day as may be required.

7.4.4 Blasting

Section 4.6.3 describes the proposed Project blast monitoring measures. Key components are summarised below.

Blast monitoring (vibration and photographic) would also include CTS-1 when blasting is undertaken within 1 km of the rock feature (Figure 7-3).

7.4.5 Air Quality

Section 4.7.3 describes the proposed Project air quality monitoring measures. The existing air quality monitoring network would continue to be implemented and augmented for the Project. Key additional components are summarised below.

As part of the existing AQGHGMP, SCPL has committed to establishing a PM₁₀ TEOM near Stratford. This monitor would be installed prior to the commencement of the Project.

SCPL would also establish a real time PM₁₀ and PM_{2.5} TEOM near Craven and PM_{2.5} TEOM near Stratford to provide mine operators with information to guide and manage operations to achieve compliance with relevant air quality criteria.

SCPL would establish a predictive meteorological forecasting system which would be used as part of a pro-active air quality management system. The predictive system would provide an alert for the appropriate personnel to review and manage the intensity of upcoming activities for the ensuing day as may be required.

7.4.6 Biodiversity

Sections 4.9.3, 4.9.4, 4.10.3 and 4.11.3 describe the proposed Project biodiversity monitoring measures. Key components are summarised below.

Weed and Pest Monitoring

Appropriately qualified persons would be engaged to undertake weed control. Follow-up site inspections would occur to determine the effectiveness of weed control.

Measures to control exotic animals would be implemented by an appropriately qualified person(s).

Rehabilitation Monitoring

Revegetation of the post-mine landforms would be under regular review, including annual flora surveys by appropriately qualified and experienced persons to identify the progress of the rehabilitation programme (in terms of plant growth and species diversity).

After the revegetation programme is established fauna monitoring surveys would be performed by the appropriately qualified personnel at three year intervals.

Detailed monitoring reports would be prepared annually.

Biodiversity Enhancement Area

An annual programme would be undertaken to monitor and report on revegetation/flora in the biodiversity enhancement area. Fauna usage monitoring would be undertaken at three year intervals. The monitoring would be undertaken by suitably qualified persons.

Biodiversity Offset Areas

A programme would be undertaken to monitor and report on the effectiveness of the measures and the performance of the revegetation in the biodiversity offset areas, with summary reporting to be carried out annually and comprehensive reporting following the independent audit. The monitoring would be undertaken by suitably qualified persons.

Terrestrial fauna surveys would also be conducted every three years to monitor the use of the biodiversity offset areas by vertebrate fauna.

Independent Audit of the Biodiversity Offset Areas

The proposed biodiversity offset areas would be independently audited at intervals agreed with relevant authorities. The audits would be conducted by suitably qualified persons to:

- assess compliance with the Biodiversity Management Plan;

- assess the performance of the biodiversity offset areas;
- review the adequacy of the management measures and monitoring programme; and
- recommend actions or measures to improve the performance of the biodiversity offset areas, Biodiversity Management Plan, or monitoring programme, if required.

Results of the audits would be reported in the Annual Review.

Squirrel Glider Monitoring

Trapping for Squirrel Gliders would be undertaken in the Project area and those found would be fitted with a radio tracking device as soon as practical after grant of Development Consent, to assist with the estimation of home ranges and identify important habitat resources (e.g. den trees and foraging areas).

The information gathered would be used to adjust the implementation of management measures (e.g. if important den sites are identified and are due to be cleared, additional nest boxes may be installed and/or the important hollows relocated).

Fauna Usage Monitoring

SCPL would install and monitor an appropriate number of nest boxes and glider poles for the Squirrel Glider and other arboreal animals.

Once installed, the nest boxes and glider poles would be monitored by suitably qualified personnel to observe fauna usage. A monitoring report would be prepared annually.

Aquatic Ecology

SCPL would continue to annually monitor aquatic ecosystems around the Stratford Mining Complex. A monitoring report would be prepared annually.

7.4.7 Rehabilitation

As part of the Rehabilitation Management Plan a monitoring programme would be developed to track the progress of revegetation in terms of plant growth and species diversity and to determine the requirement of intervention measures.

Irrigation water and soil in areas of rehabilitation that are irrigated (i.e. within contained catchment areas) would be monitored, and if necessary, irrigation water treatment (e.g. lime dosing) or soil amelioration measures (e.g. gypsum treatment) would be implemented to maintain suitable soil conditions and vegetation establishment/growth.

The annual surveys would be undertaken by an appropriately qualified and experienced person and a detailed rehabilitation monitoring report would be prepared annually.

7.5 REPORTING

7.5.1 Annual Review

SCPL would continue to produce an Annual Review of the environmental performance of the Project for the 12 month reporting period. Copies of the Annual Review would be made available on the Yancoal website.

Environmental monitoring results as described in Section 7.4 would be compared against relevant statutory requirements, monitoring results of previous years and relevant predictions of this EIS.

Biodiversity management, biodiversity offsets and rehabilitation monitoring results and various environmental activities planned for the next 12 months would also be discussed in the Annual Review.

7.5.2 Development Consent Requirements

SCPL would provide regular reporting of environmental performance of the Project on the Yancoal website, in accordance with the reporting arrangements in any plans or programmes approved under the conditions of the Project Development Consent and associated licences and approvals.

7.5.3 Independent Environmental Audit

Consistent with existing reporting requirements, SCPL would commission an independent environmental audit of the Project every three years.

Upon completion of the independent environmental audit, SCPL would submit responses to the DP&I and where necessary, revise environmental management plans.

7.5.4 Other Reporting

Annual Return

A summary of monitoring required by the EPLs (including the recording of complaints) and a Statement of Compliance would continue to be reported in Annual Returns and submitted to the EPA.

Water Licences - Annual Reporting

SCPL would continue to report (including monitoring data, interpretation and discussion relating to groundwater and salinity) in accordance with the conditions of existing and any future water licences to the NOW.

Greenhouse Gas Reporting

Under NGERs requirements, relevant sources of greenhouse gas emissions and energy consumption must be measured and reported on an annual basis, allowing major sources and trends in emissions/energy consumption to be identified.

As part of ongoing NGERs measurement and reporting requirements, a site specific emission factor for fugitive emissions from coal seams would be determined for the Project.

Commonwealth Government EEO Program

Yancoal is also a participant in the Commonwealth Government's EEO Program. Yancoal would assess energy usage from all aspects of its operations, including the Project, and publicly report the results of energy efficiency assessments, and the opportunities that exist for energy efficiency projects with a financial payback of up to four years.

NPI Reporting

SCPL would continue to provide annual NPI reports to the EPA. Emissions data for the Stratford Mining Complex would be made publicly available on the Federal Government's NPI website (www.npi.gov.au) and would also be reported in the Annual Review.

Community Complaints Register

A community complaints register is maintained by SCPL. Complaints and subsequent actions undertaken are reported in the Annual Review and on the Yancoal website.

The Stratford Mining Complex complaints register would continue to be maintained for the Project.