

Stratford Extension Project Environmental Impact Statement

EXECUTIVE SUMMARY



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ES1 OVERVIEW

This Environmental Impact Statement (EIS) is for the Stratford Extension Project (the Project). The Project provides for the continuation and extension of open cut coal mining and processing activities at the Stratford Mining Complex.

The Stratford Mining Complex is an open cut coal mining operation located in the Gloucester Basin approximately 100 kilometres north of Newcastle in New South Wales (Figure ES-1).

Stratford Coal Pty Ltd (SCPL) is the owner and operator of the Stratford Mining Complex. SCPL is a wholly owned subsidiary of Yancoal Australia Limited (Yancoal)¹.

The nearby Duralie Coal Mine (DCM) is also owned by Yancoal and is located approximately 20 kilometres south of the Stratford Mining Complex (Figure ES-1). The Stratford Mining Complex and DCM collectively comprise Yancoal's Gloucester Basin operations.

Stratford Mining Complex

The current mining activities at the Stratford Mining Complex include coal extraction from the existing Stratford Coal Mine (SCM) and Bowens Road North Open Cut (BRNOC) open cut mining operations. Coal production commenced at the Stratford Mining Complex in 1995.

The approximate extent of the existing and approved surface development at the Stratford Mining Complex is shown on Figure ES-2.

Major components include open cut pits, mine waste rock emplacements, run-of-mine (ROM) pad/coal stockpiles, water management infrastructure/storages, coal handling and preparation plant (CHPP), co-disposal areas, product coal stockpiles, rail infrastructure and other infrastructure areas.

ROM coal excavated from the open cut pits is delivered to the ROM pad and then conveyed to the CHPP for processing. The CHPP also processes ROM coal transported from the DCM on the North Coast Railway and small quantities of CHPP rejects recovered by excavation from the western co-disposal area at the SCM (Figure ES-2).

Blended coal products are transported by rail to the Port of Newcastle for export, and to domestic customers.

Approximately 125 people (including Yancoal staff and on-site contractor personnel) are employed at the Stratford Mining Complex.

Nature of the Project

The Project provides for the continuation and extension of operations at the Stratford Mining Complex. The Project would allow an additional 11 years of mining at up to 2.6 million tonnes per annum.

The Project would approximately double the operational workforce (i.e. a total of up to 250 on-site personnel).

The Socio-Economic Assessment indicates that operation of the Project is likely to result in an average annual stimulus of some 714 direct and indirect jobs in New South Wales.

The Project would involve the extension of mining into three new open cut mining areas (Figure ES-2):

- Roseville West Pit Extension;
- Avon North Open Cut; and
- Stratford East Open Cut.

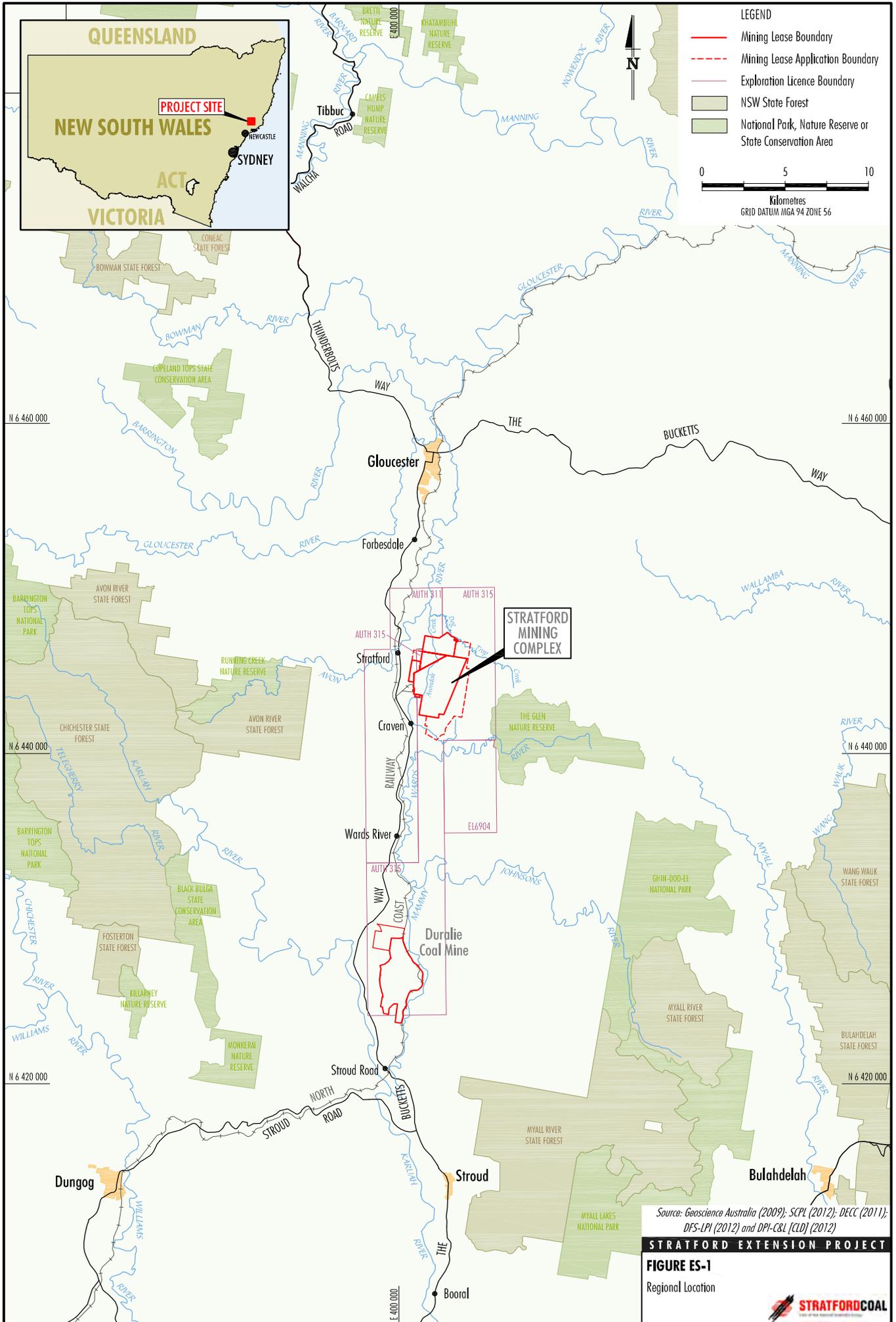
The Project would also involve continuation of mining in the BRNOC (in Year 1 of the Project) and opportunistic recovery of CHPP rejects from the western co-disposal area.

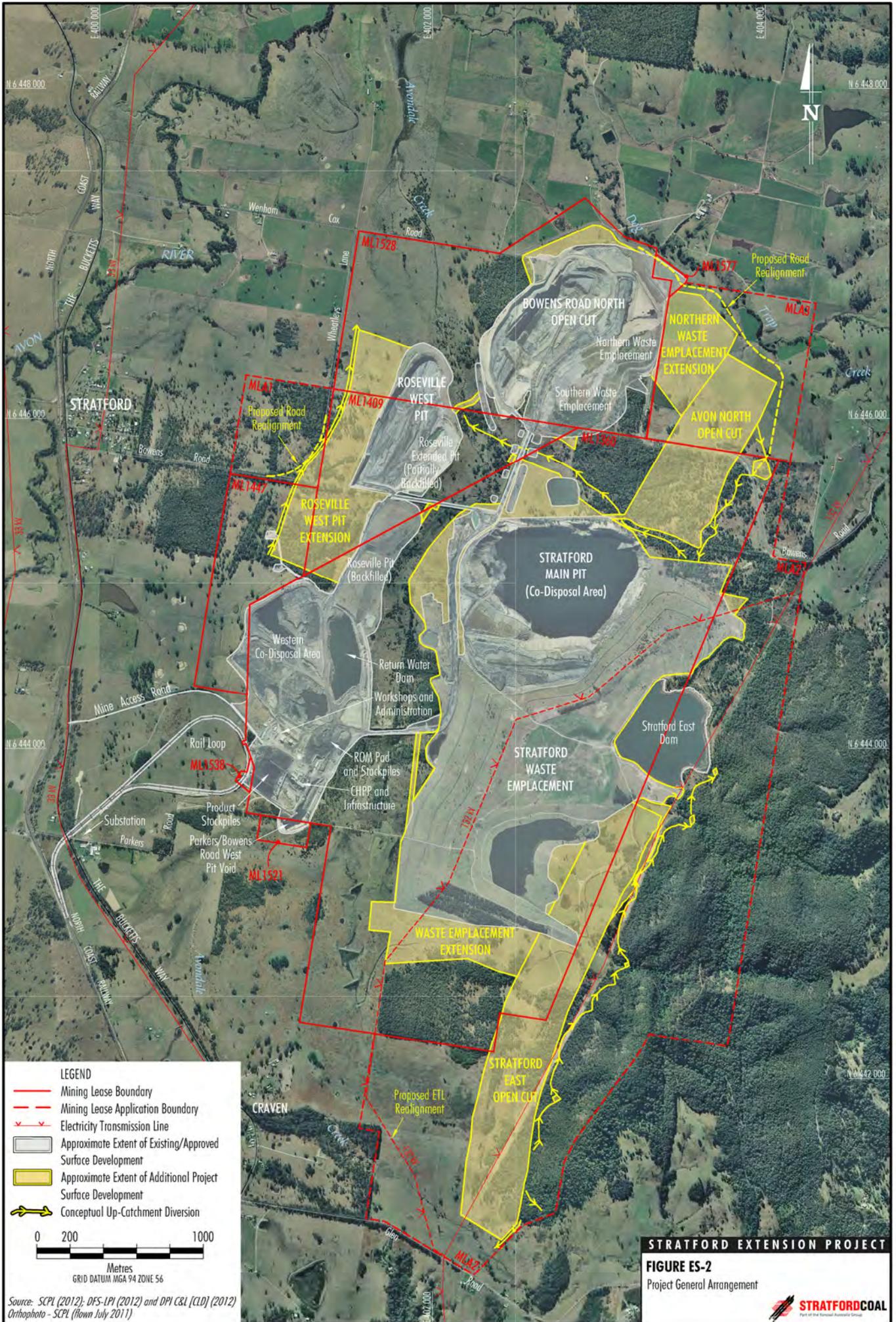
Waste rock (including overburden and interburden) mined during the development of the Project would continue to be used to in-fill the mine voids behind the advancing open cut mining operations, and to extend the existing Stratford Waste Emplacement and the Northern Waste Emplacement (Figure ES-2).

The approved capacity of the CHPP and coal handling fixed infrastructure would be adequate to meet the Project processing rates such that no major upgrades to the CHPP and coal handling fixed infrastructure are required for the Project, with the exception of a new rotary breaker for raw coal preparation.

Product coal produced from the CHPP at the Stratford Mining Complex would continue to be stockpiled prior to being reclaimed and loaded to trains for transport on the North Coast Railway to Newcastle.

¹ On 28 June 2012, Yancoal Australia Limited was listed on the Australian Stock Exchange and merged with Gloucester Coal Ltd under a scheme of agreement on the same date. SCPL is now a wholly owned subsidiary of Yancoal Australia Limited.





Statutory Context

The Project is “State Significant Development” to which Division 4.1 of Part 4 of the New South Wales *Environmental Planning and Assessment Act, 1979* applies.

This EIS has been prepared to accompany a Development Application made for the Project. This EIS addresses the Director-General’s Requirements issued by the New South Wales Department of Planning and Infrastructure.

This EIS will be placed on public exhibition and comments from the community and government agencies will be addressed by SCPL. The Project will be determined by the New South Wales Minister for Planning and Infrastructure (or delegate).

The proposed action to extend open cut coal mining and processing operations at the Stratford Mining Complex is a “controlled action” for the purposes of the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*.

This EIS forms part of the assessment process under the *Environment Protection and Biodiversity Conservation Act, 1999*. A decision will be made whether or not to approve the controlled action by the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (or delegate).

This EIS does not seek approval for any modification to the approved DCM.

ES2 KEY FEATURES OF THE PROJECT

The proposed life of the Project is 11 years, commencing approximately 1 July 2013, or when all necessary approvals are in place (both State and Commonwealth).

The general arrangement of the Project would use the existing infrastructure and service facilities at the Stratford Mining Complex.

The main activities associated with the development of the Project would include:

- ROM coal production rate of up to 2.6 million tonnes per annum, including mining operations associated with:
 - completion of the BRNOC;
 - extension of the existing Roseville West Pit; and

- development of the new Avon North and Stratford East Open Cuts;
- exploration activities;
- progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations;
- continued and expanded placement of waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement;
- progressive development of new haul roads and internal roads;
- coal processing at the existing CHPP including Project ROM coal, sized ROM coal received and unloaded from the DCM and material recovered periodically from the western co-disposal area;
- stockpiling and loading of product coal to trains for transport on the North Coast Railway to Newcastle;
- disposal of CHPP rejects via pipeline to the existing co-disposal area in the Stratford Main Pit and, later in the Project life, the Avon North Open Cut void;
- realignments of Wheatleys Lane, Bowens Road, and Wenham Cox/Bowens Road;
- realignment of a 132 kilovolt power line for the Stratford East Open Cut;
- continued use of existing contained water storages/dams and progressive development of additional sediment dams, pumps, pipelines, irrigation infrastructure and other water management equipment and structures;
- development of soil stockpiles, laydown areas and gravel/borrow areas, including modifications and alterations to existing infrastructure as required;
- monitoring and rehabilitation;
- all activities approved under DA 23-98/99 and DA 39-02-01; and
- other associated minor infrastructure, plant, equipment and activities, including minor modifications and alterations to existing infrastructure as required.

Based on the planned maximum production rate, the coal reserve for the Project is approximately 21.5 million tonnes of ROM coal.

Project Development Activities

Additional infrastructure and construction/development activities which are required to support the Project (including modifications and alterations to existing infrastructure) would be progressively developed in parallel with ongoing mining operations, including:

- realignments of sections of Wheatleys Lane, Bowens Road, and Wenham Cox/Bowens Road;
- relocation of a 132 kilovolt power line;
- relocation of a 33 kilovolt power line;
- installation of a new rotary breaker in the CHPP;
- noise management infrastructure upgrades and haul road bunding;
- realignment of a New South Wales Rural Fire Service fire trail;
- relocation of a Telstra phone line; and
- other minor upgrades including car park extensions, offices, bathhouse and muster areas, warehouse, fuel bays, boiler shed, tyre storage and workshop extensions (e.g. tyre fitting bays) for the Project mine fleet.

Short-term construction/development activities (e.g. noise attenuation infrastructure/bunds and road realignments) would require an additional construction workforce of up to approximately 30 people for short periods.

These construction/development activities would generally be restricted to daylight hours (i.e. 7.00 am to 6.00 pm).

Mining Operations

Each of the open cut mining areas for the Project would be mined using conventional open pit methods.

The open cut mining areas would involve supporting infrastructure such as haul roads, bunding, soil stockpiles, hardstands and water management structures and have been designed to integrate with the existing Stratford Mining Complex operations and minimise the amount of additional infrastructure required.

Open cut mining operations would be conducted during the periods specified below:

- BRNOC (Year 1) – mining operations would only occur between the hours of 7.00 am to 7.00 pm, seven days per week.

- Roseville West Pit Extension (Years 1 to 11) – mining operations would only occur between the hours of 7.00 am to 6.00 pm, seven days per week.
- Stratford East Open Cut (Years 1 to 5) – mining operations would be conducted 24 hours per day, seven days per week, subject to compliance with noise limits. Fleet associated with the removal of overburden would generally only operate between the hours of 7.00 am to 6.00 pm, seven days per week.
- Stratford East Open Cut (Years 6 to 11) – mining operations would be conducted 24 hours per day, seven days per week.
- Avon North Open Cut (Years 1 to 5) – mining operations would be conducted 24 hours per day, seven days per week.

Recovery of CHPP rejects by excavation from the western co-disposal area for re-processing would only occur between the hours of 7.00 am to 6.00 pm, seven days per week.

Coal Processing and Product Coal Transport

A new rotary breaker would be installed at the CHPP for raw coal preparation. Otherwise, the approved capacity of the CHPP and coal handling fixed infrastructure would be adequate to meet the Project processing rates such that no major upgrades to the CHPP and coal handling fixed infrastructure are required.

Product coal produced from the CHPP at the Stratford Mining Complex would continue to be stockpiled prior to being reclaimed and loaded to trains for transport on the North Coast Railway to Newcastle.

The handling and processing of ROM coal at the CHPP would continue to operate 24 hours per day, seven days per week.

CHPP Rejects Management

Approximately 12.3 million tonnes of CHPP rejects would be produced and require disposal over the life of the Project.

The Stratford Main Pit would continue to be used for co-disposal of CHPP rejects at the Stratford Mining Complex until the existing storage capacity is exhausted at which point in time alternative storage capacity would become available within the Avon North Open Cut void.

Water Supply and Water Management

The Project water management system would generally be based on the existing water management system with augmentations (e.g. additional diversions, sediment dams, flood levees and contained water storages) undertaken progressively over the life of the Project.

Contained water storages for the Project would include the existing Stratford East Dam, Stratford Main Pit, Return Water Dam and Parkers/Bowens Road West Pit. Once mining operations are completed in the BRNOC and Avon North Open Cut during the life of the Project, the voids would also be used as contained water storages.

The Project water management system would be designed and operated to achieve no overflow from contained water storages to downstream watercourses including Avondale Creek, Dog Trap Creek and the Avon River.

Benefits of the Project

The Project would provide for the continuation of the Stratford Mining Complex and direct employment of 250 on-site personnel at maximum production, including a mixture of direct Yancoal employees and contractors.

The Project would involve the production of up to 2.6 million tonnes per annum of ROM coal with 21.5 million tonnes of coal extracted over the life of the Project. The CHPP at the Stratford Mining Complex would produce up to 3.5 million tonnes per annum of product coal from the Stratford Mining Complex and the DCM.

The Project would produce a combination of saleable thermal and coking coal that would be sold to domestic and export markets.

Project coal production would contribute to New South Wales export income, State royalties and State and Commonwealth tax revenue, as well as contributing to electricity supply and manufacturing in Australia and other countries that purchase Project coal.

The Socio-Economic Assessment indicates that operation of the Project is likely to result in an average annual stimulus of up to approximately 250 direct and indirect jobs in the Newcastle region and some 714 direct and indirect jobs in New South Wales at peak production. The Project would also make contributions to regional and New South Wales business turnover and household income.

The Socio-Economic Assessment indicates a net benefit of between \$145 million and \$174 million would be forgone if the Project is not implemented. In addition, the Project would generate total royalties to the state of NSW in the order of \$130 million over the life of the Project.

Interaction with other Operations, Activities and Infrastructure Projects in the Vicinity of the Project

Existing and proposed coal mining and processing operations as well as coal seam gas (CSG) development, exploration activities and public infrastructure projects in the vicinity of the Stratford Mining Complex that may potentially interact with the Project include (Figure ES-3):

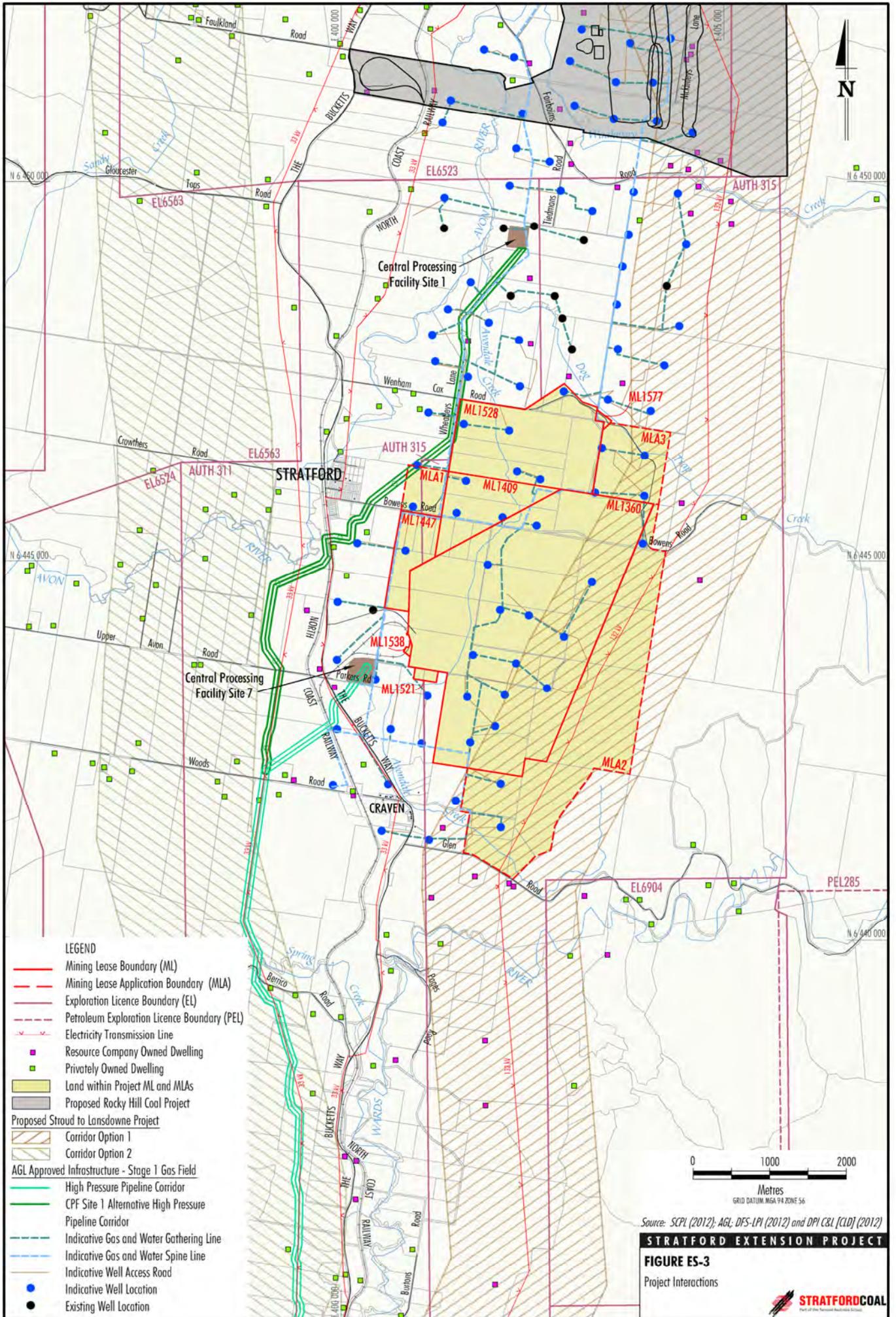
- AGL Gloucester LE Pty Ltd (AGL)'s Gloucester Gas Project;
- exploration activities undertaken by Gloucester Resources Limited (GRL), AGL and Yancoal;
- GRL's proposed Rocky Hill Coal Project;
- the existing DCM (owned by Yancoal); and
- TransGrid's Stroud to Lansdowne 330 kilovolt Power Line Project.

Descriptions of Project potential interactions and potential cumulative impacts with these and other operations, activities and infrastructure are provided in this EIS.

ES3 CONSULTATION AND COMMUNITY INITIATIVES

The Project consultation programme has been comprehensive and has included:

- Regular meetings and briefings with key State government agencies for feedback on environmental assessments and key mitigation measures, including the Department of Planning and Infrastructure, Environment Protection Authority (EPA), Office of Environment and Heritage and New South Wales Office of Water.
- Ongoing consultation with the Gloucester Shire Council, including representation of the Gloucester Shire Council on the Stratford Mining Complex Community Consultative Committee.



- Consultation with the Commonwealth Department of Sustainability, Environment, Water, Population and Communities regarding assessment under the *Environment Protection and Biodiversity Conservation Act, 1999*.
- Consultation with the community and affected landholders through the Stratford Mining Complex Community Consultative Committee, Community Information Sessions and other Project-specific consultation mechanisms.
- Involvement of and consultation with the Aboriginal community through the Aboriginal Cultural Heritage Assessment in accordance with relevant guidelines, including participation in surveys and meetings.
- Dialogue with service providers and other resource companies with existing or proposed activities in the vicinity of the Stratford Mining Complex that may potentially interact with the Project.

Community information evenings were held locally in March 2012 to provide an opportunity for the local community to ask SCPL representatives and specialists preparing the EIS studies, any specific queries or issues of concern relating to the Project.

SCPL supports the local community through sponsorships of community organisations and direct community contribution payments to the Gloucester Shire Council. SCPL plays an active role in local communities through direct employment and financial contributions to regional events and facilities.

SCPL would continue to provide funding contributions to community programmes and groups during the life of the Project.

ES4 ENVIRONMENTAL ASSESSMENT

An environmental risk assessment was conducted for the Project to identify key potential environmental issues for further assessment in the EIS. The environmental risk assessment involved a workshop with a number of specialists that contributed to the EIS. All of the potential environmental issues were ranked as low or as low as reasonably practicable by the risk assessment team.

The key environmental assessment issues for the Project are summarised below.

ES4.1 NOISE AND BLASTING

The Stratford Mining Complex is an existing industrial facility, with coal production commencing in 1995. Mining operations are currently approved to be conducted between the hours 7.00 am to 10.00 pm, however, have historically (i.e. between 1995 to 2003) been conducted up to 24 hours per day. Coal handling, processing and transportation are currently conducted up to 24 hours per day.

Background noise levels (in the absence of the Stratford Mining Complex noise contribution) have previously been characterised as being approximately 30 to 32 A-weighted decibels (dBA). Project-specific noise levels (intrusive criteria) were developed from these background levels in accordance with the New South Wales *Industrial Noise Policy*.



Community information sheets have been distributed by SCPL to inform the local community of the Project and to provide updates on progress of the EIS and specialist studies in November 2011, February 2012 and May 2012.



An acoustic model was developed for the assessment of Project noise impacts. The acoustic model was used to investigate noise mitigation measures and to inform mine planning decisions with the objective of appreciably reducing Project noise levels.

SCPL conducted an investigation of feasible and reasonable noise mitigation measures for the Project, particularly in relation to night-time operations. In summary, Project noise mitigation measures would include:

- implementation of extra quiet conveyor drives and idlers on fixed infrastructure;
- implementation of extra quiet 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 kilometres of 6 metre high acoustic bunds along haul roads; and
- installation of approximately 4 kilometres of 6 metre high acoustic bunds around the rail loop.

With the implementation of the above noise mitigation measures, the following outcomes are relevant:

- Landholder agreements have been reached with the two privately owned receivers where relevant operational noise criteria would be exceeded during the daytime.

- During evening and night-time periods, operational noise would comply with the relevant criteria at all privately owned receivers during periods of calm meteorological conditions.
- Landholder agreements have been reached with nine out of the 16 privately owned receivers where relevant operational noise criteria would be exceeded during the evening and night-time periods under adverse meteorological conditions. A further three receivers are identified in the existing SCM Development Consent as being in the Noise Management Zone.

Indicative noise contours for night-time operations under adverse meteorological conditions for Years 2, 7 and 10 are presented in Figures ES-4, ES-5 and ES-6, respectively.

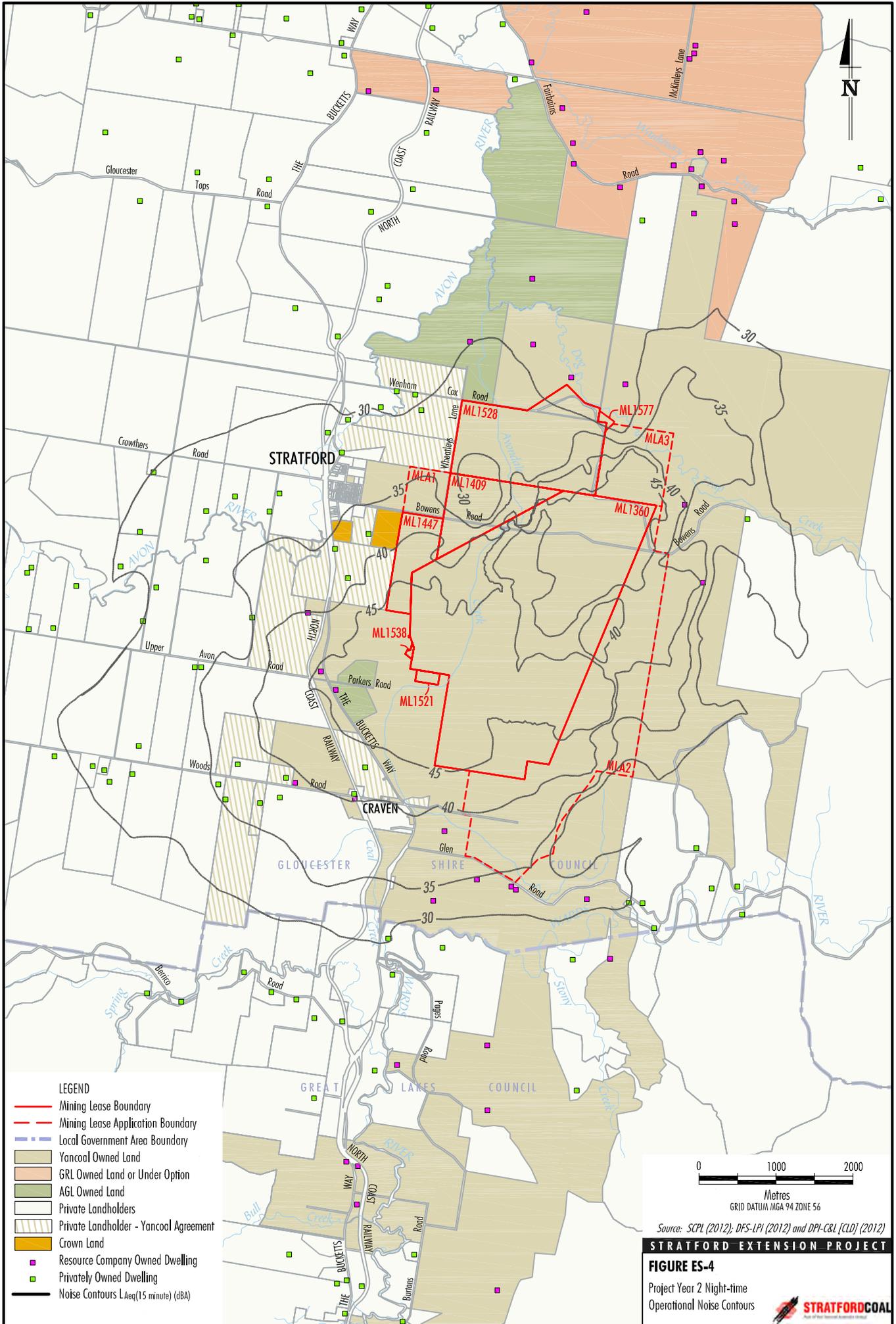
A quantitative cumulative assessment was also undertaken in consideration of Project noise levels in conjunction with noise levels associated with the approved DCM, AGL's Gloucester Gas Project and GRL's proposed Rocky Hill Coal Project.

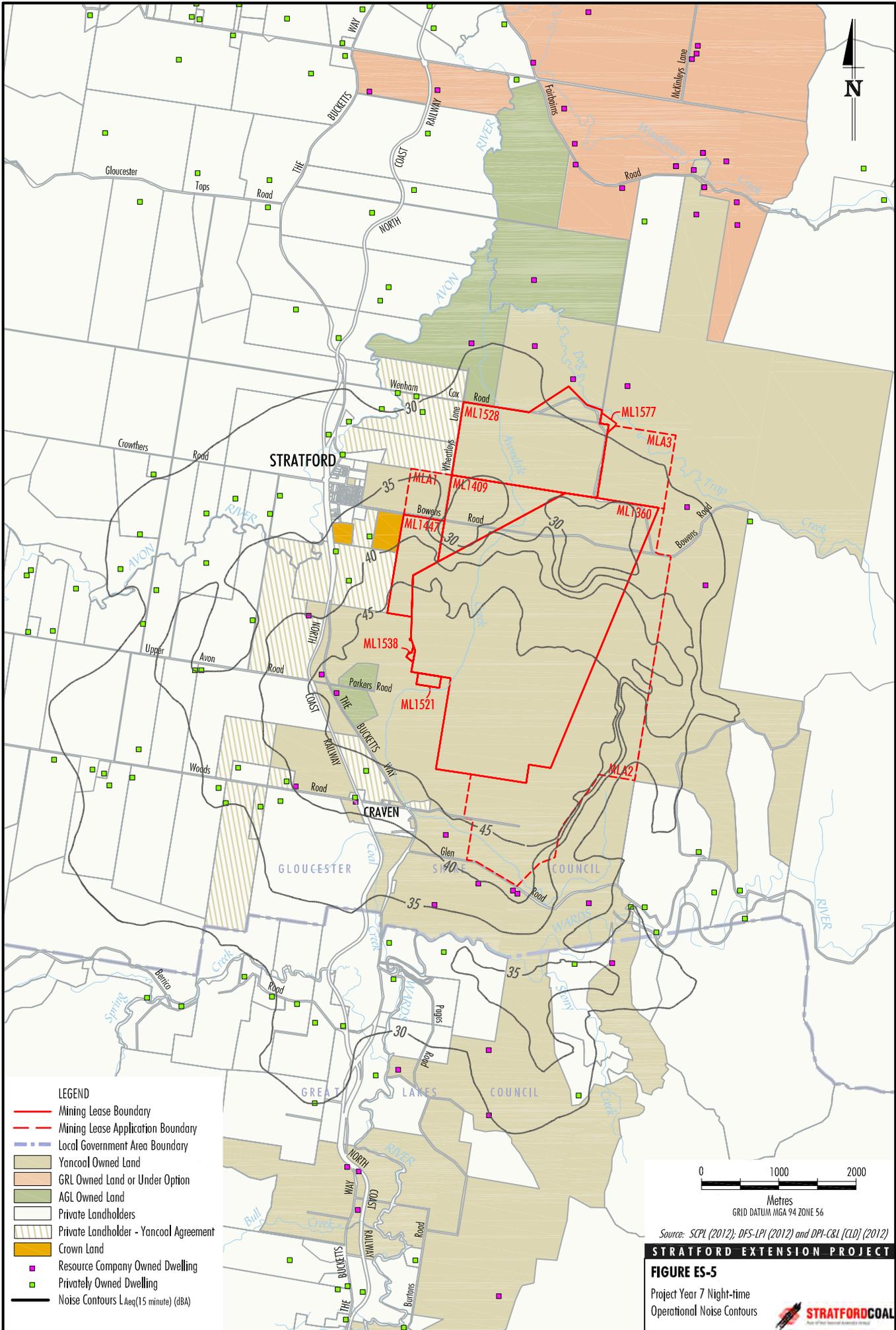
The noise assessment shows that exceedances of the New South Wales *Industrial Noise Policy* cumulative (amenity) criteria are only predicted to occur at receivers where Project-only exceedances have been predicted (as described above).

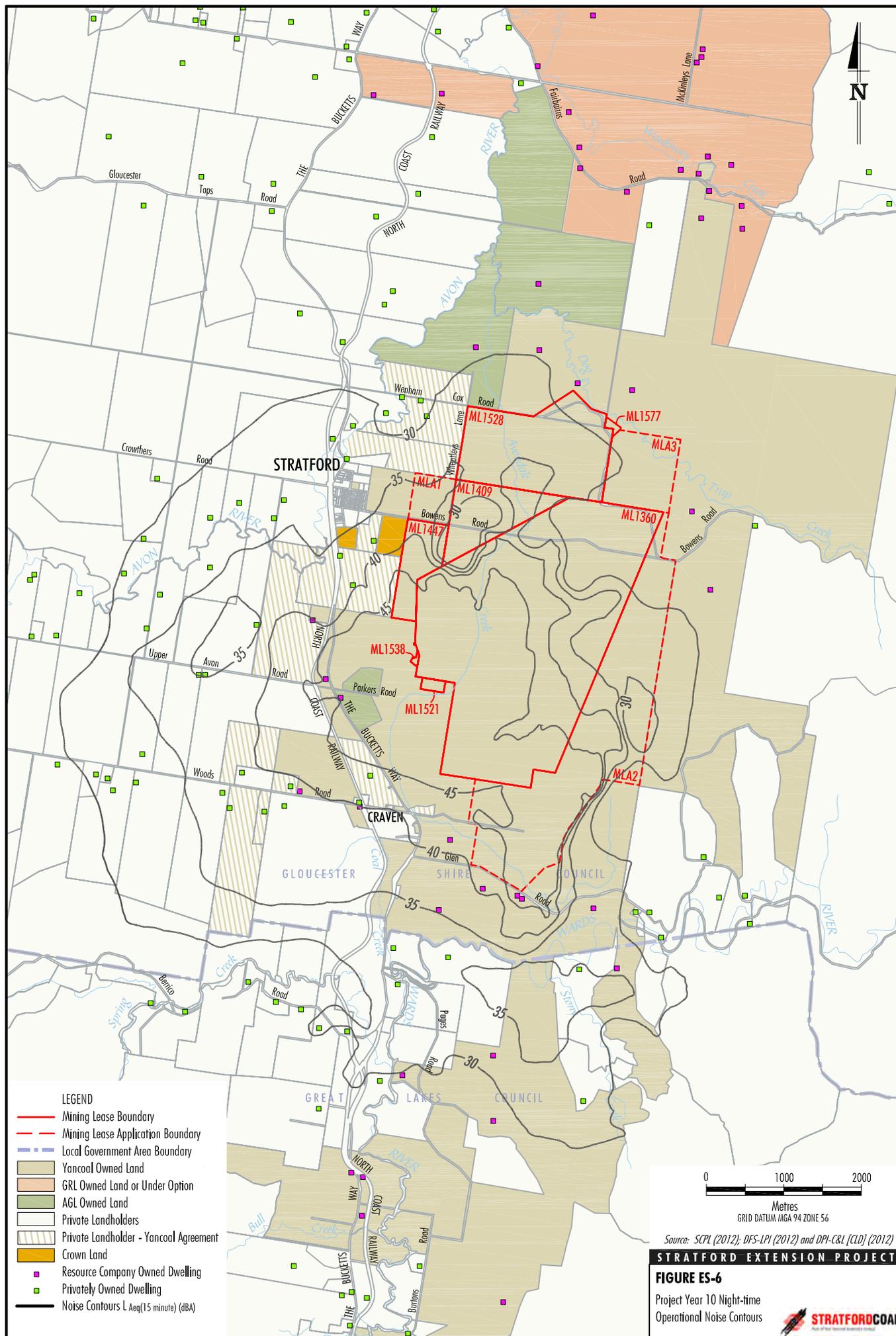
Noise Management Procedures

The private receivers where noise emissions are predicted to exceed the Project-specific noise levels can be divided into a Noise Management Zone and a Noise Affection Zone. Proposed management procedures for receivers in these zones are described below.

These 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 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).

Additional 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.

Noise Affectation Zone

Management procedures for the Noise Affectation 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.

Real-time Noise Management

The existing Noise Management Plan would be revised to include:

- 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 which would be used as part of a proactive management (i.e. alert) system in conjunction with the real-time monitoring and management system; and
- details of revised triggers for the Project real-time monitoring and management system.

Rail Noise

The existing/approved average product coal rail movements of 2.5 trains per day would be unchanged for the Project. However, peak product coal rail movements would increase from 5 to 6 trains per day as a result of the Project.

The increase in rail noise level as a result of peak Project-related movements is 0.6 dBA. This noise level increase would not be perceptible to most people.

For existing/ approved rail movements, the offset distance from the North Coast Railway where the EPA trigger level is met is 58 m. This distance would increase to 67 m for the Project.

Quarterly monitoring would be conducted along the North Coast Railway to verify the ongoing noise performance of the product coal trains over the life of the Project.

Blasting

Project blasting activities would be designed to minimise the effects of blasting on nearby receivers. This would be achieved by reducing the Maximum Instantaneous Charge (MIC) (or other relevant blasting parameter) according to the proximity of blasts to nearby receivers.

With the proposed reduction in MIC, the Project blasting emissions would comply with the relevant blasting criteria with the exception of three privately-owned receivers where exceedances of the amenity criteria are predicted. These predicted effects have been recognised during landholder consultation, and relevant agreements have been reached.

ES4.2 AIR QUALITY

Air quality data has been collected in the vicinity of the Stratford Mining Complex during the period 1995 to 2012. The data shows that air quality in the area generally complies with relevant EPA criteria.

A Best Practice Measures study on air quality emission controls was undertaken by SCPL in 2012 for the Stratford Mining Complex in accordance with EPA requirements. As a result of the study, the following additional best practice measures were identified:

- vehicle speed restriction to 60 kilometres per hour;
- use of larger capacity vehicles to transport coal and waste rock;
- increased intensity of haul road sprays;
- watering of wind erosion areas; and
- vegetative groundcover on wind erosion areas.

These measures have been adopted as part of the Project Air Quality Assessment.

No exceedance of relevant criteria at any privately-owned receiver was predicted, either Project-only or in consideration of background concentrations.

The existing Air Quality and Greenhouse Gas Management Plan describes that a Tapered Element Oscillating Microbalance (TEOM) analyser would be installed to monitor particulate matter concentrations continuously, at a location in close proximity to Stratford. For the Project, a second TEOM would also be installed to monitor particulate matter concentrations continuously, at a location in close proximity to Craven. These monitors would enable SCPL to pro-actively and re-actively manage the potential short-term particulate matter emissions from the Project, to prevent or minimise potential impacts at privately-owned receivers.

The management plan would also be updated to include a meteorological forecasting system as part of the Project. This system would predict meteorological conditions for the coming day to determine in advance where the risk of dust emissions may occur (e.g. based on wind speed, direction, rainfall and atmospheric stability).

ES4.3 FLORA AND FAUNA

The existing Stratford Mining Complex is located in a rural setting characterised by cattle grazing on native and improved pastures. The portion of existing mining leases not currently subject to mining is managed for a combination of biodiversity conservation (i.e. biodiversity enhancement area) and cattle grazing.

The Project area is situated on the western edge of a very large area of native vegetation, including The Glen Nature Reserve and surrounding forested private land, the Myall River State Forest and Ghi-Doo-Ee National Park to the south and south-east. Much larger areas of natural vegetation also exist in the Barrington Tops complex of State Forests and National Parks located to the west of the Avon River valley.

Refinements to the Project design were made during the assessment process to minimise land disturbance and associated impacts on flora, fauna and their habitats. The additional surface development associated with the Project would involve the clearance of approximately 105 hectares of native vegetation types and approximately 195 hectares of cleared land with a small portion containing planted trees (approximately 1.3 hectares).

The Flora Assessment and Terrestrial Fauna Assessment concluded that the Project would be unlikely to significantly impact any threatened flora or fauna species, with the possible exception of the Squirrel Glider. The Squirrel Glider may have the potential to be significantly impacted in the short-term due to the proposed removal of habitat and a temporary increase in isolation of some known habitat areas, however these impacts are not considered likely to result in the loss of the entire local population.

The following mitigation measures would ameliorate the short-term potential impacts on the Squirrel Glider relating to habitat loss and connectivity of the local population:

- installation of nest boxes and relocation of cleared hollows;
- additional plantings of feed trees/shrubs for the species;
- erection of glider poles in the biodiversity enhancement and biodiversity offset areas;
- fitting of radio collars and monitoring of the local Squirrel Glider population by radio tracking; and
- monitoring fauna use of nest boxes and glider poles.

SCPL would prepare a Biodiversity Management Plan which would mitigate impacts on flora and fauna due to Project activities, including vegetation clearance procedures, weed and feral animal control and salvage and relocation of habitat features.

In addition, residual impacts on flora and fauna would be offset through a biodiversity offset strategy. 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 (Figure ES-7).

The proposed offset areas are located on land currently managed for pastoral purposes, adjacent to the Project to the south and north-west and further south. An arrangement would be made to ensure protection in perpetuity and management of the identified biodiversity offset areas (or equivalent).

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

The biodiversity offset areas would provide for a range of ecological gains including:

- The addition of the biodiversity offset areas as new protected areas enhances nature conservation in the region.
- The proposed biodiversity offset areas are suitably located because they are local to the area proposed to be disturbed and therefore have a greater chance of maintaining and improving the biodiversity that would be impacted.
- The revegetation of biodiversity offset areas is designed to provide connectivity between isolated woodland remnants. This would facilitate movement of animals between remnants and the large block of forest to the east and south of the Project area, thereby re-establishing genetic exchange across the landscape.
- Numerous threatened species are known to inhabit the biodiversity offset areas or conservation areas that directly adjoin the biodiversity offset areas.
- The biodiversity offset areas support all native vegetation types within the Project disturbance areas² and have a greater diversity of vegetation types than occur on the Project area.

- The management of the biodiversity offset areas would include animal pests and weed management.

The Project incorporates a range of measures targeted specifically at maintaining the Squirrel Glider population, including a nest-box programme and monitoring. Because the Squirrel Glider is currently known to occur in a few relatively small patches, the biodiversity offset strategy has the potential to improve the conservation of the local Squirrel Glider population in the medium to long-term.

ES4.4 SURFACE WATER

The Project is located in the surface water catchment of the Avon River only. The Avon River is a tributary of the Gloucester River which ultimately flows to the Manning River.

Water in the Avon River is used for stock watering purposes and irrigation purposes. Flows in the Avon River are unregulated and therefore water users rely on the natural flow regime for their water supplies.

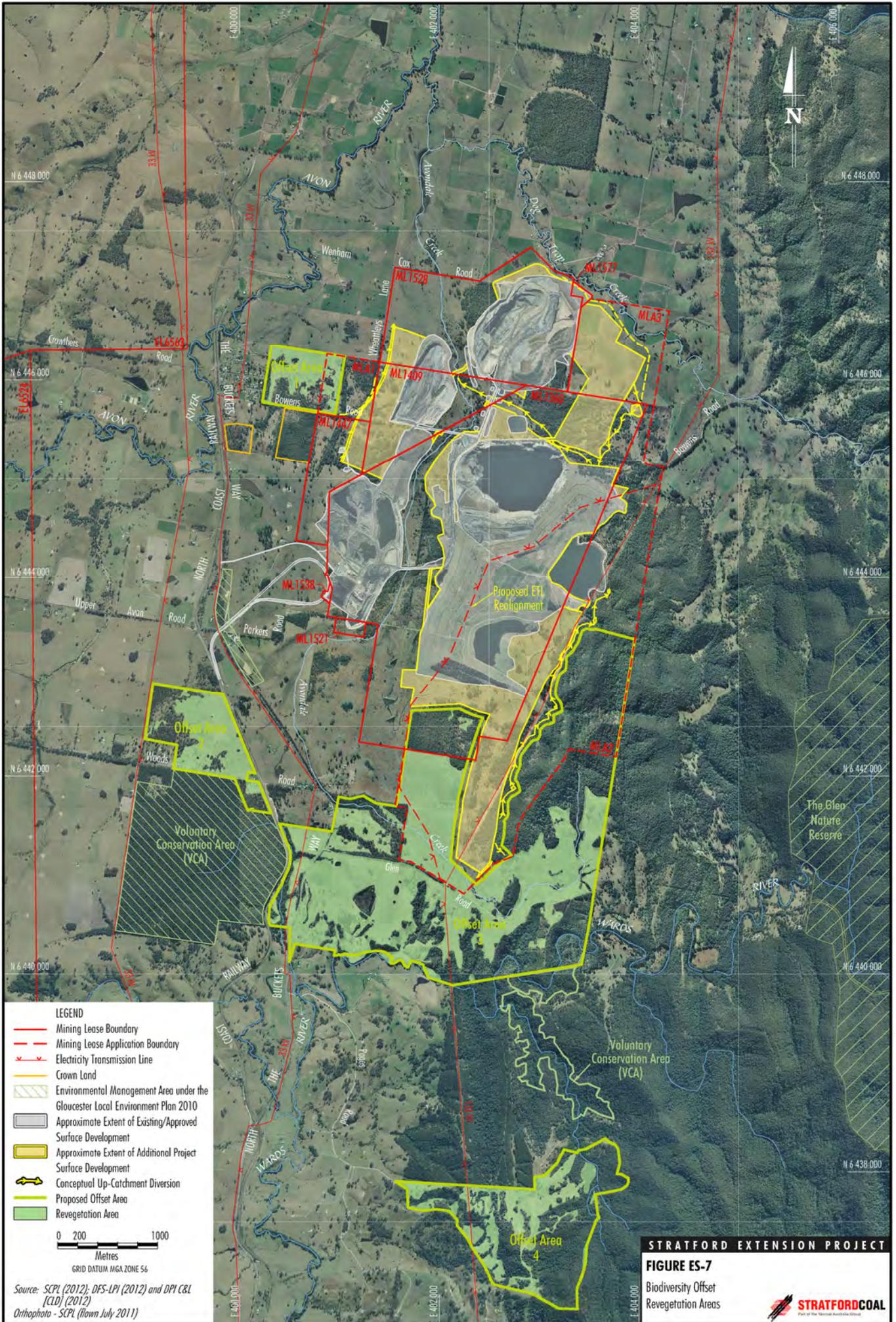
The existing Stratford Mining Complex is located within the Avondale Creek and Dog Trap Creek sub-catchments of the Avon River.

Within the Project area, Avondale Creek is considered an ephemeral waterway experiencing some extended periods of no or negligible flow during dry weather. The creek is broadly meandering, swampy and in places a poorly defined stream.

In contrast to Avondale Creek, Dog Trap Creek comprises a much more tightly meandering, well defined, incised channel. Dog Trap Creek is considered ephemeral experiencing some extended periods of no or negligible flow.

Portions of the catchments reporting to Avondale and Dog Trap Creeks have already been diverted from their original flow paths to be captured within the existing/approved Stratford Mining Complex water management system.

² With the exception of Derived Grassland, which is derived as a result of previous land use activities from other habitat types recorded in the surface development area and biodiversity offset areas.



The Project would result in progressive extension of the open cut mining operations and associated subsequent re-use of runoff captured from operational catchment areas. Compared to the existing/approved total catchment area excised by the Stratford Mining Complex, the proposed Project catchment is small enough such that it is not expected to result in a measurable change to downstream flows in Avondale Creek, Dog Trap Creek or the Avon River.

No access licences would be required for Project surface water containments on the basis that Project water storages would either be within maximum harvestable rights and/or would be relevant excluded works under the New South Wales *Water Management (General) Regulation, 2011*.

The Project water management system is to be operated with the objective to achieve no contained water storage overflow. The risk of a contained water overflow (i.e. spill) from the Project was evaluated as part of a detailed site water balance and the results demonstrate there is a very low risk of spill occurring from the contained water storages over the life of the Project life to Avondale Creek.

With implementation of management strategies and monitoring, the risks of elevated dissolved solids and other contaminants impacting downstream waters is considered to be low. The risk of increased suspended sediment migration downstream from erosion associated with up-catchment diversions is also considered low due to the proposed erosion control measures that both have been used successfully in the past and are proposed for future diversions.

Irrigation would only occur on rehabilitated or topsoiled areas from which runoff reports to contained water storages or open pits. The risk of build-up of salts in irrigation areas and their impact on downstream water quality is considered negligible because irrigation would only occur within the surface catchment of contained water storages.

The potential for flooding in the Project area to impact on mine infrastructure (including open cut pits) would be managed through the construction of flood bunds. It is considered unlikely that any discernible 100-year average recurrence interval peak flow flood level increases (i.e. afflux) would extend upstream of Yancoal-owned land.

The existing Water Management Plan would be reviewed and revised to incorporate the Project, describing the operational site water management system and provisions for review of the site water balance, erosion and sediment controls, surface water (and groundwater) monitoring and management.

ES4.5 GROUNDWATER

Extensive baseline geological and groundwater data is available for the Project area and surrounds, including a Project-specific groundwater investigation programme and groundwater monitoring programmes and investigations undertaken at the Stratford Mining Complex and surrounding projects (e.g. AGL's Gloucester Gas Project and GRL's proposed Rocky Hill Coal Project).

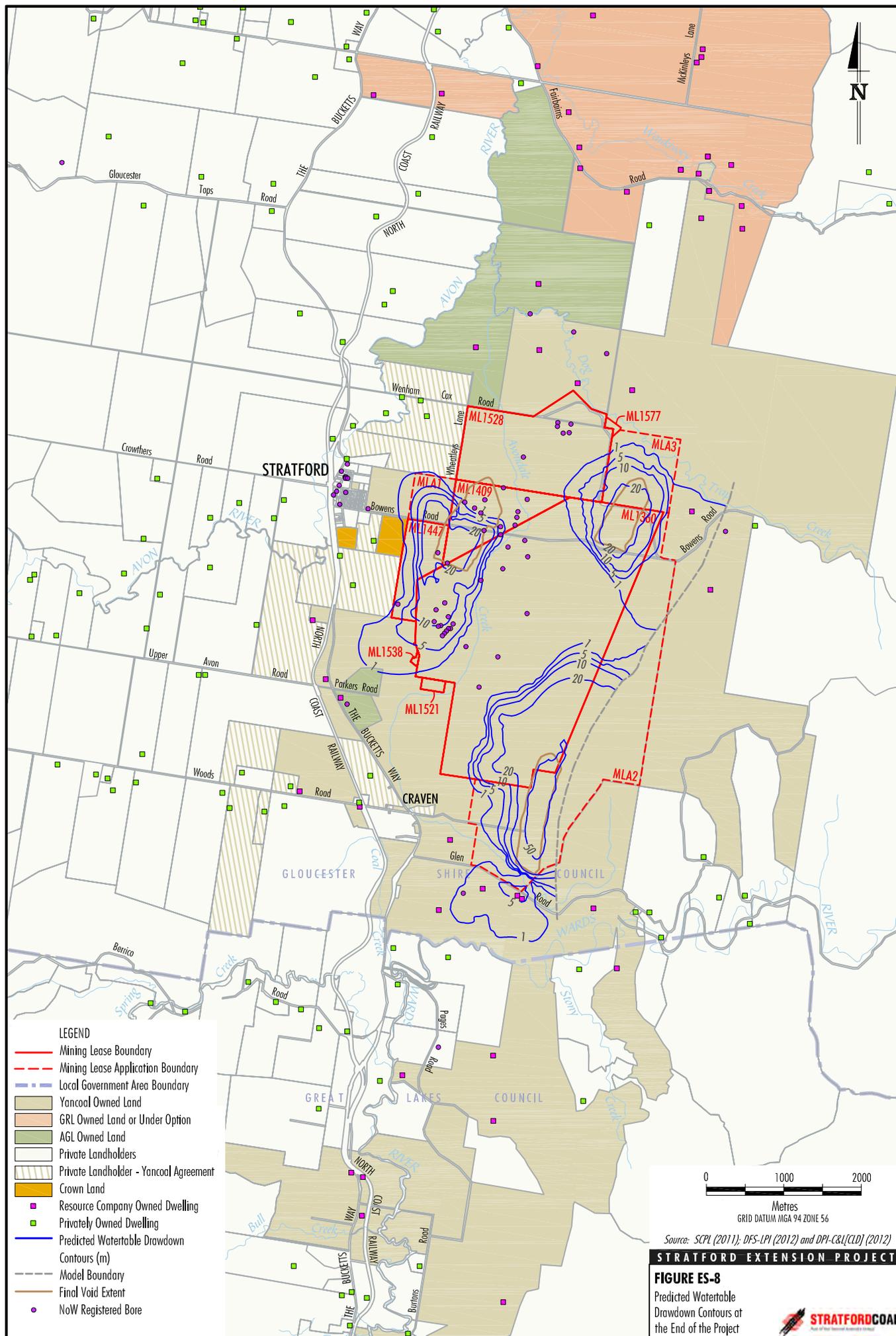
Geological and groundwater data supports the presence of two groundwater systems:

- Fractured rock groundwater system – including shallow rock aquifer and coal measures; and
- Alluvial groundwater system – including alluvial (narrow channel) sediments associated with Dog Trap Creek, Avondale Creek and the Avon River.

Privately owned bores in the vicinity of the Project are licensed for stock and domestic use, and include private bores in Stratford and a private bore to the south of the Stratford Mining Complex (Figure ES-8). Locally there is little reliance on groundwater bores as a source of water for agricultural enterprises, as they predominantly rely on surface water sources which are more abundant and generally better quality.

Detailed numerical modelling has been undertaken as a component of a Groundwater Assessment to quantify the likelihood and magnitude of potential impacts from the Project and other developments in the region.

As mining operations progress, groundwater accumulates in the open cuts. The average inflows to the open cuts (combined) over the life of the Project are predicted to be about 1.1 megalitres per day, with the majority (approximately 98.5 percent) derived from the fractured rock groundwater system.



LEGEND

- Mining Lease Boundary
- - - Mining Lease Application Boundary
- - - Local Government Area Boundary
- Yancool Owned Land
- GRL Owned Land or Under Option
- AGL Owned Land
- Private Landholders
- Private Landholder - Yancool Agreement
- Crown Land
- Resource Company Owned Dwelling
- Privately Owned Dwelling
- Predicted Watertable Drawdown Contours (m)
- - - Model Boundary
- Final Void Extent
- NoW Registered Bore



Metres
GRID DATUM MGA 94 ZONE 56

Source: SCPL (2011); DFS-LPI (2012) and DPI-C&I[CLD] (2012)

STRATFORD EXTENSION PROJECT

FIGURE ES-8

Predicted Watertable Drawdown Contours at the End of the Project



SCPL currently holds sufficient licence allocation under the New South Wales *Water Act, 1912* for the dewatering activities (i.e. groundwater inflows) associated with the fractured rock groundwater system.

Figure ES-8 shows the maximum watertable drawdown extents from each of the open cut mining areas. The detailed numerical modelling predicts:

- negligible impact on groundwater levels or groundwater yield for groundwater users with privately owned bores; and
- negligible drawdown in the aquifers of the alluvial groundwater system.

The Groundwater Assessment concludes that there is expected to be negligible change in groundwater quality as a result of mining in the short-term. Further, it is expected that groundwater quality would not be impacted by final void water quality post-mining, as the final voids would remain groundwater sinks (i.e. there would be no deleterious effect on the beneficial uses of any groundwater sources).

The existing groundwater monitoring program at the Stratford Mining Complex would be progressively extended for the Project.

ES4.6 AGRICULTURAL RESOURCES

Agricultural activities known to have been conducted in the Project area include cattle grazing for beef and dairy products, with small areas observed to have been used for cultivation for forage crops. There is, however, no evidence of crop production for grains (irrigated or unirrigated) or intensive horticulture.

No Class 3, 2 or 1 Agricultural Suitability lands have been identified within the Project disturbance areas. Agricultural Suitability classes identified across the site included Class 4 and Class 5 lands.

A review of the regional mapping in the *Upper Hunter Strategic Regional Land Use Plan* indicates that the nearest mapped strategic agricultural land is located on the Avon River approximately 2 kilometres to the west of the Project. Based on the agricultural limitations identified in the site soil survey, Rural Land Capability mapping, Agricultural Suitability mapping and review of regional mapping of strategic agricultural lands, the Project area does not include highly productive soils, nor does it include areas of high value or strategic agricultural lands.

The Project (plus a portion of the biodiversity offset areas) would result in the long-term disturbance or alteration of existing agricultural lands. The rehabilitation and mine closure strategy for the Project includes re-establishment of approximately 300 hectares of agricultural land suitable for grazing (Figure ES-9). This re-establishment of agricultural lands would be undertaken progressively as a component of the Project rehabilitation programme.

As has already been successfully demonstrated at the Stratford Mining Complex, SCPL anticipates rehabilitated agricultural lands would be of comparable Agricultural Suitability classification to neighbouring areas.

The Agricultural Assessment and Socio-Economic Assessment concluded that the Project has very little potential to materially affect regional agricultural production or demand for agricultural infrastructure, supplies and services at a local or regional level.

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

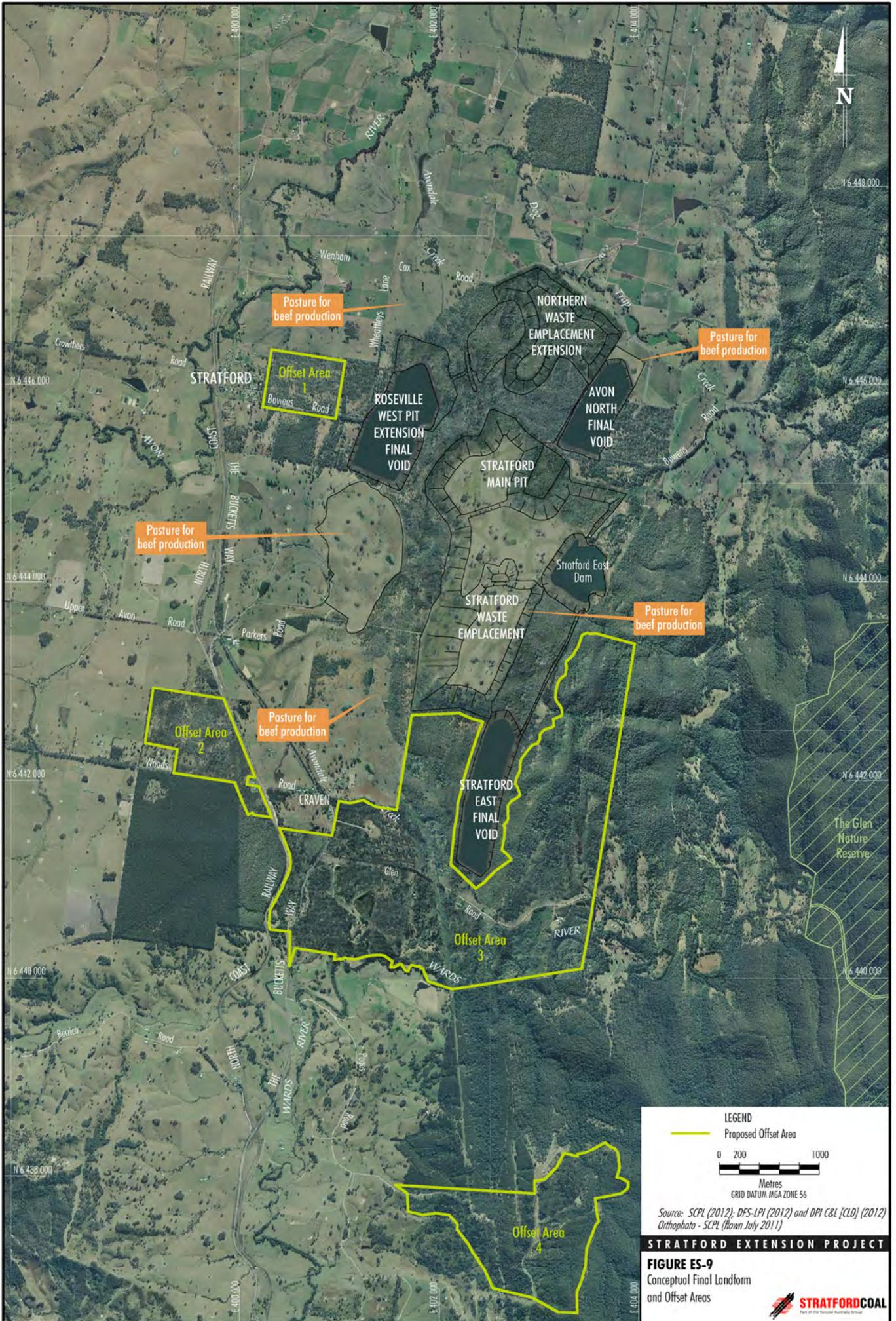
The implementation of the Property Management Strategy would serve to minimise the potential direct impacts of the Project on agricultural production within the Project area and Yancoal-owned land, and potential indirect impacts (e.g. weeds and pests) on surrounding agricultural lands.

ES4.7 OTHER SPECIALIST STUDIES

In addition to the key studies described above, specialist studies in this EIS include:

- aquatic ecology;
- heritage;
- geochemistry;
- land contamination;
- road transport;
- visual amenity;
- socio-economic; and
- preliminary hazard analysis.

The findings of these studies demonstrated that the impacts would be negligible, within acceptable levels or could be readily managed.



ES5 REHABILITATION

SCPL has extensive operational rehabilitation experience at the Stratford Mining Complex, including with re-establishment of agricultural and native vegetation areas.

Key features of the Project final landform would include:

- final voids located in the Stratford East Open Cut, Avon North Open Cut and Roseville West Pit Extension;
- elevated mine landforms associated with the Stratford Waste Emplacement and Northern Waste Emplacement that are broadly integrated with the surrounding landforms;
- landforms at grade or only slightly elevated above pre-mining topography associated with areas of the backfilled Bowens Road North Open Cut, Roseville West Pit Extension, Stratford Main Pit, Avon North Open Cut and Stratford East Open Cut, the rehabilitated infrastructure area and western co-disposal area; and
- permanent Stratford East Dam water storage structure and various water management structures to direct the flow of water from the mine landforms to Avondale Creek, Dog Trap Creek and their associated tributaries.

The Project's simulated rehabilitated final landform is shown on Figure ES-9.

Approximately 350 hectares of native woodland/open forest vegetation and approximately 300 hectares of agricultural land suitable for grazing would be re-established as a component of the Project rehabilitation and revegetation programme.

Revegetation of woodland/open forest areas would include the planting of species characteristic of the existing remnant vegetation in areas with suitable soil, slope and aspect. An objective of the rehabilitation programme is to restore ecosystem function to land affected by the Project development including maintaining or establishing self-sustaining ecosystems.

Once mining operations cease at the Stratford East Open Cut, Avon North Open Cut and the Roseville West Pit Extension, final void inflows would no longer be collected and pumped out, and as a result, the voids would gradually begin to fill with water.

The final void waterbodies are not predicted to spill under any simulated climatic sequences. An adaptive management approach to the final void design would be adopted during the life of the Project.

A Rehabilitation Management Plan would be developed and implemented for the Project, including a rehabilitation monitoring programme designed to track the progress of rehabilitation and revegetation.

Key strategic rehabilitation completion criteria would be reviewed and refined as part of the Mining, Rehabilitation and Environmental Management Process.

The specific rehabilitation parameters and completion criteria would be determined in consultation with relevant government agencies and documented in the Mining Operations Plan and Rehabilitation Management Plan.

ES6 KEY ENVIRONMENTAL MANAGEMENT, MITIGATION, MONITORING AND OFFSET COMMITMENTS

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.

SCPL would continue to implement the existing strategies, plans and programmes and where necessary, review, revise and build on them. The existing monitoring programmes would also be augmented to address the Project extension to the Stratford Mining Complex.

Key environmental management, mitigation and monitoring measures include the following:

- SCPL would implement feasible and reasonable noise management and mitigation measures to minimise noise emissions associated with the Project.
- SCPL would implement management procedures for receivers in the Noise Management Zone and the Noise Affection Zone.

- SCPL would revise the existing Blasting/Vibration Management Plan to address changes to blasting practices required by the Project, including reducing the MIC (or other relevant blasting parameter) according to the proximity of blasts to nearby receivers.
- SCPL would implement an adaptive management approach to Project noise and air quality management that would include real-time noise and air quality monitoring and meteorological forecasting.
- SCPL would continue to implement best practice air quality management measures.
- SCPL would install TEOMs at locations in close proximity to Stratford and Craven to continuously monitor particulate matter concentrations.
- SCPL would implement a Biodiversity Management Plan to mitigate impacts on flora and fauna due to Project activities.
- SCPL would implement a biodiversity offset strategy to offset residual impacts to biodiversity, including the establishment and protection of biodiversity offset areas in perpetuity.
- SCPL would implement a Rehabilitation Management Plan for the Project, including progressive rehabilitation of Project disturbance areas, the reinstatement of key agricultural and ecological values, and implementation of a mine closure strategy.
- 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.
- SCPL would install new groundwater and surface water monitoring/sampling sites to augment the existing monitoring programmes.
- Yancoal would implement a Property Management Strategy for the management of agricultural land in the Project area and on adjoining Yancoal-owned lands.