STRATFORDCOAL
Part of the Yancoal Australia Group

Stratford Extension Project
Environmental Impact Statement






SECTION 2

PROJECT DESCRIPTION

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2 PROJECT DESCRIPTION

Mining operations at the Stratford Mining Complex are currently conducted in accordance with Development Consents DA 23-98/99 and DA 39-02-01 as modified on 26 November 2010 (Section 2.2). This section presents a description of the existing operations, the history of statutory approvals and a description of the Project.

2.1 EXISTING STRATFORD MINING COMPLEX OPERATIONS

The current mining operations at the Stratford Mining Complex are approved to produce up to 2.1 and 1 Mtpa of ROM coal at the SCM and BRNOC, respectively.

The approximate extent of the existing and approved surface development at the Stratford Mining Complex is shown on Figure 2-1. Major components include open cut pits, mine waste rock emplacements, ROM pad/coal stockpiles, water management infrastructure/storages, CHPP, co-disposal areas, product coal stockpiles, rail infrastructure and other infrastructure areas.

Open cut mining at the Stratford Mining Complex is currently undertaken during the following approved hours of operation:

- 7.00 am to 10.00 pm (SCM); and
- 7.00 am to 7.00 pm (BRNOC).

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

The unloading of ROM coal from the Duralie Shuttle Train is currently conducted between 7.00 am and 10.00 pm[1].

The loading of trains with product coal is undertaken 24 hours per day, seven days per week.

A summary of the existing operations undertaken at the Stratford Mining Complex is provided below.

2.1.1 Mining Operations

Open Cut Mining Areas

Open cut mining at the Stratford Mining Complex is currently undertaken in the Roseville West Pit and BRNOC. Small quantities (up to approximately 0.2 Mtpa) of CHPP rejects are also recovered by excavation from the western co-disposal area for re-processing in the CHPP when the opportunity arises.

Open cut mining has been conducted in a number of other areas at the Stratford Mining Complex in the past, including (Figure 2-1):

- Stratford Main Pit;
- Roseville Pit;
- Roseville Extended Pit; and
- Parkers/Bowens Road West Pit.

The Stratford Main Pit is currently used for waste rock backfill, co-disposal of CHPP rejects and water storage.

The Roseville Pit has been backfilled and is undergoing rehabilitation. Backfilling of the Roseville Extended Pit is in progress and nearing completion.

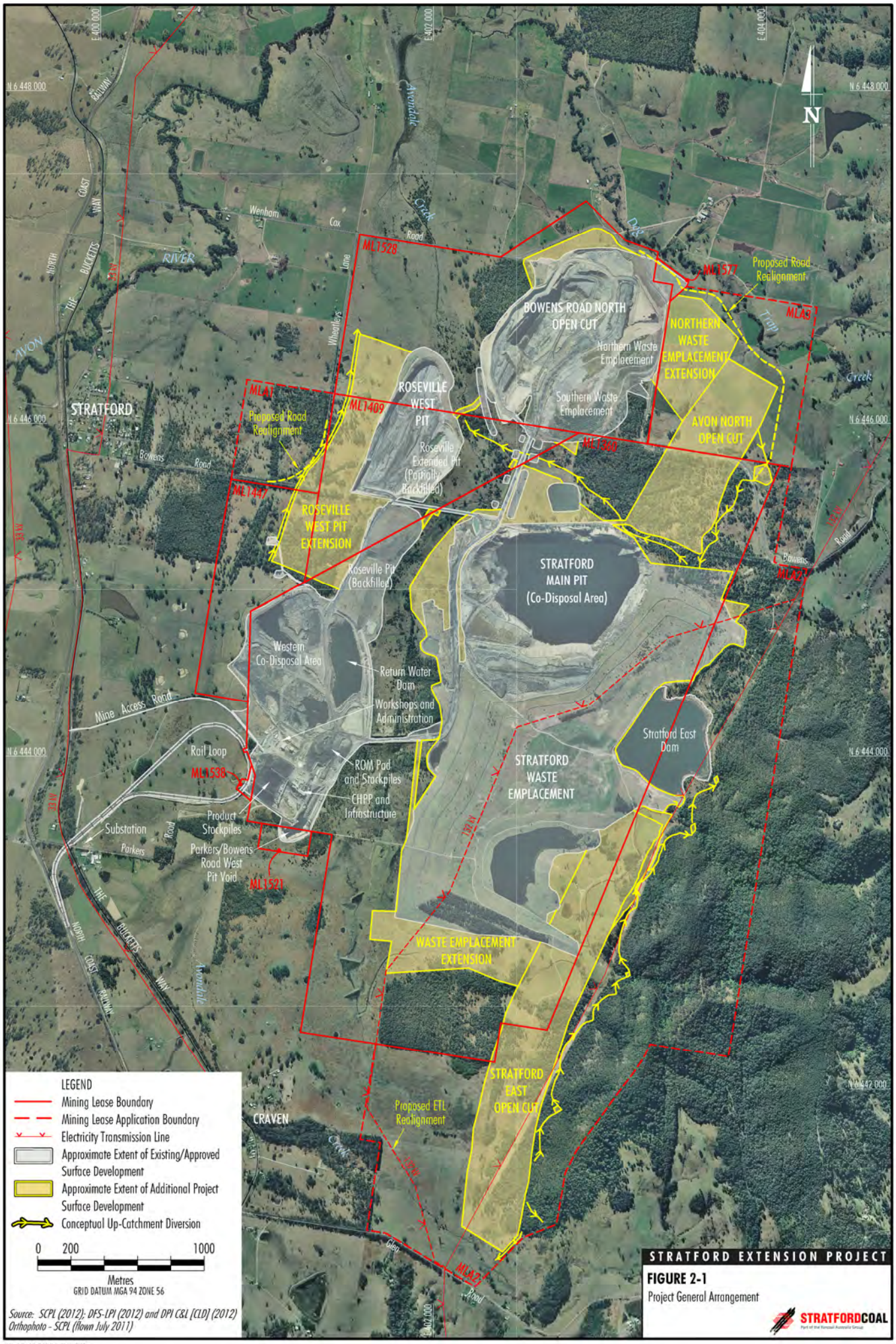
The Parkers/Bowens Road West Pit void is currently used for containment of surface water runoff from the CHPP and infrastructure areas.

Open Cut Mining Sequence

Conventional open cut mining methods are used at the Stratford Mining Complex. The general sequence of open cut mining is as follows:

1. Vegetation clearance and removal.
2. Topsoil stripping by dozers. Stripped topsoil is used directly in progressive rehabilitation or is placed in stockpiles for later re-use.
3. Removal of weathered or friable overburden by excavator and haul truck, with supporting dozers.
4. Drilling and blasting of competent overburden (and interburden).

[1] Yancoal is currently seeking separate approval to extend the Duralie Shuttle Train paths to be between 6.00 am and 1.00 am.



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5. Overburden (and interburden) removal by excavator and haul truck, with supporting dozers. Overburden and interburden placed in out-of-pit mine waste rock emplacements, or as infill in the mine void, behind the advancing open cut mining operations.
6. Mining of exposed coal seams by excavator and loading into haul trucks for transport to the ROM pad and ROM coal stockpiles.
7. Progressive landform profiling and rehabilitation of mine waste rock emplacements (on occasions temporary rehabilitation is undertaken to stabilise landforms until further mining operations are carried out in the future).

The existing capacity of the ROM coal stockpiles is approximately 150,000 tonnes (t).

ROM coal is delivered to the ROM pad and then transferred into a loading hopper and conveyed to the CHPP for processing (Figure 2-2).

Further description of the mining methods and coal handling is provided in Section 2.7.

Mine Fleet and Supporting Equipment/Plant

The existing mine fleet at the Stratford Mining Complex includes:

- six excavators;
- fifteen haul trucks;
- six dozers;
- one loader;
- two graders;
- two drills; and
- two water carts.

Other mining equipment and plant used to support the mine fleet include, but are not limited to, diesel powered generators, service vehicles and lighting plant.

2.1.2 Coal Handling and Preparation Plant

The existing CHPP and infrastructure area is shown on Figure 2-2. The CHPP has a design capacity of approximately 750 tonnes per hour (tph) ROM coal feed and includes:

- coal sizing and screening; and
- coal processing plant (incorporating fine coal and coarse coal circuits).

Residual oversized ROM coal reject material (e.g. overburden roof rock and floor rock) from the coal sizing and screening in the CHPP is periodically trucked to the co-disposal area.

The slimes and coarse rejects from the coal processing plant are combined for co-disposal on-site.

Coal products from the CHPP and bypass coal are conveyed to the product coal stockpiles and subsequent reclaim and loaded onto trains for transport to domestic and export markets.

Further description of the CHPP is provided in Section 2.8.

2.1.3 Product Coal and Rail Transport

Up to approximately 3.3 Mtpa of coal products (including saleable thermal and coking coal) are currently produced at the Stratford Mining Complex.

The existing capacity of the product coal stockpiles is approximately 400,000 t. Product coal is reclaimed to the existing rail loading conveyor and bin adjacent to the rail loop. The existing product coal stockpiles and rail infrastructure are shown on Figure 2-2.

An average of 2.5 product coal train[2] movements per day (with a peak of five movements per day) is currently approved at the Stratford Mining Complex.

Product coal is transported to domestic and export markets via the North Coast Railway to Newcastle.

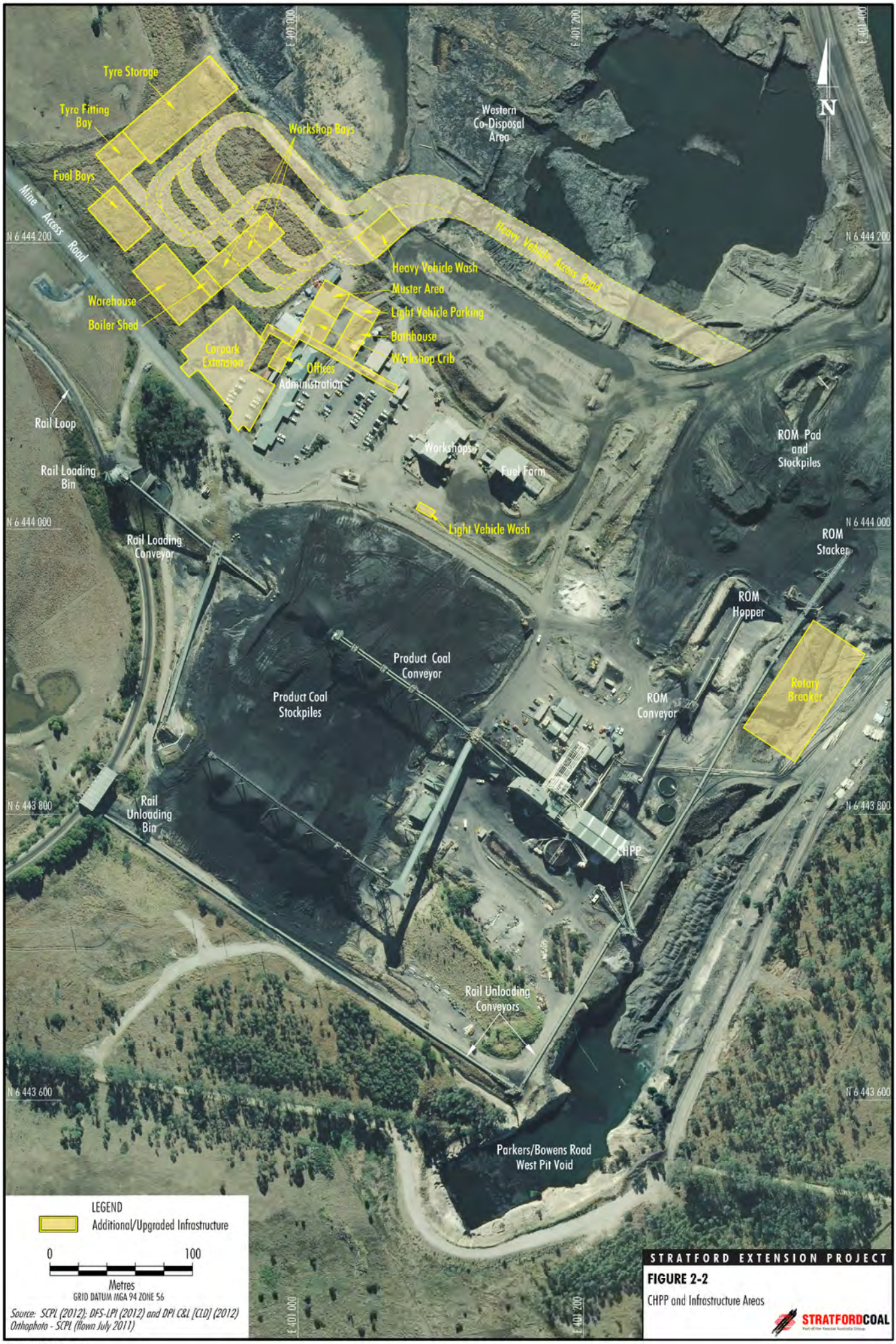
ROM Coal from DCM

Sized ROM coal from the DCM is transported on the North Coast Railway to the Stratford Mining Complex for processing (Figures 1-1).

ROM coal is unloaded from trains at the rail unloading bin and conveyed to the ROM stacker for subsequent reclaim from the ROM pad to the CHPP (Figure 2-2).

Rail loading and transport services are provided by a rail contractor who operates the Duralie Shuttle Train and co-ordinates all loading, unloading and train movements. Train movements are co-ordinated with the Australian Rail Track Corporation (ARTC).

[2] Train lengths up to 1,300 m.



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2.1.4 Waste Rock Management

Mine waste rock (including overburden and interburden) generated from the existing open cuts is either placed as infill in the mine void behind the advancing mining operations (i.e. in-pit emplacement), or placed in out-of-pit mine waste rock emplacements.

The approximate extent of existing and/or approved surface development is shown on Figure 2-1.

2.1.5 CHPP Reject Management

CHPP rejects produced are pumped as a slurry via a pipeline to the Stratford Main Pit. CHPP rejects have also historically been placed in the western co-disposal area and backfilled into mine voids (i.e. Parkers/Bowens Road West Pit and Roseville Pit).

The disposal of CHPP rejects is managed in accordance with the approved Life of Mine Rejects Disposal Plan (SCPL, 2009).

2.1.6 Water Management Infrastructure

Existing and/or approved water management infrastructure at the Stratford Mining Complex includes the following:

- Return Water Dam;
- Stratford East Dam;
- Stratford Main Pit;
- Parkers/Bowens Road West Pit void;
- diversion drains/bunds and retention dams;
- sediment dams;
- pumps and pipelines; and
- irrigation system.

Overflows and controlled releases from sediment dams are monitored in accordance with Environment Protection Licences (EPLs) 5161 and 11745.

In addition and with the formal written approval of the NSW Office of Environment and Heritage (OEH), SCPL is licensed under EPL 5161 to release water from the Stratford East Dam during drought conditions[3].

Further description of the existing water management system at the Stratford Mining Complex is provided in Section 2.12.1 and Appendix B (Surface Water Assessment).

2.1.7 Electricity Supply and Distribution

The electricity supply and distribution system at the Stratford Mining Complex is fed by two existing 33 kV distributor lines adjacent to The Bucketts Way.

A private substation off Parkers Road near the intersection with The Bucketts Way provides an 11 kV supply, which is reticulated at variable voltages according to site requirements.

2.1.8 Other Infrastructure and Service Facilities

Other infrastructure and service facilities which exist at the Stratford Mining Complex include:

- administration buildings;
- ablution buildings;
- stores;
- workshops and heavy vehicle servicing facilities;
- washdown facilities;
- hardstand and laydown areas;
- bunded fuel farm;
- communication, power and water reticulation infrastructure;
- mine access road;
- exploration facilities and work areas;
- internal access roads; and
- parking facilities.

The majority of the other infrastructure and service facilities are contained adjacent the ROM pad and product coal stockpiles as shown on Figure 2-2.

2.1.9 Environmental Monitoring and Management

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, respectively.

[3] If a formal drought declaration is made by the Rural Lands Protection Board.

In November 2010, the name and content of several of the strategies, plans and programmes were modified, and SCPL is currently in the process of addressing the modified monitoring and management requirements of Development Consents DA 23-98/99 and DA 39-02-01.

The list of strategies, plans and programmes and representation of how the environmental management systems of the SCM and BRNOC are integrated is shown on Figure 2-3.

SCPL will continue to implement the existing strategies, plans and programmes and where necessary, review and revise them (in consultation with the relevant regulatory authorities) for the Project.

Further discussion of the existing content and/or revision of these strategies, plans and programmes for the Project is provided under the relevant sub-sections in Section 4.

A summary of the existing and historical environmental management and monitoring regime at the Stratford Mining Complex is provided in Table 2-1, and the locations of relevant existing and historical monitoring sites are shown on Figure 2-4.

2.1.10 Rehabilitation, Wildlife Corridors and Offsets

Rehabilitation is undertaken in a progressive manner at the Stratford Mining Complex with the primary objective to minimise erosion.

Rehabilitation of previously disturbed areas (either temporary or permanent) associated with the construction of infrastructure (e.g. noise bunds and rail loop batters) have been conducted using a variety of techniques including re-shaping, topsoil placement, direct seeding with pasture and native seed, hydraseeding, hydramulching and straw-bitumen mulching.

Rehabilitation of waste rock emplacements involve contouring of the outer emplacement batters up to an overall slope of 1 in 4, followed by drainage works (e.g. bench drains and contour banks).

Topsoil from stripped areas (as mining advances) and stockpiles is respread on contoured landforms to an average thickness of 100 to 200 millimetres (mm) prior to commencement of revegetation works.

Revegetation works on the Stratford Waste Emplacement have involved the establishment of pasture grasses and legumes with selective placement of trees and shrubs for habitat creation and wildlife corridors. Trees are also planted to achieve aesthetic/screening effects as well as providing windbreaks, woodlots and stock shelter. Areas of the revegetated Stratford Waste Emplacement are currently used for cattle agistment. A pivot irrigation system is also used to improve the land use capability of the rehabilitated landform.

Revegetation works on the BRNOC waste rock emplacements to date has involved application of an initial cover crop of millet or oats to protect the contoured emplacement surfaces from erosion, followed by establishment of native vegetation.

Photographic plates showing the rehabilitation and revegetation works undertaken at the Stratford Mining Complex are provided on Figure 2-5.

Drill holes within the mining tenements continue to be cemented/sealed in accordance with the *Borehole Sealing Requirements on Land: Coal Exploration* (NSW Department of Mineral Resources [DMR], 1997).

As part of the rehabilitation strategies for the SCM and BRNOC, SCPL propose to establish and maintain wildlife corridors at the Stratford Mining Complex, and implement an offset strategy in co-ordination with the DCM (Figure 2-6).

2.2 STRATFORD MINING COMPLEX HISTORY

2.2.1 Stratford Coal Mine

The potential environmental impacts associated with the development of the SCM were assessed in the *Stratford Coal Project Environmental Impact Statement* (the Stratford Coal EIS) (SCPL, 1994a). The Stratford Coal Project was approved by the Minister for Planning in December 1994 (Development Consent DA 73/94).

Construction of the SCM commenced in January 1995 and coal production began in June 1995. The SCM was originally an operation producing approximately 1.1 Mtpa of high quality coking and thermal coal over a 14 year mine life.

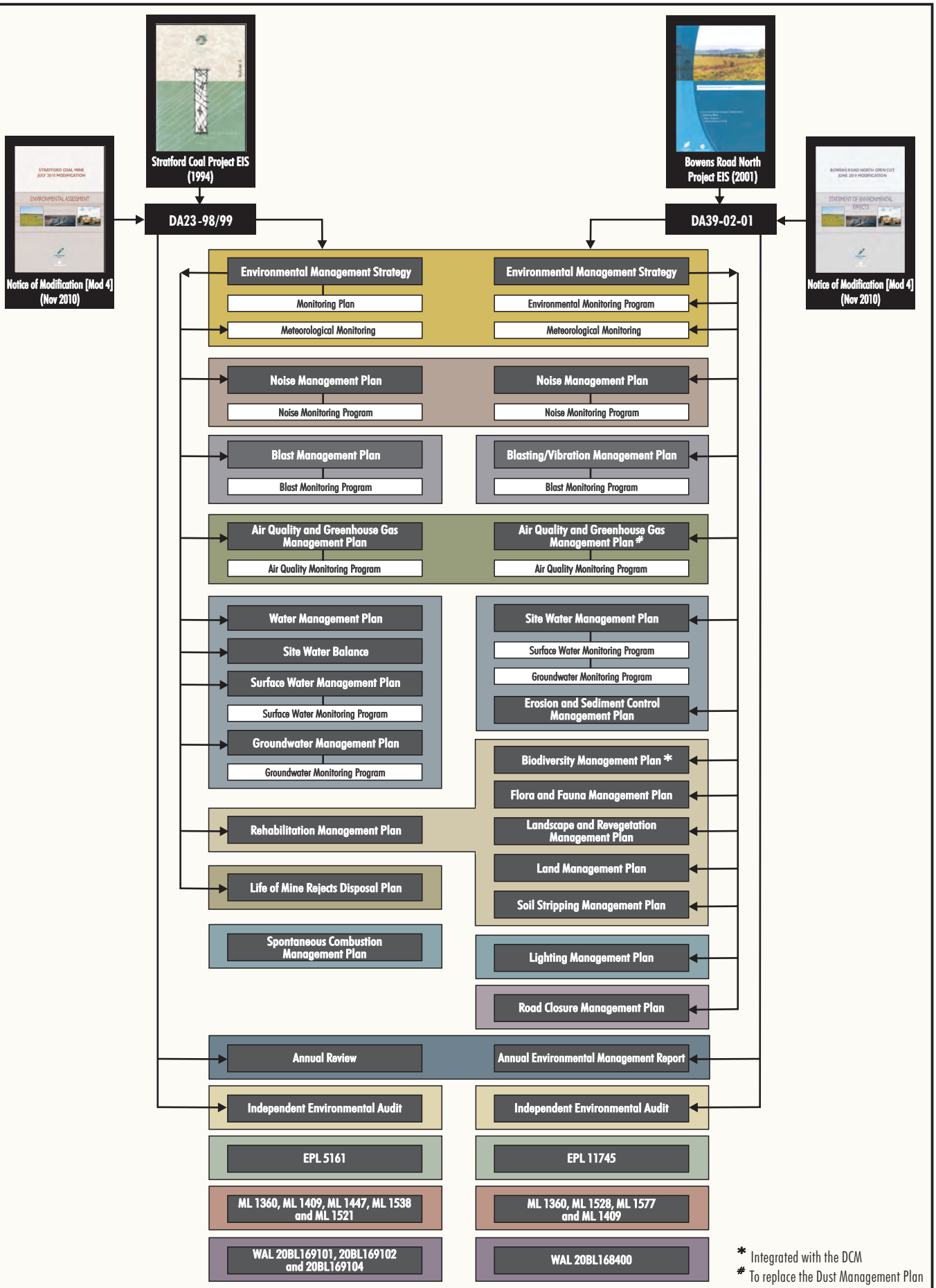

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FIGURE 2-3
Integrated Environmental Management Systems

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Table 2-1
Summary of the Stratford Mining Complex Environmental Management and Monitoring Regime

Environmental Aspect	Environmental Management Documentation	Environmental Monitoring[#]
Land Resources, Flora and Fauna	• Rehabilitation Management Plan[1] • Biodiversity Management Plan[2] • Landscape and Revegetation Management Plan[2] • Land Management Plan[2] • Soil Stripping Management Plan[2] • Flora and Fauna Management Plan[2] • Gloucester District Bush Fire Management Plan Operations	• *Meteorology* – On-site meteorological station adjacent to the administration building. • *Weeds* – all SCPL owned land. • *Rehabilitation monitoring* – rehabilitation areas.
Surface Water	• Water Management Plan[1] • Site Water Balance[1] • Surface Water Management Plan[1] • Site Water Management Plan[2] • Erosion and Sediment Control Plan[2] • Water Management Plan[2]	• *Surface water flow* (including 'nil' flow records) - W2 and W5/SWQ2. • *Surface water quality* – W1, W2, W3, W3A, W4, W5/SWQ2, W6, W8, W9, W10, SD1, SD2, SD3, SD4, SD7/SWQ5, SD10, SD10A, SD11*, SD12, SD13, SD14, SD15, SD16, SD17, SD18, Roseville West Pit, BRN pit, Avondale Swamp*, BRW, RWD, Eastern Emplacement Area, SED, Stratford Main Pit and Ellis Dam. • *Structural integrity of dams* – all sediment dams and contained water dams. • *Aquatic monitoring* – macroinvertebrate surveys (W1, W2, W3, W5, W8 and S3).
Groundwater	• Groundwater Management Plan[1] • Site Water Management Plan[2]	• *Groundwater levels* and quality – SCPL Bore, Bramley Bore, Griffin Bore, Stratford Village Bores, CD6*, CD9* CD10*, RB1, RB2, RB3, RB4*, GW1, GW2, GW3, GW4, GW5, GW7, GW8, BRWN1, MW1, MW2*, MW3, MW4, MW5*, MW6, MW7, MW8, MW9*, MW10^, MW11 and MW12. • *Groundwater extraction* – sumps within the open cuts.
Air Quality	• Air Quality and Greenhouse Gas Management Plan (AQGHGMP)[1,2] • Dust Management Plan[2]	• *Dust deposition* – D5, D6, D7, D8, D9, D10 and D11. • *PM_{10}* – HVD1, HVD2, HVD3, HVD4 and HVD5 (Cassar residence). • *Real-time PM_{10}* – monitoring and recording at neighbouring residences and other locations as required.
Noise and Blasting	• Noise Management Plan[1,2] • Blast Management Plan[1] • Blast/Vibration Management Plan[2]	• *Attended noise monitoring* – Craven, Ex Bagnall, Isaac, Ex Van Der Drift, Ex Ellis, Ex Clarke, Ex Battaglini, Johnson, Ex Deveraux, Ex Wadland and Ex Atkins residences. • *Unattended noise monitoring* – Craven, Ex Bagnall, Isaac, Ex Van Der Drift, Ex Ellis, Ex Clarke, Ex Wadland and Falla residences. • *Blasting* – Ex Clarke, Isaac, Ex Ellis, Falla and Ex Judge residences. • *Real-time* – monitoring and recording at neighbouring private residences and other locations as required.
Waste	• Life of Mine Rejects Disposal Plan[1]	• Reject solids volumes and pH. • Refer to surface water and groundwater monitoring above.

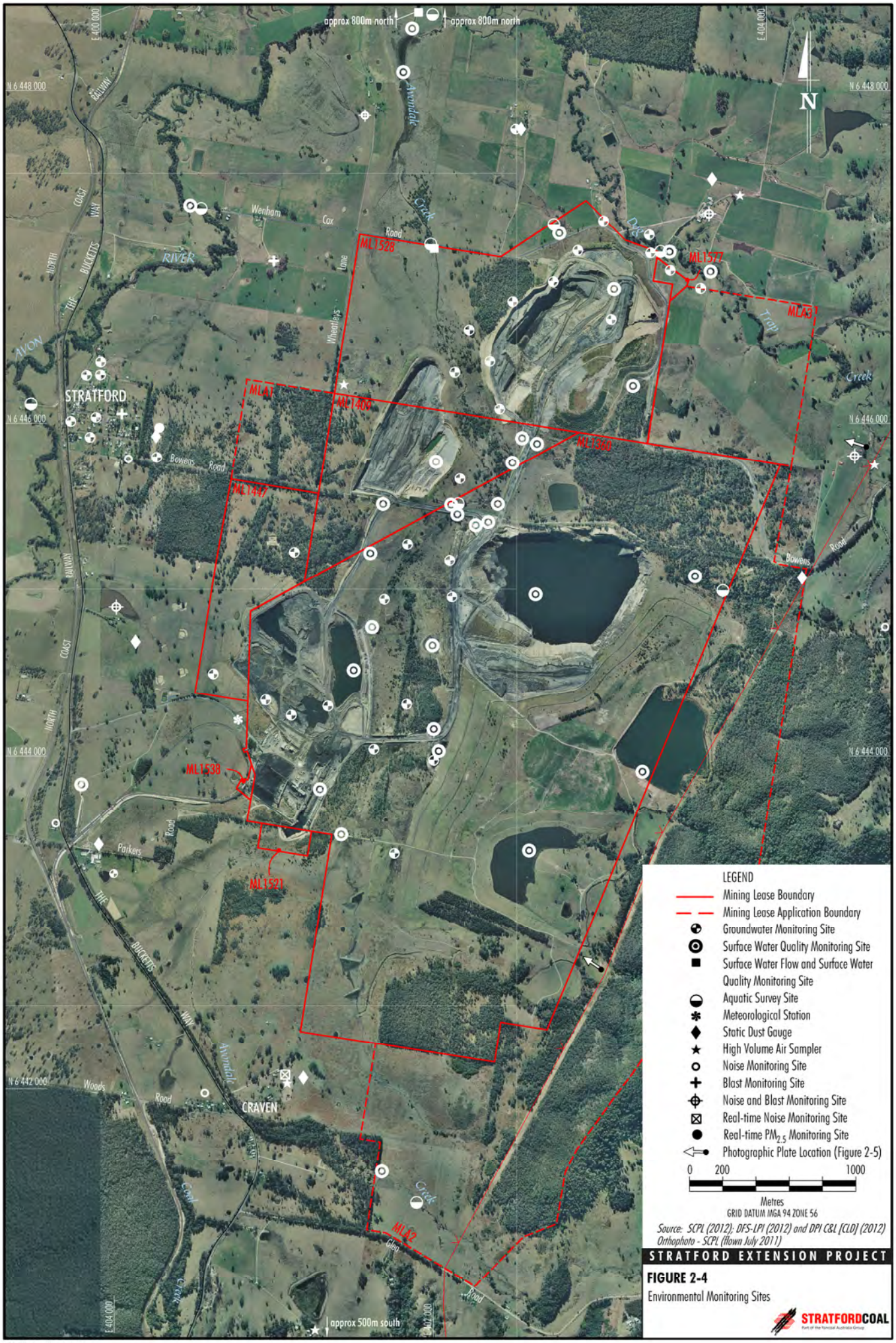
[#] As required by management plans under the Development Consents, EPLs, MLs and Water Licence conditions and on-site investigations.

[1] As required by the conditions of the Development Consent (DA 23-98/99), as modified by the then NSW Minister for Planning in November 2010.

[2] As required by the conditions of the Development Consent (DA 39-02-01), as modified by the then NSW Minister for Planning in November 2010.

* Historical Monitoring Site.

^ Bore damaged.



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Stratford Waste Emplacement - Existing Rehabilitation (Refer Figure 2-4)

BRNOC Waste Emplacements - Existing Rehabilitation (Refer Figure 2-4)

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FIGURE 2-5
Rehabilitation and Revegetation Photographic Plates

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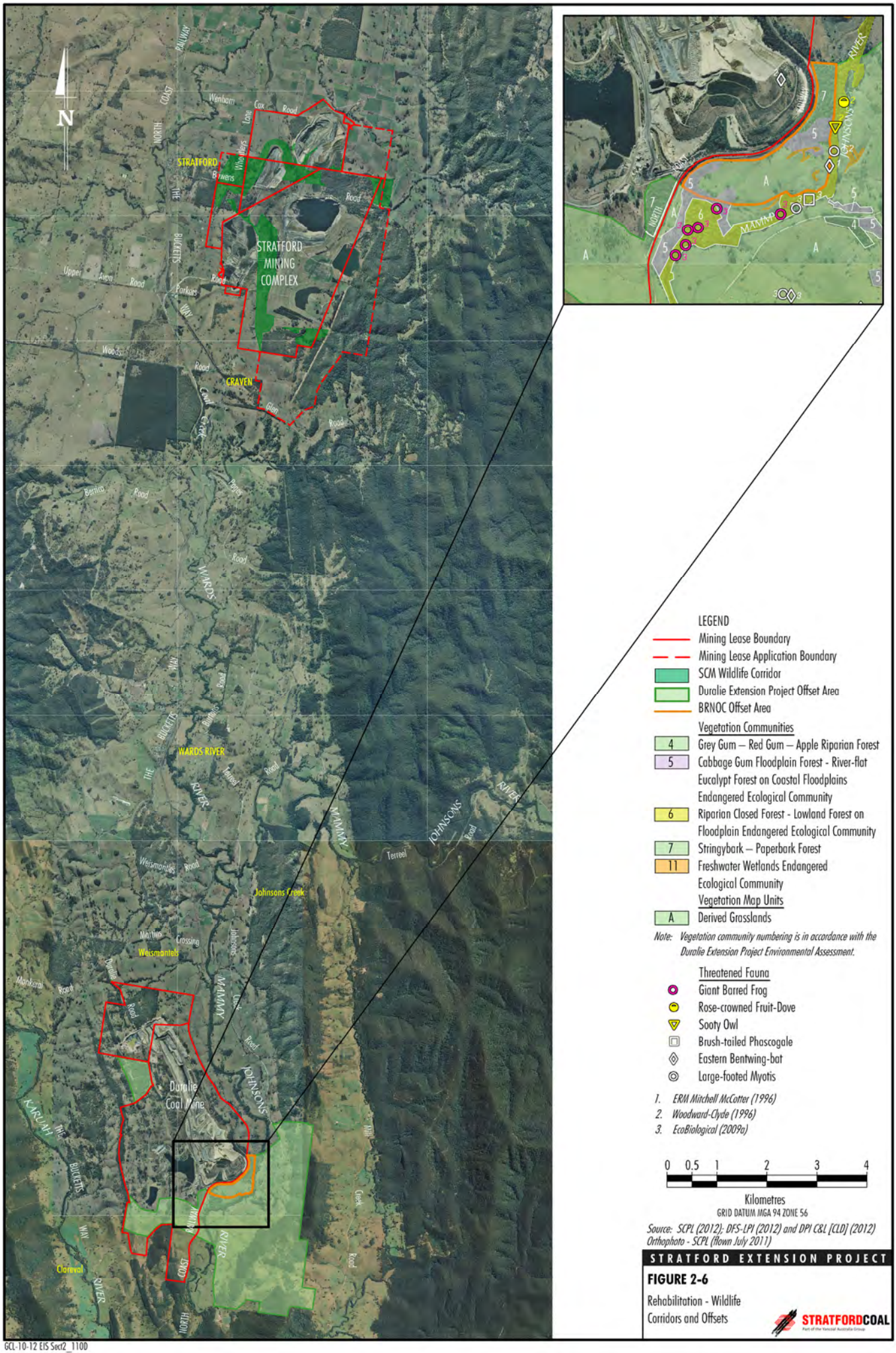

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FIGURE 2-6

Rehabilitation - Wildlife Corridors and Offsets

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Since commencement of the operation, a number of modifications to the original SCM have been made (including the issuing of a new Development Consent), *viz.*:

- In 1996, an application to access the Roseville coal seam, increase the ROM coal mining rate from 1.8 to 3.4 Mtpa and increase the saleable coal production rate from 1.1 to 1.7 Mtpa, was assessed via the *Proposal to Increase Saleable Coal Production to 1.7 Mtpa* (SCPL, 1996) and associated supporting information. The modification was approved in July 1996.
- In 1998, a new Development Application was lodged to allow the SCM to accept DCM ROM coal for processing through the SCM CHPP and allow disposal of associated CHPP rejects at the SCM. This new Development Application was assessed via the *Proposed Modifications to the Stratford Coal Mine Statement of Environmental Effects* (SCPL, 1998). The new Development Application was approved in February 1999 (Development Consent DA 23-98/99).
- In 2000, a modification to further increase saleable coal production was assessed via the *Stratford Coal Mine – Domestic Production Modification Statement of Environmental Effects* (SCPL, 2000). This modification increased saleable coal production to 2.3 Mtpa by increasing the ash content in the coal product, whilst maintaining the approved ROM mining rate of 3.4 Mtpa. The modification to DA 73/94 was approved in July 2000.
- In July 2003, DA 73/94 was relinquished and DA 23-98/99 was commenced.
- In 2003, a modification of DA 23-98/99 to extend the approved Roseville Pit (Roseville Extended Pit) and to reinstate the 2.3 Mtpa saleable coal production rate (as per the 2000 modification to DA 73/94) was assessed via the *Stratford Coal Mine Modification Statement of Environmental Effects* (SCPL, 2003). As a component of this assessment, an operational noise assessment compliant with the *NSW Industrial Noise Policy* (INP) (NSW Environment Protection Authority [EPA], 2000) was conducted. The Roseville Extended Pit was approved in January 2006.
- In 2006, a modification of DA 23-98/99 to develop a small pit adjacent to and contiguous with the approved Roseville Extended Pit was assessed via the *Stratford Coal Mine Roseville West Pit Modification Statement of Environmental Effects* (SCPL, 2006a). The Roseville West Pit was approved in February 2007.
- In 2008, a modification of DA 23-98/99 to augment the ROM and product coal stockpile areas to improve the efficiency of handling and storage of ROM coal and product coal at the SCM was assessed via the *Stratford Coal Mine Coal Handling Modification* (SCPL, 2008). The modification to DA 23-98/99 was approved in September 2008.
- In 2010, a modification of DA 23-98/99 to increase the CHPP processing rate, change the DCM train number/unloading times, increase the product coal transported via rail, deepen the Roseville West Pit and dispose of additional CHPP rejects and waste rock in the Stratford Main Pit void, and irrigate within an approved contained catchment was assessed via the *Stratford Coal Mine – July 2010 Modification Environmental Assessment* (SCPL, 2010). The latest modification to DA 23-98/99 was approved on 26 November 2010.

2.2.2 Bowens Road North Open Cut

The BRNOC was assessed in the *Bowens Road North Project Environmental Impact Statement* (BRN EIS) (SCPL, 2001a) and was approved by the then NSW Minister for Urban Affairs and Planning in July 2001 (Development Consent DA 39-02-01).

Development of the Bowens Road North deposit began in March 2003.

Since commencement of the BRNOC operation, DA 39-02-01 has been modified on four occasions, *viz.*:

- In 2002, an application to modify the mining schedule and mine fleet was assessed via the *Bowens Road North Coal Mine – Project Modification Statement of Environmental Effects* (SCPL, 2002a). The modification was approved in October 2002.
- In 2004, an application to modify the mining rate (i.e. an increase from 0.65 to 0.9 Mtpa) was assessed. The modification was approved in November 2004.

- In 2005, an application to modify the general arrangement and various conditions of the Development Consent DA 39-02-01 was assessed (SCPL, 2005). The modification was approved in June 2005.
- In 2010, a modification of DA 39-02-01 to include a minor cutback to the BRNOC pit (with additional mine waste rock), increase the annual ROM coal production to 1 Mtpa and extend the mine life to end of 2013, was assessed via the *Bowens Road North Open Cut – June 2010 Modification Environmental Assessment* (SCPL, 2010b). The latest modification to DA 39-02-01 was approved on 26 November 2010.

2.3 COAL RESOURCE, GEOLOGICAL FEATURES AND EXPLORATION ACTIVITIES

The Project coal resource is located within the Permian aged Gloucester Basin in NSW.

The Project is located in the central eastern flank of the north-south trending synclinal structure of the Gloucester Basin. In this area, a thick sequence of Carboniferous volcanics is overlain by late Permian sedimentary strata including coal seams. The Permian succession is divided into the following three groups (oldest to youngest):

- Stroud Volcanics;
- Dewrang Group; and
- Gloucester Coal Measures.

Figure 2-7 presents the indicative stratigraphy of the Project area including the target coal seams. The target coal seams for the Project are located within the Craven and Avon Subgroups of the Gloucester Coal Measures and within the Dewrang Group, including:

- Marker [M7] Seam;
- Bindaboo Seam;
- Deards Seam;
- Cloverdale Seam;
- Roseville Seam;
- Bowens Road Seam;
- Avon Seam;
- Cheer-up Seam; and
- Clareval Seam.

The Cloverdale, Roseville, Marker, Bowens Road and Avon Seams have been previously mined at the Stratford Mining Complex. The Weismantel and Clareval Seams are currently mined at the DCM.

Based on the planned maximum production rate, the coal reserve for the Project is approximately 21.5 million tonnes (Mt) of ROM coal[4].

Coal seams in the Project area are generally of constant thicknesses except to the east where thrust faulting has thickened and repeated strata, which is further complicated by the steeply dipping syncline structure. A description of the local geology and geological features (including faulting) in the vicinity of the Project is provided in Appendix A (Groundwater Assessment).

During the life of the Project, mine exploration activities would continue to be undertaken in the Development Application area. These activities would occur within, and external to, the open cut footprints and would be used to investigate aspects such as geological features, seam structure and coal/overburden characteristics as input to detailed mine planning and feasibility studies.

2.4 PROJECT GENERAL ARRANGEMENT

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

The main activities associated with the development of the Project would include (Figure 2-1):

- ROM coal production up to 2.6 Mtpa for an additional 11 years (commencing approximately 1 July 2013 or upon the grant of all required approvals), 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;

[4] The total Project ROM coal reserve includes 0.3 Mt of ROM coal approved to be mined at the BRNOC during Year 1 of the Project.

<table>
<tr><th>BASIN</th><th>PERIOD</th><th>GROUP</th><th>SUB-GROUP</th><th>FORMATION</th><th>COAL SEAMS</th></tr>
<tr><td rowspan="11">GLOUCESTER</td><td rowspan="11">PERMIAN</td><td rowspan="7">GLOUCESTER COAL MEASURES</td><td rowspan="5">CRAVEN</td><td>Crowthers Road</td><td>[Conglomerate]</td></tr>
<tr><td>Woods Road (Leloma)</td><td>Linden, Marker (M6,M7[2]), Bindaboo[1,2], Deards[1,2]</td></tr>
<tr><td>Bucketts Way (Jilleon)</td><td>Cloverdale[1,2], Roseville[1,2] Marker (M3, M8, M1)[1]</td></tr>
<tr><td>Wards River</td><td>[Conglomerate]</td></tr>
<tr><td>Wenham</td><td>Bowens Road[1,2], Bowens Road Lower[1]</td></tr>
<tr><td colspan="2">SPELDON FORMATION</td></tr>
<tr><td rowspan="2">AVON</td><td>Dog Trap Creek</td><td>Glenview, Marker 2</td></tr>
<tr><td>Waukivory Creek</td><td>Avon[1,2], Triple[1], Rombo, Glen Road, Valley View, Parkers Road</td></tr>
<tr><td colspan="2" rowspan="3">DEWRANG GROUP</td><td>Mammy Johnsons</td><td>Mammy Johnsons</td></tr>
<tr><td>Weismantel</td><td>Weismantel</td></tr>
<tr><td>Duralie Road</td><td>Cheer-up[2], Clareval[2]</td></tr>
<tr><td colspan="3">ALUM MOUNTAIN VOLCANICS</td></tr>
</table>

[1] Coal reserves currently/previously mined at the Stratford Mining Complex
[2] Coal reserves to be mined by the Project

Source: Tamplin Resources (2010) , Stratford Coal (1994) and SCPL (2012)

STRATFORD EXTENSION PROJECT

FIGURE 2-7
Stratigraphic Units of the Development Application Area

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- 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 kV 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.

Project general arrangements for end of Year 1, Year 2, Year 6, Year 7 and Year 10 are shown on Figures 2-8 to 2-12. These general arrangements are based on planned maximum production and mine progression. The mining layout and sequence may vary to take account of localised geological features, coal market volume and quality requirements, mining economics and Project detailed engineering design.

The detailed mining sequence over any given period would be documented in the relevant Rehabilitation and Environmental Management Plan (REMP) or Mining Operations Plan (MOP) as required by the DRE (within the DTIRIS).

The final landform and rehabilitation concept for the end of the Project life and progressive rehabilitation is presented in Section 5.

2.5 KEY OPERATIONS, ACTIVITIES AND INFRASTRUCTURE OF POTENTIAL RELEVANCE TO INTERACTIONS WITH THE PROJECT

A description of potential interactions between the Project and regional CSG development (Gloucester Gas Project), exploration activities (AGL, GRL and Yancoal), coal mining (DCM), future coal mining and public infrastructure (Stroud to Lansdowne Project) is provided below. A summary of the consultation undertaken by Yancoal with the various proponents of these developments is provided in Section 3.

Potential cumulative impacts associated with these developments have been considered in this EIS (Section 4).

2.5.1 Gloucester Gas Project and AGL Exploration Activities

The Stage 1 of the Gloucester Gas Project was granted Project Approval (08_0154) under Part 3A of the EP&A Act by the Planning Assessment Commission in February 2011. AGL is the proponent of the Gloucester Gas Project.

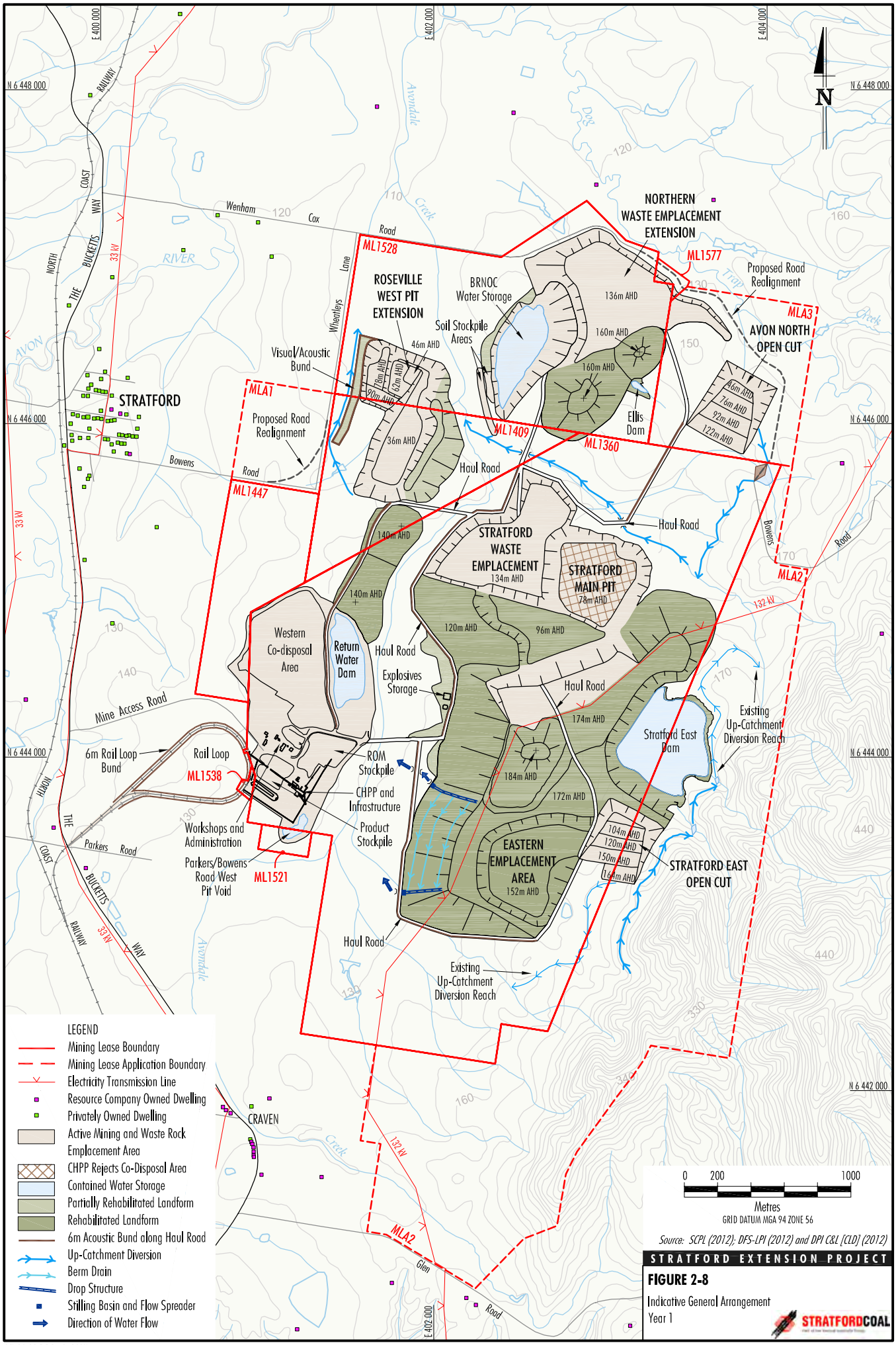
The Gloucester Gas Project includes works for the extraction of CSG from the Gloucester Basin within Petroleum Exploration Licence (PEL) 285 (Figure 1-1). Stage 1 of the Gloucester Gas Project involves:

- development of 110 gas wells and associated infrastructure between Gloucester and just south of Stratford;
- development of a Central Processing Facility (at one of two potential locations); and
- construction and operation of a high pressure gas transmission pipeline from Stratford to a delivery station at Hexham in NSW.

Exploration activities continue to be undertaken by AGL within PEL 285.

Project Interaction with the Gloucester Gas Project and AGL Exploration Activities

Infrastructure associated with Stage 1 of the Gloucester Gas Project overlays and is adjacent to the existing mining and exploration tenements at the Stratford Mining Complex (Figure 2-13).



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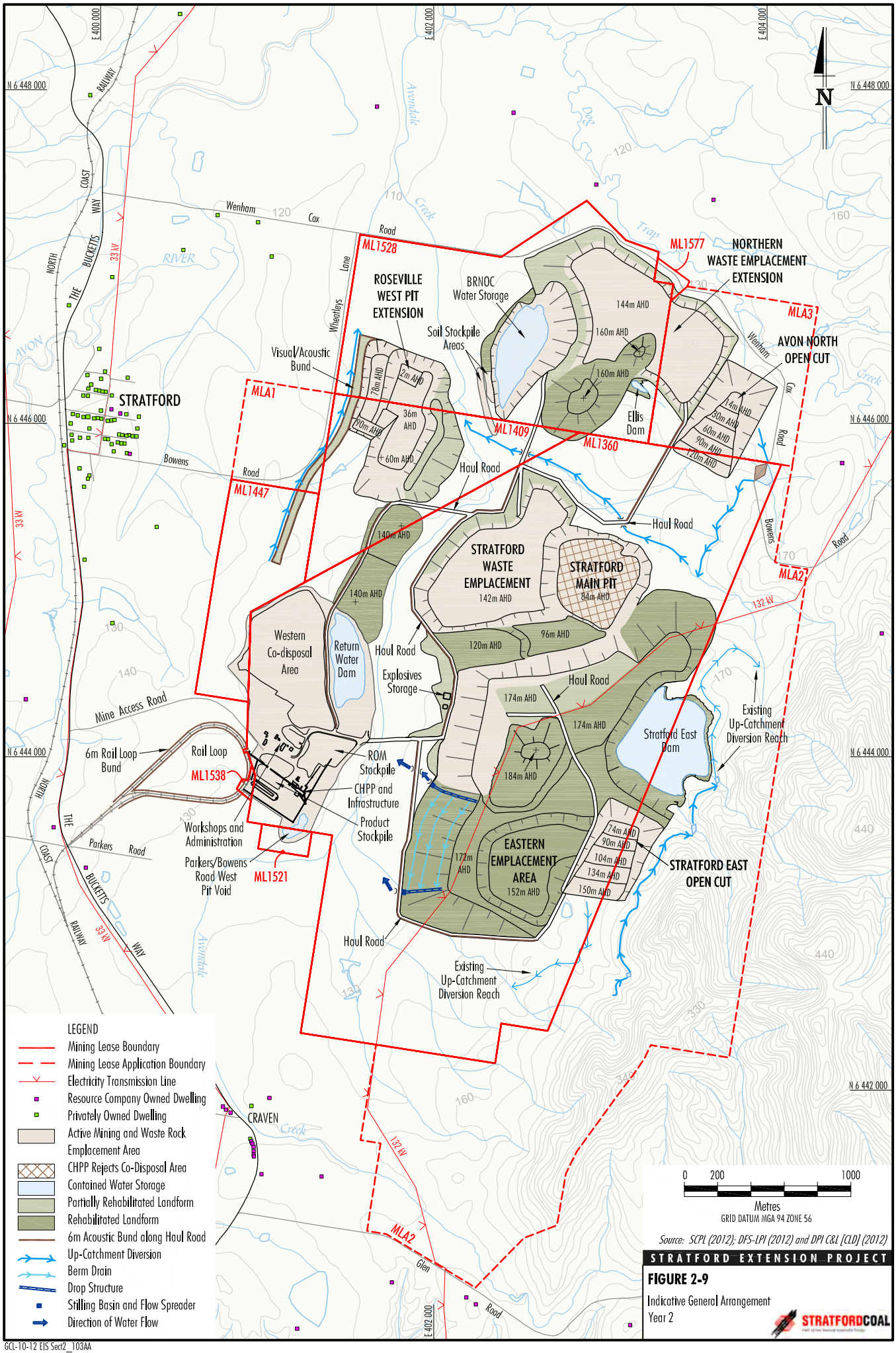

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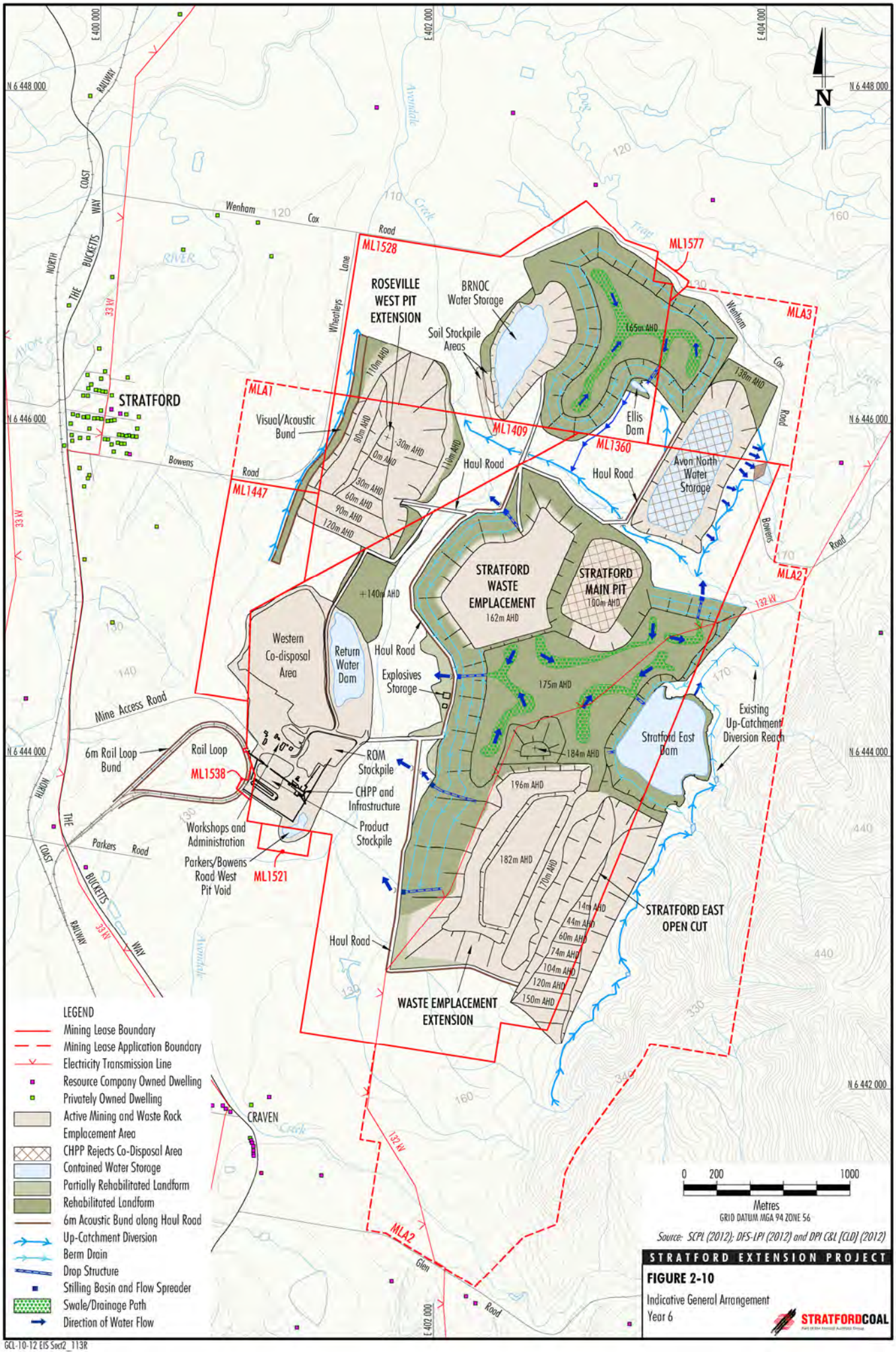
E 400 000
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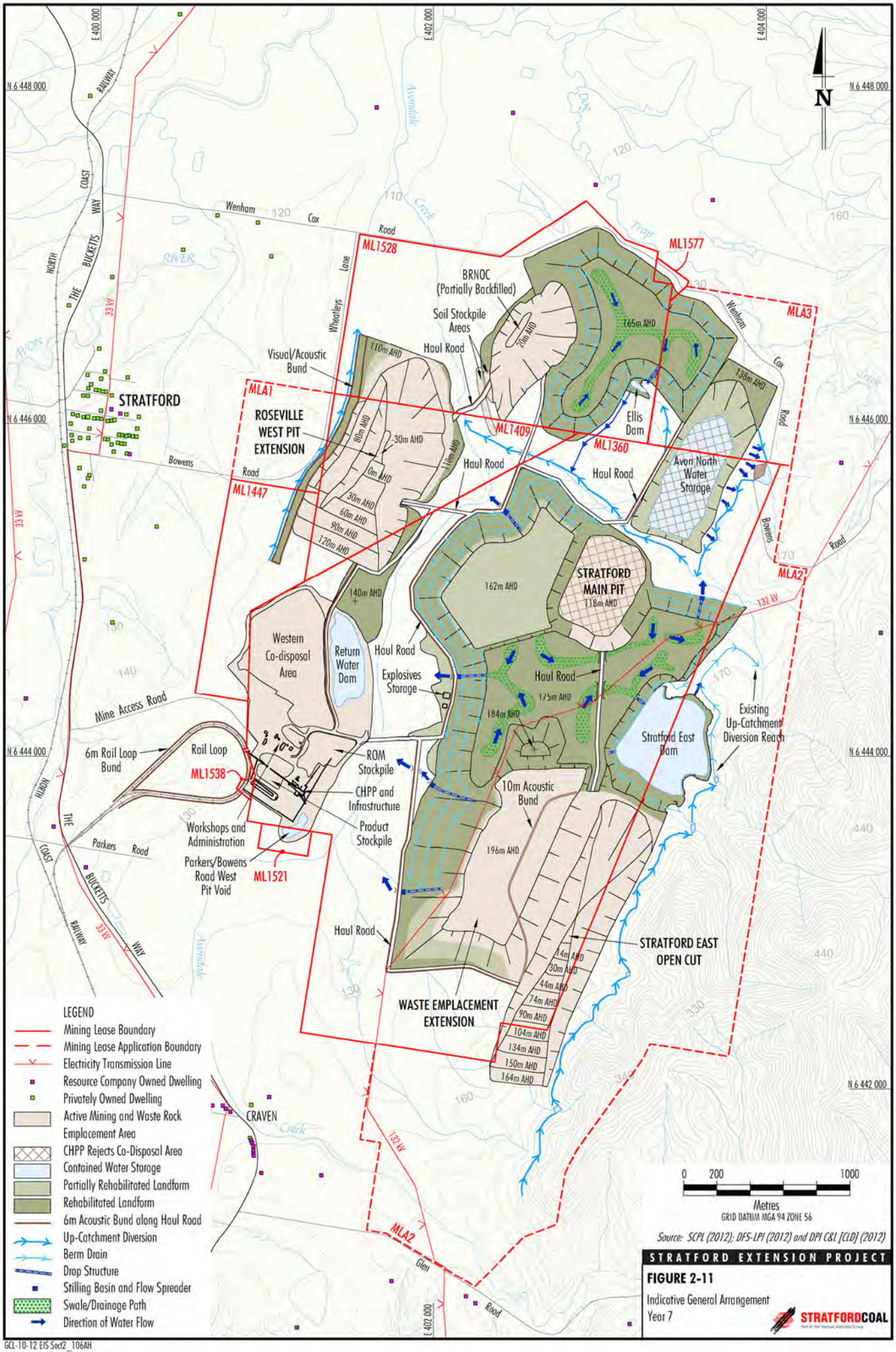
RAILWAY
COAST
NORTH
BUCKETTS
WAY
THE
33 kV
RIVER
Wenham
Cox
Road
Lane
Wheatleys
Avondale
Creek
ML1528
ML1577
ROSEVILLE WEST PIT EXTENSION
BRNOC Water Storage
Soil Stockpile Areas
MLA3
MLA1
STRATFORD
Visual/Acoustic Bund
ML1409
ML1360
Ellis Dam
Haul Road
Avon North Water Storage
Bowens
ML1447
MLA2
STRATFORD WASTE EMPLACEMENT
162m AHD
STRATFORD MAIN PIT
100m AHD
Western Co-disposal Area
Return Water Dam
Explosives Storage
Mine Access Road
6m Rail Loop Bund
Rail Loop
ML1538
ROM Stockpile
CHPP and Infrastructure
Product Stockpile
Workshops and Administration
Parkers/Bowens Road West Pit Void
ML1521
Parkers Road
HILBON
Existing Up-Catchment Diversion Reach
Stratford East Dam
STRATFORD EAST OPEN CUT
WASTE EMPLACEMENT EXTENSION
CRAVEN
Glen
110m AHD
80m AHD
0m AHD
-30m AHD
30m AHD
60m AHD
90m AHD
120m AHD
+140m AHD
165m AHD
138m AHD
175m AHD
184m AHD
196m AHD
182m AHD
170m AHD
14m AHD
44m AHD
60m AHD
74m AHD
104m AHD
120m AHD
150m AHD
LEGEND
Mining Lease Boundary
Mining Lease Application Boundary
Electricity Transmission Line
Resource Company Owned Dwelling
Privately Owned Dwelling
Active Mining and Waste Rock Emplacement Area
CHPP Rejects Co-Disposal Area
Contained Water Storage
Partially Rehabilitated Landform
Rehabilitated Landform
6m Acoustic Bund along Haul Road
Up-Catchment Diversion
Berm Drain
Drop Structure
Stilling Basin and Flow Spreader
Swale/Drainage Path
Direction of Water Flow
0
200
1000
Metres
GRID DATUM MGA 94 ZONE 56
Source: SCPL (2012); DFS-LPI (2012) and DPI C&L [CLD] (2012)
STRATFORD EXTENSION PROJECT
FIGURE 2-10
Indicative General Arrangement
Year 6
STRATFORDCOAL
GCL-10-12 EIS Sect2_113R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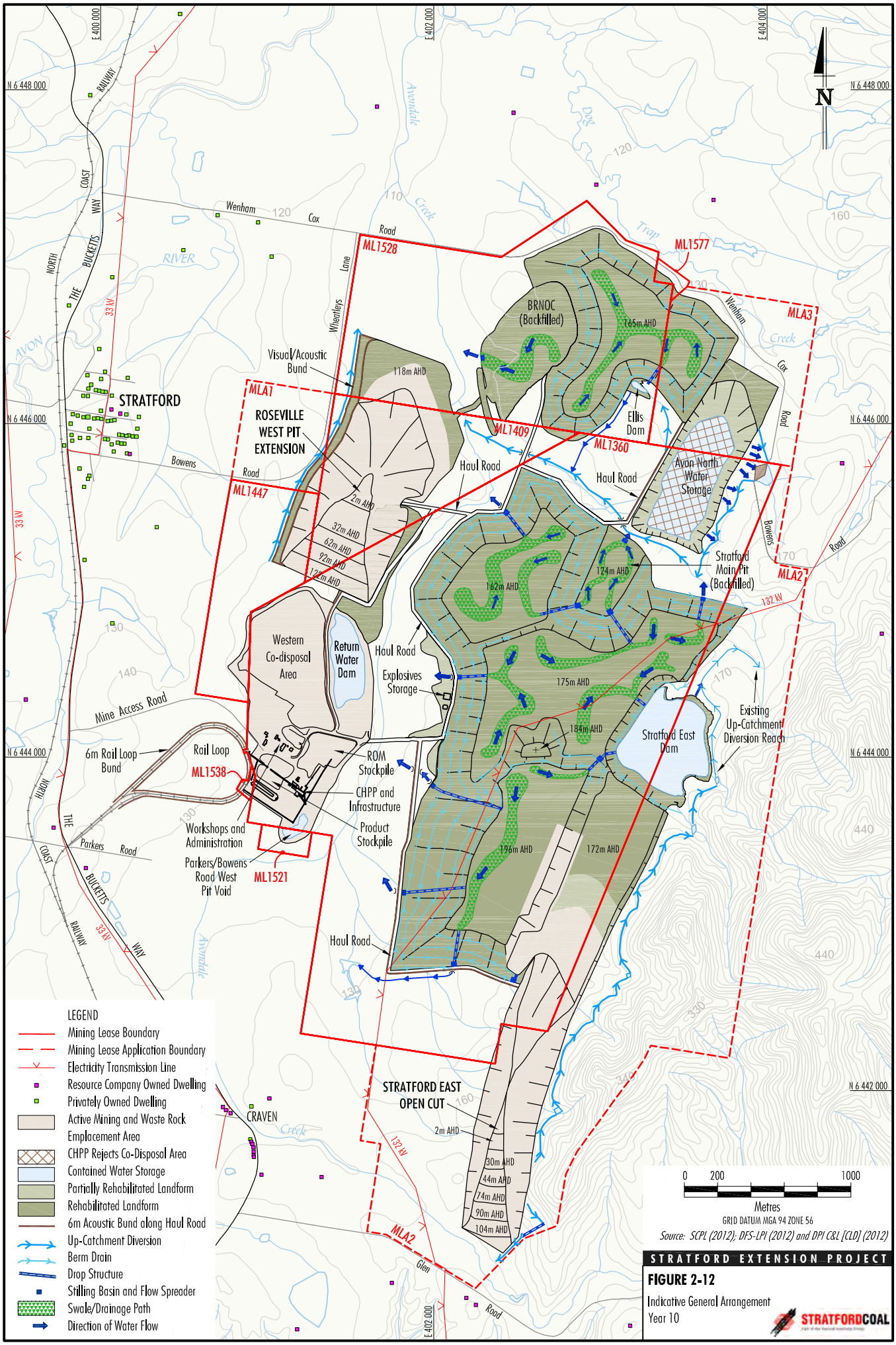
Wenham Cox Road
ML1528
ML1577
MLA3
BRNOC (Partially Backfilled)
Soil Stockpile Areas
Haul Road
Visual/Acoustic Bund
Wheatleys Lane
STRATFORD
MLA1
ROSEVILLE WEST PIT EXTENSION
ML1409
ML1360
Ellis Dam
Avon North Water Storage
Bowens Road
ML1447
STRATFORD MAIN PIT
Western Co-disposal Area
Return Water Dam
Explosives Storage
MLA2
Mine Access Road
6m Rail Loop Bund
Rail Loop
ML1538
ROM Stockpile
CHPP and Infrastructure
Product Stockpile
Workshops and Administration
Parkers Road
Parkers/Bowens Road West Pit Void
ML1521
Stratford East Dam
Existing Up-Catchment Diversion Reach
10m Acoustic Bund
STRATFORD EAST OPEN CUT
WASTE EMPLACEMENT EXTENSION
CRAVEN
Glen Road
THE BUCKETTS WAY
NORTH COAST RAILWAY
33 kV
132 kV
Avondale Creek
RIVER
LEGEND
Mining Lease Boundary
Mining Lease Application Boundary
Electricity Transmission Line
Resource Company Owned Dwelling
Privately Owned Dwelling
Active Mining and Waste Rock Emplacement Area
CHPP Rejects Co-Disposal Area
Contained Water Storage
Partially Rehabilitated Landform
Rehabilitated Landform
6m Acoustic Bund along Haul Road
Up-Catchment Diversion
Berm Drain
Drop Structure
Stilling Basin and Flow Spreader
Swale/Drainage Path
Direction of Water Flow
0 200 1000
Metres
GRID DATUM MGA 94 ZONE 56
Source: SCPL (2012); DFS-LPI (2012) and DPI C&I [CLD] (2012)
STRATFORD EXTENSION PROJECT
FIGURE 2-11
Indicative General Arrangement
Year 7
STRATFORDCOAL
GCL-10-12 EIS Sect2_106AH



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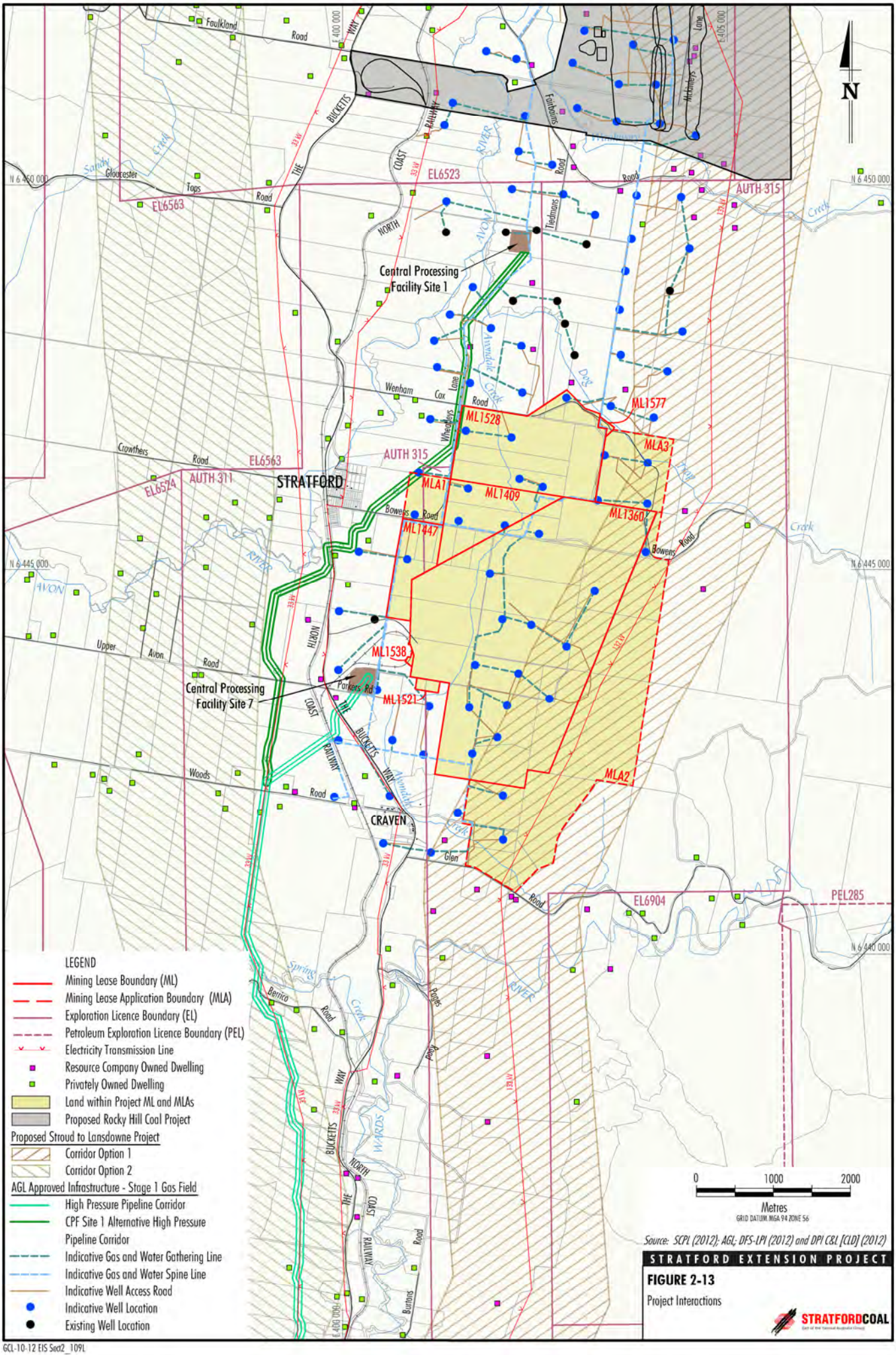


GCL-10-12 EIS Sect2_109L

As the current PEL does not apply to the surface lands subject to Yancoal mining leases, a Petroleum Production Lease (PPL) can only be issued under the *Petroleum (Onshore) Act, 1991* where the holder of the mining leases agrees. Accordingly, only proposed gas wells and associated infrastructure located outside of existing mining tenements at the Stratford Mining Complex and Project MLAs have been considered for the purposes of this EIS.

The Central Processing Facility has also been considered at the nearest location to the Project (i.e. Site 7 adjacent to the existing rail loop at the Stratford Mining Complex). The Noise and Blasting Assessment (Appendix C) however considered cumulative noise impacts at both Site 1 and Site 7 (Figure 2-13) for the purpose of comparison.

It is considered unlikely that any significant or sustained cumulative impacts would arise from the exploration activities being undertaken by AGL in the region as exploration activities are generally short-term, of a limited extent and will be closely regulated by the DRE.

2.5.2 GRL Exploration Activities

GRL is undertaking exploration activities within EL 6523, EL 6524 and EL6563, north and west of the Stratford Mining Complex (Figure 1-1). In February 2012, GRL submitted *Documentation Supporting an Application for Director-General's Requirements for the Rocky Hill Coal Project* (R.W. Corkery and Co. Pty Limited, 2012) and its interactions with the Project are considered further in Section 2.5.5.

Project Interaction with the GRL Exploration Activities

It is considered unlikely that any significant or sustained cumulative impacts would arise from the exploration activities being undertaken by GRL in the region as exploration activities are generally short-term, of a limited extent and will be closely regulated by the DRE.

2.5.3 Yancoal Exploration Activities

Yancoal is approved to undertake exploration activities within surrounding authorisations (AUTH 311 and AUTH 315), and EL 6904 to the south-east of the Stratford Mining Complex (Figure 2-13). It is considered unlikely that any significant or sustained cumulative impacts would arise from the exploration activities being undertaken by Yancoal in the region as exploration activities are generally short-term, of a limited extent and will be closely regulated by the DRE.

2.5.4 Duralie Coal Mine

The CHPP at the Stratford Mining Complex currently receives sized ROM coal from the DCM for processing (Section 2.1.3). Duralie Coal Pty Ltd (DCPL) (a wholly owned subsidiary of Yancoal) is the owner and operator of the DCM.

The Duralie Extension Project at the DCM was approved on 11 November 2011 (Project Approval 08_0203).

Project Interaction with the DCM

Sized ROM coal would continue to be transported on the North Coast Railway to the Stratford Mining Complex for processing in accordance with Project Approval (08_0203), up to a maximum of 3.0 Mtpa.

2.5.5 GRL Rocky Hill Coal Project

GRL submitted *Documentation Supporting an Application for Director-General's Requirements for the Rocky Hill Coal Project* (R.W. Corkery and Co. Pty Limited, 2012) to the DP&I in February 2012. The proposed Rocky Hill Coal Project is located largely within EL 6523 to the north of the Stratford Mining Complex (Figure 2-13).

The new mine proposal includes the following major components:

- mine entrance and access road;
- site office and amenities complex;
- development of four open cut pits;
- visibility barriers;
- site water management structures;
- a series of cut-off grout curtains adjacent to Waukivory Creek;
- out-of-pit overburden emplacements;
- CHPP (including plant feeder/reclaimer, crushing station, desliming screen, dense media, spirals and cyclone circuits, Jamieson flotation cell, horizontal belt filter, thickener, dewatering units and sumps, pumps and pipelines);
- ROM coal and product coal stockpiles;
- switchyard and workshop;
- overland conveyors;
- demolition of former Boral Timber Mill buildings;
- construction of rail loop and train loading infrastructure; and

- installation of power supply and control infrastructure.

Project Interaction with GRL's Rocky Hill Coal Project

Infrastructure and development activities associated with the proposed Rocky Hill Coal Project are located approximately 5 km to the north of the existing mining and exploration tenements at the Stratford Mining Complex (Figure 2-13).

Based on the indicative timing of the proposal provided in the *Documentation Supporting an Application for Director-General's Requirements for the Rocky Hill Coal Project* (R.W. Corkery and Co. Pty Limited, 2012), it has been conservatively assumed for the purposes of cumulative assessment (e.g. groundwater, surface water, noise, air quality, transport, visual and socio-economic) that Year 1 of the proposed Rocky Hill Coal Project coincides with Year 1 of the Project, and has been considered in each of the respective assessments.

2.5.6 Stroud to Lansdowne 330 kV Power Line Project

The Stroud to Lansdowne Project would involve construction of a single-circuit 330 kV transmission line between Essential Energy's Stroud Substation and a new substation near Lansdowne (north of Taree). TransGrid is the proponent of the Stroud to Lansdowne Project.

TransGrid called on community members to register their expression of interest for the Stroud to Lansdowne Project's Community Working Group. SCPL has had a representative accepted as a member of the Community Working Group. In February 2012, TransGrid released a draft Options Selection Report (OSR) (AECOM, 2012a) for purposes of consultation which included several corridor options/alignments. In July 2012, TransGrid released a final OSR, in which corridor option 1 was selected as the preferred option (AECOM, 2012b). The two corridor options in the vicinity of the Stratford Mining Complex are shown on Figure 2-13.

Project Interaction with the Stroud to Lansdowne Project

The Stroud to Lansdowne Project transmission line alignment could potentially traverse a similar alignment to the existing 132 kV transmission line east of the Project (i.e. corridor option 1). As described in Section 2.6.2, a section of the existing 132 kV transmission line is proposed to be realigned as part of the Project.

SCPL will continue to liaise with TransGrid to ensure that the proposed Stroud to Lansdowne Project transmission line alignment does not impact on the development the subject of this application.

2.6 PROJECT CONSTRUCTION/ DEVELOPMENT ACTIVITIES

The Project would utilise existing infrastructure and supporting services at the Stratford Mining Complex. 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 kV power line;
- installation of a new rotary breaker in the CHPP;
- noise management infrastructure upgrades and haul road bunding;
- realignment of a NSW Rural Fire Service (RFS) fire trail; and
- relocation of a Telstra phone line.

Construction/development activities would generally be restricted to daylight hours (i.e. 7.00 am to 6.00 pm) up to seven days a week.

Additional mobile equipment would be required for short periods during the Project construction/ development activities. The number and type of equipment would be expected to vary depending on the activity being undertaken.

Consideration of construction/development activities and their potential for noise generation is provided in the Noise and Blasting Assessment (Appendix C).

2.6.1 Road Realignments

The extent of the Project open cut and mine waste rock emplacements would require realignments of sections of local roads for continued public road accessibility around the northern extent of the Project (Figure 2-1).

The road realignments would generally involve the construction of:

- a 400 m sealed two-lane road realignment of Wheatleys Lane and Bowens Road around the western extent of the proposed Roseville West Pit Extension and upslope diversion; and
- a 1.7 km sealed two-lane road realignment of Wenham Cox/Bowens Road around the north-eastern extent of the proposed Northern Waste Emplacement Extension and Avon North Open Cut.

The road realignment adjacent to Dog Trap Creek would be offset at least 40 m from the bed of the stream.

The detailed design of the road realignments would be undertaken in accordance with Austroads Guide to Road Design and to the satisfaction of the Gloucester Shire Council (GSC).

2.6.2 132 kV Power Line Relocation

The extent of the Stratford East Open Cut would require the relocation of a section of the existing 132 kV power line, and its associated easement, owned and operated by TransGrid (Figure 2-1). The relocation works would be undertaken by TransGrid in consultation with Yancoal.

2.6.3 Rotary Breaker Installation

A new rotary breaker would be installed for raw coal preparation in the CHPP. Further details are provided in Section 2.8.

2.6.4 Noise Management Infrastructure Upgrades and Haul Road Bunding

Upgrades/replacement of infrastructure and equipment for noise attenuation purposes would be required for the Project, including (where required):

- replacement of conveyor drives and idlers with lower noise equivalents;
- installation of acoustic bunding beside key haul roads and a perimeter visual/acoustic bund to the west of the Roseville West Pit Extension; and
- installation of acoustic bunding around the rail loop.

The acoustic bunding adjacent the rail loop would require a minor realignment of an existing 33 kV power line to the Stratford Mining Complex (Section 2.14.4).

Construction of earth bunds on key haul roads would be undertaken as part of ROM operations to reduce noise emissions from haul trucks.

2.6.5 RFS Fire Trail Realignment

The extent of Stratford East Open Cut and Stratford Waste Emplacement would require realignment of an existing RFS fire trail, which provides access from Parkers Road to the ridgeline east of the Project (Figure 2-1).

The fire trail would be extended south along the existing 132 kV power line easement, to provide access south of the Stratford East Open Cut until approximately Year 6 (Figure 2-10). Following Year 6, the fire trail would be realigned to the north of the Stratford East Open Cut (Figure 2-11). Access across the Stratford Waste Emplacement would be maintained throughout the life of the Project.

Realignment of the fire trail would be undertaken in consultation with the Stratford and Craven RFS and local landholders.

2.6.6 Telstra Phone Line Relocation

The extent of the Roseville West Pit Extension and Northern Waste Emplacement during Year 1 of the Project (Figure 2-8) would require relocation of two sections of an existing Telstra phone line, which services residents to the north-east of the Project.

The relocations of the Telstra phone line would be undertaken in consultation with Telstra and local landholders and in a manner to minimise disruption of the service.

2.7 MINING OPERATIONS

2.7.1 Hours of Operation

Project mining operations would be conducted during the periods specified below:

- **BRNOC –** mining operations would only occur between the hours of 7.00 am to 7.00 pm, seven days per week.
- **Roseville West Pit Extension –** 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** – 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.

2.7.2 Open Cut Mining Areas

The Project includes four open cut mining areas, namely (Figure 2-1):

- BRNOC (completed in Year 1) within ML 1528 and ML 1409;
- Roseville West Pit Extension within ML 1409, ML 1360, ML 1447 and MLA 1;
- Avon North Open Cut within ML 1360 and MLA 3; and
- Stratford East Open Cut within ML 1360 and MLA 2.

Excavation of up to approximately 0.2 Mtpa of CHPP rejects would also continue to be recovered from the western co-disposal area for re-processing in the CHPP when the opportunity arises.

An overview of the design features of each of the open cut mining areas and the western co-disposal area are provided below.

Bowens Road North Open Cut

Coal mining operations in the BRNOC are scheduled to be completed during Year 1 of the Project, some 10 years after its commencement in 2003. No additional ROM coal would be mined from the BRNOC beyond the currently approved 5.4 Mt coal reserve (total).

The existing haul road would continue to be used for coal haulage to the ROM pad and processing in the CHPP.

Once mining operations in the BRNOC are completed the void would be used as a contained water storage (Figures 2-9 and 2-10) until open cut mining operations in the Avon North Open Cut have been completed. At this time stored waters would be transferred to the Avon North Open Cut void (Figures 2-10 and 2-11) and the BRNOC void then backfilled with mine waste rock from the Roseville West Pit Extension.

Mine waste rock would be hauled via a new haul road across Avondale Creek from the Roseville West Pit Extension to the BRNOC void. A bund would be constructed along the new haul road to attenuate noise propagation and screen views from Wheatleys Lane and Wenham Cox Road.

The BRNOC void would be backfilled to the surrounding natural surface (at grade) and rehabilitated.

Roseville West Pit Extension

The Roseville West Pit Extension involves the continuation of open cut mining to the west and south of the existing Roseville West Pit at the Stratford Mining Complex (Figures 2-8 to 2-12).

Extension of the open cut mining operation to the west would access the Marker [M7], Bindaboo, Deards, Cloverdale and Roseville Seams. As the open cut mining operation progresses to the south, the previously mined and backfilled Roseville Pit would be excavated/cut-back to allow mining through to the stratigraphically deeper Roseville Seam. Over-excavation of the previously backfilled Roseville Pit would occur to maintain geotechnical stability of the pit walls.

Approximately 7.3 Mt of ROM coal would be mined from the Roseville West Pit Extension.

Access to the Roseville West Pit Extension would be via the existing waste rock and ROM coal haulage roads to the east and south respectively.

A perimeter bund would be constructed along the western edge of the pit to restrict access, attenuate noise propagation and screen views of the active open cut mining areas from Bowens Road and Wheatleys Lane.

Constraints to the Roseville West Pit Extension include the coal resource extent and strip ratios. At its nearest point, the Roseville West Pit Extension is approximately 1 km east of Stratford. No open cut mining would be carried out within 40 m of Avondale Creek.

At the end of the Project life, the Roseville West Pit Extension void would remain and is described in Section 5.

Avon North Open Cut

The Avon North Open Cut is a new mining area to be developed north-east of the Stratford Main Pit (Figure 2-1). Approximately 4.3 Mt of ROM coal would be mined from the Avon North Open Cut, targeting the Avon Seam.

Access to the Avon North Open Cut would be via an extension to the haul road north of the Stratford Main Pit to the toe of the Northern Waste Emplacement Extension (Section 2.10).

Constraints to the Avon North Open Cut include the coal resource extent and strip ratios to the east and west respectively. In the north, the open cut mining area is more than 150 m south of Dog Trap Creek and would not excavate any of its associated alluvium. In the south, the Avon North Open Cut is constrained to retain a flow path for upslope catchment runoff from an eastern diversion.

Once mining operations in the Avon North Open Cut are completed, the void would be used as a contained water storage and ultimately for co-disposal of CHPP rejects once the Stratford Main Pit co-disposal area void is filled (Figures 2-10 to 2-12).

At the end of the Project life, the Avon North Open Cut void would remain and is described in Section 5.

Stratford East Open Cut

The Stratford East Open Cut is a second new mining area to be developed for the Project located east and south of the Stratford Waste Emplacement (Figure 2-1).

Approximately 9.6 Mt of ROM coal would be mined from the Stratford East Open Cut, targeting the Cheer-up and Clareval Seams.

Access to the Stratford East Open Cut would be via a haul road constructed along the western and southern toe of the Stratford Waste Emplacement and Stratford Waste Emplacement Extension (Figure 2-10).

Constraints to the Stratford East Open Cut include the coal resource extent and strip ratios to the east and west respectively. In the north, the open cut is constrained by Stratford East Dam. In the south, the open cut mining area is more than 100 m north of Avondale Creek and would not excavate any of its associated alluvium.

The Stratford East Open Cut would require the relocation of an existing 132 kV power line and its associated easement, as described in Section 2.6.2.

At the end of the Project life, the Stratford East Open Cut void would remain and is described in Section 5.

Western Co-Disposal Area

Opportunistic recovery of CHPP rejects from the western co-disposal area would occur as part of the Project. The extent of the western co-disposal area is contained by existing bunds to the west of the Return Water Dam (Figure 2-8).

Approximately 1.3 Mt of CHPP rejects would be recovered from the western co-disposal area during the life of the Project.

At the end of the Project life, the western co-disposal area would be re-profiled and rehabilitated and is described in Section 5.

2.7.3 Indicative Mine Schedule

The staging of the development of the open cut mining areas as described in Section 2.7.2 would be determined by the requirements of the coal market, product specification and/or blending requirements. As these requirements are likely to vary over the life of the Project, the rate of development of the individual open cut mining areas and coal extraction rates may also vary.

An indicative mine schedule for the Project is provided in Table 2-2.

Table 2-2
Indicative Mine Schedule

Project Year	Waste Rock (Mbcm)	ROM Coal (Mtpa)
1*	12.8	1.8
2	14.5	1.7
3	13.3	1.7
4	13.4	1.7
5	13.9	2.0
6	16.4	1.8
7	16.5	2.1
8	16.8	2.2
9	16.8	2.4
10	16.9	2.6
11	6.6	1.5
Total	157.9	21.5

* Assumed Project commencement date is 1 July 2013.

Mbcm = million bank cubic metres.

2.7.4 Open Cut Mining Activities

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. A summary of the general open cut mining activities and sequence is provided below.

1. Vegetation Clearing

Vegetation would be progressively cleared over the life of the Project ahead of the active mining and waste rock emplacement areas (Figures 2-8 to 2-12). Specific vegetation clearance procedures (generally consistent with existing procedures at the Stratford Mining Complex) would be developed for the Project as described in Section 7.

2. Soil Stripping and Handling

Where stripped soils cannot be used directly for progressive rehabilitation, the soil would be stockpiled separately and seeded with grasses to maintain soil viability. Specific soil management, stockpiling and re-application procedures (generally consistent with existing procedures at the Stratford Mining Complex) would be developed for the Project as described in Section 5.

3. Weathered Overburden Removal

Typically only at shallow stripping depths, some weathered or friable overburden would be removed by excavator and haul truck, with supporting dozers, and hauled for placement in mine waste rock emplacements (refer to Section 2.10).

4. Overburden Drill and Blast

The method of material fragmentation at the Stratford Mining Complex is by drill and blasting techniques and dozer ripping. Overburden material would typically be drilled on a 6 m by 6 m pattern in 20 m benches.

A mixture of ammonium nitrate and fuel oil (ANFO) (dry holes) and emulsion blends (wet holes) explosives would be used at an average powder factor of approximately 0.8 kilograms per bank cubic metre. Blast sizes for the Project would typically range from 50,000 bank cubic metres (bcm) up to approximately 250,000 bcm.

In accordance with DA 23-98/99, blasting would only occur between the hours of 9.00 am and 5.00 pm, six days per week (excluding public holidays or Sundays). While only one blast per day would continue to occur on-site (unless an additional blast is required following a misfire), the Project would require up to five blasts per week, averaged over any 12 month period (i.e. two additional blasts per week).

Blasting activities would continue to be undertaken in accordance with the existing procedures for blasting at the Stratford Mining Complex.

When blasting is undertaken within 500 m of Bowens Road, Wheatleys Lane, Wenham Cox Road or Glen Road, temporary closures for short periods (i.e. approximately 30 minutes) would be required.

5. Overburden/Interburden Removal and Handling

Overburden (and interburden) removal would continue to be undertaken by excavator and haul truck, with supporting dozers to expose the underlying coal seams.

Overburden and interburden would be placed in out-of-pit mine waste rock emplacements, or as infill in the mine void, behind the advancing open cut mining operations (refer to Section 2.10).

6. Coal Mining and Handling

Mining of exposed coal seams at the Stratford Mining Complex typically involves excavators loading ROM coal to haul trucks for haulage to the ROM pad. Haulage of ROM coal to the ROM pad would utilise internal haul roads.

7. Landform Profiling and Rehabilitation

Landform profiling and rehabilitation of mine waste rock emplacements would be undertaken progressively over the life of the Project. A detailed description of the rehabilitation strategy and proposed post-mine landform and land use at the Stratford Mining Complex is provided in Section 5.

2.7.5 Mine Fleet

The mine fleet for the Project would vary according to the equipment requirements associated with the advancing open cut mining operations.

The existing/approved mine fleet (Section 2.1.1) at the Stratford Mining Complex would continue to be used, with some replacement and additional fleet items as new mining areas are developed including:

- six additional excavators;
- nineteen additional haul trucks;
- five additional dozers;
- two additional graders;
- one additional drill; and
- one additional water cart.

The additional fleet items would be of low noise emission standard. An indicative Project mine fleet is provided in the Noise and Blasting Assessment (Appendix C).

2.8 COAL PROCESSING

ROM coal from the open cut pits at the Stratford Mining Complex would be transported via internal haul roads to the ROM pad for stockpiling and/or direct dumping to the ROM hopper and conveyed to the CHPP for processing.

ROM coal from DCM would continue to be transported on the North Coast Railway to the Stratford Mining Complex for processing. ROM coal would be unloaded from trains at the rail unloading bin and conveyed to the ROM stacker for subsequent reclaim from the ROM pad to the CHPP for processing.

Small quantities (up to approximately 0.2 Mtpa) of coal recovered from the western co-disposal area would also be re-processed in the CHPP during the life of the Project.

A plan view of the ROM pad, stockpiles, hoppers, conveyors, bins, stackers, CHPP and product coal stockpiles are shown on Figure 2-2.

Based on the indicative mine schedule for the Project (Table 2-2) and consistent with the approved DCM schedule, the combined coal processing and production rates for the Project are provided in Table 2-3.

A description of the operation of the CHPP is provided below and is shown on Figure 2-14.

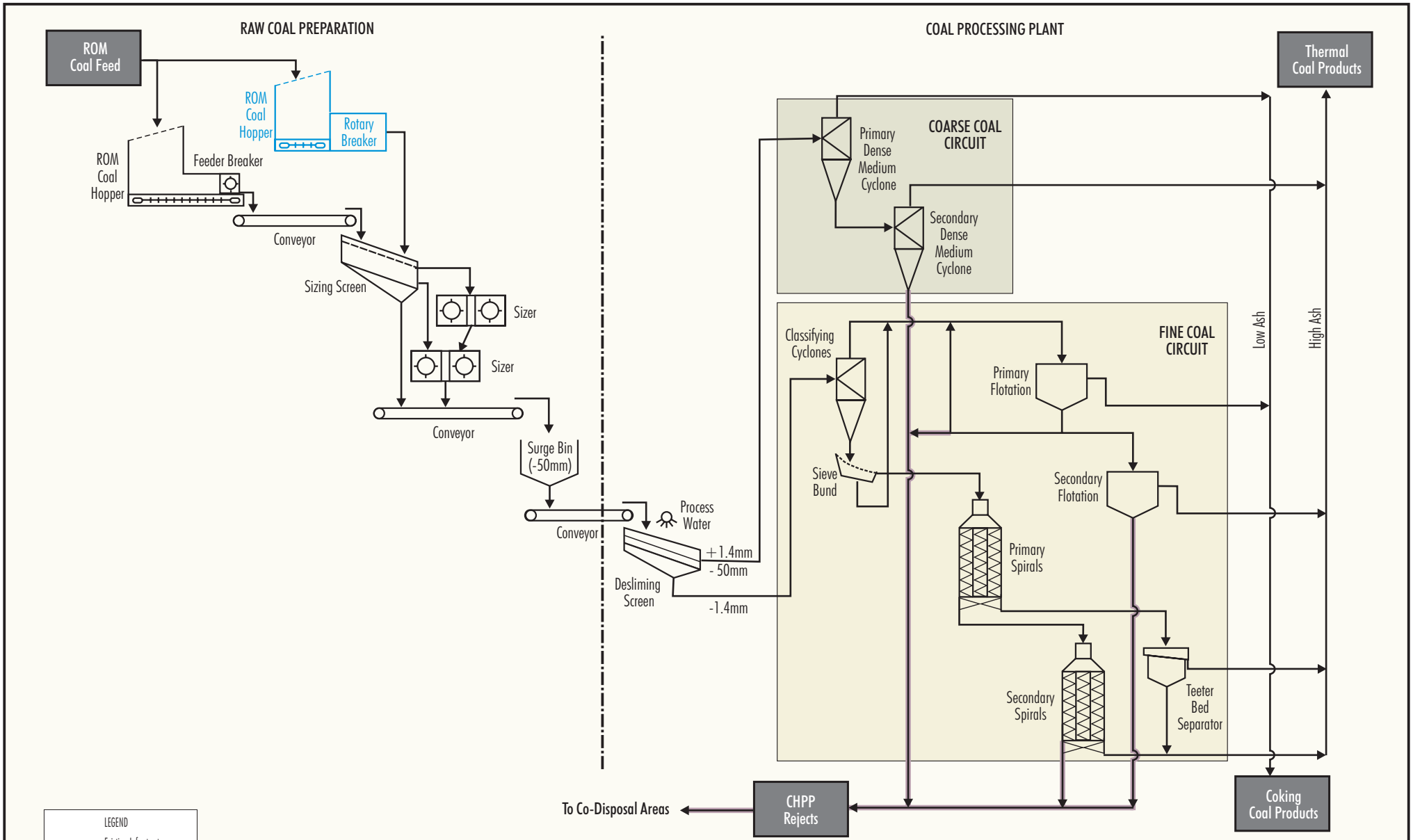
The approved capacity of the CHPP and coal handling fixed infrastructure would be adequate to meet the Project processing rates such that no major upgrades to the CHPP and coal handling fixed infrastructure is required for the Project with the exception of a new rotary breaker (Section 2.6.3) for raw coal preparation.

Table 2-3
Indicative Coal Processing and Production Schedule

Project Year	Project ROM Coal (Mtpa)	DCM ROM Coal (Mtpa)	Western Co-Disposal Area Coal Recovery (Mtpa)	Total ROM Coal Processed^ (Mtpa)	CHPP Rejects (Mtpa)	Product Coal for Rail (Mtpa)
1*	1.8	2.4	0.1	4.3	1.4	2.9
2	1.7	3.0	0.1	4.8	1.3	3.5
3	1.7	2.2	0.2	4.1	1.4	2.7
4	1.7	2.3	0.2	4.2	1.4	2.8
5	2.0	2.5	0.1	4.6	1.5	3.1
6	1.8	1.5	0.2	3.5	1.2	2.3
7	2.1	-	0.2	2.3	0.8	1.5
8	2.2	-	0.2	2.4	0.9	1.5
9	2.4	-	-	2.4	0.9	1.5
10	2.6	-	-	2.6	1.0	1.6
11	1.5	-	-	1.5	0.5	1.0
Total	**21.5**	**13.9**	**1.3**	**36.7**	**12.3**	**24.4**

* Assumed Project commencement date is 1 July 2013.

^ Combined ROM coal mined by Project (Table 2-2), DCM ROM coal and western co-disposal area coal recovery.



Source: SCPL (2012)

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FIGURE 2-14
Indicative CHPP Operations Flowsheet

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There would however be some upgrades/ replacement of infrastructure and equipment for noise attenuation purposes (e.g. quieter conveyor drives) as described in Section 2.6.4, and other ongoing minor improvements and maintenance works to de-bottleneck coal processing operations within the CHPP.

2.8.1 Coal Sizing and Screening

ROM coal received in the CHPP would be fed to the raw coal feeder breaker and/or rotary breaker at approximately 750 tph.

The broken coal is then screened (and if oversized further crushed in separate sizers) before being conveyed to the surge bin for sized coal less than 50 mm.

Residual oversized ROM coal reject material (e.g. overburden roof rock and floor rock) from the coal feeder breaker and sizers is periodically trucked to the co-disposal areas.

Sized coal from the surge bin is fed to the coal processing plant for washing at approximately 650 tph.

2.8.2 Coal Processing Plant

Sized coal is washed in the desliming screen, with fine coal/slimes (less than 1.4 mm) fed to the fine coal circuit and washed coal (greater than 1.4 mm) fed to the coarse coal circuit.

The fine coal circuit separates coal fines from the slimes and comprises:

- classifying cyclones and sieve bend;
- primary and secondary flotation cells;
- primary and secondary spirals; and
- teeter bed separator.

The coarse coal circuit comprises primary and secondary dense medium cyclones to separate the coarse rejects from the washed coal.

The slimes and coarse rejects from the coal processing plant are then combined for co-disposal at the Stratford Mining Complex. The CHPP rejects are pumped as slurry via pipeline to the existing co-disposal area in the Stratford Main Pit. Once mining is completed in the Avon North Open Cut, the void would be used as a new co-disposal area for the Project. The existing slurry pipeline would be extended to the new co-disposal area when available.

Where the slurry (and any return water) pipeline extension crosses the tributary of Avondale Creek, its location and placement would be designed in consideration of the NSW Office of Water's (NOW) *Guidelines for Laying Pipes and Cables in Watercourses* (NOW, 2010a).

The management of CHPP rejects at the Stratford Mining Complex co-disposal areas is described in Section 2.11.

Coal products from the CHPP are conveyed to the product coal stockpiles for subsequent reclaim and loading to trains.

2.9 PRODUCT COAL AND RAIL TRANSPORT

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.

Based on the planned maximum production rate and processing of ROM coal mined from both the Project and DCM, the total product coal required for rail transport over the life of the Project is provided in Table 2-3.

As a component of the Project, transport of product coal via rail would increase from the currently approved 3.3 Mtpa up to 3.5 Mtpa. Retaining the existing approved train lengths of up to 1,300 m, the Project would continue to only require an average of 2.5 product coal trains (total) per day (i.e. no change to the existing approved average rail movements) however a peak of six per day would be required during periods to meet SCPL's required performance standards[5] at the Port of Newcastle.

No changes to existing rail transport routes are proposed for the Project.

[5] Assuming cargo assembly for loading of a Cape Size vessel (approximately 140,000 t) in 4.5 days (on average) and 6.5 days (maximum). If performance standards are not met, penalties are incurred. Performance standards are reviewed annually and are generally tightened over time to drive improved performance.

2.10 WASTE ROCK MANAGEMENT

2.10.1 Waste Rock Quantities

Approximately 158 Mbcm of waste rock would be mined over the life of the Project (Table 2-2).

2.10.2 Waste Rock Emplacement Strategy

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, as well as being placed in out-of-pit mine waste rock emplacements.

The out-of-pit mine waste rock emplacements for each of the open cut mining areas are as follows and are discussed further below:

- **BRNOC -** Northern Waste Emplacement Extension and Southern Waste Emplacement.
- **Roseville West Pit Extension -** Stratford Waste Emplacement (including Stratford Main Pit) and BRNOC void.
- **Avon North Open Cut -** Northern Waste Emplacement Extension and Stratford Waste Emplacement (including Stratford Main Pit).
- **Stratford East Open Cut -** Stratford Waste Emplacement and Stratford Waste Emplacement Extension.

The Northern Waste Emplacement would be extended with waste rock from the BRNOC and Avon North Open Cut until it reaches a maximum elevation of 165 m AHD during Year 4 of the Project (Figure 2-9). Once the maximum elevation is reached, waste rock from the Avon North Open Cut would then be placed in the Stratford Main Pit/Stratford Waste Emplacement (Figure 2-10).

Waste rock (including previously backfilled material in the Roseville Pit) from Roseville West Pit Extension would be placed in the Stratford Main Pit/Stratford Waste Emplacement from Year 1 of the Project (Figure 2-8). Once the Avon North Open Cut void is available for use as water storage, waste rock from the Roseville West Pit Extension would be used to backfill the BRNOC void (Figure 2-11).

The Stratford Waste Emplacement Extension would be developed in Year 1 of the Project with waste rock from the Stratford East Open Cut (Figure 2-8). The Stratford Waste Emplacement and Stratford Waste Emplacement Extension would be lifted with waste rock from Stratford East Open Cut until reaching a maximum elevation of 196 m AHD (Figure 2-12).

A conceptual cross-section of the final landform incorporating the out-of-pit waste rock emplacements is provided in Section 5 (Figure 5-2). The waste rock emplacements would be progressively shaped by dozers for rehabilitation activities (i.e. final re-contouring, topsoiling and revegetation) (Section 5).

2.10.3 Waste Rock Geochemistry

An assessment of the geochemical characteristics of the waste rock material associated with the development of the Project is provided in the Geochemistry Assessment (Appendix L) prepared by EGi (2012). A summary of the assessment is provided below.

Geochemical tests were conducted on 998 waste rock (including overburden, interburden and floor) samples from 21 boreholes distributed across the Project open pits. The testwork included pH and electrical conductivity (EC), acid base accounting, acid buffering characterisation, net acid generation and element enrichment and solubility testwork.

Acid Base Accounting

The Geochemistry Assessment (Appendix L) concluded that the waste rock materials generated from the Roseville West Pit Extension and BRNOC would generally be expected to be non-acid forming (NAF).

Based on the acid base accounting test work, the Avon North Open Cut would generally be expected to be NAF. A small quantity of overburden immediately adjacent to some of the coal seams would however be potentially acid forming (PAF).

The acid base accounting test work indicates that the Stratford East Open Cut waste rock materials would be expected to be generally PAF, with some potentially acid forming – low capacity (PAF-LC) and NAF materials also expected to be present (Appendix L).

Element Enrichment and Solubility

Element enrichment testwork was also conducted on 23 samples from eight drill holes and compared to average crustal abundance values. Results of this testwork indicated no significant elemental enrichment apart from sulphur.

The solubility testwork from selected waste rock material samples indicated there would be negligible mobilisation of metals/metalloids under near-neutral pH conditions, however, elevated sulphate salinity may occur where pyritic materials are present (Appendix L).

2.10.4 PAF Management Procedures

As described in Section 2.10.3, geochemical assessments have indicated the presence of PAF waste rock materials, particularly associated with the Stratford East Open Cut. The targeted coal seams in the Stratford East Open Cut are equivalent to those mined at the DCM. 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 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 (Appendix L).

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 (Appendix L).

2.11 CHPP REJECT MANAGEMENT

2.11.1 CHPP Reject Quantities

Approximately 12.3 Mt of CHPP rejects would be produced and require disposal over the life of the Project (Table 2-3).

2.11.2 CHPP Rejects Co-Disposal Strategy

The disposal of CHPP rejects at the Stratford Mining Complex would continue to be managed in accordance with the approved Life of Mine Rejects Disposal Plan (SCPL, 2009) with appropriate updates to reflect 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.

Following completion of mining in the Avon North Open Cut, the void would be used as a new co-disposal area for the Project. The existing slurry pipeline from the CHPP would be extended to the new co-disposal area when available.

In accordance with current management measures, the CHPP rejects would be disposed either subaqueously or subaerially and below the estimated post-mining groundwater level. CHPP rejects that are deposited subaerially would be treated with limestone prior to inundation, in accordance with Life of Mine Rejects Disposal Plan (SCPL, 2009).

A review of the physical characteristics (e.g. density and particle fractions) of the CHPP rejects was undertaken by Allan Watson Associates (2012) and is provided as an attachment to the Surface Water Assessment (Appendix B).

The results of the review have been used to assist with sensitivity analyses for the site water balance performance (Section 2.12.6), as significant volumes of water can be recycled from the co-disposal areas.

Capping and rehabilitation of the co-disposal areas would be undertaken as described in Section 5.

2.11.3 CHPP Rejects Geochemistry

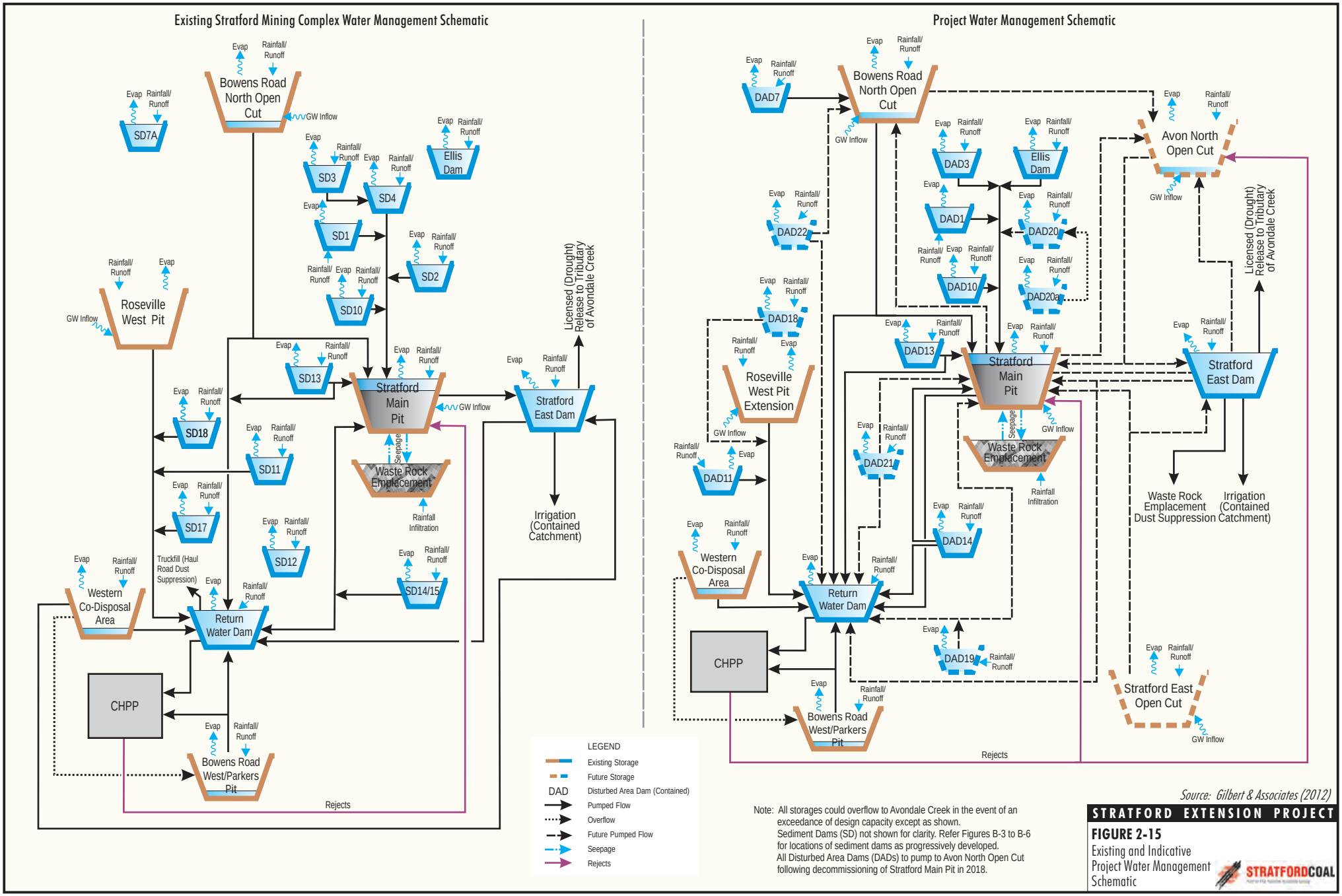
An assessment of the geochemical characteristics of the CHPP reject material associated with the development of the Project is provided in the Geochemistry Assessment (Appendix L) prepared by EGi (2012). A summary of the assessment is provided below.

Total sulphur distributions of raw coal from the Project open pits were reviewed and compared to the total sulphur distributions of raw coal currently processed at the CHPP.

This review of raw coal total sulphur distributions indicated that the CHPP rejects from the Project would be expected to have a lower acid generating potential than rejects currently produced at the CHPP (Appendix L). As a result, the existing CHPP reject management measures outlined in the approved Life of Mine Rejects Disposal Plan (SCPL, 2009) were considered by EGi (2012) to be suitable for the Project.

2.12 WATER MANAGEMENT

The existing water management system would be progressively augmented as water management requirements change over the life of the Project. Figure 2-15 provides a schematic of the existing and indicative Project water management systems.



Source: Gilbert & Associates (2012)

Note: All storages could overflow to Avondale Creek in the event of an exceedance of design capacity except as shown.
Sediment Dams (SD) not shown for clarity. Refer Figures B-3 to B-6 for locations of sediment dams as progressively developed.
All Disturbed Area Dams (DADs) to pump to Avon North Open Cut following decommissioning of Stratford Main Pit in 2018.

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FIGURE 2-15
Existing and Indicative Project Water Management Schematic

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A detailed description of the Project water management system is provided in the Surface Water Assessment (Appendix B) prepared by Gilbert & Associates.

2.12.1 Existing Water Management System

The existing water management system at the Stratford Mining Complex is based on the management of five separate water types, namely:

- up-catchment diversions/runoff;
- contained water sourced from open cut mining operations and preferentially used for coal processing, dust suppression and irrigation (during times of water surplus);
- sewage including treated/grey water (Section 2.15.1);
- runoff containing sediments from areas disturbed by Project activities; and
- runoff from rehabilitated or partially rehabilitated areas.

A summary list of the existing and/or approved water management infrastructure at the Stratford Mining Complex is provided in Section 2.1.6 and is described further below.

Up-Catchment Runoff Control

Surface water runoff controls aimed at preventing up-catchment runoff water from entering open cut mining operational areas have been constructed at the Stratford Mining Complex. Details of the main up-catchment runoff water control structures at the Stratford Mining Complex are discussed below.

Eastern Diversions

Two eastern diversion drains/bunds have been constructed upslope of the Stratford East Dam and the Eastern Emplacement Area, diverting upslope runoff (from the foothills east of the Stratford Mining Complex) to the north and south respectively.

Water flow in the eastern diversion to the north reports to the headwaters of a small tributary of Avondale Creek which runs between the Stratford Main Pit and the BRNOC.

The eastern diversions were designed with a capacity to drain a 100-year average recurrence interval (ARI) peak flow and have been constructed with a trapezoidal flow cross-section, rip-rap lining on drop structures, with gentle longitudinal gradients in order to control erosion.

The eastern diversions have been in service for many years at the Stratford Mining Complex and have been stable during this time (Appendix B).

Western Diversions

Diversion drains/bunds have been constructed upslope of the western co-disposal area, backfilled Roseville Pit and current Roseville West Pit; diverting upslope runoff to the north to Avondale Creek.

Bowens Road North Diversions

Diversion bunds and drains have been constructed to the north-east and upslope of the BRNOC, diverting upslope runoff to Dog Trap Creek.

Haul Road Crossings

Two engineered creek crossings of Avondale Creek have been constructed to allow operational access between the eastern and western sides of Avondale Creek within the Stratford Mining Complex mine tenements.

The haul road crossings allow for up-catchment runoff in the upper reaches of the Avondale Creek catchment to drain (south to north) without capture in the Stratford Mining Complex water management system (e.g. contained water storages).

A third haul road crossing also exists across a small tributary of Avondale Creek between the Stratford Main Pit and the BRNOC. The crossing (including culverts) allows for upslope catchment runoff from one of the eastern diversions to drain (east to west) without capture in the Stratford Mining Complex water management system (e.g. contained water storages).

Flood Control Embankments

Flood control embankments have been constructed adjacent to Avondale Creek to prevent inundation of open cut mining operational areas, waste rock emplacements and contained water storages.

Contained Water Storages

Water collected for storage on-site includes groundwater inflows to the open cut mining operations and incident rainfall and runoff from mine disturbance areas at the Stratford Mining Complex. Water liberated from CHPP rejects in the Stratford Main Pit also continues to be recycled for use in coal processing and for dust suppression.

Water pumped from sumps in the open pits (i.e. BRNOC and Roseville West Pit) is pumped to either the Return Water Dam or the Stratford Main Pit.

SCPL holds existing groundwater licences issued by the NOW that allows for the following maximum volumetric quantities to be dewatered from the open cut mining operations:

- 500 megalitres per annum (ML/annum) (BRNOC);
- 315 ML/annum (Roseville West Pit); and
- 20 ML/annum (Stratford Main Pit).

The Return Water Dam provides a supply reservoir for the CHPP and is used as a truck fill point for haul road dust suppression. The Return Water Dam has a design (as-built) capacity of approximately 512 megalitres (ML) and is kept supplied by pumping from other contained water storages. The Return Water Dam also receives local runoff from the adjacent western co-disposal area. A recent hydrographic survey (CalCo Surveyors, 2011) has indicated the Return Water Dam has a current capacity of approximately 335 ML due to silt accumulation in recent years (Appendix B).

The Stratford Main Pit acts as both the CHPP rejects co-disposal area and contained water storage at the Stratford Mining Complex, with significant storage capacity of approximately 25 gigalitres (Appendix B).

Prior to the cessation of mining in the Stratford Main Pit and use as water storage, the Stratford East Dam was formerly the main contained water storage at the Stratford Mining Complex. The Stratford East Dam has a storage capacity of approximately 2,872 ML (Appendix B). The Stratford East Dam is not a prescribed dam under the *Dams Safety Act, 1978*.

Irrigation of water from Stratford East Dam is undertaken over a contained portion of the adjacent rehabilitated Stratford Waste Emplacement (runoff from which reports back to the Stratford East Dam), to assist in the current pasture cropping programme on the rehabilitated emplacement and to reduce its stored water volume and provide additional storage capacity during times of water surplus. The on-site irrigation system is described further below.

In addition and with the formal written approval of the OEH, SCPL is licensed under EPL 5161 to release water from the Stratford East Dam during drought conditions[6].

The Parkers/Bowens Road West Pit void captures runoff from the CHPP and associated infrastructure areas and is kept dewatered by pumping to the Return Water Dam. The Parkers/Bowens Road West Pit void has a capacity of approximately 107 ML.

SCPL also holds an existing groundwater licence (186 ML/annum) for the Parkers/Bowens Road West Pit void.

Sedimentation Control

Specific erosion and sediment control structures currently in use at the Stratford Mining Complex include:

- four sediment dams containing runoff from the BRNOC waste rock emplacements;
- two sediment dams containing runoff from the backfilled Roseville Pit;
- eight sediment dams containing runoff from haul roads;
- a sediment dam downslope of the rehabilitated Stratford Waste Emplacement; and
- a sediment dam adjacent to the rail siding cutting near The Bucketts Way.

Sediment dam sizing is based on (Appendix B):

- sufficient capacity to capture runoff from a 20-year ARI 1 hour duration rainfall event (54.9mm) over the dam catchment; and
- sufficient area to provide for gravity settling of particles coarser that fine silt size in a 20-year ARI 1 hour duration rainfall event.

Water captured in sediment dams which receive runoff from haul roads and active waste rock emplacement areas is pumped to contained water storages.

Water captured in sediment dams which receive runoff from rehabilitated or partially rehabilitated areas is only released from the sediment dam after gravity settling (i.e. passive management) in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2008).

Sediment generation is controlled by timely progressive rehabilitation and vegetation establishment on disturbed areas at the Stratford Mining Complex (e.g. completed sections of waste rock emplacements) to minimise the area exposed to erosion. Silt fences are also erected downslope of other disturbed areas (e.g. topsoil stockpiles before grass cover establishment).

[6] If a formal drought declaration is made by the Rural Lands Protection Board.

Sediment dams and silt fences are routinely inspected on a minimum quarterly basis and after significant rainfall events, with maintenance carried out as required to maintain their effectiveness. This includes removal of sediment from sediment dams when the storage volume is reduced by 30 percent (%) due to sediment accumulation.

Overflows and controlled releases from sediment dams are monitored in accordance with EPLs 5161 and 11745.

On-site Irrigation System

In accordance with the latest modification to DA 23-98/99 (approved on 26 November 2010), irrigation of water from the Stratford East Dam has been conducted on approximately 35 hectares (ha) of the rehabilitated portion of the Stratford Waste Emplacement.

An on-site irrigation system of pumps, piping and water distribution equipment is used to supply water directly from the Stratford East Dam across the rehabilitated portion of the Stratford Waste Emplacement and is only carried out on areas that drain back to the contained water storage.

The on-site irrigation system area comprises electrically-powered centrifugal pumps, travelling irrigators, and fixed sprays.

2.12.2 Project Water Management System

The objectives of the on-site water management throughout the Project would be to:

- protect the integrity of local and regional water resources;
- operate such that there was no contained water storage overflow;
- maintain separation between runoff from areas undisturbed by mining and water generated within active mining areas; and
- provide a reliable source of water to meet Project requirements.

To meet these objectives, the Project water management system would generally be based on the existing water management system (Section 2.12.1) with augmentations (e.g. additional diversions, sediment dams, flood levees and contained water storages) undertaken progressively over the life of the Project.

The progressive development of the Project water management system is described in Appendix B and is shown on Figures 2-8 to 2-12. Figure 2-15 provides a schematic of the integration of the existing and Project water management systems.

A predictive assessment of the performance of the Project water management system for a range of different climatic scenarios is presented in Appendix B and summarised in Section 2.12.6.

The post-mining water management strategy would incorporate some aspects of the operational Project water management system and is described further in Section 5.

Up-Catchment Runoff Control

The existing surface water runoff controls aimed at preventing up-catchment runoff water from entering open cut mining operational areas would be retained for the Project.

Details of the additional up-catchment runoff water control structures for the Project are discussed below.

Eastern Diversions

Extensions to the existing eastern diversion drains/bunds upslope of the Stratford East Dam would be constructed progressively in advance of the Stratford East Open Cut mining operation (Figures 2-8 to 2-10) to divert up-catchment runoff to the north, reporting to the headwaters of a small tributary of Avondale Creek. As the Stratford East Open Cut mining area progresses further south (Figure 2-11), an additional eastern diversion would be constructed to divert up-catchment runoff (from the foothills to the east) to the south, reporting to the headwaters of Avondale Creek.

A new eastern diversion would also be constructed for the Avon North Open Cut to divert up-catchment runoff to the south, reporting to the headwaters of a small tributary of Avondale Creek (Figures 2-8 and 2-9).

Western Diversion

A new western diversion would be developed in advance of the Roseville West Pit Extension to divert upslope runoff to the north to Avondale Creek (Figures 2-8 to 2-10).

Up-catchment diversion works would be designed in consultation with NOW, with particular focus on channel stability and longevity. The design capacity of additional up-catchment diversion works would be consistent with existing up-catchment diversion works (i.e. sufficient to pass a 100-year ARI peak flow) that have been in service and stable for many years at the Stratford Mining Complex (Appendix B).

Stabilisation of the up-catchment diversions would be achieved by design of appropriate channel cross-sections and gradients and the use of channel lining with grass or rockfill. In general, up-catchment diversions would be designed as "contour" drains with low longitudinal gradients (e.g. 0.5%) to limit erosion potential (Appendix B).

Drop structures at the outfalls of the diversions would be designed to be stable at design flow rates and would involve lining with coarse, durable rockfill or some other form of stable revetment, as well as energy dissipation integrated within the design (Appendix B).

Tributary of Avondale Creek

As described above, the extensions to the eastern diversion in advance of the Stratford East Open Cut mining operation would direct flow northwards to link into the existing eastern diversion drains/bunds upslope of the Stratford East Dam and report to the existing tributary of Avondale Creek.

A geomorphologic review and characterisation inspection of the existing tributary of Avondale Creek was conducted by Fluvial Systems (2012) and is provided as an attachment to the Surface Water Assessment (Appendix B).

The diversion extensions would progressively add some additional catchment to the tributary of Avondale Creek (up to approximately 1.41 square kilometres [km^2] when the Stratford East Open Cut reaches its ultimate extent – an increase of approximately 84% to the current creek catchment at the existing diversion outfall) (Appendix B).

A 600 m long section of the tributary of Avondale Creek would be diverted south by up to 150 m to avoid the Avon North Open Cut.

Prior to diversion of this 600 m section, an investigation would be undertaken in consideration of the actual increase in catchment at the time and the overall performance of the diversion along its length (via monitoring) to inform the final design (Section 4.5.3). The final design and construction would also consider the NOW's *Guidelines for In-stream Works* (NOW, 2010b).

Haul Road Crossings

A new engineered creek crossing of Avondale Creek (e.g. culvert) would be constructed between the Roseville West Pit Extension and BRNOC void (Figure 2-11) to allow for up-catchment runoff in the upper reaches of the Avondale Creek catchment to drain (south to north) without capture in the Stratford Mining Complex water management system (e.g. contained water storages).

The new haul road crossing of Avondale Creek would be designed with adequate capacity to pass up to a 100-year ARI peak flow – consistent with existing Avondale Creek crossings. The creek crossing design and installation would be undertaken with due regard to mitigating potential effects on fish passage (Section 4.11.3).

An additional culvert crossing would also be installed for the haul road between the Stratford Main Pit and Avon North Open Cut (Figure 2-8) which traverses the alignment of the tributary of Avondale Creek.

Similar to the existing haul road crossing (including culverts) between the Stratford Main Pit and BRNOC, the additional crossing would allow for upslope catchment runoff from the eastern diversions to drain (east to west) without capture in the Stratford Mining Complex water management system (e.g. contained water storages).

The additional haul road crossing of the tributary of Avondale Creek would be designed with adequate capacity to pass up to a 100-year ARI peak flow - consistent with existing eastern diversion design capacity.

The design and construction of the new haul road crossings would consider the NOW's *Guidelines for Watercourse Crossings* (NOW, 2010c).

Flood Control Embankments

The potential for flooding in the Project area to impact on mine infrastructure would continue to be managed through the construction of levees around mine operational areas. The existing flood control embankments constructed adjacent to Avondale Creek would be retained for the Project.

Contained Water Storages

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 (Section 2.12.1).

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 with estimated capacities of 8,600 ML and 20,300 ML respectively.

The Stratford East Dam and other contained water storages would be managed and operated for no release to downstream watercourses. This would involve operating the storages with a maximum operating level to provide freeboard for storm runoff storage. The freeboard for storm storage would be maintained by transferring excess water to other contained storages or, in the unlikely event that all storages had insufficient freeboard, by pumping to the western co-disposal area or an open pit (i.e. potentially causing disruption to mining operations).

Notwithstanding the above, SCPL is seeking to retain the existing licensed release (EPL 5161) of water from the Stratford East Dam during drought conditions[7] 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 arise during the life of the Project).

Sedimentation Control

Sedimentation control for the Project would be implemented generally consistent with the approach undertaken at the Stratford Mining Complex. For clarity, distinction is made between the two types of site sediment control structures that have been assessed and included as part of the Project water management system as follows:

- Disturbed Area Dams; and
- Sediment Dams.

Details of the two types of sediment control structures for the Project are discussed below.

Disturbed Area Dams

In addition to existing contained water storages, Disturbed Area Dams would contain runoff from active waste rock emplacements or other areas disturbed by mining activities and runoff from haul roads or the CHPP area. Disturbed Area Dams would be sized consistent with the sizing criteria for existing sediment dams at the Stratford Mining Complex (Section 2.12.1), with pumped transfer of accumulated water back to contained water storages.

Sediment Dams

Sediment dams would contain runoff from topsoiled/partially rehabilitated mine areas that have been shaped to final profiles, covered with topsoil and seeded. The sediment dams would allow for gravity settling of sediment prior to release off-site.

Sediment dams would be sized to capture runoff from a 90th percentile rainfall event with a duration of five days (Landcom, 2004 and NSW Department of Environment, Climate Change and Water [DECCW], 2008a).

Sediment dams would be maintained until such time as vegetation successfully establishes on topsoiled areas and where runoff has similar water quality characteristics to areas that are undisturbed by mining activities.

Outlet structures from sediment dams would also be designed in consideration of the NOW's *Guidelines for Outlet Structures* (NOW, 2010d).

2.12.3 Water Consumption

The main water requirement for the Project would be for the CHPP make-up supply (to replace water pumped out with the CHPP rejects to the co-disposal areas) and moisture lost with product coal.

Water would also be required for washdown of mobile equipment and dust suppression on haul roads, active waste rock emplacement areas, ROM coal stockpiles and conveyor systems. Some water would also be used for fire fighting and other minor non-potable water uses. Water would be transferred from the contained water storages to the Return Water Dam to maintain supply to the CHPP and for dust suppression (truckfill).

The water consumption requirements and water balance of the system would fluctuate with climatic conditions and as the extent of the mining operation changes over time. A summary of water demands for the Project are provided below.

CHPP Make-Up

The CHPP make-up water demand rate is related directly to the rate of ROM coal feed to the CHPP, and the rate of production and moisture content of CHPP rejects. The water demand was calculated based on a pumped CHPP rejects solids concentration of 28.5%. The estimated make-up demand peaks at a rate of approximately 11 megalitres per day (ML/day) over the life of the Project (Appendix B).

[7] If a formal drought declaration is made by the Rural Lands Protection Board.

Dust Suppression – Haul Roads

Project haul road dust suppression demand was calculated based on estimated future haul road lengths and widths with daily dust suppression demand calculated as pan evaporation minus rainfall over the haul road areas multiplied by 1.35 (to allow for higher evaporation off the dark, highly trafficked haul roads) (Appendix B).

Estimated haul road demand for the Project is highly seasonal and compares reasonably well with average monitored 2010 use in spring/summer of 1.46 ML/day and 0.79 ML/day in autumn/winter (Appendix B).

Dust Suppression – Active Waste Rock Emplacements

In order to control dust generation from waste rock emplacement operations, active waste rock emplacements are also proposed to be watered.

The extents of active waste rock emplacement areas at different phases of the Project are presented in Appendix B as well as the estimated change in area over the Project life.

Daily demand was calculated by multiplying the available areas by pan evaporation minus rainfall multiplied by an "efficiency" factor of 70% (recognising that not all areas of waste rock emplacement may be able to be accessed for watering at any one time) (Appendix B).

2.12.4 Irrigation System

The Project would involve the contingent use of existing approved irrigation areas as well as the development of new areas on an as-required basis (i.e. as determined by periodic reviews of the site water balance) as new rehabilitated areas become available. Irrigation would only occur on rehabilitated or topsoiled areas from which runoff reports to contained water storages or open pits.

For the purposes of assessment and site water balance modelling (Appendix B), irrigation was assumed to occur:

- from the Stratford East Dam when the total stored water volume on-site was in excess of 3,000 ML (in order to maintain a supply reserve);
- only over additional rehabilitated waste rock emplacement areas within the catchments of contained water storages; and
- at a rate equal to pan evaporation minus rainfall multiplied by a crop factor (0.67 for summer and 0.28 for winter[8]).

The potential irrigation areas are presented in Appendix B and show that extensive additional irrigation areas become available later in the Project life.

2.12.5 Open Pit Dewatering

Predicted groundwater inflows to each of the open cut mining operations over the life of the Project are presented in Appendix A and summarised in Table 2-4.

Table 2-4
Predicted Indicative Groundwater Inflows to Open Pits

Open Cut Mining Operation	Predicted Groundwater Inflows (ML/annum)	
	Average	Maximum
BRNOC*	152	163
Roseville West Pit Extension	188	261
Avon North Open Cut^	92	119
Stratford East Open Cut	38	57

Source: Appendix A.

* Up until backfilled.

^ Up until the end of mining.

Whilst groundwater inflows are predicted to only be small (generally less than <0.5 ML/day), sumps would be excavated in the floor of active open pits to manage the inflows.

Water that accumulates in the open pit sumps would be used for dust suppression over Project haul roads and active waste rock emplacement surfaces and/or would be transferred to contained water storages. Where water transfers occur via pipeline across the tributary of Avondale Creek, the NOW's *Guidelines for Laying Pipes and Cables in Watercourses* (NOW, 2010a) would be considered.

Licensing of the predicted groundwater inflows for the Project are assessed and discussed in Section 4.4.3 (Table 4.4-1) and Section 6.

[8] Based on irrigation experience at the DCM.

2.12.6 Simulated Performance of Project Water Management System

A predictive assessment of the performance of the Project water management system (including supply, containment and risk of disruption to mining operations) is presented in Appendix B.

The key findings of the assessment are summarised in Tables 2-5 and 2-6 including the predicted make-up requirements for the Project at maximum production rates, water supply sources and storage volumes for the containment system for a range of different climatic scenarios.

The predicted CHPP water supply reliability averaged 99.9% (over all modelled climatic scenarios) which indicates a very low operational risk of water supply deficit over the life of the Project (Appendix B).

The water balance simulation showed that there were no simulated overflows from the contained water storages in any of the modelled climatic scenarios.

To achieve the no contained water storage overflow objective, the Project would be operated with an operational risk of disruption to mining which could occur as a result of exceedance of the design capacity of the water management system and the need to store water in active open pits if required. The predicted operational risk of more than 200 ML of water stored in each of the open pits over the life of the Project (i.e. potential disruption to mining operations) is summarised in Table 2-7.

Table 2-5
Indicative Project Water Supply System Performance

	10%ile (Low) Rainfall 11-Year Period	50%ile (Median) Rainfall 11-Year Period	90%ile (High) Rainfall 11-Year Period
Average Inflows (ML/year)			
Rainfall Runoff	2,729	3,003	4,386
Open Pit Dewatering (Groundwater)	455	455	434
Recharge from Stratford Waste Emplacement to Stratford Main Pit (Co-Disposal Area)	48	61	106
CHPP Rejects Water (Recycle)	2,395	2,395	2,395
TOTAL AVERAGE INFLOWS	**5,627**	**5,914**	**7,321**
Average Outflows (ML/year)			
Evaporation	759	725	853
CHPP Supply	2,805	2,805	2,805
Dust Suppression – Haul Roads	651	692	652
Dust Suppression – Waste Rock Emplacements	1,108	1,166	1,099
Irrigation – Contained Mine Landforms Undergoing Rehabilitation	803	854	807
Disturbed Area Dam Overflow	43	54	235
Contained Water Storage Overflow	0	0	0
TOTAL AVERAGE OUTFLOWS	**6,169**	**6,296**	**6,451**

Source: Appendix B
Note: The difference between the total average inflows and total average outflows is the change in water stored on-site relative to existing stored water volumes.

Table 2-6
Indicative Project Water Containment System Performance

Model Statistic	Total Volume in All Contained Water Storages and Disturbed Area Dams (ML) (11-Year Period)	
	Minimum	Maximum
5%ile Exceedance Probability	2,254	8,012
Average	7,491	10,147
95%ile Exceedance Probability	12,627	22,613

Source: Appendix B

Table 2-7
Estimate of Project Risk of Disruption to Mining Operations

Open Cut Mining Operation	Percentage of Days where Volume Stored In-pit is Greater than 200 ML		
	Average for Modelled Simulations (%)	95th Percentile for Modelled Simulations (%)	Highest for Modelled Simulations (%)
BRNOC*	<0.1	<0.1	<0.1
Roseville West Pit Extension	4.0	21	45
Avon North Open Cut*	0.8	0.4	27
Stratford East Open Cut	2.5	11	23

Source: Appendix B.

* Up to the end of mining.

The sensitivity of water balance model predictions was also tested by varying the following model parameters (Appendix B):

- rainfall runoff (± 10%);
- predicted groundwater inflows/outflows (± 10%);
- co-disposed CHPP rejects density (+ 33%); and
- evaporation rates (± 10%).

For all model sensitivity runs, there were no simulated overflows from the contained water storages in any of the modelled climatic scenarios (Appendix B).

2.13 FINAL VOIDS

At the cessation of mining, final voids would remain in the Roseville West Pit Extension, Avon North Open Cut and Stratford East Open Cut (Figure 5-2). The approximate depths and areas of final voids are provided in Table 2-8.

Table 2-8
Indicative Project Final Voids

Final Void	Depth (m)	Area (ha)
Roseville West Pit Extension	140	65
Avon North Open Cut	30	24
Stratford East Open Cut	180	49

Source: Appendix B

The surface catchment of the final voids would be reduced to a practicable minimum by maximising backfilling to the natural surface and the use of upslope diversions and contour drains around their perimeter.

A final void water balance has been prepared for the end of the Project life and is presented in Appendix B.

2.14 INFRASTRUCTURE AND SERVICES

The existing infrastructure and services at the Stratford Mining Complex would continue to be utilised throughout the life of the Project, with minor additions, upgrades and maintenance works.

2.14.1 Administration and Workshops

The existing administration offices, buildings, workshops, stores and ablution facilities at the Stratford Mining Complex would continue to be used with some minor upgrades during the life of the Project, 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.

2.14.2 Other Infrastructure and Service Facility

Existing washdown facilities, hardstand and laydown areas would continue to be used with minor upgrades during the life of the Project for heavy equipment (e.g. park-up areas).

2.14.3 Access Roads and Internal Roads

The existing access road off The Bucketts Way would remain the primary site access (Figure 2-1).

Wherever possible, existing internal roads would be used to service the Project. A new internal road would be constructed across the western co-disposal area to provide heavy vehicle access to the proposed additional infrastructure areas (Figure 2-2). Temporary internal roads would be constructed as required. The use of these internal access roads would be restricted to mine personnel only.

2.14.4 Electricity Supply and Distribution

The maximum electricity consumption for the Project when fully operational would be approximately 43,000 megawatt-hours per annum.

The existing electricity supply and distribution system at the Stratford Mining Complex would continue to supply power to the Project with minor upgrades. Power would be transferred either by overhead cable or underground cable where necessary. Standard electrical safety laws and practices (including vehicle clearance considerations) would continue to apply.

An existing 132 kV power line and easement (owned and operated by TransGrid) also traverses ML 1477 (Figure 2-1) and would require relocation during the Project (Section 2.6.2). As described in Section 2.6.4, a minor realignment of an existing 33 kV power line would be required for installation of an acoustic barrier.

Appropriate ground clearance beneath the power lines would be maintained throughout the Project in accordance with TransGrid's easement requirements.

2.14.5 Potable Water

Potable water for the Project would continue to be supplied by a local contractor and stored on-site. The existing potable water supply system would continue to service the Project with minor changes.

2.14.6 Communications

The existing communication systems at the Stratford Mining Complex would be retained for the Project. The communications systems would be upgraded if improved services are made available in the region.

2.15 WASTE MANAGEMENT

The Project would generate waste streams that would be similar in nature to the existing operations at the Stratford Mining Complex. The key waste streams would continue to comprise:

- waste rock (as described in Sections 2.1.1 and 2.10);
- CHPP rejects (as described in Section 2.11);
- recyclable and non-recyclable general wastes;
- sewage and wastewater; and
- other wastes from mining and workshop activities (e.g. used tyres, scrap metal and waste hydrocarbons and oil filters).

General waste minimisation principles (i.e. reduce, re-use and recycle) would continue to be applied at the Stratford Mining Complex for the Project to minimise the quantity of wastes that require off-site disposal.

All general domestic waste (e.g. general solid [putrescibles] waste and general solid [non-putrescible] waste as defined in *Waste Classification Guidelines Part 1: Classifying Waste* [NSW Department of Environment and Climate Change (DECC), 2008]) and general recyclable products would continue to be collected by an appropriately licensed contractor. SCPL would maintain a register of waste collected by the licensed waste contractor.

Waste tyres would continue to be stockpiled and disposed in the backfilled sections of the Stratford Main Pit for the Project. Tyres would be placed in discrete lots and buried with a minimum cover of 5 m, and avoid other combustible material. Records of buried locations and depths would continue to be recorded for the Project.

Scrap metal at the workshops would continue to be collected by a scrap metal merchant for recycling.

Waste hydrocarbons and oil filters are currently collected, stored and removed by licensed contractors.

The current collection and storage methods (including containment of waste oil/grease tanks/drums within a separate bunded area at the workshop) would be continued for the Project, with removal of waste hydrocarbons and oil filters by licensed contractors.

2.15.1 Sewage Treatment and Disposal

Sewage treatment at the Stratford Mining Complex comprises:

- a 'Biotreat' tank system (including primary settlement and aeration) located at the site office;
- a septic tank system located at the training building near the site office;
- an active aeration system located at the bath-house complex near the site office;
- a primary treatment and aeration system located at the CHPP;
- a septic tank system and transpiration trench located at the Rail Load-out Bin; and
- a septic system located at the BRNOC field crib rooms.

Treated/grey water from the sewage treatment systems near the site office are sprayed onto grassed areas adjacent to the buildings. Treated water from the sewage treatment system located at the CHPP is sprayed on vegetated areas south of the CHPP (incorporating the CHPP noise bund). The existing sewage treatment facilities (with upgrades as required) and treated/grey water spray areas would continue to be operated in a manner to the satisfaction of the GSC for the Project and in accordance with the *Environmental Guidelines: Use of Effluent by Irrigation* (NSW Department of Environment and Conservation [DEC], 2004a).

2.16 MANAGEMENT OF DANGEROUS GOODS

The transportation, handling and storage of all dangerous goods at the Stratford Mining Complex is conducted in accordance with the requirements of the *Storage and Handling of Dangerous Goods – Code of Practice 2005* (WorkCover, 2005) and this practice would continue for the Project.

Transport

Consistent with existing operations at the Stratford Mining Complex, dangerous goods required for the Project would be transported in accordance with the appropriate State legislation.

Hydrocarbon Storage

Hydrocarbons used at the Stratford Mining Complex include fuels (diesel and petrol), oils, greases, degreaser and kerosene.

Existing hydrocarbon storage facilities (including the 110,000 litre (L) capacity diesel storage tank at the fuel farm adjacent the workshop and the 10,000 L diesel storage tank adjacent the CHPP) would continue to be operated in accordance with the requirements of Australian Standard (AS) 1940: *The Storage and Handling of Flammable and Combustible Liquids*.

Additional hydrocarbon storage (e.g. diesel and oils) would be required by the Project. Construction and/or upgrades of storage facilities would be undertaken in accordance with AS 1940: *The Storage and Handling of Flammable and Combustible Liquids* and the *Operational Health and Safety Act, 2000*.

Bulk oil would continue to be stored within a bunded area.

On-site petrol usage would be minor and petrol engine vehicles would be fuelled off-site at local service stations.

Procedures have been developed at the Stratford Mining Complex for the handling, storage, containment and disposal of workshop hydrocarbons (i.e. oils, greases, degreaser and kerosene). Waste hydrocarbons are collected, stored and removed by licensed contractors on a periodic basis.

Spill kits are, and would continue to be, maintained at the Stratford Mining Complex for the Project.

Bunding and spill management at the Stratford Mining Complex would be implemented in consideration of the relevant OEH guidelines to manage environmental risks associated with the storage and handling of liquid substances, including:

- *Storing and Handling Liquids: Environmental Protection – Participant's Manual* (DECC, 2007); and
- *Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management – Part B Review of Best Practice and Regulation* (DEC, 2005b).

Explosives Storage

Explosives required for the Project would include initiating products and detonators, ANFO and emulsion explosives. Explosives would be transported and used in accordance with the existing safety and operational procedures at the Stratford Mining Complex.

Detonators, bulk explosives and explosive products (e.g. emulsion, prill) would be stored at a new explosives storage (Figure 2-8) in accordance with the requirements of AS 2187: *Explosives – Storage, Transport and Use*.

Chemical Storages and Material Safety Data Sheets

The management and storage of chemicals at the Stratford Mining Complex would continue to be conducted in accordance with the existing management procedures, Australian Standards and codes. The existing 20,000 L aboveground storage tank adjacent the CHPP would continue to be used to store a processing frother for the Project.

All chemicals brought on-site for use at the operation would be recorded in the existing inventory registers at the Stratford Mining Complex. A list of the existing Material Safety Data Sheets (MSDS) registers is provided in Appendix Q.

No chemicals or hazardous material would be permitted on-site unless a copy of the appropriate MSDS is available on-site or, in the case of a new product, it is accompanied by an MSDS.

2.17 WORKFORCE

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

At full development, the proposed Project operational workforce would be in the order of 250 on-site personnel, including a mixture of direct Yancoal employees and contractors.

The operational hours at the Project would generally be 24 hours a day, seven days a week.

Short-term construction/development activities (e.g. road realignments) would require an additional construction workforce of up to approximately 30 people for short periods. It is expected that such construction/development activities would peak during Year 1 of the Project, but may be required throughout the life of the Project.

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