STRATFORD MINING COMPLEX
Life of Mine Rejects Disposal Plan

STRATFORD MINING COMPLEX
(STRATFORD EXTENSION PROJECT)

LIFE OF MINE REJECTS DISPOSAL PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	Approval Date
All	Initial (SCPL, 1994)	Original (as presented in SCM EIS)	DII-MR	1995
All	Amended (Gilbert & Sutherland, 1998)	Amended (Western Reject Emplacement Area Extension)	DII-MR	Jan 1999
All	New Version A (May 2003)	Review and Approval (Disposal in Main Pit)	DPI	May 2003
All	New Version B (Dec 2009)	Review and Approval	DII	Dec 2009
All	New Version C (Dec 2016)	Revision (Outcomes of Reject Emplacement Area Assessment – 19 Oct 2016)	DIRR, DP&E	-
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1 INTRODUCTION

1.1 STRATFORD MINING COMPLEX

Stratford Coal Pty Ltd (SCPL), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal), owns the Stratford Coal Mine (SCM), which is located approximately 100 kilometres (km) north of Newcastle, New South Wales (NSW) (Figure 1). SCPL also owns the Bowens Road North Open Cut (BRNOC), located to the immediate north of the SCM. The SCM and BRNOC are collectively referred to as the Stratford Mining Complex (SMC).

Yancoal also owns the Duralie Coal Mine (DCM), which is located approximately 20 km south of the SMC (Figure 1). Run-of-mine (ROM) coal from the DCM is transported by rail to the SMC for processing and subsequent export.

Since 1995, the SMC has involved open cut mining and processing of coal from the Stratford Main Pit and several smaller satellite pits (Bowens Road West, Roseville, Roseville Extension, Roseville West and Bowens Road North pits), within the Stratford Mining Leases at the Stratford Coal Handling and Preparation Plant (CHPP).

Coal production at the DCM commenced in March 2003 with ROM coal being railed to the Stratford CHPP for processing. The SMC and DCM product coals are railed to the port of Newcastle for export.

The rejects streams produced from the Stratford CHPP are handled collectively and comprises fine and coarse reject. The reject is pumped as a slurry (at approximately 45% solids concentration by weight) to the Stratford Main Pit for disposal.

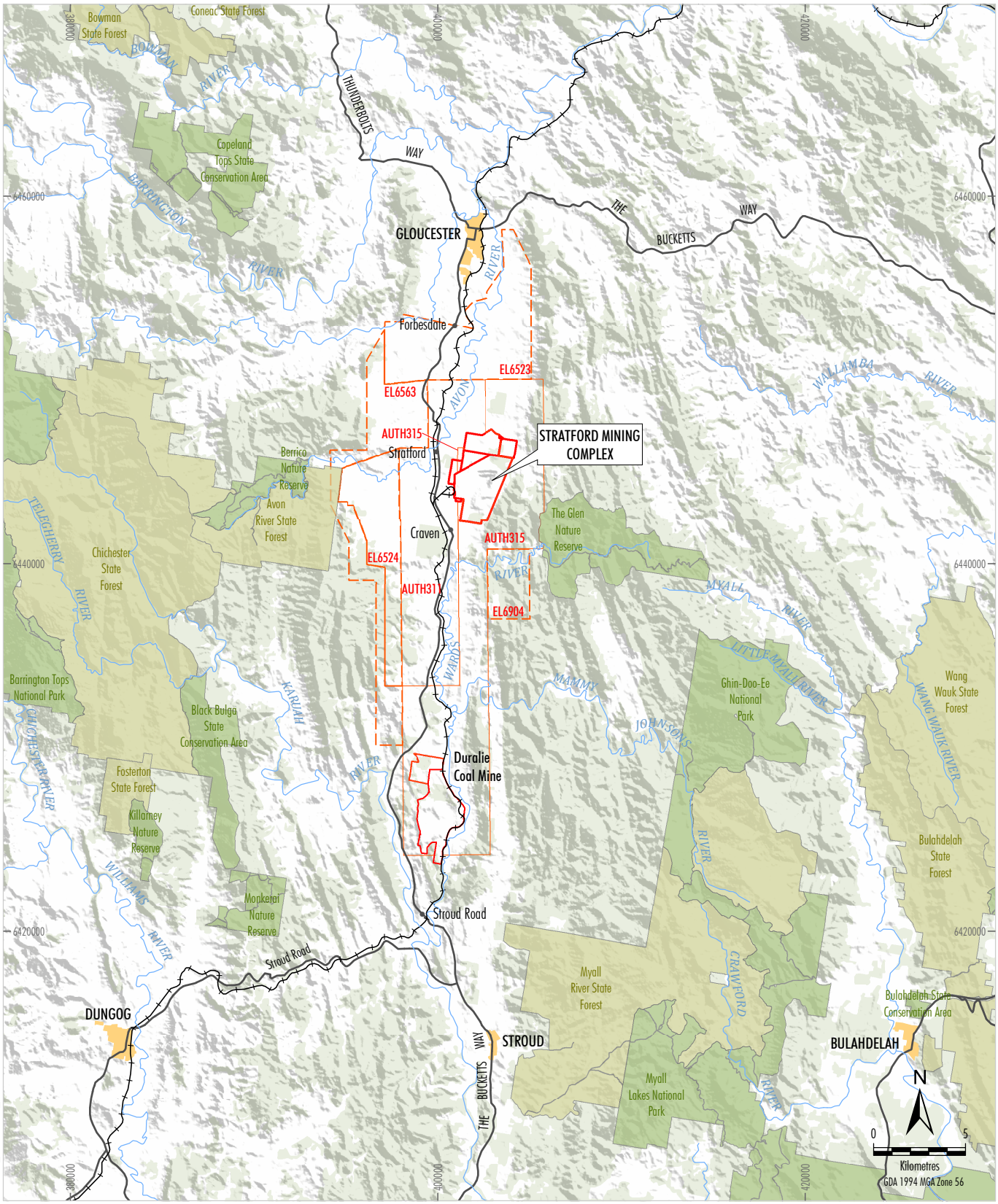
Mining activities approved under the SCM Development Consent and the BRNOC Development Consent were suspended in mid-2014, however, processing of ROM coal from the DCM and the export of product coals has continued under the SCM Development Consent.

The Development Consent SSD-4966[1] for the Stratford Extension Project (SEP) was granted on 29 May 2015 and involves the extension and continuation of mine operations at the SMC, including (among other things):

- mining of up to 2.6 million tonnes of ROM coal per annum;
- continuation of mining in the BRNOC; and the extension of mining into three new open cut mining areas:
  - Avon North Open Cut;
  - Stratford East Open Cut; and
  - Roseville West Pit Extension.
- progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations;
- continued and expanded placement of waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement;
- coal processing at the existing coal handling and preparation plant (CHPP);
- 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 mine life, the Avon North Open Cut void;
- continued use of existing water storages/dams and progressive development of additional sediment dams, pumps, pipelines, irrigation infrastructure and other water management equipment and structures;
- other associated minor infrastructure, plant, equipment and activities and minor modifications to existing structure, plant and equipment and activities; and
- rehabilitation of the site.

The general arrangement of the approved SMC is provided in Figure 2.

[1] A copy of the Development Consent (and other statutory State and Federal licenses and approvals) is available on the Stratford Coal website (www.stratfordcoal.com.au).



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LEGEND

- Mining Lease Boundary
- Exploration Licence Boundary
- NSW State Forest
- National Park, Nature Reserve or State Conservation Area

Source: Geoscience Australia (2006);
NSW Department of Planning & Environment (2017)

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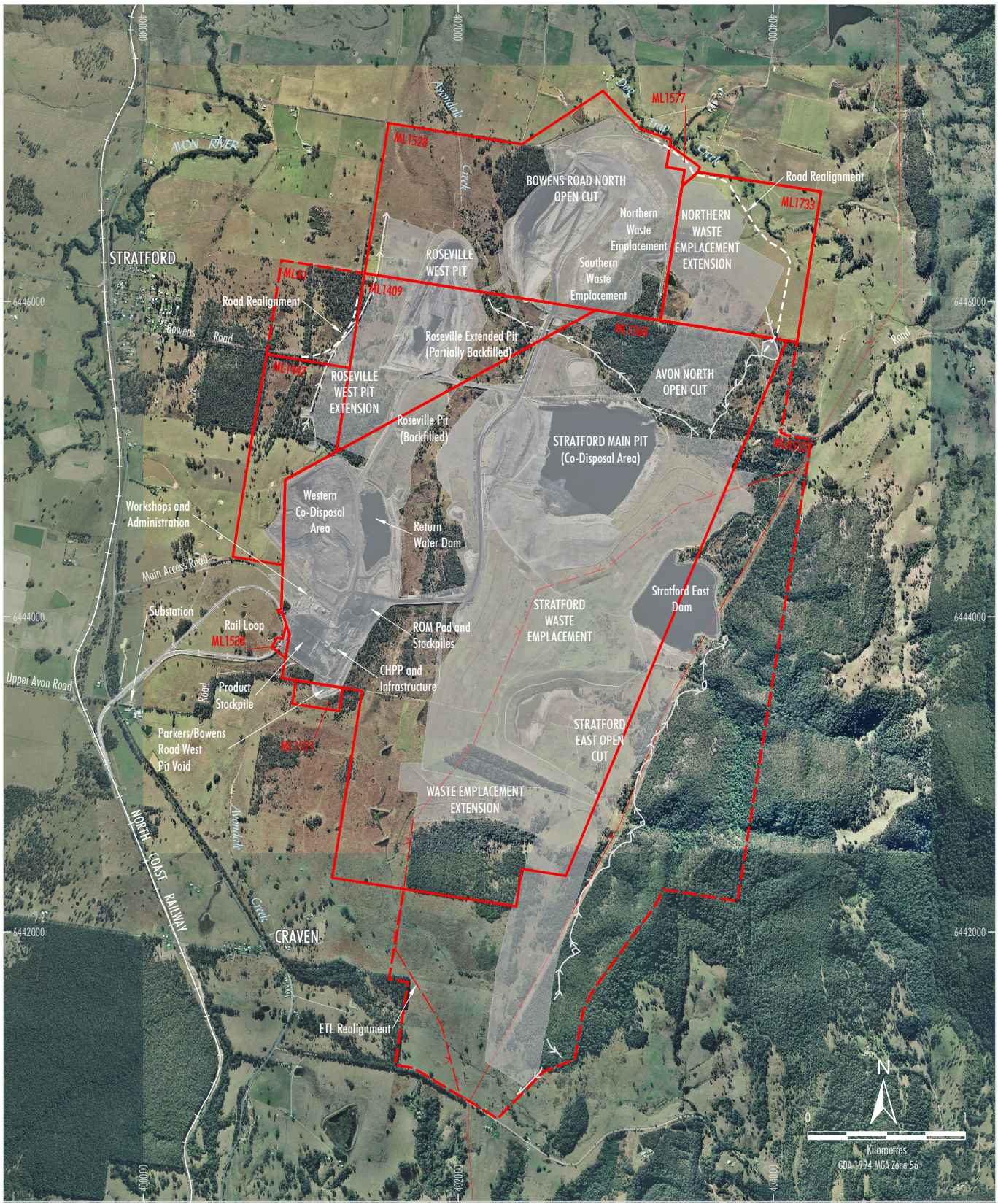
STRATFORD EXTENSION PROJECT

Regional Location

Figure 1



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LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary
- Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Conceptual Up-Catchment Diversion

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STRATFORD EXTENSION PROJECT

Approved General Arrangement

Source: Orthophoto - Yancoal (July 2014); LPI (2016); NSW Department of Planning & Environment (2017)

Figure 2

1.2 PURPOSE AND SCOPE

The first Life of Mine Rejects Disposal Plan (RDP) was contained in the *Stratford Coal Mine Environmental Impact Statement* (SCPL, 1994). Following grant of the SCM Development Consent (former DA 23-98/99[2]), including the condition to "*dispose of rejects generated by the processing of coal on site in general accordance with the approved SMC Life of Mine Reject Disposal Plan*", the RDP was revised in 1998, 2003, 2009 and 2016. A brief history of rejects disposal and relevant approvals at SMC is provided in Section 3.

Since the repeal of the *Coal Mine Health and Safety Regulation 2006 under the Coal Mine Health and Safety Act 2002,* and its replacement with the *Work Health and Safety (Mines and Petroleum) Act 2013*, the emplacement of rejects at the SMC is required to be undertaken in accordance with the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* Schedule 3, Part 5, Clause 27 High Risk Activities – Emplacement Areas[3]. Further, an unannounced inspection of the SMC was conducted on 31 May 2018 by the NSW Resources Regulator (within the DP&E) and based on the outcomes required:

> *...CIM Stratford Pty Ltd to develop a strategy to assess the proposed rehabilitation methodology for the reject emplacement facility considering factors such as anticipated material densities and moisture content of the emplaced materials, and the approved post mining land use for the facility. ...*

Cognisant of the above legislative changes, NSW Resources Regulator inspection outcomes, former requirements of DA 23-98/99 and in accordance with the relevant requirements Development Consent SSD-4966 (Section 2.1), this RDP has been prepared to:

- Estimate the remaining life of the Stratford Main Pit as a secure containment facility for reject disposal, including allowance for storage of supernatant water with a low risk of spill.
- Identify sufficient secure containment capacity to store the total projected volume of reject to be produced, including the reject from processing of coal from the DCM, beyond the life of the Stratford Main Pit (i.e. Avon North Open Cut void).
- Describe the rehabilitation strategy for any remaining reject left in the above-ground western reject co-disposal area at the completion of the reprocessing operation consistent with the Mining Operations Plan (MOP) and Rehabilitation Management Plan (RMP).
- Describe the rehabilitation strategy for the Stratford Main Pit once it reaches its reject disposal capacity consistent with the MOP (including consideration of factors such as material densities and moisture contents, and the approved post-mining land use).
- Facilitate control of water movement to and from the active reject disposal areas such that there is a low risk of surface and groundwater contamination either during the active mine life or post rehabilitation and lease relinquishment.
- Facilitate efficient, low cost disposal and management of reject both during the operational and the closure (rehabilitation) stages.
- Facilitate reject disposal operations that are in compliance with the regulatory guidelines and Development Consent conditions.
- Provide for monitoring of reject disposal and associated water management system performance to establish ongoing compliance with the objectives of the RDP and to enable ready deployment of corrective measures if required to maintain compliance.

[2] DA 23-98-99 was surrendered, effective 11 April 2018, in accordance with Condition 9, Schedule 2 of Development Consent SSD-4966.
[3] Previously in accordance with the *Coal Mine Health and Safety Regulation 2006*

1.3 STRUCTURE OF THE RDP

The remainder of this RDP is structured as follows:

Section 2: Outlines the statutory requirements applicable to the RDP.

Section 3: Provides a brief history of rejects disposal and relevant approvals at SMC.

Section 4: Details the design objectives and performance criteria for the emplacement of coal reject materials that will be used to assess the SMC.

Section 5: Provides a summary of assessments of the geochemical characteristics of CHPP reject materials at the SMC.

Section 6: Provides the anticipated rejects production schedule for the life of mine at the SMC, including a detailed schedule for the next five calendar years.

Section 7: Describes the rejects disposal methodology and disposal schedule for the Stratford Main Pit.

Section 8: Describes the rehabilitation strategy for all rejects disposal areas.

Section 9: Provides details of the reject monitoring program including a trigger action response program.

Section 10: Describes the program to review and report on the effectiveness of management measures and improvement of environmental performance over time as well as a protocol for periodic review and update of the RDP.

Section 11: Lists the references cited in this RDP.

2 STATUTORY REQUIREMENTS

SCPL's statutory obligations are contained in:

(i) the conditions of NSW Development Consent SSD-4966;

(ii) the conditions of the Commonwealth Approval EPBC 2011/6176;

(iii) the conditions of NSW Environment Protection Licence (EPL) 5161;

(iv) relevant licences and permits, including conditions attached to mining leases; and

(v) other relevant legislation, including the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

Obligations relevant to this RDP are described below.

2.1 NSW DEVELOPMENT CONSENT SSD-4966

2.1.1 Coal Reject Specific Requirements

Table 1 presents the conditions in Schedule 3 of NSW Development Consent SSD-4966 under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) which specifically relate to the management of coal rejects at the SMC and indicates where they are addressed in this RDP.

Table 1
Coal Reject Specific Requirements in NSW Development Consent SSD-4966

<table>
<tr><th>NSW Development Consent SSD-4966
Schedule 3</th><th>Section Where Addressed in this RDP</th></tr>
<tr><td>Condition 3 / Table 3 (Hours of Operation)<table><tr><th>Activity</th><th>Operating Hours</th></tr><tr><td>• Recovery and transport of CHPP rejects for re-processing.</td><td>7 am to 6 pm,
7 days per week.</td></tr></table></td><td>Section 8.1</td></tr>
<tr><td>Condition 31 / Table 8 (Water Management Performance Measures)<table><tr><th>Feature</th><th>Performance Measure</th></tr><tr><td>In-pit emplacement of CHPP rejects and potentially acid forming materials.</td><td>• Emplacement and/or encapsulation and/or capping to prevent or minimise the migration of pollutants beyond the pit shell ... ;
• Emplacement of CHPP rejects below the predicted post-mining groundwater level;
• Adequate freeboard within the pit to minimise the risk of discharge to surface waters.</td></tr></table></td><td>Sections 4, 7 and 8</td></tr>
<tr><td>Condition 32(c))(ii) (Surface Water Management Plan)
• Detailed plans, including design objectives and performance criteria for: ...
- Design and management for the emplacement of coal reject materials and potential acid-forming or sulfate generating materials.</td><td>Sections 4, 5, 7 and 8
and Figures 3 and 4</td></tr>
<tr><td>Condition 52(a) (Waste)
The Applicant shall:
a) Implement all reasonable and feasible measures to minimise waste (including coal reject) generated by the development.</td><td>Section 6</td></tr>
</table>

2.2 LICENCES, PERMITS AND LEASES

In addition to the NSW Development Consent SSD-4966 and Commonwealth Approval (EPBC 2011/6176), all activities at or in association with the SMC will be conducted in accordance with a number of licences, permits and leases which have been issued or are pending issue.

Key licences, permits and leases pertaining to the SMC include:

- The conditions of EPL 5161 administered by the EPA under the NSW *Protection of the Environment Operations Act, 1997* (POEO Act).
- The conditions of the Mining Leases (MLs) 1360, 1409, 1447, 1538, 1521, 1577, 1528 and ML 1733 issued by the NSW Minister for Mineral Resources under the NSW *Mining Act, 1992*[4].
- Mining Operations Plan submitted and approved by the Division of Resources and Geoscience (DRG).
- Water supply works, water use approvals and water access licences issued by the NSW Office of Water under the NSW *Water Management Act, 2000* including:
  - WAL 41534 in the Gloucester Basin Groundwater Source (aquifer) for 500 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
  - WAL 41535 in the Gloucester Basin Groundwater Source (aquifer) for 20 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
  - WAL 41536 in the Gloucester Basin Groundwater Source (aquifer) for 315 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
  - WAL 41537 in the Gloucester Basin Groundwater Source (aquifer) for 186 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
  - WAL 41538 in the Gloucester Basin Groundwater Source (aquifer) for 410 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.

It should be noted that SCPL also holds other water licences. A detailed register of current licences, permits and approvals is maintained on-site by SCPL personnel and a summary of current approvals is presented in the Annual Review.

[4] SCPL has lodged applications for the Mining Lease Application (MLA) areas MLA1 and MLA2 (now MLA 552) with the DRG as shown on Figure 2.

2.3 OTHER LEGISLATION AND RELEVANT REQUIREMENTS

SCPL will operate the SEP at the SMC consistent with the NSW Development Consent SSD-4966, the Commonwealth Approval (EPBC 2011/6176), and any other legislation that is applicable to an approved Part 4 Project under the EP&A Act.

In addition to the statutory obligations described in Sections 2.1 and 2.2, the following NSW Acts (and their Regulations) that are related to the management of coal rejects and/or may be applicable to the conduct of the SEP at the SMC include:

- *Work Health and Safety (Mines and {Petroleum Sites) Act 2013.*
- *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.*
- *Dams Safety Act, 2015.*

Specific details relating to the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* relevant to this RDP is provided in the following sub-section.

2.3.1 Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

This RDP has been prepared in accordance with the requirements of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* Schedule 3 High Risk Activities Part 5, Clause 27 Emplacement Areas.

3 HISTORY OF REJECT DISPOSAL AND APPROVALS AT THE SMC

The first RDP for the SMC was approved by the DII-MR (now DRG) in 1995. The RDP was contained in the *Stratford Coal Mine Environmental Impact Statement* (SCPL, 1994) and involved disposal to the above ground western reject co-disposal area, which was developed in three cells. Reject disposal was to be transferred to the Roseville and Bowens Road West Pits following the completion of mining in these satellite deposits, and finally to a purpose created cell within the main out of pit overburden emplacement at the southern end of the Stratford Main Pit.

An amended RDP (Gilbert and Sutherland Pty Ltd, 1998) was lodged by SCPL[5] in October 1998 and was approved by the then DII-MR in January 1999. The core change from the approved plan was the extension of the western reject emplacement area to the north and west of the previously approved cells 1, 2 and 3 to accommodate changes to the mine plan.

In June 2000, SCPL obtained approval for modifications to DA 23-98/99 to allow production of higher ash thermal coal. This change meant that coal recovery increased resulting in a lower rate of reject generation. The reduced life of mine reject emplacement requirement meant that the previously approved northwest extension of the western reject emplacement area was no longer required.

Following discussions with the then DII-MR regarding changes to the particle size distribution in the pumped co-disposal reject, a coarse reject crushing system was established to introduce <50mm heavy media bath reject into the pumped co-disposal reject. This facility was commissioned in October 2000. These operational and reject disposal changes were incorporated in a revised MOP submitted to the then DII-MR in May 2001.

SCPL initiated a series of investigations and trials to demonstrate that excess water readily separates from the pumped co-disposal reject post disposal. The material has also been shown to be competent and able to form a stable rehabilitated landform. Based on these findings and advice from specialist geotechnical consultants (GE Holt and Associates), SCPL ceased combining crushed coarse pumped reject and allowed the combined fine and Dense Media Cyclone reject to be placed in the completed Roseville void. SCPL also successfully investigated the potential to recover and sell thermal coal from previously placed reject in the above ground western reject co-disposal area. Following approval by the then DII-MR, SCPL commenced the recovery and re-processing of rejects that will ultimately see most of the above ground reject re-processed and the residual reject placed in mine voids, below eventual groundwater table levels. These two changes were reflected in a revised MOP lodged in May 2001 and approved by the then DII-MR in June 2001.

Following the cessation of mining in the Stratford Main Pit in 2003, the CHPP rejects have been pumped as a co-disposed slurry via a pipeline to the Stratford Main Pit. A new RDP was prepared in May 2003 to reflect the use of the Stratford Main Pit for rejects and this was revised again in December 2009 to reflect changes in ROM production at the SMC and DCM.

The Stratford Main Pit will continue to be used for co-disposal of CHPP rejects at the SMC for the SEP. The Stratford Main Pit acts as both the CHPP rejects co-disposal area and contained water storage at the SMC, with significant storage capacity of approximately 25 gigalitres (GL). Annual bathymetric survey of the co-disposed rejects surface within the Stratford Main Pit continue to be undertaken to enable estimates of stored water volumes and in situ rejects density to be made. As described in Section 7.2, the Stratford Main Pit will be able to store the rejects produced over the next 5 years (and for a period beyond) at the SMC.

Following completion of mining in the Avon North Open Cut, the void will be made available as a new co-disposal area when required for the SEP as the life of mine reject disposal strategy.

[5] Mine development and all operations at Stratford were conducted by the corporate entity Stratford Coal Pty Ltd, a wholly owned subsidiary of CIM Resources Limited. Development of the Duralie project was undertaken by Duralie Coal Pty Ltd, a separate wholly owned CIM subsidiary company. Following the merging of the Stratford and Duralie projects a new operating company, Gloucester Coal Pty Ltd, was created as the single entity for both projects.

4 PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

Table 8 in NSW Development Consent SSD-4966 prescribes the water management performance measures for the SMC, which includes coal reject-specific performance measures for the 'In-pit Emplacement of CHPP Rejects and Potentially Acid Forming Materials'.

SCPL will assess the SMC against the coal reject specific performance measures and indicators outlined in Table 2.

Table 2
Coal Reject Specific Performance Measures and Indicators

Performance Measure	Performance Indicator
In-pit Emplacement of CHPP Rejects and Potentially Acid Forming Materials • Emplacement, and/or encapsulation and/or capping to prevent or minimise the migration of pollutants beyond the pit shell or seepage from out-of-pit emplacement areas. • Emplacement of CHPP rejects below the predicted post-mining groundwater level. • Adequate freeboard within the pit to minimise the risk of discharge to surface waters.	CHPP rejects are managed generally in accordance with the methodologies described in Sections 7 and 8 of this RDP and the SWB (i.e. to provide adequate freeboard).

The performance indicators in Table 2 will be used to assess and manage the SMC-related risks to ensure that there are no exceedances of the performance measures. In accordance with Condition 2, Schedule 5 of NSW Development Consent SSD-4966, where any exceedance of the performance measures has occurred, SCPL will, to the satisfaction of the Secretary:

- take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur;
- consider all reasonable and feasible options for remediation (where relevant) and submit a report to the DP&E describing those options and any preferred remediation measures or other course of action; and
- implement remediation measures as directed by the Secretary.

5 REJECT CHARACTERISATION

5.1 REJECT FROM SMC AND DCM

EGi (2010) assessed the geochemical characteristics of the CHPP rejects (including DCM rejects) in 2010. The assessment included reviews of laboratory-generated wash trial and CHPP rejects testing carried out between 1995 and 1998, and co-disposed CHPP rejects testing in the Stratford Main Pit conducted in 2008.

Results showed that most co-disposed CHPP rejects represented by the samples tested from the Stratford Main Pit deposition area were Potentially Acid Forming (PAF) or Potentially Acid Forming – Low Capacity (PAF-LC), with low Acid Neutralising Capacity (ANC) and fast rates of reaction (EGi, 2010). Multi-element analysis suggests that materials represented by the samples tested would have no significant elemental enrichment (except for S), but would mobilise metals at low pH (EGi, 2010). Pyrite oxidation and acid release would be associated with elevated metal concentrations, including Al, Fe, Mn, Ni and Zn (EGi, 2010).

These results indicated that implementation of appropriate management measures would be required to manage potential acid rock drainage (ARD) impacts associated with the existing and proposed co-disposed CHPP rejects. Note that Stratford Main Pit water quality monitoring confirms that current management measures have successfully controlled pH from deposited CHPP rejects and maintained a circum neutral pH in the Stratford Main Pit.

The CHPP reject samples tested had lower acid forming potential than the laboratory generated DCM rejects samples, and indicated that the overall PAF/PAF-LC nature of the combined CHPP rejects deposited at the Stratford Main Pit was due mainly to the DCM ROM coal feed.

A further assessment of the geochemical characteristics of the CHPP reject material associated with the development of the Project is provided in the Geochemistry Assessment (SEP EIS Appendix L) prepared by EGi (2012) in the Stratford Extension Project Environmental Impact Statement. A summary of the assessment is provided below.

Total sulphur distributions of raw coal from the SEP 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 approved extensions to the SMC are expected to have a lower acid generating potential than rejects currently produced at the CHPP (including rejects from Duralie ROM coal). As a result, the existing CHPP reject management measures outlined in the prior versions of the Life of Mine Rejects Disposal Plan (Sections 7 and 8) were considered by EGi (2012) to be suitable.

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 (SEP EIS Appendix B) in the Stratford Extension Project Environmental Impact Statement. The results of the review have been used to assist with sensitivity analyses for the site water balance performance as significant volumes of water can be recycled from the co-disposal areas.

Implementation of appropriate management measures are required at the SMC to minimise impacts of potential acid forming characteristics of the co-disposed rejects on surrounding water systems and are described in Sections 7 and 8.

The results of additional characterisation of deposited CHPP rejects will be incorporated in subsequent revisions of this RDP.

6 REJECT PRODUCTION

An indicative coal and reject material production schedule for the next five calendar years (to end of 2022) is provided in Table 3.

Table 3
Indicative Coal and Reject Material Production Schedule – Next Five Calendar Years

Project Year	Calendar Year Ending	SEP ROM Coal Production (Mtpa)			DCM ROM Coal (Mtpa)	Western Reject Co-Disposal Area Recovery (Mtpa)	Total ROM Coal (Mtpa)	CHPP Rejects (Mtpa)	Product Coal for Rail (Mtpa)
		BRNOC	Avon North	Stratford East					
1*	2018	0.3	0.3	0.1	0.6	0.1	1.4	0.5	0.9
2	2019	0.7	0.6	0.6	-	0.1	2.0	0.8	1.2
3	2020	-	0.6	0.6	-	-	1.2	0.4	0.8
4	2021	-	0.6	0.6	-	-	1.2	0.4	0.8
5	2022	-	0.6	0.6	-	-	1.2	0.4	0.8

*SEP Commenced in April 2018. Avon North Open Cut commenced in June 2018.

During this period it is anticipated that approximately 2.5 Mt of CHPP rejects (total) would be produced and require management at the SMC. These quantities are approximately 20% of the estimated total life of mine CHPP rejects to be produced by the SEP (i.e. 12.3 Mt).

As described in Section 7, the Stratford Main Pit will continue to be used for co-disposal of CHPP rejects at the SMC 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 SEP. The existing slurry pipeline from the CHPP would be extended to the new co-disposal area when available.

SCPL will continue to implement all reasonable and feasible measures to minimise waste (including coal reject) generated by the development. Small quantities (approximately 0.1 Mtpa) or rejects from the western reject co-disposal area will continue to be re-processed in the CHPP.

7 REJECT DISPOSAL MANAGEMENT

This RDP is based on on-going pumped co-disposal of reject within the Stratford Main Pit void. Reject disposal within the Stratford Main Pit commenced operation in May 2003. Since that time approximately 19.4 Mt of reject material has been deposited in the Stratford Main Pit (to the beginning of April 2018). The surveyed rejects levels in the Stratford Main Pit as at the end of April 2018 are shown on Figure 3.

The EGi (2010; 2012) geochemical assessment reports concluded that implementation of appropriate management measures would be required to manage potential ARD impacts associated with the existing and proposed co-disposed CHPP rejects. However, the Stratford Main Pit water quality monitoring confirms that current management measures have successfully controlled pH from deposited CHPP rejects and maintained a circum neutral pH in the Stratford Main Pit. As a result, the existing CHPP reject management measures outlined in the previously approved Life of Mine Rejects Disposal Plan (SCPL, 2009) were considered by EGi (2012) to be suitable for the SEP.

Rejects at the SMC have been previously characterised as being PAF, therefore measures to manage rejects are in place. Rejects management measures include placement into the Stratford Main Pit where they are progressively inundated with water to prevent significant pyrite oxidation and acid generation in the long term, with monitoring of water quality undertaken during operations and provision for lime (calcium hydroxide - $Ca[OH]_2$) dosing and limestone (calcium carbonate - $CaCO_3$) treatment as required. These measures will continue for the SEP.

7.1 STRATFORD MAIN PIT REJECT DISPOSAL METHODOLOGY

All reject (coarse and fine) is pumped to the Stratford Main Pit as slurry. DCM reject, which forms a proportion of the total reject stream, has previously been classified as PAF-HC. As such, a principal requirement for placement of co-disposal reject under the previously approved RDP has been for a combination of sub-aqueous and sub-aerial deposition with limestone treatment and progressive inundation.

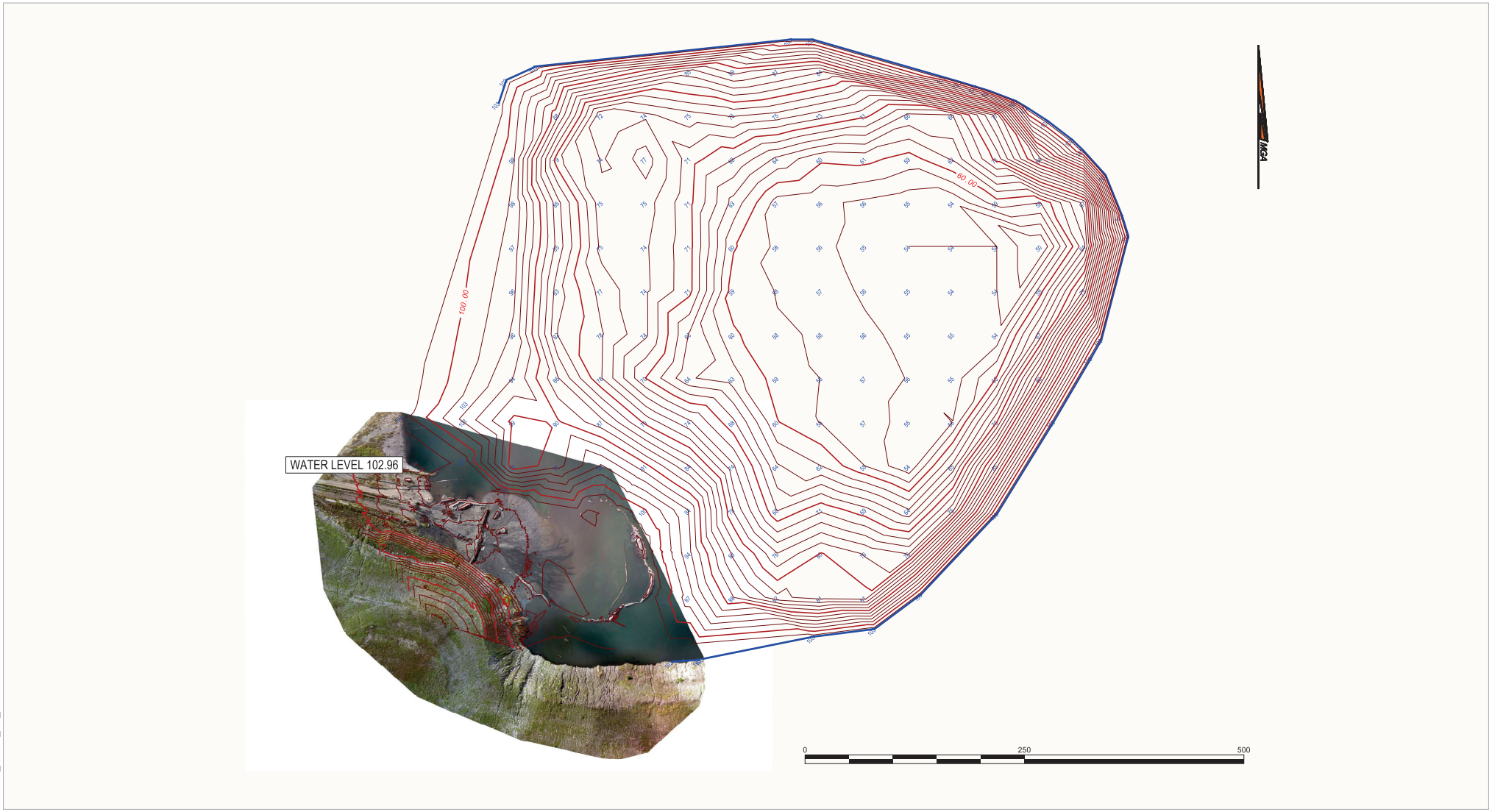
This methodology, as described in the previously approved RDP (SCPL, 2009) has successfully controlled the formation of acid conditions in the Stratford Main Pit, with recorded pH in water samples not falling below 6.3 since 2003. Recorded pH of reject beach samples has generally been near neutral with since 2003 with only occasional lower readings.

Pumped co-disposal reject is disposed of via a reject delivery pipeline located along the pit access road and directed towards the low point within the pit void. Sub-aqueous beaching of co-disposal reject deposited directly into water is undertaken wherever practical and safe. This is achieved by “floating” the delivery line into the disposal area from the land-based take off point at the southern end of the pit. Discharge occurs from a stationary deposition location. As a result, submerged beach slopes estimated at between 5% and 15% are formed. Deposition at any one location continues until the beach rises to within 0.5 m of the water surface. At this time the deposition location is moved.

The original sub-aqueous deposition had resulted in a low density tailings deposit that was likely to consolidate extremely slowly, if at all, given its deposition beneath the water level in the void. In accordance with the previously approved RDP (SCPL, 2009), SCPL commenced a combined approach of sub-aerial and sub-aqueous deposition of reject, to facilitate a higher density reject deposit.

Sub-aerial deposition will be facilitated by relocation of the reject discharge point to the southern end of the pit, however previously this has been located on the western side of the pit. The discharge point will be alternated from the south western corner around to the central southern side to form a beach from the south-western side of the Stratford Main Pit sloping to the south-eastern side (Figure 3). Water recovery will be undertaken from the south-western side of the pit. Following this, reject deposition will also occur west to east from the south with water recovery from the south-west of the Stratford Main Pit.

Control of acid generation in the sub-aerially deposited reject will be facilitated by incorporating limestone into the reject stream, establishing reject beaches 2 m to 3 m above water level such that they are significantly inundated with rising pit waters within 6-12 months, dosing the reject beach surface with lime at appropriate rates, and alternating the discharge point so that deposited reject beaches are essentially not exposed for more than 1 year.



YAN-17-10_MP2018_RDP_001A

Source: Yancoal (2018)

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STRATFORD EXTENSION PROJECT

Surveyed Rejects Level in
Stratford Main Pit - April 2018

Figure 3

EGi have advised that application of <4 mm size limestone at a rate of 80 t $CaCO_3$/hectare incorporated into the top 300 mm to 500 mm of exposed surface reject should provide sufficient control of ARD from exposed materials until they are inundated. Limestone will be incorporated into the top surface of the surface reject via surface broadcasting/spreading and ripping with appropriate equipment.

In addition, limestone (<4 mm size) will be introduced to the CHPP reject stream at a rate of approximately 5 kg/t (based on a neutralising value of >90%) when DCM coal is being processed. Limestone analysis will be conducted on a regular basis to test sizing and neutralising value. The rate at which limestone is introduced may be reviewed based on results from monitoring (refer Section 9).

Limestone will be introduced into the CHPP with DCM coal at the plant feed. The method for introducing lime will comprise a front end loader feeding lime into the CHPP hopper. The average rate of lime that will be introduced is 1.5 kg/t of ROM coal as DCM coal has a yield of approximately 70%. Lime will pass through the CHPP and go into the reject stream at 5 kg/t before being deposited in the Stratford Main Pit. Alternative methods of introducing lime to the reject stream may be used.

Guidelines on limestone addition rates for co-disposed reject and tailings placed in the Stratford Main Pit are presented in details within Attachment A.

On-going monthly monitoring of Stratford Main Pit water quality (refer Section 9) will continue and will provide feedback on the adequacy of lime dosing.

A coarse reject stream, comprising particles from 100 mm size down to about 12 mm, may be produced at the CHPP. This second waste stream (most likely to be PAF or PAF-LC) will temporarily report to Bowens Road West Pit where it will be recovered by excavator and truck and deposited within the lower levels of the Stratford Main Pit void.

All activities required under the proposed reject disposal methodology will be subject to risk assessment including compilation of specific Safe Work Method Statements for key tasks.

7.2 REJECT DISPOSAL SCHEDULE

Given the reject production schedule in Table 3 (Section 6), the rise of the reject surface within the Stratford Main Pit depends on the density of the deposited reject. A filling schedule for the Stratford Main Pit has been calculated for a reject density of 1.2 t/m^3. The future rejects beach levels have been calculated based on the existing (April 2018) surveyed beach levels (Figure 3) projected forward according to the calculated filling schedule.

Table 4 summarises the notional filling schedule for the Stratford Main Pit over the next five calendar years. The projected rejects levels in the Stratford Main Pit at the end of 2022 is shown on Figure 4.

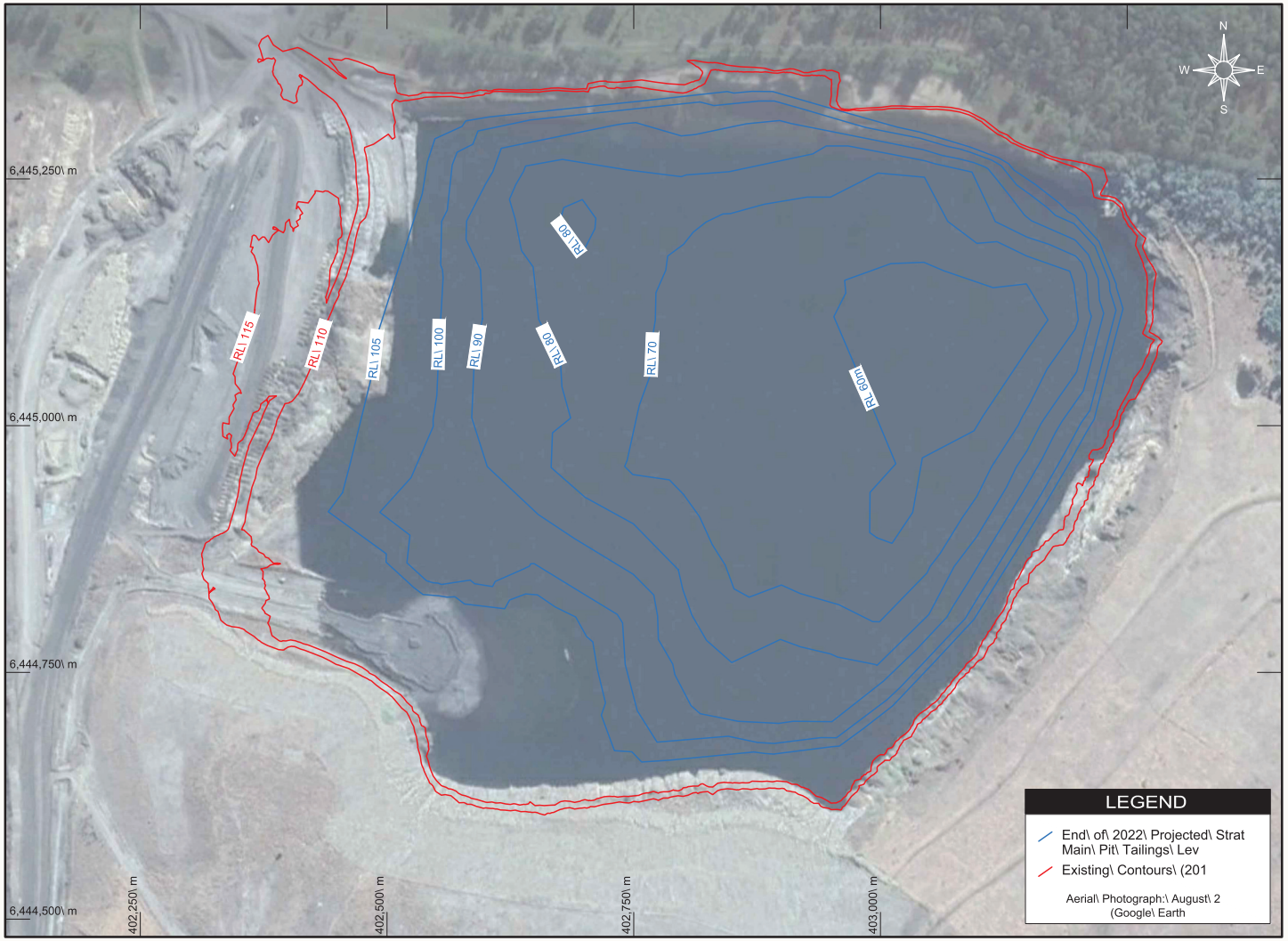
Table 4
Summary of Stratford Main Pit Reject Disposal Schedule – Next Five Calendar Years

Timing (End of Calendar Year)	1.2 t/m^3 Reject Density		
	Reject Volume (ML)	Remaining Capacity in Stratford Main Pit (ML)*	Reject RL ** (m AHD)
Apr-Dec 2018	366	16,953^	104.9
Dec 2019	667	16,239	106.1
Dec 2020	333	16,007	107.0
Dec 2021	333	15,606	107.6
Dec 2022	333	15,273	108.3

* To spill at RL 115 m AHD.

** Approximate head of beach RL.

^ Assuming the remaining capacity as of 1 April 2018 is 17,318 ML and approximate RL is 104 m AHD.



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Source: HEC (2018)

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Projected Rejects Levels in
Stratford Main Pit - December 2022

Figure 4

It is not proposed for reject to be placed in the Stratford Main Pit higher than the estimated pre-mine groundwater level, estimated to be equal to the level of the adjacent Avondale Creek at approximately[6] RL 114 m AHD, in order to maintain reject saturation and limit potential for long term reject oxidation.

7.3 WATER MANAGEMENT

Reject disposal and process water recovery is a major component of the water management and water supply system at the SMC. The bulk of water used on-site is in the CHPP and recovery of water for re-use in the CHPP is the single largest component of the overall supply system.

Water management at the SMC is described in further detail in the SMC Water Management Plan. On average the site has operated in surplus with more water on average being yielded from the mine, and mine infrastructure catchments, than has been needed in supply for the mining and processing operations. Management of this excess water has been by way of containment in the Stratford East Dam, storage in Stratford Main Pit and controlled release to Avondale Creek under a discharge licence[7]. Prior to the commissioning of reject disposal in the Stratford Main Pit, transfer of mine water to Stratford East Dam ceased as did controlled release to Avondale Creek. Figure 5 shows a schematic of the existing and indicative SEP water management system.

The Bowens Road West void continues to be used as a transient storage for runoff from the CHPP and coal stockpile area. Any water which accumulates in the void is pumped to the Return Water Dam which is then recycled through the CHPP.

The Return Water Dam continues to receive local runoff from the adjacent western reject co-disposal area and associated re-processing operations. This water is used in the CHPP and for dust suppression on haul roads. In the unlikely event that excess water builds up in this storage there is provision for it to be pumped, via the CHPP, across to the Stratford Main Pit.

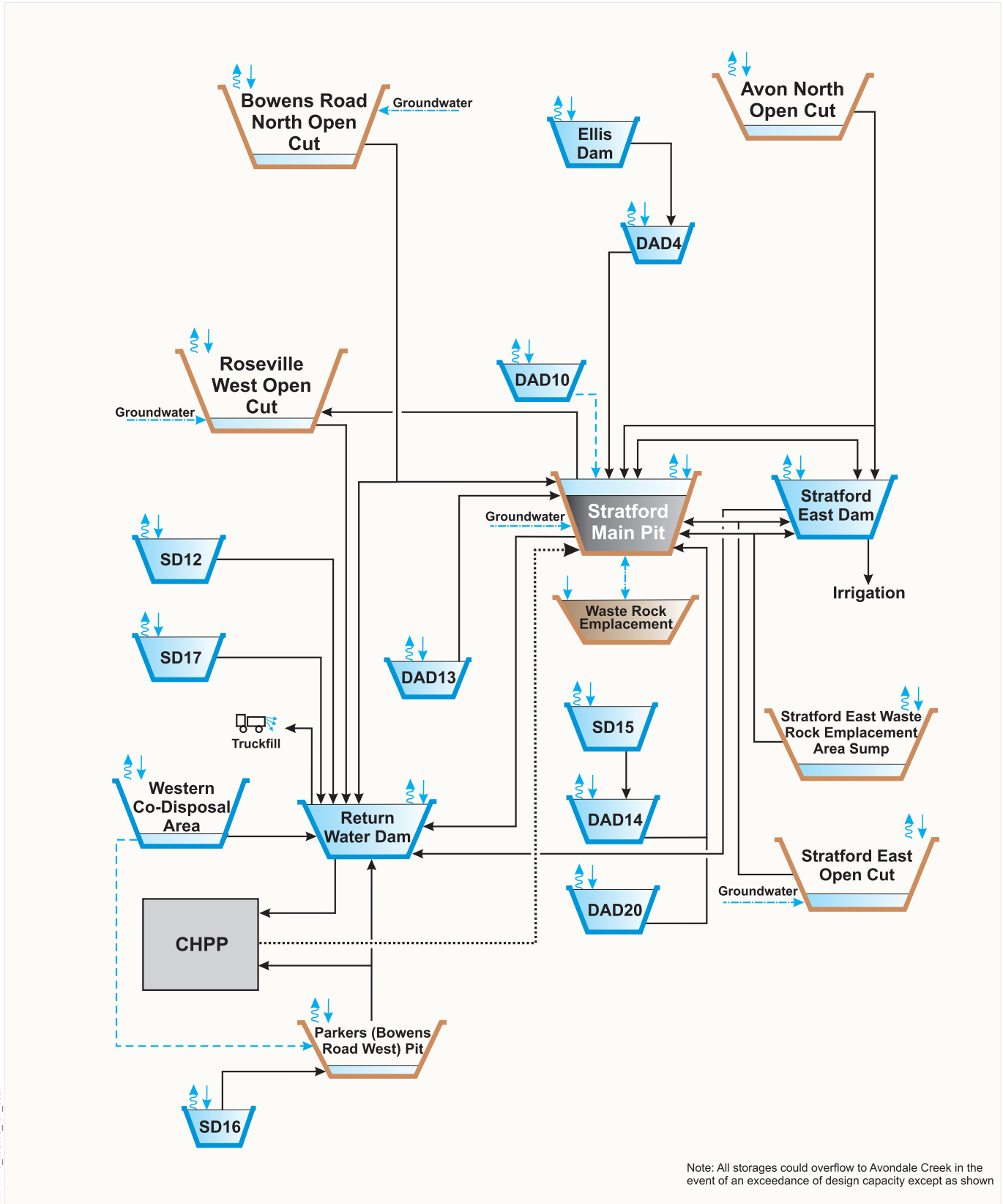
Stratford East Dam contains fresh water runoff, water from mine dewatering, and past transfer of excess water from the Roseville Pit void reject co-disposal area. Since commissioning of reject disposal in the Stratford Main Pit, the Stratford Main Pit has been used for storage of excess water on-site and Stratford East Dam has not been used for this purpose. Water levels in the Stratford East Dam have fallen from RL 162 m AHD in early 2003 to less than RL 158 m AHD in late 2008 and RL 158.7 m AHD in April 2018 (RL 164m spillway level). Monitored electrical conductivity (a measure of salinity) has reduced from 2,400 µS/cm in 2003 to approximately 1,400 µS/cm in 2008 and to 890 µS/cm in early 2018. The Stratford East Dam continues to provide longer term water supply security for both the CHPP and for haul road dust suppression.

Bowens Road North (BRNOC) and Roseville West open cuts have in the past been dewatered to the Return Water Dam for re-use in the CHPP. Since ceasing operations in BRNOC and Roseville West in 2014, groundwater inflow and rainfall has been allowed to accumulate in the pit voids. Since early 2016 water from the Stratford Main Pit is able to be transferred to the BRNOC pit to help maintain control over the water level in the Stratford Main Pit. In 2016, enhanced evaporator sprays were set up on the Stratford Main Pit waste emplacement to reduce the volume of stored water in the Stratford Main Pit. However for the purposes of the water balance model (described below) these evaporators have (conservatively) not been included as a water management measure.

A water balance model has been developed (using GoldSim software) to simulate the behaviour of the SMC water management system from January 2018 to the end of 2022. The model simulates all site storages and their associated catchments as well as water movements associated with the mining, coal processing and reject disposal/activities on a daily basis. The model simulates daily changes in stored volumes of water in response to inflows (rainfall and groundwater) and outflows (evaporation, dust suppression use, irrigation loss and spill [if any]).

[6] Refer Figure 4 of Stratford Coal Project – Life of Mine Reject Disposal Plan, report prepared for Stratford Coal Pty Ltd by Gilbert and Sutherland Pty Ltd, September 1998.

[7] Under a variation to the Environment Protection Licence 5161 issued in June 2001.



YAH-17-10_MP2018_RDP_003A

LEGEND

- Pumped Flow
- Gravity Flow
- Seepage
- Tailings
- Evaporation
- Rainfall/Runoff
- Dam
- Void
- Water
- Tailings Material
- Waste Material

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STRATFORD EXTENSION PROJECT

Existing and Indicative Project Water Management Schematic

Figure 5

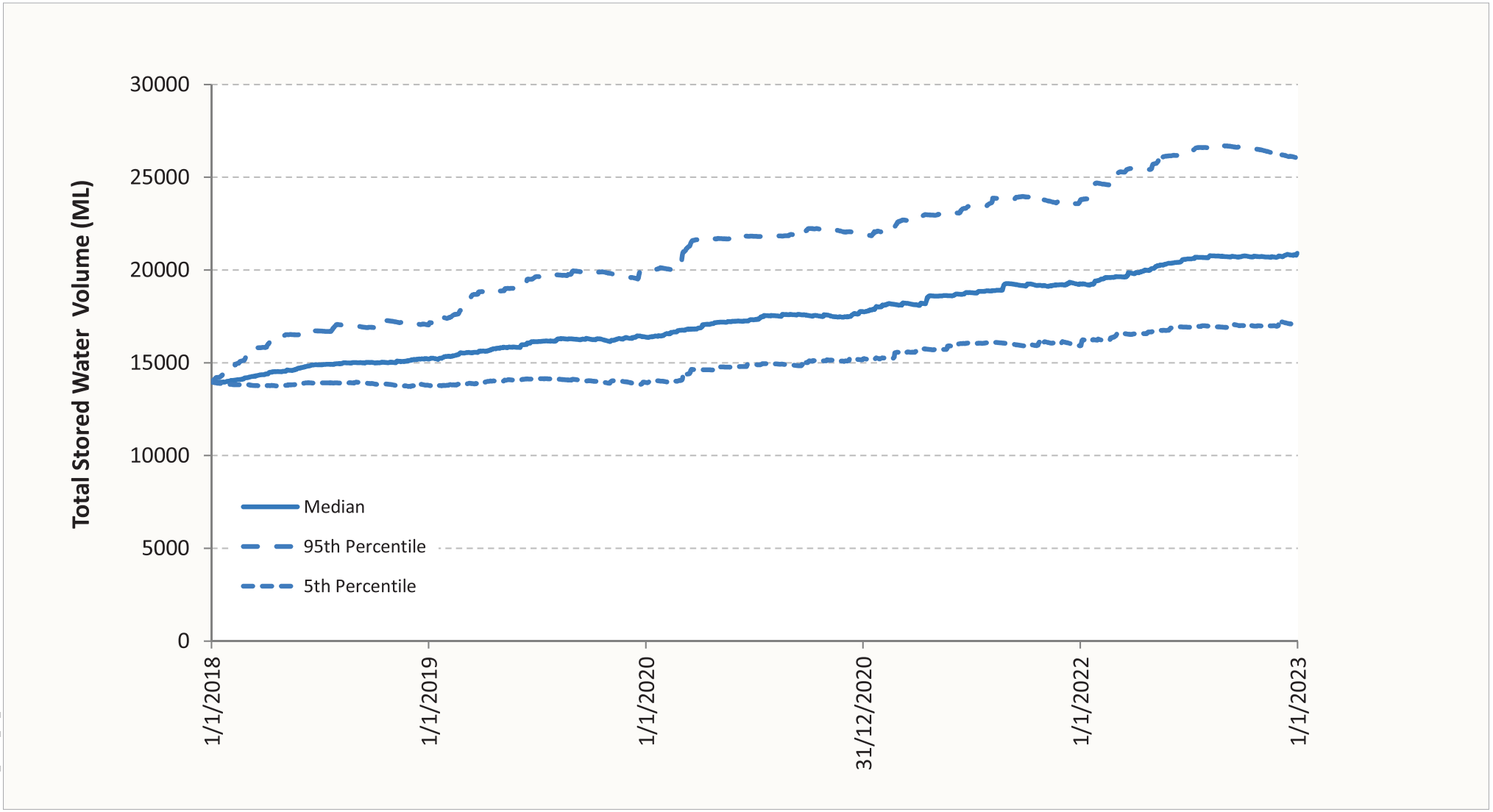
The model simulates 129 possible mine life "realizations", each of 5 years, to the end of 2022. Realization 1 uses climatic data from 1889 to 1893; realization 2 uses data from 1890 to 1894; realization 3 uses data from 1891 to 1895 and so on. In order that recent climate be included in as many realizations as all other years in the record, climate data was "wrapped" with data from 1889 to 1893 added to the record after 2017. In this way, historically representative climatic realizations are produced which can be used to test the water management system over a wide range of climatic conditions. By ranking simulated outcomes, the model can be used to estimate the probability and consequences of different water management outcomes occurring.

The key outcome of the simulation model for planning the Stratford Main Pit reject disposal is spill risk. As the pit fills with reject, less space becomes available for storage of water and the risk of spill increases as this space diminishes. The model was run starting in January 2018 with an assumed reject density of 1.2 t/m^3 used to calculate the diminishing capacity of the Stratford Main Pit.

Model results show that spill from the Stratford Main Pit is not predicted to occur under any realization which implies <1% spill risk until the end of 2022.

Based on the above model predictions, and in order to keep spill risk to a minimum assuming a reject density of 1.2 t/m^3, reject should be able to be disposed of into the Stratford Main pit until at least the end of 2022. Periodic survey of the in-pit reject surface, together with monitoring of reject tonnages will allow reject densities to be checked to refine the above estimates in the future. It is not currently proposed to place reject above RL 114 m in order to keep the reject below the estimated long term groundwater level.

Model predicted Stratford Main Pit water volumes versus time are shown on Figure 6. This plot shows that the water volume in the Stratford Main Pit towards the end of the modelled period is expected to be low, but will depend on climatic conditions experienced in the coming years (note that modelling has assumed a non-recoverable or "dead" water storage volume of 500 ML). Ongoing water balance reviews will allow improved predictions of the likely water volume at the end of reject disposal into the Stratford Main Pit.



YAN-17-10_MP2018_RDP_004A

Source: Yancoal (2018)

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STRATFORD EXTENSION PROJECT

Predicted Stratford Main Pit
Water Volumes - Next Five Calendar Years

Figure 6

8 REHABILITATION STRATEGY

Rehabilitation of the CHPP reject disposal areas will be undertaken generally in accordance with the SMC Mining Operations Plan (MOP) and Rehabilitation Management Plan (RMP). Performance and completion criteria for the rehabilitated reject disposal areas are described in the MOP and RMP in accordance with Condition 55, Schedule 3 of NSW Development Consent SSD-4966 (refer Section 6, and the detailed plans provided, in SCPL's MOP and RMP).

Capping and rehabilitation of the completed co-disposal areas will be undertaken to prevent or minimise the migration of pollutants beyond the pit shell or seepage from out-of-pit emplacement areas.

8.1 WESTERN REJECT CO-DISPOSAL AREA

Previous geochemical investigations on reject material (EGi, 2010; 2012) have indicated that potential exists for generation of acid drainage from the rejects, as well as elevated salt levels. As a means of minimising the impact of this, the original design for rehabilitation of the western reject co-disposal area involved an engineered cover consisting of capillary breaking layer and compacted cover to restrict oxygen and water ingress into the reject and therefore potential oxidation of the placed potentially acid forming beach materials.

In 1998, Gilbert & Sutherland (in a previously approved Life of Mine Reject Disposal Plan) recommended a rehabilitation design for landforms at the western reject co-disposal area involving:

- a combined subsoil and topsoil cover of nominal thickness of 0.9 m (comprising a 300 mm thick topsoil layer underlain by a 600 mm thick compacted clay layer);
- separation of the cover from the underlying reject by a suitably well-drained layer of material to act as a capillary breaking layer; and
- a healthy vegetative cover.

SCPL propose to rehabilitate the landforms at the western reject co-disposal area where reject material is not fully recovered by the end of the reclamation operations in accordance with the above design recommendations.

For landforms at the western reject co-disposal area where reject has been reclaimed, there will be little or no potential for generation of acid drainage nor for elevated salt levels. The following rehabilitation design is proposed for these areas:

- push down any remaining dam walls (formed from coarse reject) to create a relatively level landform with maximum slopes on the outer edge designed at 10°;
- spreading of a 150 mm to 200 mm topsoil layer;
- addition of lime and gypsum, as required; and
- revegetate with trees, shrubs and grasses.

Pushing down of dam walls and shaping will be achieved using a bulldozer. Addition of lime and gypsum (where required) will be carried out by a rehabilitation contractor using a small bulldozer/tractor with ancillary plant. As carbonaceous material will have been removed from most, if not all, of these areas it is planned for the revegetation to include shrubs and possibly trees.

Hours of Operation – Recovery of CHPP Rejects

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

8.2 ROSEVILLE AND BOWENS ROAD WEST PITS

Gilbert & Associates Pty Ltd conducted an investigation into the requirements for covering the backfilled Roseville and Bowens Road West Pits in March 2002.

The following recommendations were made on the basis of that study (Gilbert & Associates Pty Ltd, 2002):

- Reject should not be deposited at levels higher than the final groundwater level which was expected to re-establish at levels similar to the pre-mine case.
- Cover materials should be selected for their suitability as a growing medium for surface vegetation and a long-term growing medium.
- A general minimum cover thickness of 1.5 m was recommended.

The Roseville Pit void reject co-disposal area has been rehabilitated according to those recommendations and the following principles:

- fill with coarse reject or other material (if necessary), to create a relatively level landform;
- areas which did not have sufficient coarse reject fill on top of the co-disposed reject had a 600 mm thick layer of inert material added;
- spreading of a 150 mm to 200 mm topsoil layer;
- addition of lime and gypsum, as required; and
- revegetation with trees, shrubs and grasses.

Revegetation of the rehabilitated co-disposal area consisted of shallow rooting grasses and shrubs, so as not to impact upon the integrity and effectiveness of the cover works to limit water and air movement into the buried reject material. Vegetation types were selected on the basis of the approved mine site rehabilitation plan (at the time), and included introduced pasture species. Vegetation of the reject area assists in the minimising erosion from the area, as well as leading to increased transpiration rates, thereby reducing potential infiltration into the reject material.

The Bowens Road West Pit will be rehabilitated to the same principles as the Roseville Pit prior to the end of the mine life as described in the MOP.

The Bowens Road West Pit void will be backfilled to approximate the pre-mining surface levels, with reformation of the natural drainage lines within the area. The area will be revegetated for erosive resistance and stability, as well as providing for post-mining land use, such as grazing.

8.3 STRATFORD MAIN PIT

The Stratford Main Pit will be rehabilitated to the same principles as the Roseville and Bowens Road West Pits (as described in Section 8.2) prior to the end of the mine life as described in the MOP.

The Stratford Main Pit will be backfilled with inert overburden materials (rather than coarse reject) to a minimum depth of 2 m, sourced from on-going mining operations of other open cuts at the SMC. A clay layer of 1 m to 1.5 m would be added to the inert material, followed by a 150 mm to 200mm topsoil layer, addition of lime and gypsum as required and revegetation with trees, shrubs and grasses. Backfilling will occur to between 5 m and 10 m above pre-mining surface levels, to allow for minor settling which may occur due to the significant depth of deposited reject in the Stratford Main Pit. A gradually sloping (less than 10-12^{o}) final surface profile will be provided. Stable drainage lines will be incorporated into the final landform design.

Strategy to Assess the Rehabilitation Methodology at the Stratford Main Pit

In accordance with Corrective Action 1 of the Inspection Outcome following the unannounced inspection of the SMC conducted on 31 May 2018 by the NSW Resources Regulator (within the DP&E), SCPL will include a detailed description of the strategy to assess the above rehabilitation methodology proposed for the Stratford Main Pit in the next Annual Review (Section 10.1) and be included in a future revision of this RDP.

Factors to be considered will include anticipated material densities and moisture contents which are discussed below.

Anticipated Material Densities

As described in Section 7.2, a reject density of 1.2 t/m^3 has been used to calculate the filling schedule.

As described in Section 5.1, 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 (SEP EIS Appendix B) in the Stratford Extension Project Environmental Impact Statement.

Anticipated Moisture Content of Emplaced Materials

At a reject settled density of 1.2 t/m^3 and with a reject particle density of 2.14 t/m^3 (from laboratory testwork), the calculated moisture content of the emplaced rejects is 27% (w/w). That is, 73% of the water pumped with CHPP rejects is available for reclaim.

Deposited CHPP rejects in-situ moisture contents (including determining water return efficiencies) are monitored to inform the annual review of the site water balance.

Approved Post-Mining Land Use

Rehabilitation concepts for the Stratford Main Pit include profiling the backfilled pit to free-draining landforms, capping the reject material and topsoiling for revegetation with endemic woodland/open forest species. Depending on the extent of backfilling in the Stratford Main Pit, a final void may also remain for water storage.

The post-mining land uses at the SMC will include:

- revegetated mine landforms including endemic woodland/open forest species; and
- revegetated mine landforms to include agricultural land (e.g. Class 4 lands under the Agricultural Suitability classification system).

Rehabilitation of mined lands would be considered suitable when the nominated standards and/or completion criteria for land use, landform stability, revegetation, and beneficial use have been met, or if the relevant Minister(s) otherwise accepts the rehabilitation status.

9 MONITORING AND ASSESSMENT

The performance of the reject and water management system is monitored to confirm compliance with the reject disposal and water management plans. Environmental water quality monitoring is also conducted to check for possible effects of mining and processing activities on surface and groundwater. The following monitoring program will be implemented with transfer of reject material for disposal to the Stratford Main Pit (Table 5).

Table 5
Reject Monitoring Program

Parameter	Location	Frequency
Rainfall	Mine site office	Daily
Reject solids	CHPP	Monthly totals
Reject solids (pH field testing)	Stratford Main Pit – Reject beach	Monthly
Water level	Stratford Main Pit	Monthly
Reject deposit level (bathymetric survey)	Stratford Main Pit reject area	Six-Monthly
Pumping volumes (inflow and outflow)	Transfer pumps	Monthly totals
Pit water quality (pH, EC, Alkalinity)	Stratford Main Pit	Monthly
Monitoring bores water level and quality	Around Stratford Main Pit (refer to the Groundwater Management Plan)	Quarterly
Receiving surface drainage water quality (pH, EC)	Avondale Creek upstream and downstream of mine (refer to Surface Water Management Plan)	Monthly/Event (>25 mm / 24 hour)

A trigger action response program (TARP) will be used in conjunction with the reject monitoring program. Key components of the TARP are outlined in Table 6 below.

Table 6
Reject Monitoring Trigger Action Response Program

Monitoring Trigger	Action	Response
Rainfall Events >100mm	Inspect Stratford Main Pit clean water diversions. Inspect pit water level.	Undertake remedial works if required. Relocate depositional points if required.
Water level increase in Stratford Main Pit greater than modelled	Review weather data, pumping/mine waste inputs, and reject density data.	Revise Stratford Main Pit fill model as required.
Reject density significantly differs from predicted 1.2 t/m^3	Correlate with CHPP data. Confirm survey data.	Revise depositional methodology. Revise Stratford Main Pit fill model as required.
Persistent downward trend in water quality results or reject results over three month period	Investigate source/cause of water quality decline. The investigation would seek to assess presence and extent of any acid generation from exposed reject and quality profile in void water column. Appropriate remedial measures would be implemented based on findings of these investigations.	If source is found to be exposed reject revert to sub-aqueous disposal within safety limitations. Otherwise adopt alternative recommended actions (refer below).

Historical water quality data recorded for the Stratford Main Pit will be used as a baseline of comparison for future monitoring with the objective of maintaining existing water quality over the period of this RDP. Monitoring results including comparisons against baseline values will be presented in the Annual Review (Section 10.1).

Water volume data will be assessed using the water balance simulation model as a basis and reviewed/reported in the Annual Review. In the event that the review indicates likely final water volumes in the Stratford Main Pit of a magnitude that could compromise rehabilitation, a revision of the reject disposal schedule would be undertaken and a revision to this RDP prepared.

In the event that monitoring and implementation of the TARP indicates that additional management measures are required (i.e. as a results of a persistent downward trend in water quality results), the following measures will be investigated and where appropriate will be implemented (EGi, 2010):

- increasing limestone dosage amounts;
- increasing blending depth;
- optimising limestone incorporation methods;
- decreasing limestone size fraction;
- increasing frequency of lime application; and
- use of more direct effort in control of convection/advection (such as compaction).

In addition, the disposal of a greater proportion of CHPP rejects subaqueously will also be considered as a contingency measure.

10 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

10.1 ANNUAL REVIEW

In accordance with Condition 4, Schedule 5 of the NSW Development Consent SSD-4966, SCPL will conduct an Annual Review of the environmental performance of the SMC by the end of March each year, or other timing as may be agreed by the Secretary. This will be made publicly available on the Stratford Coal website, in accordance with Condition 11, Schedule 5 of the NSW Development Consent SSD-4966.

The Annual Review will specifically address the following aspects of Condition 4, Schedule 5, which are directly relevant to this RDP:

- describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;
- include a comprehensive review of the monitoring results and complaints records for the SMC over the previous calendar year, including a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the Stratford Extension Project EIS (SCPL, 2012);
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance, including adaptive management;
- identify any trends in the monitoring data over the life of the SMC;
- identify any discrepancies between the predicted and actual impacts of the SMC (including the SEP), and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the SMC.

10.2 RDP REVIEW AND UPDATE

If changes are proposed to the SMC reject emplacement activities, this RDP will be revised in accordance with the requirements of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* Schedule 3 High Risk Activities Part 5, Clause 27 Emplacement Areas.

If necessary, the RDP will be revised, to ensure the RDP is updated on a regular basis and to incorporate any recommended measures to improve environmental performance.

11 REFERENCES

Allan Watson Associates (2012) *Geotechnical Characterisation of CHPP Rejects.* March 2012.

EGi (2010) *Geochemical Assessment of Co-Disposed Rejects and Tailings from the Duralie Extension Project and the Stratford Coal Mine*. Document No 6902/905, March 2010.

EGi (2012) *Geochemical Assessment of Stratford Extension Project*. March 2012.

Gilbert & Associates Pty Ltd (2002) *Stratford Coal Mine – Assessment of Covering Requirements for Rehabilitation of the Backfilled Roseville and Bowen's Road West Pits.* Report 9915-3.rg2c prepared for Stratford Coal Pty Ltd, March.

Gilbert and Sutherland Pty Ltd (1998) *Stratford Coal Project – Life of Mine Reject Disposal Plan*. Report prepared for Stratford Coal Pty Ltd, September 1998.

Stratford Coal Pty Ltd (SCPL) (1994) *Stratford Coal Mine Environmental Impact Statement*.

Stratford Coal Pty Ltd (SCPL) (2012) *Stratford Extension Project Environmental Impact Statement*.

ATTACHMENT A

GUIDELINES ON LIMESTONE ADDITION RATES FOR CO-DISPOSED REJECT

TO:	Stratford Coal Pty Ltd
ATTENTION:	Tony Dwyer
FROM:	Warwick Stewart and Stuart Miller
DATE:	18 September, 2009
SUBJECT:	Guidelines on limestone addition rates for co-disposed rejects and tailings placed in the Stratford Pit

This memorandum provides guidelines on limestone addition rates for co-disposed rejects and tailings placed in the Stratford Pit to account for proposed modifications in the disposal system.

It is understood that the current wet disposal system in which co-disposed rejects and tailings are placed immediately below water will be modified for more efficient placement and utilisation of available storage space. The rejects/tailings will be deposited from an advancing deposition head, progressing across the Stratford void at about 2-3m above the pit void water level. The beach will be trafficable, improving access and facilitating repositioning of the discharge point. The rejects/tailings will be progressively flooded as the pit fills.

Inundation of the rejects/tailings effectively halts pyrite oxidation and generation of acid rock drainage (ARD), and at closure all deposited rejects/tailings will be below water, providing long term ARD control. The exposed beach represents the smaller portion of the deposition face, with most rejects/tailings depositing below the water level. Inundation of any given placed beach materials is expected to occur approximately 6 months after deposition, based on an average expected annual water level rise of 5-6m. It is recommended that limestone treatment be used to control ARD generation in the exposed beach materials during the exposure period.

The following previous work by EGi was used to provide an indication of appropriate limestone addition rates:

> EGi Document No 6902/1/280, "Duralie, Coal Project, Environmental Geochemistry of Mine Rock and Coal Reject. Implications for Mine Operation and Waste Management – Final Report", June 1996.
>
> EGi Document No 6903/332, "Stratford Coal Mine, Geochemical Assessment of Coal Reject Disposal Options, Stage 1: Geochemical Characterisation of Coal Reject and Spoil", November 1997.

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Environmental Geochemistry International Pty Ltd ABN 12003 793 486

EGi Document No 6903/362, "Stratford Coal Mine, Geochemical Assessment of Coal Reject Disposal Options, Stage 2: Leaching Behaviour of Coal Reject", July 1998.

EGi Document No 6902/800, "Geochemical Assessment of Deposited Rejects from the Duralie/Stratford Disposal Area", March 2008.

Leach column testing was carried out between 1995 and 1998 on unblended and limestone blended co-deposited beach rejects/tailings from Stratford and laboratory generated rejects/tailings from Duralie. The testing was carried out for approximately 6 months, and showed that addition of -4mm limestone at a rate of 10kg CaCO3/t to the rejects/tailings from Stratford (0.8%S) maintained circum-neutral pH for over 6 months, but the last collection showed a slight pH drop, indicating the lag before acid conditions develop may not extend to 12 months. The Duralie rejects/tailings had higher S (2.3%S) and were much more reactive, and addition of -4mm limestone at the same rate failed to provide any lag.

More recent testing by EGi on deposited beach rejects from the Stratford disposal facility (March 2008, EGi Document No 6902/800) indicates that the combined rejects from Duralie and Stratford have total S values closer to the Stratford column than the Duralie Column (average 0.8%S from 24 samples tested).

There has not been any direct kinetic testing on the currently deposited rejects, and the variation of the ARD potential has not been comprehensively defined. However, based on the previous work, application of -4mm limestone at a rate of 20kg $CaCO_3$/t is likely to provide sufficient buffering to maintain a lag for at least 12 months.

Most of the rejects/tailings in the deposition front will be immediately inundated during deposition, and only the 2-3m portion above the water level needs be treated with limestone. It is understood that the preferred method of limestone addition by Coal Handling and Preparation Plant (CHPP) operators is to surface broadcast or spread limestone on beach surfaces and incorporate this into the rejects/tailings material by ripping with appropriate equipment. The alternative of blending limestone into the washery waste stream would not be practical or economical, since the deposition method will not allow selective treatment of the beach portion without also treating the portion that will be immediately inundated.

The deposited materials on the beach exposures at the Stratford Pit appeared to be relatively fine grained and reasonably well graded, and it is expected that diffusion, rather than convection or advection, will be the main mechanism controlling oxidation in these materials after deposition. Diffusion control will result in a gradually downward migrating oxidation front as pyritic materials are progressively consumed, rather than deep penetration of oxygen into all materials above water. Since diffusion is likely to be the main oxidation mechanism, it is not expected to be necessary to incorporate limestone into the full 2-3m beach. Blending limestone into the surface 300-500mm should provide sufficient control of ARD from exposed materials until they are inundated. In addition to

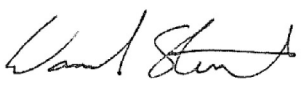
direct neutralisation of acid generated in the blending zone, the limestone may also provide a source of alkalinity for deeper portions of the lift as infiltrating water passes through the limestone. The mechanisms, efficiency and rates of reaction of limestone blending for these materials under the proposed beach deposition system has not been directly assessed, but it is understood that the management of these materials can be readily modified if required, and it is suggested that limestone blending of the surface be trialled in conjunction with monitoring to check performance. Surface conditioning (such as traffic compaction) may be required after ripping to ensure that any open zones produced by ripping do not lead to increased oxidation rates.

An initial treatment rate of 80 t $CaCO_3$/ha as -4mm limestone is recommended for each lift, which is equivalent to a rate of 20kg $CaCO_3$/t (as suggested by previous leach column testing) incorporated in the surface 300mm and assuming a density of 1.3 t/m^3. Surface field pH measurements (approximately 1 part solid to 2 parts deionised water) of deposited rejects should be carried out regularly for varying durations of exposure after deposition to check for evidence of acid formation. Values of less than pH 5.5 indicate the limestone dosage rate may be insufficient or the surface incorporation method ineffective. The pH and alkalinity of the free water alongside the beach should also be monitored. It is recommended that an alkalinity value of at least 30 mg $CaCO_3$/L is maintained in the pond. If the alkalinity decreases below 30 mg $CaCO_3$/L it may be necessary to modify the limestone treatment strategy and/or directly lime dose the pond. Possible considerations to improve ARD mitigation performance if required include:

- reducing lift heights;
- increasing limestone dosage rates;
- increasing blending depth;
- optimising limestone incorporation methods;
- use of more direct effort in control of convection/advection (such as compaction); and
- blending of limestone into the process stream in addition to surface treatment.

On-going characterisation of deposited rejects would be useful to better define the geochemical variation of the rejects and confirm the validity of the treatment rates. Leach column testing of blended rejects materials could also be considered to help determine optimal treatment rates, and help demonstrate the adequacy of the management approach.

Regards,



Warwick Stewart