STRATFORD MINING COMPLEX
Water Management Plan

STRATFORD MINING COMPLEX
(STRATFORD EXTENSION PROJECT)

WATER MANAGEMENT PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DPIE Approval
All	WMP-R01-A	Original	EPA, CL&W and DP&E	25 May 2018
Section 1.2, Section 4, Section 5 and Section 8.2	WMP-R02-A	Stratford East Open Cut Commencement	EPA, DoI Water and DP&E	30 October 2018
All	WMP-R03-A	Roseville West Open Cut Pit Recommencement	EPA, DoI Water and DP&E	2 July 2019
Sections 1.2 and 1.5	WMP-R04-A	Revision following Annual Review 2020 and Independent Environmental Audit 2020. Updated to describe scope of revisions to SWMP and GWMP and consultation for revised WMP.	EPA, DPIE Water and DPIE	18 October 2021

June 2021
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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 subsequently export.

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):

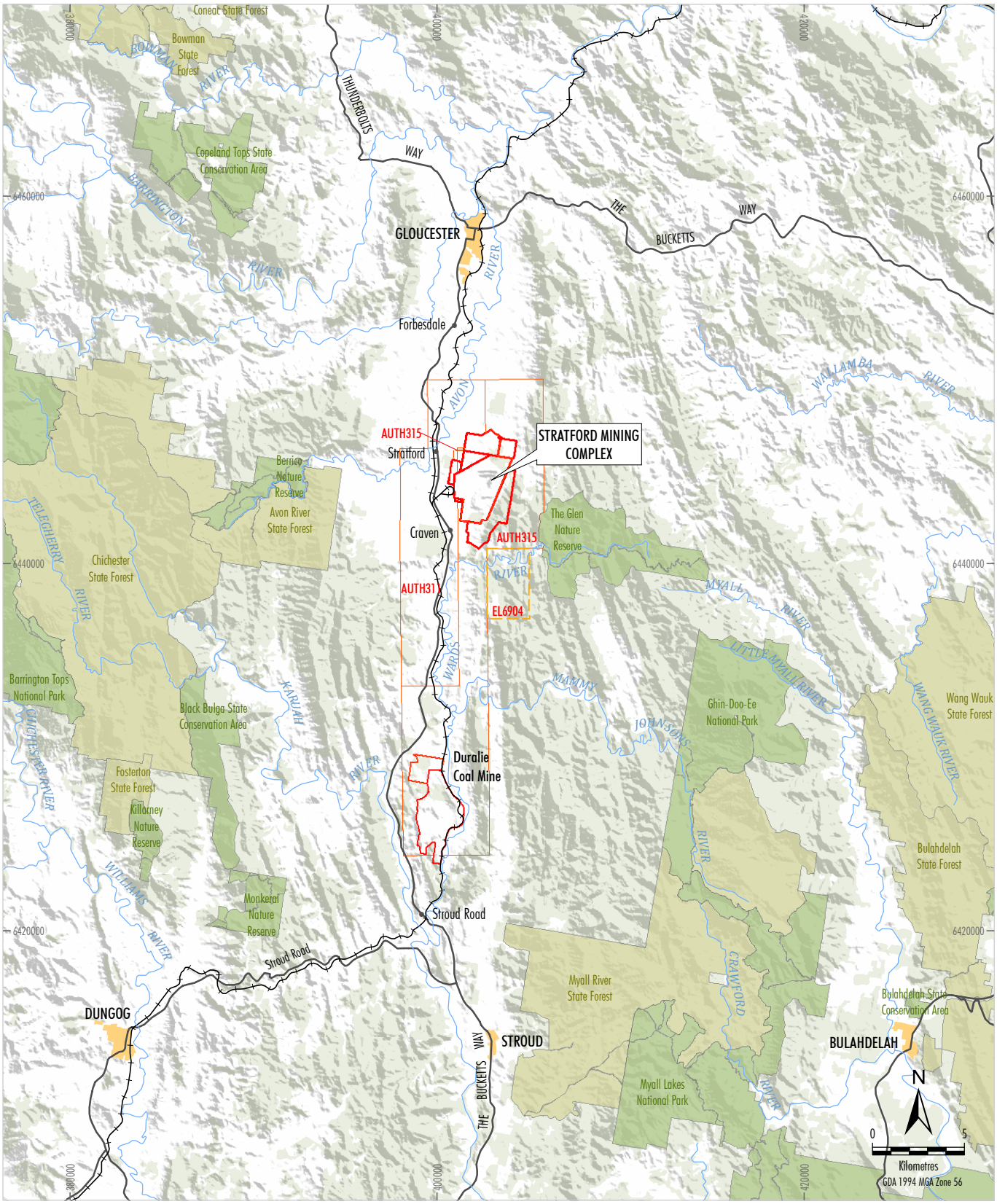
- mining of up to 2.6 million tonnes of ROM coal per annum;
- continuation of mining in the BRNOC, the recommencement of mining in the Roseville West Open Cut Pit; and the extension of mining into three new open cut mining areas:
  - Avon North Open Cut;
  - Stratford East Open Cut; and
  - Roseville 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.

SCPL commenced the approved activities in accordance with the conditions of SSD-4966 on 4 April 2018. The general arrangement of the approved SMC is provided in Figure 2[2].

The water related conditions of NSW Development Consent SSD-4966 and additional conditions for the protection of water resources in Commonwealth Approval (EPBC 2011/6176) are provided in Attachment A.

[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).

[2] MLA1 is a proposed future Mining Lease Application (MLA) area as shown on Figure 2. The application for MLA1 has not yet been lodged.



YAN-17-10_MP WMP2021 MPCF_205A

LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Geoscience Australia (2006); Yancoal (2019); NSW Department of Planning & Environment (2017)

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STRATFORD EXTENSION PROJECT

Regional Location

Figure 1

YAN-17-10_MP WMP2021 MPCF_202A

LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Orthophoto - Google Earth CNES/Airbus (2020); LPI (2016); NSW Department of Planning & Environment (2017)

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STRATFORD EXTENSION PROJECT

Approved General Arrangement

Figure 2

1.2 PURPOSE AND SCOPE

This Water Management Plan (WMP) has been prepared in accordance with the requirements of Condition 32, Schedule 3 of NSW Development Consent SSD-4966 (Section 2.1) and Condition 4 of Commonwealth Approval (EPBC 2011/6176) (Section 2.2).

On 30 November 2017, the Secretary of the then Department of Planning and Environment (DP&E) (now the Department of Planning, Industry and Environment (DPIE) (the Secretary) approved the progressive submission of environmental management plans for the SMC in accordance with Condition 15, Schedule 2 of NSW Development Consent SSD-4966. Consistent with the Secretary's approval for the progressive submission of environmental management plans, the scope of this WMP is specifically related to the following:

- mining operations associated with:
  - recommencement of mining in the Roseville West Open Cut Pit;
  - completion of the BRNOC;
  - development of the new Avon North Open Cut; and
  - development of the new Stratford East Open Cut.
- exploration activities;
- progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations;
- continued and expanded placement of waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement;
- progressive development of new haul roads and internal roads;
- coal processing at the existing Coal Handling and Preparation Plant (CHPP) including Project ROM coal, sized ROM coal received and unloaded from the SMC 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;
- realignment of sections of Wenhams Cox/Bowens Road;
- 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;
- 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 and minor modifications to existing structure, plant and equipment and activities.

The scope of this WMP does not include mining operations associated with the Roseville West Pit Extension.

In accordance with Conditions 5(a) and (c), Schedule 5, of Development Consent SSD-4966, this WMP has been reviewed and revised to address outcomes from the 2020 SMC Annual Review and 2020 SMC Independent Environmental Audit. The revisions are relevant to updating the Surface Water Management Plan (Appendix 2) and Groundwater Management Plan (Appendix 3) to includes detailed design information of the potentially acid forming material containment cell approved to be constructed within the Stratford Waste Emplacement, and to include updates to the SMC surface water and groundwater monitoring programs. Other minor administrative updates have also been made where relevant to contemporise the WMP and its supporting appendices.

1.3 STRUCTURE OF THE WMP

The remainder of the WMP is structured as follows:

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

Section 3: Details the performance measures and performance indicators that will be used to assess the SMC.

Section 4: Provides an overview of the SMC water management system and measures.

Section 5: Provides a summary of the monitoring programs detailed in the Site Water Balance, Surface Water Management Plan and Groundwater Management Plan.

Section 6: Describes the protocol for cumulative assessment and management.

Section 7: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

Section 8: 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 WMP.

Section 9: Describes the protocol for management and reporting of incidents, complaints and non-compliances with statutory requirements.

Section 10: Lists the references cited in this WMP.

In accordance with Condition 32(c) (i-iii), Schedule 3 of NSW Development Consent SSD-4966, this WMP incorporates three documents (provided as Appendices 1 to 3), namely the:

- Site Water Balance (SWB) (Appendix 1);
- Surface Water Management Plan (SWMP) (Appendix 2); and
- Groundwater Management Plan (GWMP) (Appendix 3).

1.4 SUITABLY QUALIFIED AND EXPERIENCED PERSONS

The then NSW DP&E - Resource Assessments Director, as nominee of the Secretary, approved the appointment of Mr Anthony Marszalek and Dr Noel Merrick as suitably qualified and experienced persons for the preparation of the WMP on 10 October 2017.

Relevant site water balance and surface water related appendices of this WMP have been prepared and reviewed by Mr Anthony Marszalek (i.e. Appendices 1 and 2) while the groundwater related appendices of this WMP have been prepared and reviewed by Dr Noel Merrick (i.e. Appendix 3). This revised WMP has been reviewed by Mr Marszalek and Dr Merrick.

1.5 CONSULTATION FOR THE WMP

The original WMP was provided to the NSW Environment Protection Authority (EPA) and NSW Crown Lands and Water (CL&W) (now Department of Planning, Industry and Environment – Water [DPIE – Water]) for the purposes of consultation in accordance with Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966. The NSW CL&W provided a letter dated 7 March 2018 with a single comment on the WMP regarding the need for monitoring seepage/leachate from water storages, emplacements and final voids. This comment was addressed in Appendix 3. The EPA confirmed, via a letter dated 8 March 2018, that it had no comments on the WMP.

This revised WMP was provided to the EPA and DPIE-Water for consultation purposes in June 2021 as required by Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966. On 16 July 2021, the EPA provided some minor comments on the SWMP (Appendix 2). SCPL subsequently revised the SWMP to address the EPA's comments. A copy of the EPA's correspondence is provided in Appendix A of the SWMP. No comments on this revised WMP were received from the DPIE-Water. On 18 October 2021, the DPIE (Planning and Assessment division) approved this revised WMP. The DPIE's letter of approval is provided in Attachment B. The revision status of this WMP is provided on the title page of this plan.

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.

Obligations relevant to this WMP are described below.

2.1 NSW DEVELOPMENT CONSENT SSD-4966

2.1.1 WMP Requirements

Condition 32, Schedule 3 of NSW Development Consent SSD-4966 requires the preparation of a WMP. Table 1 presents these requirements and indicates where they are addressed in this WMP.

Table 1
WMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this WMP
Water Management Plan **32.** The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:	This WMP
(a) be prepared in consultation with the EPA and DPIE – Water, by suitably qualified and experienced person/s whose appointment has been approved by the Secretary.	Sections 1.4 and 1.5
(b) be submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary; and	Section 8.2
(c) in addition to the standard requirements for management plans (see condition 3 of Schedule 5) include a:	Table 2
(i) Site Water Balance that: • includes details of: - sources and security of water supply, including details of Water Access Licences held, and contingency supply for future reporting periods; - water use and management on site; - any off-site water discharges; and - reporting procedures, including the preparation of a site water balance for each calendar year; and • investigates and implements all reasonable and feasible measures to minimise water use on site;	Appendix 1

Table 1 (Continued)
WMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this WMP
(ii) Surface Water Management Plan, that includes: • detailed baseline data on water flows and quality in the watercourses that could potentially be affected by the development; • a detailed description of the water management system, including the: - clean water diversion systems; - erosion and sediment controls (mine water system); and - mine water management systems, including irrigation areas; • detailed plans, including design objectives and performance criteria for: - design and management of final voids; - design and management for the emplacement of coal reject materials and potential acid-forming or sulphate-generating materials; - management of sodic and dispersible soils; - diversion of the key tributary of Avondale Creek; - reinstatement of drainage lines on the rehabilitated areas of the site; and - control of any potential water pollution from the rehabilitated areas of the site; • performance criteria for the following, including trigger levels for investigating any associated potentially adverse impacts: - mine water management system; - downstream surface water quality; - downstream flooding impacts; and - stream and riparian vegetation health for the Avon River and its tributaries, including Avondale and Dog Trap Creeks; • a program to monitor and report on: - effectiveness of the mine water management system; - effectiveness of the stream diversion for the key tributary of Avondale Creek; - surface water (with a focus on base flow and low flows) and quality in the watercourses potentially affected by the development; and - downstream flooding impacts; • reporting procedures for the results of the monitoring program; and - a plan to respond to any exceedances of the performance criteria, and repair, mitigate and/or offset any adverse surface water impacts of the development;	Appendix 2

Table 1 (Continued)
WMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this WMP
(iii) Groundwater Management Plan that includes: • detailed baseline data of groundwater levels, yield and quality in the region that could be affected by the development, including licensed privately-owned groundwater bores and a detailed survey/schedule of groundwater dependent ecosystems; • groundwater assessment criteria including trigger levels for investigating any potentially adverse groundwater impacts; • a program to monitor and report on: - groundwater inflows to the open cut pits; - the seepage/leachate from water storages, emplacements and final voids; - background changes in groundwater yield/quality against mine-induced changes; and - impacts of the development on: • regional and local (including alluvial) aquifers; and • groundwater supply of potentially affected landowners; and • groundwater dependent ecosystems and riparian vegetation; • a program to validate the groundwater model for the development, including an independent review of the model every 3 years, and comparison of monitoring results with modelled predictions; and • a plan to respond to any exceedances of the performance criteria; and;	Appendix 3
(iv) protocol that has been prepared in consultation with the owners of nearby resource developments, including the Gloucester Gas Project, to: • minimise and manage the cumulative water quality and quantity impacts of these developments; • review opportunities for water sharing/water transfers between these developments; • coordinate water quality monitoring programs as far as practicable; • undertake joint investigations/studies in relation to complaints/exceedances of trigger levels where cumulative impacts are considered likely; and • co-ordinate modelling programs for validation, re-calibration and re-running of the groundwater and surface water models using approved mine and gas production operation plans. *Note: The protocol can be developed in stages and will need to be subject to ongoing review, dependent upon the determination of, and commencement of, other mining developments in the area.*	Section 6

A comprehensive list of all conditions in NSW Development Consent SSD-4966 relevant to water is provided in Attachment A, including:

- Water Supply (Condition 25, Schedule 3);
- Compensatory Water Supply (Condition 26, Schedule 3);
- Water Pollution (Condition 27, Schedule 3);
- Irrigation (Condition 28, Schedule 3);
- Avondale and Dog Trap Creeks (Conditions 29 and 30, Schedule 3);
- Water Management Performance Measures (Condition 31, Schedule 3); and
- Water Management Plan (Condition 32, Schedule 3).

In accordance with Condition 29, Schedule 3 of NSW Development Consent SSD-4966, no mining operation will be carried out within 40 m of Avondale Creek or Dog Trap Creek, with the exception of the construction and/or use of haul road crossings.

Riparian habitat along Avondale Creek will be improved to the satisfaction on the Secretary in accordance with Condition 30, Schedule 3 of NSW Development Consent SSD-4966.

2.1.2 Management Plan (General) Requirements

In addition to the WMP requirements prescribed in Condition 32, Schedule 3 of NSW Development Consent SSD-4966, Condition 3, Schedule 5 of NSW Development Consent SSD-4966 outlines the management plan (general) requirements that are also applicable to the preparation of this WMP.

Table 2 presents these requirements and indicates where each is addressed within this WMP.

Table 2
Management Plan (General) Requirements

NSW Development Consent SSD-4966 Schedule 5	Section Where Addressed in this WMP
Management Plan Requirements	
3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	Section 2
(a) detailed baseline data;	Appendices 1 to 3
(b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 2
• any relevant limits or performance measures/criteria;	Section 3 and Appendices 1 to 3
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any mitigation measures;	Section 3 and Appendices 1 to 3
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 4 and Appendices 1 to 3
(d) a program to monitor and report on the:	Sections 5 to 8 and Appendices 1 to 3
• impacts and environmental performance of the development;	
• effectiveness of any management measures (see c above);	
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 7 and Appendices 1 to 3
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 8
(g) a protocol for managing and reporting any:	
• incidents;	Section 9
• complaints;	Section 9
• non-compliances with statutory requirements; and	Section 9
• exceedences of the impact assessment criteria and/or performance criteria; and	Sections 5, 7 and 8 and Appendices 1 to 3
(h) a protocol for periodic review of the plan.	Section 8.2

2.2 COMMONWEALTH APPROVAL (EPBC 2011/6176)

As described in Section 1, the Commonwealth Approval (EPBC 2011/6176) was granted on 29 January 2016. Water resources were a controlling provision in the approval decision and consequently additional conditions for the protection of water resources were included.

Condition 4 of Commonwealth Approval (EPBC 2011/6176) requires the WMP, required by NSW Development Consent SSD-4966, to address a number of specific matters. Table 3 presents these requirements and indicates where they are addressed in this WMP.

As these requirements are to be met by this WMP, Condition 6 of Commonwealth Approval (EPBC 2011/6176) is not applicable and a separate management plan will not be prepared.

A comprehensive list of all the additional conditions in Commonwealth Approval (EPBC 2011/6176) relevant to water resources is provided in Attachment A, including:

- Water Management Plan (Conditions 4 to 6); and
- Final Water Impact Verification Report (Condition 7).

Table 3
WMP Requirements in Commonwealth Approval (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this WMP
Additional Conditions for the Protection of Water Resources	
4. Subject to Condition 6, the water management plan required by Condition 32 of Schedule 3 to ***the Development Consent*** must:	This WMP
(a) describe and implement a surface water and groundwater monitoring programme consistent with the ***National Water Quality Management Strategy***, with sufficient spatial and temporal coverage, to:	Section 2.4.4
(i) establish appropriate baseline data, performance measures, assessment criteria and trigger values required by Conditions 31 and 32 of Schedule 3 to ***the Development Consent***	Appendices 2 and 3
(ii) provide for detection of exceedance of trigger values as a result of the action in a manner that is quantifiable and robust (for example by comparison to baseline data and the use of ***control sites***)	Appendices 2 and 3
(iii) obtain the additional data needed to validate the ***numerical groundwater model*** consistent with the requirements of Condition 32(c)(iii) of Schedule 3 of the ***Development Consent***, including: • seasonal variations in groundwater levels and surface water-groundwater interaction • strata definition	Appendix 3
This programme must include installation of additional multi-level (nested) monitoring wells between the town of Stratford and the SMC area.	Appendix 3
(b) define and detail a system of ***cascading trigger values*** and corresponding treatments **Note:** ***Cascading trigger values*** must consider the potential for impacts on all relevant water-related assets, including Avondale Creek, Dog Trap Creek, and their tributaries, and private water users to the west of the SMC area.	Appendices 2 and 3
(c) describe how the water management performance measures identified in Table 8 of Condition 31 of Schedule 3 to ***the Development Consent***, and groundwater assessment criteria in Condition 32(c)(iii) of Schedule 3 to ***the Development Consent*** will be achieved	Section 3 and Appendix 3
(d) in addition to the requirements of Condition 32(c)(iv) of Schedule 3 to ***the Development Consent***, prepare a protocol that gives consideration to information products as they arise from the Commonwealth Office of Water Science's Bioregional Assessment for the Gloucester Subregion.	Section 6.1
5. Within ten (10) business days of the approval of any water management plan in accordance with Condition 32 of Schedule 3 to ***the Development Consent***, the person taking the action must provide ***the Department*** with a copy of the plan.	Section 8.2
6. If it is not possible to address 4a) to d) through a water management plan approved in accordance with Condition 32 of Schedule 3 to ***the Development Consent***, those matters must be addressed in a separate management plan and provided to ***the Minister*** for his approval. In that case, the person taking the action must not ***commence the action*** until the plan has been approved in writing by ***the Minister***. The plan, once approved, must be implemented.	N/A (*refer above*)

2.3 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, ML 1733 and ML 1787 issued by the NSW Minister for Mineral Resources and Energy under the NSW *Mining Act, 1992*.
- Mining Operations Plan submitted and approved by the NSW Resources Regulator.
- Water supply works, water use approvals and water access licences issued by the NSW DPIE – Water under the NSW *Water Management Act, 2000* including:
    - WAL 19514 in the Avon River Water Source (unregulated river) for 7 share components under the Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009.
    - WAL 19521 in the Avon River Water Source (unregulated river) for 32 share components under the Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009.
    - WAL 19536 in the Avon River Water Source (unregulated river) for 133 share components under the Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009.
    - WAL 19540 in the Avon River Water Source (unregulated river) for 77 share components under the Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009.
    - WAL 19546 in the Avon River Water Source (unregulated river) for 2 share components under the Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009.
    - WAL 36616 in the Avon River Water Source (unregulated river) for 20 share components under the Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009.
    - WAL 38268 in the Gloucester Basin Groundwater Source (aquifer) for 15 share components under the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.
    - WAL 38273 in the Gloucester Basin Groundwater Source (aquifer) for 5 share components under the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.
    - WAL 38274 in the Gloucester Basin Groundwater Source (aquifer) for 5 share components under the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.
    - WAL 38280 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 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.

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.

2.4 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 2.3, the following NSW Acts (and their Regulations) that are water related and/or may be applicable to the conduct of the SEP at the SMC include:

- *Dams Safety Act, 2015.*
- *Water Act, 1912.*
- *Water Management Act, 2000.*

Further details relating to the above NSW Acts regulated by the EPA and DPIE – Water, and other relevant water policy and guideline documentation relevant to this WMP is provided in the following sub-sections.

2.4.1 Protection of the Environment Operations Act, 1997

Unless an EPL authorises otherwise, the SEP will be carried out to comply with Section 120 of the NSW Protection of the Environment Operations Act 1997.

2.4.2 Water Management Act, 2000

The Water Management Act, 2000 incorporates the provisions of various prior Acts relating to the management of surface and groundwater in NSW and provides a single statute for regulation of water access, use and works (e.g. pumps or bores) that affect the licensing of surface water and alluvial and non-alluvial (i.e. fractured rock and porous rock) groundwater in the vicinity of the SMC.

Water sharing plans have been commenced under the Water Management Act, 2000 for all groundwater and surface water systems within which the SMC lies, including:

- Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009
- Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016

2.4.3 Water Act, 1912

As water sharing plans have been commenced under the Water Management Act, 2000 for all groundwater and surface water systems within which the SMC lies (Section 2.4.2), the Water Act, 1912 is not relevant to licensing considerations for the SEP.

2.4.4 National Water Quality Management Strategy/ANZECC & ARMCANZ (2000)

The National Water Quality Management Strategy is a joint national approach to improving water quality in Australian and New Zealand waterways. The ANZECC water quality guidelines (ANZECC & ARMCANZ, 2000) have been considered where applicable in the SWMP (Appendix 2) and GWMP (Appendix 3) for the SMC.

2.4.5 NSW Water Quality and River Flow Objectives

The NSW Water Quality and River Flow Objectives have been developed to guide plans and actions to achieve healthy waterways in NSW, including the Manning River catchment.

Each objective is based on providing the right water quality for the environment and the different beneficial uses of the water. They are based on measurable environmental values (EVs), which are those values or uses of water that the community believes are important for a healthy ecosystem for public benefit, welfare, safety or health. The target concentrations for each water quality objective (WQO) are based on ANZECC & ARMCANZ (2000) and are applied as described in Using the ANZECC Guidelines and Water Quality Objectives in NSW (Department of Environment and Conservation, 2006).

2.4.6 Aquifer Interference Policy

The Aquifer Interference Policy has been developed by the NSW Government as a component of the NSW Government's Strategic Regional Land Use Policy. The Aquifer Interference Policy applies state-wide and details water licence and impact assessment requirements.

The Aquifer Interference Policy has been developed to ensure equitable water sharing between various water users and proper licensing of water taken by aquifer interference activities such that the take is accounted for in the water budget and water sharing arrangements. The Aquifer Interference Policy also enhances existing regulation, contributing to a comprehensive framework to protect the rights of all water users and the environment in NSW.

2.4.7 Regional / Strategic Plans

Local Land Services Hunter Local Strategic Plan 2016-2021 has been considered where applicable in the development of this WMP. The Local Strategic Plan describes the priorities including improvements to water quality, waterways management and working with stakeholders and land managers on surface water and groundwater resource availability in the region.

3 PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

Table 8 in NSW Development Consent SSD-4966 prescribes the water management performance measures for the SMC (Attachment A).

SCPL will assess the SMC against the water management performance measures and indicators outlined in Table 4.

Table 4
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Water Management - General • Minimise the use of clean water on site. • Maximise as far as reasonable and feasible the separation of clean and dirty water within the site.	The water management system is constructed and maintained generally in accordance with the design described in the SWB and SWMP.
Construction and Operation of Linear *(sic)* Infrastructure • Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1, Volume 2A – Installation of Services* and *Volume 2C – Unsealed Roads*. • Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land (July 2012)*, or its latest version. • Design, install and maintain creek crossings generally in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries 2003)* and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003)*, or their latest versions.	The erosion and sediment controls are constructed and maintained generally in accordance with the design described in the SWMP. Infrastructure within 40 m of watercourses are constructed and maintained generally in accordance with the design described in the SWMP. Creek crossing are constructed and maintained generally in accordance with the design described in the SWMP.
Mine Sediment Dams • Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* and *Volume 2E – Mines and Quarries*.	Sediment dams are constructed and maintained generally in accordance with the design described in the SWMP.
Clean Water Diversion and Storage Infrastructure • Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site. • Design, install and maintain the clean water system to capture and convey the 1 in 100 year ARI flood.	The water management system is constructed and maintained generally in accordance with the design described in the SWB and SWMP.
Stream Diversion of Tributary of Avondale Creek • Design, install and maintain the tributary diversion to convey the modelled peak water flows of its altered catchment. • Establish and maintain geomorphic stability of the diversion channel using appropriate revegetation and stabilisation techniques. • Demonstrate that the channel is appropriately vegetated and stabilised prior to the release of flows into the diversion channel. • Control water flows entering the diversion channel by the construction of a stormwater detention basin.	The stream diversion of tributary of Avondale Creek is constructed and maintained generally in accordance with the design described in the SWMP.

Table 4 (Continued)
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Mine Water Storages and Out-of-pit Emplacement of Potentially Acid-Forming Materials • No discharges to surface waters. • Adequate freeboard to minimise the risk of discharge to surface waters.	Water management infrastructure (including mine water storages) and PAF materials in out-of-pit emplacements are constructed and maintained generally in accordance with the design described in the SWB and SWMP.
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 and PAF materials are managed generally in accordance with the methodologies described in the SWB, SWMP and GWMP.
Chemical and Petroleum Storage • Chemical and hydrocarbon products to be stored in bunded areas in accordance with relevant Australian Standards.	Chemical and hydrocarbon storages will be constructed and maintained in accordance with the relevant Australian Standards (refer SWMP).
Aquatic and Riparian Ecosystem, in the Avon River and its Tributaries, particularly Avondale and Dog Trap Creeks • Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and *Using the ANZECC Guidelines and Water Quality Objectives in NSW (DECC 2006)*, or their latest versions.	Site-specific in-stream WQOs are developed as described in the SWMP.

The performance indicators in Table 4 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 DPIE describing those options and any preferred remediation measures or other course of action; and
- implement remediation measures as directed by the Secretary.

4 WATER MANAGEMENT SYSTEM OVERVIEW

The SMC water management system operates under a surplus water balance, with a trend for increasing water storage on-site over time. The objectives of the on-site water management throughout the life of the SMC are to:

- protect the integrity of local and regional water resources;
- operate such that there is no uncontrolled overflow of contained water storages;
- 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 the requirements of the SMC.

The integrated water management system for the SMC for the SEP will be progressively developed as water management requirements change over time.

Further details are provided in the SWB, SWMP and GWMP in Appendices 1 to 3.

4.1 SITE WATER BALANCE

The Site Water Balance describes the water management and use at the SMC. A predictive model of the performance of the water management system (including supply, containment and risk of disruption to mining operations) has been developed by Hydro Engineering and Consulting Pty Ltd (Appendix 1). The model provides an indication of the predicted make-up requirements for the SMC at maximum production rates, water supply sources and storage volumes for the containment system for a range of different climatic scenarios.

In accordance with Condition 25, Schedule 3 of NSW Development Consent SSD-4966, SCPL will ensure that sufficient water is supplied for all stages of the development, and obtain the necessary water licences for the development under the Water Management Act, 2000, and if necessary, adjust the scale of operations on-site to match its available water supply.

Further details of the site water balance for the SMC is provided in Appendix 1.

4.2 SURFACE WATER MANAGEMENT

The SMC water management system has been designed to control waters generated from surface development areas while minimising the capture of surface water runoff by diverting up-catchment runoff around such areas. The water management system includes a combination of permanent structures that may continue to operate post closure and temporary structures that are only required until the completion of rehabilitation works (e.g. sediment control structures).

Temporary and permanent up-catchment diversion bunds/drains and interception dams will continue to be constructed over the life of the SMC to divert runoff from undisturbed areas around the open pits and waste rock emplacements.

Water stored on-site includes incident rainfall-runoff generated from operational areas at the SMC and (lesser) groundwater inflows to the mine workings.

The contained water storages and associated water transfer systems and operational protocols have been designed to maintain adequate freeboard to minimise the risk of discharge to mine waters. Based on the system design, the site water balance (Appendix 1 of the WMP) does not predict any discharges to surface waters from contained water storages in accordance with the water management performance measure.

The surface water management system and monitoring program is described in the SWMP.

4.2.1 Surface Water Licensing

The SMC is located within the mapped extent of the Avon River Water Source under the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009.

No extraction of surface water from an unregulated stream is proposed for the SMC. SCPL will not require licensing for surface waters for the SMC as (1) exemptions under the Water Management (General) Regulation, 2011 will apply; and (2) the runoff water captured by undisturbed areas between the proposed up-catchment diversion structures and the ultimate extent of the SMC disturbance boundary will be within the estimated Harvestable Right available to SCPL (based on total contiguous landholdings).

Notwithstanding, SCPL holds existing surface water licences in the Avon River Water Source including:

- WAL 19514 in the Avon River Water Source (unregulated river) for 7 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
- WAL 19521 in the Avon River Water Source (unregulated river) for 32 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
- WAL 19536 in the Avon River Water Source (unregulated river) for 133 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
- WAL 19540 in the Avon River Water Source (unregulated river) for 77 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
- WAL 19546 in the Avon River Water Source (unregulated river) for 2 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
- WAL 36616 in the Avon River Water Source (unregulated river) for 20 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.

4.3 GROUNDWATER MANAGEMENT

A Groundwater Management Plan has been prepared to control potential impacts on local and regional groundwater resources and includes and a monitoring program to validate and review the groundwater model predictions. Groundwater management measures also include:

- management of potentially acid forming materials and CHPP rejects;
- management of notifications by groundwater users; and
- compensatory actions.

Further details are provided in the GWMP in Appendix 3.

In accordance with Condition 26, Schedule 3 of NSW Development Consent SSD-4966, SCPL will provide a compensatory water supply to the owner of any privately-owned land whose water supply is adversely and directly impacted (other than a negligible impact) as a result of the development, in consultation with DPIE-Water, and to the satisfaction of the Secretary.

4.3.1 Groundwater Licensing

Further to the details provided in Sections 2.3 and 2.4.2, the groundwater systems within which the SMC lies, specifically relate to:

- **Gloucester Basin Water Source** (i.e. porous rock aquifer) under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.*
- **Avon River Water Source** (i.e. alluvial aquifers) under the *Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009.*

SCPL currently holds several WALs in the Gloucester Basin Groundwater Source (Section 2.3), for a total of 1,476 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016* to account for direct and indirect take of groundwater from the porous rock aquifer (see Section 2.3).

SCPL currently holds no aquifer access licences in the Avon River Water Source under the *Water Management Act, 2000.* Notwithstanding, a proportion of the existing unregulated river access licence entitlements (i.e. 271 share components) may be available for conversion into Project aquifer access licences in accordance with the *Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009* for in the event of direct or indirect take of groundwater inflow volumes from this alluvial water source.

5 MONITORING PROGRAMS

5.1 SITE WATER BALANCE INPUTS AND OUTPUTS

Site water balance monitoring includes:

- mine water storage levels and volumes (stored and freeboard);
- rainfall and evaporation;
- mine pit inflows/dewatering (where measurable from pumping records);
- dust suppression water use;
- processing water inputs and outputs;
- irrigation volumes and rates; and
- any discharges (volume, rate and quality) licensed by an EPL.

Further detail is provided in the SWB (Appendix 1).

5.2 SURFACE WATER MONITORING PROGRAM

SCPL will monitor and implement the following as part of the surface water monitoring program:

- recording of meteorological parameters (e.g. rainfall);
- water management system monitoring program (e.g. storage levels, pumping rates/transfers and water quality);
- irrigation area monitoring program (e.g. areas, application rates and water quality);
- visual inspections of erosion and sediment control structures;
- visual checks for integrity of up-catchment diversion channels/bunds;
- geotechnical inspections to monitor the stability of pit walls in the Avon North Open Cut (proximal to Dog Trap Creek) and Stratford East Open Cut (proximal to the eastern diversions);
- surface water quality and flow monitoring at sites on the Avon River, Avondale Creek, Dog Trap Creek and ephemeral drainage lines; and
- macroinvertebate monitoring program.

Details of the various programs are provided in the SWMP (Appendix 2).

5.3 GROUNDWATER MONITORING PROGRAM

The groundwater monitoring program includes:

- groundwater inflows to the open cut mining areas (where measurable from pumping records);
- alluvial and porous rock groundwater levels (or pressures for vibrating wire installations);
- alluvial and porous rock groundwater quality; and
- representative private groundwater bores (e.g. Stratford Village bores).

Further detail is provided in the GWMP (Appendix 3).

6 PROTOCOL FOR CUMULATIVE ASSESSMENT AND MANAGEMENT

Condition 32(c)(iv), Schedule 3 of NSW Development Consent SSD-4966 includes the requirement for SCPL to prepare a protocol to (among other things) minimise and manage potential cumulative water quantity and quality impacts of nearby resource developments in consultation with the owners those resource developments, including the Gloucester Gas Project.

In February 2016, AGL announced that the Gloucester Gas Project will not proceed. Further, there are no other existing or approved resource development projects in the vicinity of the SMC. Therefore, until such time that a nearby resource development project is approved the scope of this WMP does not include provisions for cumulative impact monitoring and management or for water sharing or other such requirements as required by Condition 32(c)(iv), Schedule 3 of NSW Development Consent SSD-4966.

The surface water and groundwater monitoring programs are detailed in the SWMP (Appendix 2) and GWMP (Appendix 3) and will be subject to review if a future resource development is approved.

The site water balance and groundwater models are described in the SWB (Appendix 1) and GWMP (Appendix 3) respectively.

6.1 BIOREGIONAL ASSESSMENT FOR THE GLOUCESTER SUBREGION

A number of information products have been published as part of the Commonwealth Office of Water Science (OWS)'s Bioregional Assessment for the Gloucester Subregion, including:

- Context Statement for the Gloucester Subregion - Product 1.1 from the Northern Sydney Basin Bioregional Assessment dated 28 May 2014 (Commonwealth OWS, 2014a).
- Coal and Coal Seam Gas Resource Assessment for the Gloucester Subregion - Product 1.2 for the Gloucester Subregion from the Northern Sydney Basin Bioregional Assessment dated 27 October 2014 (Commonwealth OWS, 2014b).
- Description of the Water-Dependent Asset Register for the Gloucester Subregion - Product 1.3 for the Gloucester Subregion from the Northern Sydney Basin Bioregional Assessment dated 20 January 2015 (Commonwealth OWS, 2015a).
- Current Water Accounts and Water Quality for the Gloucester Subregion - Product 1.5 for the Gloucester Subregion from the Northern Sydney Basin Bioregional Assessment dated 9 October 2015 (Commonwealth OWS, 2015b).

The above documents, and the bioregion data register, have been used as reference material where necessary during the preparation of this WMP and SWB, SWMP and GWMP (Appendices 1 to 3)[3].

[3] Bioregional assessment is large scale and not reflective of local impact context. Hence the available products have only been used for context or to provide initial guidance.

7 CONTINGENCY PLAN

In the event a water management performance measure for the SMC (detailed in Section 3) may not have been met or a performance indicator is determined to have been exceeded, SCPL will implement the following Contingency Plan:

- The Environment and Community Superintendent will investigate the potential exceedance to assess whether it is a potential or confirmed breach (i.e. non-compliance) of the water management performance measure (as prescribed in the conditions of SSD-4966).
- The Environment and Community Superintendent will report the potential exceedance to the Operations Manager within 24 hours of investigation assessment completion.
- Where an exceedance of the performance measure is confirmed to have caused, or threatens to cause, material harm to the environment, SCPL will report the exceedance to the DPIE, and any other relevant agencies at the earliest opportunity (i.e. within 48 hours of assessment completion).
- For any other water related incident (i.e. an exceedance of a performance measure that does not cause, or threaten to cause, material harm to the environment) then SCPL will report the incident to the DPIE and any other relevant agencies within 7 days of the incident being confirmed as a non-compliance of the conditions of consent.
- SCPL will identify an appropriate course of action with respect to the confirmed non-compliance, in consultation with specialists and relevant government agencies, as necessary. The course of action may include development and implementation of:
  - specific contingency measures for implementation (both short-term and longer term);
  - a program to review the effectiveness of the contingency measures; and
  - adaptive management strategies (e.g. where a performance indicator may have been exceeded but the performance measure complied with).
- Specific contingency measures will be developed in consideration of the specific circumstances of the non-compliance and assessment of environmental consequences (if any). Examples of specific contingency measures are provided in Section 7.1.
- SCPL will, on request, submit the proposed course of action to the DPIE for approval.
- SCPL will implement the approved course of action to the satisfaction of the DPIE.

7.1 SPECIFIC CONTINGENCY MEASURES

Specific contingency measures for an exceedance of the water management performance measures will be investigated and may include:

- The conduct of additional monitoring (e.g. increase in monitoring frequency or additional sampling) to inform the specific contingency measures.
- Implementation of adaptive management strategies (e.g. on-site reconfiguration) to better maintain separation of clean and mine waters, diversion of clean waters, storage ‘as-built’ designs and avoid discharge of mine waters (except in accordance with an EPL).
- Provision of equivalent water supply or compensation for an impacted privately-owned bore.

8 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

8.1 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 WMP:

- 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.

This WMP will be reviewed within three months of the submission of an Annual Review, and revised where appropriate, as described in Section 8.2.

8.2 WMP REVIEW AND UPDATE

It is noted that as the NSW Development Consent SSD-4966 was not ‘taken up’ by SCPL prior to 31 December 2015, the timeframes prescribed in the conditions were not enforceable, and at the time activities at the Stratford Mining Complex continued under DA 23-98/99 and DA 39-02-01. The original WMP was prepared at least 3 months prior to commencement of mining at the Avon North Open Cut as agreed by the Secretary on 30 November 2017. Similarly, this WMP has been re-submitted prior to the commencement of mining in the Stratford East Open Cut.

Consistent with the Secretary’s approval for the progressive submission of environmental management plans on 30 November 2017, relevant environmental management plans will be re-submitted at least 3 months prior to the commencement of mining in the Roseville West Pit Extension.

In accordance with Condition 5, Schedule 5 of NSW Development Consent SSD-4966, this WMP will be reviewed (to the satisfaction of the Secretary) within three months of the submission of:

- an Annual Review (Condition 4, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an independent environmental audit (Condition 9, Schedule 5); or
- any modification to the conditions of NSW Development Consent SSD-4966 (unless the conditions require otherwise).

The reviews will be undertaken to ensure the WMP is updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the SMC.

Where a review leads to revisions in the WMP then, within 4 weeks of the review, the revised WMP will be submitted for the approval of the Secretary.

The revision status of this WMP is indicated on the title page of each copy.

The approved WMP will be made publicly available on the Stratford Coal website, in accordance with Condition 11(a), Schedule 5 of NSW Development Consent SSD-4966.

In accordance with Condition 5 of Commonwealth Approval (EPBC 2011/6176), a copy of the approved WMP will also be provided to the Commonwealth Department of Agriculture, Water and the Environment.

9 REPORTING PROTOCOLS

In accordance with Condition 3(g), Schedule 5 of NSW Development Consent SSD-4966, SCPL has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in the SCPL's Environmental Management Strategy. Where relevant, additional detail on management and reporting of exceedances of impact assessment criteria and/or performance criteria are described in the SWMP (Appendix 2) and the GWMP (Appendix 3).

In accordance with Condition 8, Schedule 5 of NSW Development Consent SSD-4966, SCPL will provide regular reporting on the environmental performance of SMC on the SCPL website.

10 REFERENCES

Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality – The Guidelines*. National Water Quality Management Strategy. October 2000.

Commonwealth Office of Water Science (2014a) *Context Statement for the Gloucester Subregion - Product 1.1 from the Northern Sydney Basin Bioregional Assessment.* 28 May 2014.

Commonwealth Office of Water Science (2014b) *Coal and Coal Seam Gas Resource Assessment for the Gloucester Subregion - Product 1.2 for the Gloucester Subregion from the Northern Sydney Basin Bioregional Assessment.* 27 October 2014.

Commonwealth Office of Water Science (2015a) *Description of the Water-Dependent Asset Register for the Gloucester Subregion - Product 1.3 for the Gloucester Subregion from the Northern Sydney Basin Bioregional Assessment*. 20 January 2015.

Commonwealth Office of Water Science (2015b) *Current Water Accounts and Water Quality for the Gloucester Subregion - Product 1.5 for the Gloucester Subregion from the Northern Sydney Basin Bioregional Assessment*. 9 October 2015.

Department of Environment and Conservation (DEC) (2006) *Using the ANZECC Guidelines and Water Quality Objectives in NSW.* June 2006.

Department of Environment and Climate Change (DECC) (2008a) *Managing Urban Stormwater: Soils and Construction Volume 2A – Installation of Services.* January 2008.

Department of Environment and Climate Change (DECC) (2008b) *Managing Urban Stormwater: Soils and Construction Volume 2C – Unsealed Roads*. January 2008.

Department of Environment and Climate Change (DECC) (2008c) *Managing Urban Stormwater: Soils and Construction Volume 2E – Mines and Quarries.* June 2008.

Department of Primary Industries (DPI) Fisheries NSW (2013) *Policy and Guidelines for Fish Habitat Conservation and Management.* June 2013.

Department of Primary Industries (DPI) Office of Water (2012) *Controlled Activities on Waterfront Land – Guidelines for Riparian Corridors on Waterfront Land*. July 2012.

Environment Protection Authority (EPA) (2007) *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.*

Fairfull, S. and Witheridge, G. (2003) *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings.* NSW Fisheries, January 2003.

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

ATTACHMENT A

WATER RELATED NSW DEVELOPMENT CONSENT SSD-4966 CONDITIONS

Table A1
Water Related NSW Development Consent SSD-4966 Conditions

<table>
<tr><th>NSW Development Consent SSD-4966
Schedule 3</th><th>Section Where Addressed in this WMP</th></tr>
<tr><td colspan="2">Schedule 3</td></tr>
<tr><td>Water Supply
25. The Applicant shall ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of operations on site to match its available water supply.
Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.</td><td>Section 4.1 and Appendix 1</td></tr>
<tr><td>Compensatory Water Supply
26. The Applicant shall provide a compensatory water supply to the owner of any privately-owned land whose water supply is adversely and directly impacted (other than a negligible impact) as a result of the development, in consultation with DPIE – Water, and to the satisfaction of the Secretary.
The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent, in quality and volume, to the loss attributed to the development. Equivalent water supply should be provided (at least on an interim basis) within 24 hours of the loss being identified.
If the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.
If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant shall provide alternative compensation to the satisfaction of the Secretary.</td><td>Appendix 3</td></tr>
<tr><td>Water Pollution
27. Unless an EPL authorises otherwise, the Applicant shall comply with Section 120 of the POEO Act.</td><td>Section 2.4.1</td></tr>
<tr><td>Irrigation
28. The Applicant shall only carry out irrigation on parts of the site that drain directly to mine water storages, and in accordance with the relevant requirements of an approved Water Management Plan.</td><td>Appendix 2</td></tr>
<tr><td>Avondale and Dog Trap Creeks
29. The Applicant shall not carry out any mining operations within 40 metres of Avondale or Dog Trap Creeks, with the exception of the construction and/or use of the proposed and existing haul road crossings of Avondale Creek shown in the figure(s) in Appendix 3.
30. The Applicant shall improve the riparian habitat along Avondale Creek to the satisfaction of the Secretary. These improvements must be made within the area of the proposed Biodiversity Enhancement Area (see Appendix 8) and include the re-establishment of flora species characteristic of the Cabbage Gum open forest vegetation community.</td><td>Section 2 and Appendix 2
Appendix 2</td></tr>
<tr><td>Water Management Performance Measures
31. The Applicant shall comply with the performance measures in Table 8 to the satisfaction of the Secretary.
Table 8: Water Management Performance Measures
<table>
<tr><th>Feature</th><th>Performance Measure</th></tr>
<tr><td>Water Management - General</td><td>• Minimise the use of clean water on site
• Maximise as far as reasonable and feasible the separation of clean and dirty water within the site</td></tr>
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Water Related NSW Development Consent SSD-4966 Conditions

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<tr><td>Table 8 (Continued): Water Management Performance Measures
<table>
<tr><th>Feature</th><th>Performance Measure</th></tr>
<tr><td>Construction and operation of linear (sic) infrastructure</td><td>• Design, install and maintain erosion and sediment controls generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1, Volume 2A – Installation of Services and Volume 2C – Unsealed Roads.
• Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the Guidelines for Controlled Activities on Waterfront Land (July 2012), or its latest version.
• Design, install and maintain creek crossings generally in accordance with the Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries 2003) and Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003), or their latest versions.</td></tr>
<tr><td>Mine Sediment Dams</td><td>• Design, install and maintain the dams generally in accordance with the series Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E – Mines and Quarries.</td></tr>
<tr><td>Clean Water Diversion and Storage Infrastructure</td><td>• Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site.
• Design, install and maintain the clean water system to capture and convey the 1 in 100 year ARI flood.</td></tr>
<tr><td>Stream diversion of tributary of Avondale Creek</td><td>• Design, install and maintain the tributary diversion to convey the modelled peak water flows of its altered catchment.
• Establish and maintain geomorphic stability of the diversion channel using appropriate revegetation and stabilisation techniques.
• Demonstrate that the channel is appropriately vegetated and stabilised prior to the release of flows into the diversion channel.
• Control water flows entering the diversion channel by the construction of a stormwater detention basin.</td></tr>
<tr><td>Mine Water Storages and out-of-pit emplacement of potentially acid-forming materials</td><td>• No discharges to surface waters.
• Adequate freeboard to minimise the risk of discharge to surface waters.</td></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 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.</td></tr>
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<tr><td>Table 8 (Continued): Water Management Performance Measures
<table>
<tr><th>Feature</th><th>Performance Measure</th></tr>
<tr><td>Chemical and petroleum storage</td><td>• Chemical and hydrocarbon products to be stored in bunded areas in accordance with relevant Australian Standards.</td></tr>
<tr><td>Aquatic and riparian ecosystem, in the Avon River and its tributaries, particularly Avondale and Dog Trap Creeks</td><td>• Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and Using the ANZECC Guidelines and Water Quality Objectives in NSW (DECC 2006), or their latest versions.</td></tr>
</table></td><td>Section 3 and Appendices 2 & 3</td></tr>
<tr><td>Water Management Plan
32. The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:</td><td>This WMP</td></tr>
<tr><td>(a) be prepared in consultation with the EPA and DPIE-Water, by suitably qualified and experienced person/s whose appointment has been approved by the Secretary.</td><td>Sections 1.4 and 1.5</td></tr>
<tr><td>(b) be submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary; and</td><td>Section 8.2</td></tr>
<tr><td>(c) in addition to the standard requirements for management plans (see condition 3 of Schedule 5) include a:</td><td>Table 3</td></tr>
<tr><td>(i) Site Water Balance that:
• includes details of:
- sources and security of water supply, including details of Water Access Licences held, and contingency supply for future reporting periods;
- water use and management on site;
- any off-site water discharges; and
- reporting procedures, including the preparation of a site water balance for each calendar year; and
• investigates and implements all reasonable and feasible measures to minimise water use on site;</td><td>Appendix 1</td></tr>
<tr><td>(ii) Surface Water Management Plan, that includes:
• detailed baseline data on water flows and quality in the watercourses that could potentially be affected by the development;
• a detailed description of the water management system, including the:
- clean water diversion systems;
- erosion and sediment controls (mine water system); and
- mine water management systems, including irrigation areas;
• detailed plans, including design objectives and performance criteria for:
- design and management of final voids;
- design and management for the emplacement of coal reject materials and potential acid-forming or sulphate-generating materials;
- management of sodic and dispersible soils;
- diversion of the key tributary of Avondale Creek;
- reinstatement of drainage lines on the rehabilitated areas of the site; and
- control of any potential water pollution from the rehabilitated areas of the site;</td><td>Appendix 2</td></tr>
</table>

Table A1 (Continued)
Water Related NSW Development Consent SSD-4966 Conditions

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this WMP
Schedule 3 (Continued)	
Water Management Plan (Continued) • performance criteria for the following, including trigger levels for investigating any associated potentially adverse impacts: - mine water management system; - downstream surface water quality; - downstream flooding impacts; and - stream and riparian vegetation health for the Avon River and its tributaries, including Avondale and Dog Trap Creeks; • a program to monitor and report on: - effectiveness of the mine water management system; - effectiveness of the stream diversion for the key tributary of Avondale Creek; - surface water (with a focus on base flow and low flows) and quality in the watercourses potentially affected by the development; and - downstream flooding impacts; • reporting procedures for the results of the monitoring program; and • a plan to respond to any exceedances of the performance criteria, and repair, mitigate and/or offset any adverse surface water impacts of the development;	Appendix 2
(iii) Groundwater Management Plan that includes: • detailed baseline data of groundwater levels, yield and quality in the region that could be affected by the development, including licensed privately-owned groundwater bores and a detailed survey/schedule of groundwater dependent ecosystems; • groundwater assessment criteria including trigger levels for investigating any potentially adverse groundwater impacts; • a program to monitor and report on: - groundwater inflows to the open cut pits; - the seepage/leachate from water storages, emplacements and final voids; - background changes in groundwater yield/quality against mine-induced changes; and - impacts of the development on: • regional and local (including alluvial) aquifers; and • groundwater supply of potentially affected landowners; and • groundwater dependent ecosystems and riparian vegetation; • a program to validate the groundwater model for the development, including an independent review of the model every 3 years, and comparison of monitoring results with modelled predictions; and • a plan to respond to any exceedances of the performance criteria; and;	Appendix 3
(iv) protocol that has been prepared in consultation with the owners of nearby resource developments, including the Gloucester Gas Project, to: • minimise and manage the cumulative water quality and quantity impacts of these developments; • review opportunities for water sharing/water transfers between these developments; • coordinate water quality monitoring programs as far as practicable;	Section 6

Table A1 (Continued)
Water Related NSW Development Consent SSD-4966 Conditions

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this WMP
Schedule 3 (Continued)	
Water Management Plan (Continued) • undertake joint investigations/studies in relation to complaints/exceedances of trigger levels where cumulative impacts are considered likely; and • co-ordinate modelling programs for validation, re-calibration and re-running of the groundwater and surface water models using approved mine and gas production operation plans. *Note: The protocol can be developed in stages and will need to be subject to ongoing review, dependent upon the determination of, and commencement of, other mining developments in the area.*	Section 6

Table A2
Additional Conditions for the Protection of Water Resources in Commonwealth Approval (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this WMP
Additional Conditions for the Protection of Water Resources	
4. Subject to Condition 6, the water management plan required by Condition 32 of Schedule 3 to ***the Development Consent*** must:	This WMP
(a) describe and implement a surface water and groundwater monitoring programme consistent with the ***National Water Quality Management Strategy***, with sufficient spatial and temporal coverage, to:	Section 2.4.4
(i) establish appropriate baseline data, performance measures, assessment criteria and trigger values required by Conditions 31 and 32 of Schedule 3 to ***the Development Consent***	Section 3 and Appendices 2 and 3
(ii) provide for detection of exceedance of trigger values as a result of the action in a manner that is quantifiable and robust (for example by comparison to baseline data and the use of ***control sites***)	Appendices 2 and 3
(iii) obtain the additional data needed to validate the ***numerical groundwater model*** consistent with the requirements of Condition 32(c)(iii) of Schedule 3 of the ***Development Consent***, including: • seasonal variations in groundwater levels and surface water-groundwater interaction • strata definition	Appendix 3
This programme must include installation of additional multi-level (nested) monitoring wells between the town of Stratford and the SMC area.	Appendix 3
(b) define and detail a system of ***cascading trigger values*** and corresponding treatments **Note:** ***Cascading trigger values*** must consider the potential for impacts on all relevant water-related assets, including Avondale Creek, Dog Trap Creek, and their tributaries, and private water users to the west of the SMC area.	Appendices 2 and 3
(c) describe how the water management performance measures identified in Table 8 of Condition 31 of Schedule 3 to ***the Development Consent***, and groundwater assessment criteria in Condition 32(c)(iii) of Schedule 3 to ***the Development Consent*** will be achieved	Section 3 and Appendix 3
(d) in addition to the requirements of Condition 32(c)(iv) of Schedule 3 to ***the Development Consent***, prepare a protocol that gives consideration to information products as they arise from the Commonwealth Office of Water Science's Bioregional Assessment for the Gloucester Subregion.	Section 6.3.1
5. Within ten (10) business days of the approval of any water management plan in accordance with Condition 32 of Schedule 3 to ***the Development Consent***, the person taking the action must provide ***the Department*** with a copy of the plan.	Section 8.2
6. If it is not possible to address 4a) to d) through a water management plan approved in accordance with Condition 32 of Schedule 3 to ***the Development Consent***, those matters must be addressed in a separate management plan and provided to ***the Minister*** for his approval. In that case, the person taking the action must not ***commence the action*** until the plan has been approved in writing by ***the Minister***. The plan, once approved, must be implemented.	N/A (*refer above*)

Table A2 (Continued)
Additional Conditions for the Protection of Water Resources in Commonwealth Approval (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this WMP
7. The person taking the action must prepare and submit to ***the Minister*** for approval a final water impact verification report. The report must: (a) demonstrate that the water within the voids will not be released to surface water or groundwater systems in the long-term (b) consider possible worst case scenarios associated with the final voids and outline contingency responses, for example, if monitoring shows a groundwater gradient from the final voids towards the alluvium (c) be based on results of recalibrated groundwater and site water balance modelling as required by Condition 32(c) of Schedule 3 of the ***Development Consent***: (i) utilises hydrological and geological data obtained during mining, including validation of the hydraulic properties of all major hydrostratigraphic units, particularly to the west of the site of the action and representation of surface-groundwater interactions (ii) applies uncertainty analysis that incorporates the potential influence of climate variability (d) demonstrate that owners of any nearby resource developments, as described in Condition 32 of Schedule 3 to ***the Development Consent***, have been consulted in preparation of the report. The report must be provided to ***the Minister*** for approval between five (5) and ten (10) years prior to the expiry of this approval. Once approved in writing by ***the Minister***, the plan must be taken into account in planning for the closure of the mine and the long-term management of the final voids.	N/A (*not required until 5-10 years prior to expiry of EPBC 2011/6176*).

ATTACHMENT B

DPIE LETTER OF APPROVAL OF WMP

Mr Michael Plain
Environment and Community Superintendent
3364 Bucketts Way South
Stratford NSW 2422

18/10/2021

Dear Mr Plain

Stratford Extension Project (SSD-4966)
Water Management Plan

I refer to the Water Management Plan submitted in accordance with condition 5 of Schedule 5 of the conditions of consent for the Stratford Extension Project (SSD-4966).

The Department has carefully reviewed the document and is satisfied that it meets the relevant requirements of the conditions of consent.

Accordingly, the Secretary has approved the Water Management Plan (Revision 4, dated June 2021). Please ensure that the approved plan is placed on the project website at the earliest convenience.

The Department also notes that a copy of the revised plan was provided to Natural Resources Access Regulator (NRAR) on 18 June 2021 and that you are yet to receive feedback. Should you receive comments from NRAR that require amendments to the plan, the Department requests that you update the plan, including evidence of how the comments have been addressed, and resubmit to the Department for review and approval.

If you wish to discuss the matter further, please contact Jarrod Blane on 02 8275 1831 or jarrod.blane@dpie.nsw.gov.au.

Yours sincerely

JEvans

Jessie Evans
Director
Resource Assessments (Coal & Quarries)

As nominee of the Secretary

APPENDIX 1

SITE WATER BALANCE

STRATFORD MINING COMPLEX
Site Water Balance

STRATFORD MINING COMPLEX
(STRATFORD EXTENSION PROJECT)

SITE WATER BALANCE

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DPIE Approval
All	SWB-R01-A	Original	EPA, CL&W and DP&E	25 May 2018
Section 1.2, (Table 1), Section 3.3, Section 5 (Figure 3), Section 7.2 (Table 6), Sections 8, 9 and 12.2 and Attachment A	SWB-R02-A	Stratford East Open Cut Commencement	EPA, DoI Water and DP&E	30 October 2018
All	SWB-R03-A	Roseville West Open Cut Pit Recommencement	EPA, DoI Water and DP&E	2 July 2019
All	SWB-R04-A	Administrative revisions / contemporisations	EPA, DPIE Water and DPIE	18 October 2021

June 2021
Document No. SWB-R04-A
(01088411)

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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.

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 for the Stratford Extension Project (SEP) was granted on 29 May 2015 and involves the extension and continuation of mine operations at the SMC[1].

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

1.2 PURPOSE AND SCOPE

This Site Water Balance (SWB) has been prepared in accordance with the requirements of Condition 32(c)(i), Schedule 3 of NSW Development Consent SSD-4966 (Table 1) and recognises the relevant future requirements of Condition 7 of Commonwealth Approval EPBC 2011/6176 (Table 2).

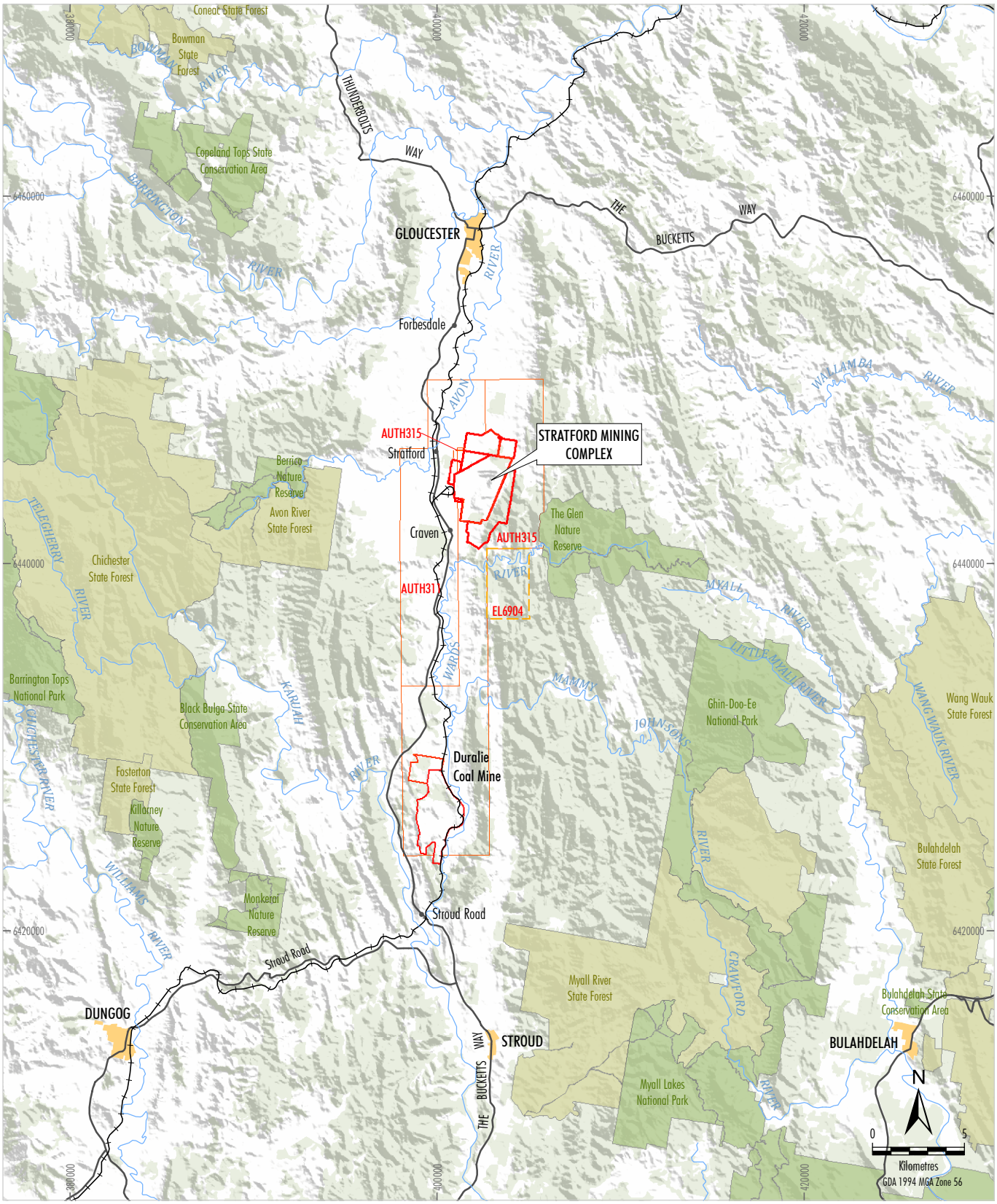
The SWB is a component of the overarching Water Management Plan (WMP) (Appendix 1 of the WMP) and outlines the SWB at the SMC to ensure compliance with NSW Development Consent SSD-4966 and Commonwealth Approval (EPBC 2011/6176).

On 30 November 2017, the Secretary of the former Department of Planning and Environment (DP&E) (now the Department of Planning, Industry and Environment [DPIE]) (the Secretary) approved the progressive submission of environmental management plans for the Project in accordance with Condition 15, Schedule 2 of NSW Development Consent SSD-4966.

This SWB has been prepared to manage site water management system associated with the Avon North Open Cut, BRNOC, Stratford East Open Cut and SMC more generally and will be updated prior to mining in the Roseville West Pit Extension.

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

[2] MLA1 is a proposed future Mining Lease Application (MLA) area as shown on Figure 2. The application for MLA1 has not yet been lodged.



YAN-17-10_MP WMP2021 MPCF_205A

LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Geoscience Australia (2006); Yancoal (2019); NSW Department of Planning & Environment (2017)

STRATFORDCOAL

Part of the Yancoal Australia Group

STRATFORD EXTENSION PROJECT

Regional Location

Figure 1

YAN-17-10_MP WMP2021 MPCF_202A

LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Orthophoto - Google Earth CNES/Airbus (2020); LPI (2016); NSW Department of Planning & Environment (2017)

STRATFORDCOAL
Part of the Yancoal Australia Group

STRATFORD EXTENSION PROJECT

Approved General Arrangement

Figure 2

The scope of this SWB does not include mining operations associated with the Roseville West Pit Extension. Consequently, the indicative coal processing and production schedule for the purposes of this SWB is provided in Table 1.

Table 1
Indicative Coal Processing and Production Schedule – Next Six 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	Roseville West					
1*	2018	0.3	0.3	0.1	0	0.6	0.1	1.4	0.5	0.9
2	2019	0.7	0.6	0.6	0.11	-	0.1	2.11	0.8	1.2
3	2020	-	0.6	0.6	0.14	-	-	1.34	0.4	0.8
4	2021	1.4				0.3	0.1	1.8	0.7	1.1
5	2022	1.1				0	0.1	1.2	0.5	0.7
6	2023	1.3				0	0.1	1.4	0.6	0.8

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

1.3 STRUCTURE OF THE SWB

The remainder of the SWB is structured as follows:

Section 2: Outlines the statutory requirements applicable to the SWB including details of Water Access Licences held.

Section 3: Presents detailed baseline data.

Section 4: Details the performance measures and performance indicators that will be used to assess the SMC.

Section 5: Provides a description of the SMC water management system including details of the sources of water supply.

Section 6: Provides a description of the water sources at the SMC.

Section 7: Describes the water use and water management on-site including measures to minimise water use.

Section 8: Presents the reliability and security of water supply, including contingency planning for future reporting periods.

Section 9: Describes on-site containment designs and capacities.

Section 10: Details the SWB monitoring program.

Section 11: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

Section 12: Describes the program to review and report on the effectiveness of management measures and improvement of environmental performance over time as well as the protocol for periodic review and update of the SWB.

Section 13: Describes the protocol for management and reporting of incidents, complaints and non-compliances with statutory requirements.

Section 14: Lists the references cited in this SWB.

In addition, the SWB will be supplemented as required to include a site water balance for each calendar year (Attachment A) in accordance with Condition 32(c)(i), Schedule 3 of NSW Development Consent SSD-4966.

1.4 SUITABLY QUALIFIED AND EXPERIENCED PERSONS

The former NSW DP&E - Resource Assessments Director, as nominee of the Secretary, approved the appointment of Mr Anthony Marszalek and Dr Noel Merrick as suitably qualified and experienced persons for the preparation of the WMP on 10 October 2017.

The original and this revised SWB has been prepared and reviewed by Mr Anthony Marszalek with relevant input (i.e. groundwater inflow estimates) from Dr Noel Merrick.

1.5 CONSULTATION FOR THE SWB

The original SWB was provided to the NSW Environment Protection Authority (EPA) and NSW Crown Lands and Water (CL&W) (now Department of Planning, Industry and Environment – Water [DPIE Water]) for the purposes of consultation in accordance with Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966. The NSW CL&W provided a letter dated 7 March 2018 confirming it had no comments on the original SWB. The EPA confirmed, via a letter dated 8 March 2018, that it had no comments on the original SWB.

The revisions to this SWB are administrative in nature and include revisions to contemporise the document. This revised SWB has been provided to DPIE Water and EPA for the purposes of consultation. On 16 July 2021, the EPA provided some minor comments on the SWMP (Appendix 2 of the WMP). No comments were provided by the EPA on this SWB. No comments on the revised WMP (including this SWB) were received from the DPIE-Water. On 18 October 2021, the DPIE (Planning and Assessment division) approved the revised WMP. The revision status of this SWB is provided on the title page of this plan.

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.

Obligations relevant to this SWB are described below.

2.1 NSW DEVELOPMENT CONSENT SSD-4966

2.1.1 SWB Requirements

Condition 32(c)(i), Schedule 3 of NSW Development Consent SSD-4966 requires the preparation of a SWB. Table 2 presents these requirements and indicates where they are addressed in this SWB.

In accordance with the requirements of Condition 32, Schedule 3 of NSW Development Consent SSD-4966 this SWB is included as a component of the WMP (Appendix 1 of the WMP).

Table 2
SWB Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this SWB
Water Management Plan **32.** The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:	The WMP
(a) be prepared in consultation with the EPA and DPIE Water, by suitably qualified and experienced person/s whose appointment has been approved by the Secretary.	Sections 1.4 and 1.5
(b) be submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary; and	Section 12.2
(c) in addition to the standard requirements for management plans (see condition 3 of Schedule 5) include a:	Table 3
(i) Site Water Balance that:	This SWB
• includes details of:	
- sources and security of water supply, including details of Water Access Licences held, and contingency supply for future reporting periods;	Sections 2.3, 6 and 8
- water use and management on site;	Sections 5 and 7
- any off-site water discharges; and	Section 9
- reporting procedures, including the preparation of a site water balance for each calendar year; and	Sections 12.3 and 13 and Attachment A
• investigates and implements all reasonable and feasible measures to minimise water use on site;	Section 7

In accordance with Condition 29, Schedule 3 of NSW Development Consent SSD-4966, no mining operation will be carried out within 40 m of Avondale Creek or Dog Trap Creek, with the exception of the construction and/or use of haul road crossings.

Riparian habitat along Avondale Creek will be improved to the satisfaction on the Secretary in accordance with Condition 30, Schedule 3 of NSW Development Consent SSD-4966.

2.1.2 Management Plan (General) Requirements

In addition to the SWB requirements prescribed in Condition 32(c)(i), Schedule 3 of NSW Development Consent SSD-4966, Condition 3, Schedule 5 of NSW Development Consent SSD-4966 outlines the management plan (general) requirements that are also applicable to the preparation of this SWB.

Table 3 presents these requirements and indicates where each is addressed within this SWB.

Table 3
Management Plan (General) Requirements

NSW Development Consent SSD-4966 Schedule 5	Section Where Addressed in this SWB
Management Plan Requirements	
3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
(a) detailed baseline data;	Section 3
(b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 2
• any relevant limits or performance measures/criteria;	Section 4
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any mitigation measures;	Section 4 (Table 5)
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 5, 7 and 9
(d) a program to monitor and report on the:	Sections 10 to 13
• impacts and environmental performance of the development;	
• effectiveness of any management measures (see c above);	
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 11
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 12
(g) a protocol for managing and reporting any:	
• incidents;	refer to WMP
• complaints;	refer to WMP
• non-compliances with statutory requirements; and	refer to WMP
• exceedences of the impact assessment criteria and/or performance criteria; and	Sections 10, 11 and 12
(h) a protocol for periodic review of the plan.	Section 12.2

2.2 COMMONWEALTH APPROVAL (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176) was granted on 29 January 2016. Water resources are a controlling provision and Commonwealth Approval (EPBC 2011/6176) includes conditions for the protection of water resources (Table 4). These conditions acknowledge and defer to the requirement for a Water Management Plan under NSW Development Consent SSD-4966.

As described in Section 1.4, this SWB has been prepared in accordance with the requirements of Condition 4 and (where relevant the future requirements of) Condition 7 of Commonwealth Approval (EPBC 2011/6176).

Table 4
SWB Requirements in Commonwealth Approval (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this SWB
7. The person taking the action must prepare and submit to ***the Minister*** for approval a final water impact verification report. The report must: (a) demonstrate that the water within the voids will not be released to surface water or groundwater systems in the long-term (b) consider possible worst case scenarios associated with the final voids and outline contingency responses, for example, if monitoring shows a groundwater gradient from the final voids towards the alluvium (c) be based on results of recalibrated groundwater and site water balance modelling as required by Condition 32(c) of Schedule 3 of the ***Development Consent***: (i) utilises hydrological and geological data obtained during mining, including validation of the hydraulic properties of all major hydrostratigraphic units, particularly to the west of the site of the action and representation of surface-groundwater interactions (ii) applies uncertainty analysis that incorporates the potential influence of climate variability (d) demonstrate that owners of any nearby resource developments, as described in Condition 32 of Schedule 3 to ***the Development Consent***, have been consulted in preparation of the report. The report must be provided to ***the Minister*** for approval between five (5) and ten (10) years prior to the expiry of this approval. Once approved in writing by ***the Minister***, the plan must be taken into account in planning for the closure of the mine and the long-term management of the final voids.	N/A (*not required until 5-10 years prior to expiry of EPBC 2011/6176*).

2.3 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, ML 1733 and ML 1787 issued by the NSW Minister for Mineral Resources and Energy under the NSW *Mining Act, 1992*.
- Mining Operations Plan submitted and approved by the NSW Resources Regulator.
- Water supply works, water use approvals and water access licences issued by the NSW DPIE 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 surface 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.

2.4 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 2.3, the following NSW Acts (and their Regulations) that are water related and/or may be applicable to the conduct of the SEP at the SMC include:

- *Water Act, 1912.*
- *Water Management Act, 2000.*

Relevant licences or approvals required under these Acts will be obtained as required.

3 BASELINE DATA

3.1 METEOROLOGICAL INFORMATION

Meteorological monitoring is undertaken at the SMC in accordance with the requirements of Condition 24, Schedule 3 of the NSW Development Consent SSD-4966, to the satisfaction of the EPA. The on-site weather station monitors a number of meteorological parameters, including daily rainfall and temperature, solar radiation, wind speed and wind direction.

A summary of monthly meteorological conditions is provided in the SMC Annual Reviews which are publicly available on the Stratford Coal website (http://www.stratfordcoal.com.au).

3.2 EIS SITE WATER BALANCE

The site water balance model for the SMC was developed by Gilbert & Associates Pty Limited in 2012 as part of the Stratford Extension Project EIS Surface Water Assessment (Gilbert & Associates, 2012) and integrates components of both the SCM and BRNOC. The predictive model was formulated using 120 years of interpolated rainfall and evaporation data obtained for the site from the Queensland Department of Science, Information Technology, Innovation and the Arts Silo Data Drill to generate a stochastic data set.

In addition to the meteorological data described above, the following data from the operations and activities conducted at the SMC (from commissioning in 1995) has been used to update and calibrate the predictive model of the site water balance (Attachment A), including:

- Daily estimated volumes of water pumped from/to mine water storages (i.e. Stratford Main Pit, Stratford East Dam, Return Water Dam, Bowens Road West Void), operational open cut pits (i.e. Roseville West Pit, Roseville Extension Pit, Bowens Road North Pit), CHPP and temporary mine storages (i.e. sediment dams).
- Water storage levels for the Stratford Main Pit, Stratford East Dam and Return Water Dam.
- Monthly CHPP production records.
- Dust suppression records.
- Progressive mine “snapshot” plans for the period since mine commissioning which were used to calculate mine catchment areas.

3.3 SITE WATER BALANCE UPDATE

A water and salt balance model of the SCM water management system has been developed to simulate the behaviour of the water management system to the end of the next five years (i.e. period up to the end of 2022). The model was developed in its current form and previously calibrated as part of the Stratford Extension Project Surface Water Assessment (Gilbert & Associates, 2012).

The model simulates daily changes in stored volumes of water at the Stratford Mining Complex in response to inflows (i.e. rainfall, groundwater and water contained in rejects) and outflows (i.e. evaporation, CHPP use, dust suppression use, irrigation loss and spill [if any]). Stored volumes of water on-site as of January 2018 were utilised as the baseline condition for modelled forecasts.

Modelling includes simulation of storage in the Return Water Dam, Stratford East Dam, Bowens Road West Pit, Stratford Main Pit, in-pit waste rock emplacement (pore water storage), BRNOC, Roseville West Pit and the planned Avon North Open Cut and Stratford East Open Cut, as well as existing and planned sediment dams and disturbed area dams.

A detailed description of the model simulation, including period, time-steps, and key assumptions are provided in Attachment A. The model forecast results are presented including water supply reliability, spill potential and overall water balance.

3.4 GEOCHEMISTRY INFORMATION

Review of the water quality of contained water stored in the Stratford Main Pit as part of the Geochemistry Assessment (Environmental Geochemistry International Pty Ltd, 2012) confirms that past management measures at the SMC have successfully controlled pH from deposited CHPP rejects and maintained a circum neutral pH.

Previous geochemical testwork also identified the potential for concentrations of metals and other constituents in waste rock to mobilise under low pH conditions. SCPL continues to monitor these solute concentrations in contained water storages as part of the existing surface water monitoring program as described in the SWMP (Appendix 2 of the WMP).

4 PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

Table 8 in NSW Development Consent SSD-4966 prescribes the water management performance measures for the SMC (Appendix A).

SCPL will assess the SMC against the specific water management performance indicators outlined in Table 5.

Table 5
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Water Management - General • Minimise the use of clean water on site. • Maximise as far as reasonable and feasible the separation of clean and dirty water within the site.	The water management system is constructed and maintained generally in accordance with the design described in Section 5.
Construction and Operation of Linear *(sic)* Infrastructure • Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1, Volume 2A – Installation of Services* and *Volume 2C – Unsealed Roads*. • Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land (July 2012)*, or its latest version. • Design, install and maintain creek crossings generally in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries 2003)* and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003)*, or their latest versions.	The erosion and sediment controls are constructed and maintained generally in accordance with the design described in Section 5. Infrastructure within 40 m of watercourses are constructed and maintained generally in accordance with the design and infrastructure described in Section 5 and Section 2.1.1. Creek crossing are constructed and maintained generally in accordance with the design described in Section 5.
Mine Sediment Dams • Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* and *Volume 2E – Mines and Quarries*.	Sediment dams are constructed and maintained generally in accordance with the design described in Section 5.1.2.
Clean Water Diversion and Storage Infrastructure • Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site. • Design, install and maintain the clean water system to capture and convey the 1 in 100 year ARI flood.	The water management system is constructed and maintained generally in accordance with the design described in Section 5.
Stream Diversion of Tributary of Avondale Creek • Design, install and maintain the tributary diversion to convey the modelled peak water flows of its altered catchment. • Establish and maintain geomorphic stability of the diversion channel using appropriate revegetation and stabilisation techniques. • Demonstrate that the channel is appropriately vegetated and stabilised prior to the release of flows into the diversion channel. • Control water flows entering the diversion channel by the construction of a stormwater detention basin.	The stream diversion of tributary of Avondale Creek is constructed and maintained generally in accordance with the design described in the SWMP.

Table 5 (Continued)
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Mine Water Storages and Out-of-pit Emplacement of Potentially Acid-Forming Materials • No discharges to surface waters. • Adequate freeboard to minimise the risk of discharge to surface waters.	Water management infrastructure (including mine water storages) and PAF materials in out-of-pit emplacements are constructed and maintained generally in accordance with the design described in Section 5 and the SWMP.
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 and PAF materials are managed generally in accordance with the methodologies described in the SWMP and GWMP. Adequate freeboard will be maintained as described in Section 5.1.1.
Chemical and Petroleum Storage • Chemical and hydrocarbon products to be stored in bunded areas in accordance with relevant Australian Standards.	Chemical and hydrocarbon storages will be constructed and maintained in accordance with the relevant Australian Standards (refer Section 5.1.3).
Aquatic and Riparian Ecosystem, in the Avon River and its Tributaries, particularly Avondale and Dog Trap Creeks • Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and *Using the ANZECC Guidelines and Water Quality Objectives in NSW (DECC 2006)*, or their latest versions.	Site-specific in-stream WQOs are developed as described in the SWMP.

Note: The SWMP and GWMP are included in Appendices 2 and 3 of the WMP.

The performance indicators in Table 5 will be used to assess and manage the Project-related risks to ensure that there are no exceedances of the performance measures.

5 WATER MANAGEMENT SYSTEM

The objectives of the on-site water management system throughout the life of the SEP at the SMC are outlined within Section 4 of the WMP. The aspects of the water management system of particular relevance to the SWB are to:

- maintain separation between runoff from areas undisturbed by mining and water generated within active mining areas;
- operate such that there is no uncontrolled overflow of contained water storages; and
- provide a reliable source of water to meet the requirements of the SMC.

The SMC water management system operates under a surplus water balance, with a trend for increasing water storage on-site over time. The majority of water used on-site is in the CHPP and recovery of water for re-use in the CHPP (i.e. recycling of CHPP process waters) is the largest component of the overall supply system (Gilbert & Associates Pty Limited, 2012).

The key components of the water management strategy relevant to the SWB at the SMC are (SCPL, 2012):

- water management storages;
- diversions for runoff from catchment areas upslope of the mine disturbance area (i.e. upslope diversions);
- runoff control structures and devices on disturbed and rehabilitated areas at the mine;
- procedures, structures and devices for the control of erosion and sediment movement including suitably designed sediments dams;
- capture and on-site containment of mine water and open pit dewatering equipment;
- procedures and equipment for the reuse of captured and contained mine water for dust suppression (haul roads, mine waste emplacement surfaces), CHPP supply and irrigation; and
- sewage treatment plants and a system for the disposal of effluent.

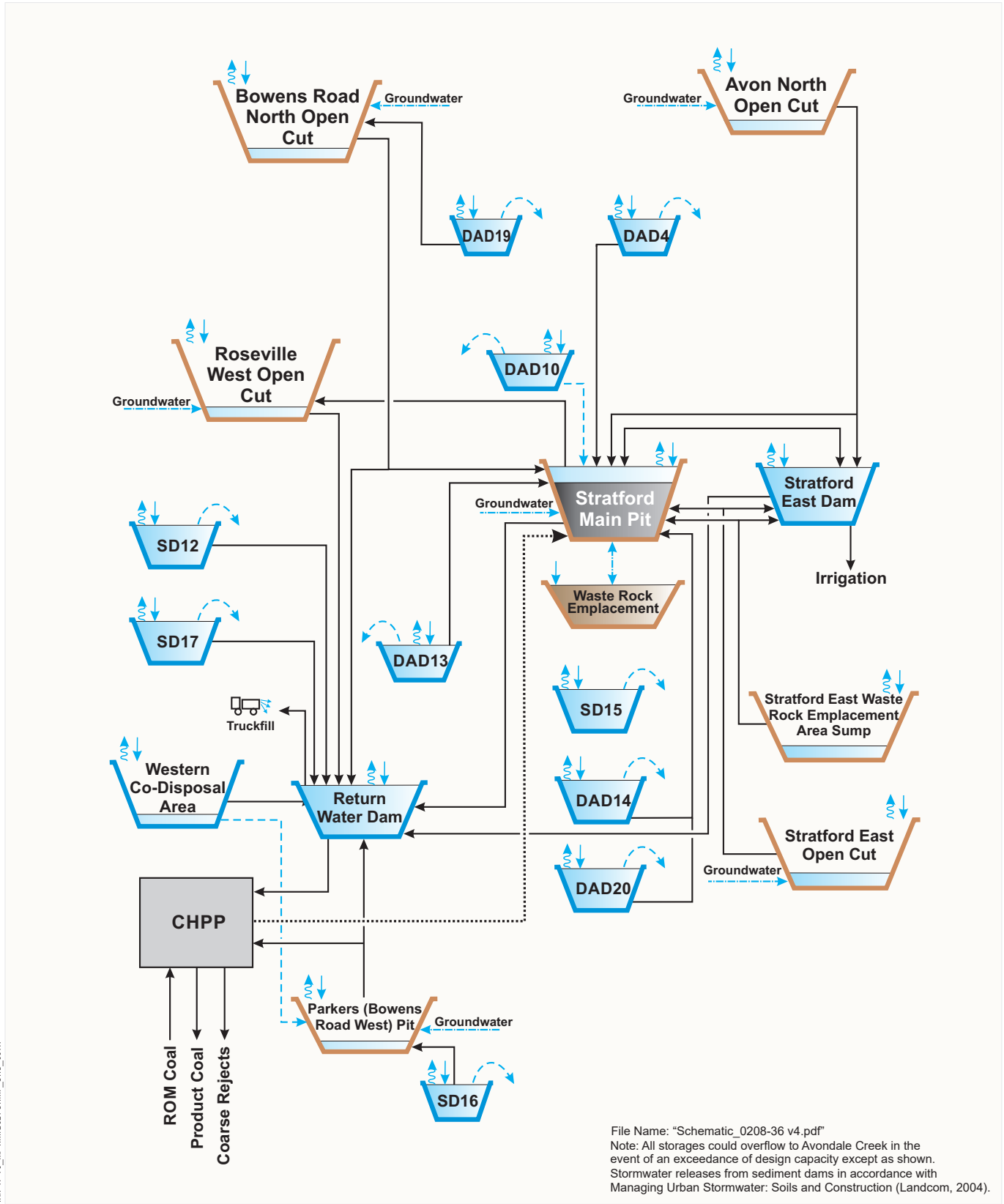
The integrated water management system for the SMC is shown in schematic form on Figure 3 and will be progressively developed as water management requirements change over time.

Similarly, consistent with the relevant performance measures (Section 5):

- Sediment control structures such as sediment dams and sediment fences will be employed where necessary within and downstream of disturbance areas.
- Erosion and sediment controls will be designed, installed and maintained generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1 (Landcom, 2004), Volume 2A – Installation of Services (DECC, 2008a) and Volume 2C – Unsealed Roads (DECC, 2008b).

Water from sediment control dams will be preferentially used in SMC related activities and is only released in a manner that minimises change to downstream turbidity in accordance with EPL 5161.

Further and more specific details of the water management system are provided in Attachment A.



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Note: All storages could overflow to Avondale Creek in the event of an exceedance of design capacity except as shown. Stormwater releases from sediment dams in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004).

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LEGEND

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

STRATFORDCOAL

STRATFORD EXTENSION PROJECT

Existing and Indicative Project Water Management Schematic

Figure 3

5.1 WATER STORAGES AND RELATED INFRASTRUCTURE

5.1.1 Mine Water (Contained Water) Storages

Water stored on-site includes incident rainfall-runoff generated from operational areas at the SMC and (lesser) groundwater inflows to the mine workings.

Contained water storages at the SMC include (Figure 2):

- Stratford Main Pit which 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).
- Stratford East Dam which is located on the eastern boundary of the ML and has a capacity of up to approximately 2,872 ML.
- Return Water Dam which has a design (as-built) capacity of approximately 512 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.
- Parkers/Bowens Road West Pit void which 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.

The above contained water storages have been designed to have adequate freeboard to minimise the risk of discharge of mine waters. Based on the system design, the site water balance (Attachment A) does not predict any discharges to surface waters in accordance with the water management performance measure (Table 5).

The existing open cut voids also provide significant additional on-site containment capacity if required for water storage.

5.1.2 Sediment Dams

Consistent with the relevant performance measures (Section 4) the sediment dams will be designed, installed and maintained generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1 (Landcom, 2004) and Volume 2E Mines and Quarries (DECC, 2008c). Detailed sediment dam design criteria are included in the SWMP (Appendix 2 of the WMP).

Water collected from the disturbance footprint (e.g. internal haul roads and waste emplacements) will be temporarily contained in the sediment dams. Where opportunities arise, water will be recycled for dust suppression or use in the process plant, or otherwise released in accordance with the requirements of an EPL.

5.1.3 Chemical and Hydrocarbon Storages

Consistent with the relevant performance measures (Section 4), chemical and hydrocarbon products will be stored in bunded areas in accordance with the relevant Australian Standards, including AS 1940-2017 The Storage and Handling of Flammable and Combustible Liquids.

6 WATER SOURCES

The water management strategy aims to maintain separation between water generated in undisturbed areas and water generated in disturbed areas.

Water captured from disturbed areas includes:

- rainfall within the open pits;
- groundwater seepage into the open pits;
- rainfall runoff and seepage from active sections of the waste rock emplacement;
- rainfall runoff from the CHPP and infrastructure area;
- rainfall runoff from the co-disposal area;
- rainfall runoff from haul roads;
- rainfall runoff from areas stripped of topsoil (typically exposing clays);
- rainfall runoff from areas yet to be adequately revegetated within sediment dam catchments; and
- direct rainfall falling on sediment dams and water management storages.

7 WATER USE AND MANAGEMENT MEASURES

The main water requirement for the SMC is 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 is required for washdown of mobile equipment and dust suppression on haul roads, active waste rock emplacement areas, ROM coal stockpiles and conveyor systems. Water is also used for irrigation on contained rehabilitated areas. Some water is also required to be used for fire fighting and other minor non-potable water uses. Water is 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 will fluctuate with climatic conditions and as the extent of the mining operation changes over time. Fluctuations in water consumption have been accounted for in the site water balance model (Attachment A).

7.1 UPSLOPE DIVERSION WORKS

Temporary and permanent upslope diversion drains/bunds will continue to be constructed over the life of the SMC, to divert runoff from undisturbed areas around the open pits and waste rock emplacement (i.e. disturbed areas).

The design capacity for temporary diversion is based on the peak flow generated by a 1:20 annual exceedance probability (AEP) event. Permanent diversions will be designed for the peak flow generated by 1:100 AEP rainfall event.

While it is recognised that the performance measure for upslope diversions and storage infrastructure for the SMC is to capture and convey the 1:100 AEP flood, the existing site layout in some circumstances during the life of the SMC may result in this objective being impractical. Where such impracticalities arise, SCPL will seek the Secretary's approval of an appropriate design event, in consultation with DPIE Water and the EPA.

Notwithstanding, upslope diversions will be designed to be stable at the existing design flows. Diversion stability will be achieved by providing appropriately sized channel cross-sections and bed gradients; and by incorporating bed and bank treatments such as rock fill and vegetation to provide erosion resistance.

Upslope diversions and sediment controls are described in detail in the SWMP (Appendix 2 of the WMP) including the stream diversion of the tributary of Avondale Creek.

7.2 OPEN CUT DEWATERING

Predicted groundwater inflows to the each open cut over life of the SMC were modelled by Heritage Computing (2012) and the results are summarised in Table 6. For the purposes of this site water balance, the average groundwater inflow has been applied to each relevant active pit with adjustments for the scope of this SWB (i.e. the next five years as agreed with Dr Noel Merrick) to reflect the proposed mining sequence in each year and are presented in Attachment A.

Table 6
EIS Predicted Pit Groundwater Inflows

Pit	Project Average (ML/day)*	Project Maximum (ML/day)
BRNOC	0.22 (0.41)	0.43
Roseville West Pit	0.50 (0.50)	0.69
Avon North Open Cut	0.25 (0.23)	0.32
Stratford East Open Cut	0.11 (0.12)	0.17
Stratford Main Pit	0.11 (0.21)	0.25

Source: After Heritage Computing (2012)

* Next five years in parentheses.

The open pit workings are collection points for incident rainfall, infiltration through mine waste rock emplacements and rainfall runoff. Sumps are excavated in the floor of the active open pits as part of routine mining operations to facilitate efficient dewatering operations and to minimise interruption to mining.

Water that accumulates in the open pit sumps will be used for dust suppression over haul roads and active waste rock emplacement surfaces and/or will be transferred to contained water storages. Where water transfers occur via pipeline across the tributary of Avondale Creek, the Guidelines for Laying Pipes and Cables in Watercourses (DPI Water, 2012b) will be considered.

Some water transfers could occur during the next five years from the Roseville West Pit void in advance of future mining and still meet the performance measure of 'adequate freeboard within the pit to minimise the risk of discharge to surface waters'. If water transfers were to occur, the transfers would be modelled in a subsequent revision of the SWB.

7.3 IRRIGATION

For the purposes of managing surplus waters held on-site, irrigation of water will involve continued 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 will only occur on rehabilitated or topsoiled areas from which runoff reports to contained water storages, or open pits, in accordance with Condition 28, Schedule 3 of NSW Development Consent SSD-4966.

Irrigation areas, and management and monitoring of irrigation are described further in the SWMP (Appendix 2 of the WMP).

7.4 POTABLE WATER USE

Potable water for the SMC is sourced from MidCoast Water. Potable water is transported to the SMC by a local contractor and is stored on-site in a holding tank in the infrastructure area, as such it is not specifically part of the SWB.

8 WATER SUPPLY RELIABILITY

A predictive model of the performance of the water management system (including supply, containment and risk of disruption to mining operations) has been developed by Hydro Engineering and Consulting Pty Ltd (Attachment A) for a five year period (to the end of 2022). The model provides an indication of the predicted make-up requirements for the SMC at maximum production rates, water supply sources and storage volumes for the containment system for a range of different climatic scenarios.

Water balance model results indicate that the SMC will continue to operate with a water surplus on average and there were no simulated water supply shortfalls for the CHPP or haul road dust suppression in any of the realisations modelled. The implied water supply reliability is therefore greater than 99% (Attachment A).

SCPL will review and revise (as necessary) the site water balance for the SMC on an annual (calendar year) basis to ensure water supply reliability is maintained.

9 SPILL POTENTIAL / DISCHARGE TO SURFACE WATERS

The risk of a contained water storage overflow (i.e. spill) from the SMC was evaluated as part of the site water balance for the next five years (to the end of 2022) (Attachment A) and there were no spills simulated during the 129 climatic realisations simulated, which is consistent with the EIS site water balance (Gilbert and Associates, 2012).

Subject to adherence with the operational protocols (including storage of water in active mine pits if required) and other assumptions inherent in the water balance modelling, the implied spill risk from the Stratford Main Pit (i.e. to Avondale Creek) is less than 1% (Attachment A).

The relevant performance indicators and performance measures described in Section 5 of the Surface Water Management Plan and the process is summarised in Table 12 of the Surface Water Management Plan.

10 MONITORING PROGRAMS

The following aspects of the water management system are monitored to inform the annual review of the site water balance:

- mine water storage levels and volumes (stored and freeboard), including development of storage curves for existing storages and any new storages;
- mine pit inflows/dewatering (where measurable from pumping records);
- dust suppression water demands;
- processing water inputs and outputs including:
  - CHPP feed tonnages and moisture contents;
  - product tonnages and moisture contents;
  - CHPP rejects tonnages and solid water ratios; and
  - deposited CHPP rejects in-situ moisture contents (including determining return water efficiencies); and
- irrigation volumes and rates.

The appropriate monitoring frequencies and methods will be determined by SCPL as required. Further detail is provided in the SWMP.

A summary of the water management system monitoring information will be provided in the Annual Review (Section 12.1).

11 CONTINGENCY PLAN

In the event a water management performance measure for the SMC (Section 4) may not have been met or a performance indicator is determined to have been exceeded, SCPL will implement the Contingency Plan described in the WMP.

11.1 SPECIFIC CONTINGENCY MEASURES

Specific contingency measures for an exceedance of the water management performance measures will be investigated and may include:

- The conduct of additional monitoring (e.g. increase in monitoring frequency or additional sampling) to inform the specific contingency measures.
- Implementation of adaptive management strategies (e.g. on-site reconfiguration) to better maintain separation of clean and mine waters, diversion of clean waters, storage 'as-built' designs and avoid discharge of mine waters (except in accordance with an EPL).
- Provision of equivalent water supply or compensation for an impacted privately-owned bore.
- The provision of a suitable offset (e.g. improvement works) if there was an environmental consequence and/or adverse surface water impacts were to result.

12 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

12.1 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.

Contents of the Annual Review and revision of the WMP, including the SWB are described in the WMP.

This SWB will be reviewed within three months of the submission of an Annual Review, and revised where appropriate, as described in Section 12.2.

12.2 SITE WATER BALANCE REVIEW AND UPDATE

It is noted that as the NSW Development Consent SSD-4966 was not 'taken up' by SCPL prior to 31 December 2015, the timeframes prescribed in the conditions were not enforceable (Table 2), and at the time activities at the SMC continued under DA 23-98/99 and DA 39-02-01. The original WMP (including the original SWB) was prepared at least 3 months prior to commencement of mining at the Avon North Open Cut as agreed by the Secretary on 30 November 2017. Similarly, this SWB has been re-submitted prior to the commencement of mining in the Stratford East Open Cut.

Consistent with the Secretary's approval for the progressive submission of environmental management plans on 30 November 2017, relevant environmental management plans will be re-submitted at least 3 months prior to the commencement of mining in the Roseville West Pit Extension.

In accordance with Condition 5, Schedule 5 of NSW Development Consent SSD-4966, this SWB will be reviewed (to the satisfaction of the Secretary) within three months of the submission of:

- an Annual Review (Condition 4, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an independent environmental audit (Condition 9, Schedule 5); or
- any modification to the conditions of NSW Development Consent SSD-4966 (unless the conditions require otherwise).

The reviews will be undertaken to ensure the SWB is updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the SMC.

Where a review leads to revisions in the SWB then, within 4 weeks of the review, the revised SWB will be submitted for the approval of the Secretary.

The revision status of this SWB is indicated on the title page of each copy.

The approved SWB will be made publicly available on the SCPL website, in accordance with Condition 11(a), Schedule 5 of NSW Development Consent SSD-4966.

In accordance with Condition 5 of Commonwealth Approval EPBC 2011/6176, a copy of the approved WMP (including this SWB) will also be provided to the Commonwealth Department of Agriculture, Water and the Environment.

12.3 SITE WATER BALANCE – CALENDAR YEAR REVIEW

In accordance with Condition 32(c)(i), Schedule 3 of NSW Development Consent SSD-4966, the SWB will be supplemented as required to include a site water balance for each calendar year (Attachment A).

13 REPORTING PROTOCOLS

In accordance with Condition 3(g), Schedule 5 of NSW Development Consent SSD-4966, SCPL has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in the SCPL's Environmental Management Strategy and WMP. Management and reporting of exceedances of impact assessment criteria and/or performance criteria are described in the SWMP (Appendix 2 of the WMP) and the GWMP (Appendix 3 of the WMP).

In accordance with Condition 8, Schedule 5 of NSW Development Consent SSD-4966, SCPL will provide regular reporting on the environmental performance of the SMC on the SCPL website.

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ATTACHMENT A

SITE WATER BALANCE – CALENDAR YEARS [2018-2022]

(Hydro Engineering & Consulting Pty Ltd, 2018)

A1.1 INTRODUCTION

A water and salt balance model of the Stratford Mining Complex (SMC) water management system has been developed to simulate the behaviour of the water management system over the period up to the end of 2022. The model was developed in its current form and calibrated as part of the Stratford Extension Project (SEP) EIS.

A1.2 MODEL DESCRIPTION

The model simulates daily changes in stored volumes of water at the SMC in response to inflows (rainfall, groundwater and water contained in rejects) and outflows (evaporation, CHPP use, dust suppression use, irrigation loss and spill [if any]). Modelling includes simulation of storage in the Return Water Dam, Stratford East Dam, Parkers/Bowens Road West Pit, Stratford Main Pit, in-pit waste rock emplacement (pore water storage), BRNOC, Roseville West Pit, Avon North Open Cut and the planned Stratford East Open Cut and associated waste rock emplacement area sump, as well as existing and planned sediment dams and disturbed area dams. For each storage, the model simulates:

Change in Storage = Inflow – Outflow

Where:

Inflow includes rainfall runoff (for surface storages), seepage (from waste rock emplacements), groundwater inflow (for open pits) and all pumped inflows from other storages.

Outflow includes evaporation, seepage, spill (if any) and all pumped outflows to other storages or to a water use.

The model operates on a daily or smaller time-step. Model simulations begin on 1/1/2018 and simulate the period to the end of 2022 (five years). The model simulates 129 "realizations" derived using the historical daily climatic record[1] from 1889 to 2017 inclusive. 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. The results from all realizations are used to generate estimates of supply reliability and water inventory. This method effectively includes all recorded historical climatic events in the water balance model, including high, low and median rainfall periods.

Key assumptions in the model are as follows:

- Rejects from the CHPP will continue to be disposed of to the Stratford Main Pit void. Future rejects disposal rates (based on advice from SCPL) are for a total 2.5 Mt of rejects in the five years to the end of 2022.
- Based on bench-scale testwork on rejects samples from the SCM CHPP, and discussions with SCPL personnel; a dry density[2] of 1.2 tonnes per cubic metre (t/m^3) was assumed for rejects in the Stratford Main Pit void. A dry density of 1.2 t/m^3 results in an estimated 85% of the original water pumped out in the rejects from the CHPP being "liberated" during settlement of the reject solids in the void and reporting to the void surface.
- Runoff from active (including currently unrehabilitated) mine areas at the SMC will continue to be directed to the Stratford Main Pit (i.e. it is the main contained water storage).
- Dewatering of the BRNOC by pumping to the Stratford Main Pit occurred from February 2018, followed by progressive backfill using waste rock from the Avon North Open Cut.

[1] Data was sourced from 'Patched Point' climatic data for the Bureau of Meteorology (BoM) Craven (Longview) rainfall station (Station no. 60042). The Patched Point Data set combines observations and interpolations to provide daily data, such that if on any day a station does not have an observation, then the gap in the record is 'patched' (i.e. filled) with an estimate obtained by spatial interpolation of the daily data from surrounding BoM stations (refer https://legacy.longpaddock.qld.gov.au/silo/ppd/). Both rainfall and pan evaporation data were obtained from this source.

[2] Dry density is the mass of dry particles per unit total volume.

- Mining of the Avon North Open Cut commenced in June 2018, with dewatering by pumping to the Stratford Main Pit and the Stratford East Dam. Irrigation over a 29 ha irrigation area adjacent to the Stratford East Dam is to continue. Irrigation is planned such that it would not lead to direct runoff, with soil moisture monitoring conducted to guide irrigation management.
- Runoff from the Avon North Open Cut area and adjacent out of pit waste rock emplacement, including areas of the BRNOC waste rock emplacement that would be used for additional waste rock emplacement, would be managed by directing runoff to either the Avon North Open Cut, BRNOC or Ellis Dam. An additional 144 ha is estimated to contribute to the SMC water management system from this area by the end of 2022, with progressive rehabilitation of waste rock emplacement areas occurring from 2019 onwards.
- Runoff from the Stratford East Open Cut area and adjacent in pit and out of pit waste rock emplacement would be managed by directing runoff to either the Stratford East Open Cut or Stratford East Waste Rock Emplacement Area Sump. An additional 144 ha is estimated to contribute to the SMC water management system from this area by the end of 2022, with progressive rehabilitation of waste rock emplacement areas occurring from 2021 onwards.
- The Return Water Dam is the primary source of water for the CHPP and haul road watering. Water is pumped to the Return Water Dam from BRNOC, Roseville West Pit and the Stratford Main Pit.
- The Parkers/Bowens Road West Void is used as a transient storage for runoff from the CHPP and coal stockpile area. Any water which accumulates in the void is either transferred directly to the CHPP for re-use or is transferred to the Return Water Dam.
- There is no further planned controlled release of water from the mine to Avondale Creek.
- Starting water levels in site storages are as advised by SCPL for 1 January 2018.
- The Roseville West Pit remains as a contingency water storage. Should the stored water volume in the Stratford Main Pit exceed 90% of its remaining capacity, it is assumed that water would be pumped from the Stratford Main Pit to the Roseville West Pit.

A1.3 MODEL FORECAST RESULTS

A1.3.1 Water Supply Reliability

Water balance model results indicate that the SCM would continue to operate with a water surplus on average. Figure A-1 below summarises the forecast total water inventory as probability plots over the simulation period. These probability plots show the range of likely total stored water volumes with the solid central plot representing the median, while the upper and lower broken lines show the 5^{th}/95^{th} percentile volumes. There is a predicted 90% chance that the total water volume will fall in between the 5^{th}/95^{th} percentile volume plots.

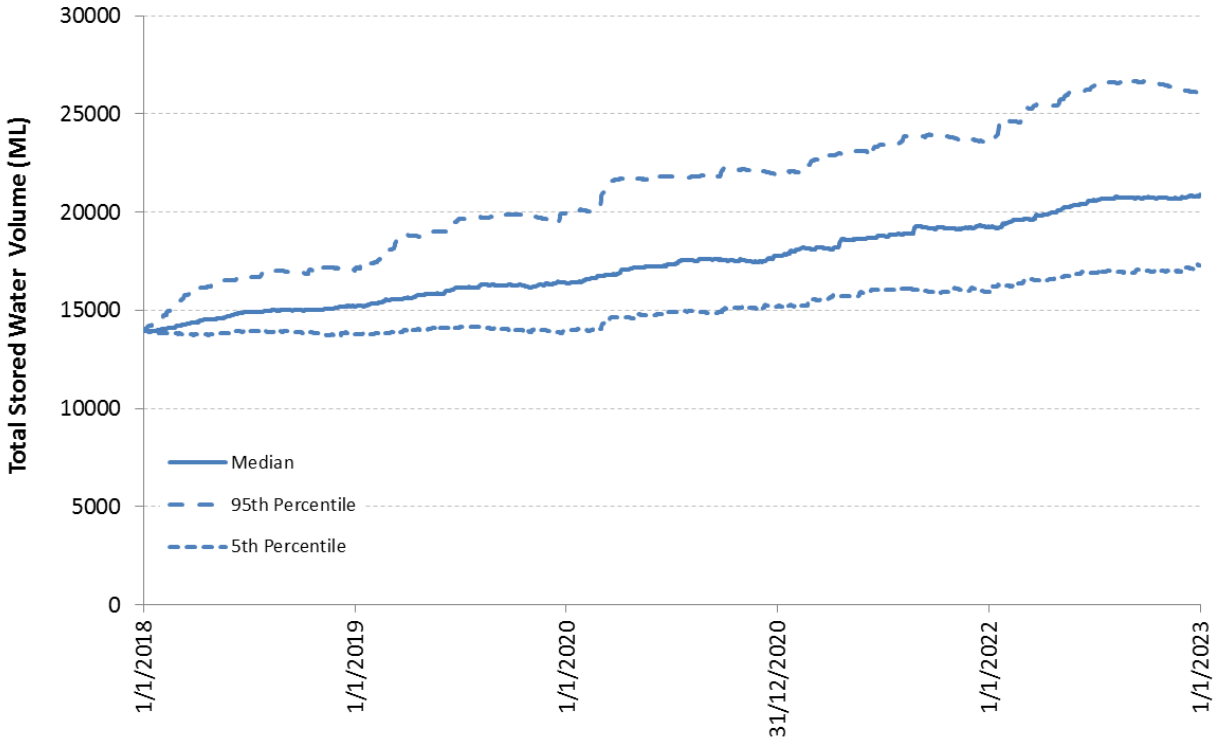

Figure A-1 Forecast Water Inventory

There were no simulated water supply shortfalls for the CHPP or haul road dust suppression in any of the realizations modelled. The implied water supply reliability is therefore greater than 99%.

A1.3.2 Spill Potential

As the Stratford Main Pit is filled with rejects, less space becomes available for the storage of mine water. Water balance model results indicate that, even with the addition of the planned tonnages of rejects (2.5 Mt) up until the end of 2022 and at an assumed rejects density of 1.2 t/m^3, no spills were simulated from the Stratford Main Pit in any of the realizations modelled and therefore the implied spill risk from the Stratford Main Pit is less than 1%.

A1.3.2 Overall Water Balance

The overall water balance for the SMC, for the period to the end of 2022, averaged over all 129 realizations is summarised in Table A-1.

Table A-1 Predicted Average Water Balance

Average Inflows (ML/year)	
Groundwater	444
Rainfall-runoff	2,790
Stratford Main Pit Waste Rock Emplacement Recharge	68
Rejects Supernatant Water	1,071
TOTAL	4,373
Average Outflows (ML/year)	
Evaporation	1,115
CHPP Supply	1,265
Haul Road Dust Suppression	385
Irrigation	169
DAD or SD Overflow	11
TOTAL	2,945

APPENDIX 2

SURFACE WATER MANAGEMENT PLAN

STRATFORD MINING COMPLEX
Surface Water Management Plan

STRATFORD MINING COMPLEX
(STRATFORD EXTENSION PROJECT)

SURFACE WATER MANAGEMENT PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DPIE Approval
All	SWMP-R01-A	Original	EPA, CL&W and DP&E	25 May 2018
Section 1.2, (Table 1), Section 5.1.1, Section 6.1.1, Table 8, Section 7.3, Section 8.2 (Table 9) and Section 11.2	SWMP-R02-A	Stratford East Open Cut Commencement	EPA, DoI Water and DP&E	30 October 2018
All	SWMP-R03-A	Roseville West Open Cut Pit Recommencement	EPA, DoI Water and DP&E	2 July 2019
Sections 1.2, 1.5, 7.2, 7.5, 8.2 and 8.6 and Figure 4	SWMP-R04-A	Revision following Annual Review 2020 and Independent Environmental Audit 2020. Revised to incorporate Stratford Waste Emplacement PAF Containment Cell location, design detail and monitoring program updates.	EPA, DPIE Water and DPIE	18 October 2021
Sections 1.2, 1.4, 1.5, 4.3, 6.1.1, 6.1.2, 7.1, 7.11, 8.6, 10.1, Tables 7, 9, 11 & 12	SWMP-R04-B	Revision to allow for emergency releases in accordance with EPL	EPA, NSW DCCEEW and DPHI	29 May 2025

May 2025
Document No. SWMP-R04-B

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Appendix A Consultation Correspondence

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.

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 for the Stratford Extension Project (SEP) was granted on 29 May 2015 and involves the extension and continuation of mine operations at the SMC[1].

SCPL commenced the approved activities in accordance with the conditions of SSD-4966 on 4 April 2018. The general arrangement of the approved SMC is provided in Figure 2[2].

1.2 PURPOSE AND SCOPE

This Surface Water Management Plan (SWMP) has been prepared in accordance with the requirements of Condition 32(c)(ii), Schedule 3 of NSW Development Consent SSD-4966 (Table 1), Condition 4 of Commonwealth Approval (EPBC 2011/6176) (Table 2) and recognises the relevant future requirements of Condition 7 of Commonwealth Approval (EPBC 2011/6176).

The SWMP is a component of the overarching Water Management Plan (WMP) (Appendix 2 of the WMP) and outlines the procedures and strategies for surface water management at the SMC to ensure compliance with NSW Development Consent SSD-4966 and Commonwealth Approval (EPBC 2011/6176).

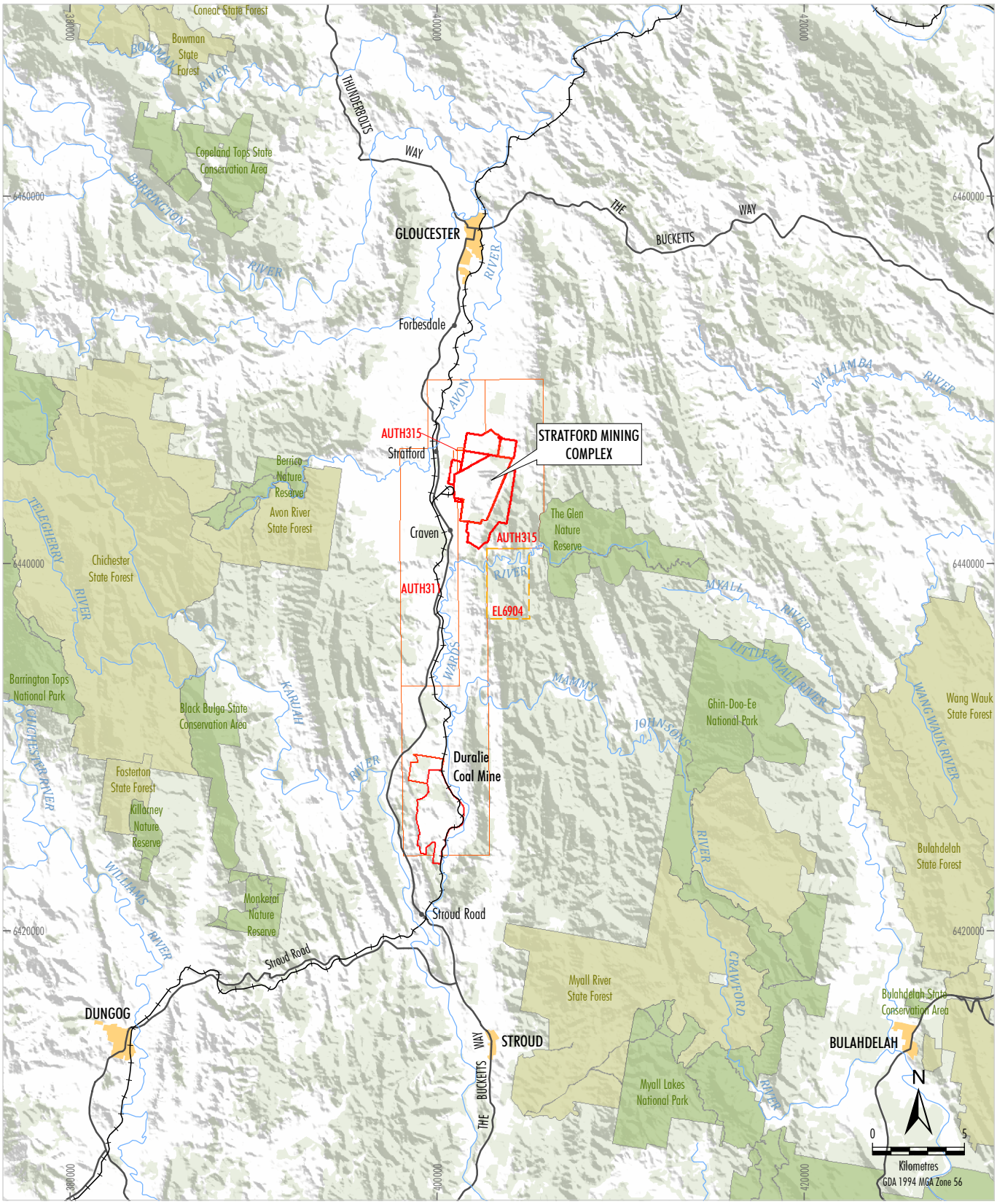
On 30 November 2017, the Secretary of the Department of Planning and Environment (DP&E) (now the Department of Planning, Housing and Infrastructure (DPHI) (the Secretary) approved the progressive submission of environmental management plans for the Project in accordance with Condition 15, Schedule 2 of NSW Development Consent SSD-4966.

This SWMP has been prepared to manage potential surface water impacts associated with the Avon North Open Cut, BRNOC, Stratford East Open Cut, Roseville West Open Cut Pit and the SMC more generally and will be updated prior to mining in the Roseville West Pit Extension.

The scope of this SWMP does not include mining operations associated with the Roseville West Pit Extension. Consequently, the indicative coal processing and production schedule for the purposes of this SWMP is provided in Table 1.

[1] A copy of the Development Consent (ant other statutory State and Federal licences and approvals) is available on the Stratford Coal Website (http://www.stratfordcoal.com.au).

[2] MLA1 is a proposed future Mining Lease Application (MLA) area as shown on Figure 2. The application for MLA1 has not yet been lodged.



YAN-17-10_MP WMP2021 MPCF_205A

LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Geoscience Australia (2006); Yancoal (2019); NSW Department of Planning & Environment (2017)

STRATFORDCOAL

Part of the Yancoal Australia Group

STRATFORD EXTENSION PROJECT

Regional Location

Figure 1

YAN-17-10_MP WMP2021 MPCF_202A

LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Orthophoto - Google Earth CNES/Airbus (2020); LPI (2016); NSW Department of Planning & Environment (2017)

STRATFORDCOAL
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STRATFORD EXTENSION PROJECT

Approved General Arrangement

Figure 2

Table 1
Indicative Coal Processing and Production Schedule – Next Six 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	Roseville West Pit					
1*	2018	0.3	0.3	0.1	0	0.6	0.1	1.4	0.5	0.9
2	2019	0.7	0.6	0.6	0.11	-	0.1	2.11	0.8	1.2
3	2020	-	0.6	0.6	0.14	-	-	1.34	0.4	0.8
4	2021	1.4				0.3	0.1	1.8	0.7	1.1
5	2022	1.1				0	0.1	1.2	0.5	0.7
6	2023	1.3				0	0.1	1.4	0.6	0.8

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

1.3 STRUCTURE OF THE SWMP

The remainder of the SWMP is structured as follows:

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

Section 3: Provides an overview of the hydrological setting.

Section 4: Presents detailed baseline data for water flows and water quality and other relevant information.

Section 5: Details the performance measures and performance indicators that will be used to assess the SMC, including cascading trigger levels and performance criteria.

Section 6: Provides a detailed description of the SMC water management system.

Section 7: Provides a description of the surface water management measures

Section 8: Describes the monitoring programs.

Section 9: Describes the process for assessment of the activities undertaken at the SMC against the performance indicators (including trigger levels), as well as the performance measures for water management and water resources.

Section 10: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

Section 11: Describes the program to review and report on the effectiveness of management measures and improvement of environmental performance over time as well as the protocol for periodic review and update of the SWMP.

Section 12: Describes the protocol for management and reporting of incidents, complaints and non-compliances with statutory requirements.

Section 13: Lists the references cited in this SWMP.

1.4 SUITABLY QUALIFIED AND EXPERIENCED PERSONS

The former NSW DP&E - Resource Assessments Director, as nominee of the Secretary, approved the appointment of Mr Anthony Marszalek and Dr Noel Merrick as suitably qualified and experienced persons for the preparation of the WMP on 10 October 2017. Mr Aaron Hagenbach was also approved as a suitably qualified and experienced person for the preparation of the WMP on 12 September 2024 by the NSW DPHI.

This revised SWMP has been prepared and reviewed by Mr Aaron Hagenbach.

1.5 CONSULTATION FOR THE SWMP

The original SWMP was provided to the NSW Environment Protection Authority (EPA) and NSW Crown Lands and Water (CL&W) (NB: Water is now within a division[3] of the NSW Department of Climate Change, Energy, the Environment and Water [DCCEEW]) for the purposes of consultation in accordance with Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966.

The NSW CL&W provided a letter dated 7 March 2018 confirming it had no comments on the SWMP. The EPA confirmed, via a letter dated 8 March 2018, that it also had no comments on the SWMP.

June 2021 SWMP Revision

As outlined in Section 7.2 of this SWMP, acid base accounting test work indicates that the Stratford East Open Cut waste rock materials are expected to be generally potentially acid forming (PAF), with PAF waste material to be selectively handled and placed either in-pit or in out-of-pit waste rock emplacement containment cells. A PAF containment cell is to be constructed within the Stratford Waste Emplacement, adjacent to the Stratford East Open Cut.

This SWMP has been updated in June 2021 to include detail regarding the Stratford Waste Emplacement PAF containment cell design and to include site water monitoring program updates. This revised SWMP was provided to the EPA and DPIE Water in June 2021 for consultation purposes as required by Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966. The EPA provided review comments on and recommendations for the revised SWMP on 16 July 2021, viz., requesting inclusion of an additional monitoring parameter in the Surface Water Monitoring Program (Table 11) and refinement of a Performance Measure (in Table 12) relevant to Avondale Creek. SCPL subsequently revised this SWMP to address the EPA's comments. A copy of the EPA's correspondence is provided in Appendix A of this SWMP. No comments on this revised SWMP (or the revised WMP) were received from the DPIE-Water. On 18 October 2021, the DPIE (Planning and Assessment division) approved the revised WMP (including this SWMP). The revision status of this SWMP is provided on the title page of this plan.

May 2025 SWMP Revision

This SWMP has since been updated in consultation with DPHI and EPA to allow for emergency releases , subject to authorisation under an EPL.

[3] NSW Biodiversity Conservation and Science Division.

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.

Obligations relevant to this SWMP are described below.

2.1 NSW DEVELOPMENT CONSENT SSD-4966

2.1.1 SWMP Requirements

Condition 32(c)(ii), Schedule 3 of NSW Development Consent SSD-4966 requires the preparation of a SWMP. Table 2 presents these requirements and indicates where they are addressed in this SWMP.

In accordance with the requirements of Condition 32, Schedule 3 of NSW Development Consent SSD-4966 (Table 1), this SWMP is included as a component of the overarching WMP (Appendix 2 of the WMP).

Table 2
SWMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this SWMP
Water Management Plan **32.** The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:	The WMP
(a) be prepared in consultation with the EPA and DPIE Water, by suitably qualified and experienced person/s whose appointment has been approved by the Secretary.	Sections 1.4 and 1.5
(b) be submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary; and	Section 11.2
(c) in addition to the standard requirements for management plans (see condition 3 of Schedule 5) include a: ...	Table 3
ii) Surface Water Management Plan, that includes: • detailed baseline data on water flows and quality in the watercourses that could potentially be affected by the development; • a detailed description of the water management system, including the: - clean water diversion systems; - erosion and sediment controls (mine water system); and - mine water management systems, including irrigation areas;	This SWMP Sections 3 and 4 Section 7.6 Sections 6, 6.1 and 6.1.2 Sections 6.1 and 7.10

Table 2 (Continued)
SWMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this SWMP
Water Management Plan (Continued)	
• detailed plans, including design objectives and performance criteria for:	
- design and management of final voids;	Section 7.7
- design and management for the emplacement of coal reject materials and potential acid-forming or sulphate-generating materials;	Sections 7.2 and 7.3
- management of sodic and dispersible soils;	Section 7.4
- diversion of the key tributary of Avondale Creek;	Section 7.7
- reinstatement of drainage lines on the rehabilitated areas of the site; and	Section 7.9
- control of any potential water pollution from the rehabilitated areas of the site;	Section 7.9
• performance criteria for the following, including trigger levels for investigating any associated potentially adverse impacts:	
- mine water management system;	Section 5.1.1
- downstream surface water quality;	Section 5.1.3
- downstream flooding impacts; and	Section 5.1.4
- stream and riparian vegetation health for the Avon River and its tributaries, including Avondale and Dog Trap Creeks;	Section 5.1.5
• a program to monitor and report on:	Sections 8 to 11
- effectiveness of the mine water management system;	
- effectiveness of the stream diversion for the key tributary of Avondale Creek;	
- surface water (with a focus on base flow and low flows) and quality in the watercourses potentially affected by the development; and	
- downstream flooding impacts;	
• reporting procedures for the results of the monitoring program; and	Section 12
• a plan to respond to any exceedances of the performance criteria, and repair, mitigate and/or offset any adverse surface water impacts of the development;	Sections 5, 8 and 10

In accordance with Condition 29, Schedule 3 of NSW Development Consent SSD-4966, no mining operation will be carried out within 40 m of Avondale Creek or Dog Trap Creek, with the exception of the construction and/or use of haul road crossings.

Riparian habitat along Avondale Creek will be improved to the satisfaction on the Secretary in accordance with Condition 30, Schedule 3 of NSW Development Consent SSD-4966.

2.1.2 Management Plan (General) Requirements

In addition to the SWMP requirements prescribed in Condition 32(c)(ii), Schedule 3 of NSW Development Consent SSD-4966, Condition 3, Schedule 5 of NSW Development Consent SSD-4966 outlines the management plan (general) requirements that are also applicable to the preparation of this SWMP.

Table 3 presents these requirements and indicates where each is addressed within this SWMP.

Table 3
Management Plan (General) Requirements

NSW Development Consent SSD-4966 Schedule 5	Section Where Addressed in this SWMP
Management Plan Requirements	
3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
(a) detailed baseline data;	Sections 3 and 4
(b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 2
• any relevant limits or performance measures/criteria;	Section 5
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any mitigation measures;	Section 5 (Table 8)
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 4 and 5
(d) a program to monitor and report on the:	Sections 5 and 9
• impacts and environmental performance of the development;	
• effectiveness of any management measures (see c above);	
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 10 and refer to WMP
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 11
(g) a protocol for managing and reporting any:	
• incidents;	refer to WMP
• complaints;	refer to WMP
• non-compliances with statutory requirements; and	refer to WMP
• exceedences of the impact assessment criteria and/or performance criteria; and	Sections 8 to 11
(h) a protocol for periodic review of the plan.	Section 11.2

2.2 COMMONWEALTH APPROVAL (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176) was granted on 29 January 2016. Water resources are a controlling provision and Commonwealth Approval (EPBC 2011/6176) includes conditions for the protection of water resources (Table 4). These conditions acknowledge and defer to the requirement for a Water Management Plan under NSW Development Consent SSD-4966.

As described in Section 1.2, this SWMP has been prepared in accordance with the requirements of Condition 4 and (where relevant the future requirements of) Condition 7 of Commonwealth Approval (EPBC 2011/6176).

Table 4
SWMP Requirements in Commonwealth Approval (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this SWMP
Additional Conditions for the Protection of Water Resources	
4. Subject to Condition 6, the water management plan required by Condition 32 of Schedule 3 to ***the Development Consent*** must:	
(a) describe and implement a surface water and groundwater monitoring programme consistent with the ***National Water Quality Management Strategy***, with sufficient spatial and temporal coverage, to:	WMP
(i) establish appropriate baseline data, performance measures, assessment criteria and trigger values required by Conditions 31 and 32 of Schedule 3 to ***the Development Consent***	Sections 3, 4 and 5
(ii) provide for detection of exceedance of trigger values as a result of the action in a manner that is quantifiable and robust (for example by comparison to baseline data and the use of ***control sites***)	Sections 5.1 and 8
Additional Conditions for the Protection of Water Resources (Continued)	
(iii) obtain the additional data needed to validate the ***numerical groundwater model*** consistent with the requirements of Condition 32(c)(iii) of Schedule 3 of the ***Development Consent***, including: • seasonal variations in groundwater levels and surface water-groundwater interaction • strata definition	GWMP
This programme must include installation of additional multi-level (nested) monitoring wells between the town of Stratford and the SMC area.	GWMP
(b) define and detail a system of ***cascading trigger values*** and corresponding treatments **Note:** ***Cascading trigger values*** must consider the potential for impacts on all relevant water-related assets, including Avondale Creek, Dog Trap Creek, and their tributaries, and private water users to the west of the SMC area.	Sections 5.1 and 6
(c) describe how the water management performance measures identified in Table 8 of Condition 31 of Schedule 3 to ***the Development Consent***, and groundwater assessment criteria in Condition 32(c)(iii) of Schedule 3 to ***the Development Consent*** will be achieved	Table 8 and GWMP
(d) in addition to the requirements of Condition 32(c)(iv) of Schedule 3 to ***the Development Consent***, prepare a protocol that gives consideration to information products as they arise from the Commonwealth Office of Water Science's Bioregional Assessment for the Gloucester Subregion. ...	WMP

Table 4 (Continued)
SWMP Requirements in Commonwealth Approval (EPBC 2011/6176)

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this SWMP
7. The person taking the action must prepare and submit to ***the Minister*** for approval a final water impact verification report. The report must: (a) demonstrate that the water within the voids will not be released to surface water or groundwater systems in the long-term (b) consider possible worst case scenarios associated with the final voids and outline contingency responses, for example, if monitoring shows a groundwater gradient from the final voids towards the alluvium (c) be based on results of recalibrated groundwater and site water balance modelling as required by Condition 32(c) of Schedule 3 of the ***Development Consent***: (i) utilises hydrological and geological data obtained during mining, including validation of the hydraulic properties of all major hydrostratigraphic units, particularly to the west of the site of the action and representation of surface-groundwater interactions (ii) applies uncertainty analysis that incorporates the potential influence of climate variability (d) demonstrate that owners of any nearby resource developments, as described in Condition 32 of Schedule 3 to ***the Development Consent***, have been consulted in preparation of the report. The report must be provided to ***the Minister*** for approval between five (5) and ten (10) years prior to the expiry of this approval. Once approved in writing by ***the Minister***, the plan must be taken into account in planning for the closure of the mine and the long-term management of the final voids.	N/A (*not required until 5-10 years prior to expiry of EPBC 2011/6176*).

2.3 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 and 1528 issued by the NSW Minister for Mineral Resources and Energy under the NSW *Mining Act, 1992*.
- Mining Operations Plan submitted and approved by the NSW Resources Regulator.
- Water supply works, water use approvals and water access licences issued by the NSW DPIE Water under the NSW *Water Management Act, 2000* including:
    - WAL 19514 in the Avon River Water Source (unregulated river) for 7 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
    - WAL 19521 in the Avon River Water Source (unregulated river) for 32 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
    - WAL 19536 in the Avon River Water Source (unregulated river) for 133 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
    - WAL 19540 in the Avon River Water Source (unregulated river) for 77 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
    - WAL 19546 in the Avon River Water Source (unregulated river) for 2 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.
    - WAL 36616 in the Avon River Water Source (unregulated river) for 20 share components under the *Water Sharing Plan for Lower North Coast Unregulated and Alluvial Water Sources 2009*.

- WAL 38268 in the Gloucester Basin Groundwater Source (aquifer) for 15 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
- WAL 38273 in the Gloucester Basin Groundwater Source (aquifer) for 5 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
- WAL 38274 in the Gloucester Basin Groundwater Source (aquifer) for 5 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*.
- WAL 38280 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 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*.

- Mining and workplace health and safety related approvals granted by the NSW Resources Regulator and SafeWork NSW.

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.

2.4 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 as described in the WMP.

In addition to the statutory obligations described in Sections 2.1 and 2.3, the following NSW Acts (and their Regulations) that are and/or may be applicable to the conduct of the SEP at the SMC include:

- *Water Act, 1912.*
- *Water Management Act, 2000.*

Relevant licences or approvals required under these Acts will be obtained as required.

3 HYDROLOGICAL SETTING

3.1 REGIONAL SURFACE WATER RESOURCES

The SMC is located in an upper catchment of the Manning River system (i.e. Avon River Water Source in the Manning Extraction Management Unit under the *Water Sharing Plan* within the NSW Lower North Coast Water Management Area). The Manning River system drains some 8,000 km^2 and extends from the Great Dividing Range to the sea near Taree (SCPL, 2012).

The Avon River is the regional surface water resource of relevance to the SMC (Figure 3). Further downstream, the Avon River flows into the Gloucester River and then the Manning River. Flows in the Avon River are unregulated and therefore water users rely on the natural flow regime for their water supplies (SCPL, 2012).

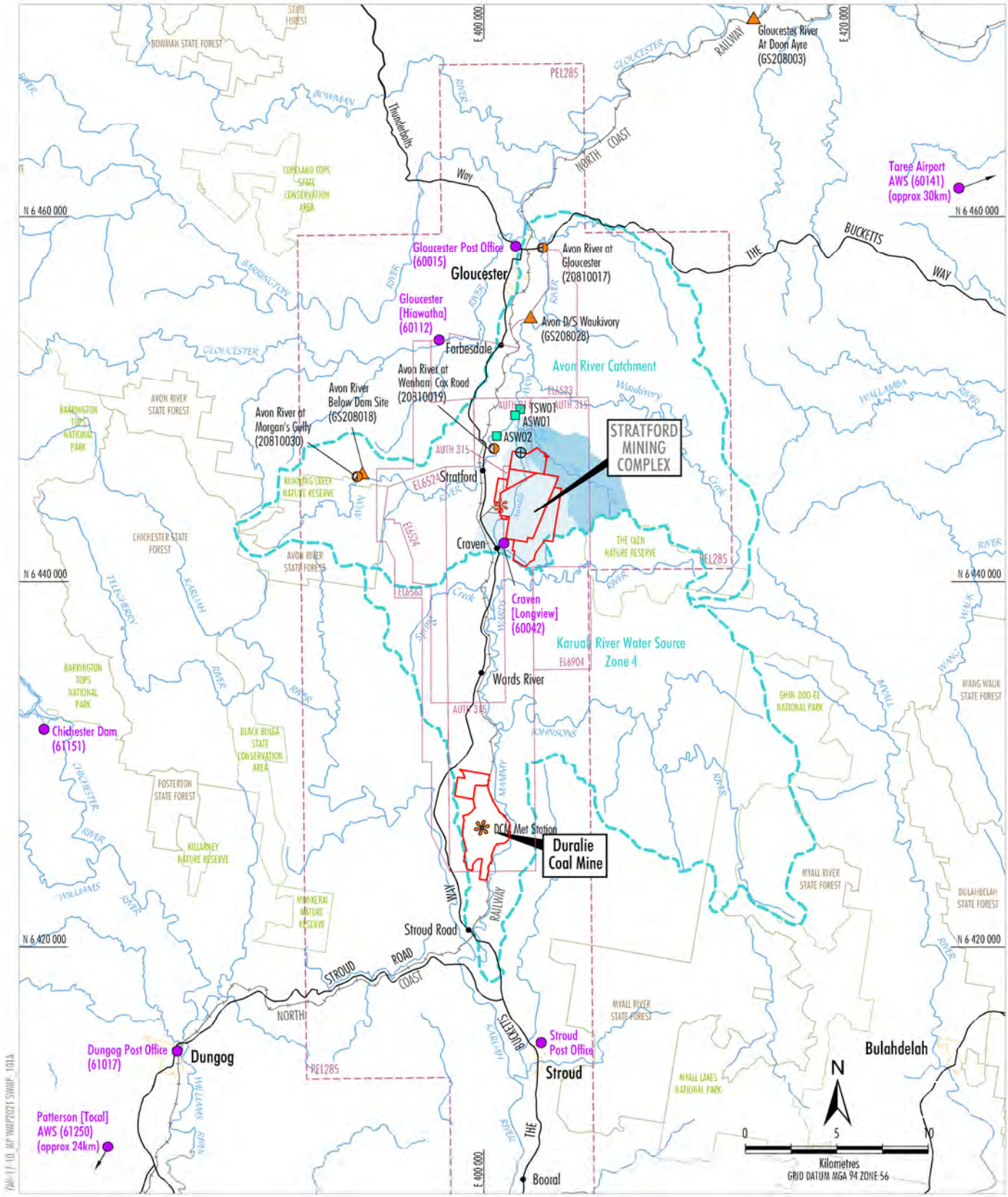
3.2 LOCAL HYDROLOGY

Local catchment drainage comprises a number of drainage lines and creeks flowing west and north-west towards the Avon River (Figure 3). Avondale Creek is a tributary of Dog Trap Creek and drains the SMC area, joining Dog Trap Creek approximately 1 km north of the SMC. Dog Trap Creek itself is a tributary of Avon River which flows northward through Gloucester (Figure 3).

As the drainage lines within the SMC area have small catchments, they typically exhibit low to zero flow for extended periods during dry weather, while heavy rainfall events result in short duration, high flow events. Groundwater seepage provides minor contributions to flows in Dog Trap Creek and Avondale Creek during periods of elevated groundwater levels that follow extended rainfall events.

A portion of the catchment reporting to Avondale Creek (27%) has already been diverted from its original flow path to be captured within the existing/approved SMC water management system to prevent mine water and sediment laden runoff entering the creek and for on-site usage. Similarly, a small portion of the catchment of Dog Trap Creek (0.9%) has also been diverted from its original flow path to be captured within the existing/approved SMC (specifically BRNOC) water management systems.

Further detail is provided in the Stratford Extension Project - Surface Water Assessment (Gilbert & Associates, 2012) available at: http://www.stratfordcoal.com.au.



Source: Geoscience Australia (2009); SCPL (2012); DECC (2011); DFS-LPI (2012); DPI-C&L [CLD] (2012); Yancoal (2019)

LEGEND

- Mining Lease Boundary
- Exploration Licence Boundary
- Petroleum Exploration Licence Boundary
- National Park, Nature Reserve or State Conservation Area
- NSW State Forest
- Catchment Boundary
- Avondale Creek Catchment
- Dog Trap Creek Catchment
- Meteorological Station
- BoM Weather Station
- DPIE Water Gauging Station
- DPIE Water Water Quality Sampling Station
- Gloucester Gas Project – Continuous Water Level and Electrical Conductivity Gauging Station

STRATFORDCOAL

STRATFORD EXTENSION PROJECT

Regional Surface Water Monitoring Locations

Figure 3

4 BASELINE DATA

4.1 METEOROLOGICAL MONITORING

Meteorological monitoring is undertaken at the SMC in accordance with the requirements of Condition 24, Schedule 3 of the NSW Development Consent SSD-4966, to the satisfaction of the EPA. The on-site weather station monitors a number of meteorological parameters, including daily rainfall and temperature, solar radiation, wind speed and wind direction.

A summary of monthly meteorological conditions is provided in the SMC Annual Reviews which are publicly available on the Stratford Coal website (http://www.stratfordcoal.com.au).

4.2 SURFACE WATER FLOWS

Flows in the Avon River are unregulated. The closest existing gauging station on the Avon River to the Project site is located downstream of the Waukivory Creek confluence (GS208028). The gauging station was commissioned in 2004 and has a contributing catchment area of 225 km^2. The estimated mean annual flow at the gauging station is approximately 35,610 ML.

A second gauging station was also operated on the Avon River further upstream at the Below Dam Site (GS208018) between 1971 and 1985. The contributing catchment of the gauging station was 26 km^2 and recorded a mean annual flow of 8,940 ML.

Streamflow in the Avon River is characterised by strong flow persistence with zero streamflow recorded on only 14% and 3% of days at gauging stations GS208028 and GS208018, respectively. Averaged over the full period of available data (approximately fourteen years), streamflow in the Avon River at gauging station GS208028 is estimated to amount to some 15% of rainfall in the contributing catchment.

The SMC is located within the Avondale Creek and Dog Trap Creek sub-catchments which ultimately flow into the Avon River.

The headwaters of Avondale Creek rise to the south-east of the SEP area. Upstream of the SMC, Avondale Creek flows to the west before draining northwards between operational areas at the SMC, and eventually joining Dog Trap Creek approximately 1 km north (and downstream) of the SEP. Within the SMC, Avondale Creek is considered an ephemeral waterway experiencing some extended periods of no or negligible flow during dry weather.

SCPL operates a stream depth monitoring station on Avondale Creek (W5) which has a reporting catchment of 20.5 km^2. Recorded data indicates that Avondale Creek exhibits rapid response to rainfall and recedes quickly following rainfall.

No streamflow data is available for Dog Trap Creek, however it is considered ephemeral experiencing some extended periods of no or negligible flow. Observation and anecdotal evidence from SCPL staff indicate that streamflow in Dog Trap Creek has similar flow characteristics to Avondale Creek within the SMC area, but less flow persistence than the lower reaches of Avondale Creek downstream of the SMC area.

4.3 SURFACE WATER QUALITY

A detailed description of baseline surface water quality data is provided in the Stratford Extension Project - Surface Water Assessment (Gilbert & Associates, 2012) and is summarised below.

Water quality monitoring data indicates that surface water quality in the vicinity of the SMC generally meets Australian and New Zealand Environmental and Conservation Council (ANZECC) livestock watering and protection guideline values (ANZECC, 2000). However, results indicate considerable variability in pH and salinity (Electrical Conductivity [EC]), with some parameters (e.g. metals) exhibiting elevated values above ANZECC guideline values during periods of low stream flow.

Table 5 presents a summary of the baseline surface water quality monitoring data collected at Avondale Creek, Dog Trap Creek and the Avon River at the SMC and surrounds.

Table 5
Baseline Surface Water Quality Ranges for Avondale Creek, Dog Trap Creek and Avon River

Parameter	Avondale Creek			Dog Trap Creek		Avondale Creek d/s of Dog Trap Creek confluence		Avon River
	SCM EIS (1994) W5	SCM EIS (1994) W6	SCPL EIS (2001) W5 & W6	SCM EIS (1994) W3	SCPL EIS (2001)[3] W3	SCM EIS (1994) W4	SCPL EIS (2001)[3] W4	SCPL EIS (2001) W1 & W2
pH	5.8 – 6.5	6.5 – 6.6	4.5 – 8.2	6.9 – 7.2	6.1 – 8.0	6.5 – 7.2	5.8 – 9.0	6.0 – 8.0
EC (µs/cm)	1,000 – 2,000	990 – 1,700	80 – 13,000	510 – 650	85 – 960	520 – 800	100 – 2,390	65 – 1,260[5]
TSS (mg/L)	<0.01 (2 samples)	3 – 15 (2 samples)	<1 – 15,000	< 1 (1 sample)	<1 – 320	4 (2 samples)	<2 – 220	58.5 – 819
TDS (mg/L)	750 – 1,430	620 – 1,030	70 – 7,200	210 – 460	54 – 614[4]	260 – 480	64 – 1,530[4]	1 – 1,500[5]
Turbidity (NTU)	-	-	4 – 280	-	1.8 – 120	-	2 – 146	2 – 575
Chloride (mg/L)	362 – 853	272 – 629	21 – 4,400	73 – 1774	12 – 232	108 – 198	15 – 470	20 – 313[5]
Sulphate (mg/L)	21 – 28	<1 – 19	<1 – 280	2 – 18	<1 – 32	9 – 18	<1 – 400	<1 – 100[5]
Iron (filtered) (mg/L)	<0.01 – 0.16	0.04 – 0.33	<0.01 – 16	<0.01 – 0.09	<0.001 – 1.3	0.07 – 0.16	<0.01 – 2.2	<0.01 – 2.1
Total Nitrogen (mg/L)	1.0 – 1.6	2.0 (2 samples)	<1 – 26	0.7 – 3 (2 samples)	<1 – 31	1.7 – 31 (2 samples)	1.7 – 31	<1 – 23
Total Phosphorus (mg/L)	<1 (2 samples)	<1 (2 samples)	<0.1 – 3.1	<1 (2 samples)	<0.1 - 2	<1 (2 samples)	<0.3 – 0.5	<0.1 – 0.4

1 Source: Gilbert & Associates Pty Limited (2010a).

2 Source: SCPL (2001).

3 Site W3 and W4 data reported in SCPL (2001) were amalgamated. The data range reported here has been obtained from the SCM database for the period up to late 2000.

4 No TDS data available, TDS calculated from EC.

5 Latest sampling results taken on 14/11/00 and 25/10/00 respectively.

d/s = downstream

The available data for Avondale Creek and Dog Trap Creek indicate that the local surface water resources are generally characterised by near neutral pH conditions. Recorded EC of local surface waters is generally low with the exception of the downstream sections of Avondale Creek due to the outcropping/sub-cropping of coal seams within the catchment and associated slow seepage of more saline groundwater into the creek. However, the average EC levels are below the ANZECC (2000) guideline value for the protection of aquatic ecosystems.

Consistent with long-term water quality records for the Avon River, average total nitrogen and total phosphorus concentrations are elevated in local surface waters relative to ANZECC and ARMCANZ (2000a) guideline values for the protection of aquatic ecosystems.

Avon River exhibits generally good water quality with low levels of salinity (µs/cm) (217 to 670 (µS/cm) relative to the ANZECC (2000) guideline values for protection of aquatic ecosystems.

The highest turbidity levels (typically derived from non-mining land use practices, such as stream bed and bank erosion, or access by livestock) were recorded in the mid-sections of the Avon River.

Total nitrogen and total phosphorus concentrations measured in the Avon River (typically sourced from agricultural runoff and in-stream processes) have been elevated relative to ANZECC (2000) guideline values for protection of aquatic ecosystems (SCPL, 2012).

4.4 GEOCHEMISTRY INFORMATION

Waste Rock

The Geochemistry Assessment concluded that the waste rock materials generated from three of the four open cut mining areas at the SMC would generally be expected to be non acid forming (NAF), with the exception of a small quantity of overburden immediately adjacent to some of the coal seams in the Avon North Open Cut. The acid base accounting test work indicates that the Stratford East Open Cut waste rock materials would be expected to be generally potential acid forming (PAF), with some PAF-LC (potential acid forming – low capacity) and NAF materials also expected to be present (EGi, 2010).

CHPP Rejects

Results of the geochemical investigations to date show that most co-disposed rejects and tailings materials represented by the samples tested from the Stratford Main Pit deposition area are PAF or PAF-LC, with low 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 is likely to be associated with elevated metal concentrations, including Al, Fe, Mn, Ni and Zn (EGi, 2010).

The CHPP reject 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). Implementation of appropriate management measures are required at the SMC to minimise impacts of potential acid forming characteristics of the co-disposed rejects and tailings on surrounding water systems and are described in Section 5.1.5.

5 PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

Table 8 in NSW Development Consent SSD-4966 prescribes the water management performance measures for the SMC (Appendix A).

SCPL will assess the SMC against the specific water management performance indicators outlined in Table 6.

Table 6
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Water Management - General • Minimise the use of clean water on site. • Maximise as far as reasonable and feasible the separation of clean and dirty water within the site.	The water management system is constructed and maintained generally in accordance with the design described in Sections 6 and 7 and the SWB.
Construction and Operation of Linear Infrastructure • Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1, Volume 2A – Installation of Services* and *Volume 2C – Unsealed Roads*. • Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land (July 2012)*, or its latest version. • Design, install and maintain creek crossings generally in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries 2003)* and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003)*, or their latest versions.	The erosion and sediment controls are constructed and maintained generally in accordance with the design described in Sections 6 and 6.1.2. Infrastructure within 40 m of watercourses are constructed and maintained generally in accordance with the design described in Sections 6 and 7. Creek crossings are constructed and maintained generally in accordance with the documents described in Sections 6 and 7.
Mine Sediment Dams • Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* and *Volume 2E – Mines and Quarries*.	Sediment dams are constructed and maintained generally in accordance with the design described in Section 6.1.2.
Clean Water Diversion and Storage Infrastructure • Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site. • Design, install and maintain the clean water system to capture and convey the 1 in 100 year ARI flood.	The water management system is constructed and maintained generally in accordance with the design described in Section 7.6 and the SWB.
Stream Diversion of Tributary of Avondale Creek • Design, install and maintain the tributary diversion to convey the modelled peak water flows of its altered catchment. • Establish and maintain geomorphic stability of the diversion channel using appropriate revegetation and stabilisation techniques. • Demonstrate that the channel is appropriately vegetated and stabilised prior to the release of flows into the diversion channel. • Control water flows entering the diversion channel by the construction of a stormwater detention basin.	The stream diversion of tributary of Avondale Creek is constructed and maintained generally in accordance with the design described in Section 7.7.

Table 6 (Continued)
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Mine Water Storages and Out-of-pit Emplacement of Potentially Acid-Forming Materials • No discharges to surface waters. • Adequate freeboard to minimise the risk of discharge to surface waters.	Water management infrastructure (including mine water storages) and PAF materials in out-of-pit emplacements are constructed and maintained generally in accordance with the design described in Section 6.1 and the SWB.
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 and PAF materials are managed generally in accordance with the methodologies described in Sections 7.2 and 7.3 and the GWMP and SWB (i.e. adequate freeboard).
Chemical and Petroleum Storage • Chemical and hydrocarbon products to be stored in bunded areas in accordance with relevant Australian Standards.	Chemical and hydrocarbon storages will be constructed and maintained in accordance with the relevant Australian Standards (refer Section 6.1.3).
Aquatic and Riparian Ecosystem, in the Avon River and its Tributaries, particularly Avondale and Dog Trap Creeks • Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and *Using the ANZECC Guidelines and Water Quality Objectives in NSW (DECC 2006)*, or their latest versions.	Site-specific in-stream WQOs are developed as described in Section 5.1.3.

Note: The SWB and GWMP are included in Appendices 1 and 3 of the WMP.

The performance indicators in Table 6 will be used to assess and manage the potential risks associated with the SMC to ensure that there are no exceedances of the performance measures.

5.1 CASCADING TRIGGER LEVELS

Each of the cascading trigger levels described in the following sub-sections will be applied during the process of assessment against the performance indicators and measures as detailed in Section 9.

5.1.1 Mine Water Management System

The specific performance indicator to ensure there is a negligible risk of spill from the Stratford Main Pit during operations (i.e. to meet the performance measure for no discharge to surface waters and to maintain adequate freeboard) is as follows:

- water level increases in Stratford Main Pit are generally consistent with predictions over time.

The corresponding cascading trigger levels will apply if the water levels in Stratford Main Pit were to exceed the modelled risk of spill levels (i.e. 1%, 2%, 5% and 10%) during the course of mining the Avon North Open Cut and Stratford East Open Cut for the forward predictions (i.e. end of Year 1, end of Year 3 and end of Year 5). Further details regarding the application of the trigger levels are provided in Section 9.

5.1.2 Surface Water Flows (Baseflow and Low Flows)

Avondale Creek and Tributaries

Within the SMC area, Avondale Creek is an ephemeral waterway experiencing some extended periods of no or negligible flow during dry weather.

SCPL operates a stream depth and EC monitoring station on Avondale Creek (W5) which has a reporting catchment of 20.5 km^2. Recorded data indicates that Avondale Creek exhibits rapid response to rainfall and recedes quickly following rainfall.

Therefore no cascading trigger levels for flows are proposed. Notwithstanding, monitoring data will continue to be reviewed periodically with visual observations to identify if any unexpected flow behaviour due to mining activities was to occur.

Dog Trap Creek and Tributaries

No streamflow data is available for Dog Trap Creek, however flow has been observed by site personnel to be ephemeral experiencing extended periods of no or negligible flow. Observation and anecdotal evidence from SCPL staff indicate that streamflow in Dog Trap Creek has similar flow characteristics to Avondale Creek within the SMC area, but less flow persistence than the lower reaches of Avondale Creek downstream of the SMC area. Dog Trap Creek adjacent the SMC comprises a much more tightly meandering, well defined, incised channel, in contrast to Avondale Creek.

No cascading trigger levels for flows are therefore proposed. Notwithstanding, visual observations will be used to identify if any unexpected flow behaviour due to mining activities was to occur.

Private Water Users (West of the SMC)

Consistent with the Secretary's approval for the progressive submission of environmental management plans, the scope of this SWMP does not include mining of the Roseville West Pit Extension and therefore corresponding trigger levels for private water users (west of the SMC) are not currently proposed.

Management Measures / Treatments

The surface water runoff control structures designed to prevent up-catchment runoff water from entering open cut mining operational areas are described in Section 7.1. The potential for flooding in the SMC area to impact on mine infrastructure will continue to be managed through the construction of levees around mine operational areas and the maintenance of existing flood control embankments.

5.1.3 Downstream Surface Water Quality

Avondale Creek, Dog Trap Creek and Tributaries

Site-specific in-stream WQOs have been considered in the development of the trigger levels (in accordance with the performance measures) (Section 9). However, as no more than a negligible impact on water quality in Avondale Creek is predicted, the specific performance indicator is therefore targeting significant 'changes' in water quality of downstream waters as follows:

- no significant decline in water quality at W4 (i.e. Dog Trap Creek downstream of Avondale Creek confluence) or W3 (Dog Trap Creek upstream of Avondale Creek confluence).

Water quality sampling and analysis will be undertaken using the following parameters for investigation:

- Electrical Conductivity (EC);
- pH;
- Filtered Iron (Fe); and
- Sulphate.

The corresponding cascading trigger levels (Section 9) will apply if the select water quality parameters at W3 or W4 were to exceed the 12 month mean plus 1.5 and 2 standard deviations (based on log transformed data) and the same indicator has not been exceeded at upstream control site(s). Further details regarding the application of the trigger levels are provided in Section 9.

Private Water Users (West of the SMC)

Consistent with the Secretary's approval for the progressive submission of environmental management plans, the scope of this SWMP does not include mining of the Roseville West Pit Extension and therefore corresponding trigger levels for private water users (west of the SMC) are not currently proposed.

Management Measures / Treatments

Erosion and Sediment Control

Erosion and sedimentation at the SMC could potentially result directly or indirectly from:

- runoff from areas disturbed in advance of, and during mining;
- runoff from topsoil stockpiles and waste rock emplacements prior to rehabilitation;
- runoff from rehabilitated areas prior to adequate stabilisation of the revegetated surface;
- runoff from infrastructure areas; and
- runoff from access and haul roads and rail embankments.

In addition to the above, elevated winds may also result in erosion from exposed surfaces. Management measures for wind erosion are provided in SCPL's Air Quality Management Plan.

The primary objectives of the erosion and sediment control strategy at the SMC are to:

- minimise and control soil erosion and sediment generation in areas disturbed by ongoing mining and construction activities; and
- minimise the potential for mine related activities to lower the water quality (particularly in terms of total suspended solids content) of downstream local watercourses.

Control strategies for soil erosion and sediment migration for the SMC are described in Section 6.1.2.

5.1.4 Flooding

No impacts on downstream flooding are predicted for the SMC. However, there is flood water inundation potential in the SMC area during major floods. This inundation potential is controlled by the hydraulic capacity of the existing Avondale Creek haul road crossing, causing water to back-up on the upstream side (i.e. afflux).

Flood modelling of the peak 1:100 annual exceedance probability (AEP) flow indicates that afflux of 1 centimetre (cm) to 2 cm are predicted upstream of the existing haul road crossing adjacent the CHPP within Yancoal-owned lands. It is therefore considered unlikely that any discernible 1:100 AEP peak flow flood level increases will extend upstream of Yancoal-owned land and corresponding trigger levels are not proposed.

Downstream of Stratford, a constriction (i.e. narrowing) of the otherwise 1 to 1.5 km wide valley floodplains of the Avon River occurs near the confluence with Dog Trap Creek, and is likely to control flood levels in the areas immediately upstream. Further downstream of this point the valley widens substantially with more extensive flood plains and remnant river channel lakes evident.

Within the SMC area, the two existing haul road crossings of Avondale Creek cause localised increases in creek levels upstream of these crossings during high flows. Hydraulic design and modelling of these crossings and associated flood bunding has been commissioned by SCPL in order to design flood mitigation measures (including bunding) to reduce the risk of flooding of mine areas, with design based on a 1:1,000 AEP flow event.

5.1.5 Stream Ecology and Riparian Vegetation Health for the Avon River and Tributaries

Avondale Creek and Dog Trap Creek

Specific performance indicators to ensure there is no significant impact on aquatic ecosystems and biota and there is no more than negligible impact on riparian vegetation along Avondale Creek, as a result of the SMC, are as follows:

- no significant change in biotic indices at M1, M2, M3, M5, M8 and S3;
- no observations of significant vegetation desiccation and/or dieback at M1, M2, M3, M8 and S3; and
- riparian habitat along Avondale Creek is improved to the satisfaction (i.e. approval) of the Secretary in accordance with Condition 30, Schedule 3 of NSW Development Consent SSD-4966.

Management Measures / Treatments

SCPL's Mining Operations Plan/Rehabilitation Management Plan describes the measures that will be undertaken by SCPL to rehabilitate creeks and drainage lines in the vicinity of the SMC. Additionally, SCPL's Biodiversity Management Plan describes the drainage lines (including the upper reach of Avondale Creek and two reaches of the Wards River) that will be subject to conservation and enhancement as part of implementation of the SMC biodiversity offset strategy.

6 WATER MANAGEMENT SYSTEM

The objectives of the on-site water management system throughout the life of the SMC are outlined within Section 4 of the WMP. The aspects of the water management system of particular relevance to the SWMP are to:

- maintain separation between runoff from areas undisturbed by mining and water generated within active mining areas;
- minimise the potential for uncontrolled overflow of contained water storages;
- provide a reliable source of water to meet the requirements of the SMC.

The SMC water management system operates under a surplus water balance, with a trend for increasing water storage on-site over time. The majority of water used on-site is in the CHPP and recovery of water for re-use in the CHPP (i.e. recycling of CHPP process waters) is the largest component of the overall supply system (Gilbert & Associates Pty Limited, 2012).

The key components of the water management strategy at the SMC are (SCPL, 2012):

- water management storages;
- diversions of runoff from catchment areas upslope of the mine disturbance area (i.e. upslope diversions);
- runoff control structures and devices on disturbed and rehabilitated areas at the mine;
- procedures, structures and devices for the control of erosion and sediment movement including suitably designed sediments dams;
- capture and on-site containment of mine water and open pit dewatering equipment;
- procedures and equipment for the reuse of captured and contained mine water for dust suppression (haul roads, mine waste emplacement surfaces), CHPP supply and irrigation; and
- sewage treatment plants and a system for the disposal of effluent.

The integrated water management system for the SMC will be progressively developed as water management requirements change over time.

Similarly, consistent with the relevant performance measures (Section 5):

- any infrastructure within 40 m of watercourses will be designed, installed and maintained generally in accordance with the *Controlled Activities on Waterfront Land – Guidelines for Riparian Corridors on Waterfront Land* (DPI Water, 2012a), or its latest version; and
- any creek crossings will be designed, installed and maintained generally in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI Fisheries NSW, 2013) and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings* (Fairfull, S. and Witheridge, G., 2003), or their latest versions.

Water from sediment control dams will be preferentially used in SMC related activities and is only released in a manner that minimises change to downstream turbidity in accordance with EPL 5161.

Further and more specific details of the water management system are provided in the SWB (Appendix 1 of the WMP).

6.1 WATER STORAGES AND RELATED INFRASTRUCTURE

6.1.1 Mine Water (Contained Water) Storages

Water stored on-site includes incident rainfall-runoff generated from operational areas at the SMC and (lesser) groundwater inflows to the mine workings.

Contained water storages at the SMC include (Figure 2):

- **Stratford Main Pit** which 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).
- **Return Water Dam** which has a design (as-built) capacity of approximately 512 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.
- **Parkers/Bowens Road West Pit void** which 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.

The above contained water storages and associated water transfer systems and operational protocols have been designed to maintain adequate freeboard to minimise the risk of discharge of mine waters. Based on the system design, the site water balance (Appendix 1 of the WMP) does not predict any discharges to surface waters in accordance with the water management performance measure. The existing open cut voids also provide significant additional on-site containment capacity if required for water storage.

6.1.2 Stratford East Dam

The Stratford East Dam has a capacity of up to approximately 2,872 ML and the depth of the lake is less than 20 m at its deepest location at the invert of original unnamed minor stream. Stratford Eat Dam was used as a mine water storage until 2003, after which no further direct mine water transfers to the dam occurred. Since 2003 the dam has been used to capture run-off from rehabilitation and mine landforms irrigated for the purposes of managing surplus waters stored in accordance with Condition 28, Schedule 3 of NSW Development Consent SSD-4966 (and Conditions L1.3 and L1.4 of NSW EPL 5161).

A comparison of available surface water quality records for Stratford East Dam prior to use for mine water storage (i.e. pre-1997), during mine water storage (1997-2003), and in recent years (i.e. since the March 2021 rainfall-runoff events which included in the NSW east coast flood events) is presented in Table 7 for pH, EC and TSS.

Table 7
Summary of Water Quality Data for the Stratford East Dam

Period of Record (Use)	Statistics	pH	EC (µS/cm)	TSS (mg/L)
25 August 1995-23 December 1996 [Incident Rainfall-Runoff: Construction - Prior to Mine Water Storage]	20th Percentile	6.6 (37)	-	-
	Average (Mean)	7.0 (37)	245 (36)	373 (8)
	80th Percentile	7.3 (37)	272 (36)	402 (8)
9 January 1997-16 December 2003 [Mine Water Storage]	20th Percentile	7.4 (92)	-	-
	Average (Mean)	7.9 (92)	2,015 (94)	14 (18)
	80th Percentile	8.4 (92)	2,294 (94)	24 (18)
20 January 2004-26 February 2021 [Output to Irrigation of Rehabilitated Landforms: No Direct Mine Water Inputs]	20th Percentile	7.8 (183)	-	-
	Average (Mean)	8.2 (183)	1,255 (183)	<5 (53 of 80)*
	80th Percentile	8.7 (183)	1,502 (183)	10 (of 27 >LOR)
30 March 2021-26 March 2025 [Rainfall-Runoff Capture; Rehabilitated Landforms]	20th Percentile	8.2 (49)	-	-
	Average (Mean)	8.5 (49)	700 (49)	<5 (37 of 49)*
	80th Percentile	8.7 (49)	744 (49)	8 (of 12 >LOR))

Source: SCPL (2025)
() Number of measurements in parentheses.
* Median statistic presented where limit of reporting (LOR) values > 50% of measurements, 80th %ile only presented for records beyond LOR.

6.1.3 Chemical and Hydrocarbon Storages

Consistent with the relevant performance measures (Section 5), chemical and hydrocarbon products will be stored in bunded areas in accordance with the relevant Australian Standards, including AS 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids*.

7 WATER MANAGEMENT MEASURES

7.1 EROSION AND SEDIMENT CONTROL

Erosion and Sediment Control Strategy

The primary objectives of the erosion and sediment control at the SMC are to:

- minimise and control soil erosion and sediment generation in areas disturbed by ongoing mining and construction activities; and
- minimise the potential for mine related activities to lower the water quality (particularly in terms of total suspended solids content) of downstream local watercourses.

Control strategies for soil erosion and sediment migration for the SMC include:

- Maximum separation of runoff from disturbed and undisturbed areas.
- Construction of sediment dams downstream of disturbed areas to contain runoff up to specified design criteria (refer *Design Criteria* below).
- Subsequent priority use of these waters in SMC related activities and/or natural controlled release to substantial buffer zones in a manner that minimises the potential for change to downstream turbidity.
- Selective use of benign flocculants such as gypsum to assist in the settlement of suspended solids if required.
- Construction of surface drains to facilitate the efficient transport of surface runoff.
- Construction of silt fences downslope of disturbed sites.
- Rapid and progressive stabilisation of disturbed surfaces.

A description of topsoil management strategies implemented at the SMC is provided in SCPL's Mining Operations Plan/Rehabilitation Management Plan.

Construction activities will generally occur in the following order:

1. Construction of diversion drains (typically upslope of disturbance areas).
2. Installation of silt fences and temporary sediment traps in overland flow areas downslope of disturbance areas.
3. Construction of sediment dams on drainage lines downslope of disturbance areas.
4. Construction of collection drains to convey runoff to sediment dams.
5. General construction works will only take place once all erosion and sediment control measures are in place to the satisfaction of the Environmental Superintendent.

Design Criteria

Two types of sediment control structures form part of the water management system at the SMC.

- Disturbed Area Dams; and
- Sediment Dams.

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

Disturbed Area Dams

In addition to existing contained water storages, disturbed area dams will 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 will be sized consistent with the sizing criteria for existing sediment dams at the SMC (Table 8), with pumped transfer of accumulated water back to contained water storages.

Sediment Dams

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

Water to be released from the designated sediment dams shall achieve:

- a pH range of 6 to 8.
- <50 mg/L of total suspended solids, and
- no visible oil and grease.

All water outside the above requirements will be appropriately treated to meet the requirements prior to release.

Sediment dams will be maintained until such time as they are no longer required (such as when vegetation successfully establishes on topsoiled areas and where runoff has similar water quality characteristics to areas that are undisturbed by mining activities).

Design criteria for sediment control structures are summarised in Table 8.

Table 8
Sediment Control Structures – Design Criteria

Sediment Control Structure	Function	Design Capacity
Temporary Diversion drains	Reduce runoff from undisturbed areas onto disturbed areas.	1:20 AEP peak flow.
Permanent Diversion drains	Reduce runoff from undisturbed areas onto disturbed areas.	1:100 AEP peak flow.
Collection drains	Intercept and convey disturbed area runoff water to sediment dams.	1:20 AEP peak flow.
Sediment dams	Settlement of sediments in runoff from topsoiled/partially rehabilitated mine areas Temporary containment of runoff from topsoiled/partially rehabilitated mine areas prior to release off-site.	Sufficient volume to store runoff from the 90th percentile five-day duration rainfall event (38.6 mm of rain)[1] above the normal operating level[2,3].
Disturbed area dams	Settlement of sediments in runoff from disturbed areas. Temporary containment of runoff from disturbed areas prior to reuse and/or gradual controlled release to grassed buffer zones.	Sufficient volume to store runoff from the 90th percentile five-day duration rainfall event (38.6 mm of rain)[1] above the normal operating level[2,4].

1 Assuming a runoff coefficient of 0.64 for 'pervious' areas and 0.9 for 'impervious' areas.

2 Normal operating level is the level above the minimum level at which water can be removed from the storage using the operational dewatering equipment plus the allowance for sediment storage (determined in accordance with Landcom [2004] & DECC [2008c]).

3 Gauge markers will be installed in each sediment basin to show the sediment-laden water storage depth, to provide an indication when the retention volume maximum is exceeded.

4 Gauge boards (with board levels surveyed relative to spillway level) will be installed in each disturbed area dam.

Sediment control structures (i.e. sediment dams and disturbed area dams) are designed to spill if a rainfall event exceeds the specific design criteria for the structure. Where the discharge occurs solely as a result of rainfall in excess of the design criteria this is not considered a non-compliance.

In addition to the control strategies for soil erosion and sediment migration described above, the following measures will also be adopted:

- Review and approval (by the Environmental Superintendent) of construction environmental management plans prepared by Contractors responsible for construction works.
- Minimisation of surface disturbance and restriction of access to undisturbed areas.
- Sediment dams will be dewatered within 5 days of a runoff-generating rainfall event to re-establish the design containment capacity.
- Outlets of collection and diversion drains are to bedrock lined in order to prevent localised erosion.

Sediment dams will generally be dewatered to well-grassed areas where a sufficient grassed buffer exists to reduce the transfer of sediments to watercourses. This is required in order to drain the sediment dam within 5 days of a runoff event and reinstate its capacity of the dam to capture the design event, as required for 'Type F Basins' in accordance with Landcom (2004) (Section 6.3.4 [j] [i]).

This will be undertaken by SCPL in order to ensure dewatering occurs in a manner that does not cause erosion. The release will involve siphoning water from the sediment dam to a downstream point using a small diameter pipe or by low rate pumping, also using a small diameter discharge pipe. The low flow rate reduces the energy of the discharge flow and erosion risk at the discharge point (Landcom, 2004).

To further mitigate the risk of erosion at the discharge point, release will typically occur to a well-grassed area downstream of the sediment dam (Landcom, 2004). Discharging to a well-grassed area reduces the velocity of flow and ensures that the discharge area is naturally armoured (by the grass cover) (Landcom, 2004). Discharging regularly to the same area promotes grass growth, thereby ensuring stability of the discharge point. The grass also acts as a filter to further remove any residual sediment (Landcom, 2004). Discharge to bare soil areas will not be undertaken at the SMC.

7.2 MANAGEMENT OF POTENTIALLY ACID-FORMING MATERIALS

The Geochemistry Assessment (EGi, 2012) concluded that the waste rock materials generated from three of the four Project open cut mining areas are likely to be NAF, with the exception of a small quantity of overburden immediately adjacent to some of the coal seams in the Avon North Open Cut. The acid base accounting test work indicates that the Stratford East Open Cut waste rock materials are expected to be generally PAF, with some PAF-LC and NAF materials also expected to be present.

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 when pyritic material is present (Environmental Geochemistry International Pty Ltd, 2012).

As described in Section 1.2, the mine plan sequence for the scope of this SWMP includes the completion of the BRNOC and development of the Avon North Open Cut and 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, upon commencement of mining in the Stratford East Open Cut, PAF waste rock material will be segregated and selectively handled and then placed in either in-pit (below the predicted final water table recovery level) or out-of-pit waste rock emplacements (PAF waste cells).

During operations, limestone will 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 (SCPL, 2012). Limestone application would be at a rate of at least 20 tonnes calcium carbonate per hectare [$CaCO_3$/ha]), however this rate may be subject to change based on ongoing geochemical characterisation and investigations, and monitoring program results.

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

Condition O6.14 of the SMC's Environmental Protection Licence 5161 requires EPA approval of the location and design of out-of-pit PAF material containment cells. An out-of-pit PAF material containment cell is proposed to be constructed within the Stratford Waste Emplacement (refer Figure 4 in Section 8.7) to receive PAF waste rock material mined from the adjacent Stratford East Open Cut. Detailed designs of the containment cell and the cell capping layer have been prepared by ATC Williams Pty Ltd (2020a and b) and were provided to the EPA in October 2020.

After topsoil stripping and excavation of existing NAF waste rock material, construction of the containment cell and capping layer will generally involve (ATC Williams Pty Ltd, 2020a and b):

- using moisture conditioned and compacted clay fill material to construct the cell basal liner, batter liner and upstream embankment liner;
- testing of clay fill material to confirm compliance with compaction standard specifications;
- tipping PAF material into cell in low lifts followed by compaction to minimise risk of accelerated oxidation;
- treatment of the emplaced PAF material with limestone for temporary control of acid generation;
- placement of a geotextile separation layer over the emplaced PAF material;
- capping the emplaced PAF material (above the geotextile layer) with 1 m of low permeability clay material;
- covering the clay capping layer with approximately 10 m of NAF waste rock material; and
- conducting 'as built' verification reporting to confirm the cell and capping layer have been constructed as per design specifications.

As the underlying topography below the containment cell (i.e. the base of the Stratford Waste Emplacement) is directed to the Stratford Main Pit, in the event any leachate is generated from the cell, leachate would be directed to the pit.

Additional geochemical characterisation and investigation will be undertaken over the life of the SMC, including waste rock/roof rock PAF/NAF distribution modelling.

SCPL will continue to monitor the water quality of contained water storages (i.e. pH and solute concentrations) during the life of the SMC as part of the existing surface water monitoring program. If in the event acid rock drainage is identified through the surface water monitoring program, specific acid rock drainage controls will be implemented.

7.3 MANAGEMENT OF CHPP REJECTS

The disposal of CHPP rejects at the SMC will continue to be managed in accordance with the Life of Mine Rejects Disposal Plan (2018) with appropriate updates to reflect the approved extensions to the SMC. The CHPP rejects will continue to be disposed either subaqueously or subaerially and below the estimated post-mining groundwater level. CHPP rejects that are deposited subaerially will be treated with limestone prior to inundation, in accordance with Life of Mine Rejects Disposal Plan (2018) which is available online (http://www.stratfordcoal.com.au).

The Stratford Main Pit will continue to be used for co-disposal of CHPP rejects. Following completion of mining in the Avon North Open Cut in the future, the void will be made available as a new co-disposal area where required.

Limestone treatment will continue to be undertaken on CHPP reject material that is deposited subaerially in the Stratford Main Pit (and eventually the Avon North Open Cut), in accordance with SCPL's Life of Mine Rejects Disposal Plan (2018).

A review of the physical characteristics (e.g. density and particle fractions) of the CHPP rejects was undertaken by Allan Watson Associates (2012) for the SCPL (2012) *Stratford Extension Project Environmental Impact Statement* (SEP EIS). The results of the review have been used to assist with sensitivity analyses for the site water balance performance (Appendix 1 of the WMP), as significant volumes of water can be recycled from the co-disposal areas.

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.

Further details and relevant performance criteria for the rehabilitated reject disposal area are provided in SCPL's Mining Operations Plan/Rehabilitation Management Plan in accordance with Condition 55, Schedule 3 of NSW Development Consent SSD-4966 (refer Section 6, and the detailed plans provided in, SCPL's Mining Operations Plan/Rehabilitation Management Plan).

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

Regular monitoring is conducted to confirm the appropriateness of the CHPP reject management procedures outlined above (Section 8). In the event that monitoring indicates that additional management measures are required, 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.

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

7.4 MANAGEMENT OF SODIC AND DISPERSIBLE SOILS

A description of topsoil management strategies implemented at the SMC is provided in SCPL's Mining Operations Plan/Rehabilitation Management Plan.

Management of sodic and dispersible soils will be considered during evaluation of the application of topsoil and addition of lime and gypsum, prior to seeding and the behaviour of placed soil over time (i.e. erosion or dispersion, compaction, salting or hard setting) as a component of the Mining Operations Plan/Rehabilitation Management Plan.

Detail on the management of sodic and dispersive soils will be included in a later version of this SWMP in accordance with the progressive submission of environmental management plans for the SMC as approved by DPIE in accordance with Condition 15, Schedule 2 of NSW Development Consent SSD-4966.

7.5 HAUL ROAD CREEK CROSSINGS

As described in the SEP EIS, a haul road crossing, and associated culvert, over Avondale Creek linking the BRNOC and the Roseville West Pit (Figure 2) is scheduled to be constructed in 2022. The design and construction of the haul road crossing and culvert, and any future haul road crossings and culverts, will consider the NSW Natural Resources Access Regulator's Guidelines for Controlled Activities on waterfront land, including the *Guidelines for watercourse crossings on waterfront land* (NSW Office of Water [NOW], 2012a) and *Guidelines for instream works on waterfront land* (NOW, 2012b), or their latest versions.

7.6 UP-CATCHMENT DIVERSION SYSTEMS (CLEAN WATER DIVERSION SYSTEMS)

The SMC water management system will control waters generated from surface development areas while minimising the capture of surface water runoff by diverting up-catchment runoff around such areas. The water management system will include a combination of permanent structures (that will continue to operate post closure) and temporary structures (that will only be required until the completion of rehabilitation works [e.g. sediment control structures]).

Temporary and permanent up-catchment diversion bunds/drains and interception dams will continue to be constructed over the life of the SMC to divert runoff from undisturbed areas around the open pits and waste rock emplacements. For the scope of this SWMP, the diversions will comprise progressive development of:

- a diversion bund/drain to the east of the Avon North Open Cut; and
- diversion bunds/drains to the east of the Stratford East Open Cut.

Avon North Open Cut

An eastern diversion will 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.

Stratford East Open Cut

Extensions to the existing eastern diversion drains/bunds upslope of the Stratford East Dam will be constructed progressively in advance of the Stratford East Open Cut mining operation 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, an additional eastern diversion will be constructed to divert up-catchment runoff (from the foothills to the east) to the south, reporting to the headwaters of Avondale Creek.

7.7 TRIBUTARY OF AVONDALE CREEK

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

As described in Section 7.1 and 7.6, the extensions to the eastern diversion in advance of the Stratford East Open Cut mining operation will 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).

The diversion extensions will 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) (Gilbert & Associates, 2012).

Management Measures / Treatments

Prior to diversion of the 600 m section of the tributary of Avondale Creek adjacent to the Avon North Open Cut, an investigation will be undertaken to determine the overall performance of the tributary of Avondale Creek along its length (via survey) to inform the final design.

Prior to extension of the existing eastern up-catchment diversion for the Stratford East Open Cut, the longitudinal profile of the tributary of Avondale Creek will be surveyed from the diversion outlet to the junction of Avondale Creek, to define the location and size of all knickpoints (e.g. gully head erosion points). This survey will also include cross-section surveys at approximately 50 m spacings. The survey will be repeated every two years, with survey data interpreted by a qualified, independent fluvial geomorphologist to determine whether any measured change is within the normal range of variability, or whether a programme of works is required to stabilise the drainage.

7.8 MANAGEMENT OF FINAL VOID WATER

The approved final landform includes three final voids, located within the Stratford East Open Cut, Avon North Open Cut and the Roseville West Pit Extension. Once mining operations cease the voids will gradually begin to fill with water.

Post-mining inflows to the final voids will comprise three contributing sources:

- incident rainfall;
- runoff (albeit from a reduced reporting catchment); and
- groundwater inflows (reducing with time from the porous rock groundwater system as it recovers and adjacent waste rock emplacement infiltration).

Water will be lost from the final voids through evaporation.

Bunds/embankment walls will be constructed adjacent to the lowest side of each final void, in order to confine each final void waterbody in the event of an extreme wet climatic scenario. The bunds will be made from compacted earth (SCPL, 2012).

Each of the final voids will retain a highwall. Appropriate safety bunds and/or fencing and signage will be installed around the perimeter of the voids to restrict access for stock and people in accordance with NSW Resources Regulator requirements. The geotechnical stability of the final void highwalls will be reviewed to establish a suitable offset distance for the perimeter safety bunding/fencing (SCPL, 2012).

Further details on final rehabilitation concepts and management of the final voids (including design objectives and performance criteria) is included in SCPL's Mining Operations Plan/Rehabilitation Management Plan (refer Section 6, and the detailed plans provided in, SCPL's Mining Operations Plan/Rehabilitation Management Plan).

7.9 MANAGEMENT OF REHABILITATED AREA RUNOFF

Mine waste rock emplacement surfaces will be formed to maximise rainfall absorption and to minimise the requirement for artificial drainage structures. The final top surface of the Avon North waste rock emplacements will be graded to drain to the east, away from the outer batters of the emplacements, thereby minimising the catchment reporting to the batters. Final emplacement top surface drainage will however be directed around the final voids.

Emplacement batter drainage will be progressively developed as part of waste rock emplacement activities. Drainage will comprise berm drains (with low longitudinal gradients) spaced at regular intervals down the batters, directing drainage around the emplacement perimeter, either to intersect the natural surface (and then to natural drainage lines) or to engineered drop structures. Other options may include catch benches to slow the velocity of water downslope or adopting a concave profile on rehabilitated slopes.

In addition to the controls described in Section 7.1, sediment dams downstream of the waste rock emplacements will 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.

Further details on final rehabilitation concepts and rehabilitation runoff areas (including performance criteria) is included in SCPL's Mining Operations Plan/Rehabilitation Management Plan (refer Sections 6 and 7, and the detailed plans provided in, SCPL's Mining Operations Plan/Rehabilitation Management Plan).

7.10 IRRIGATION

Irrigation will involve continued 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 will only occur on rehabilitated or topsoiled areas from which runoff reports to contained water storages, or open pits, in accordance with Condition 28, Schedule 3 of NSW Development Consent SSD-4966.

Historically, irrigation of water from the Stratford East Dam has been conducted on approximately 29 hectares (ha) of the rehabilitated portion of the Stratford Waste Emplacement.

An on-site irrigation system of pumps, piping and water distribution equipment was 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 comprised electrically-powered centrifugal pumps, travelling irrigators and fixed sprays.

Irrigation of water from Stratford East Dam will continue to be 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.

Erosion Control

Irrigation areas will be monitored for signs of erosion (Section 8.3) and, if signs of erosion are observed, appropriate remediation measures will be implemented.

8 MONITORING PROGRAMS

8.1 METEOROLOGY

In accordance with the requirements of Condition 24, Schedule 3 of the NSW Development Consent SSD-4966, SCPL maintains an Automatic Weather Station (AWS) on-site, which monitors the following meteorological parameters:

- daily rainfall;
- daily temperature statistics (e.g. average, maximum and minimum);
- solar radiation; and
- wind speed and direction.

8.2 WATER MANAGEMENT SYSTEM MONITORING PROGRAM

Table 9 outlines the surface water management system and monitoring programs for the SMC.

Table 9
Water Management System Monitoring Program

Monitoring Location	Parameter	Frequency
Bowens Road North Pit, Parkers Pit (Bowens Road West Pit), Roseville West Pit	EC, pH, TSS, ORP, Acidity, Aluminium, Sulphate (SO_4), Sodium, Calcium, Chloride, Iron, Zinc, Magnesium and Manganese.	Monthly
Stratford Main Pit, Avon North Open Cut, Stratford East Open Cut,	Water Storage Level.	Monthly.
	EC, pH, TSS, ORP, Acidity, Aluminium, SO_4, Sodium, Calcium, Chloride, Iron, Zinc, Magnesium and Manganese.	Monthly
Stratford East Dam	Water Storage Level.	Monthly.
	EC, pH, TSS, ORP, Acidity, Aluminium, SO_4, Sodium, Calcium, Chloride, Iron, Zinc, Magnesium and Manganese.	Monthly
	EC, pH,, NTU	In accordance with applicable EPL conditions during releases.
Eastern Emplacement Area (Stratford East Waste Rock Emplacement Area Sump)*	pH, EC, TDS, TSS, turbidity, acidity, alkalinity, Al, As, B, Cd, Ca, Cl, Cr, Cu, Fe, Pb, Hg, Mg, Mn, Zn, total N, ORP, pH, total P, sodium, sulphate.	Monthly.
Return Water Dam	Water Storage Level.	Monthly
	pH, EC and ORP.	Monthly
Sediment Dams (SD12, SD15, SD16, SD17)	pH, EC, TSS[2].	Overflow events
Disturbed Area Dams (DAD4, DAD10, DAD13, DAD14, DAD19, DAD20, Ellis Dam)	EC, pH, TSS[2], Acidity, Aluminium, SO_4, Sodium, Calcium, Chloride, Iron, Zinc, Magnesium and Manganese.	Monthly and event.
Transfer Pumps	Pumping rates and duration of water transfers to provide a record of volumetric transfers between on-site storages.	During each period of pumping.
Reject Production	Rejects solids volume produced by CHPP.	Monthly totals.
Co-disposed Rejects	pH.	Monthly.
	Reject storage level and density (boat sounding survey).	Every six months.
	Bathymetric survey.	Annually

[1] A maximum of one event sample is taken in any 21 day period. An event is defined as a runoff-producing rainfall event (i.e. 25 mm or greater of rainfall in a 24-hour period).

[2] Condition L1.2 of NSW EPL 5161, as varied on 23 September 2023, clarifies that if a rainfall event at the premises exceeds a total of 40 millimetres over any consecutive 5 day period then the total suspended solids content quality limits specified for the monitoring points stipulated in EPL 5161 are not applicable.

* Where additional EPL Discharge Points are established, monitoring parameters and frequency and will be applied in accordance with the applicable EPL conditions.

* Once the Stratford Waste Emplacement PAF containment cell (Section 7.2) is backfilled, the Stratford East Waste Emplacement Area Sump will no longer exist and will be removed from the Water Management System Monitoring Program. Sites for monitoring of seepage/leachate are outlined in Table 11.

A site water balance review will be undertaken on an annual basis to monitor the status of inflows, outflows, site water inventory and consumption. The site water balance review will be used to optimise water management performance and will enable corrective actions to be implemented if required. The results of the water balance review will be reported in the Annual Review (Section 11.1).

8.3 IRRIGATION AREA MONITORING PROGRAM

Table 10 outlines the irrigation area monitoring program for the SMC.

Table 10
Irrigation Monitoring Program

Monitoring Component	Parameter	Frequency
Irrigation Water Volume Monitoring	Application rates.	During irrigation.
	Application times.	During irrigation.
	Application durations.	During irrigation.
	Application areas.	During irrigation.
Irrigation Area Visual Monitoring	Signs of runoff, water-logging and/or active erosion in gullies downstream of irrigation areas.	Every six months
	Signs of active erosion in contour banks and drains.	Every six months
Irrigation Water Quality	pH, EC, Residual Sodium Carbonate and Sodium Adsorption Ratio.	Monthly

8.4 SEDIMENTATION CONTROL STRUCTURE MONITORING

Routine inspections of erosion and sediment control structures will be undertaken on a quarterly basis or following rain events of >50mm in a 24 hour period.

8.5 UP-CATCHMENT DIVERSION SYSTEM MONITORING

The integrity of up-catchment diversion channels/bunds will be visually inspected on a six monthly basis or following rain events of >50mm in a 24 hour period.

Quarterly independent geotechnical inspections of open cut mining areas will be used in conjunction with groundwater monitoring results and inspections of up-catchment diversions to monitor the stability of pit walls during the life of the SMC, including the Avon North Open Cut (nearest to Dog Trap Creek) and Stratford East Open Cut (nearest to the eastern diversions).

8.6 SURFACE WATER MONITORING PROGRAM

The SMC surface water monitoring program comprises surface water quality and flow monitoring at sites on the Avon River, Avondale Creek, Dog Trap Creek and ephemeral drainage lines within the mining area.

Surface water samples are tested for a range of parameters including pH, EC, turbidity, total suspended solids (TSS), total dissolved solids (TDS), alkalinity, aluminium (Al), calcium (Ca), chloride (Cl), cobalt (Co), iron (Fe), magnesium (Mg), manganese (Mn), nickel (Ni), sulphate (SO4), zinc (Zn), sodium (Na), nitrogen (N) nitrate (NO_3), phosphorus (P), arsenic (As), boron (B), cadmium (Cd), copper (Cu), lead (Pb), chromium (Cr) and mercury (Hg).

Continuous water depth and EC monitoring stations have also been established on Avondale Creek (W5) and the Avon River (W2) downstream of the SMC.

The monitoring station at W5 will be rated (establishing a relationship between flow depth and flow rate) so that flow rate is effectively continuously monitored. Data from this station in combination with water quality data will be used to assess changes to the quantity and quality of water generated from the Avondale Creek catchment during the life of the SMC.

An outline of the surface water quality monitoring program is provided in Table 11. Regional and local surface water monitoring locations (including past monitoring sites and those undertaken by others) are shown on Figures 3 and 4, respectively.

Table 11
Surface Water Quality Monitoring Program

Monitoring Location^	Parameter[1]	Frequency
W1, W3, W4, W6, W8, W9, W10, W11	Suite 1	Monthly and Event[2]
W2, W5	Suite 1	Monthly and Event[2]
	EC	Continuous
	Water level	Continuous
Stratford Waste Emplacement PAF Containment Cell Surface Water Monitoring Locations*		
W8, W5[3]	Suite 2[4]	Monthly and Event[2]

1 Suite 1: EC, pH, TSS, TDS, alkalinity, turbidity, SO_4, As, Cd, Cu, Fe, N, P, Ca, Mg, Cl, Na, Pb, Mn, Cr, B and Hg.

2 Surface water quality monitoring will also be undertaken following rainfall events in which >25 mm of rain falls in a 24-hour period, with sampling not to be repeated within 21 days after the sampling date. Monthly or quarterly sampling is undertaken should a "no greater than 25 mm in 24-hour rainfall" event occur.

3 Results from monitoring locations W8 and W5 (downstream from the PAF containment cell) will be compared against results from upstream monitoring locations W6 and W9. Monitoring of the Stratford Main Pit is included in Table 9.

4 Suite 2: pH, EC, TDS, TSS, turbidity, acidity, alkalinity, SO_4, Al, As, B, Cd, Ca, Cl, Co, Cr, Cu, Fe, Pb, Hg, Mg, Mn, Ni, Zn, total N, ORP, total P and sodium.

* The SMC's Groundwater Monitoring Program (within the GWMP [Appendix 3 of the WMP]) includes seepage/leachate monitoring locations relevant for the PAF Cell.

^ Where additional EPL Discharge Points are established, parameters, frequency and associated monitoring will be applied in accordance with the applicable EPL conditions.

Water quality monitoring will be undertaken in accordance with the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC, 2000) and Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC, 2004b). Water samples collected on-site will be analysed by a National Association of Testing Authorities accredited laboratory. Surface water quality results will be reviewed and reported annually in the Annual Review.

Where additional EPL Discharge Points are established, monitoring will be undertaken in accordance with the applicable EPL conditions. Emergency water releases from the premises are to be undertaken via licensed discharge points as described in EPL 5161 as amended from time to time. Release limits will apply as defined in the applicable EPL conditions.

8.7 STREAM ECOLOGY AND RIPARIAN VEGETATION "HEALTH" MONITORING PROGRAM

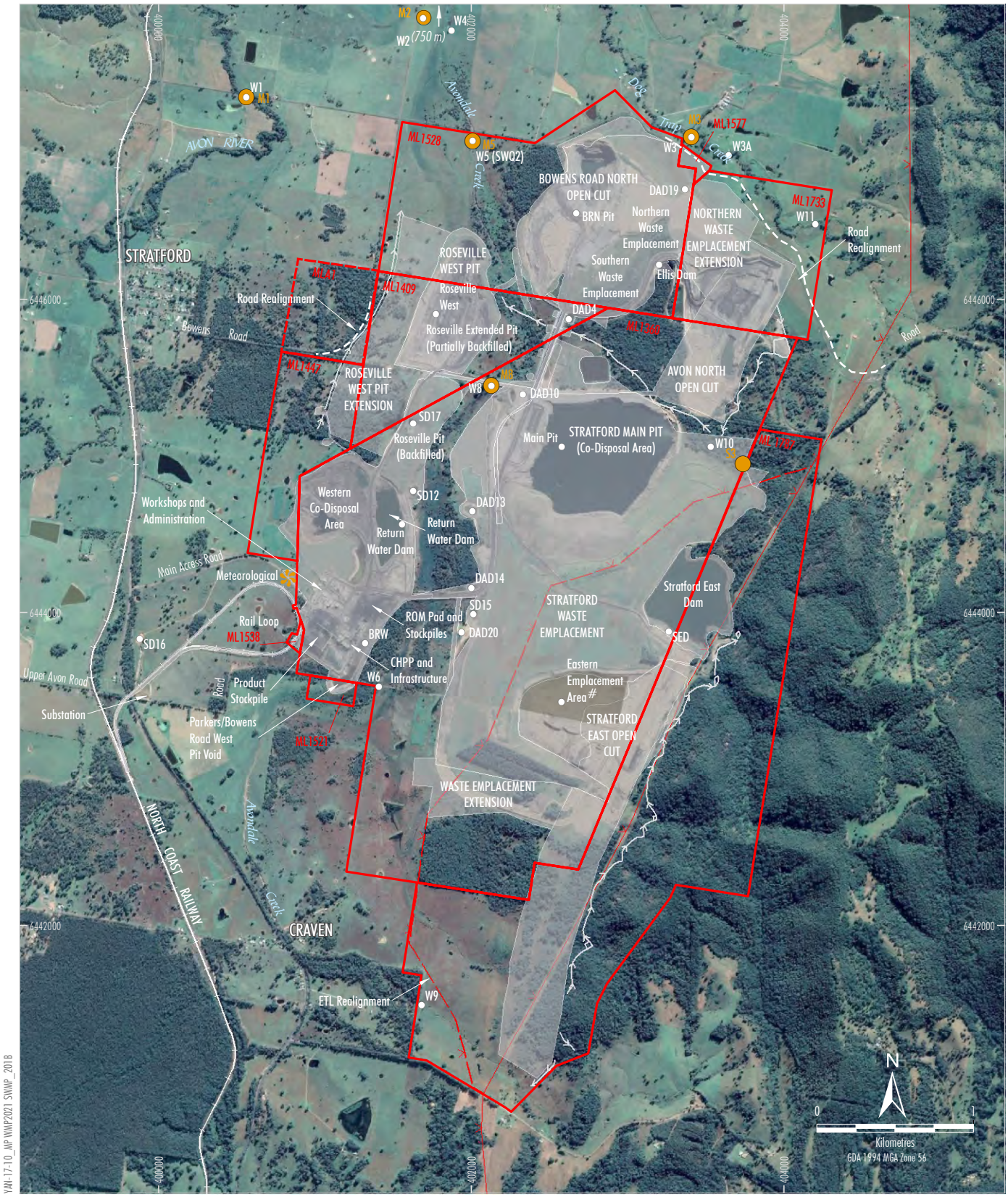
A macroinvertebrate monitoring program will continue to be undertaken on an annual basis, nominally in Spring. Macroinvertebrate monitoring will be conducted at six sites (M1, M2, M3, M5, M8 and S3) for aquatic macroinvertebrates and water quality using rapid assessment techniques. Macroinvertebrate sampling locations will be sampled at the locations shown on Figure 4 or at alternate comparable locations within the stream if access to the site is not practicable. Riparian vegetation health monitoring will be undertaken at each of the macroinvertebrate monitoring sites with the exception of M5.

The objectives of the monitoring program are to:

- collect baseline data on the macroinvertebrate community utilising NSW Australian River Assessment System (AUSRIVAS) sampling protocols;
- use biotic indices and community parameters to assess stream "health";
- conduct visual monitoring (i.e. photographic) to detect a potential change in the quality and quantity of riparian vegetation annually; and
- sample stream water quality (EC, dissolved oxygen, temperature and pH).

Data analysis references a range of biotic and other indices to assess the environmental condition of the macroinvertebrate communities, including, but not necessarily limited to: Stream Invertebrate Grade Number Average Level (SIGNAL) (Chessman, 1995); taxa richness; sensitive fauna; and silt-tolerant fauna. Visual monitoring and photography of riparian vegetation health will occur annually at the locations shown on Figure 4. Vegetation will be monitored for signs of stress potentially related to the SMC, such as leaf scorching, desiccation

or dieback. The results of the stream ecology and riparian vegetation health monitoring program will be reported in the Annual Review (Section 11.1).



YAN-17-10_MP WMP2021 SWMP_201B

LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary*
- Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Conceptual Up-Catchment Diversion
- Surface Water Quality Monitoring Site
- Macroinvertebrate Monitoring Site
- Meteorological Station
- Stratford Waste Emplacement PAF Containment Cell

MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.

 # Once PAF Containment Cell backfilled, the Eastern Emplacement Area monitoring site will be removed.

Note: 1. *Riparian vegetation monitoring is undertaken at all macroinvertebrate sites excluding M5*

2. *Natural controlled releases will occur immediately downstream of sediment dams SD7, SD12, SD15, SD16 and SD17.*

Source: Orthophoto - Google Earth CNES/Airbus (2020); NSW Department of Planning & Environment (2017)

STRATFORDCOAL

STRATFORD EXTENSION PROJECT

Local Surface Water Quality Monitoring Sites

Figure 4

9 ASSESSMENT OF PERFORMANCE (INDICATORS AND MEASURES)

The monitoring results will be used to assess the SMC against the relevant performance indicators and performance measures described in Section 5 and the process is summarised in Table 12.

If data analysis indicates a performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the performance measure. If a performance measure is determined to have been exceeded, the Contingency Plan will be implemented (Section 10).

Table 12
Process for Assessment against Performance Indicators and Measures

Performance Measure	Specific Performance Indicator(s)	Data Analysis to Assess against Performance Indicator(s)	Monitoring			Cascading Trigger Levels	Assessment of Performance Indicator and Performance Measure	Relevant Management and Contingency Measures
			Sites	Parameters	Frequency			
No discharge of mine affected water to downstream surface waters.	• Modelled forward risk of spill from Stratford Main Pit is negligible.	• The site water balance including the Stratford Main Pit will be reviewed annually (each calendar year period). Water levels in the pit will be identified corresponding to spill risks of <1%, <2%, <5% and <10% over forward time periods of 1, 3 and 5 years.	• Stratford Main Pit	• Water storage level.	• Monthly.	• **Low Risk (Negligible) Outcome**: Water storage level in Stratford Main Pit is less than modelled pit level with greater than 1% risk of spill in the current year; 2% risk of spill in the forward 2 year period; or 10% risk of spill over the forward 5 year period. • **Moderate Risk Trigger:** Water storage level in Stratford Main Pit is higher than modelled pit level with greater than 1% risk of spill in the current year; 2% risk of spill in the forward 2 year period; or 5% risk of spill over the forward 5 year period. • **High Risk Trigger:** Water storage level in Stratford Main Pit is higher than modelled pit level with greater than 2% risk of spill in the current year; 5% risk of spill in the forward 2 year period; or 10% risk of spill over the forward 5 year period.	• The performance indicator will be determined to have been exceeded if data analysis and modelling indicates that water storage levels in the Stratford Main Pit are greater than expected and there is consequently a greater than negligible risk of spill from the Stratford Main Pit during operations. Management measures would be applied to reduce the risk. • The performance measure is exceeded if discharge to surface waters was to occur as a consequence of inadequate freeboard being maintained in the Stratford Main Pit during operations. • The above analyses will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE, DPIE Water and EPA. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 10).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Review of system maintenance scheduling. • Temporary transfer of water to other voids/water storages on-site (i.e. Roseville West Pit). • Revision of the rejects balance for the Stratford Main Pit. • Identification of additional reject disposal areas (subsequent to obtaining appropriate regulatory approvals). • Identification of other corrective actions such as water treatment, enhanced irrigation and additional site storage.
No impact on water quality in Avondale Creek as a result of the SMC.	• Greater than negligible decline in water quality at W4 or W3.	• Select water quality data analysed annually (as part of Annual Review): - The mean and standard deviation for each water quality parameter at W4 and W3 will be calculated from the long-term monitoring data. - The mean and standard deviation for each water quality parameter at upstream control sites (W1, W11, W6 and W9) will be calculated from the long-term monitoring data.	• W4 (and W3). • W1, W11, W6 and W9.	• EC, pH, SO_4, Iron.	• Monthly/ Event	• **Low Risk (Negligible) Outcome**: The 12 month mean is within the long-term data 'mean plus 1.5 standard deviation', and the same trigger has not been exceeded at an upstream control site. • **Moderate Risk Trigger:** The 12 month mean exceeds the long-term data 'mean plus 1.5 standard deviation', and the same trigger has not been exceeded at an upstream control site. • **High Risk Trigger:** The 12 month mean exceeds the long-term data 'mean plus 2 standard deviation', and the same trigger has not been exceeded at an upstream control site.	• The performance indicator will be determined to have been exceeded if data analysis indicates a greater than negligible change in the quality of downstream water compared to the upstream control sites. • If the performance indicator has been exceeded, an assessment will be undertaken to determine if the change in water quality is a result of the SMC. • The performance measure is exceeded if analysis of the monitoring confirms that there has been greater than negligible impact on water quality in Avondale Creek as a result of the SMC. • The above analysis will include consideration of water quality monitoring at W1, W3, W11, W4, W6 and W9) and any licensed discharge points. • The above analysis will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE, DPIE Water and EPA. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 10).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Implementation of additional temporary/permanent erosion control measures (if sediment runoff is identified as the source). • Implement other viable source controls (e.g. additional waste rock management measures) if other runoff sources identified. • Implementation of additional rejects management techniques. • Offsets.

Table 12 (Continued)
Process for Assessment against Performance Indicators and Measures

Performance Measure	Specific Performance Indicator(s)	Data Analysis to Assess against Performance Indicator(s)	Monitoring			Cascading Trigger Levels	Assessment of Performance Indicator and Performance Measure	Relevant Management and Contingency Measures
			Sites	Parameters	Frequency			
No significant impact on aquatic ecosystems and biota as a result of the SMC.	• No significant change in biotic indices at M1, M2, M3, M5, M8 and S3.	• Biotic indices will be analysed using trend analysis following each aquatic survey to determine if a significant change has occurred.	• M1, M2, M3, M5, M8 and S3.	• Biotic indices (SIGNAL; taxa richness; sensitive fauna; and silt-tolerant fauna).	• Annually	• **Low Risk (Negligible) Outcome**: If data analysis indicates no significant change in biotic indices at M1, M2, M3, M5, M8 and S3has occurred. • **Moderate/High Risk Trigger:** If data analysis indicates a significant change in biotic indices at M1, M2, M3, M5, M8 and S3has occurred, beyond natural responses.	• The performance indicator will be determined to have been exceeded if data analysis indicates a significant change in biotic indices at M1, M2, M3, M5, M8 and S3 has occurred, beyond natural responses. • The performance measure is exceeded if analysis of the monitoring confirms that there has been a significant impact on aquatic biota as a result of the SMC. • The above analysis will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE, DPIE Water and EPA. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 10).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Implementation of additional temporary/permanent erosion control measures (if sediment runoff is identified as the source). • Implement other viable source controls (e.g. additional waste rock management measures) if other runoff sources identified. • Implementation of additional rejects management techniques. • Offsets.
No more than a negligible impact on riparian vegetation along Avondale Creek as a result of the SMC.	• No observations of significant vegetation desiccation and/or dieback at M1, M2, M3, M8 and S3.	• Riparian vegetation will be monitored annually for observation of significant vegetation desiccation and/or dieback.	• M1, M2, M3, M8 and S3.	• Visual signs of vegetation health (vigour, leaf scorching, desiccation, dieback).	• Annually	• **Low Risk (Negligible) Outcome**: If no observations of significant vegetation desiccation and/or dieback at M1, M2, M3, M8 and S3 • **Moderate/High Risk Trigger:** If observations of significant vegetation desiccation and/or dieback at M1, M2, M3, M8 and S3	• The performance indicator will be determined to have been exceeded if significant vegetation desiccation and/or dieback are observed at M1, M2, M3, M8 and S3. • The performance measure is exceeded if analysis of the riparian vegetation indicates there is a greater than negligible impact on riparian vegetation as a result of the SMC. • The above analysis will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE, DPIE Water and EPA. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 10).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Implementation of additional temporary/permanent erosion control measures (if sediment runoff is identified as the source). • Implement other viable source controls (e.g. additional waste rock management measures) if other runoff sources identified. • Implementation of additional rejects management techniques. • Offsets.

10 CONTINGENCY PLAN

In the event a water management performance measure for the SMC (detailed in Section 5) may not have been met or a performance indicator is determined to have been exceeded, SCPL will implement the Contingency Plan described in the WMP.

10.1 SPECIFIC CONTINGENCY MEASURES

Specific contingency measures for an exceedance of the water management performance measures will be investigated and may include:

- The conduct of additional monitoring (e.g. increase in monitoring frequency or additional sampling) to inform the specific contingency measures.
- Implementation of adaptive management strategies (e.g. on-site reconfiguration) to better maintain separation of clean and mine waters, diversion of clean waters, storage 'as-built' designs and avoid discharge of mine waters (except in accordance with an EPL).
- Emergency releases may be required during and after declared natural disasters or severe wet weather events (subject to authorisation under an EPL) to maintain adequate freeboard and to minimise the risk of uncontrolled discharges to surface waters.

11 REVIEW AND IMPROVEMENT OF THE SWMP

11.1 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.

Contents of the Annual Review, including review of the SWMP are described in the WMP.

This SWMP will be reviewed within three months of the submission of an Annual Review, and revised where appropriate, as described in Section 11.2.

11.2 SWMP REVIEW AND UPDATE

It is noted that as the NSW Development Consent SSD-4966 was not 'taken up' by SCPL prior to 31 December 2015, the timeframes prescribed in the conditions were not enforceable (Table 2), and at the time activities at the SMC continued under DA 23-98/99 and DA 39-02-01. The original WMP (including the original SWMP) was prepared at least 3 months prior to commencement of mining at the Avon North Open Cut as agreed by the Secretary on 30 November 2017. Similarly this SWMP has been re-submitted prior to the commencement of mining in the Stratford East Open Cut.

Consistent with the Secretary's approval for the progressive submission of environmental management plans on 30 November 2017, relevant environmental management plans will be re-submitted at least 3 months prior to the commencement of mining in the Roseville West Pit Extension.

In accordance with Condition 5, Schedule 5 of NSW Development Consent SSD-4966, this SWMP will be reviewed (to the satisfaction of the Secretary) within three months of the submission of:

- an Annual Review (Condition 4, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an independent environmental audit (Condition 9, Schedule 5); or
- any modification to the conditions of NSW Development Consent SSD-4966 (unless the conditions require otherwise).

The reviews will be undertaken to ensure the SWMP is updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the SMC.

Where a review leads to revisions in the SWMP then, within 4 weeks of the review, the revised SWMP will be submitted for the approval of the Secretary.

The revision status of this SWMP is indicated on the title page of each copy.

The approved SWMP will be made publicly available on the SCPL website, in accordance with Condition 11(a), Schedule 5 of NSW Development Consent SSD-4966.

In accordance with Condition 5 of Commonwealth Approval (EPBC 2011/6176), a copy of the approved WMP (including this SWMP) will also be provided to the Commonwealth Department of Agriculture, Water and the Environment.

12 REPORTING PROTOCOLS

In accordance with Condition 3(g), Schedule 5 of NSW Development Consent SSD-4966, SCPL has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in the SCPL's Environmental Management Strategy and WMP.

In accordance with Condition 8, Schedule 5 of NSW Development Consent SSD-4966, SCPL will provide regular reporting on the environmental performance of the SMC on the SCPL website.

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APPENDIX A

CONSULTATION CORRESPONDENCE

NSW EPA (16 JULY 2021)

DOC20/21/550225-2; EF13/3637

Planning and Assessment Division
Department of Planning, Industry and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Attention: The Planning Officer

16 July 2021

EPA Submission on Planning Advice Request

Dear Sir/Madam,

Thank you for the request for advice for Post Approval Consultation (PAE-23394546), requesting a review by the NSW Environment Protection Authority (EPA) of the Updated Water Management Plan and supporting Appendices. The document has been updated in accordance with Condition 5, Schedule 5 of the Stratford Extension Project Development Consent (SSD-4966-PA-10) at Stratford Mining Complex.

Please find the EPA's comments and recommendations in the attached submission.

If you require any further information regarding this matter, please contact Emma Coombs on (02) 4908 6831 or email EPA.Northopsregional@epa.nsw.gov.au.

Yours sincerely

ROB HUGHES
Unit Head - Regulatory Operations Regional North
Environment Protection Authority

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(from outside NSW) NSW 2124 Australia NSW 2150 Australia

NSW Environment Protection Authority (EPA) Submission on review of Updated Water Management Plan and supporting Appendices, SSD-4966-PA-10 at Stratford Mining Complex.

PAF Waste Cell - Surface and Groundwater Monitoring Requirements

The scheduled activities undertaken at the premises are subject to an existing Environmental Protection Licence 5161 (EPL 5161) issued under section 43 of the *Protection of the Environment Operations Act* 1997 (POEO Act) for Coal Works and Mining for Coal under clauses 10 and 28 respectively of Schedule 1 of the POEO Act.

Condition O6.14 of EPL 5161 requires EPA approval of the location and design of out-of-pit PAF material containment cells. An out-of-pit PAF material containment cell is proposed to be constructed within the Stratford Waste Emplacement to receive PAF waste rock material mined from the adjacent Stratford East Open Cut.

In August 2020, the EPA reviewed documentation supplied by the proponent regarding a proposed out-of-pit Potential Acid Forming (PAF) waste cell and advised the proponent in correspondence dated 1 September 2020 that additional information was required.

The EPA received a response to its request for additional information on 6 October 2020. The additional information adequately addressed the EPA's requirements.

In its correspondence to the proponent dated 1 September 2020, the EPA also advised that surface water and groundwater monitoring of pH and heavy metals would need to be undertaken. Given that Stratford already undertake extensive surface water and groundwater monitoring across the premises. The EPA requested that the proponent review the current surface water and groundwater monitoring locations and provide a map of the premises, PAF cell location and proposed monitoring locations deemed most suitable to identify leaching of PAF waste material.

The EPA also requested that the proponent include the proposed suite of metals to be monitored and frequency of monitoring. Upon review of the updated WMP, it is evident that the surface and groundwater monitoring locations have been reviewed and a map prepared that details the most suitable monitoring locations (see Figure 4). The proposed suite of metals to be monitored and frequency of monitoring has also been included at Section 8.2, Table 9.

Public Authority Consultation (PAE-23394546)

The EPA has reviewed the following documents:

- Stratford Mining Complex Water Management Plan, dated June 2021 (document no. WMP-R04-A)

and supporting appendices, including:

- Stratford Mining Complex Surface Water Management Plan, dated June 2021 (document no. SWMP-R04-A)
- Stratford Mining Complex Ground Water Management Plan, dated June 2021 (document no. GWMP-R04-A)

The EPA understands the Water Management Plan, and supporting Appendices, have been updated in accordance with Condition 5, Schedule 5, of the Stratford Extension Project Development Consent SSD-4966, with revisions relevant to:

- incorporating detail regarding the Stratford Waste Emplacement PAF containment cell design, and associated updates to the surface water and groundwater monitoring programs (primarily within the Surface Water Management Plan and Groundwater Management Plan); and

- administrative updates (e.g. contemporising regulatory agency names, updating figures to include recent aerial imagery).

The EPA has reviewed the documentation and has the following comments and recommendations:

1. Matters to be addressed prior to determination

a. Surface Water Quality Monitoring Program

Table 11 in Section 8.7 defines the suite of surface water quality monitoring parameters to be undertaken at each monitoring location. It states that results from monitoring locations W8 and W5 (downstream from the PAF containment cell) will be compared against results from upstream monitoring locations W6 and W9.

W6 and W9 form part of the suite 1 monitoring parameters. W8 and W5 form part of the suite 2 monitoring parameters. Suite 1 does not include acidity as a monitoring parameter. Acidity is considered relevant to the determination of downstream impact at W8 and W5.

Recommendation:

It is recommended that acidity be included in the monitoring suite for W6 and W9.

b. Assessment of Performance (Indicators and Measures)

Table 12 in section 9 outlines the process that the proponent will use to assess performance against a defined set of performance indicators and measures.

The second performance measure states "No more than a negligible impact on water quality in Avondale Creek". The portion of the table for that performance measure has been copied overleaf for ease of reference.

s.120 of the POEO Act prohibits the pollution of waters. Water pollution is defined in the Dictionary of the Act and includes:

> *"placing in or on, or otherwise introducing into or onto, waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the waters is changed"*

The performance measures listed in Table 12 allows some pollution of waters before an assessment is made as to the significance of the pollution.

The column titled "Assessment of Performance Indicator and Performance Measure" states that the performance measure will be determined to have been exceeded if data analysis indicates a *significant* change in the quality of downstream water compared to the upstream control sites.

It further states that the performance measure is exceeded if analysis of the monitoring confirms that there has been greater than *negligible* impact on water quality in Avondale Creek as a result of the SMC.

The terms "significant" and "negligible" are used interchangeably and are not defined.

The performance measure does not reflect compliance with s.120 of the POEO Act. Apart from pH, the parameters used to determine performance do not have a limit prescribed to them by EPL 5161, therefore the defence provisions prescribed in s.122 of the POEO Act do not apply.

Recommendation:
It is recommended that the Performance Measure be amended to "No impact on water quality in Avondale Creek" and that effective pollution controls and measures are put in place to ensure that this objective is met.

Performance Measure	Specific Performance Indicator(s)	Data Analysis to Assess against Performance Indicator(s)	Monitoring			Cascading Trigger Levels	Assessment of Performance Indicator and Performance Measure	Relevant Management and Contingency Measures
			Sites	Parameters	Frequency			
No more than a negligible impact on water quality in Avondale Creek.	• No significant decline in water quality at W4 or W3.	• Select water quality data analysed annually (as part of Annual Review): – The mean and standard deviation for each water quality parameter at W4 and W3 will be calculated from the long-term monitoring data. – The mean and standard deviation for each water quality parameter at upstream control sites (W1, W11, W6 and W9) will be calculated from the long-term monitoring data.	• W4 (and W3). • W1, W11, W6 and W9.	• EC, pH, SO_4, iron.	• Monthly/ Event	• **Low Risk (Negligible) Outcome:** The 12 month mean is within the long-term data 'mean plus 1.5 standard deviation', and the same trigger has not been exceeded at an upstream control site. • **Moderate Risk Trigger:** The 12 month mean exceeds the long-term data 'mean plus 1.5 standard deviation', and the same trigger has not been exceeded at an upstream control site. • **High Risk Trigger:** The 12 month mean exceeds the long-term data 'mean plus 2 standard deviation', and the same trigger has not been exceeded at an upstream control site.	• The performance indicator will be determined to have been exceeded if data analysis indicates a significant change in the quality of downstream water compared to the upstream control sites. • If the performance indicator has been exceeded, an assessment will be undertaken to determine if the change in water quality is a result of the SMC. • The performance measure is exceeded if analysis of the monitoring confirms that there has been greater than negligible impact on water quality in Avondale Creek as a result of the SMC. • The above analysis will include consideration of water quality monitoring at W1, W3, W11, W4, W6 and W9. • The above analysis will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE, DPIE Water and EPA. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 10).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Implementation of additional temporary/permanent erosion control measures (if sediment runoff is identified as the source). • Implement other viable source controls (e.g. additional waste rock management measures) if other runoff sources identified. • Implementation of additional rejects management techniques. • Offsets.

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2. Matters to be addressed post approval

a. Licence Variation Required

The EPA notes that the Updated Water Management Plan and appendices includes additional surface water and ground water monitoring sites to identify potential leaching of PAF waste material.

EPL 5161 will be reviewed upon finalisation of the post approval consultation to reflect the management of PAF material and updated water quality monitoring.

This concludes the EPA's submission on the proposal.

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STRATFORD MINING COMPLEX
Groundwater Management Plan

STRATFORD MINING COMPLEX
(STRATFORD EXTENSION PROJECT)

GROUNDWATER MANAGEMENT PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DPIE Approval
All	GWMP-R01-A	Original	EPA, CL&W and DP&E	25 May 2018
Section 1.2, (Table 1), Section 4.1, Sections 5.1.1 & 5.1.2, Sections 7.1 & 7.3 (Figure 5), Section 8 and Section 10.2	GWMP-R02-A	Stratford East Open Cut Commencement	EPA, DoI Water and DP&E	30 October 2018
All	GWMP-R03-A	Roseville West Open Cut Pit Recommencement	EPA, DoI Water and DP&E	2 July 2019
Sections 1.5 and 7.1 and Figure 5	GWMP-R04-A	Revision following Annual Review 2020 and Independent Environmental Audit 2020. Revised to incorporate Stratford Waste Emplacement PAF Containment Cell location and monitoring sites	EPA, DPIE Water and DPIE	18 October 2021

June 2021
Document No. GWMP-R04-A
(01088416)

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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.

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 for the Stratford Extension Project (SEP) was granted on 29 May 2015 and involves the extension and continuation of mine operations at the SMC[1].

SCPL commenced the approved activities in accordance with the conditions of SSD-4966 on 4 April 2018. The general arrangement of the approved SMC is provided in Figure 2[2].

1.2 PURPOSE AND SCOPE

This Groundwater Management Plan (GWMP) has been prepared in accordance with the requirements of Condition 32(c)(iii), Schedule 3 of NSW Development Consent SSD-4966, Condition 3, Schedule 5 of NSW Development Consent SSD-4966, Condition 4 of Commonwealth Approval EPBC 2011/6176 and recognises the relevant future requirements of Condition 7 of Commonwealth Approval EPBC 2011/6176 (Section 2).

The GWMP is a component of the overarching Water Management Plan (WMP) (Appendix 3 of the WMP) and outlines the procedures and strategies for groundwater management at the SMC to ensure compliance with NSW Development Consent SSD-4966 and Commonwealth Approval (EPBC 2011/6176).

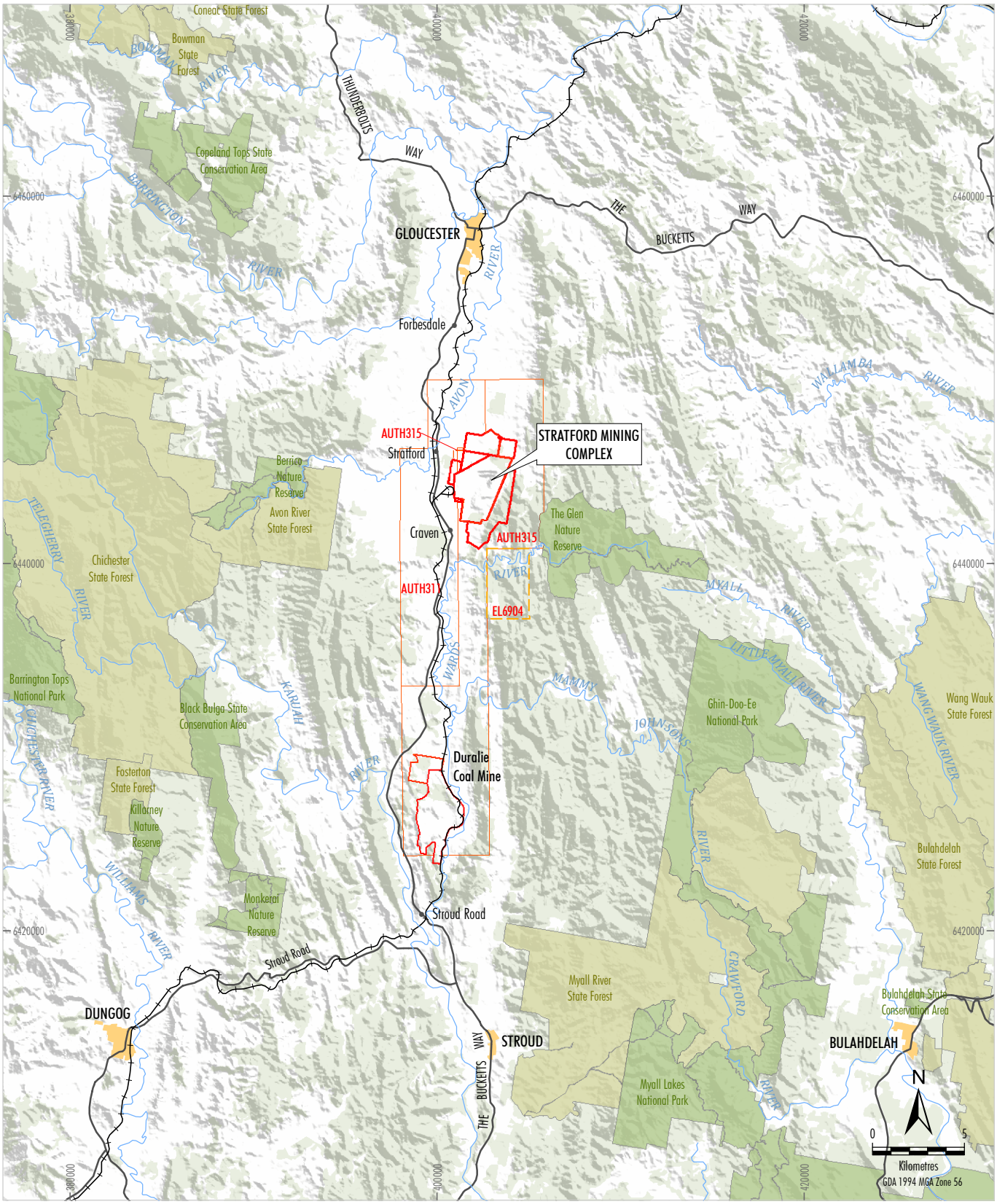
On 30 November 2017, the Secretary of the Department of Planning and Environment (DP&E) (now the Department of Planning, Industry and Environment [DPIE]) (the Secretary) approved the progressive submission of environmental management plans for the Project in accordance with Condition 15, Schedule 2 of NSW Development Consent SSD-4966.

This GWMP has been prepared to manage groundwater impacts associated with the Avon North Open Cut, BRNOC, Stratford East Open Cut, Roseville West Open Cut Pit and the SMC more generally and will be updated prior to mining in the Roseville West Pit Extension.

The scope of this GWMP does not include mining operations associated with the Roseville West Pit Extension. Consequently, the indicative coal processing and production schedule for the purposes of this GWMP is provided in Table 1.

[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).

[2] MLA1 is a proposed future Mining Lease Application (MLA) area as shown on Figure 2. The application for MLA1 has not yet been lodged.



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LEGEND

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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Geoscience Australia (2006); Yancoal (2019); 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

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Orthophoto - Google Earth CNES/Airbus (2020); LPI (2016); NSW Department of Planning & Environment (2017)

STRATFORDCOAL
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STRATFORD EXTENSION PROJECT

Approved General Arrangement

Figure 2

Table 1
Indicative Coal Processing and Production Schedule – Next Six 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	Roseville West					
1*	2018	0.3	0.3	0.1	0	0.6	0.1	1.4	0.5	0.9
2	2019	0.7	0.6	0.6	0.11	-	0.1	2.11	0.8	1.2
3	2020	-	0.6	0.6	0.14	-	-	1.34	0.4	0.8
4	2021	1.4				0.3	0.1	1.8	0.7	1.1
5	2022	1.1				0	0.1	1.2	0.5	0.7
6	2023	1.3				0	0.1	1.4	0.6	0.8

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

1.3 STRUCTURE OF THE GWMP

The remainder of the GWMP is structured as follows:

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

Section 3: Provides an overview of the hydrogeological setting.

Section 4: Presents detailed baseline data for groundwater levels, yield and quality, including groundwater users and groundwater dependent ecosystems.

Section 5: Details the performance measures and performance indicators that will be used to assess the SMC, including cascading trigger levels and performance criteria considering predicted groundwater impacts.

Section 6: Describes the groundwater management measures.

Section 7: Describes the groundwater monitoring program.

Section 8: Describes the process for assessment of the activities undertaken at the SMC against the performance indicators (including trigger levels for investigation), as well as the performance measures for water management and water resources.

Section 9: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

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 the protocol for periodic review and update of the GWMP.

Section 11: Describes the protocol for management and reporting of incidents, complaints and non-compliances with statutory requirements.

Section 12: Lists the references cited in this GWMP.

1.4 SUITABLY QUALIFIED AND EXPERIENCED PERSONS

The former NSW DP&E - Resource Assessments Director, as nominee of the Secretary, approved the appointment of Mr Anthony Marszalek and Dr Noel Merrick as suitably qualified and experienced persons for the preparation of the WMP on 10 October 2017.

The original and this revised GWMP have been prepared and reviewed by Dr Noel Merrick.

1.5 CONSULTATION FOR THE GWMP

The original GWMP was provided to the NSW Environment Protection Authority (EPA) and NSW Crown Lands and Water (CL&W) (now the NSW Department of Planning, Industry and Environment – Water [DPIE Water]) for the purposes of consultation in accordance with Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966.

The NSW CL&W provided a letter dated 7 March 2018 with a single comment on the GWMP regarding the need for monitoring seepage/leachate from water storages, emplacements and final voids. This comment is addressed in Section 7.3. The EPA confirmed, via a letter dated 8 March 2018, that it had no comments on the GWMP.

June 2021 GWMP Revision

This GWMP has been revised in June 2021 to include the location of the Stratford Waste Emplacement PAF containment cell on Figure 5 and to include updates to the Groundwater Monitoring Program (Section 7) for monitoring potential PAF cell seepage/leachate. This revised GWMP has been provided to the EPA and DPIE Water for consultation purposes as required by Condition 32(a), Schedule 3 of NSW Development Consent SSD-4966. On 16 July 2021, the EPA provided some minor comments on the SWMP (Appendix 2 of the WMP). No comments were provided by the EPA on this GWMP. No comments on the revised WMP (including this GWMP) were received from the DPIE-Water. On 18 October 2021, the DPIE (Planning and Assessment division) approved the revised WMP (including this GWMP). The revision status of this GWMP is provided on the title page of this plan.

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.

Obligations relevant to this GWMP are described below.

2.1 NSW DEVELOPMENT CONSENT SSD-4966

2.1.1 GWMP Requirements

Condition 32(c)(iii), Schedule 3 of NSW Development Consent SSD-4966 requires the preparation of a GWMP. Table 2 presents these requirements and indicates where they are addressed in this GWMP.

In accordance with the requirements of Condition 32, Schedule 3 of NSW Development Consent SSD-4966 (Table 2), this GWMP is included as a component of the overarching WMP (Appendix 3 of the WMP).

Table 2
GWMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this GWMP
Water Management Plan **32.** The Applicant shall prepare and implement a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:	The WMP
(a) be prepared in consultation with the EPA and DPIE Water, by suitably qualified and experienced person/s whose appointment has been approved by the Secretary.	Sections 1.4 and 1.5
(b) be submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary; and	Section 10.2
(c) in addition to the standard requirements for management plans (see condition 3 of Schedule 5) include a: ...	Table 3
(iii) Groundwater Management Plan that includes: • detailed baseline data of groundwater levels, yield and quality in the region that could be affected by the development, including licensed privately-owned groundwater bores and a detailed survey/schedule of groundwater dependent ecosystems; • groundwater assessment criteria including trigger levels for investigating any potentially adverse groundwater impacts; • a program to monitor and report on: - groundwater inflows to the open cut pits; - the seepage/leachate from water storages, emplacements and final voids;	Sections 3 and 4 Section 5.1 Sections 7 to 10

Table 2 (Continued)
GWMP Requirements in NSW Development Consent SSD-4966

NSW Development Consent SSD-4966 Schedule 3	Section Where Addressed in this GWMP
Water Management Plan (Continued)	
• a program to monitor and report on (continued):	Sections 7 to 10
- background changes in groundwater yield/quality against mine-induced changes; and	
- impacts of the development on:	
• regional and local (including alluvial) aquifers; and	
• groundwater supply of potentially affected landowners; and	
• groundwater dependent ecosystems and riparian vegetation;	
• a program to validate the groundwater model for the development, including an independent review of the model every 3 years, and comparison of monitoring results with modelled predictions; and	Section 6.2
• a plan to respond to any exceedances of the performance criteria; and;	Sections 5, 7, 8 and 9

In accordance with Condition 29, Schedule 3 of NSW Development Consent SSD-4966, no mining operation will be carried out within 40 m of Avondale Creek or Dog Trap Creek, with the exception of the construction and/or use of haul road crossings.

Riparian habitat along Avondale Creek will be improved to the satisfaction on the Secretary in accordance with Condition 30, Schedule 3 of NSW Development Consent SSD-4966.

2.1.2 Management Plan (General) Requirements

In addition to the GWMP requirements prescribed in Condition 32(c)(iii), Schedule 3 of NSW Development Consent SSD-4966, Condition 3, Schedule 5 of NSW Development Consent SSD-4966 outlines the management plan (general) requirements that are also applicable to the preparation of this GWMP.

Table 3 presents these requirements and indicates where each is addressed within this GWMP.

Table 3
Management Plan (General) Requirements

NSW Development Consent SSD-4966 Schedule 5	Section Where Addressed in this GWMP
Management Plan Requirements	
3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
(a) detailed baseline data;	Sections 3 and 4
(b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 2
• any relevant limits or performance measures/criteria;	Section 5
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any mitigation measures;	Section 5 (Table 6)
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 5 and 6
(d) a program to monitor and report on the:	Sections 7 and 10
• impacts and environmental performance of the development;	
• effectiveness of any management measures (see c above);	

Table 3 (Continued)
Management Plan (General) Requirements

NSW Development Consent SSD-4966 Schedule 5	Section Where Addressed in this GWMP
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 9 and refer to WMP
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 10
(g) a protocol for managing and reporting any:	
• incidents;	refer to WMP
• complaints;	refer to WMP
• non-compliances with statutory requirements; and	refer to WMP
• exceedences of the impact assessment criteria and/or performance criteria; and	Sections 7 to 10
(h) a protocol for periodic review of the plan.	Section 10.2

2.2 COMMONWEALTH APPROVAL EPBC 2011/6176

Commonwealth Approval (EPBC 2011/6176) was granted on 29 January 2016. Water resources are a controlling provision and Commonwealth Approval (EPBC 2011/6176) includes conditions for the protection of water resources (Table 4). These conditions acknowledge and defer to the requirement for a Water Management Plan under NSW Development Consent SSD-4966.

As described in Section 1.2, this GWMP has been prepared in accordance with the requirements of Condition 4 and (where relevant the future requirements of) Condition 7 of Commonwealth Approval (EPBC 2011/6176).

Table 4
GWMP Requirements in Commonwealth Approval EPBC 2011/6176

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this GWMP
Additional Conditions for the Protection of Water Resources	
4. Subject to Condition 6, the water management plan required by Condition 32 of Schedule 3 to ***the Development Consent*** must:	
(a) describe and implement a surface water and groundwater monitoring programme consistent with the ***National Water Quality Management Strategy***, with sufficient spatial and temporal coverage, to:	The WMP (Section 2.4.4)
(i) establish appropriate baseline data, performance measures, assessment criteria and trigger values required by Conditions 31 and 32 of Schedule 3 to ***the Development Consent***	Sections 3, 4 and 5
(ii) provide for detection of exceedance of trigger values as a result of the action in a manner that is quantifiable and robust (for example by comparison to baseline data and the use of ***control sites***)	Sections 5.1 and 7
(iii) obtain the additional data needed to validate the ***numerical groundwater model*** consistent with the requirements of Condition 32(c)(iii) of Schedule 3 of the ***Development Consent***, including: • seasonal variations in groundwater levels and surface water-groundwater interaction • strata definition	Section 6.2
This programme must include installation of additional multi-level (nested) monitoring wells between the town of Stratford and the SMC area.	Section 7
(b) define and detail a system of ***cascading trigger values*** and corresponding treatments **Note:** ***Cascading trigger values*** must consider the potential for impacts on all relevant water-related assets, including Avondale Creek, Dog Trap Creek, and their tributaries, and private water users to the west of the SMC area.	Sections 5.1 and 6 and SWMP

Table 4 (Continued)
GWMP Requirements in Commonwealth Approval EPBC 2011/6176

Commonwealth Approval (EPBC 2011/6176)	Section Where Addressed in this GWMP
(a) describe how the water management performance measures identified in Table 8 of Condition 31 of Schedule 3 to ***the Development Consent***, and groundwater assessment criteria in Condition 32(c)(iii) of Schedule 3 to ***the Development Consent*** will be achieved	Table 6 and Section 5.1
(b) in addition to the requirements of Condition 32(c)(iv) of Schedule 3 to ***the Development Consent***, prepare a protocol that gives consideration to information products as they arise from the Commonwealth Office of Water Science's Bioregional Assessment for the Gloucester Subregion. …	The WMP (Section 7)
Additional Conditions for the Protection of Water Resources (Continued)	
7. The person taking the action must prepare and submit to ***the Minister*** for approval a final water impact verification report. The report must: (a) demonstrate that the water within the voids will not be released to surface water or groundwater systems in the long-term (b) consider possible worst case scenarios associated with the final voids and outline contingency responses, for example, if monitoring shows a groundwater gradient from the final voids towards the alluvium (c) be based on results of recalibrated groundwater and site water balance modelling as required by Condition 32(c) of Schedule 3 of the ***Development Consent***: (i) utilises hydrological and geological data obtained during mining, including validation of the hydraulic properties of all major hydrostratigraphic units, particularly to the west of the site of the action and representation of surface-groundwater interactions (ii) applies uncertainty analysis that incorporates the potential influence of climate variability (d) demonstrate that owners of any nearby resource developments, as described in Condition 32 of Schedule 3 to ***the Development Consent***, have been consulted in preparation of the report. The report must be provided to ***the Minister*** for approval between five (5) and ten (10) years prior to the expiry of this approval. Once approved in writing by ***the Minister***, the plan must be taken into account in planning for the closure of the mine and the long-term management of the final voids.	N/A (*not required until 5-10 years prior to expiry of EPBC 2011/6176*).

2.3 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, ML 1733 and ML 1787 issued by the NSW Minister for Mineral Resources and Energy under the NSW *Mining Act, 1992*.
- Mining Operations Plan submitted and approved by the NSW Resources Regulator.
- Water supply works, water use approvals and water access licences issued by the NSW DPIE 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.

2.4 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* as described in the WMP.

In addition to the statutory obligations described in Sections 2.1 and 2.3, the following NSW Acts (and their Regulations) that are water related and/or may be applicable to the conduct of the SEP at the SMC include:

- *Water Act, 1912.*
- *Water Management Act, 2000.*

Relevant licences or approvals required under these Acts will be obtained as required.

3 HYDROGEOLOGICAL SETTING

The Gloucester Basin coal measures are of Permian age and contain conglomerate, sandstone, siltstone, mudstone and coal (Heritage Computing, 2012). These Permian age sediments and the underlying Early Permian and Carboniferous strata (principally tuffs, mudstones, and acid volcanics) were folded during formation of the Basin. The older basement rocks form two sub-parallel lines of hills, are typically erosion-resistant and form the more prominent ridges to the east and west of the SMC. The Permian age Coal Measures occur between these basin margins across the valley floor (Heritage Computing, 2012). The main stratigraphic units are shown on Figure 3.

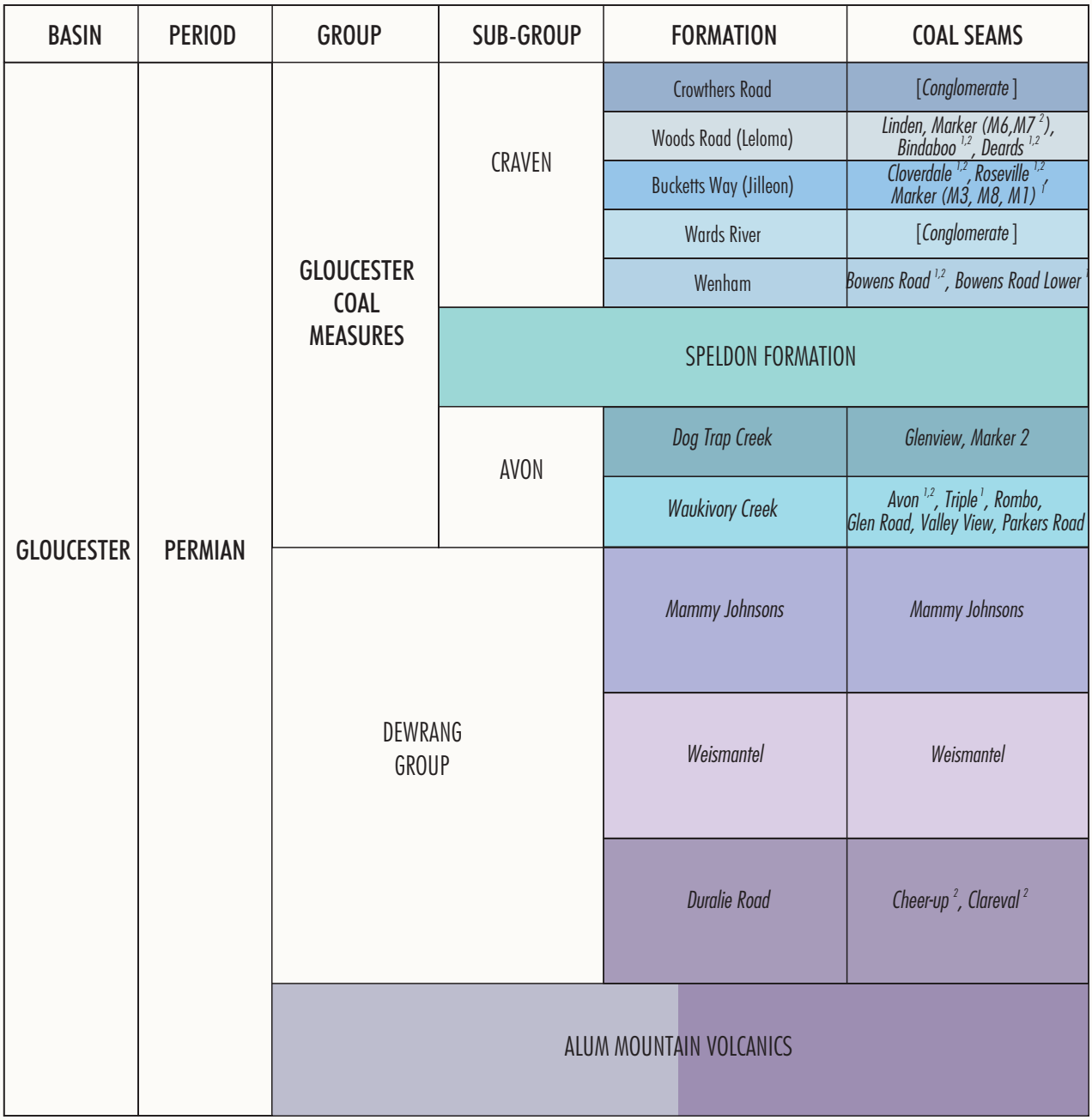
The Gloucester Coal Measures comprise two subgroups: (1) Avon Subgroup (Middle Permian) and (2) Craven Subgroup (Upper Permian). They subcrop over a major portion of the SMC and consist of coarse and medium grained sandstones with minor siltstone, conglomerate and coal seams. The Avon Subgroup hosts the Avon coal seam while the Craven Subgroup hosts the Cloverdale, Roseville and Bowens Road coal seams. The underlying Dewrang Group (Early Permian) hosts the Weismantel and Clareval coal seams.

The main aquifers in the Gloucester Basin are associated with the coal seams which are intersected by faults that compartmentalise groundwater flow. Groundwater is located predominantly within coal seams in the SMC area. A groundwater divide is present in the Craven area (near northing 6442000), which separates the surface catchments and groundwater systems in this part of the Gloucester Basin (Heritage Computing, 2012). The direction of groundwater flow is from the south-east to the north-west, and the main groundwater discharge zones are Avondale and Dog Trap Creeks, and the Avon River (Heritage Computing, 2012).

Recharge to the groundwater systems occurs from rainfall and runoff infiltration, lateral groundwater flow and some leakage from surface water storages and streams (e.g. Dog Trap Creek). Recharge to the coal seam aquifers is via direct rainfall infiltration where the coal seams outcrop or via overlying alluvium or regolith in areas of subcrop. Although groundwater levels are sustained by rainfall infiltration, they are also controlled by topography, geology and surface water levels in local drainages (Heritage Computing, 2012).

Local groundwater tends to mound beneath hills (e.g. to the east of the SMC), with ultimate discharge to local drainages and loss by evapotranspiration where the watertable is near the ground surface (generally less than 2 to 3 m below ground level) (Heritage Computing, 2012).

The typical depth to groundwater is generally 1 to 10 m in the vicinity of the SMC tenements (Heritage Computing, 2012). Where groundwater levels occur close to surface elevations (e.g. alluvial sediments associated with Avondale Creek), evapotranspiration is a likely occurrence.



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

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STRATFORDCOAL

STRATFORD EXTENSION PROJECT

Stratigraphic Units of the Project Area and Surrounds

Figure 3

4 BASELINE DATA

Baseline hydrogeological and groundwater data was reviewed and compiled from a number of sources by Heritage Computing (2012) including:

- Gloucester Basin geology mapping;
- Yancoal exploration (geological) data and logs;
- NSW Government PINNEENA Groundwater Works Database records;
- existing water management (including groundwater licensing) records from the SCM and BRNOC operations;
- previous hydrogeological assessments and reviews undertaken at the SMC;
- groundwater level and pressure data from groundwater monitoring programs and investigations undertaken at the SMC and surrounding projects (including at the time the AGL Gloucester Gas Project and the Rocky Hill Coal Project);
- groundwater quality data from the above monitoring programs and investigations; and
- other regional topographic mapping data.

The baseline groundwater datasets were augmented at the time with the results of a targeted groundwater investigation programme undertaken by RPS Aquaterra in 2011 (Heritage Computing, 2012).

A summary of the baseline groundwater data compiled from these sources is presented in the sections below and locations shown on Figure 4 (DPIE Water registered sites) and Figure 5 (local groundwater monitoring sites).

4.1 GROUNDWATER LEVELS AND YIELD

Groundwater Levels

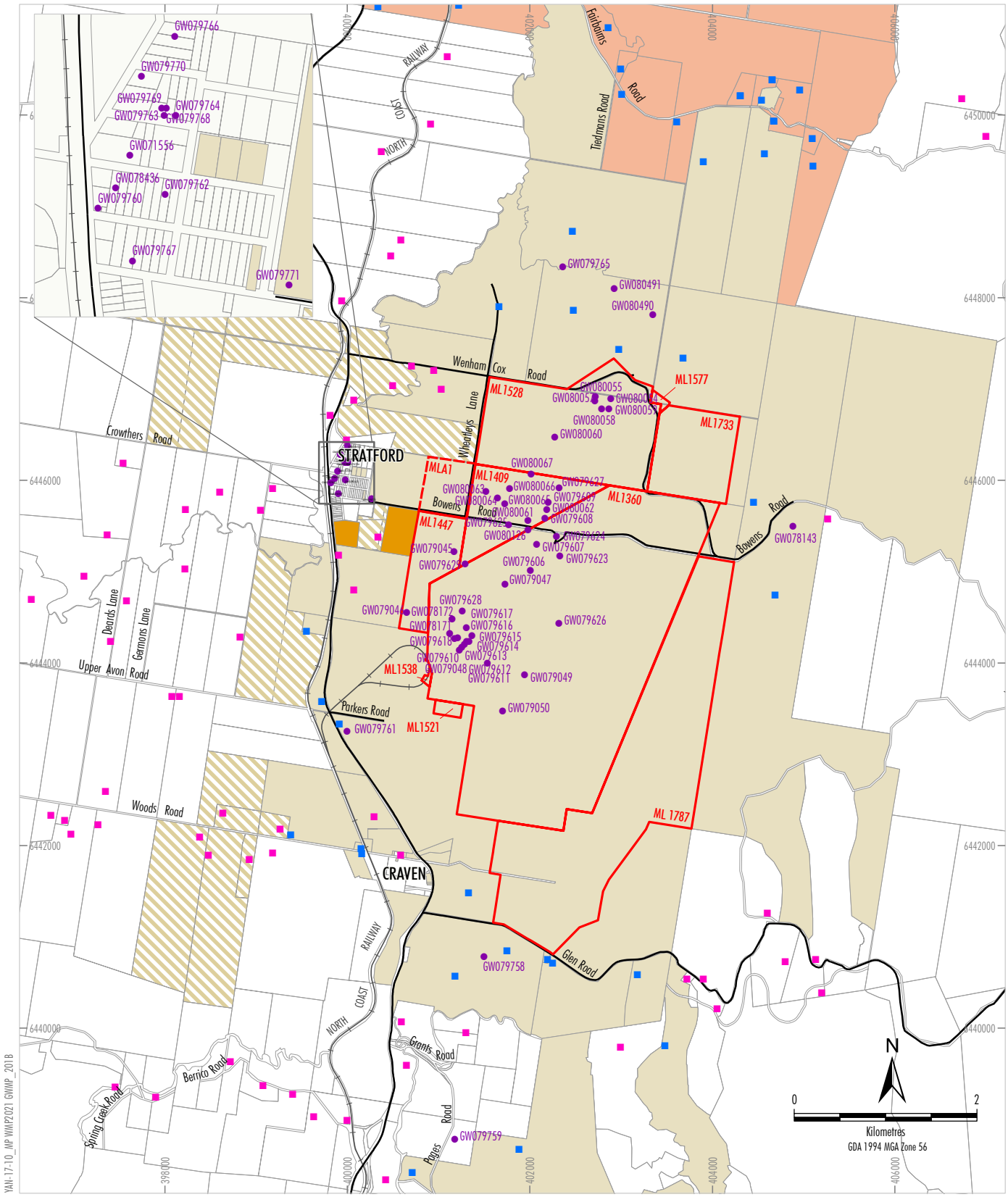
Records of groundwater levels in the vicinity of the SMC are available from as early as 1994. Monitoring bores have been established in a number of different timeframes and have been generally associated with different stages of mine development.

An analysis of the available temporal data (including hydrographic plots) was provided in Heritage Computing (2012).

In summary, the analysis indicated (Heritage Computing, 2012) (Figure 5):

- coal seam monitoring bore MW6 (north of BRNOC) showed a pronounced mining effect shortly after commencement in 2003, with a drawdown of about 8 m; from 2007 onwards this bore has responded to weather variations with event amplitudes of 2-4 m;
- coal seam monitoring bores MW3 and MW4 between the BRNOC and the Roseville Extended Pit showed a mild but gradually increasing effect from both the approaching BRNOC and the receding Roseville Extended Pit, and a sharp response at the onset of Roseville West Pit in 2009;
- coal seam monitoring bores MW1 and MW2 showed a mild response to Roseville Extended Pit and a sharper response to Roseville West Pit;
- interburden monitoring bores close to open cut mining areas have all shown a mining response;
- regolith monitoring bores are fairly stable, showing mild responses to weather variation, with bores MW9 and MW8 (adjacent to BRNOC) showing a mining effect with drawdowns of about 5 m, and monitoring bore RB4[3] (north of Roseville Extended Pit) responding to mining;
- the Ex Griffin and Ex Bramley bores (1.2 km and 2 km respectively from historical [BRNOC and Stratford Main Pit] mining areas) show no discernible effects from mining;

[3] Bore RB4 was removed by mining in 2009.



LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary*
- Yancoal Owned Land
- GRL Owned Land or Under Option
- Private Landholders - Yancoal Agreement
- Crown Land
- Privately Owned Dwelling
- Resource Company Owned Dwelling
- DPIE Water Registered Bores

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Orthophoto - Yancoal (July 2019); LPI (2016); NSW Department Planning & Environment (2017)

STRATFORDCOAL

STRATFORD EXTENSION PROJECT

DPIE Water Registered Bores

Figure 4

YAN-17-10_MP WMP2021 GWMP_202A

LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary*
- Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Conceptual Up-Catchment Diversion
- Groundwater Monitoring Site
- Future Groundwater Monitoring Site
- Stratford Waste Emplacement PAF Containment Cell

**MLA1 is a proposed future Mining Lease Application (MLA) area and has not yet been lodged.*

Source: Orthophoto - Google Earth CNES/Airbus (2020); LPI (2016); NSW Department of Planning & Environment (2017)

STRATFORDCOAL

STRATFORD EXTENSION PROJECT

Local Groundwater Monitoring Locations

Figure 5

- alluvial monitoring bores show no discernible effects from mining; and
- no mining effects have been observed in any privately-owned bores in Stratford.

For the purposes of developing trigger levels for investigation (Section 5.1), the groundwater hydrographs have been updated (to 2017) and are presented in Attachment A for:

- coal seams and coal measures (north and south);
- regolith (north and south);
- interburden (north and south); and
- Stratford Village (north and south).

Groundwater Pressures

At the time of installation, the monitoring results available from the installed vibrating wire piezometers at NS585, NS246, GC207 and NS256 (Figure 5) indicated that no significant mining effects (i.e. deviation from the hydrostatic pressure line) have been recorded at these locations at the SMC (Heritage Computing, 2012).

Groundwater Inflows/Pumping Rates

Records of pumped water volumes from operational open cut mining areas at the SMC (e.g. BRNOC, Roseville Extended Pit and Roseville West Pit) have been kept for water management and groundwater licensing purposes. The pumped water data is presented in graphic form including trend lines in Heritage Computing (2012).

The recorded pumped volumes are however a combination of groundwater inflow, rainfall runoff, seepage from waste emplacements and, in some cases, water transfers. Therefore the pumping rates do not represent actual groundwater inflow rates (i.e. groundwater inflow rates will be significantly lower).

The trend lines show that pumping rates at the SMC have been approximately:

- 1 ML/day at BRNOC, declining with time;
- 0.6 ML/day at Roseville Extended Pit, declining with time; and
- 0.3 ML/day at Roseville West Pit, increasing steadily with time.

Since mid-2014, no water has been pumped from the BRNOC Pit or the Roseville West Pit. At October 2017, the water levels in those pits had risen approximately 30 m and 10 m, respectively. At September 2018, no groundwater has yet been intersected in the Avon North Open Cut, and the BRNOC Pit is nearly dry following dewatering since April 2018.

4.2 GROUNDWATER QUALITY

A detailed description of baseline groundwater quality data is provided in the *Stratford Extension Project - Groundwater Assessment* (Heritage Computing, 2012).

Table 5 summarises the water quality attributes of groundwater samples taken by groundwater specialists as a component of various hydrogeological investigations between 1981 and 2003, and by SCPL between 1993/1994 and December 2010. The locations of the local groundwater monitoring bores are shown on Figure 5.

Table 5
Summary of Water Quality Data at SMC Groundwater Monitoring Sites
(July 1981 to December 2010)

Analyte	Unit	Median	Minimum	Maximum	Mean
pH	-	6.7	3.4	8.4	6.4
Electrical Conductivity (EC)	µS/cm	3,700	425.1	11,346	4,062
Sulphate	mg/L	70.0	1.7	1,382	157.9
Calcium	mg/L	139.2	10.0	1,873	244.4
Magnesium	mg/L	50.0	0.2	238.3	75.5
Sodium	mg/L	600.0	58.0	2,362	689.4
Potassium	mg/L	6.5	1.0	22.7	8.1
Chloride	mg/L	1,035	73.0	4,858	1,368
Iron	mg/L	2.2	0.0	110.0	12.4
Manganese	mg/L	0.6	0.0	409.2	17.1
Zinc	mg/L	20.0	15.0	550.0	195.0
Alkalinity as $CaCO_3$	mg/L	1.0	0.0	350.0	40.8
Total Suspended Solids (TSS)	mg/L	14.0	1.0	3921	376.6
Total Dissolved Solids (TDS)	mg/L	2,207	200.0	19,710	3,103
Oxygen Reduction Potential (ORP)	mV	46.5	6.2	211.8	60.7
Bicarbonate	mg/L	209.0	0.0	742.6	267.9
Copper	mg/L	26.0	3.0	200.0	61.1
Lead	mg/L	0.1	0.0	378.0	21.3
Phosphorus (total)	mg/L	0.3	0.1	312.0	19.5

µS/cm = micro Siemens per centimetre.

mg/L = milligrams per litre.

mV = millivolt.

$CaCO_3$ = calcium carbonate.

A summary of the EC statistics for laboratory samples analysed from the SMC monitoring network from commencement of sampling to December 2010 is provided in the *Stratford Extension Project – Groundwater Assessment* (Heritage Computing, 2012). In summary, the median recorded values for EC at the SMC are approximately: 5,000 microSiemens per centimetre (µS/cm) in coal; 4,500 µS/cm in alluvium and regolith; and 3,500 µS/cm in coal measures interburden (Heritage Computing, 2012).

The analysis conducted by Heritage Computing (2012) shows salinity is fairly uniform spatially, with the highest value (11,700 µS/cm) in Avondale Creek alluvium to the south of the SMC, and generally lower values in Stratford closer to the Avon River.

Apart from two private bores in the village of Stratford and monitoring bore MW12 (that intercept better quality alluvial waters), most groundwaters are beyond the limit of potable use but on the basis of salinity are suitable for livestock, irrigation and other general uses.

4.3 GROUNDWATER USE

Locally there is little reliance on groundwater bores as a source of water, as agricultural enterprises predominantly rely on surface water sources which are more abundant and generally better quality. The number of privately held bores in the SMC area and surrounds is low due to the generally poorer groundwater quality, high rainfall and subsequent high rates of runoff (SCPL, 2012).

A search of the NSW Government PINNEENA Groundwater Works Database identified 62 registered bores and wells within approximately 5 km of the SMC (SCPL, 2013). Their locations are shown on Figure 4. The majority of these identified registered bores are on land owned by Yancoal.

Registered bores not owned by Yancoal in the vicinity of the SMC include (Figure 4):

- eleven private bores in the village of Stratford; and
- one private bore (GW079759) to the south of the SMC.

The privately-owned bores are licensed for stock and domestic use.

4.4 GROUNDWATER DEPENDENT ECOSYSTEMS

There are no high priority groundwater dependent ecosystems (GDEs) identified within the WSP as occurring in the vicinity of the SMC. Further, no GDEs have been identified on or near the SMC area (after National Water Commission, 2006). In addition, flora surveys have not detected any terrestrial or aquatic vegetation that appears to be associated with groundwater (FloraSearch, 2012).

4.5 METEOROLOGICAL MONITORING

Meteorological monitoring is undertaken at the Stratford Mining Complex in accordance with the requirements of Condition 24, Schedule 3 of the NSW Development Consent SSD-4966, to the satisfaction of the EPA. The on-site weather station monitors a number of meteorological parameters, including daily rainfall and temperature, solar radiation, wind speed and wind direction.

A summary of the meteorological conditions at the SMC are included in the Site Water Balance (SWB) and reported annually in the SMC Annual Review (available on the Stratford Coal website: http://www.stratfordcoal.com.au).

5 PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

Table 8 in NSW Development Consent SSD-4966 prescribes the water management performance measures for the SMC. SCPL will assess the SMC against the specific water management performance indicators outlined in Table 6.

Table 6
Water Management Performance Measures and Indicators

Performance Measure	Performance Indicator
Water Management - General	
• Minimise the use of clean water on site. • Maximise as far as reasonable and feasible the separation of clean and dirty water within the site.	The water management system is constructed and maintained generally in accordance with the design described in the Site Water Balance (SWB) and SWMP.
Construction and Operation of Linear *(sic)* Infrastructure	
• Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1, Volume 2A – Installation of Services* and *Volume 2C – Unsealed Roads*.	The erosion and sediment controls are constructed and maintained generally in accordance with the design described in the SWMP.
• Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land (July 2012)*, or its latest version.	Infrastructure within 40 m of watercourses are constructed and maintained generally in accordance with the design described in the SWMP.
• Design, install and maintain creek crossings generally in accordance with the *Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries 2003)* and *Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003)*, or their latest versions.	Creek crossings are constructed and maintained generally in accordance with the design described in the SWMP.
Mine Sediment Dams	
• Design, install and maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* and *Volume 2E – Mines and Quarries*.	Sediment dams are constructed and maintained generally in accordance with the design described in the SWMP.
Clean Water Diversion and Storage Infrastructure	
• Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site. • Design, install and maintain the clean water system to capture and convey the 1 in 100 year ARI flood.	The water management system is constructed and maintained generally in accordance with the design described in the SWB and SWMP.

Table 6 (Continued)
Water Management Performance Indicators

Performance Measure	Performance Indicator
Stream Diversion of Tributary of Avondale Creek • Design, install and maintain the tributary diversion to convey the modelled peak water flows of its altered catchment. • Establish and maintain geomorphic stability of the diversion channel using appropriate revegetation and stabilisation techniques. • Demonstrate that the channel is appropriately vegetated and stabilised prior to the release of flows into the diversion channel. • Control water flows entering the diversion channel by the construction of a stormwater detention basin.	The stream diversion of tributary of Avondale Creek is constructed and maintained generally in accordance with the design described in the SWMP.
Mine Water Storages and Out-of-pit Emplacement of Potentially Acid-Forming Materials • No discharges to surface waters. • Adequate freeboard to minimise the risk of discharge to surface waters.	Water management infrastructure (including mine water storages) and PAF materials in out-of-pit emplacements are constructed and maintained generally in accordance with the design described in the SWB and SWMP.
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 and PAF materials are managed generally in accordance with the methodologies described in the SWB and SWMP.
Chemical and Petroleum Storage • Chemical and hydrocarbon products to be stored in bunded areas in accordance with relevant Australian Standards.	Chemical and hydrocarbon storages will be constructed and maintained in accordance with the relevant Australian Standards (refer to SWMP).
Aquatic and Riparian Ecosystem, in the Avon River and its Tributaries, particularly Avondale and Dog Trap Creeks • Develop site-specific in-stream water quality objectives in accordance with ANZECC 2000 and *Using the ANZECC Guidelines and Water Quality Objectives in NSW (DECC 2006)*, or their latest versions.	Site-specific in-stream WQOs are developed as described in the SWMP.

Note: The SWB and SWMP are included in Appendices 1 and 2 of the WMP.

The performance indicators in Table 6 will be used to assess and manage the risks related with the SMC 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 DPIE describing those options and any preferred remediation measures or other course of action; and
- implement remediation measures as directed by the Secretary.

5.1 CASCADING TRIGGER LEVELS FOR INVESTIGATION

The cascading trigger levels for investigation described in the following sub-sections will be applied during the process of assessment against the performance indicators and measures as detailed in Section 8.

5.1.1 Groundwater Inflows

Monitoring Triggers

Groundwater inflows to each of the open cuts are predicted to be:

- less than 0.25 ML/day in the Avon North Open Cut on average over each calendar year;
- less than 0.45 ML/day in the BRNOC on average over each calendar year;
- less than 0.5 ML/day in the Roseville West Open Cut Pit on average over each calendar year; and
- less than 0.15 ML/day in the Stratford East Open Cut on average over each calendar year.

Monitoring data will continue to be reviewed periodically with visual observations and pumping records used to identify if any unexpected inflow behaviour due to mining activities were to occur.

Should the combined groundwater inflows from Avon North Open Cut, BRNOC and Stratford East Open Cut be recorded greater than 1.1 ML/day[4] on average over a calendar year, an investigation will be triggered to confirm that, despite mine inflows being greater than predicted, there is no more than negligible drawdown impact on water levels at groundwater production bores on privately-owned land (i.e. check groundwater drawdown triggers in Section 5.1.2).

5.1.2 Groundwater Drawdown

Monitoring Triggers

Trigger levels for investigation have been developed based on a review of updated groundwater hydrographs (Attachment A) and considering baseline groundwater level statistics presented in Table 7.

Table 7
Groundwater Investigation Trigger Levels

Monitoring Bore	Monitoring Purpose	Baseline Groundwater Level (m AHD)*		
		5th Percentile (P5)	20th Percentile (P20)	50th Percentile (P50)
Mine Site Bores				
MW12	Trigger	116.32	116.79	117.06
MW11	Control	106.04	106.43	107.81
Stratford Village Bores				
SCPL Bore	Trigger	114.42	114.82	115.50
Germon	Control	109.32	110.02	110.79
Bagnell	Control	112.43	113.50	114.40

* Statistics for all measurements to 30 June 2017.

[4] Based on the average predicted pit inflows (combined) over the life of the SMC (see Section 6.2.1).

The mine site monitoring bore trigger at MW12 has been established as a shallow hole (depth 7.5 m in interburden) near the Avon North Open Cut and will be used to monitor if any mining effects were to reach shallow depths. MW11 (depth 24.5 m in coal) will be used (in conjunction with MW12) as a control site and is likely to exhibit an effect from mining the Avon North Open Cut. The mine site trigger at MW12 will also provide a very early/cascading trigger for monitoring potential mining related groundwater impacts on (shallow) Stratford Village bores.

The SCPL monitoring bore at the eastern edge of Stratford Village will be used to monitor if any mining effects were to reach shallow depths. The Germon and Bagnell bores in Stratford Village will be used (in conjunction with the SCPL bore) as control sites to identify natural or other anthropogenic changes, where access to these private bores is made available.

The application of the cascading trigger levels is presented in Section 8 (Table 10). In summary, the cascading trigger levels will apply:

1. if more than two successive monthly readings at MW12 or SCPL bore are below the P20 groundwater trigger level (116.8 mAHD and 114.8m AHD, respectively), the equivalent P20 baseline water levels at other shallow control sites have not been triggered and the change is not related to climate or other effects (i.e. dry conditions or other anthropogenic changes are not prevalent); and then
2. if more than two successive monthly readings at MW12 and SCPL bore are below the P5 groundwater trigger level (116.3 mAHD and 114.4m AHD, respectively) and the equivalent P5 baseline water levels at control sites have not been triggered and the change is not related to climate or other effects (e.g. dry conditions or other anthropogenic changes are not prevalent).

With consideration of background changes (Section 7.4), the above triggers will be used to determine if the drawdown effects are attributable to mining at the Avon North Open Cut and BRNOC.

Additional monitoring triggers for groundwater drawdown will be developed following the installation of the proposed new groundwater monitoring sites for the Stratford East Open Cut to the south and west (i.e. F6 and F7) described in Section 7.

Notification-Based Trigger

Should a groundwater drawdown related notification be received from an owner of a groundwater bore, SCPL will conduct an investigation and respond in accordance with the procedures described in Section 11. The results of the groundwater monitoring program (Section 7) will be reviewed by SCPL as part of a preliminary evaluation to determine if further investigation, notification, mitigation (e.g. bore re-conditioning), compensation (e.g. alternative water supply) or other contingency measures (refer below) are required.

The proposed performance indicator will be that no more than negligible drawdown impact on water levels at groundwater production bores on privately-owned land is experienced as a result of the SMC.

Should analysis of the monitoring results, and modelling if required, confirm that the SMC has resulted in a greater than negligible change in water levels in privately-owned bores, and the assessment is peer reviewed by a specialist approved the DPIE, then the results will be reported to DPIE and DPIE Water and the Contingency Plan enacted (Section 9).

5.1.3 Groundwater Quality

Monitoring Trigger

The ANZECC water quality guidelines (ANZECC & ARMCANZ, 2000) apply to the quality of both surface waters and groundwaters since they have been developed to protect environmental values relating to above-ground uses such as irrigation and stock use. ANZECC & ARMCANZ (2000) recommends that wherever possible site-specific data be used to define trigger values for physical and chemical factors which can adversely impact the environment, rather than using default values.

Table 1 of the *NSW Aquifer Interference Policy* (NSW Office of Water, 2012) sets out the minimal impact considerations for aquifer interference activities for groundwater sources including:

> *Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.*

The following beneficial uses were recommended by the National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia for major (or significant) aquifers and have been adopted by the NSW Office of Water in *The Groundwater Quality Protection Policy* (Department of Land and Water Conservation, 1998):

- ecosystem protection;
- recreation and aesthetics;
- raw water for drinking water supply; and
- agricultural water and industrial water.

The National Land and Water Resources Audit (Murray Darling Basin Commission, 2005) specified groundwater quality ranges for beneficial use categories based on salinity (Table 8). These salinity based categories generally align with the beneficial uses within the NSW Groundwater Quality Protection Policy.

Table 8
Groundwater Quality Categories: Electrical Conductivity

Beneficial Use	Quality Range	Description
Potable	Up to 800 μS/cm (500 mg/L TDS)*	Suitable for all drinking water and uses.
Marginal Potable	800-2,350 μS/cm (500-1,500 mg/L TDS)*	At the upper level, this water is at the limit of potable water, but is suitable for watering of livestock, irrigation and other general uses.
Irrigation	2,350-7,800 μS/cm (1,500-5,000 mg/L TDS)*	At the upper level, this water requires shandying for use as irrigation water or to be suitable for selective irrigation and watering of livestock.
Saline	7,800-22,000 μS/cm (5,000-14,000 mg/L TDS)*	Generally unsuitable for most uses. It may be suitable for a diminishing range of salt-tolerant livestock up to about 6,500 mg/L [~10,150 μS/cm] and some industrial uses.
Highly Saline	> 22,000 μS/cm (>14,000 mg/L TDS)*	Suitable for coarse industrial processes up to about 20,000 mg/L [~31,000 μS/cm].

*Approximate EC ranges derived from TDS ranges, with conversion Factor of 1.5625 applied.
Source: *National Land and Water Resources Audit* (Murray Darling Basin Commission, 2005).

Each bore will be assigned a beneficial use category based on a bore census / survey. At any production bore where a monitored EC value is outside the applicable baseline range of the assigned beneficial use classification for that bore, a second EC measurement will be taken the next month and, if the result is consistent (i.e. lowered beneficial use category), a groundwater investigation will be initiated. Subject to the outcomes of the groundwater investigation and reporting in the Annual Review, compensatory actions will be implemented if necessary (Section 6.3).

The proposed performance indicator will be that the beneficial use category (based on groundwater quality) at groundwater production bores on privately-owned land should not be lowered beyond 40 m from the activity as a result of the SMC.

6 GROUNDWATER MANAGEMENT MEASURES

6.1 GROUNDWATER USERS – MANAGEMENT OF NOTIFICATIONS

Should a groundwater related notification be received from the owner of a groundwater bore, SCPL will conduct an investigation and respond in accordance with the procedures described in Section 11.

6.2 GROUNDWATER MODEL PREDICTIONS, VALIDATION AND REVIEW

A numerical groundwater model developed by Heritage Computing (2012) was used to simulate the potential impacts of the SMC on the local aquifer systems and to estimate the potential quantity of groundwater inflow to the open pits. A summary of the potential impacts on local groundwater aquifers, surface water resources (e.g. Avon River, Dog Trap Creek and Avondale Creek) and on existing groundwater users is presented below.

6.2.1 Groundwater Model Predictions

Porous Rock Groundwater System

The numerical modelling conducted by Heritage Computing (2012) predicted negligible impact on groundwater levels or groundwater yield for groundwater users with privately owned bores in the porous rock groundwater system.

The average predicted pit inflows (combined) over the life of the SMC are predicted to be about 1.1 ML/day (390 ML/annum), with all but approximately 1.5% derived from the porous rock groundwater system (Heritage Computing, 2012).

Given the similarity of salinity concentration levels in the various groundwater sources (i.e. porous rock and alluvial), no appreciable change in the porous rock groundwater salinity is expected as a consequence of mining and there is expected to be negligible change in groundwater quality as a result of mining in the short-term (Heritage Computing, 2012).

Post-Mining

Numerical modelling of the post-mining scenario showed that the water levels in the porous rock groundwater system will recover over time with substantial recovery apparent after about 40 years (Heritage Computing, 2012) and there is expected to be negligible change in groundwater quality as a result of mining in the long-term. In the long-term, the salinity in the final voids will increase through evaporative concentration, but as the final voids will remain groundwater sinks, there will be no adverse effect on the beneficial uses of any groundwater sources (including the porous rock groundwater system) (Heritage Computing, 2012).

Alluvial Groundwater System

The numerical modelling conducted by Heritage Computing (2012) predicted:

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

Given the similarity of salinity concentration levels in the various source waters (i.e. porous rock and alluvial), no appreciable change in alluvial groundwater salinity is expected as a consequence of mining (Heritage Computing, 2012). Further, it is expected that groundwater quality will not be impacted by final void water quality post-mining, and there will be no adverse effect on the beneficial uses of any groundwater sources (including the alluvial groundwater system), as the final voids will remain groundwater sinks (Heritage Computing, 2012).

Surface Water Resources

Heritage Computing (2012) examined the stream-aquifer (surface water-groundwater) interaction status of the Avon River, Dog Trap Creek and Avondale Creek.

Heritage Computing (2012) concluded that mining at the SMC is too far away from Avon River for any discernible effect on that surface water source.

Dog Trap Creek will continue as a gaining stream (i.e. with some baseflow component) and will have an average baseflow reduction of 0.07 ML/day during the life of the SMC. The baseflow reduction will peak at approximately 0.08 ML/day and then reduce when the BRNOC is used as a water storage and ultimately backfilled with waste rock (i.e. when the system recovery commences). The reduction in baseflow will have a negligible effect on the natural stream flow of Dog Trap Creek (Heritage Computing, 2012).

Avondale Creek will have variable baseflow changes during the life of the SMC that will change from an initial peak reduction of less than 0.2 ML/day to a gain in baseflow of about 0.05 ML/day. Overall, an average net reduction in baseflow of about 0.02 ML/day is expected for Avondale Creek. The predicted changes in baseflow will have a negligible effect on Avondale Creek natural stream flow (Heritage Computing, 2012).

Groundwater Users

Heritage Computing (2012) predicted that the potential changes in water level in each of the 12 privately owned bores identified in the vicinity of the SMC is expected to be negligible. Heritage Computing (2012) concluded that there will be no adverse effect on the beneficial uses of any groundwater sources, as the final voids at the SMC will remain groundwater sinks.

6.2.2 Groundwater Model Validation and Review

The numerical model developed by Heritage Computing (2012) as part of the groundwater assessment for the Stratford Extension Project will be used as a management tool for the validation and review of the predicted groundwater impacts throughout the life of the SMC.

The numerical groundwater model will be the subject of a review every 3 years.

The results of the groundwater monitoring program (Section 7), including seasonal variations in groundwater levels and surface-groundwater interaction, will inform refinement and re-calibration of the numerical groundwater model, where required. Strata definition based on additional exploration drilling in advance of the mining will also be utilised where possible.

Revised outputs from the numerical model will be reported periodically over the life of the SMC and used to inform the site water balance (as described in the SWB, Appendix 2 of the WMP).

The results of the groundwater model review and any model refinements will be reported in the Annual Review (Section 10.1).

In the event that actual groundwater drawdown levels exceed the predicted groundwater drawdown levels over the life of the SMC, the groundwater model will be further refined using any new data available to characterise the aquifer systems.

6.3 COMPENSATORY ACTIONS

In accordance with Condition 26, Schedule 3 of NSW Development Consent SSD-4966, SCPL will provide a compensatory water supply to the owner of any privately-owned land whose water supply is adversely and directly impacted (other than a negligible impact) as a result of the development. This supply will be provided in consultation with DPIE Water, and to the satisfaction of the Secretary.

The compensatory water supply measures will provide an alternative long-term supply of water that is equivalent, in quality and volume, to the loss attributable to the development. Equivalent water supply will be provided (at least on an interim basis) within 24 hours of the loss being identified, unless otherwise agreed with the landowner. If SCPL and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

If SCPL is unable to provide an alternative long-term supply of water, then SCPL will provide alternative compensation to the satisfaction of the Secretary.

6.4 GROUNDWATER LICENSING

The groundwater systems within which the SMC lies, specifically relate to:

- **Gloucester Basin Water Source** (e.g. Permian aquifer) under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.*
- **Avon River Water Source** (e.g. alluvial aquifers) under the *Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009.*

SCPL currently holds several WALs in the Gloucester Basin Groundwater Source (Section 2.3), for a total of 1,476 share components under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016* for the dewatering of the multiple pits at the SMC.

Dewatering of pits will be undertaken in accordance with the conditions of these WALs.

SCPL currently holds no aquifer access licences in the Avon River Water Source under the *Water Management Act, 2000*. Notwithstanding, a proportion of the existing unregulated river access licence entitlements (i.e. 271 share components) may be available for conversion into Project aquifer access licences in accordance with the *Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009* for future predicted inflow volumes from alluvial sediments.

Appropriate aquifer access licences and share components for any Project take of water from alluvial aquifers in the Avon River Water Source will be sought and obtained under the *Water Management Act, 2000* in consultation with DPIE Water.

7 MONITORING PROGRAM

7.1 REGIONAL AND LOCAL AQUIFERS GROUNDWATER MONITORING

The network of monitoring bores presented in Table 9 will be used to monitor the potential impacts on aquifers, groundwater levels and quality in the vicinity of the SMC.

The monitoring triggers developed in Section 5.1 will be used to trigger investigations as required.

Table 9 provides a summary of the SMC groundwater monitoring program (including future monitoring piezometers).

Table 9
Groundwater Monitoring Program

Monitoring Locations[1]	Frequency	Parameters
• Stratford Village Bores, Ex-Bramley	Six monthly	• Water level.
	Annually	• EC, pH, TDS, ORP, Sodium, Potassium, Calcium, Magnesium, Chloride, Sulphate (SO4), Iron, Manganese, Lead, Zinc, Phosphorus, Bicarbonate.
• SCPL bore, Germon, Bagnell	Monthly	• Water level.
		• EC
• F-Series F1*, F2 & F3* (for watertable recovery in spoil) F4, F5*, F6 & F7 (for drawdown monitoring)	Quarterly	• Water level.
		• EC, pH, TDS, ORP, Sodium, Chloride, SO_4, Calcium, Magnesium, Iron.
• BRN Series (MW11, MW12)	Monthly	• Water level.
		• EC
• BRN Series (MW3, MW4, MW6, MW7, MW8, MW11, MW12, Ex-Griffin)	Quarterly	• Water level.
		• EC, pH, TDS, ORP, Sodium, Chloride, SO_4, Calcium, Magnesium, Iron.
• Roseville Series (RB1, RB2*, RB3)	Quarterly	• Water level.
	Quarterly	• EC, pH, TDS, ORP, Sodium, Chloride, SO_4, Calcium, Magnesium, Iron.
• Stratford Project Series (GW1, GW2, GW3*, GW4, GW5*, GW7*, GW8, BRWN1)	Six monthly	• Water level.
	Six Monthly	• EC, pH, TDS, ORP, acidity, alkalinity, Aluminium, Sodium, Chloride, SO_4, Cobalt, Calcium, Magnesium, Manganese, Iron, Nickel and Zinc.

[1] Monitoring locations are shown on Figure 5.

* Seepage/leachate monitoring sites – includes potential seepage from final voids, water storages and emplacements including PAF Cell.

* The SMC's Surface Water Monitoring Program (within the SWMP [Appendix 2 of the WMP]) includes surface water monitoring locations relevant for the PAF Cell.

The groundwater monitoring network will be sampled for water quality on a monthly, quarterly or six monthly basis during mining, and for at least two years following mining.

Future (F-Series) monitoring piezometers will include the following (Figure 5):

- Standpipe piezometer F1 will be installed east of the Stratford Main Pit and within the backfilled spoil (or adjacent area, if not practicable). The piezometer will allow for future assessment of the waste rock hydraulic conductivity and the rainfall recharge rate through the infill material. Site F1 will be installed when the Stratford Main Pit is backfilled and be used for future seepage/leachate monitoring from the rejects disposal area in the Stratford Main Pit.
- Standpipe piezometer F2 will be installed within the backfilled spoil in the north of the Avon North Open Cut (or adjacent area, if not practicable). The piezometer will allow for future assessment of the waste rock hydraulic conductivity and the rainfall recharge rate through the infill material. Site F2 will be installed upon completion of the final landform and rehabilitation of the Avon North Open Cut mining area.

- Standpipe piezometer F3 will be installed within the backfilled spoil in the north of the Stratford East Open Cut (or adjacent area, if not practicable). The piezometer will allow for future assessment of the waste rock hydraulic conductivity and the rainfall recharge rate through the infill material. Site F3 will be installed when the Stratford East Open Cut is backfilled and be used for future seepage/leachate monitoring from the Stratford East Dam and from the Stratford Waste Emplacement PAF containment cell.
- Standpipe piezometer F4 will be installed to the west of the SMC (between Stratford and the Roseville Pit) to a depth of approximately 160 m (at Easting 401000; Northing 6445725) prior to mining within the Roseville West Pit Extension.
- Standpipe piezometer F5 will be installed north of the Stratford East Dam (and Stratford East Open Cut) to a depth of approximately 115 m (at Easting 403550; Northing 6444425). Site F5 will be installed within six (6) months of the commencement of the Stratford East Open Cut and be used for future seepage/leachate monitoring from the Stratford East Dam.
- Standpipe piezometer F6 will be installed to the south-west of the Stratford East Open Cut. A standpipe is proposed to be installed in advance of groundwater make/dewatering occurring at the Stratford East Open Cut to a depth of approximately 200 m (at Easting 401700; Northing 6442125).
- Standpipe piezometer F7 will be installed to the south of the Stratford East Open Cut. A standpipe is proposed to be installed in advance of groundwater make/dewatering occurring at the Stratford East Open Cut to a depth of approximately 140 m (at Easting 401800; Northing 6440925).

Groundwater bores may also be removed from the monitoring program as they are progressively disturbed by mining operations. The final location and timing of piezometers will include consideration of site characteristics, their location relative to the mine plan, access and site inspection. Water level measurements at these monitoring sites will be automated with and will continue for at least two years following mining.

Bore licences will be obtained prior to installation of any new monitoring bores. Monitoring bores will continue to be constructed in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2012) by an appropriately qualified water bore driller. Groundwater quality samples will be taken during drilling of any new piezometer or hydrogeological investigation bores.

Groundwater monitoring, water level measurements and sample collection, storage and transportation will be undertaken generally in accordance with the procedures outlined in the *Murray Darling Basin Groundwater Quality Sampling Guidelines* (Murray Darling Basin Commission, 1997).

Analysis will be undertaken by a laboratory which has been accredited by the National Association of Testing Authorities, Australia (NATA) to undertake testing for the parameters being determined.

Field testing will be undertaken using field equipment that is well maintained and calibrated in accordance with the manufacturer's recommendations.

The groundwater monitoring data will be used to:

- confirm numerical groundwater model predictions;
- assess mining related impacts against the performance indicators and measures and inform any required investigation (Section 5.1);
- assist accounting of groundwater take (direct/indirect) against groundwater model predictions and water access licences held by SCPL (Section 6.4);
- inform revisions and recalibration (where required) of the numerical groundwater model (Section 6.2.1); and
- inform the annual review of baseline data and any mining related effects on groundwater (Section 10.1).

7.2 GROUNDWATER INFLOWS TO OPEN CUT MINING OPERATIONS

Groundwater mine seepage inflows will be directed and collected in pit sumps along with rainfall and surface water runoff and seepage through backfilled pit areas. Water level and water quality analysis of the pit sumps will be undertaken on a monthly basis. The volumes of water extracted from the pit sumps will also be recorded and where practicable.

A site water balance review will be undertaken on an annual basis to monitor the status of inflows (including groundwater inflows to open pits), storage and consumption. The site water balance review will be used to optimise water management performance and will enable corrective actions to be implemented, if required (as described in the SWMP [Appendix 2 of the WMP]). The results of the water balance reviews will be reported in the Annual Review (Section 10.1).

7.3 SEEPAGE FROM FINAL VOIDS, WATER STORAGES AND EMPLACEMENTS

As mining operations progress, each open cut acts as a localised groundwater sink. This will cause a change in groundwater flow direction and, in some places, a localised reversal of flow direction.

There is expected to be negligible change in groundwater quality as a result of mining in the long-term (Heritage Computing, 2012). In the long-term, the salinity in the final voids will increase through evaporative concentration, but as the final voids will remain groundwater sinks, there will be no adverse effect on the beneficial uses of any groundwater sources.

There will not be a need to monitor seepage of the water reporting to the final void. Monitoring of the quality of the final void pit lakes will be undertaken post-mining and be described in the relevant closure plans.

In addition, there is expected to be negligible change in groundwater quality as a result of seepage from mine water storages in the long-term, and water quality of mine water storages is monitored monthly as described in the SWMP.

Despite this, and as recommended previously by CL&W, SCPL will monitor subsurface leakage from contained water storages holding mine water at the surface (including the Stratford Main Pit, Stratford East Dam and Return Water Dam) through the use of existing bores (sites RB2 and GW3) and the installation of future monitoring bores (sites F1, F3 and F5) (Table 9) that will be located down-gradient from these contained water storages.

With respect to Parkers/Bowens Road West Pit, this contained water storage captures dirty water runoff from the infrastructure area and is maintained at a low level. Parkers/Bowens Road West Pit will not be used for long-term mine water storage, and as such, no seepage monitoring is proposed.

Heritage Computing (2012) includes an assessment of conditions far into the future (about 200 years), including the predicted equilibrium water table levels in the future and the hydraulic gradient in the vicinity of each water storage. Using this information it has been determined that the proposed locations shown on Figure 5 will be the most appropriate locations to monitor any potential subsurface leakage from the contained water storages. These monitoring bores will be shallow, to a depth of at least 2 metres below the current water table, and will be installed at least two years prior to the formation of an hydraulic gradient from the water storage to the monitoring site.

As no mine water has been transferred to the Stratford East Dam since 2003, and the water quality is similar to off-site surface water locations, site F5 will only be installed sooner than that prescribed in Section 7.1, if/when mine water is pumped into the Stratford East Dam.

7.4 BACKGROUND CHANGES IN GROUNDWATER QUALITY/YIELD

The groundwater monitoring program presented in Table 9 will be used to identify background changes in groundwater quality/yield. Results of the monitoring program will be reported in the Annual Review (Section 10.1). The monitoring triggers developed in Section 5.1 will be used to trigger investigations as required.

7.5 GROUNDWATER SUPPLY OF PRIVATE LANDOWNERS

Monitoring of Stratford Village bores and the Ex-Griffin bore will be conducted at six monthly intervals to monitor groundwater levels, and annually to monitor groundwater quality. The purpose of this monitoring is to determine whether the mine site is having any effect on the bores in the Stratford Village. (Note: MW12 will provide an early indication of potential groundwater impacts on Stratford Village bores).

Groundwater sampling procedures will be in accordance with AS/NZ 5667.11:1998 (*Water Quality – Sampling, Part 11: Guidance on Sampling of Groundwaters*).

A summary of the groundwater monitoring program, including parameters to be monitored and frequency of sampling, is provided in Table 9. Figure 5 illustrates the location of the groundwater monitoring sites.

8 ASSESSMENT OF PERFORMANCE (INDICATORS AND MEASURES)

The monitoring results will be used to assess the SMC against the relevant performance indicators and performance measures described in Section 5; the process is summarised in Table 10.

Table 10 will be revised following the installation of the proposed new groundwater monitoring sites for the Stratford East Open Cut to the south and west (i.e. F6 and F7), once appropriate trigger levels for investigation are developed.

If data analysis indicates a performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the performance measure. If a performance measure is determined to have been exceeded, the Contingency Plan will be implemented (Section 9).

Table 10
Process for Assessment against Performance Indicators and Measures

Performance Measure	Specific Performance Indicator(s)	Data Analysis to Assess against Performance Indicator(s)	Monitoring			Cascading Trigger Levels	Assessment of Performance Indicator and Performance Measure	Relevant Management and Contingency Measures
			Sites	Parameters	Frequency			
No more than negligible impact on water levels in groundwater production bores on privately-owned land as a result of the SMC.	• No groundwater related notification received.	• If a notification is received, an investigation will be conducted to determine if the SMC has resulted in a greater than negligible change in water levels in the Stratford Village bores.	• N/A	• Notification	• When received	• Notification Received. • Investigation (monitoring) confirms that the SMC has resulted in a greater than negligible change in water levels in the Stratford Village bores (refer below).	• The performance indicator will be considered to have been exceeded if data analysis and modelling indicates that drawdown or quality changes (when compared to background changes) are greater than expected and there is consequently a greater than negligible change in water levels in the Stratford Village bores. • The performance measure is exceeded if greater than negligible impacts on water levels in groundwater production bores on privately-owned land have occurred as a result of the SMC. • The above analyses will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE, DPIE Water and EPA. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 9).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Provision of equivalent water supply or compensation.
	• No significant decline in groundwater level at MW12 (Mine Site) or SCPL Bore (Stratford Village).	• An investigation will be conducted to determine if the SMC has resulted in a greater than negligible change in water levels in the Stratford Village bores.	• MW12 (Control Site: MW11) • SCPL Bore (Control Sites: Germon & Bagnell)	• Groundwater level.	• Monthly (MW12, MW11 & SCPL Bore) • Monthly (Germon & Bagnell)	• **Low Risk (Negligible) Outcome**: No more than two successive monthly readings at MW12 or SCPL bore are below the P20 groundwater level (116.8 mAHD and 114.8m AHD, respectively). • **Moderate Risk Trigger:** More than two successive monthly readings at MW12 or SCPL bore are below the P20 groundwater level (116.8 mAHD and 114.8m AHD, respectively) and the equivalent P20 historical groundwater levels have not been exceeded at other shallow control sites (e.g. dry conditions or other anthropogenic changes are not prevalent). • **High Risk Trigger:** More than two successive monthly readings at MW12 and SCPL bore are below the P5 groundwater level (116.3 mAHD and 114.4m AHD, respectively) and the equivalent P5 historical groundwater levels have not been exceeded at control sites (e.g. dry conditions or other anthropogenic changes are not prevalent).		

Table 10 (Continued)
Process for Assessment against Performance Indicators and Measures

Performance Measure	Specific Performance Indicator(s)	Data Analysis to Assess against Performance Indicator(s)	Monitoring			Cascading Trigger Levels	Assessment of Performance Indicator and Performance Measure	Relevant Management and Contingency Measures
			Sites	Parameters	Frequency			
No impact on regional groundwater quality that reduces the beneficial use as a result of the SMC.	• No lowering of the beneficial use category (based on groundwater quality) at a groundwater production bore as a result of the SMC.	• Each bore to be assigned a beneficial use category based on EC (refer Table 8). • If data analysis indicates the performance indicator has been exceeded, the performance measure will be assessed to determine if there has been a reduction in regional groundwater quality that has lowered the beneficial use.	• SCPL Bore (Control Sites: Germon & Bagnell)	• EC (field)	• Monthly	• **Low Risk (Negligible) Outcome**: No more than two successive monthly readings at the SCPL bore are outside the applicable beneficial use category range based on EC. • **Moderate Risk Trigger:** More than two successive monthly readings at the SCPL bore are outside the applicable beneficial use category range (based on EC) and the equivalent beneficial use categories at the control sites have not been lowered. • **High Risk Trigger:** More than two successive monthly readings at the SCPL bore are outside the applicable beneficial use category range (based on EC) and the equivalent beneficial use categories at the control sites have also been lowered.	• The performance measure is exceeded if analysis of the monitoring results confirms that the SCM has resulted in a reduction in regional groundwater quality that has lowered the beneficial use. • The above analysis will include consideration of monitoring results at the SCPL bore and control sites. • The above analysis will be peer reviewed by a specialist approved by the DPIE. • The results will be reported to DPIE and DPIE Water. • If the performance measure has been exceeded, the Contingency Plan will be implemented (Section 9).	• Additional monitoring (e.g. increase in monitoring frequency or additional sampling). • Provision of equivalent water supply or compensation.

Notes: Based on historical data to 30 June 2017.

9 CONTINGENCY PLAN

In the event a water management performance measure for the SMC (detailed in Section 5) may not have been met or a performance indicator is determined to have been exceeded, SCPL will implement the Contingency Plan described in the WMP.

9.1 SPECIFIC CONTINGENCY MEASURES

Specific contingency measures for an exceedance of the water management performance measures will be investigated and may include:

- The conduct of additional monitoring (e.g. increase in monitoring frequency or additional sampling) to inform the specific contingency measures.
- Bore-reconditioning or provision of an alternative water supply (and appropriate licence) in the event that depressurisation of a bore or well privately-owned by local groundwater users is materially greater than that predicted in the EIS and results in loss of supply to the local groundwater user.
- The provision of a suitable offset (e.g. improvement works) if there was an environmental consequence and/or adverse groundwater impacts were to result.

The exact nature of remedial measures will be determined in consultation with the affected landholder. Equivalent water supply will be provided (at lease on an interim basis) within 24 hours of the loss being identified, unless otherwise agreed with the landholder. If an alternative water supply source is to be provided, it will be SCPL's responsibility to obtain a licence and pay for this source, in consultation with relevant landowner(s). The nature of the source will depend on the location of the affected landholder and the availability of nearby sources.

If an alternative long-term water supply source in unable to be provided, SCPL will provide alternative compensation in consultation with the relevant landholder(s).

The nature of the measures implemented will be reported to DPIE Water and DPIE. Where agreement cannot be reached on the measures to be implemented, SCPL will refer the matter to DPIE for resolution.

10 REVIEW AND IMPROVEMENT OF THE GWMP

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.

Contents of the Annual Review and revision of the GWMP, including the SWB is described in WMP.

This GWMP will be reviewed within three months of the submission of an Annual Review, and revised where appropriate, as described in Section 10.2.

10.2 GROUNDWATER MANAGEMENT PLAN REVIEW AND UPDATE

It is noted that as the NSW Development Consent SSD-4966 was not 'taken up' by SCPL prior to 31 December 2015, the timeframes prescribed in the conditions were not enforceable (Table 2), and at the time activities at the Stratford Mining Complex continued under DA 23-98/99 and DA 39-02-01. The original WMP (including the original GWMP) was prepared at least 3 months prior to commencement of mining at the Avon North Open Cut as agreed by the Secretary on 30 November 2017. Similarly this GWMP has been re-submitted prior to the commencement of mining in the Stratford East Open Cut.

Consistent with the Secretary's approval for the progressive submission of environmental management plans on 30 November 2017, relevant environmental management plans will be re-submitted at least 3 months prior to the commencement of mining in the Roseville West Pit Extension.

In accordance with Condition 5, Schedule 5 of NSW Development Consent SSD-4966, this GWMP will be reviewed (to the satisfaction of the Secretary) within 3 months of the submission of:

- an Annual Review (Condition 4, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an independent environmental audit (Condition 9, Schedule 5); or
- any modification to the conditions of NSW Development Consent SSD-4966 (unless the conditions require otherwise).

The reviews will be undertaken to ensure the GWMP is updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the SMC.

Where a review leads to revisions in the GWMP then, within 4 weeks of the review, the revised GWMP will be submitted for the approval of the Secretary.

The revision status of this GWMP is indicated on the title page of each copy.

The approved GWMP will be made publicly available on the SCPL website, in accordance with Condition 11(a), Schedule 5 of NSW Development Consent SSD-4966.

In accordance with Condition 5 of Commonwealth Approval EPBC 2011/6176, a copy of the approved WMP (including this GWMP) will also be provided to the Commonwealth Department of Agriculture, Water and the Environment.

11 REPORTING PROTOCOLS

In accordance with Condition 3(g), Schedule 5 of NSW Development Consent SSD-4966, SCPL has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in the WMP and SCPL's Environmental Management Strategy. Management and reporting of exceedances of performance criteria are described in this GWMP.

In accordance with Condition 8, Schedule 5 of NSW Development Consent SSD-4966, SCPL will provide regular reporting on the environmental performance of the SMC on the SCPL website.

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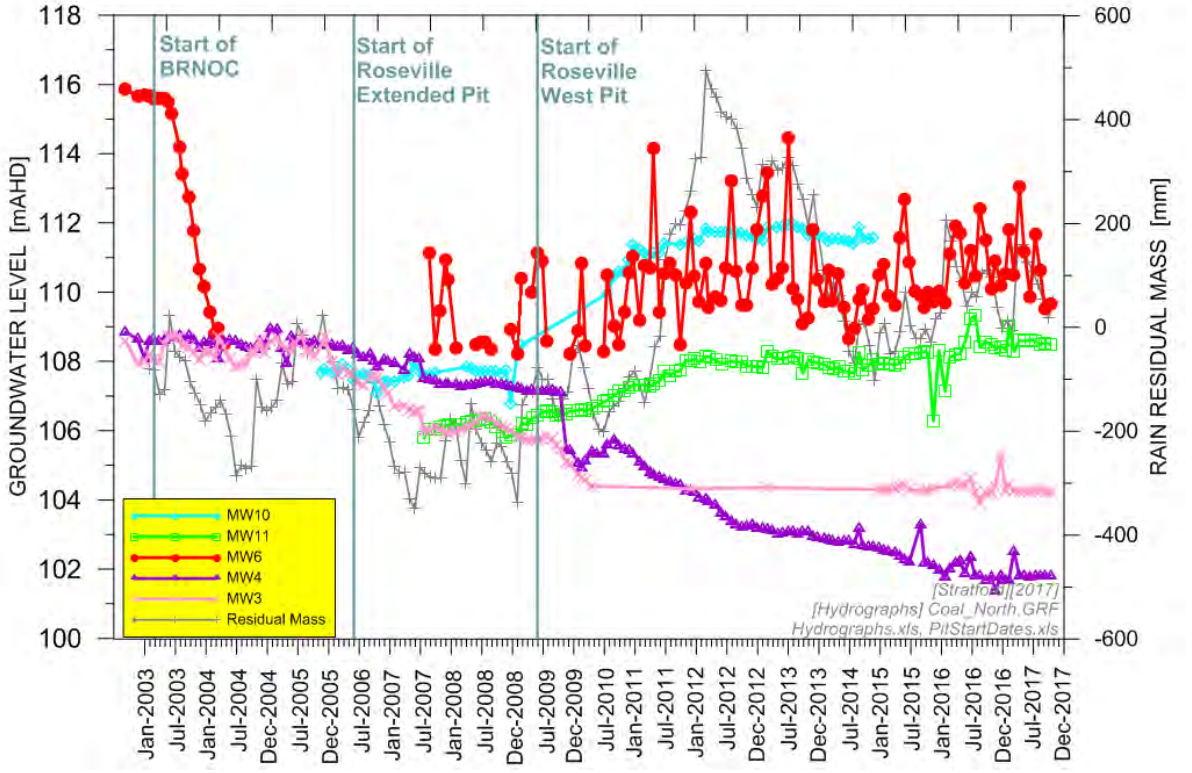
ATTACHMENT A

GROUNDWATER HYDROGRAPHS

[a]



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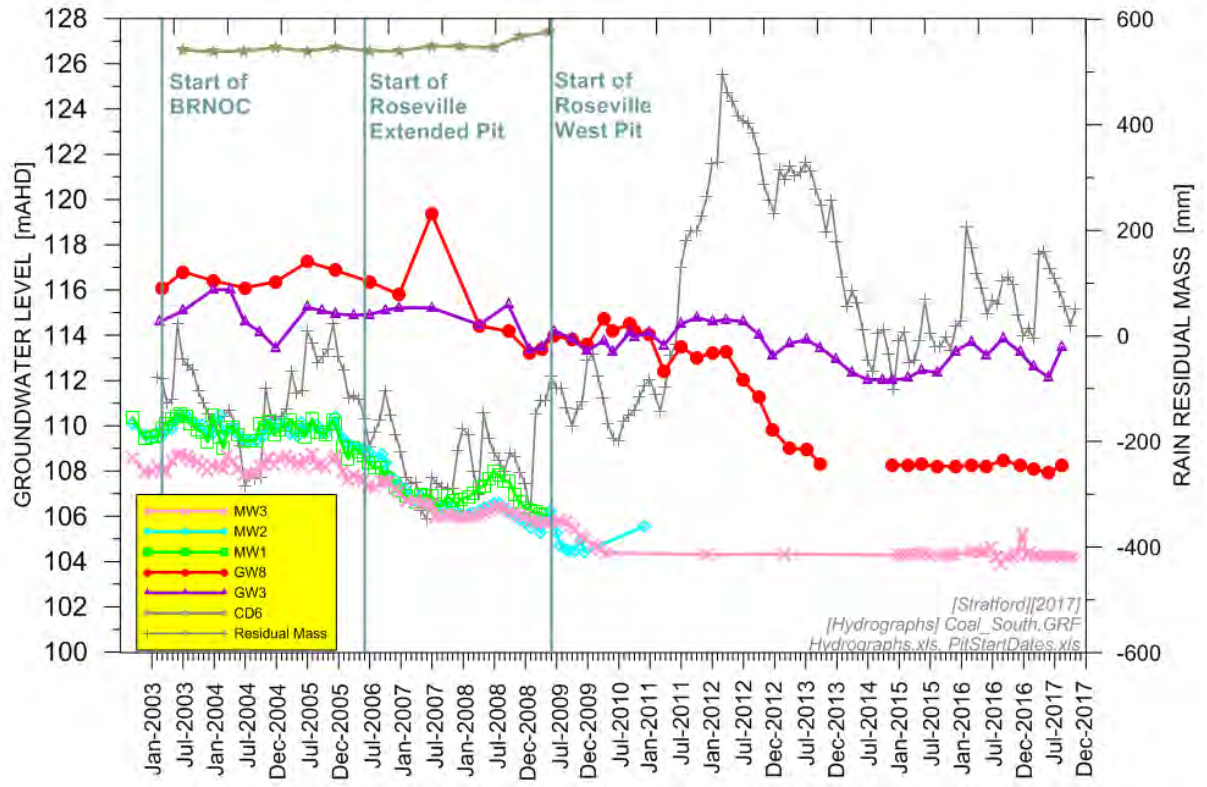
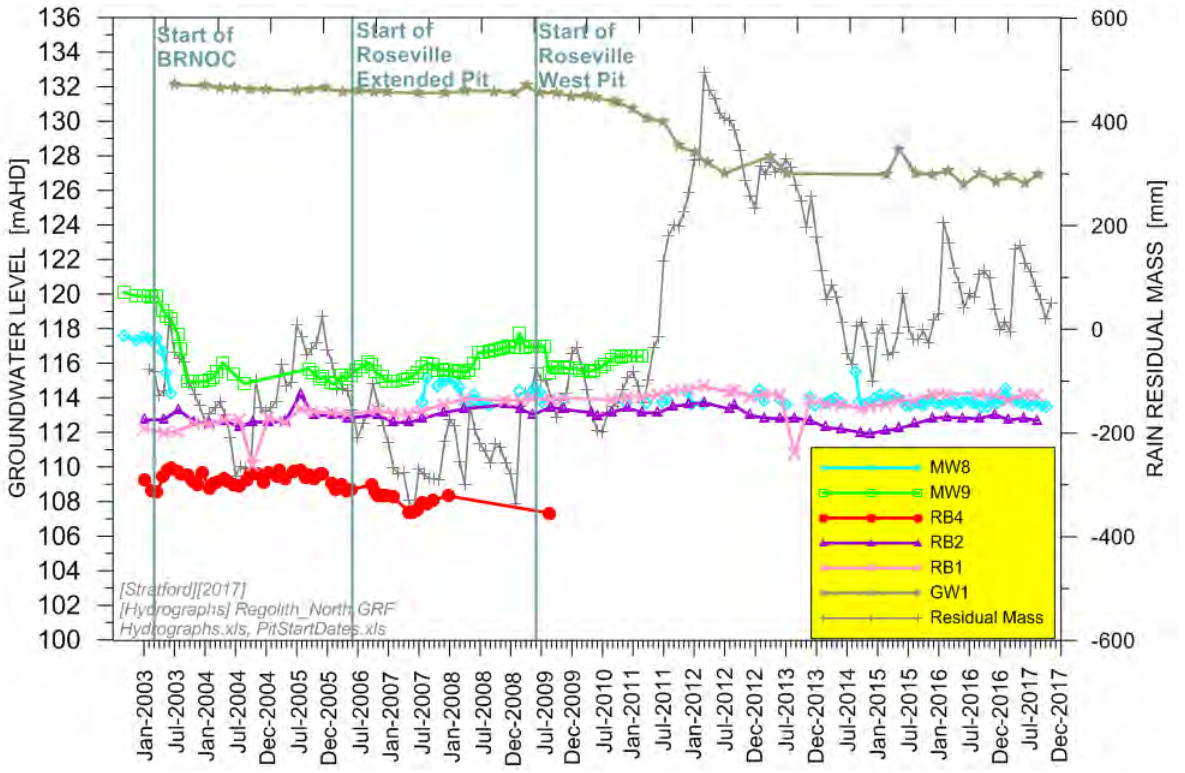


Figure A1. Groundwater hydrographs in coal seams and coal measures: [a] north; [b] south

[a]



[b]

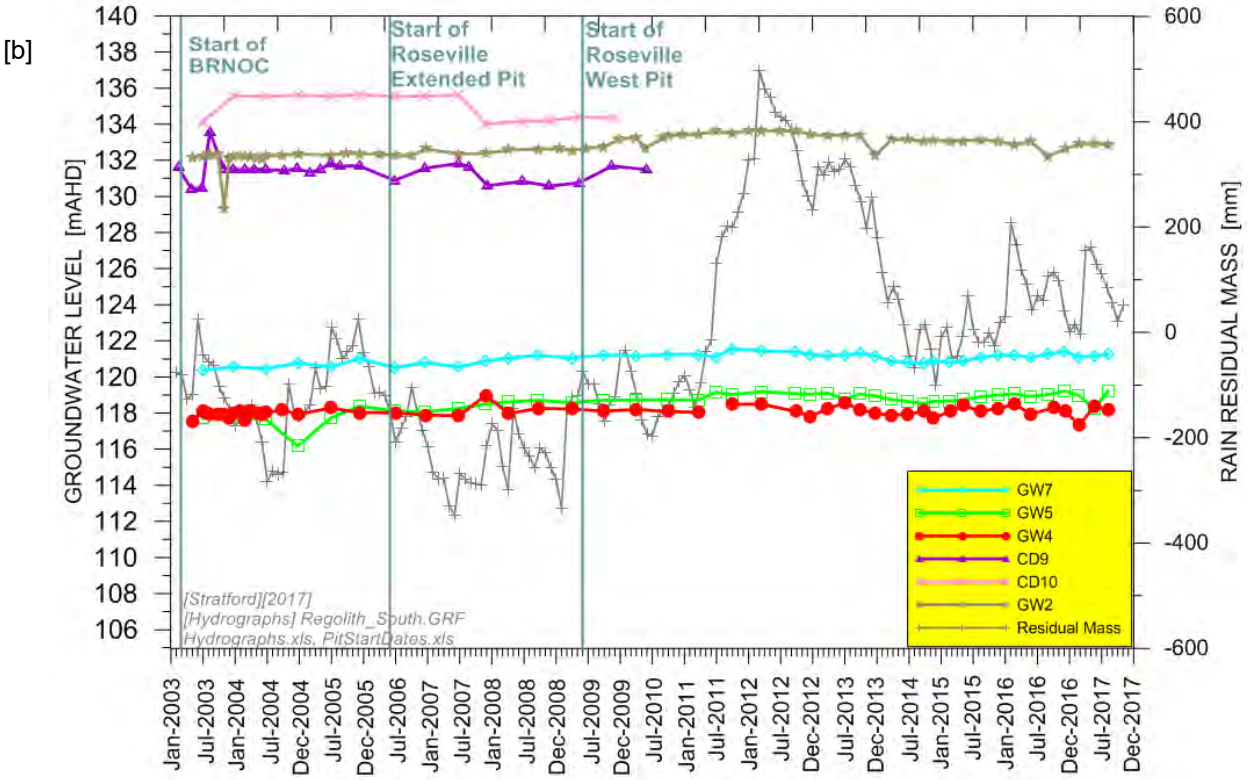
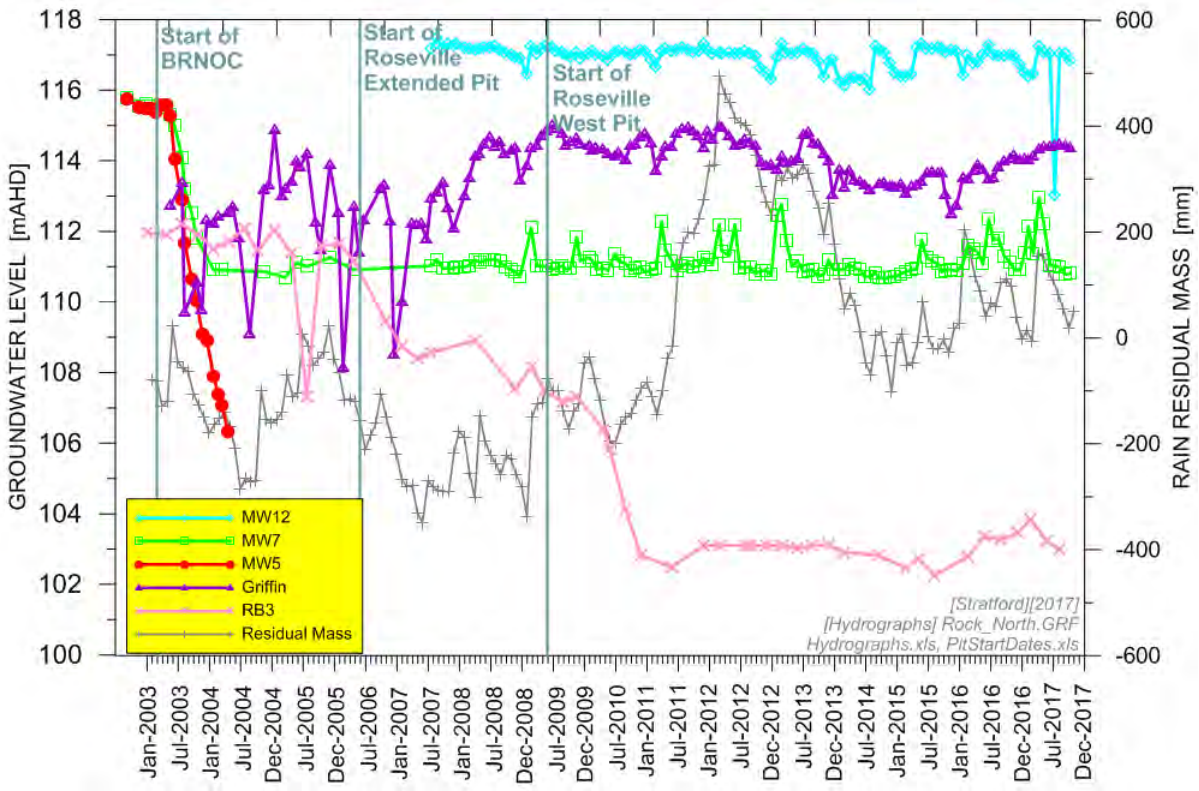


Figure A2. Groundwater hydrographs in regolith: [a] north; [b] south

[a]



[b]

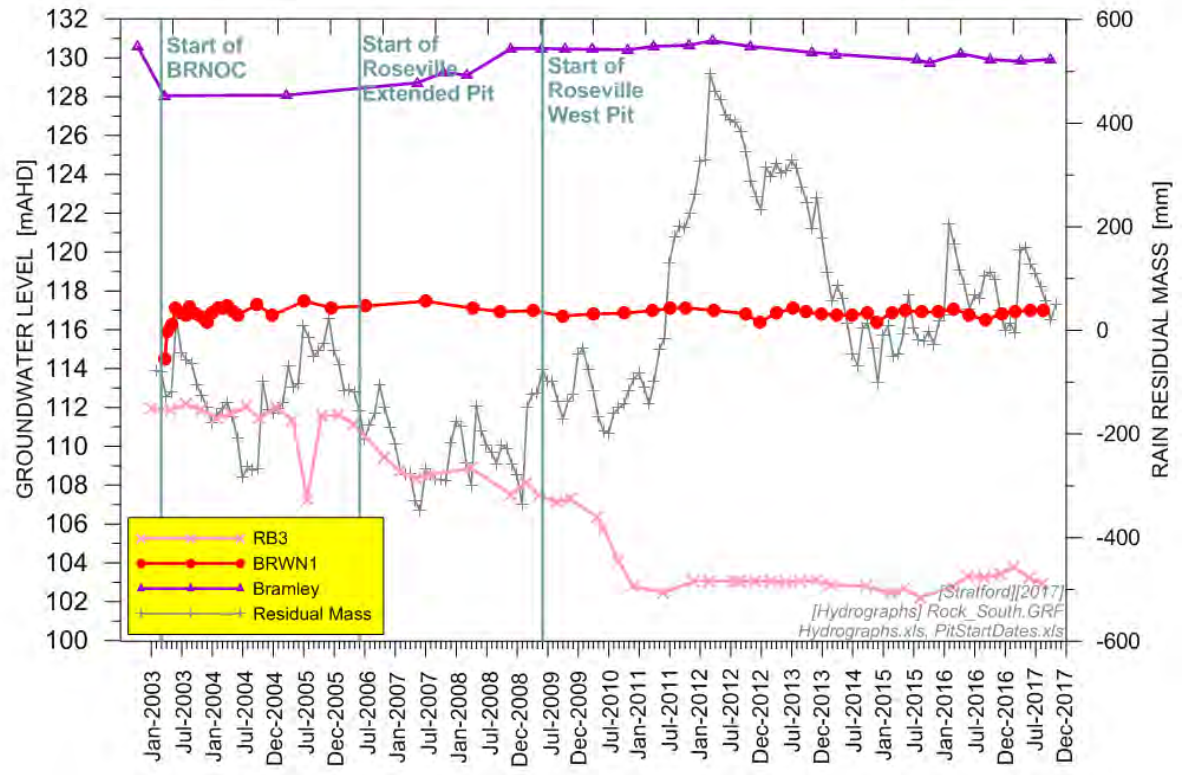
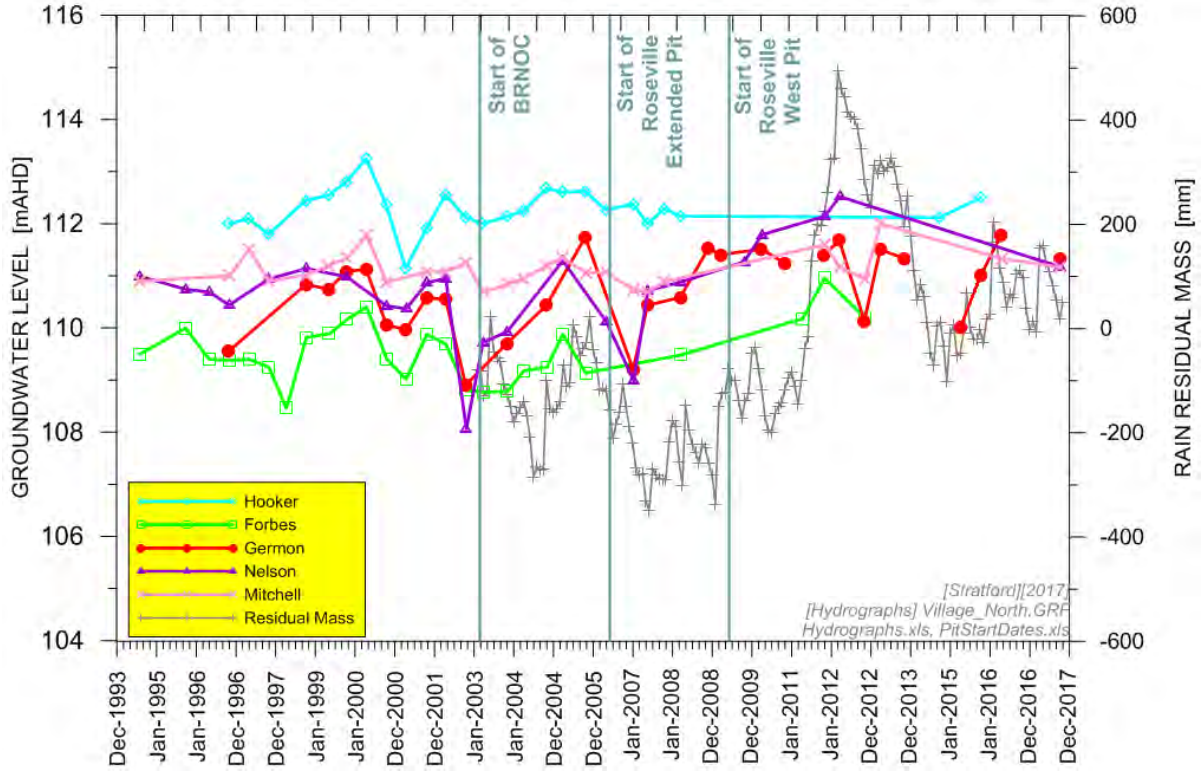


Figure A3. Groundwater hydrographs in interburden: [a] north; [b] south

[a]



[b]

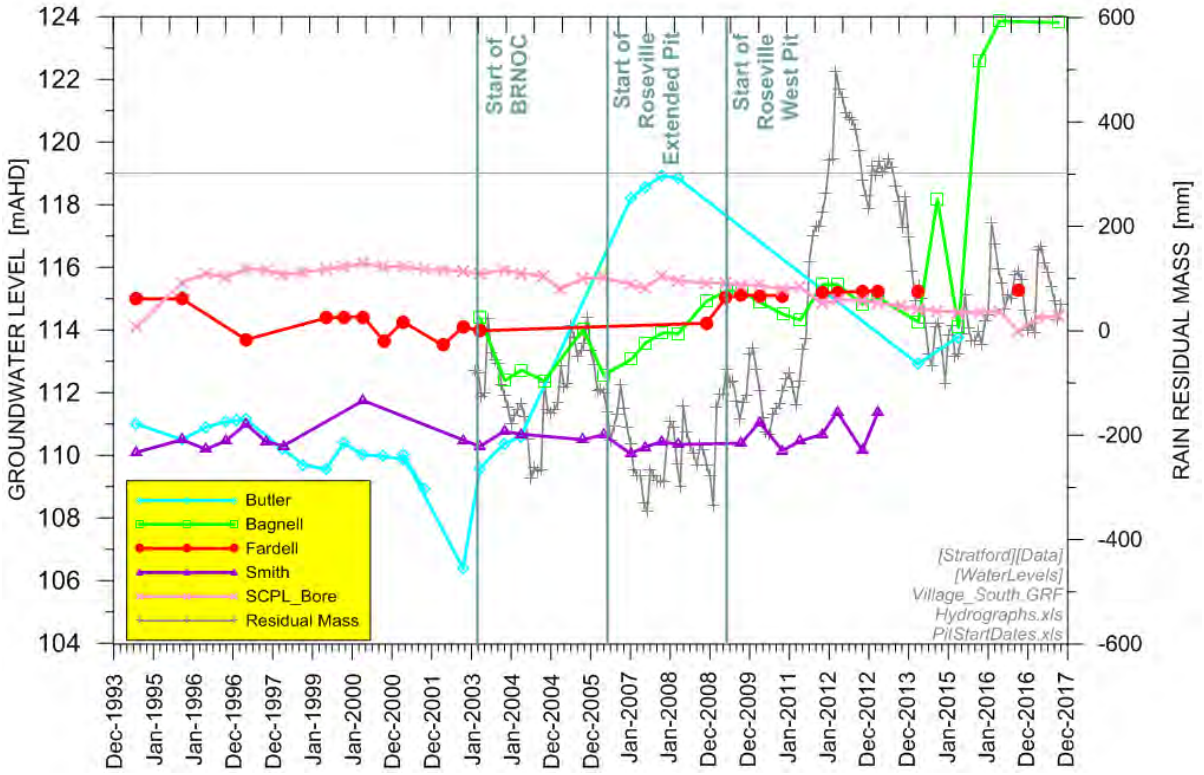


Figure A4. Groundwater hydrographs at Stratford Village: [a] north; [b] south