Version: 2| **Released:** 10/12/2020 **Key Contact**: Superintendent HSE Business Partnership

Table of Contents

1 Preface

Hunter Valley Energy Coal Pty Ltd (HVEC) operates the Mt Arthur Coal Mine Complex (MAC), which consists of approved open cut and underground mining operations, a rail loop and associated rail loading facilities. The operations are located in the Upper Hunter Valley, NSW approximately five kilometres south west of Muswellbrook.

Local hydrology comprises a number of ephemeral drainage lines and creeks flowing north and south-west towards the Hunter River. Quarry Creek, Fairford Creek, Whites Creek, and Ramrod Creek flow northwards while southwards flowing drainage lines report to Saddlers Creek which flows generally to the southwest and joins the Hunter River downstream of Denman. The Whites Creek Diversion directs runoff from undisturbed and rehabilitated mining areas around the north-eastern areas of the mine and discharges to a small tributary downstream of Denman Road and then to the Hunter River.

The water management system includes supplies drawn from clean water imported under licence to the mine from the Hunter River, mine water collected from runoff from the mine site, water recycling from the CHPP, treated effluent from Muswellbrook and fresh water from the potable water supply system (drawn from Muswellbrook town water) and water sourcing opportunities from the neighbouring Drayton Coal Mine under agreement. The network of on-site storages incorporates separation of undisturbed area runoff from mine water catchment areas. Runoff from areas disturbed by mining is diverted into on-site storages. These storages are used as priority sources of water for the CHPP and dust suppression.

The regional groundwater system consists broadly of three aquifer systems and includes:

- An extensive Quaternary alluvial aquifer system associated with the Hunter River and a smaller alluvial system associated with Saddlers Creek;
- A thin veneer of weathered bedrock (regolith) near ground surface; and
- The coal seams of the Permian Wittingham Coal Measures.

The groundwater quality of the alluvial aquifers is variable with the poorest quality water typically in the lower most extents of the basal gravel layer due to discharge from the underlying coal seam aquifers. The variation in quality in the alluvial aquifers reflects the dominant source of recharge, whether it be from the underlying coal measures resulting in very poor water quality, or recharge from rainfall or the Hunter River itself where fresher water results. Mining has resulted in localised changes to the groundwater gradient with discharge from the coal seams to the pit voids in the vicinity of open cut mining.

MAC is committed to minimising the impact of its operations on the local environment and community and has in place strict controls to monitor and manage these impacts.

A detailed description of the project can be found in the Environmental Assessment and supporting documents supplied in support of the modification to the Mt Arthur Coal Mine Open Cut Consolidation Project Approval 09_0062 MOD1 approved 26 September 2014.

2 Legislation, Standards and Regulations

2.1 Relevant Legislation and Regulations

Key legislation applicable to the management of water at MAC include but are not limited to:

- Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act);
- Protection of the Environment Operations Act 1997 (NSW) (PoEO Act);
- Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002;
- Water Act 1912;
- Water Management Act 2000; and
- Water Sharing Plans:
  - Water Sharing Plan for the Hunter Regulated River Water Source 2016;
  - Water Sharing Plan for the Hunter Unregulated and Alluvial Water Source 2009; and
  - Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016.

Key statutory approvals associated with water management are:

- Mt Arthur Coal Mine Open Cut Consolidation Project Modification 1 (PA 09_0062 MOD 1) (the Project Approval); and
- Environmental Protection Licence (EPL 11457).

2.2 Project Approval

The Project Approval was assessed under the EP&A Act and PA 09_0062) and granted on 26 September 2014. A list of the relevant conditions of the approval and where they are addressed in this Water Management Plan (WMP) is found in Appendix 8, Table 5.

2.3 Environment Protection Licence

Environment Protection Licence 11457 (EPL11457) was granted under the PoEO Act and prescribes the licensed discharges to water including locations of discharge points, concentration limits, volume limits and monitoring and recording limits. A list of the relevant conditions of the Licence and where they are addressed in this WMP is found in Appendix 8, Table 6.

2.4 Relevant Standards and Guidelines

MAC has well-established management systems that are aligned with the international environmental and safety management system standards ISO 14001 and ISO 45001. The management systems provide a framework to support the planning, implementation, monitoring and review of MAC's Water Management Systems, facilitating continual improvement in the performance of water management activities. The management systems include internal policies, subordinate plans and technical procedures that are referenced within this WMP.

2.5 Surface and Ground Water Licences

MAC also holds water access licences (WALs), water supply works and water use approvals under the Water Management Act 2000 for extraction of water from the Hunter River, under the Water Sharing Plan for the Hunter Regulated River Water Source 2016. All water licences held by MAC that are allocated for use in mining related activities are summarised in Table 1

Table 1: MAC Water Licences allocated for use in mining activities

WAL number	Work approval	Entitlement (Unit Shares)	Lot DP of Extraction Point Location	Water Sharing Plan, Source and Management Zone
WAL 917 (20AL201126)	20WA201128, 20WA203496	2197	3 DP387021	Water Sharing Plan for the Hunter Regulated River Water Source 2016, Hunter Regulated River Water Source (High Security), Zone 1A
WAL 918 (20AL201127)	20WA201128, 20WA203496	3564	3 DP387021	Water Sharing Plan for the Hunter Regulated River Water Source 2016, Hunter Regulated River Water Source (General Security), Zone 1A
WAL 1296	20WA201128, 20WA203496	301	3 DP387021	Water Sharing Plan for the Hunter Regulated River Water Source 2016, Hunter Regulated River Water Source (Supplementary Water), Zone 1A
WAL 18141	20CA207877	104	4 DP29451	Water Sharing Plan for the Hunter Unregulated and Alluvial Water Source 2009, Hunter Regulated River Alluvial Water Source, U/S Glennies Creek
WAL 18175	20CA208185	13	3 DP806149	Water Sharing Plan for the Hunter Unregulated and Alluvial Water Source 2009, Hunter Regulated River Alluvial Water Source, U/S Glennies Creek
WAL 18247	20CA 208013	247	5 DP29451	Water Sharing Plan for the Hunter Unregulated and Alluvial Water Source 2009, Hunter Regulated River Alluvial Water Source, U/S Glennies Creek
WAL41495	20MW065024	750	13 DP228159	Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016, Sydney Basin-North Coast Groundwater Source
WAL 41556	20MW065024	250	13 DP228159	Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater

WAL number	Work approval	Entitlement (Unit Shares)	Lot DP of Extraction Point Location	Water Sharing Plan, Source and Management Zone
				Sources 2016, Sydney Basin North Coast Groundwater Source
WAL 41557	20MW065024	10	13 DP228159	Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016, Sydney Basin-North Coast Groundwater Source

3 References

3.1 External Documents

- NSW EPA (24 August 2017) Environmental Protection Licence 11457
- Department of Planning, Minister of Planning's Project Approval document (dated 26 September 2014, Application Number 09-0062, Mt Arthur Coal Mine – Open Cut Consolidation Project.
- Hansen Bailey (2009), Mt Arthur Coal Consolidation Project Environmental Assessment. Prepared for Hunter Valley Energy Coal Pty Ltd.
- AGE (2009). "Mt Arthur Coal Consolidation Project Environmental Assessment – Appendix N Groundwater Impact Assessment". Report prepared for Hunter Valley Energy Coal Pty Ltd November.
- Gilbert and Associates (2009). "Mt Arthur Coal Consolidation Project Environmental Assessment – Appendix M Surface Water Assessment". Report prepared for Hunter Valley Energy Coal Pty Ltd November.
- Minerals Council of Australia (1997), "Mine Site Water Management Handbook"
- Protection of Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002
- URS Australia Pty Limited (2000) The Mount Arthur North Coal Project, Environmental Impact Statement. Prepared for Coal Operations Australia Limited.
- Standards Australia (1998), "Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples", Australian/New Zealand Standard AS/NZS 5667.1:1998, Sydney.
- Resource Strategies (2013), Mt Arthur Coal Open Cut Modification – Prepared for Hunter Valley Energy Coal Pty Ltd.

3.2 Mt Arthur Coal Internal Documents

- MAC-STE-REG-013 Mt Arthur Environmental Compliance Register
- MAC-ENC-MTP-041 Environmental Management Strategy
- MAC-ENC-PRO-060 Erosion and Sediment Control Plan
- MAC-ENC-PRO-073 Hunter River Water Discharge Procedure
- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring

4 Purpose

This Water Management Plan (WMP) has been prepared to satisfy the requirements of Schedule 3, Condition 29 of the Mt Arthur Coal Mine – Open Cut Consolidated Project Approval 09_0062, with the exclusion of the Erosions and Sediment Control Plan, which has been develop as a standalone plan as referenced in this document.

The WMP details relevant water quality impact assessment criteria, associated response procedures and compliance checking procedures for subsequent reporting in accordance with the relevant regulatory requirements for MAC.

The key purposes of this WMP are to:

- Ensure all relevant statutory requirements met;
- Ensure applicable best practice water management tools are employed to mitigate the impact of mining operations on surrounding surface water and groundwater bodies;
- Maintain an effective response mechanism to deal with issues and complaints; and
- Ensure the results of the surface water and groundwater quality monitoring comply with applicable criteria.

5 Scope

This document applies to the management of both groundwater and surface water that has the potential to be impacted by activities undertaken at MAC HVEC or companies contracted to undertake activities on its behalf.

Schedule 3, Condition 29 of the Mt Arthur Coal Mine – Open Cut Consolidated Project Approval 09_0062 MOD1 requires the WMP to include a:

- Site Water Balance;
- Erosion and Sediment Control Plan;
- Surface Water Monitoring Program;
- Groundwater Monitoring Program; and
- Surface and Ground Water Response Plan.

5.1 Included

- Site Water Balance;
- Surface Water Monitoring Program;
- Groundwater Monitoring Program; and
- Surface and Ground Water Response Plan.

5.2 Excluded

- The Erosion and Sediment Control Plan, is excluded from this WMP, it is addressed in a standalone plan, MAC-ENC-PRO-060 Erosion and Sediment Control Plan; and
- The proposed Mt Arthur Underground operation is not included in this plan as it has not commenced. The management plan will be reviewed and updated prior to the commencement of underground operations.

6 Consultation and Communication

The original version of the WMP was prepared in 2011 in consultation with EPA and NSW Office of Water (NOW) and approved by the Department of Planning and Infrastructure in 2012. Subsequent versions are submitted to the Department of Planning Infrastructure and Environment for review and approval.

In addition to formal consultation previously undertaken relating to the WMP, Mt Arthur Coal has extensive consultation and communication processes, including:

- A comprehensive community engagement program which includes the establishment of a Community Consultative Committee (CCC);
- Consultation with Muswellbrook Shire Council (MSC);
- A community response line (1800 882 044) enables members of the community to contact Mt Arthur;
- Regular reporting on the environmental performance of the project on the BHP Mt Arthur Coal website; and
- Publicly available project approvals, environmental and other related documentation (annual reports, complaints register, CCC minutes etc.) via the BHP Mt Arthur Coal website.

7 Roles and Responsibilities

The maintenance and update of this WMP is the responsibility of the HSE Superintendent. Responsibilities with respect to implementation of operational controls are defined within this plan and referenced in operational control documentation.

8 Site Water Balance

8.1 Water Sources and Security

The water management system relies on water obtained from a number of different sources as follows:

- site runoff and groundwater seepage captured within the water management system;
- licensed extraction from the Hunter River;
- water recycling from the CHPP (including tailings water);
- treated effluent from Muswellbrook;
- fresh water from the potable water supply system (drawn from Muswellbrook town water); and

- third party supplied water where it can be beneficially used (eg: mine water from neighbouring mines).

Further detail on these sources is provided in Section 8.2.

8.2 Water Management Strategy

The objectives of the water management strategy are:

- To maintain a low risk of uncontrolled discharge occurring from the water management system.
- To minimise the need to discharge water to the Hunter River by maximising re-use on site.
- To minimise the need to extract water from the Hunter River by optimising the reuse and recycling of water on site and by maximising the use of Muswellbrook treated effluent.
- To minimise risks of disruption to mining operations by efficient mine dewatering.
- To ensure that effective control over emission of airborne particulates is uninterrupted by maintaining a reliable water supply.
- To ensure uninterrupted operation of the CHPP by maintaining a reliable water supply.

MAC will be guided in its decisions on sourcing or discharging water using the site water balance model (refer Section 8.7) which enables prediction of future water supply security and risks of excess open cut pit water.

MAC categorises water into three types to effectively manage water, and to mitigate any potential for environmental harm to occur. Each type of water requires different management measures to minimise the risk of contamination of downstream drainage systems. A description of the water quality and potential sources for the three categories of water are summarised in Table 2.

Table 2: Water Categories and Design Criteria

Water Category	Description	Target Design Criteria
Clean Water	Runoff from undisturbed or rehabilitated areas where vegetation is fully established and where the water quality is suitable for release/discharge.	Overland flow where practicable, to downstream environment.
Runoff Water	Runoff from disturbed areas that do not have the potential to generate elevated salinity and/or contain pollutants other than suspended solids.	Managed in accordance with the guidelines in Landcom (2004) (Managing Urban Stormwater: Soils and Construction Volume 1 and Volume 2E).
Mine Affected	Water runoff exposed to coal or used in coal processing. Mine water includes water associated with groundwater inflows into open cut pits. This water may be highly saline and/or contain pollutants such as hydrocarbons.	Contained within the mine water management system, for events up to and including the 1% Annual Exceedance Probability (AEP), 24 hour storm event (equivalent to the 100 year Average Recurrence Interval (ARI), 24 hour storm event). Contained water will be preferably reused, if necessary releases must be from the licensed discharge point documented within EPL 11457.

8.3 Water Management System

The MAC water management system includes:

- clean water from undisturbed and rehabilitated areas,
- sediment laden water treated through sediment control structures prior to flowing from site,
- mine water collected from runoff from the mine site,
- mine water collected from groundwater seepage in to the pit,
- water recycled from the Coal Handling and Processing Plant (CHPP),
- supplies drawn from water imported under licence to the mine from the Hunter River,
- treated effluent from the MAC main effluent treatment plant,
- treated effluent from Muswellbrook and potable water from Muswellbrook for the potable water supply system , and
- excess mine water from neighbouring mines where it can be reused beneficially.

Figure 1: Surface Water Catchment Areas shows surface water catchments and major storages, Figure 2 provides an illustration of the mine water management system in schematic form, with all major storages and inter-storage linkages.

Supply

Water supply for the CHPP and other non-potable uses on site is obtained from a network of on-site storages (dams and open cut pit voids), which provide containment for mine water. On-site storages are used as priority sources of water for the CHPP and dust suppression. Water is also sourced from Muswellbrook Shire Council's waste water treatment plant. The treated water is stored for beneficial reuse in the Dirty Water Dam.

Licensed extraction from the Hunter River occurs from a pumping station on the Hunter River to the Environmental Dam, with transfer to other on-site storages as required (refer Figure 1 and Figure 2). Mt Arthur Coal presently holds both General Security Entitlements (GSE), High Security Entitlements (HSE), and Supplementary Entitlements. The volume of water that can be extracted from the Hunter River by licence holders is limited by Available Water Determinations (AWDs) which are announced by the NSW Department of Planning Industry and Environment (Water NSW) on the 1st July each year (the start of the water year) and then periodically thereafter. Refer to Section 2.5 for Hunter River extraction licence details.

Runoff from areas disturbed by mining and groundwater seepage to open cut pits report to the network of on-site storages (dams and open cut pit voids) – refer Figure 1. Refer to Section 2.5 for a summary of approvals for open cut interception of groundwater.

Storage

The network of on-site storages separates undisturbed area runoff from mine water catchment areas. Runoff from areas disturbed by mining is diverted into on-site storages or to active open cuts. The total target operational capacity of the existing on-site water storages totals 8,907 ML.

Treated effluent pumped from Muswellbrook into the Dirty Water Dam where it is stored for reuse. Treated effluent from the onsite Sewer Treatment Plant is directed to a wetland system for further treatment before being transferred to the mine water system for reuse.

Water from the Hunter River can be pumped directly to the Environmental dam where it can be stored. It can also be transferred and stored in the network of on-site storages.

Users

The CHPP, which is the dominant user of water on site, incorporates a tailings thickener and water recovery system to facilitate water recycling. The other significant water use is dust suppression on haul roads and coal stockpile areas. The main CHPP water supply storage is the Dirty Water Dam. Truck fill storages are positioned strategically to provide water for haul road dust suppression.

Runoff and Release of Water from site

Runoff from haul roads and open cut pre-strip areas is either directed to on-site storages or where they are not impacted by contaminants other than suspended solids to sediment dams and off site. Potentially sediment impacted runoff water is managed in line with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 and Volume 2E), (refer ESCP). Runoff from upslope undisturbed areas is diverted where possible around mine operations. Runoff from fully rehabilitated areas is likewise, where possible, directed offsite, via sediment dams if needed.

Controlled releases of mine water from site to the Hunter River may only occur from the Environmental Dam under the Hunter River Salinity Trading Scheme (HRSTS) See Section 8.4.

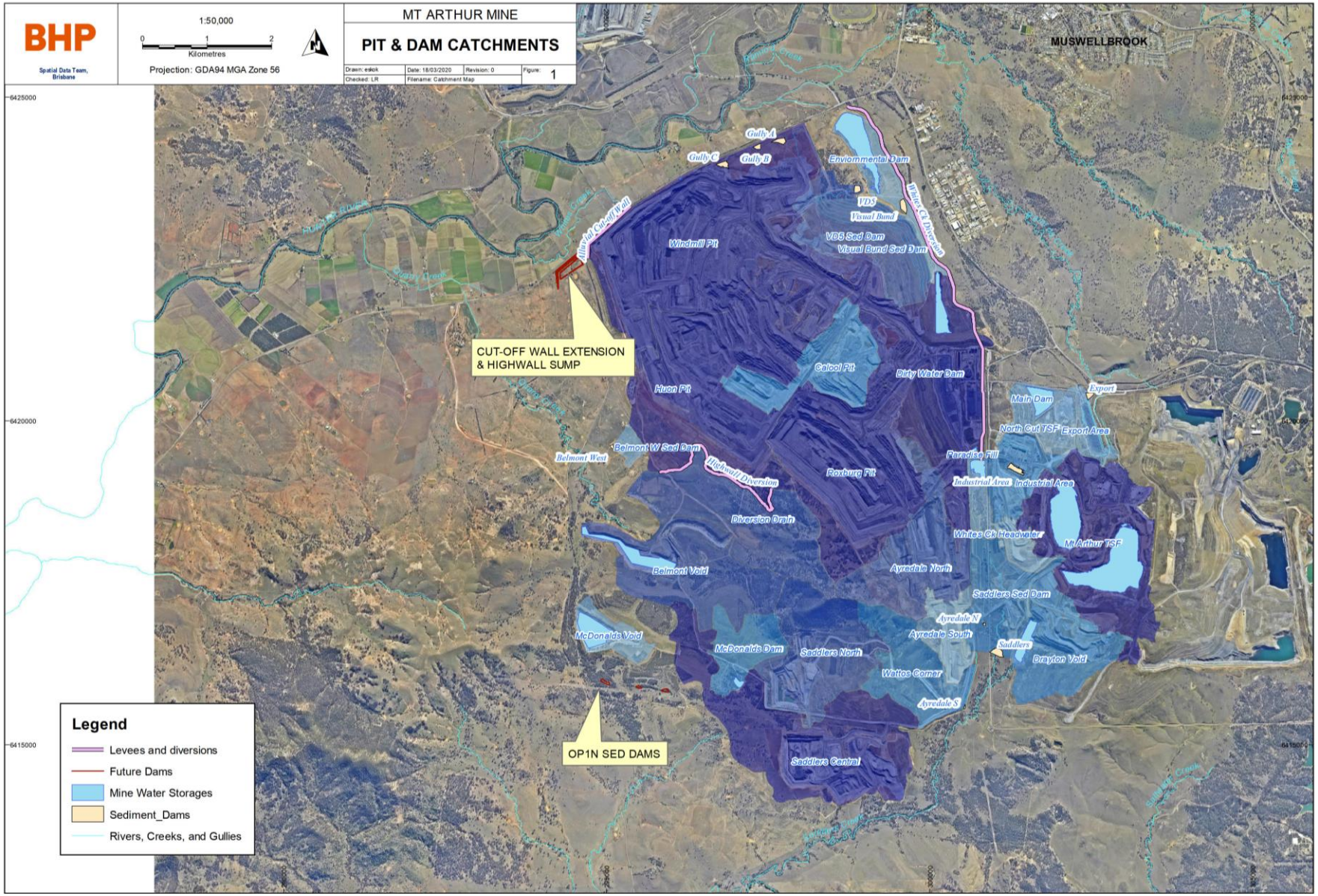


Figure 1: Surface Water Catchment Areas and Water Storages

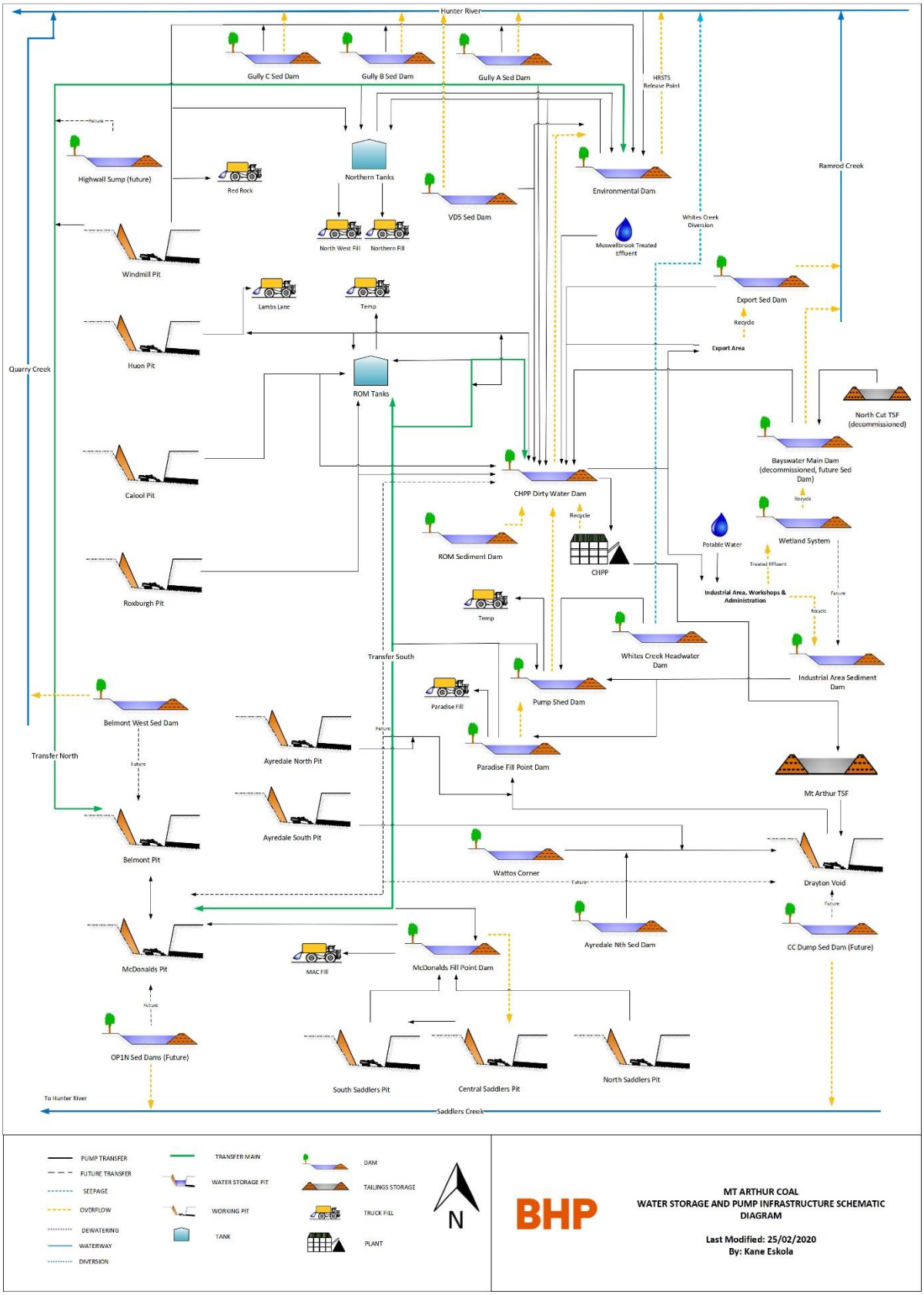


Figure 2: Water management schematic

8.4 Off-site Transfers

As indicated in Section 8, excess Mine Water from the site may be transferred off-site via controlled release from the Environmental Dam to the Hunter River with quality and volume limited in accordance with the HRSTS.

The HRSTS was established to manage the discharge of saline waters to the Hunter River, such that salt concentrations would be maintained below irrigation and environmental standards. The scheme is managed by the EPA under the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.

The scheme attempts to achieve these objectives by prohibiting releases of saline waters during periods of low flow and controlling releases of saline water during periods of high flow such that specific salinity targets at various points in the river are not exceeded. The operational parameters used to regulate the scheme are advised on a daily basis for each of the various sections of the Hunter River.

Participants in the scheme are issued with tradable discharge credits. Each credit entitles the holder to a 0.1% share of the available salt discharge capacity announced during high flow periods. The amount of saline water that may be discharged from a given discharge licence holder is determined by reference to the salinity of the discharge waters, the river flow, the number of credits held and any overriding limit that may be applied as a condition of the licence.

The specific operational process for discharging in accordance with the HRSTS requirement are detailed in MAC-ENC-PRO-073 Hunter River Water Discharge Procedure the procedure is managed within the MAC document control system.

8.5 Measures to Minimise Water use

A number of trials have been conducted in order to examine possible ways in which use of water for dust suppression can be reduced. Chemical Dust suppressant additives are used across the site on main haul roads.

Where ever possible direct recovery of tailings water is undertaken to maximise water reuse. Opportunities to improve water recovery from tailings are regularly explored.

Pumping and reticulation infrastructure is planned and budgeted annually, to ensure pumps and pipelines are in place for the efficient dewatering and transfer of water across site from non-active voids, to key consumption points (i.e. CHPP and water cart fill points) and minimise the need, dependent on climatic conditions, to source water from the Hunter River.

Exploring and maximising all possible water sharing opportunities between neighbouring mining operations, utilities and industries. Such as reuse of effluent water from the Muswellbrook Sewage Treatment plant, and the importation of mine affected water from other mine sites.

8.6 Measures to Mitigate Groundwater Leakage from Alluvial Aquifers

Groundwater leakage from alluvial aquifers must be minimised, prevented or offset, particularly for the Hunter River and Saddlers Creek alluvial.

Open cut mining operations within 150 metres of the Hunter River alluvials and Saddlers Creek alluvials that has not been granted approval under previous consents/approvals is not to be undertaken without the prior written approval of the Secretary.

Approval for mining within 150m of the Hunter River alluvial was granted by the secretary by the approval of the previous Surface and Groundwater Response Plan dated 28 April 2018, and approval from the National Recourse Access Regulator received on 21 June 2013 and for the extension of the barrier cut off wall on 7 November 2019.

To protect the Hunter River alluvial as approved by the secretary a combined groundwater cut-off wall and flood levee has been constructed parallel to Denman Road along the northern boundary of the site to prevent both surface and subsurface migration from the Hunter River to the active mining pit. The cut-off trench is composed of a soil-bentonite slurry mixture and is constructed from the crest of the embankment levee to the top of the weathered sandstone/siltstone to an average depth of approximately ten metres. The levee bank is constructed to provide protection from a 1 in 1000 year flood event.

There has been no mining within 150m of Saddlers Creek alluvial that was not approved under previous consents/approvals, and at this time there is none planned. Should this change an approval process will be undertaken prior to mining within 150m.

8.7 Water Balance Model

A predictive site water balance model has been developed using modelling software. The structure of the model is generally as per the schematic of the water management system in Figure 2.

The water balance model can be used to assess the capacity of the water management system to achieve its operational objectives. Modelling has involved simulating the dynamic water balance of the storage components in the water management system over a forward planning period under the variable climatic conditions that may be encountered. The water balance model developed for the project simulates all the inflows, outflows, transfers and changes in storage of water on site on a daily continuous basis to predict future water supply reliability.

The model is used as an operational and management planning tool to predict water source security and ensure effective water storage capacity is maintained. The model will be reviewed every two years to ensure accuracy, as a reliable water supply is crucial to the continued operation of the mine.

8.8 Groundwater Model Prediction Validation Process

Groundwater predictions (mine inflows and groundwater levels/drawdown) are calculated using a groundwater model developed to support the currently approved mining. In order to validate the model, predictions will be compared on an annual basis to the monitoring program groundwater level information.

The groundwater model will be reviewed every five years and, if required, updated and recalibrated to reflect operational or water management changes.

The most recent model review was undertaken in 2020, the model review predictions were generally consistent with the predictions of AGE, 2013. The difference in predictions between the current model and the AGE (2013) are attributed to better stratigraphic vertical resolution and a better understanding of the extent of the alluvium, regolith and Permian depth. The cut-off wall constructed between the Windmill Open Cut and Hunter River alluvium was also included in the model. The key conclusions from the groundwater assessment are summarised as follows:

- Negligible groundwater drawdown in the alluvium of Saddlers Creek consistent with previous predictions;
- Localised drawdown of up to 5 m within the alluvium along Hunter River. The extent of predicted drawdown in the alluvium are slightly less compared to the previous predictions for approved operations by AGE (2013);
- No change in landholder bores identified as potentially impacted by approved operations;
- No impacts predicted on landholder bores intersecting alluvium; predicted reduction in groundwater levels at three BHP owned bores that intersect the Permian coal measures;
- Negligible reductions in surface water flows/balance resulting from changes in groundwater baseflows to surface stream systems in Saddlers Creek;
- Reduction in potentiometric head depressurisation in the fractured and porous rock groundwater sources in the near vicinity of the Project;
- Up to 13.2 ML/year leakage (indirect take) from the Hunter River as a result of depressurisation with mining, which is lower than previously predicted;
- Reduction in upward leakage from the Permian coal measures to the overlying alluvium of the Hunter River by a maximum of 82 ML/year (0.22 ML/day) which is lower than previously predicted by AGE (2013) that predicted between 0.63 ML/day to 0.72 ML/day leakage from Hunter River; and
- Total groundwater inflows to the MAC open cut of approximately 657.5 ML/year on average (between 2020 to 2027) and ranging up to a peak in the order of 1,114 ML/year in 2026. The predicted inflow is largely consistent with the previously predicted average inflows by AGE (2013), which ranged between 711 ML/year to 912 ML/year from 2020 to 2026.

The model calibration provided an acceptable match with observed water levels and historical inflows in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al., 2012). The model predictions were generally consistent with the predictions from AGE (2013) report. Further details of the up to date site groundwater model are included in the model report (SLR, 2020).

9 Water Monitoring Programs

9.1 Objectives

The key objective of the water monitoring programs is to provide accurate information to effectively:

- Assess performance against impact assessment criteria (Trigger Values);
- Manage depressurisation and associated impacts on the aquifer systems due to operations;
- Manage water quality impacts of mining on the aquifer systems;
- Validate the Water Balance Model and assess the effectiveness of groundwater management measures;
- Quantify changes to the surface water system that result from operations;
- Assess riparian and in-channel vegetation;
- Assess channel stability;
- Assess variations from modelled predictions detailed in the Environmental Assessment;
- Provide evidence that effective water monitoring has taken place; and

A comprehensive description of the local and regional groundwater resources is provided in Section 4.4 and Appendix B of the Modification Project Environmental Assessment. In addition, reference / baseline data relevant to the program are provided in this document in Appendices 3, 5 and 6.

9.2 Surface Water Monitoring Program

9.2.1 Monitoring Methodology

Surface flow Monitoring

Flows are monitored at SW28 to ensure compliance with the for discharge flow rates for stream stability. Appendix 1 shows the location of the flow monitoring, Appendix 2 describes the location.

Stream Health

Riparian and in-stream vegetation and channel stability are used to assess potential impacts on stream health.

Vegetation Monitoring

Monitoring of riparian vegetation is undertaken annually and includes:

- Taking four photographs at each surface water monitoring site; looking upstream, downstream, at the left bank and at the right bank. Photographs are documented with their location, the direction and the date.
- A assessment of riparian condition will be undertaken annually, incorporating a riparian zone transect monitored for general vegetation condition and habitat quality and 20m x 20m survey plot monitored for species composition and community structure (dominance, age etc).

The methodology for the Vegetation Community Assessment is described in the Rehabilitation and Ecological Monitoring Procedure (MAC-ENC-PRO-080).

Channel Stability Monitoring

Channel stability monitoring is undertaken through an Annual Rapid Assessment. This includes:

- A desktop review of aerial photography and previous monitoring results to identify potential areas of stream erosion and deposition.
- Photographic logging and documenting dimensions of significant erosional and depositional features for assessing quantitative changes over time. A GPS coordinate is noted for each photograph in addition to a photograph direction (compass bearing) to enable repeat monitoring.

The full methodology for the Annual Rapid Assessment is described in the Rehabilitation and Ecological Monitoring Procedure (MAC-ENC-PRO-080).

Surface Water Quality

Surface water quality monitoring and sample collection, storage and transportation will be undertaken in accordance with the procedures outlined in the relevant sections of the Australian Standard for Water Quality Sampling AS/NZS 5667.1:1998 . Laboratory analysis will be undertaken by a laboratory which has relevant accreditation by the National Association of Testing Authorities (NATA), Australia.

Electrical conductivity of the Hunter River has been highly variable due to varying flow and ranges from 36 (2004) to 2,147 (1993) microSiemens per centimetre (µS/cm) at the Muswellbrook Bridge gauging station, and from 66 (2000) to 1,292 (1993) µS/cm at the Denman gauging station. The average conductivity at the upstream and downstream stations is 471 and 560µS/cm, respectively, while the median conductivity at the upstream and downstream stations is 436 and 527µS/cm, respectively (based on data to 16 December 2019).

The Hunter River Salinity Trading Scheme (HRSTS) regulates salinity discharged to the Hunter River. The amount of saline water that may be discharged from a given discharge licence holder is determined by reference to the salinity of the discharge waters, the river flow, the number of credits held and any overriding limit that may be applied as a condition of the licence. If required, controlled releases of excess water from the Mt Arthur Coal Mine to the Hunter River are undertaken in accordance with the HRSTS.

9.2.2 Monitoring Locations

Water quality at MAC is currently monitored at five statutory monitoring sites, plus Mt Arthur Coal's licensed discharge point.

Surface water monitoring locations, and Stream Health vegetation and channel stability monitoring locations are shown in Appendix 1 and a description of location, including geographic coordinates, and the parameters monitored and frequency are provided in Appendix 2.

9.2.3 Monitoring Frequency

Statutory monitoring of surface water is undertaken in accordance with the schedule in Appendix 2.

9.2.4 Impact Assessment Criteria

Stream Flow Monitoring - HRSTS Discharge

Impact assessment criteria are presented as trigger values which, if exceeded, lead to a response such as more intensive monitoring, investigation and if required, remedial action.

Surface water flow rate impact assessment criteria has been established as:

(a) Maximum of 450 megalitres per day of water released from discharge point SW28 during an authorised discharge under the HRSTS.

Stream Health

Riparian and impact assessment criteria has been established as:

(a) Significant degradation in species composition, community structure, vegetation condition or habitat quality recorded between consecutive monitoring periods.

(b) Significant change in erosional and/or depositional features recorded between consecutive monitoring periods.

No impact assessment criteria have been set for in-stream fauna as this has been assessed as limited due to the modified habitat prior to mining.

Surface Water Quality

Surface water quality impact assessment criteria for externally reportable monitoring locations downstream of the mining operation have been established as:

(a) recorded pH value is outside the range of 6.5 – 9.0 for three consecutive readings.

(b) **Stage 1** electrical conductivity (EC) and Total Suspended Solids (TSS): measured values that have a 95 per cent probability of being different from those already measured (95 per cent confidence level).

(c) **Stage 2** EC and TSS: measured values that have a 99 per cent probability of being different from those already measured (99 per cent confidence level).

Surface water quality impact assessment criteria trigger values are presented in Appendix 2.

A summary of baseline surface water quality results is presented in further detail in Appendix 3 and full baseline data is presented in Appendix M of the Environmental Assessment (Gilbert and Associates (2009)), including minimum, maximum, mean and median values for pH, EC, turbidity, TSS, total dissolved solids (TDS), filtered iron, nitrate and sulphate.

9.3 Groundwater Monitoring Program

9.3.1 Monitoring Methodology

Groundwater sampling is undertaken accordance with AS 5667.1:-1998, Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples and AS5667.11-1998, Guidance on the Sampling of Groundwater's.

Representative monitoring bores in the alluvial aquifers and Permian strata have been fitted with data loggers for continuous depth to water measurement via either a pressure transducer (with barometric pressure correction) or vibrating wire piezometer (VWP) apparatus. The monitoring schedule allows groundwater levels to be assessed in terms of impacts on regional aquifers, alluvial aquifers (Hunter River and Saddlers Creek alluvial aquifers) and private users. The impacts of the operation on water users and surrounding aquifers will be monitored, assessed and responded to in accordance with Appendix 7 *Landholder Consultation and Investigation Process.*

9.3.2 Monitoring Locations

Bore monitoring locations are shown in Appendix 1 and a description of location, including geographic coordinates, is provided in Appendix 4.

Regional background monitoring is completed through sampling of bores GW25 (north of site), GW41A and GW41P (north west of site) and BCGW22 (west of site).

9.3.3 Monitoring Frequency

Monitoring of groundwater levels and groundwater quality monitoring is undertaken at the bores/ piezometers in accordance with the schedules in Appendix 4, and as further defined below;

- **Groundwater Level**
  - Manual groundwater elevation/depth to groundwater every 3 months,
  - pressure transducers continuous every six hours,
  - VWP data logger download, and verification and validation of instrument drift and correction.
- **Groundwater Quality Analysis (Standard)** - Water temperature, pH, EC, TDS, TSS, iron, sulphate, chloride, calcium, magnesium, potassium, sodium, carbonate and bicarbonate.
- **Groundwater Quality Analysis (Comprehensive)** - Total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum , selenium and zinc. All metals and metalloids required as dissolved analytes.

9.3.4 Impact Assessment Criteria

Groundwater Level

The previously approved groundwater level triggers in the 2015 WMP were developed based on predictions from the 2013 MAC groundwater model. In 2020, SLR were engaged to develop a numerical groundwater model for MAC that included calibration of observed groundwater levels to June 2020. The water level predictions of the 2020 SLR model and available groundwater monitoring data (2008 to 2020) were used to establish the groundwater level triggers. The triggers were developed by applying the following methodology:

Trigger derivation category 1

If the predicted drawdown (the difference between steady state pre-mining and approved 2026 end of mining) is less than 1m then the trigger level drawdown is set at 1m [Minimum observed groundwater level minus 1m];

Trigger derivation category 2

If the observed groundwater elevation is higher than the predicted elevation but the drawdown is greater than 1 m then the trigger level is set at the predicted level [Model predicted groundwater level at end of mining];

Trigger derivation category 3

If the observed groundwater elevation is lower than the predicted groundwater elevation, then 10% of the difference between the observed water level and the base of the borehole/ instrument is applied. [Minimum observed groundwater level minus 10% of the total available drawdown (difference between the observed water level and the base of the borehole/ sensor)];

The trigger categorisation decision path for each bore is as follows:

1. If the model predicted drawdown at the end of mining is less than 1m; apply trigger category 1.

2. If the predicted drawdown at a bore at the end of mining is greater than 1m and the predicted water level at the end of mining is above the minimum observed groundwater level and the base of the bore or sensor elevation; apply trigger category 2.

3. If the minimum observed groundwater elevation at a bore is below the predicted groundwater elevation at the end of mining or the predicted groundwater level is below the base of hole / sensor depth ; apply trigger category 3

The trigger levels set specific to each bore are detailed in Appendix 4, response actions are details in Section 10.

Groundwater Quality

In 2020, SLR were engaged to review the site water groundwater quality triggers. The trigger levels set specific to each bore are detailed in Appendix 4.

Groundwater quality monitoring trigger summary:

- pH values recorded outside the 5th and 95th percentile for three consecutive monitoring periods shall trigger the groundwater quality exceedance response;
- EC values via a two stage process:
  - **Stage 1** – measured values that are above the 95th percentile level for one monitoring period will be quality assurance checked and undertake an internal review. If the level is above for three consecutive monitoring periods shall trigger the groundwater quality exceedance response as in Stage 2,
  - **Stage 2** – measured values above historic maximum values for two consecutive monitoring periods shall trigger the groundwater quality exceedance response.

pH

Groundwater quality triggers for pH were developed based on 'pre-mining' water quality levels for bores installed before the monitoring network upgrade in 2015. The baseline data was collected by MAC from 1996 to 2010, as outlined in the 2015 WMP (AGE, 2015). The baseline data has been used to specify the 5th and 95th percentile trigger levels for pH using the minimum and maximum pH baseline data.

For bores installed in the 2015 monitoring network upgrade, a statistical analysis of all available monitoring data from 2016 to 2020 was undertaken to develop the 5th and 95h percentile trigger levels. These trigger levels are not based on 'pre-mining' water quality levels as they have been installed during active mining at MAC. Under this methodology pH triggers are activated if pH values are below the 5th percentile value or above the 95th percentile value.

Electrical Conductivity (EC)

Groundwater quality triggers for EC were developed based on 'pre-mining' water quality levels for bores installed before the monitoring network upgrade in 2015. The baseline data was collected by MAC from 1996 to 2010, as outlined in the 2015 WMP, have been used to specify the 1st Stage (95th Percentile) and 2nd Stage (Maximum Value + 10%) trigger levels for EC using the 90th percentile and maximum value EC baseline data.

For bores installed in the 2015 monitoring network upgrade, a statistical analysis of all available monitoring data from 2016 to 2020 was undertaken to develop the 1st Stage (95th Percentile) and 2nd Stage (Maximum Value + 10%) trigger levels. These trigger levels are not based on 'pre-mining' water quality levels as they have been installed during active mining at MAC.

Under this methodology EC triggers are developed as two stages. The first stage trigger is activated if EC values are above the 95th percentile value, for three consecutive monitoring events. The second stage trigger is activated if the monitoring event exceeds the maximum EC value plus 10%.

9.4 Groundwater Inflows to Mining Operations

Monitoring of hydrogeological conditions is undertaken to assess groundwater seepage into open cut pits, especially from adjacent alluvial aquifers. Groundwater level monitoring being the key data set used to simulate inflows to mine areas through modelling. A large proportion, if not all, of the seepage to the open pit is lost through evaporation at the coalface or exported as moisture in run of mine activities. Currently, there is no quantitative method to measure the volume of groundwater inflows to mining operations. The groundwater model for the current mine approval is the most appropriate method to calculate water take.

Groundwater model predictions for the Environmental Assessment have open cut pit inflow increasing from 0.85ML/d, in 2009, to a peak of 2.61ML/d in 2016. The model predicts a slight decrease to 2.50ML/d at the end of open cut mining in 2026. Maximum loss of flow to the Hunter River alluvium due to mining is calculated to peak at 0.72 ML/day. These estimates are deemed as valid unless groundwater level trigger levels are exceeded. Ongoing validation and revision of the model as described in this plan ensure accuracy of these predictions.

9.5 Groundwater Yield

The Environmental Assessment predicted negligible effects on groundwater use at surrounding private bores. Notwithstanding this, potential impacts of the operation on water users will be monitored via the groundwater level monitoring network, assessed and responded to in accordance with the Landholder Consultation and Investigation Process presented in Appendix 7. Monitoring to determine groundwater yield will be considered at privately owned bores upon landowner request.

Permeability testing is also undertaken during installation of new monitoring bores to determine local groundwater hydraulic parameters.

9.6 Groundwater Dependent Ecosystems and Riparian Vegetation

Monitoring of riparian vegetation is undertaken annually as part of the Stream Health Monitoring Program and serves equally as a monitor of groundwater dependent riparian vegetation. Four photographs are to be taken at each of the surface water vegetation monitoring sites; looking upstream, looking downstream, looking at the left bank and looking at the right bank . These photographs are labelled with the location, direction and date.

9.7 Cut-off wall and flood levee monitoring

The following safeguards associated with the ongoing management of this low permeability barrier wall will be implemented to minimise, prevent or offset groundwater leakage from the alluvial aquifer:

- bi-monthly visual inspection,
- annual structural engineering inspection of the barrier wall.
- groundwater monitoring adjacent to the barrier wall to confirm the effectiveness of the wall and its' performance as a barrier in the long term.
- quarterly vegetation maintenance inspections.

9.8 Monitoring Records

The following records are kept in respect of any samples collected as part of these monitoring programs:

- the date(s) on which the sample was taken;
- the time(s) at which the sample was collected;
- the point at which the sample was taken; and
- the name of the person who collected the sample.

10 Response Plan

10.1 Surface and Groundwater

In situations where water monitoring results are identified as being unacceptable, or the real-time monitoring results exceed the relevant impact assessment criteria, as outlined in Section 9.2.4 and Section 9.3.4 the response protocols in Table 3 shall apply

Table 3 Surface Water and Groundwater Exceedance Protocol

Assessment Criteria	Exceedance criterion	Exceedance protocol
pH impact assessment criteria	pH values recorded outside the trigger level range for **three consecutive monitoring periods** shall trigger the groundwater quality exceedance response	Step 1: Notify the DPIE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance of information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, the trigger value is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPIE to determine if a written report on the exceedance will be required, and Implement identified corrective/preventative actions.
Electrical Conductivity (EC) Stage 1 surface water or groundwater quality impact assessment criteria	Measured values that are above the Stage 1 trigger level shall trigger exceedance response	Step 1: Quality assurance check of the sampling procedure and analytical data acquired, reported and entered. Step 2: For a single exceedance of a 1st stage trigger value, no further action is required other than to record the exceedance. If the 1st stage trigger value of the same parameter is exceeded at the same location for three consecutive sampling events, then the actions required for exceedance of the 2nd stage trigger values should be carried out.
Electrical Conductivity (EC) Stage 2 surface water or groundwater quality impact assessment criteria	Measured values above Stage 2 values for two consecutive reading shall trigger the groundwater quality exceedance response.	Step 1: Notify the DPIE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance of information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, the trigger value is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPIE to determine if a written report on the exceedance will be required, and Implement identified corrective/preventative actions.
Groundwater level impact assessment criteria	Any monitoring bore groundwater level or vibrating wire piezometer groundwater head pressure record below the trigger level for three consecutive monitoring periods shall trigger the groundwater level exceedance response.	Step 1: Notify the DPIE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, the trigger value is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPIE to determine if a written report on the exceedance will be required, and Implement identified corrective/preventative actions.

10.2 Stream Health

In the event of riparian and in-stream vegetation impact assessment criteria being exceeded, the following protocol will be followed:

1. The area will be inspected to confirm the condition of vegetation in the photograph and the condition of vegetation in other similar areas of the site.
2. The magnitude of the change in erosion/deposition will be verified within 24 hours of erosion or channel deposition change being identified.
3. If the inspection confirms a significant impact to vegetation specific to the area or additional erosion or deposition has occurred, DPIE and any other relevant departments will be notified.
4. An investigation will then be undertaken in consultation with DPIE and any other relevant department and will involve the consideration of the visual inspection documented above in conjunction with:
   a) site activities being undertaken at the time;
   b) baseline surface water and groundwater monitoring results;
   c) surface water and groundwater results in nearby locations;
   d) the prevailing and preceding meteorological conditions;
   e) hydrological conditions; and
   f) changes to the land use/activities being undertaken in the contributing catchment or hydrogeological regime.

   The investigation timeframe will be determined in consultation with DPIE and other relevant departments. Consultation with the DPIE will be undertaken to determine if a written report on the exceedance will be required.
5. If the investigation shows that the stream health impact is linked to activities undertaken by MAC, causal factors will be addressed and rectified if possible. Corrective/preventative measures will be developed in consultation with DPIE and any other relevant department and implemented in response to the outcomes of the investigation. Such measures could involve direct revegetation or vegetation offsets. The timeframe associated with development and implementation of corrective/preventative measures is to be determined in consultation with the DPIE and relevant departments.
6. Additional monitoring would be implemented to measure the effectiveness of corrective/preventative measures if appropriate. The timeframe associated with additional monitoring is to be determined in consultation with DPIE and relevant departments.

11 Review and Reporting

11.1 Review

This WMP will be reviewed and evaluated to assess its adequacy and effectiveness, to the satisfaction of the Secretary (in consultation with relevant government agencies) in accordance with Condition 4 of Schedule 5 of the Project Approval. This requires that this is undertaken within 3 months of:

- The submission of the Annual Review;
- The submission of an incident report;
- The submission of an audit; and
- Any modifications to the conditions of the Approval.

If necessary this WMP will be revised to incorporate any recommended measures to improve the environmental performance of MAC resulting from audits, community complaints and incident investigation findings. In addition, the review process will include ongoing evaluation of operational modifications, alternative methodologies and new technologies that become available.

11.2 Reporting

Mt Arthur Coal will report on the effectiveness of the WMP annually in the MAC Annual Review this will include:

- Reporting of monitoring results, evaluating and comparing against impact assessment criteria;

  Results of the model validation assessment, which compares the model predictions against the monitoring program groundwater level information.
- Surface and or groundwater related complaints and management/mitigation measures undertaken;
- Management/mitigation measures undertaken in the event of any confirmed exceedance of the impact assessment criteria; and
- Review of the effectiveness of management/mitigation measures and the monitoring program.

Mt Arthur Coal will also report results of any monitoring undertaken in accordance with the HRSTS on the BHP Mt Arthur Coal website (https://www.bhp.com/environment/regulatory-information) on a monthly basis in the event of a discharge.

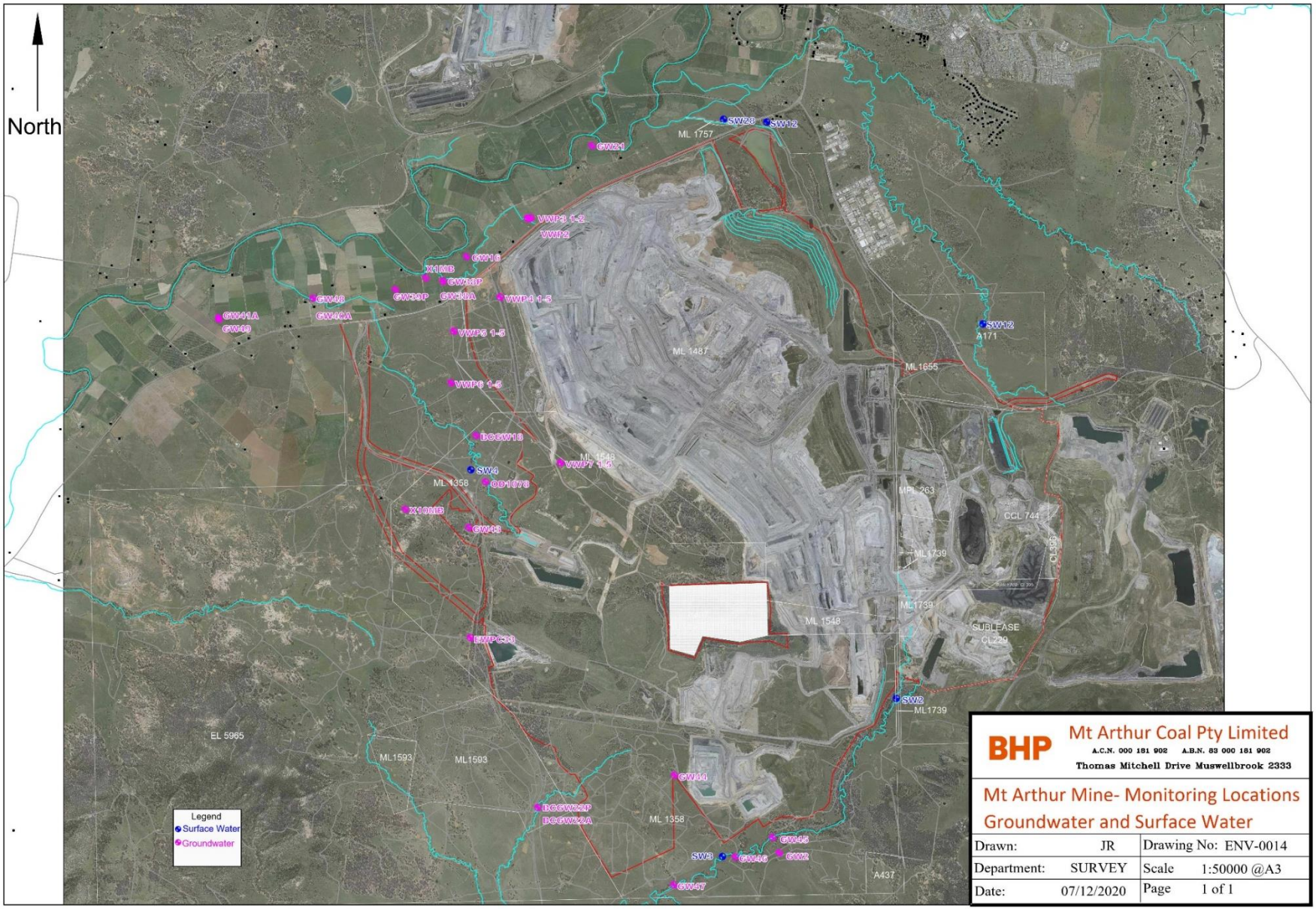
Version Management

Note:

- **Major** versions (1.0, 2.0 etc.) are for changes after a significant event / incident or for a periodic review of the document.
- **Minor** versions (1.1, 1.2 etc.) are for small changes to a page or pages within a document.

Date	Version Control		Page(s)	Details
	Major	***Minor***		
30/06/2011	*1.0*		*All*	*Draft Submitted to DPI for comment*
23/08/2012		*1.1*	*All*	*Approved by the Department of Planning & Infrastructure on 23/08/2012*
3/04/2020	*2.0*		*All*	*Amended for DPIE Approval*

Appendix 1 – Monitoring Locations Plan



Appendix 2 – Surface Water Monitoring Locations and Schedule

Site	Location	Coordinates (GDA94 Zone 56)	Parameters	Trigger Levels		Frequency
SW02	Saddlers Creek	E. 300861 N. 6415905	pH	6.5 - 9.0		Monthly or following rainfall >25mm*.
			EC (µS/cm)	Stage 1	12,365	
				Stage 2	13,900	
			TSS (mg/L)	Stage 1	219	
				Stage 2	277	
			Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	NA		Annual
SW03	Saddlers Creek	E. 298165 N. 6413452	pH	6.5 - 9.0		Monthly
			EC (µS/cm)	Stage 1	10,133	
				Stage 2	11,402	
			TSS (mg/L)	Stage 1	37	
				Stage 2	46	
			Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	NA		Annual
			Stream Health - Riparian and Stream Vegetation / Stream erosion	Significant degradation or change between consecutive monitoring periods		Annual
SW04	Quarry Creek	E. 294263 N. 6419453	pH	6.5 - 9.0		Monthly or following rainfall >25mm*.
			EC (µS/cm)	Stage 1	13,959	
				Stage 2	15,509	
			TSS (mg/L)	Stage 1	82	
				Stage 2	104	
			Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	NA		Annual
			Stream Health - Riparian and Stream Vegetation / Stream erosion	Significant degradation or change between consecutive monitoring periods		Annual
SW12	Ramrod Creek	E. 302205 N. 6421715	pH	6.5 - 9.0		Monthly or following rainfall >25mm*.
			EC (µS/cm)	Stage 1	6,659	
				Stage 2	7,153	
			TSS (mg/L)	Stage 1	555	
				Stage 2	708	
			Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	NA		Annual
			Stream Health - Riparian and Stream Vegetation / Stream erosion	Significant degradation or change between consecutive monitoring periods		Annual
SW15	White's Creek Diversion	E. 298854 N. 6424848	pH	6.5 - 9.0		Monthly or following rainfall >25mm*.
			EC (µS/cm)	Stage 1	7,128	
				Stage 2	8,262	
			TSS (mg/L)	Stage 1	103	
				Stage 2	130	
			Aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	NA		Annual
			Stream Health - Riparian and Stream Vegetation / Stream erosion	Significant degradation or change between consecutive monitoring periods		Annual
SW28		E. 298190	pH	6.5 - 9.0		

Site	Location	Coordinates (GDA94 Zone 56)	Parameters	Trigger Levels		Frequency
	Hunter River Salinity Trading Scheme HRSTS) monitoring point EPL Point 6	N. 6424890	EC (µS/cm)	Stage 1	Determined by the number of HRSTS credits held	Continuous when discharging
				Stage 2		
			TSS (mg/L)	Stage 1	120	
				Stage 2	120	
			Flow (ML/day)	Limit	450	
			Water temperature, pH, EC, TDS, TSS, turbidity, sulphate, nitrate, iron, oil and grease alkalinity, hardness, biochemical oxygen demand, total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc.	NA		Daily during discharge

** grab samples collected when safe to do so and access permits, generally during daylight hours. Rainfall event sampling to be conducted when 25mm rain received within 24 hours, midnight to midnight, with a new rainfall event considered to have commenced if there has not been a rainfall event in the previous 48 hours.*

Notes: All metals and metalloids will be measured as total (unfiltered) and dissolved (filtered).

Appendix 3 - Baseline Surface Water Quality Data

	Site:	SW2	SW3	SW4	SW13	SW15
		Saddlers Upstream	Saddlers Downstream	Quarry Creek	Fairford Creek	White's Creek Diversion
Parameter	**Dates Sampled**	02/06/1995 - 23/01/2012	02/06/1995 - 23/01/2012	02/06/1995 - 23/01/2012	02/04/2001 - 23/01/2012	18/09/2002 - 23/01/2012
	min	6.9	6.6	6.9	6.1	7.2
	max	8.6	8.7	9.1	9.0	9.7
	median	7.7	8.0	8.3	7.4	8.3
	mean	7.7	8.0	8.3	7.4	8.4
EC (µS/cm)	**min**	1,360	760	490	120	232
	max	16,300	11,000	17,000	1,150	8,790
	median	8,010	6,220	9,010	325	3,260
	mean	7,501	6,007	9,122	418	3,215
Turbidity (NTU)	**min**	0.1	0.2	0.1	6.2	0.7
	max	765	56	36	587	1110
	median	3.9	2.0	2.2	28	5.0
	mean	23	4.7	4.7	102	32
TSS (mg/L)	**min**	0.0	0.0	0.0	0.0	0
	max	828	120	240	3,300	380
	median	10	4	6	167	14
	mean	31.3	8	15.4	453.7	22
TDS (mg/L)	**min**	850	550	310	150	305
	max	15,600	6,920	11,000	700	6,000
	median	6,400	3,900	5,500	280	2,350
	mean	5,876	3,751	5,573	288	2,222
Filtered Iron (mg/L)	**min**	0.01	0.00	0.01	0.15	0.01
	max	0.50	0.50	0.58	11.0	1.70
	median	0.05	0.05	0.05	1.73	0.05
	mean	0.10	0.05	0.05	2.42	0.07
Nitrate (mg/L)	**min**	0.01	0.01	0.01	0.01	0.01
	max	5.3	3.1	5.3	20.0	7.0
	median	0.4	0.2	0.4	1.1	0.1
	mean	0.6	0.5	0.8	2.7	0.4
Sulphate (mg/L)	**min**	44	0.4	14	1	25
	max	6,100	3,420	2,350	250	2,190
	median	2,440	380	250	10	799
	mean	2,419	426	333	20	753

Appendix 4 - Groundwater Monitoring Locations and Schedule

Table 4: Groundwater Monitoring Locations and Schedule

Site No.	Location	Coordinates (GDA94 Zone 56)		Target Formation	Monitoring Schedule			Level Triggers		Quality Triggers			
										pH		EC	
		Easting (m)	Northing (m)		GW Level[1] (Quarterly)	GW Quality Standard[2] (Quarterly)	GW Quality Comprehensive[3] (Annual)	Adopted Trigger Derivation method (1,2 or 3)	Adopted Trigger Level (mAHD)	Lower (5th Percentile)	Upper (95th Percentile)	Stage 1 (95th Percentile)	Stage 2 (Maximum Value)
Alluvial Aquifer Bores													
GW16	Off Denman Rd - west of Mt Arthur North	294197	6422759	Hunter River alluvium	Q	Q	A	1	120.9	7.0	7.7	4210	4690
GW21	Off Denmand Rd - Edinglassie Homestead	296141	6424483	Hunter River alluvium	Q	Q	A	1	125.0	6.8	7.8	1197	2000
GW38A(IW4030)	Off Denman Rd - gate no. 968	293831	6422393	Hunter River alluvium	Q	Q	A	1	120.7	6.5	7.7	4900	5560
GW40A	Off Denman Rd - 1212 Gia Gindi Holstiens	291816	6422119	Hunter River alluvium	Q	Q	A	1	117.8	6.9	8.0	5290	5650
GW41A(IW4029)	Off Denman Rd - Well brook	290348	6421810	Hunter River Alluvium	Q	Q	A	1	117.9	6.6	7.7	9090	10600
X1MB	Off Denman Rd - gate no. 968	293566	6422429	Hunter River Alluvium	Q	Q	A	3	119.7	-	-	-	-
BCGW22A(IW4027)	On site - southwest of Bayswater No. 3	295314	6414210	Saddlers Creek alluvium	Q	Q	A	1	137.6	6.6	7.1	11810	14500
GW45	On site - upper Saddlers Creek	298890	6413630	Saddlers Creek alluvium	Q	Q	A	1	138.9	6.6	7.1	11810	14500
GW46	On site - central Saddlers Creek	298337	6413469	Regolith near Saddlers Creek	Q	Q	A	2	129.0	6.3	8.0	8050	11380
GW47	On site - lower Saddlers Creek	297409	6412974	Saddlers Creek alluvium	Q	Q	A	2	127.3	6.5	7.6	7320	8220
Permian/Fractured Rock Aquifer Bores													
BCGW18	Off Edderton Rd - opposite Calool	294345	6419985	Arrowfield Seam	Q	Q	A	3	147.3	7.0	9.1	8030	8510
BCGW22P(IW4026)	On site – south west of Bayswater No. 3	295301	6414215	Glen Munro Seam	Q	Q	A	3	133.7	7.1	9.9	14100	16270
EWPC33	Off Edderton Rd - west of Bayswater No. 3	294253	6416847	Blakefield Seam	Q	Q	A	1	194.3	6.5	7.5	4592	6280
GW2	On site - south of Saddlers Creek	299045	6413511	Woodlands Hill Seam	Q	Q	A	2	133.2	6.5	8.0	4266	4770
GW38P	Off Denman Rd - gate no. 968	293832	6422384	Warkworth Seam	Q	Q	A	2	120.9	7.2	8.1	3224	3830
GW39P-25mm	Off Denman Rd - Denman Rd West	293094	6422251	Warkworth Seam	Q	Q	A	3	116.0	-	-	-	-
GW43	Off Edderton Rd - Roxburgh South	294233	6418560	Woodlands Hill Seam	Q	Q	A	1	165.4	6.7	7.4	4400	4470
GW44	On site - off McDonalds Lane	297445	6414733	Woodlands Hill Seam	Q	-	-	2	99.9	-	-	-	-
GW48	Off Denman Rd - 1212 Gia Gindi Holstiens	291830	6422111	Bowfield Seam	Q	Q	A	1	117.7	6.8	8.2	4090	4750
GW49	Off Denman Rd - Well brook	290346	6421798	Arrowfield Seam	Q	Q	A	1	117.6	6.1	7.5	6170	7530
OD1078P(IW4028)	On site - southwest of Mt Arthur North	294491	6419265	Arrowfield Seam	Q	-	-	2	134.6	-	-	-	-
VWP04_130	Off Edderton Rd - Opposite windmill north	294719	6422132	Vaux Seam	Q	-	-	3	42.2	-	-	-	-

Site No.	Location	Coordinates (GDA94 Zone 56)		Target Formation	Monitoring Schedule			Level Triggers		Quality Triggers			
										pH		EC	
		Easting (m)	Northing (m)		GW Level[1] (Quarterly)	GW Quality Standard[2] (Quarterly)	GW Quality Comprehensive[3] (Annual)	Adopted Trigger Derivation method (1,2 or 3)	Adopted Trigger Level (mAHD)	Lower (5th Percentile)	Upper (95th Percentile)	Stage 1 (95th Percentile)	Stage 2 (Maximum Value)
VWP04_161	Off Edderton Rd - Opposite windmill north	294719	6422132	Bayswater Seam	Q	-	-	3	37.3	-	-	-	-
VWP04_201	Off Edderton Rd - Opposite windmill north	294719	6422132	Edderton Seam	Q	-	-	3	22.0	-	-	-	-
VWP04_262	Off Edderton Rd - Opposite windmill north	294719	6422132	Edinglassie Seam	Q	-	-	3	-7.5	-	-	-	-
VWP04_285	Off Edderton Rd - Opposite windmill north	294719	6422132	Ramrod Creek Seam	Q	-	-	3	-12.6	-	-	-	-
VWP05_164	Off Edderton Rd - Opposite windmill south	293993	6421605	Vaux Seam	Q	-	-	2	32.4	-	-	-	-
VWP05_192	Off Edderton Rd - Opposite windmill south	293993	6421605	Bayswater Seam	Q	-	-	2	32.4	-	-	-	-
VWP05_227	Off Edderton Rd - Opposite windmill south	293993	6421605	Edderton Seam	Q	-	-	2	-6.2	-	-	-	-
VWP05_288	Off Edderton Rd - Opposite windmill south	293993	6421605	Edinglassie Seam	Q	-	-	2	28.2	-	-	-	-
VWP05_311	Off Edderton Rd - Opposite windmill south	293993	6421605	Ramrod Creek Seam	Q	-	-	2	6.6	-	-	-	-
VWP06_237	Off Edderton Rd - Opposite Huon	293960	6420850	Vaux Seam	Q	-	-	2	43.1	-	-	-	-
VWP06_269	Off Edderton Rd - Opposite Huon	293960	6420850	Broonie Seam	Q	-	-	2	43.1	-	-	-	-
VWP06_304	Off Edderton Rd - Opposite Huon	293960	6420850	Edderton Seam	Q	-	-	2	4.1	-	-	-	-
VWP06_366	Off Edderton Rd - Opposite Huon	293960	6420850	Edinglassie Seam	Q	-	-	2	58.1	-	-	-	-
VWP06_388	Off Edderton Rd - Opposite Huon	293960	6420850	Ramrod Creek Seam	Q	-	-	2	53.7	-	-	-	-
VWP07_223	On site - southwest of Mt Arthur North	295656	6419565	Piercefield Seam	Q	-	-	2	94.5	-	-	-	-
VWP07_271	On site - southwest of Mt Arthur North	295656	6419565	Vaux Seam	Q	-	-	3	77.5	-	-	-	-
VWP07_286	On site - southwest of Mt Arthur North	295656	6419565	Bayswater Seam	Q	-	-	2	40.4	-	-	-	-
VWP07_326	On site - southwest of Mt Arthur North	295656	6419565	Edderton Seam	Q	-	-	2	-16.7	-	-	-	-
VWP07_418	On site - southwest of Mt Arthur North	295656	6419565	Ramrod Creek Seam	Q	-	-	3	95.7	-	-	-	-
VWP2_P1	Off Denman Rd - west of Edinglassie Homestead	295195	6423364	F4 Fault	Q	-	-	2	-0.6	-	-	-	-
VWP3_P1	Off Denman Rd - west of Edinglassie Homestead	295166	6423349	Edinglassie Seam	Q	-	-	2	-0.6	-	-	-	-
VWP3_P2	Off Denman Rd - west of Edinglassie Homestead	295166	6423349	Ramrod Creek Seam	Q	-	-	2	-27.9	-	-	-	-
X10MB	Off Edderton Rd - Roxburgh South	293247	6418841	Glen Munro	Q	Q	A	2	176.9	-	-	-	-

Note:

1- ***Groundwater Level*** *- Manual groundwater elevation/depth to groundwater every 3 months, pressure transducers continuous every six hours, VWP data logger download, and verification and validation of instrument drift and correction.*

2- ***Groundwater Quality Analysis (Standard)*** *- Water temperature, pH, EC, TDS, TSS, iron, sulphate, chloride, calcium, magnesium, potassium, sodium, carbonate and bicarbonate.*

3- ***Groundwater Quality Analysis (Comprehensive)*** *- Total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum , selenium and zinc. All metals and metalloids required as dissolved analytes.*

Appendix 5 – Baseline 1996 – 2010 Groundwater Level Data

Site ID	Formation	Number of Records	Min (mAHD)	Mean (mAHD)	Median (mAHD)	Max (mAHD)
BCGW18	Arrowfield	67	148.60	152.94	153.37	155.55
BCGW19	Glen Munro	61	179.72	181.13	181.09	182.39
EWPC33	Blakefield	67	192.14	195.99	196.28	198.10
GW6	Glen Munro	63	171.85	174.16	174.69	175.49
GW7	Woodlands Hill	63	171.96	173.50	173.65	174.67
GW43	Woodlands Hill	18	169.19	169.69	169.82	169.90
GW44	Woodlands Hill	17	125.85	126.60	126.11	128.46
OD1078P (IW4028)	Arrowfield	14	146.21	149.70	150.46	151.01
OD1078-PIEZO	Bowfield	61	137.52	148.15	149.15	153.94
OD1079-PIEZO	Glen Munro	61	169.34	172.59	172.16	177.28
GW16	Alluvium	65	121.18	122.41	122.39	124.48
GW21	Alluvium	65	125.97	126.77	126.76	130.11
GW23	Ramrod Creek	60	124.60	130.53	130.44	131.99
GW25	Alluvium	65	129.71	130.59	130.44	131.90
GW38A (IW4030)	Alluvium	18	121.92	122.11	122.06	122.45
GW38P	Warkworth	66	121.27	121.67	121.62	122.42
GW39A	Alluvium	68	121.27	121.48	121.44	123.52
GW39P-25mm	Warkworth	67	120.23	121.15	121.31	121.81
GW40A	Alluvium	67	118.82	119.25	119.18	119.82
GW41A (IW4029)	Alluvium	18	119.11	119.18	119.18	119.20
GW42	Regolith (HRA dry)	18	124.60	125.31	125.37	125.91
GW48	Bowfield	18	118.84	118.98	118.95	119.15
GW49	Arrowfield	18	118.68	118.78	118.77	118.85
BCGW22P (IW4026)	Glen Munro	18	139.68	140.43	140.49	140.87
GW2	Woodlands Hill	65	143.871	145.04	144.98	146.72
GW3	Woodlands Hill	61	143.89	145.25	145.30	145.99
GW45	Alluvium	18	141.26	142.30	142.37	144.03
GW46	Alluvium	18	136.04	136.85	136.93	137.46
GW47	Alluvium	18	129.69	130.29	130.35	130.66

Appendix 6 – Baseline 1996 – 2010 Groundwater Quality Data

		pH (pH units)							EC (µS/cm)						
Site ID	**Formation**	**Number of Records**	**Min**	**10th Percentile**	**Median**	**Mean**	**90th Percentile**	**Max**	**Number of Records**	**Min**	**10th Percentile**	**Median**	**Mean**	**90th Percentile**	**Max**
BCGW18	Arrowfield	62	5.5	7.4	8.2	8.1	8.9	9.3	6.2	3100	4408	5220	5799	7827	8210
BCGW19	Glen Munro	38	6.7	7.1	8	7.9	8.4	8.6	38	1205	1258	3185	3132	4747	6370
EWPC33	Blakefield	60	6.5	6.9	7.2	7.2	7.5	8	61	290	1092	2230	2149	2608	6280
GW6	Glen Munro	62	6.3	6.7	7.1	7.1	7.4	8	64	3030	3250	3625	3689	4225	4520
GW7	Woodlands Hill	61	6.4	6.8	7.1	7.1	7.4	7.6	62	3970	4153	4820	4797	5190	5590
GW43	Woodlands Hill	18	6.7	6.9	7.1	7.1	7.3	7.4	18	3900	3927	4220	4211	4443	4470
GW44	Woodlands Hill	2	11.6	-	12	12	-	12.4	2	5810	-	7700	7700	-	9590
OD1078P (IW4028)	Arrowfield	No Data Collected													
OD1078-PIEZO	Bowfield	37	6.4	6.9	7.2	7.2	7.5	7.7	38	1470	2584	6955	6002	7945	8300
GW16	Alluvium	65	6.9	7.1	7.3	7.4	7.6	8	65	2139	2580	3120	3254	4138	4540
GW21	Alluvium	65	6.5	7.1	7.3	7.3	7.7	8	65	636	748	899	897	1008	2000
GW23	Ramrod Creek	47	6.3	6.8	7	7	7.3	7.4	47	3310	3762	4510	4523	5098	7720
GW25	Alluvium	65	6.8	7	7.3	7.3	7.6	7.8	65	3580	4116	5430	5343	6314	7770

		pH (pH units)							EC (µS/cm)						
Site ID	**Formation**	**Number of Records**	**Min**	**10th Percentile**	**Median**	**Mean**	**90th Percentile**	**Max**	**Number of Records**	**Min**	**10th Percentile**	**Median**	**Mean**	**90th Percentile**	**Max**
GW38A (IW4030)	Alluvium	18	7	7	7.3	7.4	7.7	8.3	18	3820	4036	4365	4437	4813	5560
GW39A	Alluvium	63	5.9	6.8	7.2	7.2	7.5	8.7	63	4220	4870	5700	5693	6502	6740
GW39P-25mm	Warkworth	61	7	7.2	7.6	7.6	7.8	8.5	61	500	3392	5460	5123	6166	9170
GW40A	Alluvium	62	6.7	7.1	7.4	7.5	7.9	8.9	62	3250	3823	4145	4310	5204	5460
GW41A (IW4029)	Alluvium	18	7	7	7.5	7.5	7.8	8	18	815	1351	3265	2986	3949	4120
GW42	Regolith (HRA dry)	17	6.4	6.8	7.1	7.1	7.3	7.4	17	5910	5966	6870	7008	7848	7880

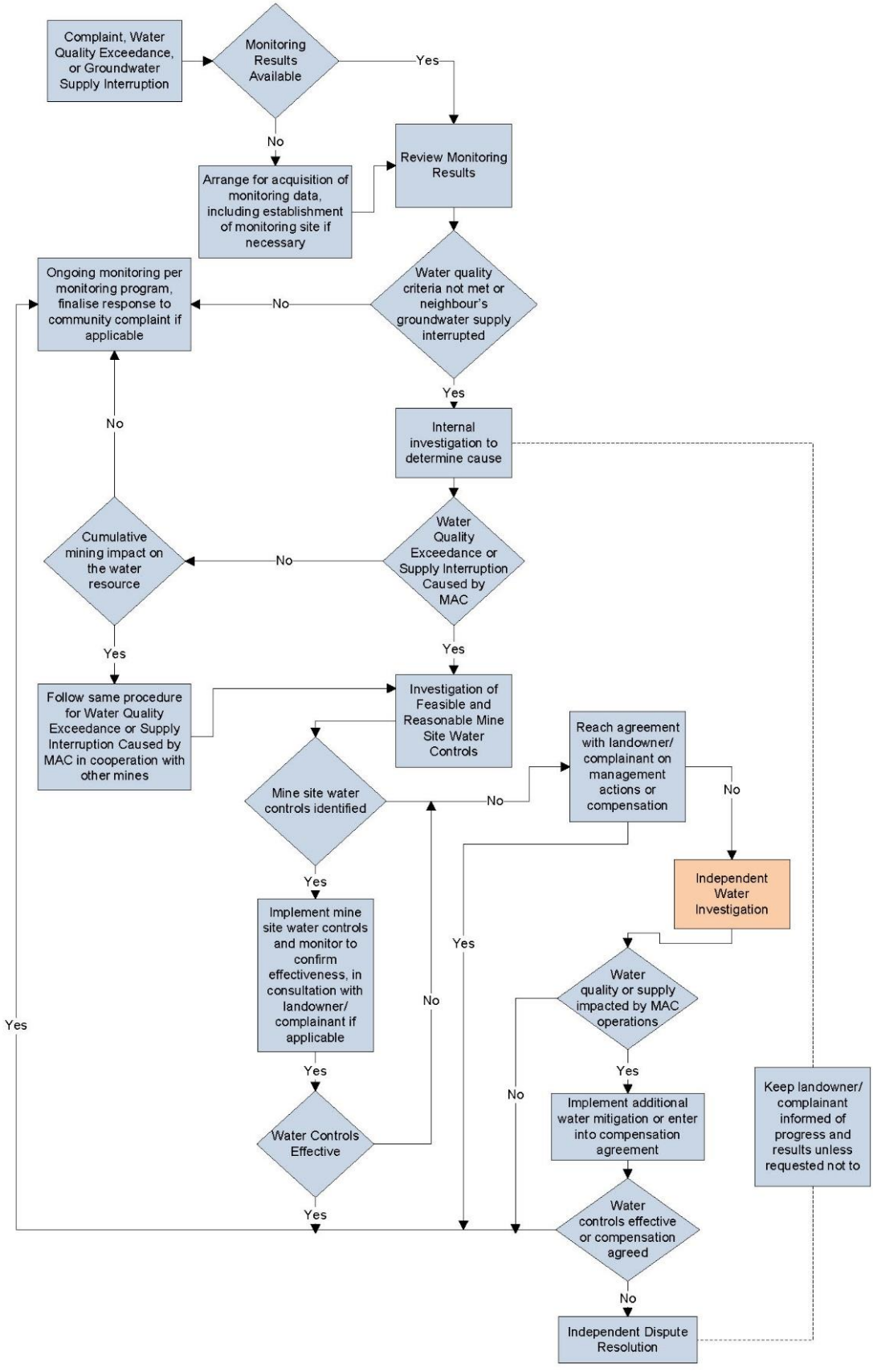
GW48	Bowfield	18	7.2	7.4	7.7	7.6	7.8	8.2	18	3090	3369	3645	3612	3856	4090
GW49	Arrowfield	18	6.5	6.5	7	6.9	7.1	7.5	18	5270	5468	5775	5754	6008	6170
BCGW22A (IW4027)	Alluvium	18	6.6	6.8	6.9	6.9	7.1	7.1	18	9740	9929	10845	10788	11477	11540
BCGW22P (IW4026)	Glen Munro	18	9.2	9.3	12.2	11.7	12.4	12.5	18	8470	8911	10840	10879	12513	12810
GW2	Woodlands Hill	63	6.5	7.4	7.7	7.7	8	8.5	62	2820	4033	4610	4566	4900	5090
GW3	Woodlands Hill	42	7.1	7.7	8	8	8.4	8.8	43	3460	3682	4160	4106	4440	4930
GW45	Alluvium	18	7	7.3	7.5	7.5	7.7	8	18	638	655	733	787	1121	1226
GW46	Alluvium	18	6.5	6.8	7	7	7.2	7.6	18	4840	5542	6130	6045	6381	6570
GW47	Alluvium	18	6.8	6.9	7.1	7.1	7.4	7.5	18	3650	4118	5220	5083	5847	5910

Notes: - GW23 went dry during the interim monitoring period.

- GW44 - CBE have difficulty sampling GW44.

- `GW26, likely erroneous record.

Appendix 7 - Landholder Consultation and Investigation Process



Appendix 8 – Approval Conditions Compliance Tables

Table 5: Development Consent (09_0062) relevant conditions

Condition Number	Environmental Performance Condition	Addressed within
Development Consent (09_0062)		
Schedule 3 Condition 26	**Water Supply** The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations to match its available water supply, to the satisfaction of the Secretary. *Note: The Proponent is required to obtain all necessary water licences and approvals for the project under the Water Act 1912 and/or Water Management Act 2000.*	Section 2 Section 8
Schedule 3 Condition 27	**Water Pollution** Unless an EPL or the EPA authorises otherwise, the Proponent shall comply with Section 120 of the POEO Act and the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.	This WMP Section 8
Schedule 3 Condition 28	**Hunter River and Saddlers Creek Alluvials** The Proponent shall not undertake any open cut mining operations within 150 metres of the Hunter River alluvials and Saddlers Creek alluvials that has not been granted approval under previous consents/approvals for Mt Arthur mine complex without the prior written approval of the Secretary. In seeking this approval the Proponent shall demonstrate, to the satisfaction of the Secretary in consultation with NOW, that adequate safeguards have been incorporated into the Surface and Ground Water Response Plan (see condition 34 below) to minimise, prevent or offset groundwater leakage from the alluvial aquifers. *Note: The alluvial aquifers and 150 metre buffers are shown conceptually in Appendix 6.*	Section 8.6 Section 9.4
Schedule 3 Condition 29	**Site Water Management Plan** The Proponent shall prepare and implement a Water Management Plan for the Mt Arthur mine complex to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with NOW and the EPA; and b) include a: - Site Water Balance; - Erosion and Sediment Control Plan; - Surface Water Monitoring Program; - Groundwater Monitoring Program; and - Surface and Ground Water Response Plan.	This WMP Section 6 Section 8 Ref ESCP Section 9.2 Section 9.3 Section 10
Schedule 3 Condition 30	The Site Water Balance must: a) include details of: - sources and security of water supply; - water use on site; - water management on site; - any off-site water transfers; - reporting procedures; and b) investigate and implement all reasonable and feasible measures to minimise water use by the Mt Arthur mine complex.	Section 8
Schedule 3 Condition 31	The Erosion and Sediment Control Plan must: a) be consistent with the requirements of Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004 (Landcom), or its latest version; b) identify activities that could cause soil erosion, generate sediment or affect flooding; c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters, and manage flood risk; d) describe the location, function, and capacity of erosion and sediment control structures and flood management structures; and e) describe what measures would be implemented to maintain the structures over time.	Separate Document referred to by this WMP
Schedule 3 Condition 32	The Surface Water Monitoring Program must include: a) detailed baseline data on surface water flows and quality in creeks and other waterbodies that could potentially be affected by the project; b) surface water and stream health impact assessment criteria; c) a program to monitor and assess: - surface water flows and quality; - impacts on water users;	Section 9 Section 9.2 Section 10.2 Appendix 2 Rehabilitation and Ecological

Condition Number	Environmental Performance Condition	Addressed within
Development Consent (09_0062)		
	- stream health; - channel stability,in Quarry Creek, Fairford Creek, Whites Creek (and the Whites Creek diversion), Saddlers Creek, Ramrod Creek and other unnamed creeks; and d) reporting procedures for the results of the monitoring program.	Monitoring Procedure (MAC-ENC-PRO-080).
Schedule 3 Condition 33	The Groundwater Monitoring Program must include: a) detailed baseline data of groundwater levels, yield and quality in the region, and privately-owned groundwater bores, that could be affected by the project; b) groundwater impact assessment criteria; c) a program to monitor: - groundwater inflows to the mining operations; - impacts on regional aquifers; - impacts on the groundwater supply of potentially affected landowners; - impacts on the Hunter River and Saddlers Creek alluvial aquifers; and - impacts on any groundwater dependent ecosystems and riparian vegetation; d) procedures for the verification of the groundwater model; and e) reporting procedures for the results of the monitoring program and model verification.	Section 9.3 Section 11
Schedule 3 Condition 34	The Surface and Ground Water Response Plan must describe the measures and/or procedures that would be implemented to: a) investigate, notify and mitigate any exceedances of the surface water, stream health and groundwater impact assessment criteria; b) compensate landowners of privately-owned land whose water supply is adversely affected by the project, including provision of an alternative supply of water to the affected landowner that is equivalent to the loss attributed to the project; c) minimise, prevent or offset potential groundwater leakage from the Hunter River and Saddlers Creek alluvial aquifers; and d) mitigate and/or offset any adverse impacts on groundwater dependent ecosystems or riparian vegetation.	Section 8 Section 9 Section 10 Appendix 7

Table 6: EPL 11457 relevant conditions

<table>
<tr><th>Condition Number</th><th>Environmental Performance Condition</th><th>Addressed within</th></tr>
<tr><td>EPL 11457</td><td></td><td></td></tr>
<tr><td>P1.2</td><td>The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.</td><td>This WMP</td></tr>
<tr><td>P1.3</td><td>The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land
<table><tr><th>EPA Identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr><tr><td>5</td><td>Discharge of saline water under the Hunter River Salinity Trading Scheme (HRSTS) Discharge Quality Volume Monitoring</td><td>Discharge of saline water under the Hunter River Salinity Trading Scheme (HRSTS) Discharge Quality Volume Monitoring</td><td>At outlet pipe from storage dam E298475 N6424784 marked as point 10 on plan titled "EPA - Plan of Premises Monitoring Points Drawing No.322403" dated 17/10/16 EPA ref DOC16/527575</td></tr><tr><td>6</td><td>Discharge of saline water under the Hunter River Salinity Trading Scheme (HRSTS) Discharge Quality Volume Monitoring</td><td>Discharge of saline water under the Hunter River Salinity Trading Scheme (HRSTS) Discharge Quality Volume Monitoring</td><td>At weir structure downstream of outlet pipe from storage dam E298190 N6424890 marked as point 11 on plan titled "EPA - Plan of Premises Monitoring Points Drawing No.322403" dated 17/10/16 EPA ref DOC16/527575</td></tr><tr><td>15</td><td>Volumetric monitoring, water quality monitoring, discharge to utilisation area</td><td>Volumetric monitoring, water quality monitoring, discharge to utilisation area</td><td>STP discharge to effluent pond utilisation area E301257 N6420449 defined as point 22 on plan titled "EPA - Plan of Premises Monitoring Points Drawing No. 322403" dated 17/10/2016 EPA Ref DOC16/527575</td></tr></table></td><td>Section 9.2</td></tr>
<tr><td>L1.1</td><td>L1 Pollution of Waters
Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.</td><td>This WMP</td></tr>
<tr><td>L2.1</td><td>L2 Concentration Limits
For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.</td><td>Section 9</td></tr>
<tr><td>L2.2</td><td>Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.</td><td>Section 9</td></tr>
<tr><td>L2.3</td><td>To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.</td><td>This WMP</td></tr>
<tr><td>L2.4</td><td>Water and/or Land Concentration Limits

POINT 6
<table><tr><th>Pollutant</th><th>Units of Measure</th><th>50 percentile concentration limit</th><th>90 percentile concentration limit</th><th>3DGM concentration limit</th><th>100 percentile concentration limit</th></tr><tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5 - 9.0</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td></td><td></td><td></td><td>120</td></tr></table></td><td>Section 9.2
Appendix 2</td></tr>
<tr><td>L3.1</td><td>L3 Volume and Mass Limits
For each discharge point or utilisation area specified below (by a point number), the volume/mass of:</td><td>Section 8
Section 9.2
Appendix 2</td></tr>
</table>

<table>
<tr><th>Condition Number</th><th>Environmental Performance Condition</th><th>Addressed within</th></tr>
<tr><td></td><td>a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.
<table><tr><th>Point</th><th>Unit of Measure</th><th>Volume/Mass Limit</th></tr><tr><td>6</td><td>megalitres per day</td><td>450</td></tr></table></td><td></td></tr>
<tr><td>M2.3</td><td>Water and/ or Land Monitoring Requirements
POINT 6
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Conductivity</td><td>microsiemens per centimetre</td><td>Continuous during discharge</td><td>A probe designed to measure the range 0 to 10,000 uS/cm</td></tr><tr><td>pH</td><td>pH</td><td>Daily during any discharge</td><td>Representative sample</td></tr><tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Daily during any discharge</td><td>Representative sample</td></tr></table>POINT 15
<table><tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr><tr><td>Faecal Coliforms</td><td>colony forming units per 100 millilitres</td><td>Quarterly</td><td>Grab sample</td></tr></table></td><td>Section 8
Section 9.2
Appendix 2</td></tr>
<tr><td>M3.2</td><td>Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.</td><td>Section 8
Section 9.2
Appendix 2</td></tr>
<tr><td>M8</td><td>M8 Requirement to monitor volume or mass
M8.1 For each discharge point or utilisation area specified below, the licensee must monitor:
a) the volume of liquids discharged to water or applied to the area;
b) the mass of solids applied to the area;
c) the mass of pollutants emitted to the air;
at the frequency and using the method and units of measure, specified below.
POINT 6
<table><tr><th>Frequency</th><th>Unit of Measure</th><th>Sampling Method</th></tr><tr><td>Continuous during discharge</td><td>megalitres per day</td><td>Weir structure and level sensor</td></tr></table>POINT 15
<table><tr><th>Frequency</th><th>Unit of Measure</th><th>Sampling Method</th></tr><tr><td>Continuous during discharge</td><td>kilolitres per day</td><td>Flow meter and continuous logger</td></tr></table>M8.2 Condition M8.1 for monitoring point 15 comes into effect on 1 October 2017.</td><td>Section8
Section 9.2
Appendix 2</td></tr>
<tr><td>M10.1</td><td>M10 Other Monitoring and recording Conditions
HRSTS Conditions
The licensee must continuously operate and maintain communication equipment which makes the conductivity and flow measurements, taken at Point 6 available to the Department of Land and Water Conservation within one hour of those measurements being taken and makes them available in the format specified in the “Hunter River Salinity Trading Scheme Discharge Point Site Equipment” as published by the Department of Land and Water Conservation on 7 May 2002.</td><td>Section 8
Section 9.2
Appendix 2</td></tr>
<tr><td>M10.2</td><td>The licensee must ensure that all monitoring data is within a margin of error of 5% for conductivity measurements and 10% for discharge flow measurement.</td><td>Section 9</td></tr>
<tr><td>M10.3</td><td>The licensee must mark monitoring point(s) 5 & 6, with a sign, which clearly indicates the name of the licensee, whether the monitoring point is up or down stream of the discharge point(s) and that it is a monitoring point for the Hunter River Salinity Trading Scheme.</td><td>Section 8
Section 9.2
Appendix 1
Appendix 2</td></tr>
<tr><td>R4.1</td><td>R4.1 HRSTS Reporting
The licensee must compile a written report of the activities under the Scheme for each scheme year. The scheme year shall run from 1 July to 30 June each year. The written report must be submitted to the EPA’s regional office within 60 days after the end of each</td><td>Section 8
Section 9.2
Appendix 2</td></tr>
</table>

Condition Number	Environmental Performance Condition	Addressed within
	scheme year and be in a form and manner approved by the EPA. The information will be used by the EPA to compile an annual scheme report.	
E1.1	**8 Special Conditions** **E1 Hunter River Salinity Trading Scheme** This licence authorises the discharge of saline water into the Hunter River Catchment from an authorised discharge point (or points), in accordance with the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2009.	Section 8 Section 9.2 Appendix 2
E 1.2	For the purposes of Clauses 23 and 29 of the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 the licensee must apply the conversion factor of 0.6.	Section 8 Section 9.2 Appendix 2
E 1.3	The licensee must not exceed the hourly volume discharge limit calculated using the following formula, at all discharge point(s) on this licence titled "Discharge of saline water under the Hunter River Salinity Trading Scheme (HRSTS)": **H = V / RRT** Where: **H** is the hourly volume discharge limit (in megalitres per hour); **V** is the licence holder's volume discharge limit for the block (in megalitres) calculated in accordance with clause 23 of the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation (2002); and **RRT** is the difference between the discharge stop and start times shown on the river register for that block (in hours) Note 1: The intent of this condition is to prevent spikes of saline water in the Hunter River as a result of discharges of less than the duration permitted by the river register. Note 2: A river register is issued by the Service Co-ordinator and allows participants of the Hunter River Salinity Trading Scheme (HRSTS) to discharge saline to the Hunter River during a discharge period.	Section 8 Section 9.2 Appendix 2