



Mt Owen Complex

Surface Water and Groundwater Response Plan

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Managed by



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1.0 Introduction

The Mt Owen Complex (MOC) is located in the Hunter coal fields of New South Wales, approximately 25 kilometres north-west of Singleton (refer to **Figure 1**). The Complex is owned and managed by Xstrata Mt Owen (XMO) which is a wholly owned subsidiary business unit of Xstrata Coal Australia Pty Ltd (Xstrata). The Mt Owen Complex currently consists of three adjacent DA approved open-cut coal mines; Mt Owen, Ravensworth East and Glendell Mines (refer to **Figure 2**). Mt Owen Mine is contract mined, currently by Thiess Pty Ltd (Thiess). The Glendell mine is owned and operated by XMO and comprises the Barrett Pit and West Pit (formerly known as Ravensworth East Mine).

1.1 Development Consent Conditions

This Surface Water and Groundwater Response Plan is part of a set of documents prepared to support the Mt Owen Complex Water Management Plan (WMP) required by the development consents for Mt Owen (DA 14-1-2004), Ravensworth East (DA 52-03-99) and Glendell Mines (DA 80/952). Although a Surface Water and Groundwater Response Plan is not specifically required in the development consent conditions for Mt Owen or Ravensworth East Mines, the plan is considered a 'best practice' approach and covers the entire Mt Owen Complex incorporating Mt Owen, Ravensworth East and Glendell Mines.

This plan outlines the response protocols to be followed to assess any adverse surface and groundwater impacts associated with the Mt Owen Complex to meet the requirements of condition 35, Schedule 3 of the Glendell Mine development consent (DA 80/952). **Table 1.1** outlines the development consent requirements for Glendell Mine and provides an indication of where each requirement is addressed in this plan.

Table 1.1 – Requirements for the Surface and Groundwater Response Plan from Glendell Development Consent (DA 80/952)

Consent Conditions		Relevant Section of Program
35	The Surface Water and Groundwater Response Plan must include:	
a)	A protocol for the investigation, notification and mitigation of any exceedances of the surface water stream health and groundwater impact assessment criteria;	Section 2.1
b)	Measures to mitigate and/or compensate potentially affected landowners for the loss of surface water flows in Bettys Creek, Swamp Creek, and Bowmans Creek downstream of the development;	Section 2.3
c)	Measures to minimise prevent or offset groundwater leakage from the Bettys Creek and Swamp Creek alluvial aquifers;	Refer to Groundwater Monitoring Program
d)	Measures to mitigate any direct hydraulic connection between the backfilled open cuts and the Bettys and Swamp Creek alluvium if the potential for adverse impacts is detected; and	Section 2.4
e)	The procedures that would be followed if any unforeseen impacts are detected during the development.	Section 2.5



Figure 1.1 Locality Plan

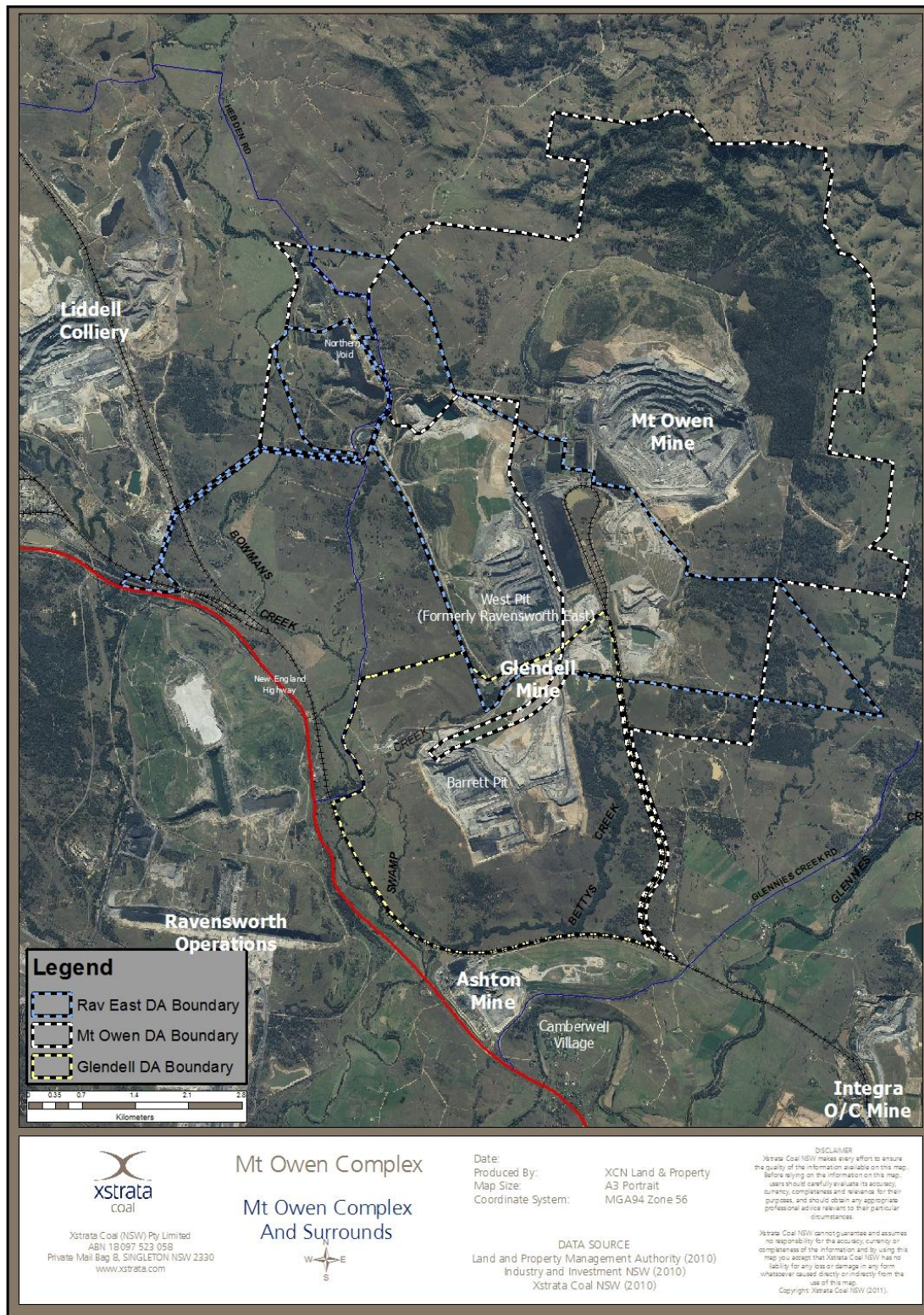


Figure 1.2 Mount Owen Complex and Surrounds

1.2 Program Objectives

The Surface Water and Groundwater Response Plan has been developed with reference to the Surface Water and Groundwater Monitoring Programs. The Plan outlines the appropriate response protocols to be undertaken in the event that adverse impacts associated with the Mt Owen Complex mining operations on the surrounding surface and groundwaters are identified. The plan outlines measures to mitigate impacts on downstream water users, minimise groundwater leakage from intercepted alluvials into open cut pits and response procedures to be followed in the event of any unforeseen impacts.

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2.0 Management Response Actions

Appropriate response actions have been developed in the event that mining operations at the Mt Owen Complex result in adverse impacts to the surrounding surface waters and groundwaters. **Table 2.1** summarises the potential water management issues that may arise and the appropriate response to be taken by relevant staff.

Table 2.1 – Mt Owen Complex Water Management Response Actions

Potential Water Management Issues	Response
Water monitoring reports results outside the surface water and stream health impact assessment criteria or maximum reported groundwater quality results (outlined in both the Surface Water and Groundwater Monitoring Plans respectively) ¹	<ul style="list-style-type: none"> • investigate results and trends, considering any mitigating factors where applicable; • report results to senior management; and • where relevant initiate the protocol outlined in Section 2.1.
Receipt of community complaint	<ul style="list-style-type: none"> • investigate complaint, considering any mitigating factors and provide feedback to complainant; • report complaint to senior management; • provide feedback to mine planning and production personnel, where relevant; and • where relevant initiate the protocol outlined in Section 2.2.
Non-compliance with Hunter River Salinity Trading Scheme (HRSTS) discharge limits	<ul style="list-style-type: none"> • investigate non-compliance, considering any mitigating factors where applicable; and • report non-compliance to the Department of Environment and Climate Change (DECC) in accordance with the Surface Water Monitoring Plan (refer to Appendix 6 of the Mt Owen Complex WMP).
Unauthorised discharge	<ul style="list-style-type: none"> • investigate discharge, considering any mitigating factors where applicable; • report discharge to the DECC; and • review adequacy of existing water management infrastructure and controls.
Loss of surface water availability for downstream water users	<ul style="list-style-type: none"> • investigate the cause of any losses in downstream surface water availability; and • where relevant initiate the process outlined in Section 2.3.
Loss of groundwater availability at private licensed bore	<ul style="list-style-type: none"> • investigate loss of groundwater availability, considering any mitigating factors where applicable; • provide feedback to complainant; • report complaint to senior management; and • where relevant initiate the process outlined in Section 2.3.

Potential Water Management Issues	Response
Increased leakage from the alluvial aquifers into open cut pits	<ul style="list-style-type: none"> • investigate the cause of any increased seepage from the alluvial aquifers into open cut pits; and • where relevant initiate the process outlined in Section 2.4.
Unforeseen impact	<ul style="list-style-type: none"> • initiate protocol outlined in Section 2.5.

Note 1: refer to the Mt Owen Complex WMP

2.1 Criteria Exceedance Protocol

XMO will monitor surface water and groundwater in accordance with the Surface Water and Groundwater Monitoring Programs (refer to the Mt Owen Complex WMP). If the surface water or groundwater monitoring reports/result(s) are outside the surface water and stream health impact assessment criteria or maximum reported groundwater quality results outlined in these programs, further investigations are required, XMO will:

- confirm the timing and general location of the exceedance(s);
- confirm the meteorological conditions at the time of the exceedance(s) (where relevant);
- identify any potential contributing factors;
- assess the monitoring results against background trends to identify any anomalies or causes;
- if the exceedance is not attributable to the Mt Owen Complex the routine monitoring program will be assessed for its effectiveness;
- where the exceedance is potentially attributable to the Mt Owen Complex appropriate mitigation and management strategies will be developed and implemented;
- where mitigation and management strategies have been implemented additional monitoring and regular reviews will be undertaken to measure the effectiveness of the strategies undertaken;
- the exceedance will be reported in accordance with the reporting mechanisms outlined in the Surface Water and Groundwater Monitoring Programs (refer to the Mt Owen Complex WMP).

2.2 Complaints Management Protocol

The Mt Owen Complex operates a dedicated complaints hotline. The details of this hotline are advertised in local newspapers, via a six monthly newsletter and on the Mt Owen Complex website.

A procedure for handling complaints has been implemented as part of the Mt Owen Complex Environmental Management System (EMS) to ensure a consistent approach to handling any complaint. All legitimate complaints will be thoroughly investigated by the Mt Owen Complex Environment and Community (E&C) Manager. With respect to complaints regarding surface water or groundwater the investigations will include, as a minimum:

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- records of the timing and general location of the issue initiating the complaint;
- details of the meteorological conditions at the time of the issue initiating the complaint;
- identification of any potential contributing factors; and
- a review of any monitoring results relevant to the complaint.

Where the complaint is potentially attributable to the Mt Owen Complex appropriate mitigation and management strategies will be developed, implemented and monitored for the effectiveness of the strategies undertaken.

Feedback to the complainant will be provided within 48 hours of receiving the complaint.

Details of complaints relating to groundwater or surface water will be provided to relevant mine planning and production personnel, to assist in the improvement of management practices, where relevant. A summary of the complaints received by the community will be reported in the Annual Environmental Management Report (AEMR).

If a landowner considers the operation to be in exceedance of the impact assessment criteria, they may request an independent review of the effects of the operation on their land. Such a request must be made in writing to the Director-General of the Department of Planning and Infrastructure (DoPI). If the Director-General determines that an independent review is to be undertaken, XMO must follow the procedures outlined in the relevant development consent.

2.3 Response Protocol for Adverse Impacts on Existing Surface Water and Groundwater Bores Supplies

The surface water available to adjacent landowners or stormwater run-off flow rates may be affected by mining activities associated with the Mt Owen Complex. In the event that a complaint is received from a landowner regarding the loss of a surface water supply or of an unusual flooding event the Complaints Management Protocol outlined in **Section 2.2** will be implemented. If the initial investigations conclude the Mt Owen Complex has potentially contributed to the event(s), the following steps will also be implemented:

- provide a copy of the landowner complaint to the New South Wales Office of Water (NOW) and DoPI and inform both agencies of the intention to conduct independent review;
- commission an independent review including investigation (where applicable) of:
 - relevant surface water flow rates, surface water availability, meteorological conditions over the relevant period of record, storm events and/or flooding depths;
 - any changes to land use that may have affected surface water flow rates and quality over time; and
 - whether the event(s) is/are attributable solely to Mt Owen Complex operations.
- provide a copy of the independent review report to the landowner and NOW;
- if the investigation concludes that the event(s) are attributable to the Mt Owen Complex then appropriate mitigation and management strategies, where relevant, will be developed and implemented; and

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- where mitigation and management strategies have been implemented additional monitoring and regular reviews will be undertaken to measure the effectiveness of the strategies undertaken.

The groundwater available to adjacent landowners may be affected by a loss of pressure in underlying aquifers. This depressurisation may occur as a result of mining activities in the area from mining operations including the Mt Owen Complex, and may affect all bores located within the depressurisation zone as discussed in the Groundwater Monitoring Program (refer to the Mt Owen Complex WMP). In the event that a complaint is received from a landowner regarding depressurisation of a water supply or bore the following protocol will be implemented:

- provide a copy of the landowner complaint to NOW and DoPI and inform both agencies of the intention to conduct independent review;
- commission an independent review including investigation of:
 - relevant groundwater levels and groundwater quality monitoring results;
 - any changes to land use that may have affected groundwater levels and quality over time;
 - meteorological conditions over the relevant period of record; and
 - whether the loss of bore water is attributable solely to Mt Owen Complex operations
- provide a copy of the independent review report to the landowner and NOW;
- if the investigation concludes that the bores have been affected by mining at the Mt Owen Complex then, depending on the most appropriate response, the Mt Owen Complex will either:
 - rehabilitate the bore/well supply by deepening; or
 - replace the water supply with water of equivalent quality and quantity
- develop and implement appropriate mitigation and management strategies, where relevant; and
- implement additional monitoring as necessary to measure the effectiveness of the strategies undertaken.

2.4 Response Protocol for Increased Leakage from Alluvium into Pits

Excessive groundwater inflow from the alluvial aquifers into the Mt Owen, Ravensworth East and Glendell open cut pits has the potential to inhibit mining operations as well as remove groundwater from the surrounding environment. Continued monitoring of groundwater seepage from the alluvials will be undertaken as part of the Groundwater Monitoring Program (refer to the Mt Owen Complex WMP).

To minimise the impacts on Swamp Creek alluvials, the western extent of the 1996 approved Glendell open cut mine has been moved approximately 350 metres to the east. As a result the western limit of the mine will now only intersect a small section of the eastern edge of Swamp Creek alluvium in the north western corner of the open cut pit area. However, as outlined in the Groundwater Monitoring Program (refer to the Mt Owen Complex WMP) a series of test pits will be excavated along the 400 metre intersection of the Swamp Creek

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alluvials and the Glendell Mine boundary prior to commencement of mining to determine the presence of any areas of high permeability.

To minimise the groundwater inflow from the Bettys Creek alluvium, a cut off embankment will be constructed across Bettys Creek immediately to the east of the intersection of the approved open cut pit with the alluvium. This embankment will be constructed at the base of the alluvium and will prevent groundwater flowing into the alluvium to be mined. Groundwater that collects upslope of the embankment will be conveyed to the Bettys Creek diversion to be constructed to the south and south-east of the emplacement area. It is anticipated that the Bettys Creek groundwater inflow prevention measures will be required during the sixth year of mining operations at the Mt Owen Complex.

In the event that the monitoring programs identify increases in groundwater inflows from the interception of alluvials at Mt Owen, Ravensworth East or Glendell Mines, the responses outlined below will be implemented:

- initiate an investigation by suitably qualified personnel into the cause(s) and extent of the increase in groundwater inflow from the alluvium into the open-cut pits;
- where appropriate, identify contingency measures such as:
 - installation of a cut-off wall, grout curtain or measures performing a similar function to seal off areas of high permeability;
 - relocation of the pit boundary to avoid intersection of highly permeable areas; and
 - installation of diversion drains, where possible.

Further information on the impacts of the interception of alluvial aquifers at Glendell Mine and associated mitigation measures have been identified as part of the Part 5 licence for groundwater extraction from the Glendell open cut pit.

2.5 Unforeseen Impacts Protocol

In the event of unforeseen impacts associated with surface waters or groundwaters at the Mt Owen Complex, the following protocol will be implemented:

- conduct a preliminary review of the nature of the impact, including:
 - any relevant monitoring data; and
 - current mine activities and land use practices;
- commission of an investigation by an appropriate qualified expert into the unforeseen impact to confirm cause and effect and consider relevant options for amelioration of impact(s) as appropriate;
- prepare an action plan in consultation with the appropriate regulatory agency;
- mitigate causal factors where possible; and
- implement additional monitoring as necessary to measure the effectiveness of the controls implemented.

The outcomes of this protocol will be reported in the AEMR. The implementation of any mitigation measures will be undertaken in consultation with DoPI, NOW and the Office of Environment and Heritage (OEH) and will be reported in the AEMR.

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3.0 Reporting and Review

The Surface Water and Groundwater Response Plan will be reviewed at least every three years or at any time when XMO makes significant changes to the mining operations. The review will include, but not be limited to, changes in the environmental requirements, advances in technology, and changes in operational or reporting procedures at the Mt Owen Complex. The effectiveness of the Surface and Groundwater Response Plan will be reported in the AEMR.

4.0 Responsibilities

The Mt Owen Complex E&C Manager is responsible for ensuring that protocols outlined in the Plan are followed. The Mt Owen Complex Operations Manager is responsible for providing adequate resources to undertake the activities required by this plan as well as ensuring the ongoing review of this plan. These responsibilities are summarised in **Table 4.1**.

Table 4.1 – Responsibilities at the Mt Owen Complex

Position	Accountability
E&C Manager	Responsible for ensuring that the protocols in the Surface Water and Groundwater Response Plan are followed in response to any adverse impacts potentially caused by the Mt Owen Complex operations
Operations Manager	Responsible for providing adequate resources to undertake the activities required by this plan

5.0 Glossary and Abbreviations

Term	Meaning
AEMR	Annual Environmental Management Report
Alluvium	Sediment deposited by a flowing stream e.g. clay, silt, sand and gravel.
Aquifer	A water bearing rock formation
DA	Development Application
DoPI	Department of Planning and Infrastructure
Groundwater	Sub-surface water which is within the saturated zone and can supply wells and springs. The upper surface of this saturated zone is called the water table.
E&C	Environment and Community
HRSTS	Hunter River Salinity Trading Scheme
NOW	New South Wales Office of Water
OEH	Office of Environment and Heritage
Surface Water	Surface water generated from runoff and groundwater aquifers that forms in creeks and drainage depressions. This also includes onsite mine water stored in dams and voids.
WMP	Water Management Plan
XMO	Xstrata Mt Owen Pty Limited

6.0 References

Golder Associates Pty Ltd 2002. Glendell Project Geotechnical Evaluation for Open Pit Mining. Prepared for Glendell Joint Venture.