MT OWEN COMPLEX

ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

1 January 2012 – 31 December 2012

Name of Mine:	Mt Owen Complex – Consisting of Mt Owen, Ravensworth East and Glendell Mines
Titles/Mining Lease:	CL 358, CL 383, CCL 715, MPL 343, ML 1410, ML 1476, ML 1415, CL 382 (sublease), ML 1355, ML 1419, ML 1453, ML 1561, ML 1608, ML 1629 & ML 1475.
MOP Commencement Date:	Mt Owen Complex (Incorporating Mt Owen and Ravensworth East Mines) - January 2009 Glendell Mine - December 2007
MOP Completion Date:	Mt Owen Complex (Incorporating Mt Owen and Ravensworth East Mines) - January 2016 Glendell Mine – December 2012
AEMR Commencement Date:	1 January 2012
AEMR Completion Date:	31 December 2012
Name of Leaseholders:	Xstrata Mt Owen Pty Limited Xstrata Glendell Pty Limited
Name of Mine Operator:	Xstrata Mt Owen Pty Limited
Reporting Officer:	Pam Simpson
Title:	Environment and Community Manager
Signature:	
Date:	31st March 2013

Distribution

NSW Department of Planning

Industry and Investment NSW

NSW Office of Environment and Heritage

NSW Office of Water

Singleton Shire Council

Mt Owen Complex Community Consultative Committee Members

Xstrata Group Environment and Community Manager

Xstrata Mt Owen Complex Internet Site

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1.0 INTRODUCTION

1.1 BACKGROUND

The Mt Owen Complex (MOC) is located at Hebden, approximately 20 km north-west of Singleton in the Upper Hunter Valley of NSW.

Mt Owen Complex

Each mining operation at the Mt Owen Complex is depicted on Figure 2 along with current offset areas, infrastructure areas, creek diversions and general mining areas.

The Mt Owen Complex consists of Mt Owen, Ravensworth East and Glendell open cut coal mines and are managed by Xstrata Mt Owen Pty Ltd (XMO) owned by Xstrata Coal Australia Pty Limited (Xstrata).

Mining operations at Mt Owen are managed by Xstrata Mt Owen and operated by Thiess Pty Limited (Thiess). Glendell and Ravensworth East operate under the management of Xstrata Glendell Pty Limited (Glendell) with all mining activities conducted by Xstrata. The Mt Owen Coal Handling Preparation Plant (CHPP) is operated by XMO.

This Annual Environmental Management Report (AEMR) details the ongoing environmental management practices undertaken at the Mt Owen Complex which incorporates the activities of the Ravensworth East, Glendell Mine and Mt Owen Mine.

A brief background to each is provided below.

Mt Owen (DA 14-1-2004)

Mt Owen commenced open cut mining operations in 1993 under the management of Hunter Valley Coal Corporation Pty Limited (HVCC) with production increasing subsequent to relevant approvals. Xstrata acquired Mt Owen in 2003.

In December 2004, Mt Owen was granted Development Consent (DA) 14-01-2004 supported by the *Mt Owen Operations Environmental Impact Statement December 2003* (Umwelt, 2003) (Mt Owen EIS) to enable:

- An increase in the approved mining area;
- The addition of a satellite pit known as the Eastern Rail (ER) Pit;
- The construction of an out of pit spoil emplacement area (West Dump);
- An increase in production to 10 Million tonnes per annum (Mtpa) Run of Mine (ROM) coal; and
- An increase in processing and transport approval through the Mt Owen Coal Handling Preparation Plant (CHPP) to 15 Mtpa ROM equivalent from Mt Owen, Ravensworth East and the Glendell project area for up to 21 years.

On 1 December 2005, HVCC, owner of, and holder of Leases and Approvals associated with the Mt Owen Mine changed its name to XMO.

December 2010 saw the approval of a modification to the Mt Owen Consent to allow for rail provisioning infrastructure to be incorporated into the Mt Owen CHPP area.

Glendell (DA 80/952)

Glendell was granted approval (DA 80/952) on 2nd May, 1983, whilst under the joint venture ownership of Renison Goldfields Limited and Dalgety Australia Ltd.

DA 80/952 was last modified under section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 25 February 2008. This modification is supported by *Environmental Assessment for the Modification of Glendell Mine Operations* (Umwelt, 2007) (Glendell EA) and permits mining operations to take place until the end of June 2024. This Modification generally permitted the following changes to operations and infrastructure at Glendell:

- An extraction of up to 4.5 Mtpa ROM Coal;
- Utilising existing and approved Mt Owen Complex services and infrastructure;
- Relocation of mine infrastructure area and access road;
- An extension of the mining lease out to 2024; and
- Mining in a general north to south direction.

Glendell operates under the management of Xstrata Glendell, previously known as HVCC. Construction activities commenced in April 2008 with the first coal extracted at Glendell in June 2008.

There have been no modifications granted to Glendell's consent in this reporting period.

Ravensworth East (DA 52-03-99)

Ravensworth East was acquired in June 1997 by Peabody Resources Ltd (Peabody) after a period of care and maintenance and a new Mining Lease (ML) 1415 was issued. With the creation of ML 1415 over the new Ravensworth East Mine, the area was assigned a separate mining tenement (ML 1453).

DA 52-3-1999 supported by the *Ravensworth East Mine – Environmental Impact Statement*, dated January 1999 (ERM Mitchell McCotter Pty Limited, 1999) (Ravensworth East EIS) was granted on 2 March 2000 to enable the production of up to 4 Mtpa ROM coal and a new ML 1475 to include the surface rights over part of the surface exclusion section of ML 1415. Mining operations commenced in August 2000 for up to 21 years.

In March 2002, Enex Resources (now Xstrata) purchased Ravensworth Operations Pty Limited (Ravensworth Operations), which included the Ravensworth East and Narama mines.

In 2002 and 2003 Ravensworth East Mine submitted variations to its approved Mining Operations Plan (MOP) for the mining of additional resources which were to be transported to the adjoining Mt Owen CHPP for delivery to the export market. The approvals increased the economic viability of the Ravensworth East operation and provided a short to medium term tailings emplacement area for the Mt Owen Mine.

Following this application, a revised MOP was prepared by Ravensworth Operations for the continuation of mining operations at Ravensworth East. A modification to DA 52-03-99 was granted in December 2002 allowing the transport and processing of coal from Ravensworth East to the Mt Owen CHPP.

A modification to the Ravensworth East Mine development consent in 2005 provided for the integration of the mining operation's management with Mt Owen Mine, forming the Mt Owen Complex.

There have been no modifications granted to Ravensworth East's consent in the reporting period.

Figure 1
Regional Locality

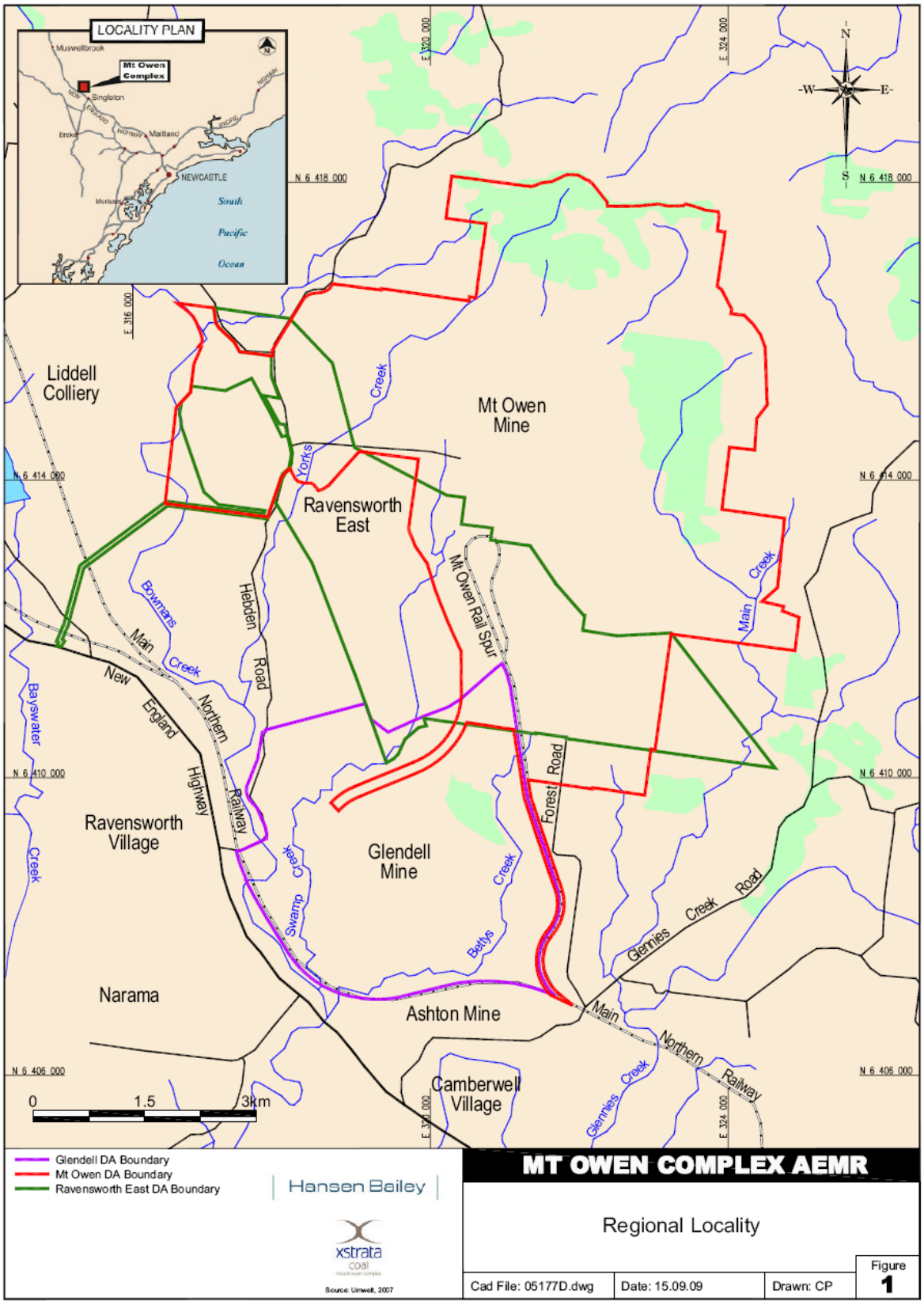
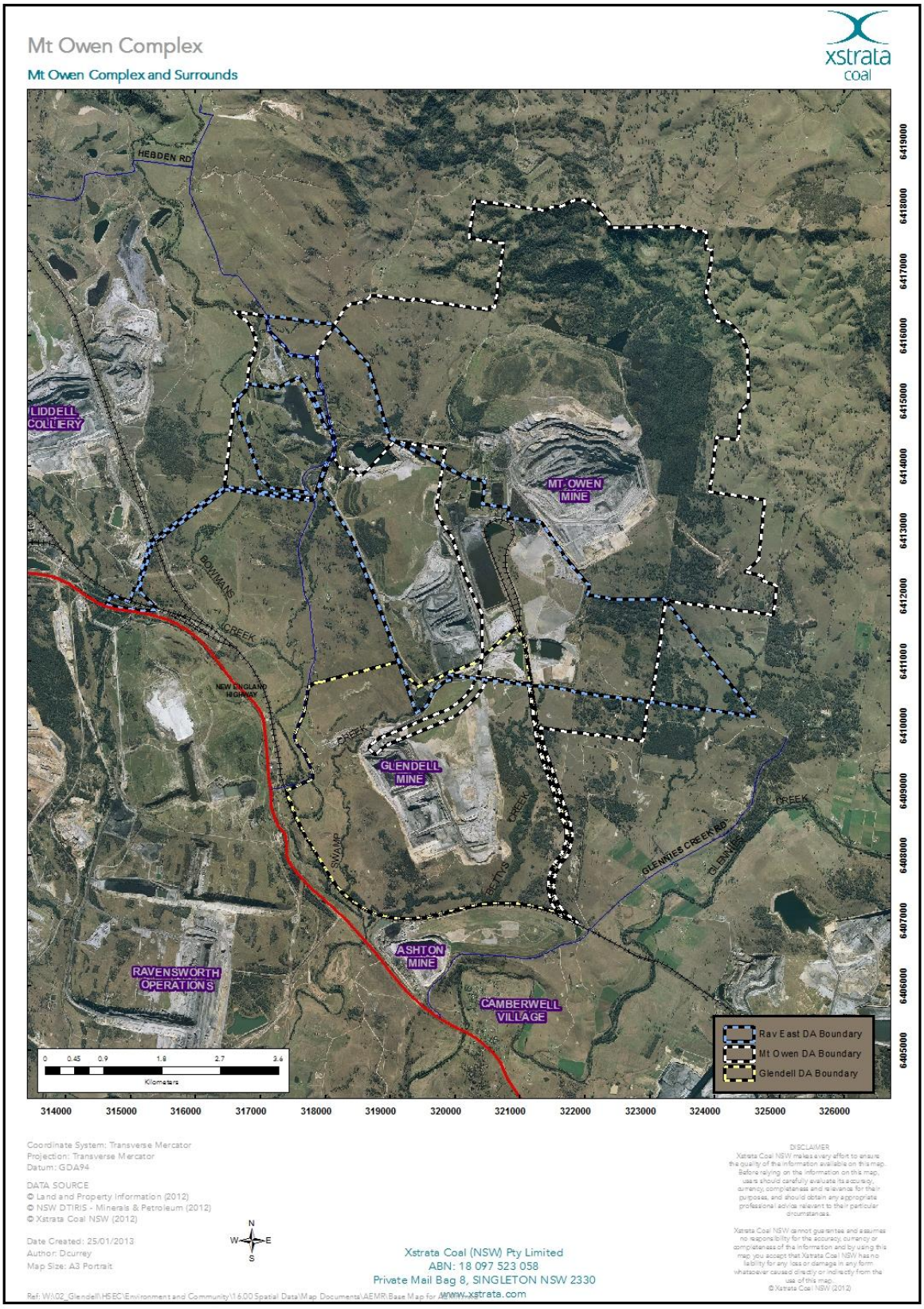


Figure 2: Mt Owen Complex and Surrounds



1.2 DOCUMENT PURPOSE

This AEMR provides a summary of activities, environmental management and performance at the Mt Owen Complex from 1 January 2012 to 31 December 2012.

This AEMR has been prepared in accordance with the *NSW Department of Primary Industries – Mineral Resources (DPI) Guidelines and Format for Preparation of an Annual Environmental Management Report* dated January 2006. This AEMR has also been prepared in accordance with development consent requirements outlined in Schedule 6 Condition 5 of DA 14-01-2004 and DA 52-3-1999, and Schedule 5 Condition 5 of DA 80/952.

Table 1 presents a list of the annual reporting requirements applicable to each planning approval and outlines where each is addressed in this AEMR. Copies of this AEMR will be made available to:

- Department Trade and Investment Regional Infrastructure and Services (DTIRIS);
- Department of Planning and Infrastructure (DoPI);
- NSW Office of Environment and Heritage (OEH);
- NSW Office of Water (NOW);
- Singleton Shire Council (SSC); and
- Mt Owen Complex Community Consultative Committee (CCC).

A copy will also be made publicly available on the Mt Owen Complex website at www.xstratacoalmtowen.com.au.

Table 1
Relevant Development Consent Reporting Requirements for the Mt Owen Complex

Condition		AEMR Section
Annual Reporting: Each year, the Applicant shall prepare an AEMR to the satisfaction of the Director-General and relevant agencies. This report must:		This Document
(a)	Identify the standards and performance measures that apply to the development;	Section 1
(b)	Describe the works carried out in the last 12 months;	Section 2
(c)	Describe the works that will be carried out in the next 12 months;	Section 5
(d)	Include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;	Section 3.3
(e)	Include a summary of the monitoring results for the project during the past year;	Section 2
(f)	Include an analysis of these monitoring results against the relevant: • Impact assessment criteria / limits; • Monitoring results from previous years; and • Predictions in the EA / EIS.	Section 2
(g)	Identify any trends in the monitoring results over the life of the project;	Section 2
(h)	Identify any non-compliance during the previous year; and	Section 2
(i)	Describe what actions were, or are being, taken to ensure compliance.	Section 2

1.3 MINE CONTACTS

The relevant mine contact names and contact details for the Mt Owen Complex are listed in Table 2.

Table 2
Mt Owen Complex Contacts

Personnel	
Xstrata Mt Owen Operations Manager	Ashley McLeod Phone: 02 6570 0881
Xstrata Glendell Operations Manager	Liz Watts Phone: 02 6520 2601
Mt Owen Complex Environment and Community Manager	Pam Simpson Phone : 02 6570 0802
Thiess Operations Manager	Jeroen Hendriks Phone: 02 6570 0870
Thiess Environmental Advisor	Peter York Phone: 02 6570 0843
General Contact Details	
Address	Mt Owen Complex 666 Hebden Road, Ravensworth NSW 2330 PO Box 320, Singleton NSW 2330
Phone Number	02 6570 0800
Facsimile Number	02 6576 1643
24-hour Community Hotline	1800 730 883
24-hour Blasting Hotline	1800 248 745
Emergency Response Line	02 6570 0800
Website	www.xstratacoalmtowen.com.au

1.4 ACTIONS REQUIRED AT PREVIOUS AEMR REVIEW

The NSW Department of Planning and the Department of Trade and Investment (Resources and Energy) conducted a joint AEMR review and inspection on 17th April 2012. Following this meeting several actions were initiated and these are detailed in Table 3 below.

Table 3: Actions arising from DoPI and DTIR Inspection 2012

Action Item	Due Date	Response / Status
Department of Planning		
It is noted that depositional dust results provided for July (DD9 and DD1 1) and September 2010 (DD9) indicate that no impact from Mt Owen complex existed due to wind direction for those months. However, monthly meteorological data presented indicates that predominant winds were from	Initial investigation of the anomoly and provide further clarification by 30 May 2012 then copy of clarification to be included in next AEMR	Initial clarification completed. Details of clarification also

the mine and as such Mt Owen Complex may have contributed to the results.		included in Section 2.2 of this AEMR.
It was noted that the report did not contain a diagram identifying the noise monitoring locations and as such the Department requests that future AEMR's contain a noise monitoring location diagram.	Next AEMR	Included in Section 2.8
It was noted that the blast monitoring results contained several administrative errors in relation to the time and date of blasts that was adequately explained during the AEMR inspection. The Department requests that the results are diligently displayed in future AEMR's.	Next AEMR	Rectified in Blast Appendix
(Mt Owen Only) Request to investigate the construction of a dedicated concrete bunded area for lubricants only and report the findings of that investigation in the next reporting period. You are requested to ensure that all chemicals are placed within bunds and are placed in such a manner that captures any potential spills.	Report in next AEMR	Included in Section 2.15
(Glendell Only) The Department requests that a report is provided by 30 May 2012 outlining the short and long term measures to prevent water discharges from sedimentation structures into the adjacent watercourse.	30 May 2012	Report submitted
Department of I&I		
AEMR does not explain out of sequence issues and mine layout discrepancies with approved MOP	Include MOP vs AEMR rehabilitation comparison and explanation for any inconsistencies in next AEMR	Table 35
All rehabilitation denote in same way making distinguishing final rehab, interim rehab and temporary stabilisation difficult	Include adequate explanation of the different classes of rehabilitation and clear illustration in next AEMR	Section 4
Consider use of low gradient cross slope flow paths (for drop structures), stilling ponds and vegetation methods	Report status in next AEMR	Section 2.3
Tailings needs to be reported on specifically and washery reject management and rehabilitation progress for life of mine.	Report on Tailings, washery reject management and rehabilitation progress for life of mine in next AEMR	Tailings – Section 1.16 Rejects – Table 8 Rehab – Section 4
Tailings management must be managed and progressively rehabilitated.	Ongoing	Section 4
S101 decommissioning and closure of Swamp Ck North void	Report on progress of capping and drainage in AEMR	Section 4
Swamp Ck south void proposed tailings wall lift	– DRE request further discussion regarding Swamp Ck South Void by 30 June 2012	This wall lift is not being progressed

Incident reporting (spills) and cleanup not adequately explained	Include details of environmental harm categories (Cat 1 and Cat 2) testing and cleanup procedure and storage areas in next AEMR	Section 2.17

1.5 CONSENTS, LEASES AND LICENCES

The Mt Owen Complex operates within the key approvals and licences as summarised in Table 4, the status of each is also presented.

There are no changes to develeopment consents for the Mt Owen Complex in 2012.

Table 4
Mt Owen Complex Approvals, Leases and Licences

Description	Expiration Date	Approval Authority
Mt Owen and Ravensworth East		
Mt Owen Complex Mining Operations Plan (Mt Owen and Ravensworth East)	January 2014	DRE
DA 14-1-2004 (Mt Owen) (Modification 26 Nov 2010)	08/12/2025	DoPI
DA 52-03-99 (Ravensworth East)	02/03/2021	DoPI
Mt Owen Environmental Protection Licence (EPL) 4460	2/09/2014	OEH
Ravensworth East EPL 10860	27/11/2014	OEH
ML 1355	27/07/2015	DRE
ML 1419	Renewed (awaiting reissue)	DRE
ML 1453	04/07/2020	DRE
ML 1561	17/02/2026	DRE
ML 1475	24/11/2021	DRE
ML 1608	19/12/2028	DRE
ML 1410	14/7/2020	DRE
ML 1415	4/7/2020	DRE
ML 1476	24/11/2021	DRE
Consolidated Coal Lease (CCL) 715	12/09/2019	DRE
Assessment Lease (AL) 8	10/07/2013	DRE
Coal Lease (CL) 383	Renewed (awaiting reissue)	DRE
Exploration Authorisation (A) 423	Renewed (awaiting reissue)	DRE
Exploration A 429	Renewed (awaiting reissue)	DRE
Exploration A 268	Renewed (awaiting reissue)	DRE
Water Licence (20WA201868) Groundwater Excavation	Perpetuity	NOW
Water Licence (20CA201623) Groundwater Excavation	30/6/2017	NOW
Water Licence (20CA200445) Groundwater Excavation	30/6/2017	NOW
Water Licence (20CA201608) Groundwater Excavation	30/6/2017	NOW
Water Licence (20CA200382) Groundwater Excavation	30/6/2017	NOW
Water Licence (20BL169337) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL168209) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL168116) Groundwater Excavation	Perpetuity	NOW

Description	Expiration Date	Approval Authority
Water Licence (20WA210993) Groundwater Excavation	31/7/2022	NOW
Water Licence (20WA200723) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL169332) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL169333) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL169334) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL169335) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL169336) Groundwater Excavation	Perpetuity	NOW
Water Licence (20WA211429) Groundwater Excavation	15/5/2013	NOW
Water Licence (20BL170294) Groundwater Excavation	Renewal processed Currently Awaiting Licence	NOW
Water Licence (20BL170295) Groundwater Excavation	Renewal processed Currently Awaiting Licence	NOW
Water Licence (20WA200891) Groundwater Excavation	Perpetuity	NOW
Water Licence (20WA211425) Groundwater Excavation	31/7/2022	NOW
Water Licence (20BL171536) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171539) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171544) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171546) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171547) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL201867) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL203066) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL201861) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL201622) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL201621) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL200921) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL200607) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL200606) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL200605) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL200444) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL200381) Groundwater Excavation	Perpetuity	NOW
Water Licence (20AL201867) Groundwater Excavation	Perpetuity	NOW
Water Licence Mt Owen (20AL200722) Pumping - Glennies Creek	Not Specified	NOW
Water Licence Ravensworth (20AL200890) Pumping - Glennies Creek	Not Specified	NOW
Water Licence (20BL169544) Liddell Bore Hole No 2	Renewal processed Currently Awaiting Licence	NOW
Water Act Licence (20SL061386) Bettys Creek Diversion	Not Specified	NOW
Glendell		
Glendell MOP	December 2012	DRE
DA 80/952	31/06/2024	DoPI
EPL 12840	27/11/2014	OEH
CL 358	27/03/2032	DRE
Mining Purposes Lease (MPL) 343	Renewed (awaiting reissue)	DRE

Description	Expiration Date	Approval Authority
ML 1629	09/03/2030	DRE
ML 1475	24/11/2021	DRE
ML 1476	23/11/2021	DRE
CL 382 (sublease)	Transfer pending – awaiting renewal of head lease	DRE
Water Licence (20BL171535) Groundwater Excavation	Perpetuity	NOW
Water Licence (20WA201868) Groundwater Excavation	5/1/2018	NOW
Water Licence (WAL1218) Groundwater Excavation	Perpetuity	NOW
Water Licence (20CA200608) Groundwater Excavation	30/6/2017	NOW
Water Licence (20CA200445) Groundwater Excavation	30/6/2017	NOW
Water Licence (20CA201623) Groundwater Excavation	30/6/2017	NOW
Water Licence (WAL9521) Groundwater Excavation	Perpetuity	NOW
Water Licence (20CA200608) Groundwater Excavation	30/6/2017	NOW
Water Licence (20BL171545) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171543) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171542) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171541) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171540) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171538) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171537) Groundwater Excavation	Perpetuity	NOW
Water Licence (20BL171534) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL612) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL1420) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL637) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL704) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL705) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL706) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL1118) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL1119) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL1364) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL1215) Groundwater Excavation	Perpetuity	NOW
Water Licence (WAL7823) Groundwater Excavation	Perpetuity	NOW

During 2012, each of the respective EPL's were modified by OEH to include requirements to implement best management practices relating to particulate matter. In addition to this modification, a further modification was also received relating to coal mine particluate matter control best practices based on wheel generated dust, bulldozing and ither equipment on overbruden and loading and dumping of overburden and overburden handling. This latter modification required the development of a monitoring program. This is due for finalisation in early 2013 and as such will be further reported on in the next AEMR.

1.6 MANAGEMENT PLANS

A variety of environmental monitoring programs and management plans have been developed for the Mt Owen Complex and consist of the following:

- Mt Owen Complex Noise Monitoring Program;
- Mt Owen Complex Blast Management Plan;
- Mt Owen Complex Air Quality and Greenhouse Gas Monitoring Program;
- Aboriginal Cultural Heritage Management Plan;
- Mt Owen Complex Landscape Management Plan;
- Mt Owen Complex Water Management Plan;
- Mt Owen Complex Surface Water Monitoring Program;
- Mt Owen Complex Groundwater Monitoring Program;
- Mt Owen Energy Savings Action Plan;
- Glendell Energy Savings Action Plan;
- Mt Owen Complex Environmental Management Strategy (EMS);
- Mt Owen Complex Environmental Monitoring Program;
- Mt Owen Complex Erosion and Sediment Control Plan; and
- Mt Owen Complex Surface and Groundwater Response Plan;

All of the above plans and programs were initially approved by the Director-General and are incorporated into activities at the Mt Owen Complex. The management plans and monitoring programs are available to the public on the Mt Owen Complex website (www.xstratacoalmtowen.com.au).

During December 2011, a compliance audit was conducted which resulted in over 2800 conditions being assessed for compliance. Table 5 below details the issues and actions required and the current status of each action.

Table 5: Compliance Audit 2012 Action Completions

Issue	Action Required	When	Status
Construction and occupation certificate for rail refuelling facility remains outstanding	Currently waiting on response from Construction Engineer	2/12	Singleton Shire Council has reviewed the application and has responded. This information is currently being sourced from Construction Engineer.
EPL variation required for process and location of noise monitoring when unable to be in close proximity to house as per discussions with neighbours	Include in 2012 EPL consolidation	Q1 2012	Not progressed in 2012 and currently on hold
Management plans not submitted by 31 March 2011 (AQ&GGMP) nor consultation with DECCW	No action able to be taken on this non compliance.		Not able to be actioned

AEMR issues (2008-2009 and 2009-2010.)	Action all outstanding issues in the 2011 AEMR currently underway	March 2012	All actions completed in 2011 AEMR
Air quality modelling required for exceedences of PM10 (25% of property)	Engage consultant to review for 2012 issues if they occur	Q4 2012	Isolated occurrences occurred however these were not sustained. Due to the incidents being isolated, it was not deemed appropriate that air quality should be remodelled. Will undertake reassessment if sustained levels are experienced.
Ground Water seepage monitoring	Engage consultant to undertake study of 2012 data	Q4 2012	Completed and included in 2012 AEMR
Biodiversity Offset Strategy (BOS) not approved by DG	Review and update BOS if necessary and submit to DG for approval in 2012	Q2 2012	Submitted to DoPI for approval
Biodiversity Offset Strategy long term security issues and bonds	Investigate further	TBA	To be completed following BOS Audit in Q2 2013
Biodiversity Offset Strategy required audit by Dec10, audit completed Nov 11	No action able to be taken.		
EMS was due in May 11, not done until Nov11	No action able to be taken.		
Website issues	Currently underway and website being updated accordingly		Completed
Captive Green and Golden Bell Frog program still required to be implemented	Discuss with Thiess E&C Officer	Q1 2012	Research has indicated no presence of GGBF in 2012.
Compliance with AS2601 (Demolition standard) not verified for removal of building at Ravensworth East by contractor	Seek documentation from contractor for this work.	Q2 2012	No documentation was available
CCC minutes must be sent to DG within month of meeting	Ensure this is done following CCC meetings	Mar 2012	Complete
Blast exceedence which occurred in March 2010	No action able to be taken		
Late blast issue which occurred in 2011	No action able to be taken		

Management plans were due to be issued by April 2008. Not issued until December 2008 by Umwelt	No action able to be taken		
Hebden road and NEH intersection works	Glendell E&C Coordinator to coordinate work (2012)	Q3 2012	Completed in 2012
Community newsletters – noise monitoring, timing of newsletter >6 months	Ensure community newsletters are prepared and circulated every 6 months and they include the required information (DC)	Q2 and Q4 2012	Completed and ongoing
Review water management plan especially tailings and return water lines	Commence review process	Q2 2012	Water management plan reviewed and approved
All components of the EMP must be reviewed annually, currently every 3 years including consultation with authorities			All EMP's were reviewed in 2012
Ravensworth sheep dip area needs to be checked for contamination and remediation work	Review area and prepare actions to remediate the area (if required)	Q3 2012	Area reviewed and fenced off in 2012
Failure of environmental monitoring at times eg dust gauges, water sampling, teom	Review monitoring data as required and action non compliances promptly to ensure issues do not extend beyond reasonable time for actioning	Monthly	Complete
Annual return late	No action able to be taken		
Environmental monitoring records – field sheets	Review monitoring field sheets and amend where required. Communicate to Environmental Contractor	Q1 2012	Field sheets modified to include all required info.
Mine water discharge occurred	No action able to be taken		

Quarterly reviews of groundwater	Review quarterly	Quarterly	Completed
Flow meters for water transfers	Current internal water management project incorporates flow meters and real time monitoring	Quarterly	Flow meters installed on all critical pipelines and volumes are captured and reported internally on a monthly basis
Validate groundwater inflows in 2012	Review groundwater inflows.	Q4 2012	Complete and incorporated into this AEMR
Investigate in status of covenants' for offset areas	Internal review of covenants required		To be considered in BOS review in 2013
Site water balance	Review annually	Q4 2012	Site water balance program now available for use on site.

1.7 PERFORMANCE SUMMARY

The Mt Owen Complex is actively involved in communicating its environmental management initiatives internally to its employees and contractors. In addition, Mt Owen Complex actively seeks to engage and consult with the community to provide information relating to the environmental, social and operational performance of the mines and enable the community to provide feedback. Members of the local community are able to contact the Mt Owen Complex via the 24-hour Community Response Line to raise any concerns they may have on 1800 730 883.

Collectively, 2012 saw the implementation of the Pollution Incident Response Management Plans (PIRMP) across the complex as well as the Pollution Reduction Program requirements.

A brief overview on each operation and its environmental performance during the reporting period is provided below.

Mt Owen continued operations associated with mining in the North Pit with mining and processing operations continuing as in previous years.

Environmental monitoring continued for air quality, surface and ground water, noise and blasting. Mining activities progressed in accordance with the Mt Owen EIS, the approved MOP and consent DA 14-1-2004 Modification.

52.9ha of rehabilitation was completed in 2012. Research continued in the Mt Owen Biodiversity offset areas. A publication was commissioned by Xstrata to document the learnings gained from historical and ongoign research which culminated in the publication of a document "Establishing Native Vegetation" in consultation with the University of Newcastle.

Glendell operations continued to based in the Barrett Pit during the reporting period. During 2012, Glendell exceeded it's predicted total rehabilitation by successfully completing 121 hectares.

Monitoring of air quality, surface and groundwater and noise, blasting and vibration continued throughout 2012.

Operations at Ravensworth East continued in the West Pit during the reporting period in accordance with the Ravensworth East consent with all mining at Ravensworth East being conducted in conjunction with the Glendell operations.

Mining activities have progressed in accordance with the EIS, approved MOP and DA 52-03-99.

1.8 LAND OWNERSHIP

Ravensworth State Forest (RSF) is situated north-west of Mt Owen consisting of approximately 880 ha and is owned by Forests NSW but managed by XMO. The remaining land within the Mt Owen DA Boundary as shown on Figure 3 is owned and managed by Xstrata and encompasses approximately 3,852 ha. Land use within the DA Boundary further to active mining areas, consists largely of pastoral land and offset areas.

During the reporting period, three properties were acquired. These are detailed in Table 6.

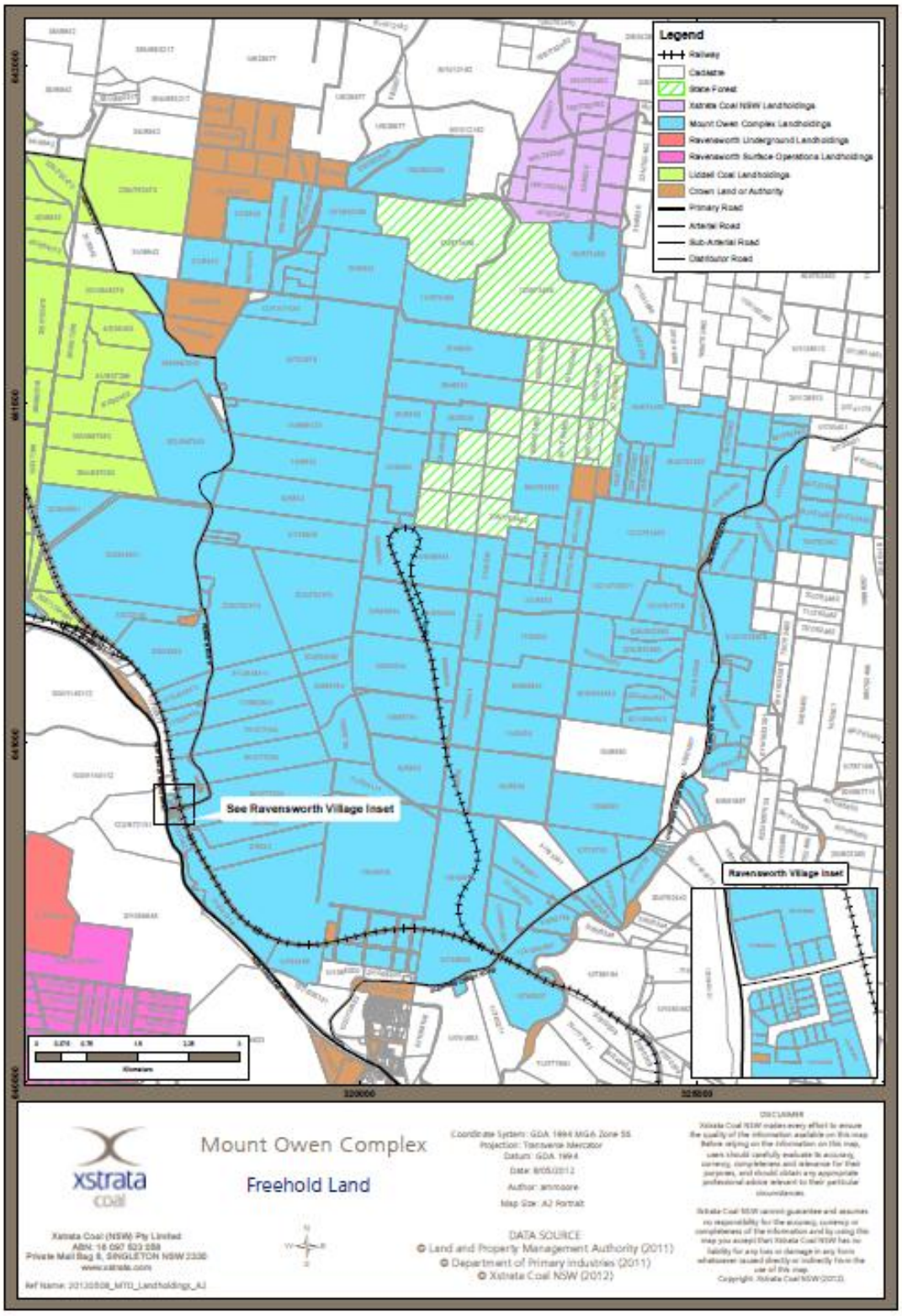
Ravensworth East ML covers approximately 1,900 ha of mine owned land with no additions to the total landholding occurring during the reporting period. Xstrata owns all land within the Glendell DA Boundary, along with large areas of buffer land.

The nearest private residents to the Mt Owen Complex are located in the village of Camberwell approximately 1.2 km to the south of Glendell's southern boundary. Some further private landholders are located at least 1.8 km to the east of Glendell with some of the nearest private landowners having acquisition rights under the existing Glendell and Mt Owen Development Consents.

Table 6 – Property Acquisitions 2012

Property Reference	Lot/DP	Date of acquisition	Reason for acquisition
Hedges	Lots 6 and 7 DP 851867	12/1/2012	Opportunistic
Richards	Various small Lots and DP references	4/4/2012	Opportunistic
Vacant land from SSC	Lots 4,5,6,7 and 21 DP 38725	4/5/2012	Opportunistic

Figure 3
Land Ownership 2012



1.9 EXPLORATION

Based on current levels of geological information, production rates and approvals, Mt Owen has an expected mine life extending to 2018, Ravensworth East is expected to extract coal to 2014 and Glendell has an expected mine life to 2021.

Further potential resources exist to the south and east of the current Mt Owen mine limits area within ML 1355, ML 1415, ML1476 and ML1561 as well as the adjoining Exploration Authorisation Lease (AL) 8. These areas are currently being assessed for two extensions to existing mining operations at Mt Owen. These areas include the Ravensworth East Resource Recovery (RERR) project, for which an EA has been lodged with the Department of Planning and the Mt Owen Continued Operations (MOCO) project, which is undergoing feasibility and preliminary environmental assessment.

Exploration took place at Mt Owen within ML 1355, at Glendell within CL 358, ML 1415, ML1475 and ML 1476 and Ravensworth East within leases AL 8 and EL 6254. Six fully cored holes and 15 non-core holes were drilled across the Mt Owen Complex for resource definition in the South Mt Owen and Ravensworth East areas. One fully cored hole and eight non-core holes for resource and mine definition at Glendell. All drill sites were within the approved areas covered by the existing Mt Owen EIS, Glendell Environmental Assessment and the Ravensworth EIS.

Guidelines for tree clearing, site access via tracks, and the control of water run-off from drill sumps were implemented prior to the commencement of all drilling activities. Land Clearance Permits were obtained from the Thiess Environmental Officer prior to any earthworks being conducted at Mt Owen, and from the Glendell Environment and Community Coordinator for both Glendell and Ravensworth East. Pre-drilling and post-drilling photographs were taken at all drill sites to record the final state of the drill site and to ensure adequate rehabilitation of the site was conducted.

All drill holes outside the five year mine plan or in areas of potential high gas flows were cemented from total depth to surface in accordance with Borehole Sealing Requirements on Land: Coal Exploration (EDG01). Drill sumps were drained of excess water (which was disposed of in the tailings dam) and back-filled with the excavated material. Topsoil that was stockpiled separately was spread over the drill site and the disturbed area was rehabilitated using appropriate The Mt Owen Complex will continue to undertake exploration activities within the approved mining areas to increase the accuracy of the geological model. Works will include continued structural, coal quality and geotechnical drilling programs.

During the year, 136 older exploration holes were rehabilitated across the Mt Owen Complex. This involved backfilling sumps, replacement of topsoil and revegetation works. Current status of the rehabilitation will be reassessed in both February 2013 and August 2013 and a final reassessment will be undertaken in late 2014.

1.10 LAND PREPARATION

Topsoil is managed in accordance with a Land Clearing and Topsoil Stripping Procedure which aims to maximise or maintain as much topsoil as possible and to preserving all attributes associated with topsoil. Prior to any disturbance of the surface, clean water diversions and erosion and sediment control works are established where required.

Pre-mining land preparation includes: clearing the minimum area required to maximise the benefit from vegetative material present, and the recovery of all suitable topsoil material in a manner least destructive to soil properties.

A comprehensive EMS has been developed for the Mt Owen Complex in accordance with Xstrata Coal NSW (XCN) Sustainable Development Standards. The Mt Owen Complex Landscape Management Plan includes specific controls relating to vegetation clearing, ensuring the most efficient beneficial use is made of all vegetation removed. No material is burnt and efforts are made to avoid burial.

Once the surface area is cleared of vegetation and topsoil, the overburden is drilled and blasted to enable it to be removed. The blasted overburden is loaded by hydraulic excavators or front end loaders into rear dump trucks for transportation to the overburden dumps.

As mining progresses, overburden is placed in emplacement areas.

The West Pit Dump and Main Dump have a maximum approved height of 190 m Australian Height Datum (AHD) and 230 m AHD respectively, consistent with the Mt Owen EIS and Mt Owen Complex MOP. The Glendell out of pit overburden emplacement areas will have a maximum height of 160 m AHD remaining consistent with the Glendell EA and Glendell MOP.

1.11 CONSTRUCTION

During the reporting period, a small demountable office was established at Glendell. This facility is now been completed and has been commissioned.

In addition, a new water fill point was also established at Glendell near the Barrett Pit. This is a permanent structure which shall remain until mine closure.

No other constructional activities were undertaken at Mt Owen, Glendell or Ravensworth East during the reporting period.

1.12 MINING

Mining at the Mt Owen Complex is undertaken in accordance with the Mt Owen Complex and Glendell MOPs and the relevant planning approvals. Similar mining methods are employed across all operations at the Mt Owen Complex. Mining is carried out by excavators and haul trucks supported by ancillary equipment including water carts, dozers, graders, fuel and service carts, loaders and drills.

Product coal from the Mt Owen Complex consists of thermal and semi soft coal. Ravensworth East produces thermal coal that may be sold to the domestic or export markets. The majority of product coal is loaded via the Mt Owen Rail Loader to the Port of Newcastle for export.

Mt Owen

Mining at Mt Owen occurs within the Wittingham Coal Measures with the North Pit located between the Hunter Thrust and the Hebden Thrust. The North Pit currently extracts coal from 22 mineable intervals, representative of 11 identifiable coal seams. Coal seams present range from the Lemington to the Lower Hebden seam and range in thickness from approximately 0.1 m to 10 m.

The Hebden Thrust, while a lesser geological structure, has resulted in significant distortion of the coal seams in the area to the extent that a different sequence is mined in the North Pit as compared to the West Pit. The current mining area is extensively faulted by small local structures.

Mt Owen produces thermal and semi-soft coking coal for supply to the export markets. The thermal coal product is highly volatile with strong combustion characteristics and has been widely used for power generation.

Semi-soft coking coal produced by Mt Owen is used by steel mills for pulverised coal injection and as a component in the coke blend.

At the end of the reporting period, approximately 47 million tonnes of coal remain to be mined within the current MOP approval.

During 2012, Mt Owen were granted a minor modification to the current Mining Operation Plan (MOP) to increase the height of the in pit dum from RL215 to RL230, to increase the dump area by approximately 107ha and to limit final rehabilitation slopes to 10º or less. This was granted on 7th November 2012 and is applicable until the next formal review of the Mt Owen MOP due in February 2014.

Glendell

Glendell is a multi-seam coal deposit containing a number of seams of the Foybrook Formation, which is the lowermost coal bearing formation of the Wittingham Coal Measures. Eight seams are mined via open cut methods from the Lemington seam to the Barrett seam and range in depth up to approximately 200 m.

Glendell mined in a general south-easterly direction during the reporting period within the Lemington, Pikes Gully, Arties, Liddell and Barrett seams.

The approved mining area is approximately 685 ha in area and approximately 200 m deep. The approved mine plan consists of a number of benches to enable the recovery of coal from multiple seams within the target coal profile.

Glendell has a current approved production rate of 4.5 Mtpa of ROM coal and will result in a final void located within the north-western extent of the site. All ROM coal extracted is processed through the Mt Owen Complex CHPP.

Mt Owen Complex mining activities, current pits, infrastructure areas along with habitat and conservation areas at the Mt Owen Complex are shown on Figure 2.

Ravensworth East

Ravensworth East is made up of the West Pit, Stage 3 and RW Pit with mining extracting coal from the Ravensworth down to the Bayswater seams which dip to the south-east at 15 degrees.

The West Pit is constrained to the east by the previously mined tailings pits and the Mt Owen rail loop and to the south and north by the lease boundary.

The West Pit continued its operation throughout the reporting period. Coal was mined from the Ravensworth and Bayswater seams.

Continuation of mining is expected to occur within the West Pit until approximately 2014.

1.13 EQUIPMENT AND PERSONNEL

A list of equipment present at the Mt Owen Complex as at the end of the reporting period is provided in Table 7.

As of the end of the reporting period, the Mt Owen Complex employed approximately 730 full time personnel made up of 278 at Ravensworth East and Glendell, and 452 at Mt Owen.

1.14 MINERAL PROCESSING

All coal extracted at Mt Owen, Ravensworth East and Glendell is transported to the Mt Owen Complex CHPP for processing or transported directly to the Ravensworth East crushing station. The Mt Owen Complex has approval to process up to 15 Mtpa and during the reporting period processed 14.577 Mt of ROM coal, thus remaining below the processing limit.

The CHPP has three 700 tonnes per hour (tph) modules utilising dense medium cyclone spirals. ROM coal can be received at one of the two receival facilities where coal is sized. Conveyors then take the raw coal to a surge bin that feeds the CHPP.

1.15 COAL TRANSPORT AND SALES

ROM coal from the Mt Owen Complex is transported for processing to the CHPP. Product coal is then conveyed to the product coal stockpile where it is stored according to coal quality.

During the total reporting period, total sales of product coal from the Mt Owen Complex were 9.071 Mt comprised of: 4.589 Mt from Mt Owen and 4.481Mt from Glendell and Ravensworth East.

A 600,000 t product stockpile is located at the Mt Owen CHPP.

Coal is placed on the stockpile via a luffing stacker and is recovered via a system of eight valves beneath the stockpile that load a 4,500 tph conveyor that feeds the 700 t rail load out bin. The stockpile currently has approximately four product types:

- Semi-soft;
- Thermal
    - High ash;
    - Mid ash; and
    - Low ash.

An additional ROM coal stockpile of approximately 30,000 t capacity is located at the Ravensworth East domestic ROM pad. This is used to stockpile raw coal from Ravensworth East for conveying via a dedicated overland conveyor system to Macquarie Generation.

The Mt Owen Rail Loop connects to the Main Northern Railway north of Glennies Creek Road crossing (see Figure 2) and is used to load coal from the Mt Owen Complex for transportation to the Port of Newcastle for export.

In addition to export coal, up to an estimated 1 Mtpa can be transported to domestic power stations via an existing conveyor and the approved Ravensworth East mine infrastructure. During the reporting period 26,991 t of domestic product coal was produced from the West Pit as part of the Ravensworth East operation and provided to Macquarie Generation.

Domestic product coal from Ravensworth East can be hauled to the existing Ravensworth East coal handling facility via internal haul roads where coal is reduced to less than 50 mm by rotary breaker and sizers. Coal is then conveyed to a 2,000 t surge bin then conveyed to a 1,000 t coal retrieval bin adjacent to the New England Highway. The feed of coal from this bin is controlled by Macquarie Generation and can be conveyed to for use at the Liddell or Bayswater Power Stations.

All export coal was transported from site via rail by 944 train movements in 2012.

Table 7

Mt Owen Complex Mining Equipment List as at 31/12/2012

Model	Type	TOTAL
EX 5500	Excavator	3
EX 2500	Excavator	4
Liebherr R996	Excavator	6
Liebherr R9400	Excavator	1
SKF Drills	Drill	3
Reedrill SK501	Drill	1
Drilltech D555P	Drill	2
Cat 793F	Truck	16
Cat 793 XQ	Truck	16
Cat 789C	Truck	10
Cat 785C	Truck	5
Cat 785C XQ	Truck	8
Cat793B	Truck	6
Cat793C	Truck	2
Hitachi EH 4500	Truck	5
Hitachi EH 4500 – 2	Truck	10
Cat D9R	Dozer	3
Cat D 10T XQ	Dozer	6
Cat D10R	Dozer	8
Cat D 11T XQ	Dozer	3
Cat D11R	Dozer	4
Cat 854G	Dozer	3
Cat854K XQ	Dozer	1
Cat 992 D	Front End Loader	1
Cat 992 G	Front End Loader	2
Cat 993K	Front End Loader	2
Cat 16 M	Grader	4
Cat 16 H	Grader	1
Cat 24 H	Grader	2
Cat 777 B	Water Truck	3
Cat 777F	Water Truck	3
HD 785 - 7	Water Truck	1
Cat 773E	Fuel Service Truck	2
Light Vehicles	Toyota	97

Note: Indicative equipment list does not include rented equipment.

**Also includes staff (leased) vehicles which are infrequently used on site*

Note: This is the total equipment that was used on site during the reporting period although not all of the equipment can be used at any one point in time..

1.16 MINING WASTE MANAGEMENT

All reject and tailings produced from the processing of coal at the CHPP have been incorporated into the Mt Owen Complex life of mine reject and tailings management strategy. Tailings are emplaced in a Ravensworth East void comprising Tailings Pit 1 (TP1) and Stage 2 (see Figure 2).

Total tailings disposal for the reporting period consisted of 5.949 Mt collectively from the Mt Owen CHPP. Mt Owen have implemented a Tailings Management Strategy that details emplacement areas and capacities. Mt Owen has four active tailings areas, one planned area and one area currently in the process of being capped and rehabilitated. Collectively 24.2M dry tonne capacity exists.

This reporting period saw the following additions to the existing fleet for each site:

- Mt Owen (Thiess) – 1 Komatsu water cart, , 6 Cat D10 dozers, 1 Cat 980H loader, 1 Cat 16M grader and 1 Cat 785 cat service truck.
- Mt Owen Complex – 1 Liebhher R9400 excavator, 1 Liebherr 996B excavator, 14 Cat 793F dump trucks and 1 Cat 789 dump truck.Glendell and Ravensworth East – 1 Rubber Tyred Dozer and 1 793 Cat truck was obtained from Mangoola.

During 2013, Glendell will park up a Hitachi EX5500 excavator and potentially 3 supporting trucks.

The reject material is combined onto a single reject belt and is loaded in to haul trucks at the reject bin prior to being placed in active dumps. Table 8 details specific extractions, movements and storages in 2012.

Table 8

Coal Extraction and Sales (2012)

Activity*	Mt Owen	Glendell / Ravensworth East	Total Mt Owen Complex
Overburden (Mbcm)	40,538	31,672	72,210
ROM Feed*	7.4	7.181	14.577
Product*	4.409	4.342	8.751
Coarse and Tailings Reject*	3.218	2.731	5.949
Sales to Port* (MT)	4.589	4.4881	9.071
Sales to Domestic Power Station (MT)	0.027	0	0.027

**Mt (except where stated)*

2 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

Environmental management has continued throughout the period monitoring all key aspects of the operations. Data and monitoring reports are now available on the Mt Owen Complex public website at www.xstratacoalmtowen.com.au. This data is updated monthly.

2.1 METEOROLOGICAL

The Mt Owen Complex operated two real time meteorological monitoring units (Sentinex 8 and 13) during the reporting period in accordance with relevant standards/guidelines for meteorological monitoring (AS 2923-1987, EPA-454/R-99-005). Sentinex 8 (SX8) is located west of Mt Owen Mine adjacent to the entrance road into the mine site.

Sentinex 13 (SX13) is a dedicated meteorological monitoring unit located to the west of the Barrett Pit at Glendell Mine.

SX8 provided the Mt Owen Complex with a complete set of data for the reporting period and monitors various parameters including wind speed and direction, temperature, rainfall and relative humidity at 15 minute intervals 24 hours a day, 7 days a week. The units also captures/calculates sigma theta, stability index, dew point and wind chill factors.

The calibration, maintenance and analysis of SX8 and SX13 is contracted to Advitech Pty Limited (Advitech).

Rainfall

Mt Owen Complex received 592mm in 2012 as recorded by Sx8 as compared to 1018 mm of rainfall in 2011. When compared to the long term annual average of 724 mm recorded at Singleton between 1969 and 1990 (Bureau of Meteorology 2010) demonstrates the extent of the dry conditions that have been experienced in 2012.

The highest monthly rainfall for the period was February 2012 when 174.2mm was recorded, while a minimum of 4.4 mm of rain was recorded in October 2012. Above average rainfall was only received during four months. The monthly breakdown of rainfall data for the reporting period is shown in Figure 4.

Ambient temperature continued to be monitored during the reporting period. During the reporting period the maximum daily temperature recorded was 40.7ºC which occurred in December. The lowest temperatures occurred in August, which was 0ºC.

A review of the ambient temperature between demonstrates both the summer and the winter months produced similar to average temperatures to previous years. Monthly temperature breakdowns are presented in Figure 5.

Wind Speed and Direction

The predominant wind directions during summer months were from the east with the Autumn winds commenced from the east to north-east and changed to south west to west in the winter period. Winter was dominated by west to south westerly winds. Spring was split between south east to westerly.

Analysis of wind direction data for the reporting period revealed that seasonal wind speed trends were generally consistent with previous years.

Mt Owen Complex experienced wind conditions and patterns during the reporting period generally consistent with those experienced in the Hunter Valley. A full accompliment of wind roses for each month are provided in Appendix B.

The maximum wind speed recorded as a 15 minute average was 12.9 metres per second (m/s) (SX13) occurring in August and September. The average wind speed for the reporting period was 2.4 m/s at SX8 and 2.36m/s at SX13.

Table 9
Sentinex 8 and 13 Wind Speed and Direction Results

Month	Maximum Wind Speed (m/s)		Average Wind Speed (m/s)		Average Wind Direction (Degrees)	
	SX8	SX13	SX8	SX13	SX8	SX13
January	10.0	11.7	2.96	3.27	130	184
February	12.3	10.8	2.01	2.14	86	184
March	8.5	10.3	2.20	2.54	124	202
April	8.5	12.1	1.75	2.06	149	211
May	8.9	11.3	1.76	2.23	201	256
June	9.1	9.6	2.24	2.53	196	243
July	7.7	9.6	2.00	2.38	188	241
August	10.9	12.9	3.00	3.06	215	276
September	12.3	12.9	2.65	2.35	165	251

October	9.8	4.7	2.66	0.02	164	226
November	8.9	10.0	2.62	2.78	136	193
December	9.1	10	2.69	3.04	134	186

Figure 4 – Rainfall 2012 (Sx8)

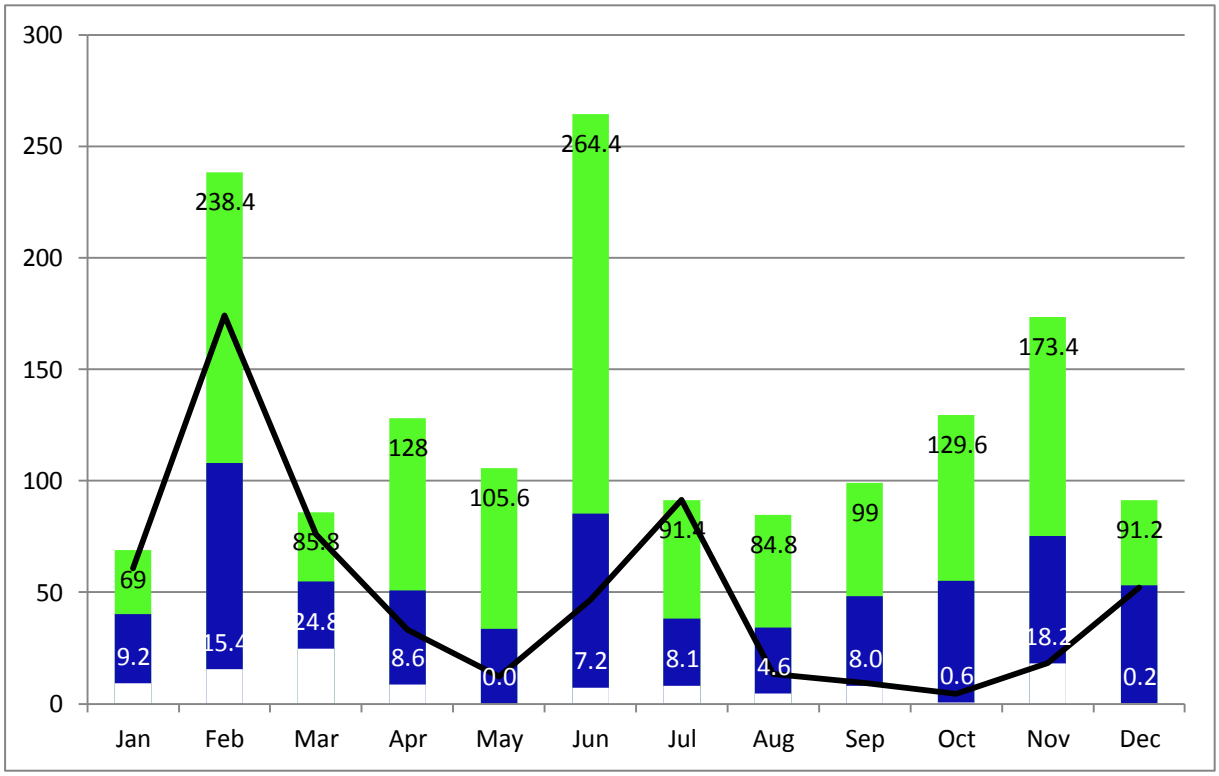
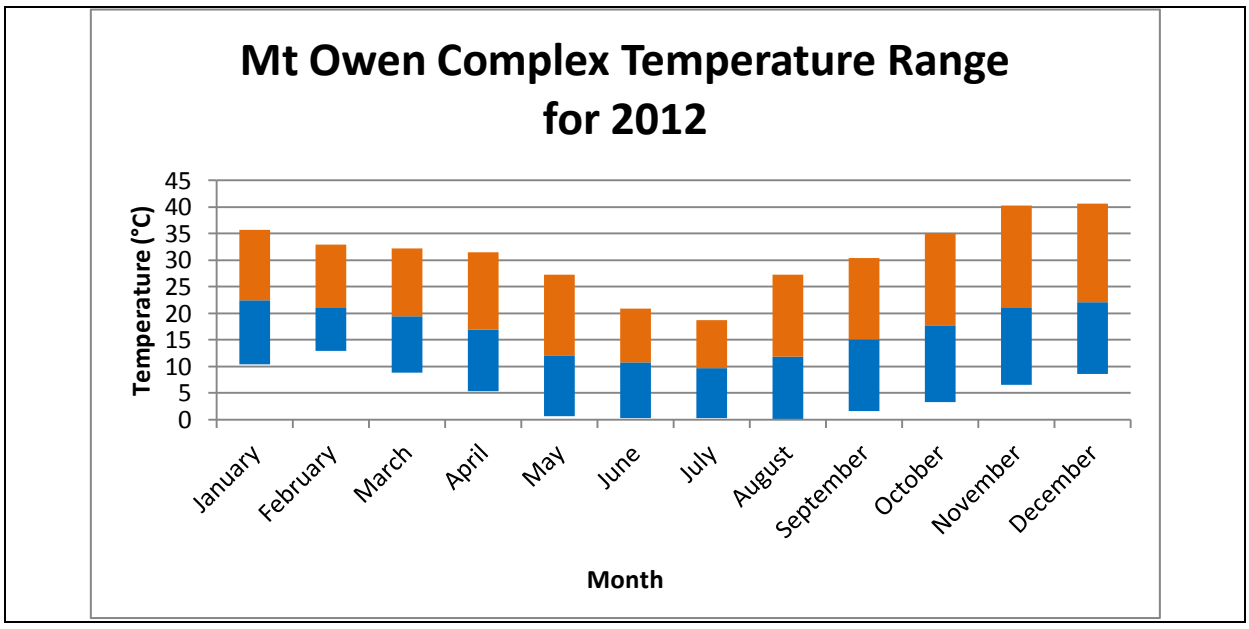


Figure 5 – Temperature Range 2012



2.2 AIR QUALITY

Environmental Management

Air quality monitoring at the Mt Owen Complex consists of a range of technologies to ensure accurate monitoring of air quality impacts, as well as the ability to proactively manage dust.

Air quality is managed in accordance with the approved Mt Owen Complex Air Quality Management Plan and Monitoring Program at the locations shown on Figure 6 and consists of:

- 27 Depositional Dust Gauges (of which 14 are representative of private residences);
- Five High Volume Air Samplers (HVAS) measuring Particulate Matter < 10 µm (PM_{10});
- Five continuous PM_{10} Air Samplers; and
- Four HVAS measuring Total Suspended Particulates (TSP).

Appendix C presents the results of air quality monitoring undertaken during the reporting period for depositional dust, PM_{10} and TSP. Table 10 summarises the air quality assessment criteria presented in the Mt Owen Complex's Development Consents.

Table 10
Air Quality Assessment Criteria

Pollutant	Standard	Average Period	Source
Total Suspended particulate matter (TSP)	90 µg/m^3	Annual average	National Health & Medical Research Council (NHMRC)
Particulate matter <10µm (PM_{10})	50 µg/m^3 150 µg/m^3	24-hour maximum Incremental 24-hour maximum Total	DA 14-01-2004, DA 52-03-99 and DA 80/952
	30 µg/m^3	Annual average	DECCW - long term reporting
	50 µg/m^3	(24 – hour average, 5 exceedances permitted a year)	National Environment Protection Council
Dust Deposition Annual Average	4 g/m^2/month	Annual Average	DECCW

Depositional Dust

Depositional dust is monitored monthly in accordance with AS/NZS 3580.10.1 (2003). Samples are collected for analysis every 30 (± 2 days) from the 27 depositional dust monitoring locations surrounding the Mt Owen Complex of which 14 are considered representative of private residences.

PM_{10} Monitoring

The monitoring of PM_{10} was undertaken during the reporting period by five HVAS. PM_{10} was recorded every six days in accordance with:

- *The NSW EPA Approved Methods & Guidance for the Modelling & Assessment of Air Pollutants in New South Wales* (2001); and
- *AS/NZS 3580.9.6:2003 Methods for Sampling and Analysis of Ambient Air – Method 9.6: Determination of suspended particulate matter – PM_{10} high volume sampler with size selective inlet – Gravimetric method* (2003).

The recorded results and annual rolling averages for PM_{10} representative of private residents are provided in Appendix C and are further discussed below.

During the 2012 period a total of 60 PM_{10} measurements were made during the reporting period at each reporting location except the Integra site which experienced technical issues in addition to damage to the power supply unit by livestock and failed to capture dataa from mid February to mid April 2012.

Continuous PM_{10} Monitoring

Mt Owen Complex operates a number of continuous PM_{10} monitors to assist with onsite management of dust consisting of five Tapered Element Oscillating Microbalancers (TEOM).

The use of real time air quality monitoring enables site personnel to assess Mt Owen's contribution to air quality. This enables personnel to actively modify operations as required to ensure compliance with conditions specified in the relevant development consents.

Mt Owen and Ravensworth East operations are monitored using three TEOMs that are located on the predominate wind axis for the Hunter Valley.

TEOM 1 is located adjacent to Hebden Road on mined owned land to the north-west of Mt Owen and is representative of upwind conditions in winter and spring. TEOM 2 and TEOM 3 are located to the south-east of Mt Owen adjacent to Falbrook Road and Glennies Creek Road respectively.

Glendell operates two TEOMs for the onsite management of air quality. Sentinex 14 (SX14) located to the south-east and Sentinex 13 (SX13) located north-west of Glendell. During winter and spring, when the north-west winds are predominant, the TEOM to the south-east represents downwind conditions and the TEOM situated to the north-west represents upwind conditions.

Data from the continuous PM_{10} monitors is downloaded daily. These units also send a trigger response which notifies site personnel of periods of high dust peaks (for proactive dust management) or potential exceedance of 24 hour PM_{10} criteria. Data is assessed against criteria by cross referencing weather conditions with operational data to determine if the exceedance was primarily attributed to the Mt Owen Complex.

Due to the close proximity of neighbouring mining operations, assessment of compliance with 24 hour average PM_{10} criteria requires an analysis and consideration of upwind and downwind results and regional dust data in order to determine the contribution from the Mt Owen Complex.

Total Suspended Particulate Monitoring (TSP)

Monitoring of Total Suspended Particluates is undertaken every six days at four units for a continuous 24 hour period in accordance with:

- *The NSW EPA Approved Methods & Guidance for the Modelling & Assessment of Air Pollutants in New South Wales* (2001); and
- *AS/NZS 3580.9.3:2003 Methods for Sampling and Analysis of Ambient Air – Method 9.3: Determination of suspended particulate matter – Total suspended particulate matter (TSP) – High volume sampler gravimetric method* (2003).

In total, 60 TSP measurements were made during the 2012 reporting period, as detailed in Table 12.

Environmental Performance

Effective dust management remains an ongoing priority at the Mt Owen Complex.

During the reporting period, chemical dust suppressants were utilised on unsealed roads to minimise dust generation in the Glendell and Ravensworth East mining areas and Petro Tac was introduced to Mt Owen.

In accordance with the guidelines for TSP monitoring, the recorded annual average was lower than the impact assessment criteria of 90 µg/m³ during the reporting period at all TSP monitors representative of local private residences with the overall site average being 59.5µg/m³ in 2012.

There were no exceedances of the annual TSP criteria at the Mt Owen Complex during the reporting period.

Depositional Dust Results

28 depositional dust monitors were monitored monthly, with 15 gauges being considered representative of private residents includes DD6, 9, 11, 12, 14, 15 and 16; DG 2, 3, 4, 5, 6, 7 and 8. All depositional dust results representative of private residents are shown in Table 11.

An analysis of the monthly data was undertaken for this AEMR, taking into consideration prevailing winds and rainfall existing during the month. Table 12 shows the predicted dust depositional rates as per the respective Environmental Assessments. For Mt Owen, year 10 predictions have been utilised and for Glendell Year 6 predictions were used.

From a weather perspective, all months during 2012 except the first quarter and July received well below average rainfall, with some months being the driest on record for Mt Owen Complex. This has had a negative impact on dust depositional results for 2012.

DD11 is located south east of Mt Owen and due West of Ravensworth East mine. This gauge reported high degrees of contamination on nine of the twelve monthly samples from bird droppings, insects and vegetation. This result has rendered this gauge of little value in assessing dust deposition rates for 2012.

DD12 is located south east of DD11. This gauge was contaminated on one occasion during April 2012 by bird droppings, insects and vegetation also, however during the other months there was no contamination recorded. DD14 and DD15, also suffered on one occasion during the year from similar contamination.

DG6 is located SE of Glendell and midway between Glendell and a neighbouring mine. DG6's average depositional dust level was 5.25g/m² as compared to a historical average of 3.5g/m². During 2012, several months experienced contamination of insects, bird droppings and vegetation matter. Whilst Glendell recognises that this gauge may be influenced to a small degree by Glendells operation, located some 4km south east, it must be noted that the vicinity of this gauge to a neighbouring operation is much closer and that this mine would also have a high impact on the results gained from this gauge.

As ongoing dust depositional gauges are impacted by non mining influences on a greater occurrence, a review of the site dust monitoring program will be undertaken in 2013 in consultation with OEH and DoPI. This will aim to refine the dust depositional network across the complex to more accurately represent the impacts of mining.

Figure 6
Air Quality Monitoring Locations

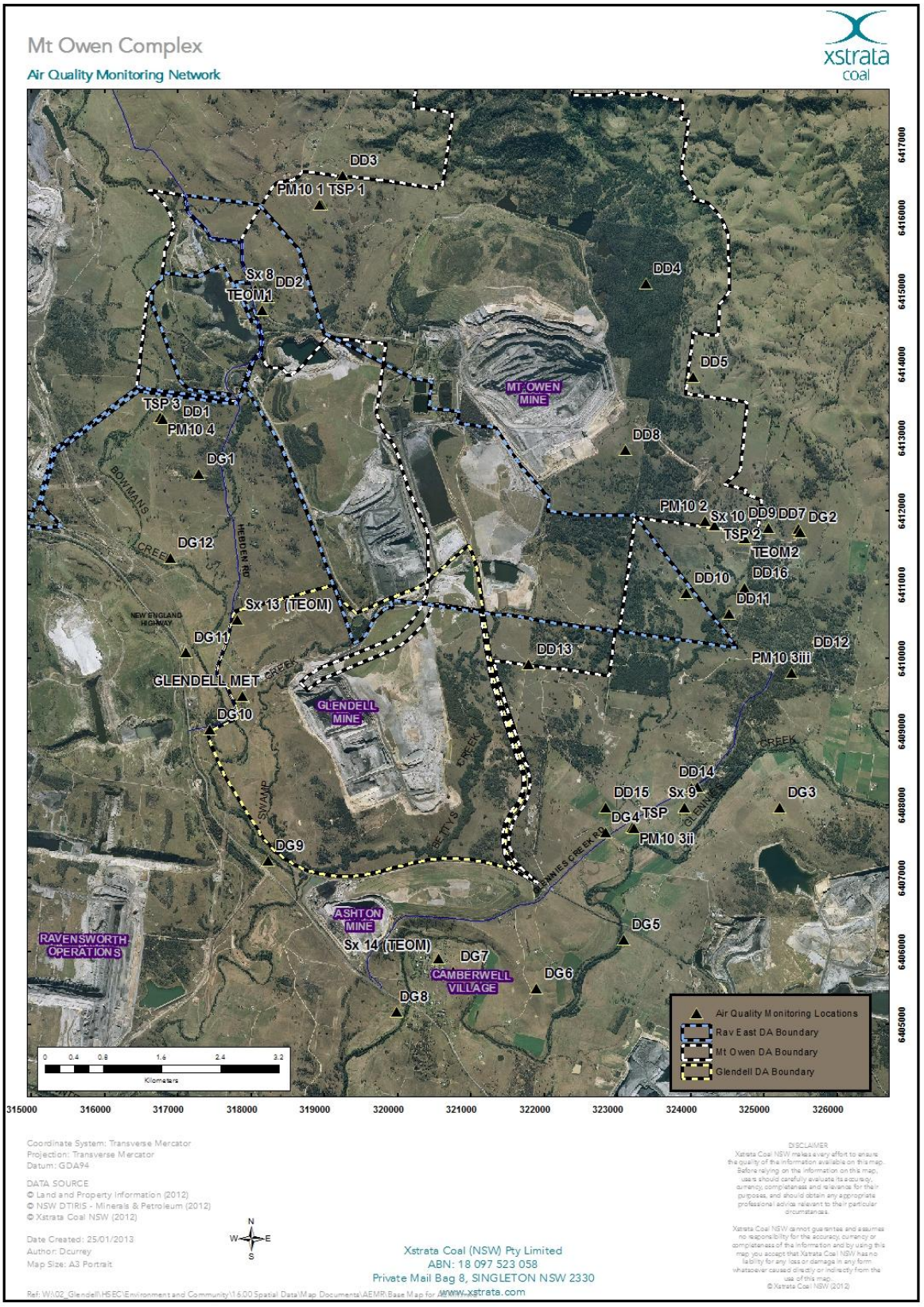


Table 11
Depositional Dust Gauges Representative of Private Residences 2012 Averages
(Insoluble Solids)

Dust Gauge Code	Location Description	2012 Annual Average (g/m^2/month)	Long term Average (2003-2012)
Mt Owen and Ravensworth East Depositional Dust Monitoring Locations			
DD6	East of Mt Owen	1.01	1.50
DD9	East of Ravensworth East	3.11	3.13
DD11	South-east of Mt Owen	4.42	3.71
DD12	East of Ravensworth East	3.32	2.44
DD14	East of Glendell	2.33	1.69
DD15	East of Glendell	3.22	2.68
DD16	East of Ravensworth East	2.47	1.97
Glendell Depositional Dust Monitoring Locations			
DG2	Glennies Creek and Falbrook areas	2.56	2.28
DG3	Glennies Creek and Falbrook areas	1.78	1.72
DG4	Glennies Creek and Falbrook areas	3.22	2.93
DG5	Camberwell area	3.27	2.99
DG6	Camberwell area	5.25	3.50
DG7	Camberwell area	2.86	2.41
DG8	Camberwell area	2.85	2.81

PM_{10} Results

PM_{10} results are recorded at five locations surrounding the Mt Owen Complex. Of these, locations PM_{10}-1 Picton and PM_{10}-3iii Middle Falbrook Road are representative of a private residences. All PM_{10} monitoring data is provided in Appendix C.

Results for all PM_{10} HVAS monitors representative of private residents are presented in Table 12 and discussed further below.

PM_{10}– 1 Picton

PM_{10}-1 is located to the north-east of Mt Owen Mine on mine-owned land.

During the reporting period, the maximum cumulative rolling average was 18.55µg/m³ and did not exceed the annual assessment criteria of 30 µg/m³ at any period during the year. On one occasion (11th September 2012) the PM_{10} level was 53µg/m³. This was the only occasion in the reporting period where greater than 50µg/m³ was recorded. Wind direction on the 11th Spetember 2012 was predominantly from the South East however OEH Regional dust monitoring network was also elevated on this day indicating regional dust levels were occurring at the time. Predicted annual averages are not specified in environmental impact assessments for this site however annual performance remained within regulatory guidelines. There were no recordings of levels in excess of 150µg/m³.

Table 12
HVAS Monitoring Sites and Results Representative of Private Residences 2012

HVAS Site	Location	Readings Required	Readings Captured	24 hour Maximum Reading (µg/m³)	24 hour Minimum Reading (µg/m³)	24 hour Average Reading (µg/m³)	Total % capture compliance	Predicted annual average
HVAS 1 (TSP)	Picton	60	60	143.0	9.0	59.5	100%	Not defined
PM_{10} 1	Picton	60	60	53.0	1.0	18.55	100%	Not defined
PM_{10} 3iii	Middle Fallbrook Road	60	60	94.0	3.0	23.03	100%	14.9
TEOM 1	Hebden Road	366	366	65.5	3.5	21.00	100%	Not defined
TEOM 2	Falbrook Road	366	366	79.4	4.0	24.01	100%	15.0
TEOM 3	Glennies Creek Road	366	365	79.5	4.2	21.7	99.7%	21.1
Sentinex13	Glendell Mine near Swamp Creek	Continuous (366 days)	358	67.1	0.6	22.7	98%	Not defined
Sentinex14	Camberwell Village	Continuous (366 days)	356	66.2	4.7	21.8	97%	27.5

PM_{10} 3 – Middle Falbrook Road

PM_{10} 3 is located to the east of Glendell. The maximum cumulative rolling average was 23.03µg/m³. Whilst this is well within regulatory guidelines (<30µg/m³), it has exceeded the predicted annual average for this site which is 14.9µg/m³. It should be noted however that since the commencement of monitoring at this location in 2006, the annual average has been in the range of 18-28µg/m³. It is firmly beleived that the current average for 2012 is heavily influenced by ongoing drought conditions and local agricultural practices, rather than mining as this site is located within 600m of intensive farming land.

During the year, there were four PM_{10} exceedances of greater than 50 µg/m³ recorded during the reporting period. Details of these are as follows:

- 6/8/12 – 57µg/m³ - W-NW Winds, averaging 8m/sec – Mt Owen and Ravensworth Mine were potential contributors.
- 5/9/12 – 94µg/m³ - NW winds, averaging 8-9m/sec – Mt Owen may have contributed.
- 11/9/12 – 53µg/m³ - SE winds, averaging 4-5m/sec – Mt Owen Complex is SW – W and NW of site and therefore did not contribute to this occurrrence
- 5/10/12 – 60µg/m³ - W winds, averaging 4m/sec – Ravensworth East Mine may have contributed.

The above results were also compared to relevant development consent conditions and planning approvals which state that there are no private residences predicted to experience:

- Maximum 24 hour PM_{10} levels above the 50 µg/m³ criterion on more than five occasions throughout the year, as a result of the development;
- Maximum 24 hour PM_{10} levels above the 150 µg/m³ criterion at any occasion throughout the year; and
- Annual average PM_{10} levels above the30 µg/m³ criterion.

During the reporting period all relevant assessment criteria relating to dust levels was complied with and operational results remained consistent with last year's data.

Continuous PM_{10} Results

In order to assess the contribution of PM_{10} from operations associated with the Mt Owen Complex, the difference between the downwind (representative of residents) and upwind PM_{10} monitoring results are reviewed. The relevant criteria used to determine if high results are being recorded as a result of the Mt Owen Complex is 50 µg/m³. Results are presented in Appendix C.

Sentinex 13 is used primarily to indicate the Complex's contribution to PM_{10} when winds are experienced from the north east, east or south east. Sentinex 14 is located within the Camberwell Village, due south of the complex's mining operations.

An analysis of monitoring data from upwind (Sentinex 13) and downwind (Sentinex 14) continuous PM_{10} monitors indicated that Glendell's contribution of PM_{10} remained below the 24 hour average criteria of 50 µg/m³ throughout the reporting period.

There were fifteen occasions where results over 50 µg/m³ were recorded, however of these only three can be related to Mt Owen Complex mining operations. Table 13 below indicates the location, date and the estimated Mt Owen Complex contribution. These correlations have also taken into account the UH Regional Air Quality Monitoring Network to assess contributions of the Mt Owen Complex to this site reported data.

On several occasions (17/8/12, 30/8/12, 13/9/12, 25/10/12, 3/11/12, 13/11/12 and 14/11/12) Mt Owen took action to further reduce the impacts of adverse weather on the community by shutting down excavators, truck fleets and dozers, irregardless of the wind direction. Glendell operated in a similar manner with several large items of equipment being shut down in high winds.

Table 13: Sentinex #13 and #14 Daily Levels >50µg/m³

Sentinex Unit	Date	Level (µg/m³)	
#14	17/8/12	57.6	NW wind average wind speed 4.8m/sec Glendell due north and therefore is not considered a direct influence.
#13	30/8/12	50.3	Predominant W wind. No contributions from Mt Owen Complex
#14	5/9/12	52.7	Predominantly NW wind, Average speed 8m/sec gusting to 16m/sec. Glendell due north and therefore is not considered a direct influence.
#14	6/9/12	54.8	Predominantly NW wind, Average speed 7m/sec gusting to 15m/sec. Glendell due north and therefore is not considered a direct influence
#14	7/9/12	51.0	Predominantly NW wind, Average speed 7m/sec gusting to 15.3m/sec. Glendell due north and therefore is not considered a direct influence
#13	13/9/12	55.1	NW wind <6m/sec. All MTO complex operations downstream of unit and therefore no contributions from MTOC.
#14	28/9/12	56.4	SW 8m/sec. Mining operations E and S of monitor. No contribution
#14	3/10/12	58.6	SW 8m/sec. MTO located N of monitoring point. No contribution

#14	5/10/12	64.5	NW 8m/sec. MTO located N of monitoring point. No contribution
#14	17/10/12	54.1	NW 6-8m/sec. MTO located N of monitoring point. No contribution
#14	25/10/12	51.3	W Wind up to 5m/sec. MTOC located N of monitoring point. No contribution.
#14	26/10/12	53.2	E wind (50%) then switch to W via S but relatively calm conditions. MTOC located N of monitoring point. No contribution
#13	3/11/12	51.0	SSE breeze but relatively calm during entire period. Mining operations from Glendell contribution calculated to be 29.7µg/m³.
#13 and #14	13/11/12	66.1 / 66.2	S-SE winds prevailed during the period, gusting to 9m/sec. MTOC E of #13 and N of #14. Mining operations at the complex may have contributed during the day however it should be noted that regional dust levels were elevated during this period across the Upper Hunter.
#13	14/11/12	53.5	Very windy conditions ranging E – S- SW- W. Mining operations from Glendell and Ravensworth East operations contribution calculated to be 24.2 µg/m³.

At no stage did PM10 levels exceed 150µg/m³.

Sentinex 13 failed to operate on 9/1/12 and 7-10/2/12 due to technical faults.

Sentinex 14 failed to operate on 18-25/1/2012 due to an air conditioning fault. A new air conditioner was sourced and installed. During this period, the OEH monitoring results were utilised. This was detailed in the Glendell EPL Annual return.

Both Sentinex 13 and 14 were offline from 26-29/11/12 due to a storm that impacted on power supplies to the Unit. Energy Australia took four days to rectify the problem due to other community demands. The OEH monitor at Camberwell also was not operating during this period.

TEOM's were also in operation to assess air quality impacts during the reporting period.

During the reporting period, TEOM2 recorded levels in excess of 50µg/m³ on 23 occasions, however when fully assessed, taking into account wind directions and regional air quality as per the OEH's Upper Hunter Air Quality Monitoring Network, Mt Owen complex contributed to the overall total on five occasions. Table 14, details the occasions when the TEOM's exceeded the daily limit of 50µg/m³ and the relative contributions from the Mt Owen Complex, where applicable. On all other occasions, the Upper Hunter Air Quality Monitoring Network also recorded elevated levels across the Upper Hunter, indicating regional air quality was elevated on a much larger scale then just in the Mt Owen district.

Table 14

TEOM results for results >50µg/m³

Date	TEOM 1	TEOM 2	Wind Dir	Calculated Contribution
11/1/12	40.5	69.3	W	Regional high dust levels as both Muswellbrook and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
10/5/12	18.5	50.5	WNW	Regional high dust levels as both Muswellbrook and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
12/5/12	26.2	57.5	NW – W	Regional high dust levels as both Muswellbrook and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
19/5/12	19.9	50.7	W-NW	Regional high dust levels as both Muswellbrook and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
24/5/12	28.9	50.3	W-SE	Regional high dust levels as both Muswellbrook and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
3/8/12	16.7	54.0	NW	Possible contribution from Mt Owen Mine calculated to be 37.3µg/m³.
4/8/12	20.9	51.5	W-NW	Possible contribution from Mt Owen or Ravensworth Mine calculated to be 30.6µg/m³.
9/8/12	26.9	50.6	W	Possible contribution from Ravensworth Mine calculated to be 23.7µg/m³.
17/8/12	29.2	67.6	NW-W	Regional high dust levels as both all Hunter Valley OEH monitors recorded levels in excess of 50µg/m³.
21/8/12	27.2	61.7	NW-SE	Possible contribution from Glendell Mine calculated to be 34.5µg/m³.
30/8/12	48.7	79.4	W-SW	No contribution from Mt Owen Complex
3/9/12	22.0	52.0	N-NE	No contribution from Mt Owen Complex
4/9/12	27.1	55.8	N-NE	No contribution from Mt Owen Complex
5/9/12	32.6	67.1	NW	Regional high dust levels as both Singleton and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
6/9/12	35.1	63.3	NW	Regional high dust levels as both Singleton and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
7/9/12	47.1	78.2	NW	Possible contribution from Mt Owen Mine calculated to be 31.1µg/m³.
12/9/12	54.1	33.6	NW	No contribution from Mt Owen Complex
13/9/12	47.8	56.1	NW-SE	Regional high dust levels as both all Hunter Valley OEH monitors recorded levels in excess of 50µg/m³.
28/9/12	40.4	55.2	NW-W	Regional high dust levels as both Singleton and Camberwell OEH monitors recorded levels in excess of 50µg/m³.

4/10/12	34.8	66.8	NW-W	Regional high dust levels as both all Hunter Valley OEH monitors recorded levels in excess of 50µg/m³.
5/10/12	50.5	59.7	W-NW	Regional high dust levels as both all Hunter Valley OEH monitors recorded levels in excess of 50µg/m³.
20/10/12	65.5	71.7	W-SE	Regional high dust levels as both Singleton and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
26/10/12	49.5	54.1	NW-SE	Regional high dust levels as both Singleton and Camberwell OEH monitors recorded levels in excess of 50µg/m³.
13/11/12	41.1	52.4	SE-S	No contribution from Mt Owen Complex

Overall trends as shown in the above figures and tables support the evidence that air quality is not adversely affected by the Mt Owen Complex mining operations. At no stage did PM10 exceed 150µg/m³ in a 24 hour period.

Total Suspended Particulate Results

TSP results are captured at four locations surrounding the Mt Owen Complex. Of these locations, TSP 1 Picton is the only location representative of a private residence, however it is located on mine-owned land. Results from TSP 1 are discussed further below. All TSP monitoring data is provided in Appendix C.

TSP 1 Picton

TSP 1 is located with PM_{10} 1 situated east north-east of Mt Owen. The cumulative rolling average remained below the required annual average of 90 µg/m³ throughout the reporting period. The highest recorded TSP reading was 143 µg/m³. TSP 1 maintained a 100% capture rate during the 2012 reporting period.

Discussion

During the reporting period TSP results were found to be consistent with impact assessment criteria set in each of the Mt Owen Complex Mine's development consents. TSP results displayed similar findings to results reported in the previous AEMR's.

Air quality will continue to be monitored in accordance with development consent conditions. Monitoring locations will be examined for their suitability with progression of operations to ensure data is representative of surrounding residents in 2013.

Dust suppression measures currently implemented at the Mt Owen Complex include the use of RST in haul road dust suppression at Glendell and Ravensworth East and Petro Tac being utilised at Mt Owen and the Glendell workshop and hard stand areas. During 2012, a modification was made to each of the Complex's EPL's which required the implementation of pollution reduction programs (PRP's) for best management practices for coal mine particulate matter. These are currently being implemented and will be reported on further in the 2013 AEMR.

Progressive rehabilitation is undertaken on areas of overburden dumps when mining is completed in the areas. Overburden areas that are not targetted for development are also temporarily revegetated to reduce potential dust emissions from the exposed areas. This process will continue into 2013.

Following the 2011 AEMR, an error was identified relating to wind roses in Appendix B. Upon further investigation wind directions were found to differ from Table 7 of the 2011 AEMR, however the results for guages DD9 and DD11 for July 2011 and September 2010 still indicated no there had been no impact from the Mt Owen complex.

2.2 GREENHOUSE GAS

Environmental Management

Xstrata is undertaking a range of broad initiatives to address greenhouse gas emissions including the funding of research and development of low emission technologies, implementing projects to capture coal seam gas and convert to electricity, and improving energy efficiency across operations.

Energy consumption at the Mt Owen Complex is monitored and reported in accordance with Xstrata and Thiess requirements. Both companies are also signatories to the Greenhouse Challenge Plus Program.

Mt Owen and Glendell have developed an Energy Savings Action Plan. The plan recognises its sources of emissions and suggests a number of ways to reduce its overall consumption of energy.

Environmental Performance

Mt Owen

Mt Owen operates 24 hours a day, 7 days per week. During the reporting period a total of 48,240 kilolitres (kl) of diesel and 48,688,355 kilowatts (kWh) of electricity was used at Mt Owen.

During the reporting period, Mt Owen mine consumed 2,134,396GJ of energy with the key contributor being the CHPP. The associated greehouse gas emissions of was 1.38M tonnes of carbon dioxide equivalent (tCO^2e). This equates to 0.17 tCO^2e/ROM tonne of coal.

Mt Owen mine continued to implement the Energy Savings Action Plan in the reporting period. An energy assessment was conducted in June 2012 with the following opportunities being identified; implementation of real time monitoring system for all key equipment thus allowing production and maintenance personnel to utilise the equipment efficiently and effectively at all times; improving haul road design to aid in reducing fuel consumption; introducing additional application of chemical dust suppressant thus decreasing dust levels, water consumption and diesel consumption; introducing compressor maintenance systems on drills thus improving fuel efficiency and introducing kidney looping system thus allowing for particulate contamination to be removed and oil to be recycled.

Glendell

Glendell and Ravensworth East operate 24 hours a day, 7 days per week. During the reporting period a total of 36,430 kL of diesel and 1,573,924 kWh of electricity was used.

During the reporting period, Glendell and Ravensworth East together consumed 1,323,373 GJ of energy. The associated greehouse gas emissions of the Ravensworth East and Glendell Mining activities was 895,350 tonnes of carbon dioxide equivalent (tCO^2e). This equates to 0.126 tCO^2e/ROM tonne of coal.

The main contributions to greenhouse gas emissions are through electricity use (mainly in the workshop and offices), fuel consumption (for mining equipment and ancilliary services) and fugitive emissions (methane from exposed coal).

The Mt Owen Complex remains committed to reducing greenhouse gas emissions generated as a result of its mining operations. Mt Owen Complex will continue to assess and implement energy and greenhouse management initiatives, where feasible, throughout the duration of operations.

Table 15

Greenhouse and Energy Use

Parameter	Units	2012		Total
		Glendell/ Ravensworth East	Mt Owen	
Diesel	KL	36,430	48,240	84,670
Electricity	KWH	1,573,924	48,688,355	50,262,279
Energy (consumed)	GJ	1,411,993	2,037,848	3,449,841
CO^2(eq)	tCO^2e	895,350	1,380,309	2,275,659
CO2/t ROM coal	tCO^2e/ ROM tonne	0.126	0.172	0.151

2.3 EROSION AND SEDIMENT

Environmental Management

Water management works on rehabilitation slopes are designed to minimise slope erosion, to ensure channel stability. The design of soil conservation and drainage structures will aim to reduce quantities and velocity of flows to less erosive values. Diversion drains and graded banks redirect silt laden water to sediment control dams.

No runoff from mining areas is transported from the site without passing through a sediment control structure. All contaminated mine water will first be contained on site for use in the CHPP or on roads for dust suppression.

Through design and maintenance of sediment structures, diversion areas and flow lines, effective sediment control will be achieved at the Mt Owen Complex.

Environmental Performance

An Erosion and Sediment Control (ESC) Plan has been developed for the Mt Owen Complex. The plan has been developed in accordance with planning approval conditions and aims to provide a framework for the management of erosion and sedimentation during the construction, operation and rehabilitation.

The ESC plan indicates activities which may contribute to soil erosion and generate sediment runoff include:

- Construction of roads, dams, drainage lines, diversion channels, boreholes and minor infrastructure;
- Mining activities, overburden emplacement and topsoil stockpiles;
- Rehabilitation; and
- Vehicle movements.

The establishment of sediment dams and sediment fence installation has improved the Mt Owen Complex's position in the control of silt laden water. Regular maintenance and inspections of erosion and sediment control measures is conducted to ensure reduced sediment transfer into waterways.

Progressive rehabilitation is completed as soon as areas become available including temporary areas which are planned to be in place for 2 years or longer.

Existing erosion control measures have performed adequately during the reporting period. Continued vigilence will be undertaken following rainfall events to ensure existing structures are maintained in an operational state.

XMO will continue to ensure all sediment and erosion measures are in place to prevent the displacement of valuable topsoil resources and limit soil transfer into waterways.

One minor water related incident occurred in March 2012, following an extensive rainfall event. A small sediment dam overtopped into Swamp Creek. This was reported in accordance with OEH's guidelines. No PIN resulted however an official warning letter was received from OEH.

No additional drop structures were constructed at Glendell or Ravensworth East during 2012. One drop structure was constructed on the western face of the WOOP dump at Mt Owen. This is designed to deliver surface runoff from the western and southern face of the WOOP dump to a small sediment dam on the western side of the dump. The structure performed to expectation in late 2012 when above average rainfall was experienced. During 2013 it is envisaged that an additional structure will be constructed on the eastern face. A comment as received in the 2012 DII inspection related to considering using cross gradient structures however the Mt Owen structure was already under construction at that time. Future drop structure designs will consider implementing cross gradient structures and such structures will be detailed in the respective AEMR for the period.

2.4 SURFACE WATER

Environmental Management

XMO has developed a site Water Management Plan for the Mt Owen Complex that incorporates surface and groundwater considerations and is designed to facilitate the efficient operations through control of water inflow and the ready provision for onsite demands.

The water management system at the Mt Owen Complex has been designed in accordance with planning approval conditions to:

- Divert clean water runoff around the pit and infrastructure areas;
- Capture surface water runoffs from pits, emplacement and operational areas;
- Contain groundwater seepage in the open cut pit;
- Restrict potential groundwater inflow into the pit from the alluvium of Swamp Creek and Bettys Creek;
- Utilise mine water for dust suppression; and
- Facilitate water transfers between Glendell and the Greater Ravensworth Mine Water Sharing System.

Mt Owen Complex has an approved Surface Water Monitoring Program for the site to satisfy planning approval conditions for the Mt Owen, Ravensworth East and Glendell Mines. The aim of the program is to:

- Provide baseline monitoring data in nearby watercourses and storages;
- Detail the integrated surface water monitoring strategy for the Mt Owen Complex and establish assessment and response to data;
- Monitor compliance of water discharges from the Mt Owen Complex under the Hunter River Salinity Trading Scheme (HRSTS);
- Outline surface water health impact criteria;
- Provide details of stream health and channel stability in creeks and diversion channels; and
- Provide methods to assess compliance of relevant consents and licences relating to surface water.

Several creek diversions are currently in place at the Mt Owen Complex. Water from the upper reaches of Bettys Creek has been diverted into Main Creek. Swamp Creek diversion was completed in January 2009.

A further proposed creek diversion is expected to commence in the south-east of the Glendell mining area of Bettys Creek during the next reporting period.

Water quality is monitored on a monthly basis for pH, EC, TSS and TDS to assist in the detection of significant impacts that may potentially be caused by mining associated activities in the various catchment areas.

The Mt Owen Complex monitors surface water at 17 upstream and downstream creek locations surrounding the operations as identified in Table 16.

In accordance with planning approval conditions Mt Owen Complex undertakes surface water monitoring of Bettys Creek, Swamp Creek, Bowmans Creek, Yorks Creek and Main Creek. Surface water monitoring locations are shown on Figure 7.

Under Environmental Protection Licence (EPL) 4460, the Mt Owen Complex is permitted to discharge into Swamp Creek from Environmental Control Dam 2 (ECD2) at a maximum rate of 66 Mega Litres (ML)/day in accordance with the HRSTS, however during 2012 Mt Owen did not discharge any waters off site.

Water samples were collected and analysed by Carbon Based Environmental Pty Limited on a monthly basis from various monitoring locations as shown on Figure 7.

Environmental Performance

Surface water monitoring results are typically compared to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Guidelines 2000) (ANZECC) guidelines for Aquatic Ecosystems, however these standards are more applicable for assessment of water quality in flowing streams/water courses rather than water quality of stagnant/still puddles in intermittently flowing water courses. In instances where the sample could only be collected from a puddle or trickling flow, ANZECC water quality guidelines were referred to, but comparisons with upstream / downstream and historical data provided a more meaningful assessment of water quality.

A summary of surface water monitoring results of pH, EC, TDS and TSS are listed in Tables 17**.** During 2012, drought conditions prevailed for the majority of the year and as such some monitoring locations dried up and no samples were able to be taken. This occurred in Yorks Creek, Swamp Creek, Bettys Creek and Main Creek areas.

The monitoring data indicates that mining activities have not had any significant impact on Bowmans Creek, Swamp Creek, Yorks Creek, Main Creek or Bettys Creek water quality. Surface water results indicate similar findings to previous reporting periods. On various occasions during the reporting period, some locations were reduced to ponds of water resulting in elevated EC levels.

The ANZECC guidelines for aquatic ecosystems specify pH in the range 6.5 - 8.5 for NSW Lowland Rivers. pH levels recorded during the reporting period were within the recommended limits at all sites with the exception of the pH results for SC1 in September 2012, SC2 in October 2012 and SC3 on four occasions where the maximum pH levels exceeded 8.5 and Bettys Creek in February 2012 when 6.33 was recorded. Historically, these creeks have demonstrated elevated pH levels and as such, has an overall average pH level of 8.1 and 8.2 respectively for SC1 and SC2 and 7.7 for BC1. SC3 however has an annual average for 2012 at 8.53 with a historical average of 8.29 since 2009. It has been reported that on occasions during the reporting periods that water was observed in the creek however flow was limited thus increasing the pH level.

The majority of EC results remained below the ANZECC guidelines for Aquatic Ecosystems – NSW Lowland Rivers (<2,200 µS/cm) during the reporting period however SC3, MC2 and YC3 have recorded average elevated EC levels above 2200µS/cm. These creeks display intermittent flows and as such accumulation of background salts increase conductivity levels in ponds located at each site. Following flushing events such as runoff from rainfall, conductivity levels return to acceptable levels.

At YC3, a high EC level of 12,000 µS/cm was recorded in September 2012 due to reduced flow. The following three months resulted in no sample being possible indicating the water ponding effects. September recorded the lowest September rainfall on record with only 8mm falling during the month.

The ANZECC Guidelines for Aquatic Ecosystems specify TSS should remain below 50 parts per million (ppm) for NSW Lowland Rivers. During the reporting period there were occasions when TSS exceeded the 50 ppm, mainly due to was an occasion where TSS levels reached a maximum 378 ppm at MC1 in April 2012. All rainfall was received in April two days prior to sampling and thus this would have significantly influenced TSS levels for April. TSS levels returned to normal the following month. The average annual TSS results are primarily influenced by change in flow conditions associated with variable rainfall events which resulted in an accumulation of particles and pooling of the waterways during flow and non-flow periods. Nominal maximum levels as detailed in Table 16 occurred in February, which was the wettest month of the year, receiving 174.2mm, April and July which received 91.4mm.

Table 16
Surface Water Monitoring Summary

Site	pH			EC (µS/cm)			TSS (mg/L)			TDS (mg/L)			No
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Samples
BMC1	7.81	8.16	8.03	538	1040	879	6	30	12	298	622	481	12
BMC2	7.84	8.21	8.06	516	1010	840	6	30	14	314	562	483	12
BMC3	7.95	8.19	8.07	369	1530	975	7	183	30	290	832	558	12
BMC4	7.69	8.14	7.94	607	1090	950	6	58	19	380	624	546	12
YC1	7.54	7.84	7.70	387	5120	2178	<5	119	33	320	3000	1323	8
YC2	6.96	7.89	7.68	363	3190	1731	<5	23	14	284	1920	1036	9
YC3	7.27	7.86	7.58	525	12000	5159	<5	76	21	406	7790	3312	9
SC1	7.68	9.19	8.10	293	567	390	<5	21	12	176	264	216	12
SC2	7.66	9.16	8.16	238	423	323	<5	36	12	164	269	207	12
SC3	8.07	8.76	8.53	1190	4250	3441	<5	184	46	598	2780	1939	8
SC4	7.74	7.82	7.78	969	1590	1280	12	25	18	608	986	797	2
BC1	6.33	8.08	7.70	121	1870	1185	<5	258	44	228	1040	701	8
BC2	7.48	7.74	7.65	249	1190	198	19	127	62	207	495	320	7
BC3	7.27	8.36	7.66	242	5770	1580	10	52	25	318	4140	1176	8
MC1	6.57	7.73	7.41	155	2310	1143	<5	378	54	157	1350	715	8
MC2	7.24	8.47	7.90	215	7040	2409	<5	135	37	344	4170	1499	9

There are no ANZECC Guidelines indicating trigger values for TDS. The current land use surrounding the Mt Owen Complex (other than mining) is beef cattle grazing. The triggers were compared to guidelines for acceptable drinking water for beef cattle outlined by the Queensland Department of Natural Resources and Water (DNRW, 2007).

A review of these guidelines indicated that TDS levels between 4,000 – 5,000 mg/L are acceptable. TDS monitoring results remained below the guideline except on one occasion at YC3 when 7790 mg/L was measured. Water pooling, still water and reduced flow was the likely cause for this high results as per comments made at the time of sampling.

Water quality monitoring results will continue to be monitored at surface water monitoring locations in accordance with relevant planning approval, Mt Owen Complex Water Management Plan; Surface Water Monitoring Program and EPL licences for the Mt Owen Complex.

Table 17
Surface Water Monitoring Locations

Watercourse	Monitoring Location
Bowmans Creek	BMC1 – BMC4
Swamp Creek	SC1 – SC4
Bettys Creek	BC1 – BC3 and BC2A
Yorks Creek	YC1 – YC3
Main Creek	MC1 – MC2

Mt Owen Complex Channel Stability Assessment

As a requirement of DA 14-1-2004 Schedule 4,Condition 35 (c) the channel stability of Yorks Creek, Swamp Creek, Bettys Creek and Main Creek needs to be regularly monitored with results reported in the AEMR.

Channel stability assessments were undertaken on nine occasions in 2012 on Swamp and Bettys Creeks. Monitoring points were previously established along each of the creeks. Cross sections were then developed to identify change in slope and depict creek bed profile. These profiles were then compared with profiles taken in previous studies to determine if the creek bank has remained stable or declined in condition.

In most instances, reports indicate that channels remain in a stable condition despite rainfall at the end of 2011 and early 2012. However, weeds are present in most areas with these being included in the site weed action plan. Upper Bettys Creek was desilted during 2012 however still requires a small degree of erosion controls to be implemented.

Many local creek conditions are a result of historical farming and grazing practices which have significantly contributed to the degradation of riparian areas. Results from the 2012 stability assessments are similar to stability assessment findings from the last AEMR report.

Hunter River Salinity Trading Scheme (HRSTS)

During the reporting periods, there has been no discharges under the HRSTS. The Mt Owen Complex currently holds 15 credits in the scheme. During 2012 no credits were directly purchased during the period, however ten credit points were transferred from Ravensworth to Mt Owen Complex following the HRSTS Auction in 2012.

There was no water discharged from the Mt Owen Complex during the reporting period though the Hunter River Salinity Trading Scheme however a discharge did occur during an extreme rainfall (68mm in 4 hours) event on 2nd March 2012 when a transfer dam that collects runoff from the Glendell workshop hardstand area overflowed into Swamp Creek. This was immediately self reported as per the Glendell EPL requirements to the relevant authorities and the Department of Planning. Samples were taken and analysis revealed water quality was similar to that of the receiving waters in Swamp Creek. There were no offsite impacts and there have been no further incidents with this dam.

Sewage Treatment

Wastewater from the administration offices, workshop and bath houses is collected and treated on site in a number of aerated wastewater treatment plants around the site, which are licensed by Singleton Council. At the Mt Owen Mine administration offices and workshop complex the effluent is then used to irrigate a three hectare tree-lot. At the Ravensworth East Mine workshop the effluent is used to irrigate a one hectare tree-lot. At the Glendell infrastructure area the effluent is reused within the mine water system.

Prescribed Dams

There are two prescribed dams at Mt Owen Complex. These dams are located at Mt Owen and both are tailings dams. The dams are subject to regulatory inspections as per the requirments of the Dams Safety Committee. No issues existed with regard to these dams during the reporting period.

2.4 WATER MANAGEMENT SYSTEM

The Mt Owen Complex operates a comprehensive water management system which is designed to facilitate the efficient operation of the Mt Owen Complex through control of water inflow and the ready provision for onsite demands. Figure 8 details the key aspects of the water flow path throughout the complex. In average to dry rainfall periods, the Mt Owen Complex is predicted to operate with a water deficit. Water used at the Mt Owen Complex is derived from the following sources:

- Internal surface runoff into the pits;
- Runoff from infrastructure areas, including haul roads, coal stockpiles and handstands;
- Groundwater accession to the pit;
- Runoff from the overburden emplacement areas, including rehabilitation areas;
- Potable water delivered to site;
- Water pumped from Liddell or Narama Mines; and
- Water pumped from the Glennies Creek controlled system under Licence.

During 2012, 139.5ML of water was drawn from Glennies Creek for potable water use on site. In addition, 349.7ML was utilised at Glendell and Ravensworth East for haul road dust suppression and 467.2 ML was consumed at Mt Owen for dust suppression. The Mt Owen CHPP consumed 5090ML with returned water being 3363ML, resulting in a balance of 1727ML used by the CHPP in 2012.

Bettys Creek Diversion

Bettys Creek, located to the south east of Mt Owen, has undergone a number of approved diversions as a result of mining operations at the Mt Owen Complex. The creek initiates at Mt Owen and travels through to Bowmans Creek through Glendell Mine.

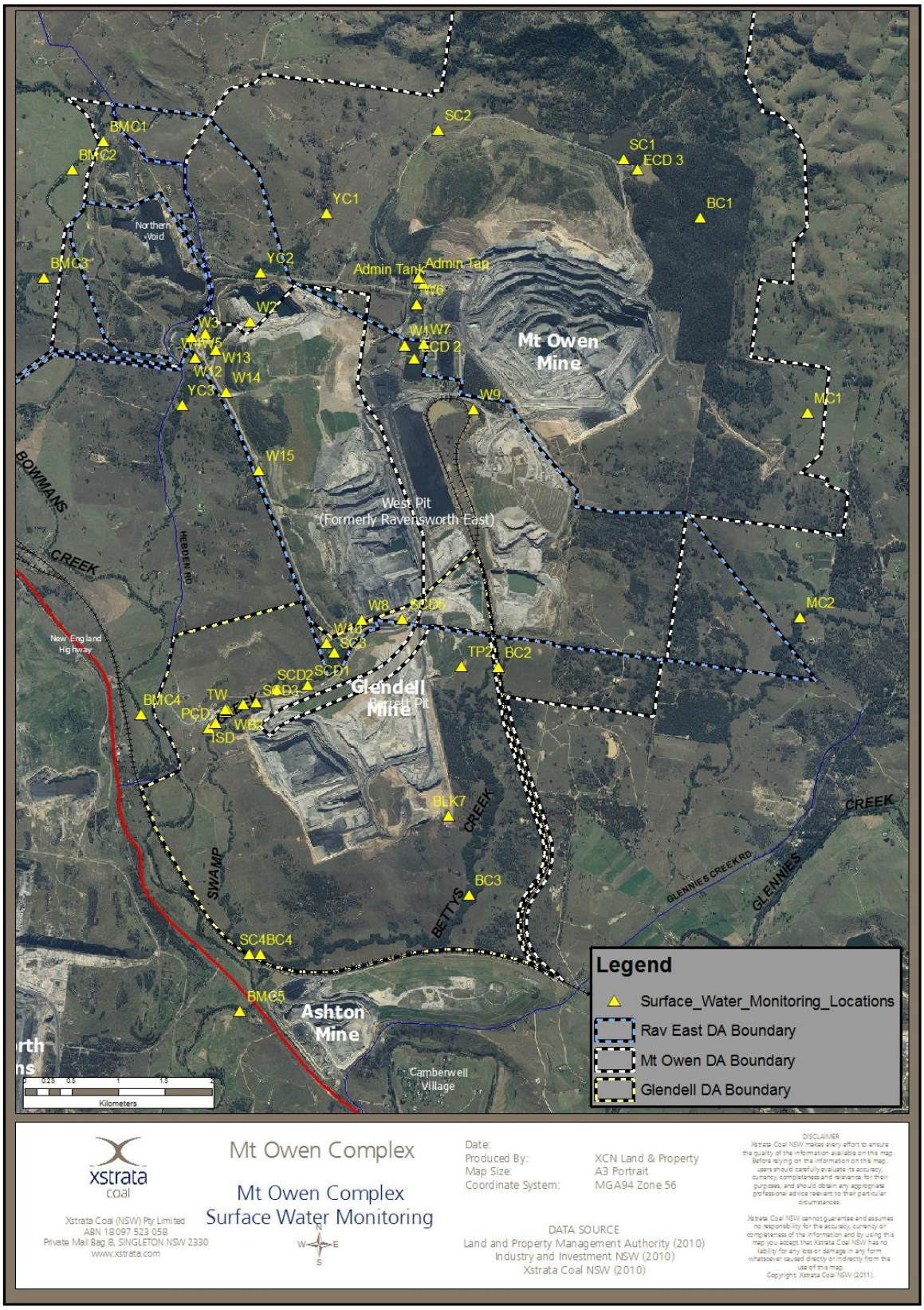
Bettys Creek Diversion Stage 1 was required due to the expansion of operations associated with Mt Owen and the Western out of Pit (WOOP) Dump. Bettys Creek Stage 2 diversion involved diverting approximately 2,080 m of the upper reaches of Bettys Creek in a south-east direction where it joins to Main Creek.

These diversions have previously been rehabilitated including reseeding, planting and hydro mulching.

Monitoring of the Bettys Creek Upper Diversion has been has found that germination numbers and species variety of seedlings in both sections of Bettys Creek is encouraging however soil tests have shown the soil to be of relatively poor quality. Weed maintenance, ongoing monitoring and erosion control is also regularly undertaken in the Bettys Creek area.

Stream Stability and Health Assessments were conducted in 2012 for both Upper and Lower Bettys Creek diversions. During 2012, remediation works were undertaken on Upper Bettys Creek diversion to repair minor erosion issues. In addition, the NSW Office of Water conducted an inspection of Lower Bettys Creek Diversion and found the area to be in accordance with expectations and committments made previously.

Figure 7
Surface Water Monitoring Locations



Water quality of Bettys Creek is monitored on a monthly basis for pH, Electrical Conductivity (EC), Total Suspended Solids (TSS) and Total Dissolved Solids (TDS). Monitoring will assist in the detection of any impacts caused by the diversion or mining activities in the Bettys Creek Catchment.

During 2013, a further diversion will be constructed along the lower reaches of Bettys Creek. This work will be completed in 2013 and further details will be included in the 2013 AEMR.

Swamp Creek Diversion

The extension of Glendell mining operations also resulted in the diversion of a section of the existing Swamp Creek. The diversion was completed in January 2009 in accordance with Schedule 3, Condition 30 of DA 80/952 and Swamp Creek Diversion Approval – 20SL061751. The project involved the construction of approximately 480 m of new channel and a haul road culvert crossing.

The diversion of Swamp Creek was carried out to provide access to Glendell Mine Infrastructure Area for the life of the mine and to prevent inundation of the open cut mine in the event of a major flood event. The diversion has been designed to contain a 1 in 100 year ARI storm event.

Revegetation of the Stage 2 creek diversion was completed in early 2009 utilising direct seeding and planting of fast growing native tube stock. Stream Stability and Health Assessments were conducted in 2012. No major work was required in the reporting period.

Water quality of Swamp Creek continues to be monitored on a monthly basis for pH, EC, TSS and TDS. Monitoring will assist in the detection of any significant impacts caused by the diversion or mining activities in the Swamp Creek Catchment. In conjunction with water monitoring, vegetation communities inspections will be conducted along with annual fauna monitoring as the vegetation matures.

Regular maintenance of the diversion will continue to ensure the long term performance meets the design objective.

2.5 GROUNDWATER

Environmental Management

To ascertain potential impacts upon groundwater from mining and land use activities, Mt Owen Complex monitors groundwater from a network of 34 piezometers as listed in Table 19 in accordance with the approved Mt Owen Complex Groundwater Monitoring Program and Water Management Plan. A number of the piezometers are paired and are either of a large or small diameter targeting shallow alluvial and deeper hardrock/coal aquifers. Several monitoring locations are located adjacent to the active mining areas to monitor groundwater pressure losses near the open cut pits. Groundwater monitoring locations at the Mt Owen Complex are shown in Figure 9.

Piezometers were monitored quarterly for groundwater quality during the reporting period in accordance with the Mt Owen Complex Groundwater Monitoring Program. All groundwater monitoring locations are sampled and analysed on a quarterly basis for pH, EC and water level.

All groundwater sampling was undertaken in accordance with AS/NZS 5667.1 (1998) and was conducted by Carbon Based Environmental Pty Limited.

Environmental Performance

A summary of groundwater monitoring results for pH, EC and standing water level are listed in Table 19. Figure 9 shows the locations of the piezometer network around the Mt Owen Complex.

An independent groundwater review was undertaken at the end of 2012, and a summary of the findings are detailed in Table 18.

Results obtained were predominantly in line with predictions made in the Mt Owen EIS predictions indicating that mining has not impacted on Bowmans Creek alluvium which is located about 4.5 km to the west of Mt Owen. Groundwater bores NV10 – NV19 are all located on the western extent of Stage 1 and 2 tailings dams and are indicators for influences on Bowmans Creek. These were all found to be comparable to EIS predictions.

Seven bores exhibited lower drawdowns than predicted, indicating no adverse impacts on surrounding water tables. Six bores exhibited drawdowns in 2012 higher than the predicted model. Three of these bores were not in the initial comparative Mt Owen model as they specifically relate to Glendell areas. NPZ4 is located to the north west of all mining operations in Yorks Creek. Studies indicate that this drawdown would be nominally affected by alluviums of Yorks Creek.

Similarly NPZ7 and NPZ8, are also located on the alluviums of Main Creek and are impacted by alluviums within this creek system.

Table 18: Comparisons against Mt Owen EIS Predictions

Bore No	Comparative Analysis with EA Predictions	Additional Comments
NV10	Comparable with EIS predictions	
NV11	Comparable with EIS predictions	
NV12	Comparable with EIS predictions	
NV13	Comparable with EIS predictions	
NV14	Comparable with EIS predictions	
NV15	Comparable with EIS predictions	
NV16	Comparable with EIS predictions	
NV17	Lower draw down than predicted (predicted	
NV18	Comparable for upper level however lower drawdown than predicted in lower level	
NV19	Comparable with EIS predictions	
NPZ1	Lower draw down than predicted	May be influenced by surrounding alluvium
NPZ3	Higher groundwater level than expected	May be influenced by ERP
NPZ4	Higher groundwater level than expected	May be influenced by surrounding alluvium
NPZ6	Lower draw down than predicted	Inconsistent with model prediction
NPZ7	Higher draw down than predicted	Inconsistent with model prediction
NPZ8	Higher draw down than predicted	Inconsistent with model prediction
NPZ9	Lower draw down than predicted	May be influenced by surrounding surface water storages
NPZ10	Lower draw down than predicted	May be influenced by surrounding surface water storages
NPZ11	Comparable with EIS predictions	
NPZ12	Lower draw down than predicted	
NPZ13	Higher draw down than predicted	Glendell Mine not included in model prediction
NPZ14	Insufficient information to make overall comparison	Glendell Mine not included in model prediction
NPZ15	Insufficient information to make overall comparison	Glendell Mine not included in model prediction
NPZ16	Higher draw down than predicted	Glendell Mine not included in model prediction
North Bore	Lower draw down than predicted	Targets alluvium
South Bore	Comparable with EIS predictions	
East Bore	Lower draw down than predicted	
GW1	Insufficient information to make overall comparison	

(Information extracted from Gilbert & Associates Groundwater Review 2012)

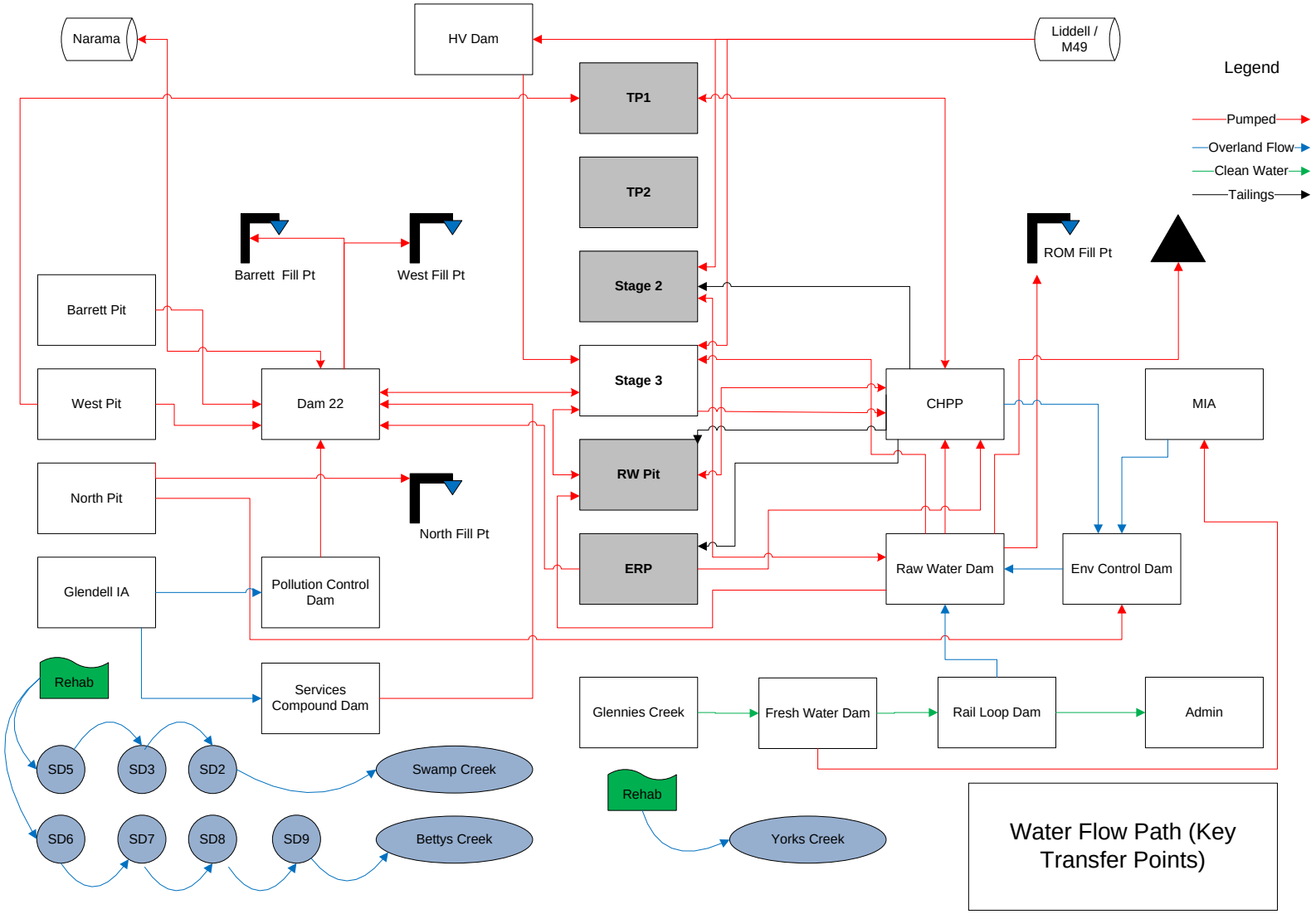


FIGURE 8 - Mt Owen Water Management Schematic

Figure 9: Groundwater monitoring locations

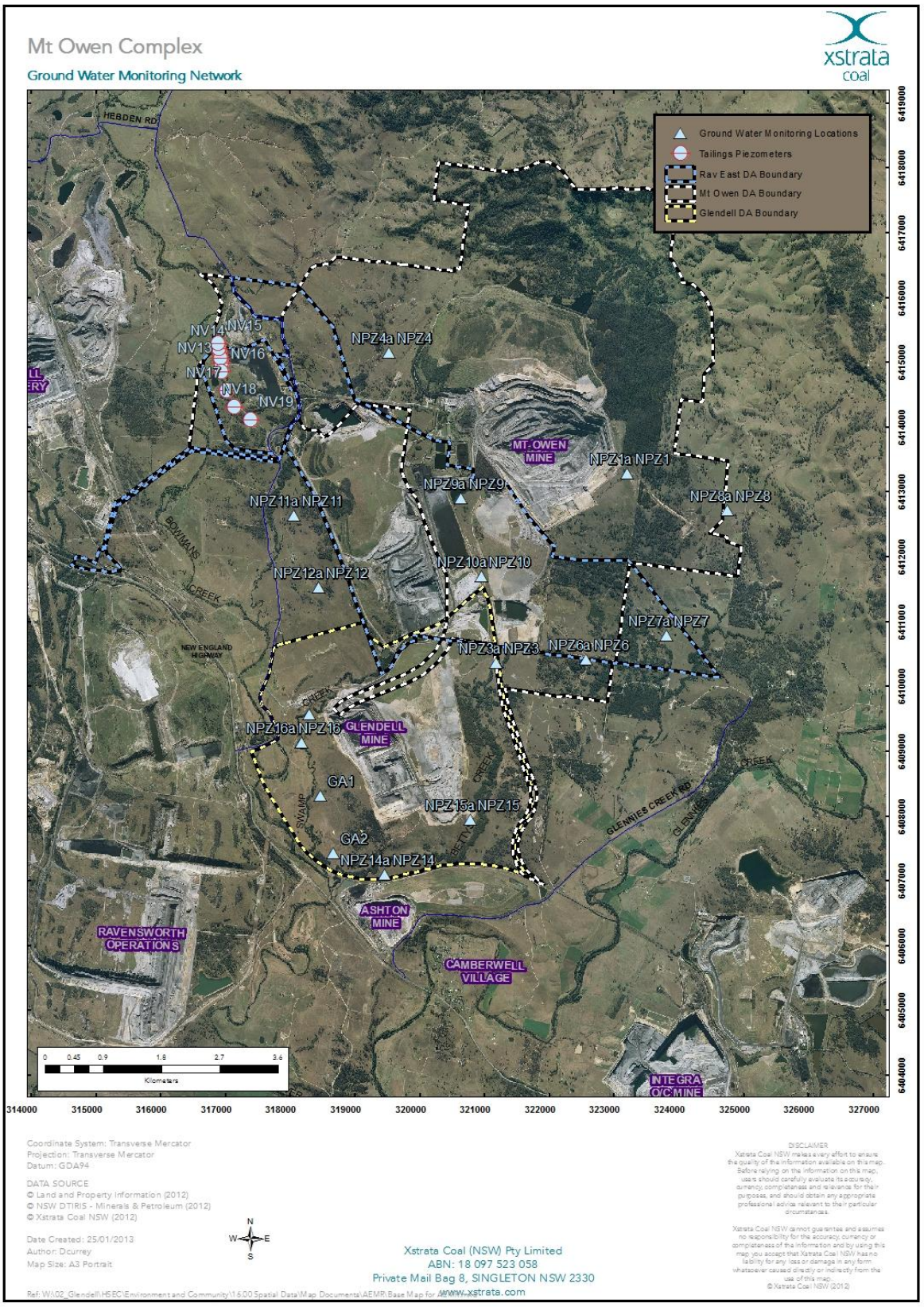


Table 19
Groundwater Monitoring Results 2012

Piezometer	EC (MS/cm)			pH			Depth (m)		
	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
NPZ3 – Small	12.7	17.4	15.3	7.2	8.1	7.5	18.91	19.92	19.36
NPZ3 – Large	8.1	14.15	10.2	7.3	7.6	7.5	28.63	34.39	31.15
NPZ13 – Small	15.67	17.01	16.45	7.2	7.4	7.24	15.67	17.01	16.45
NPZ13 – Large	8.77	11.45	10.4	7.3	7.7	7.5	44.73	45.45	45.07
NPZ14 – Large			7.8			8.0			49.19
NPZ16 – Small	9.2	11.9	11.2	7.4	7.8	7.6	6.6	8.1	7.4
GA1	0.59	1.2	0.87	7.4	8.3	7.8	3.47	4.95	4.3
GA2*	3.5	4.5	4.1	6.6	7.5	7.1	4.57	5.84	5.3
NV10 A	4.99	6.8	6.13	6.8	7.5	7.2	12.42	14.53	13.86
NV10C	Dry								
NV11A	9.98	12.73	11.7	6.4	7.3	6.9	20.72	21.22	20.89
NV11B	9.55	12.54	11.44	6.6	7.4	7.0	20.69	21.19	20.87
NV11C	Dry								
NV12A	7.2	9.25	8.03	6.5	7.4	7.0	16.71	17.12	16.92
NV12B	5.6	7.33	6.80	6.7	6.7	7.3	17.35	18.77	18.45
NV12C	Dry								
NV13A	7.06	9.63	8.47	6.4	7.4	6.9	16.71	17.05	16.86
NV13B	7.3	9.55	8.76	6.4	7.4	7.0	18.36	18.74	18.51
NV13C	Dry								
NV14A	2.82	5.94	3.81	6.5	7.5	7.03	13.02	18.3	15.79
NV14B	5.94	11.83	10.14	6.6	7.4	7.05	17.86	19.28	18.95
NV14C	Dry								
NV15A	3.08	7.15	4.82	6.7	7.6	7.03	25.64	25.98	25.80
NV15B	Dry								
NV16A	5.1	6.9	6.17	6.3	7.5	7.1	18.3	18.64	18.43
NV16B	4.61	6.93	5.8	6.3	7.6	7.1	18.19	18.85	18.45
NV16C	Dry								
NV17A	3.47	4.97	4.16	6.6	7.6	7.1	20.59	20.94	20.73
NV17B	2.9	7.26	5.6	6.6	7.5	7.11	19.66	20.96	20.68
NV17C	Dry								
NV18A	2.46	3.34	3.05	6.3	7.5	7.0	13.07	13.51	13.25
NV18B	4.32	6.08	5.44	5.9	7.4	6.8	25.26	25.59	25.37
NV19A	5.30	7.08	6.39	6.2	7.2	6.8	16.90	23.21	22.11
NV19B	5.30	7.07	6.39	6.0	7.1	6.8	22.88	23.22	23.03

*N/A – Dry Bore, *Glendell monitored piezometers*

2.6 BIODIVERSITY AND LAND MANAGEMENT

Environmental Management

During 2011, the Mt Owen Complex Landscape Management Plan was reviewed. This plan applies to landholdings within the Mt Owen Complex covering approximately 8,000 ha. The Landscape Management Plan includes a Rehabilitation and Offset Management Plan, Mine Closure Plan and Final Void Management Plan. During 2012, the Mine Closure component has been reviewed.

The overall objective of the Plan is to co-ordinate land and biodiversity management practices across the Mt Owen Complex to provide for integrated and sustainable use of both mining and non-mining landholdings.

A Flora and Fauna Management Plan for Mt Owen, Glendell Mine and Ravensworth East Mines forms part of the Mt Owen Complex EMS and is used to describe the controls and monitoring implemented for the management of flora and fauna as part of the continued operations at Mt Owen Mine, Glendell Mine and Ravensworth East Mine.

The objectives for land management at Mt Owen Complex are based on sound land management principles, such as erosion prevention, pasture diversity, careful grazing management, and noxious weed and feral animal control. Natural regeneration is promoted where practical to enhance biodiversity and landscape amenity.

Environmental Performance

The Mt Owen Complex has an implemented a Land Management Plan which incorporates final voids, mine closure, rehabilitation and offset management. In conjunction with these plans, bushfire management controls such as maintaining fire breaks, fuel reduction, maintaining access in the event of fire and provision of fire fighting equipment are covered in the site Bushfire Management Plan.

Land management inspections and maintenance works were carried during 2012. The annual monitoring programs assessed issues which monitoring and future management focuses on including; boundary fence lines, dams, weeds and pasture, feral animals, erosion and salinity, vegetation health, water quality and rehabilitation and revegetation works.

Mt Owen

Mt Owen is committed to the ongoing rehabilitation of disturbed areas back to native woodland and forest providing habitat for endangered fauna known to occur in the area. Mt Owen has long established research links with the University of Newcastle to ensure the best practical rehabilitation methods are developed and used.

The end land use objective for the rehabilitation of the overburden emplacements at Mt Owen is to create a conservation area comprising dry sclerophyll forest and open woodland that will complement the remnants of Ravensworth State Forest (RSF) and the biodiversity conservation areas being created in surrounding pasture lands. Mt Owen is committed to rehabilitating to native forest communities to the maximum extent practical. This will be through both replicating local dry sclerophyll communities to the extent found to be practical, and through the creation of more open eucalypt woodland with pasture communities.

Mt Owen has established a number of offset areas to compensate for the loss of remnant forest and is discussed in detail in Section 2.6.

During the reporting period research conducted by the University of Newcastle continued on developing a model site for the cost effective and ecologically sustainable reconstruction of native forest and woodland on highly disturbed lands. This project is known as the Biodiversity Offsets Research Program (BORP).

The first phase of BORP initially commenced in August 2005. The focus of Phase 1 was to ensure the consent conditions are met or exceeded. Eight general objectives were proposed. Progress against those eight objectives is detailed in Table 20.

Table 20

Status of BORP Committments

Proposal	Current Status
To develop a protocol for assessment of regeneration potential for both vegetation remnants and pastureland	Assessment of regeneration potential started with a conditional probability model in the ACARP C12033 project report and has since been furthered by various Honours programs:
To develop simple methods of matching community suitability to soil properties	Elements in the original landscape analysis that have been supported, such as the affect of aspect. Progress is being made in this regard in other projects and will be further developed in BORP Phase 2.
To develop cost-effective methods of reinstating vegetation strata	It will continue to develop in BORP Phase 2.
To develop methods to provide source vegetation where it is absent or in poor condition that speeds the dispersal of seed into the cleared land taking advantage of those dispersal vectors currently available.	A number of source vegetation areas have been established to identify the canopy and upper middle storey strata
To determine which dispersal vectors are present and if vector habitat should be an early target of community reestablishment	This objective is related to the identification of potential barriers and bottlenecks in community reconstruction and function.
To develop methods for rebuilding the ecology of degraded soil	Studies linked to this objective are ongoing within the Centre.
To determine the best methods for site preparation and the suppression of weeds.	This objective is addressed in experiments such as the site preparation experiment and source planting areas
To determine how to best measure and achieve sustainable forest – woodland communities on pastureland.	The conditional probability method developed in the ACARP (C12033) project

During 2012, the University of Newcastle continued to expand their research into rehabilitation success at the Mt Owen Complex. Woodland Closure Criteria has further advanced with consideration now being given to increasing the canopy seeding density to ensure all of the forest topsoil rehabilitation areas meet the Forest Closure Criteria.

2012 also saw the launch of a rehabilitation guideline, Establishing Native Vegetation – Principles and Interim Guidelines for Spoil Placement Areas and Restoration Lands, which outlines key processes that lead to successful native revegetation establishment. This guideline can be utilised by any mining operation to assist in their rehabilitation processes.

Glendell

During the previous reporting period, Glendell continued to implement measures to develop the Glendell Habitat Management Zone in accordance with Condition 36 of DA 80/952.

The Habitat Management Zone is located to the east of Glendell, and extends in a north south direction along Bettys Creek as shown on Figure 2. Stock has been excluded from this area to encourage natural regeneration of remnant vegetation.

2009 and 2010 saw the continuation of Stage 1 of tree planting in the Habitat Management Zone with approximately 6620 native species planted and 0.1 ha seeded. In 2012, an additional 9,000 native trees were planted in the Habitat Management Zone to augment previous plantings. These will be reviewed in 2013 to determine success rate and additional planting may be warranted. Details of these will be included in the next AEMR if applicable.

The Habitat Management Zone is subject to current and future land disturbance associated with a mining lease held by Integra Coal Operations for the purposes of underground coal mining. Integra have regulatory approval to disturb the land covered by the Habitat Management Zone for the purposes of installing gas wells, drilling exploration boreholes and constructing access to the gas wells and boreholes in conjunction with their underground mining activities. This disturbance is not related to Xstrata activities.

Approximately 310 native species were planted along the New England Highway in June 2009. These have continued to flourish well in 2012. The vegetation communities planted aim to re-establish Central Hunter Bulloak Forest Regeneration, Central Hunter Swamp Oak Forest and Central Hunter Box – Ironbark Woodland.

During 2012, approximately 6,000 trees were planted on the Mt Owen rehabilitation area. During the next reporting period it is expected that further tree plantings will also continue. As part of the five year plan a monitoring program will be set up to report the success of the plantings in annual reports and to regulators.

Movement activated motion cameras continued to be utilised in the buffer lands and rehabiltiation across both Glendell and Mt Owen. Various native and introduced animals were observed during the year. These cameras will be further utilised over the following years to detect fauna in the surrounding areas.

During the reporting period, a project was initiated which involved the capture and release of a quoll in the Mt Owen rehabilitation area. Whilst caught, a tracking collar was placed on the quoll to enable tracking of his habitat and den locations were. This project has revealed valuable information on the quoll and it will be continued into 2013.

Surveys were again also undertaken to assess the potential for the Green and Golden Bell frog to occur on site. No evidence was found to support the existence of the frog, however several ponds were found to contain Gambusia.

Ravensworth East

Ravensworth East Mine does not mine through the same complex habitats and remnant forest as Mt Owen Mine. Prior to the commencement of mining, the Ravensworth East area largely comprised grazing land associated with the Swamp Creek drainage plain and associated footslopes. At the time of assuming responsibility for the land the majority of remnant native vegetation had been cleared and no areas of significant biodiversity value remained. The nominated end land use for Ravensworth East is grazing and open woodland. In addition opportunities to develop corridor linkages with Mt Owen to maximise the benefits of native vegetation establishment and provide for an overall expanded woodland area are always considered in the rehabiltiation processes.

Due to the much lower biodiversity value of the Ravensworth East Mine area, biodiversity management includes maintenance of existing rehabilitation and rehabilitating disturbed areas in accordance with the approved MOP.

Glennies Creek Rehabilitation

Mt Owen Complex is actively involved in the Glennies Creek Rehabilitation Project. The project involves rehabilitating a section of Glennies and Main Creek on land owned by Xstrata in the southern eastern region of the Mt Owen Complex. Key natural resource issues are managed for invasive weeds, loss of native vegetation cover and stream bank erosion.

In addition to this project, the Mt Owen Flora and Fauna Interagency Advisory Group continued to meet on an annual basis to discuss flora and fauna management utilised at the Mt Owen Complex. During 2012, the Mt Owen Complex Flora and Fauna Management Plan was also reviewed.

2.7 WEEDS AND FERAL ANIMALS

Environmental Management

The Mt Owen Complex has commissioned Hunter Land Management for the effective identification, removal and prevention of weeds. A Noxious and Environmental Weed Action Plan was developed in this reporting period to identify all weed control activities at the Mt Owen Complex.

Feral animal control for the Mt Owen Complex consisted of a wild dog and fox baiting program. Baits laced with '1080' poison were strategically placed throughout the outer limits of the Mt Owen Complex by trained personnel, targeting wild dogs and foxes with the purpose of reducing the numbers and dispersion of target species.

Figure 10 – 2012 Habitat Management Zone

Environmental Performance

A number of environmental and noxious weed species and feral animal species have been identified at the Mt Owen Complex and active programs of control have been implemented since 1996. The main weeds targetted in 2012 included of concern are African Boxthorn in riparian zones and alluvial flats in all areas of landholdings, Green Cestrum along Glennies Creek, Lantana in the eastern areas of the landholdings confined to various sites, St Johns Wort in selected areas of steep slopes in the northern areas of the landholdings and African Olive in the RSF and new forest areas.

Weed control is undertaken utilising an annual schedule. During the reporting period, key focus was on african boxthorn, blackberry, cestrum, lantana and St Johns Wort. Other species were also targeted as seasonal outbreaks occur. Control methods consisted of the use of effective herbicides including RoundUp and Grazon Extra.

Other methods utilised include using a foliage spray from a utility mounted QuickSpray unit directly onto identified weeds, and cutting and painting stumps.

Weeds that were treated during the reporting period are geo-referenced allowing the success of the techniques to be monitored. In addition, follow up inspections and additional control works can be implemented as required during the next reporting period.

2.8 NOISE

Environmental Management

Noise monitoring is conducted in accordance with the Mt Owen Complex's Noise Monitoring Program and EMS. Noise monitoring is designed to monitor noise emissions from continued operations at Mt Owen, Ravensworth East and Glendell Mines in accordance with conditions specified in individual development consents and regulatory requirements.

Both attended and real time noise monitoring is conducted at the Mt Owen Complex by an independent contractor. A summary of attended noise monitoring results for the reporting period is provided in Appendix E.

Continuous noise monitoring is conducted utilising real time noise monitors which provide daily reports of noise levels and have the ability to send warning alarms when predefined noise levels have been reached.

Real time noise monitors are used in conjunction with attended noise monitoring results to assess noise compliance at the Mt Owen Complex and are shown on and described in Table 21.

The operation of the real time noise monitors log noise statistics, weather conditions and have the ability to alert mine personnel at a present noise level, thus enabling a review of mining operations during adverse weather conditions. The in-built 24 hour audio facility and the weather station network are currently used to facilitate the identification of mine related noise compliance.

During 2012, an additional real time noise monitor was installed at Ashton Mine to enable better understanding of directional noise monitoring impacting on the Camberwell village from Xstrata Glendell's operations.

Attended noise monitoring is conducted to assess operational noise from each of the mining areas at Mt Owen. Noise monitoring is designed to assess noise levels representative of each season during the reporting period. Attended noise monitoring was conducted on the following dates during March, May, June, July, August, October, November and December.

Attended noise monitoring locations representative of Mt Owen and Ravensworth East consists of N1 to N6 in conjunction with Sentinex 1, 4 and 5 and monitoring locations representative of Glendell consists of N3 to N7 along with Sentinex 4, 7, 11 and 12. Monitoring locations are described in Table 23.

Additionally, Glendell Mine use real time noise monitoring as an early warning system for noise management.

Noise assessment criteria during day, evening and night periods for individual residences under prevailing conditions for the Mt Owen Complex are presented in Tables 22 and 23.

During the reporting period, the Mt Owen Complex has continued to report against relevant criteria, based on NSW Industrial Noise Policy (INP), *Australian Standard AS1055-1989 and 'Acoustics – Description and Measurement of Environmental Noise, Part 1 General Procedures'*.

In addition to attended monitoring noise levels, monitoring was also undertaken on mining equipment utilised in the Glendell pit as well as R996 and R9400's at Mt Owen during 2012.

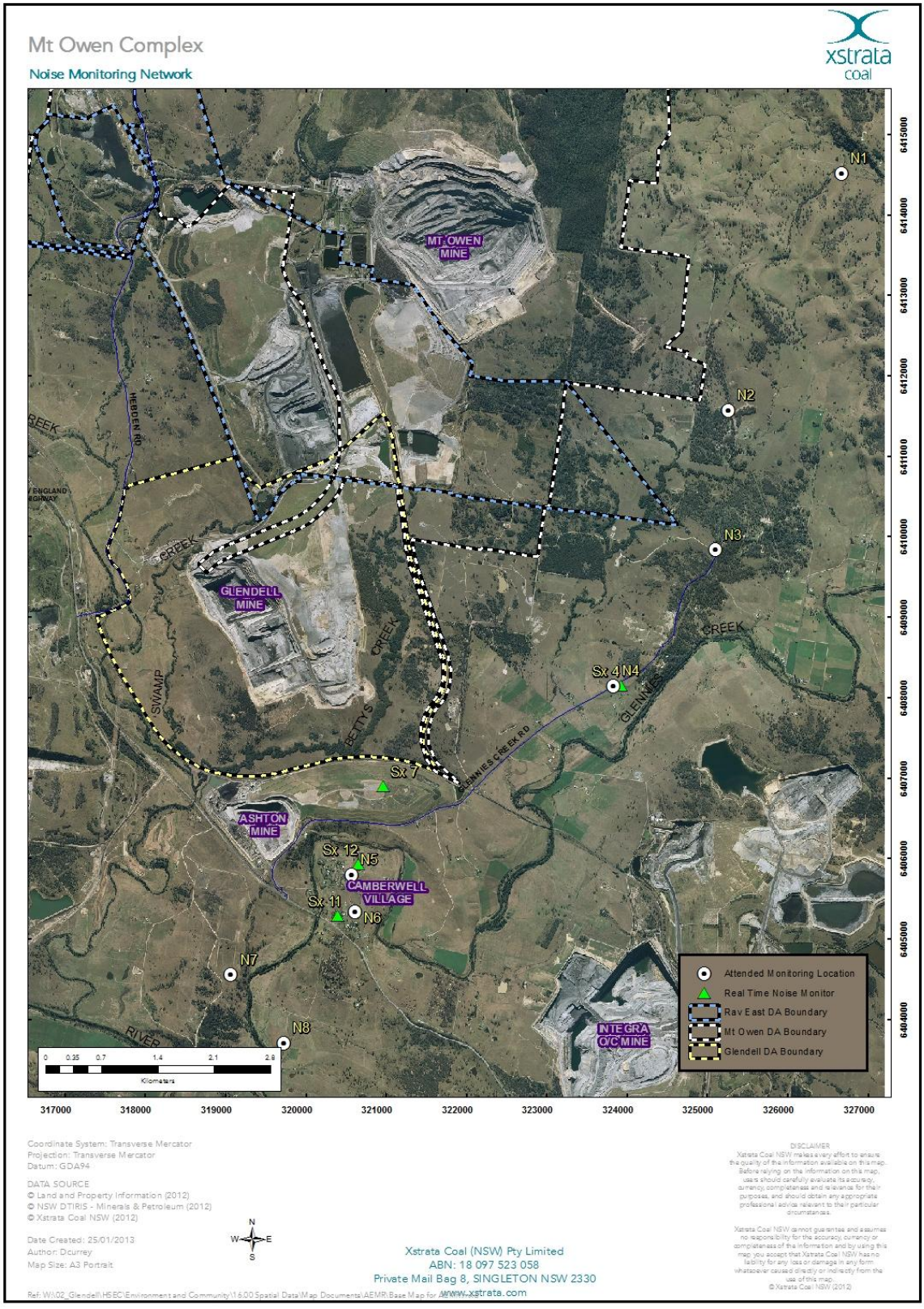


Figure 11: Noise Monitoring Network

Table 21
Noise Monitoring Locations

Monitoring Location	Associated Mine	Description of Monitoring Location
N1	Mt Owen	Greenlands, to the west of Property 54 – Reid
N2	Mt Owen	Falbrook Road, adjacent to Property 71 – Cole
N3	Mt Owen Ravensworth East Glendell	Corner of Falbrook and Middle Fallbrook Road
N4	Mt Owen Ravensworth East Glendell	Glennies Creek Road adjacent to Property 109 – Noble, 100 m south of Sentinex 4.
N5	Mt Owen Ravensworth East Glendell	Northern section of Camberwell Village
N6	Mt Owen Ravensworth East Glendell	Central section of Camberwell Village south of the New England Highway
N7	Glendell	1.5 km south of Camberwell Village at Property 7b1 – Bowman
Sentinex 1	Mt Owen Ravensworth East	Continuous noise unit located on Property 86
Sentinex 4	Mt Owen Ravensworth East Glendell	Continuous noise unit located on Property 109 – Noble, approximately 50 m east of Glennies Creek Road
Sentinex 5	Mt Owen Ravensworth East	Continuous noise unit located on Property 66
Sentinex 8	Mt Owen Ravensworth East	Met Station located to the west of Mt Owen Mine
Sentinex 11	Glendell	Continuous noise unit located on Property 37 – Richards
Sentinex 12	Glendell	Continuous noise unit located on Property 31 – Olofsson

Table 22
Mt Owen and Ravensworth East Noise Impact Assessment Criteria (dB(A))

Location	Representative Monitor	Day / Evening / Night $L_{Aeq(15minute)}$	Night time $L_{A(1minute)}$
29 – Nagle and Partridge	N2	37	45
55 – Bodiam	N1		
40 – Holmes	N1	36	45
53 – Cullinan	N1		
54 – Reid	N1		
93 – Scott	N3		
90 – Wilson	N3		
Other privately-owned residences		35	45

Table 23

Glendell Noise Impact Assessment Criteria (dB(A))

Location	Representative Monitor	Day / Evening / Night $L_{Aeq(15minute)}$	Night time $L_{A(1minute)}$
Camberwell Village A			
30 – Ninness	N6	37	37
33 – Peachy	N6		
37c – Richards	N6		
53 – Yates	N6		
11 – Chisholm	N6	41	45
22b – Turner	N6		
35 – Pugh	N6		
Other privately-owned land in Camberwell Village A	N7	40	45
Camberwell Village B			
20 – Ford	N5	42	45
21a & 21b – Merchant	N5		
38 – Roberton	N5		
47 & 50 – Vollebregt and Clarke	N5		
6 – Bennett	N5	40	45
24 – Lopes (Lane)	N5		
4 – Standing	N5	39	45
40 – Smiles	N5		
32 – Green	N5	38	45
44 – Stapleton	N5		
Other privately-owned land in Camberwell Village B	N5	37	45
Camberwell Village C			
27 – McInerney	N5	40	45
31 – Olofsson	N5	38	45
Other privately–owned land in Camberwell Village C	N5	35	45
Other Privately–owned Land			
37a and 37b – Richards	N5	38	45
83 – Westcott	N2		
110 – Hall	N4		
34 – Poulton	N7	37	45
87 – Fairfull	N3		
9 – Burgess	N7	36	45
18 – Hall	N7		
45 & 46 – Tisdell	N7		
All other privately–owned residents		35	45
Camberwell Hall & St Clements Church	N6	40	-

Table 24
Cumulative Noise Criteria for the Mt Owen Complex (dB(A))

Period	Cumulative Noise Criteria
Daytime - L_{Aeq}, 11 hour	50
Evening - L_{Aeq}, 4 hour	45
Night time - L_{Aeq}, 9 hour	40

Environmental Performance

Noise loggers were configured to provide statistical noise data summaries every 15 minutes. These were used to quantify and describe the acoustic environment around the site. Independent attended monitoring is also conducted which allows for an accurate determination of industrial noise source's contribution to ambient noise levels.

Attended noise monitoring at the Mt Owen Complex involved:

- Assessing ambient noise levels to determine Mt Owen, Ravensworth East and Glendell's contribution;
- Comparison of the results with predicted noise levels from a compliance noise model of the mine under meteorological conditions;
- Refinement of the noise compliance model taking into account the findings of the attended noise monitoring survey;
- Using the compliance noise model to predict the noise level in the surrounding region using the meteorological conditions and development consent conditions used to determine noise emission limits; and
- Comparison of the predicted noise levels with the relevant noise impact assessment criteria to assess compliance of the mine with relevant development consents and EPL criteria.

The attended noise surveys included an assessment of the noise levels generated by each mine within the Mt Owen Complex and were compared to relevant sleep disturbance criteria.

Compliance with the L_{Aeq}, period (day, evening or night) cumulative noise level criteria was assessed utilising the real time monitors to assess noise levels from all industrial sources.

Table 25 below indicates attended monitoring where periods in excess of the criteria for each mine was observed. There were no periods identified in Summer, Autumn or Spring however there were isolated periods when noise lvels were observed to be slightly higher than the criteria. These were observed on a single evening and have not since been repeated. Weather conditions at the time suggest temperature inversions may have been present given the winter period. All other monitoring resulted in noise levels below criteria and in most instances below 30dB(A). Appendix E displays seasonal data.

Table 25
Attended Noise monitoring vs Noise Criteria for the Mt Owen Complex (dB(A))

Summer 2011-2012								
			Day		Evening		Night	
	Criteria		Noise Level		Noise Level		Noise Level	
Name	Mt Owen	Glendell	Mt Owen	Glendell	Mt Owen	Glendell	Mt Owen	Glendell
Nil > Criteria								
Autumn 2012								
Nil > Criteria								
Winter 2012								
J.C. and J. McInerney	35	40				41		
T.A. and D.E. Olofsson	No Criteria Applicable for Mt Owen	38				40		40
M. and T.E. De Jong		35				38		
S.F. and C.D. Ernst		35		38		41		37
G.J. Hall		36		38		41		
Trustees Diocese of Newcastle		40				43		
S.P. Turner		41				43		
C.L. Stapleton		38		39		43		
J.L. Vollebregt and T.L. Clarke		42				44		
Bowman, Bowman, Bowman, Elder		35				38		38
Spring 2012								
Nil > Criteria								

Mt Owen and Ravensworth East

Meteorological data was collected for the attended monitoring period from Sentinex 8 to correctly analyse the monitoring results.

Noise results recorded during the attended noise monitoring surveys indicated that Mt Owen and Ravensworth East Mines were in compliance with noise limits.

Generally attended monitoring comments stated that mining related noise from Mt Owen Mine was inaudible at most periods of monitoring.

Overall during attended monitoring, there is a strong influence from external noise sources including passing vehicles on the New England Highway, Glennies Creek Road and other nearby roads, insects, animals and other operations.

A summary of noise emissions generated by Mt Owen during the reporting period, applicable to DA 14-1-2001 and EPL 4460 is shown in Appendix E.

These results are derived from the six attended noise monitoring locations during four seasonal conditions. Table 25 indicates noise levels were in the vicinity of low 30's for each of the monitoring periods for Mt Owen.

During the reporting period Mt Owen and Ravensworth East complied with $L_{Aeq,\ (15\ minute)}$ and $L_{A1,\ (1\ minute)}$ noise limits, as specified in EPL 4460, DA 14-1-2001 and DA 52-03-99 at all monitoring locations under the meteorological conditions at the time of monitoring. One one occasion however during Winter 2012, it was reported that the ambient noise levels in the Upper Falbrook region (N2) were close to Mt Owen's criteria for one round of attended monitoring. This was an isolated occurrence which was not repeated in subsequent monitoring periods. Predominant noise contributions for Mt Owen are dominated by traffic, birds and insect noise.

Glendell

Meteorological data was gathered for the attended monitoring period from Sentinex 8 and supplementary meteorological data was obtained from smaller weather stations incorporated into the five Sentinex monitors to analyse noise monitoring results.

Noise results recorded during the attended noise monitoring surveys indicated that there was a strong influence from external noise sources including passing vehicles on the New England Highway and nearby roads, insects, animals and other mining operations.

A summary of the noise emissions generated by Glendell during the reporting period, applicable to DA 80/952 is shown in Appendix E. These results are derived from the six attended noise monitoring locations during four seasonal conditions.

During the reporting period, Glendell generally complied with $L_{Aeq,(15\ minute)}$ noise limits, as specified under DA 80/952 and EPL 12840 at all monitoring locations under the meteorological conditions at the time of monitoring except for August 2012 in the Camberwell village. These results were investigated at the time of reporting and have also been discussed with the NSW Department of Planning. No further excursions have occurred at these locations since this time.

Noise mitigation measures have been implemented at Mt Owen and Glendell operations. Noise attenuation has been applied to select mining equipment to reduce mining influences. Other mitigating measures implemented are alternate dumping locations when meteorological conditions are unfavourable to lower dumping locations or ceasing some mining activities if other alternates are not available. Noise mitigation measures have also been implemented in some local residences to assist in managing noise levels at the residential location.

Broadband reversing alarms have been installed on all equipment at Glendell to eliminate high frequency noise from standard reversing beepers. Silent horns have also been fitted for all day and night work in the Barret Pit when available.

Operations will continue to operate under the Mt Owen Complex Noise Monitoring Program developed to assess noise emissions from operational activities. Attended noise monitors will continue to be used to assess compliance against relevant noise impact assessment criteria outlined in DA 14-01-2004, DA 52-03-99 and DA 80/952.

2.9 BLASTING

Environmental Management

Mt Owen Complex has implemented the following blast management practices for the life of operations in accordance with the Mt Owen Complex Blast Management Plan and the Mt Owen and Glendell MOPs:

- Designing and undertaking blasts to ensure that vibration and air-blast criteria are met, including consideration of wind speed and direction prior to blasting;
- Detailed monitoring of blasts over the life of the mine at relevant infrastructure locations, near residents and Camberwell Church;
- Use of a *"no blast"* window during times of adverse weather conditions to minimise impacts on surrounding receivers;
- Implementation of a blasting protocol in consultation with relevant infrastructure providers, including Australian Rail Track Corporation Limited (ARTC) and Energy Australia, and surrounding mining operations;
- Training all relevant personnel on environmental obligations in relation to blasting controls;

- Documentation of the date, location of blast holes and quantity of explosives used each day; and
- Periodic review of blast management procedures to evaluate performance and identify corrective action, if required.

Blasting is managed as per the Mt Owen Complex Blast Management Plan and in accordance with relevant planning approval conditions as detailed in Table 26 and 27 below.

Table 26
Overpressure Criteria

Airblast overpressure level (dB(Lin Peak))	Allowable Exceedance	Applicable Operation
115	5% of the total number of blasts over a period of 12 months	All
120	0%	All
126	Limit for Ravensworth Homestead	Ravensworth East ONLY

Table 27
Ground Vibration Criteria

Receiver	Operation	Peak Particle Velocity (mm/s)	Allowable Exceedance
Residents on privately-owned land (Camberwell Village & Noble*/Green Acres)	Mt Owen Ravensworth East Glendell	5	5% of the total number of blasts over a period of 12 months
	Mt Owen Ravensworth East Glendell	10	0%
Ravensworth Homestead	Ravensworth East	5	5% of the total number of blasts over a period of 12 months
St Clements Church	Glendell	2	5% of the total number of blasts over a period of 12 months
	Glendell	5	0%
Main Northern Railway culverts and bridges	Glendell	25	0%
Electricity transmission poles	Glendell	50	0%

(* Noble Property has since been purchased by Xstrata)

Regulatory conditions have been implemented relating to airblast and ground vibration levels at private residents unless an agreement for higher limits has been negotiated with landowner and DoPI has been notified in writing.

Blasting at the Mt Owen Complex occurs from Monday – Saturday between 9 am and 5 pm (EST) and 9 am to 6 pm (DST) unless otherwise approved by OEH. Blasting is limited to two blasts per day from each mine. Glendell is also limited to a maximum of five blasts per week averaged over a 12 month period. No blasting is permitted on Sundays or public holidays.

Following completion of an early morning blasting trial in 2007, Mt Owen has been granted approval by NSW DoPI to blast after 7 am provided that no temperature inversions are present. Blasting before 9 am is not common practice and is only used when forecast weather conditions are unfavourable.

Any private landholder within 3 km of Mt Owen and Ravensworth East and 2 km of Glendell mining areas that expresses interest in being informed of the blasting schedule is notified through either email or the Mt Owen Complex's operation of a toll free Blasting Hotline (Ph: 1800 248 745) providing information on daily and weekly blasting schedules. Weekly blast schedules are also available on the Mt Owen Complex website at www.xstratacoalmtowen.com.au.

To monitor all blasts, a monitoring network has been established at eight fixed locations surrounding the Mt Owen Complex. All blast monitoring locations are shown on Figure 12.

Meteorological based constraints on blasting have also been developed at the Mt Owen Complex.

Prior to each blast a blasting exclusion arc is calculated taking into account wind direction, wind speed, depth and size of blast. This exclusion arc provides a buffer zone around privately owned residences to minimise dust and fume impacts, and to determine a suitable blast time ensuring minimal impact.

Meteorological Assessment Protocols for Blasting

The Mt Owen Complex weather stations are maintained and operated in accordance with the OEH's *Approved methods for the sampling and analysis of air pollutants in NSW* (EPA, 2001) which also refers to the Australian Standard AS2923-1987 (Guide for measurement of horizontal wind for air quality applications). Continuous monitoring systems are calibrated in accordance with regulatory requirements.

During blasting operations, wind speed and direction are considered to ensure blasting operations do not adversely impact on the community. Dependent upon the direction of winds, blasts may be delayed until more favourable conditions prevail.

Environmental Performance

Mt Owen

A blasting summary is provided in Tables 28, 29 and 30 for the Mt Owen Complex as a whole.

Blasting at Mt Owen consisted of 104 blasts in 2012 averaging averaging 2.1 blasts per week. All blasts occurred between the hours of 7 am and 5 pm, Monday to Saturday. Of the 104 blasts there were only two occasions where airblast overpressure was recorded above the allowable assessment criteria of 115 dBL. These occurred on 11/1/2012 and 28/9/12 resulting in airblasts of 115.7 dB(L) and 115.4dB(L) respectively. No complaints were received on either occasion. The average airblast for the period was 100.58 dB(L) at Westcotts and 100.65 dB(L) at Nobles.

All vibration results from Mt Owen remained well under the maximum assessment criteria of 5 mm/s for both reporting periods with the peak vibration being 4.136 mm/sec. Mt Owen Mine results were consistent with blasting results from the previous reporting periods.

Table 28

Blasting Compliance Summary – Glendell

Location	Maximum Airblast (dB(L)	Average Airblast (dB(L)	% Compliance	Maximum Vibration	Average Vibration	% Compliance	No Blasts
Camberwell Church	114.8	103.37	100%	0.66	0.21	100%	99
Camberwell Village	115.5	98.43	99%	1.82	0.44	100%	99
Green Acres	114.4	98.4	100%	0.75	0.22	100%	99
Ravensworth Homestead	118.6	97.23	100%	1.82	0.35	100%	99

Table 29

Blasting Compliance Summary – Ravensworth East

Location	Maximum Airblast (dB(L)	Average Airblast (dB(L)	% Compliance	Maximum Vibration	Average Vibration	% Compliance	No Blasts
Camberwell Church	115	99.67	100%	0.24	0.05	100%	43
Camberwell Village	117.3	94.63	98%	0.82	0.10	100%	43
Green Acres	116.13	98.01	98%	0.61	0.21	100%	43
Ravensworth Homestead	111.4	99.56	100%	1.06	0.37	100%	43
Powerlines				0.91	0.21	100%	43
Railway				0.77	0.32	100%	43

Table 30

Blasting Compliance Summary – Mt Owen

Location	Maximum Airblast (dB(L)	Average Airblast (dB(L)	% Compliance	Maximum Vibration	Average Vibration	% Compliance	No Blasts
Westcott	113.9	100.58	100%	4.136	0.55	100%	104
Nobles	115.7	100.65	98%	1.30	0.27	100%	104

Glendell and Ravensworth East

All blast monitoring locations representative of Glendell and Ravensworth East remained compliant for airblast overpressure with the exception of two blasts. Two blasts on the 30th November 2012 and 20th December 2012 recorded airblast levels of 115.5 dB(L) and 117.3 dB(L) respectively. Each was independently reviewed and were found to be subject to wind enhancement at the time of blasting. Overall compliance to remain below 120 dB(L) was acheived for all blasts througout the year with respect to airblast and all blasts remained with vibration criteria for the entire year.

One blast was fired on Australia Day at Ravensworth East mine. This was a non complaince against Section L7.6 of Ravensworth East's EPL and as a result a report was furnished to the OEH on the blast. An official warning was received by Ravensworth East as a result of the blast and several actions were implemented at the time to prevent any further blasting non compliances. Subsequently no further blast non complainces occurred in 2012.

Specific Site Results

Ravensworth Homestead

In accordance with conditions described in DA 52-03-99 airblast overpressure criteria for the Ravensworth Homestead is 126 dBL. During the reporting period airblast overpressure for the Ravensworth Homestead was not exceeded at any stage. Peak particle velocity criteria of 5 mm/s (for 5 % of blasts) was also not exceeded.

Westcott

Airblast overpressure levels remained below the assessment criteria of 115 dBL at the Westcott monitoring station. A total of 104 blasts were conducted with zero exceeding the 115 dBL criteria resulting in an exceedance rate of 0 %.

Peak particle velocity criteria did not exceed 5mm/sec on any occasion during 2012.

A 100% blast capture rate was maintained for the duration of the reporting period.

Nobles

Airblast overpressure remained below the assessment criteria of 115 dBL at a private residence for all but two blasts. These occurred on 11/1/2012 when a level of 115.7 dB(L) was recorded and 29/9/12 when 115 dB(L) was recorded. These resulted in 1.9% exceedence which remains below the 5% performance criteria. Peak particle velocity remained well below 5mm sec for all blasts. A 100% blast capture rate was maintained for the duration of the reporting period.

Green Acres

On one occasion during the reporting period, the airblast overpressure was recorded above the assessment criteria of 115 dBL at a private residence, however this was found to be wind enhanced. This resulted in an exceedence rate of 0.7% exceedence of airblast overpressure of 115dB(L) which remained under the maximum 5% of the total number of blasts allowed within each 12 month period.

Peak particle velocity criteria of 5 mm/s (for 5 % of blasts) was not exceeded at any time during the reporting period with a maximum reading of 0.75mm/sec being recorded in 2012.

Capture rate for the Green Acres monitor was 100% during the reporting period.

Camberwell Village

During the reporting period the recorded airblast overpressure exceeded the assessment criteria of 115 dBL on two occasions, 30th November 2012 and 20th December 2012, each of which were found to have been wind enhanced.

In addition, peak particle velocity criteria of 5 mm/s (for 5 % of blasts) was not exceeded during the reporting period. A 100% blast capture rate was maintained for the reporting period.

These results equate to a rate of 1.3% in 2012 exceedence of airblast overpressure of 115dB(L) which remained under the maximum 5% of the total number of blasts allowed within each 12 month period.

St Clements Church

During the 2012 reporting period, no exceedences of airblast overpressure were recorded, nor exceedences with regard to vibration levels.

Maximum vibration event recorded at the Church was 0.66mm/sec. A 100% blast capture rate was maintained for the duration of the reporting period.

Railway

The Main Northern Railway forms the southern and south-western boundaries of the Glendell Mine site. In consultation with the ARTC, a ground vibration criterion of 25 mm/s has been adopted, as specified within the Glendell Mine development consent DA 80/952. Airblast overpressure is not required to be monitored.

In comparison with vibration assessment criteria for the Main Northern Railway culverts and bridges, monitored results remained well under the 25 mm/s with the highest recorded peak particle velocity measuring 2.9 mm/s on 9th May 2012.

Powerlines

A 132 kV powerline crosses the Glendell Mine site in a north to south direction, and will remain in place during mining operations. In consultation with Energy Australia, a ground vibration criterion of 50 mm/s has been adopted for the powerline, as specified in DA 80/952. Airblast overpressure is not required to be monitored.

In comparison with vibration assessment criteria for the powerline, monitored results remained well under the 50 mm/s with the highest recorded peak particle velocity measuring 3.1 mm/s on 5th April 2012.

The location of the blast monitors representative of the Power Lines and the Main Northern Railway are shown on Figure 12.

Overpressure and ground vibration results of all the blasts for the reporting period are presented in Appendix F.

2.10 VISUAL AND LIGHTING

Environmental Management

Potential lighting impacts from Mt Owen and Ravensworth East operations are largely limited to a night time glow. Lighting on dumps at Glendell is visible from public points, but at a distance of at least 2 km.

Glendell implements and operates under a Mining Procedure – MIN PRO 8.05 Lighting Plants where lighting is designed to cause minimal disturbance to the community. Regular monitoring is undertaken to ensure lights are directed away from private receivers to minimise intrusive impacts. Glendell minimises night lighting impacts on surrounding landowners by ensuring, where practical, that lighting plants are positioned such that light is directed towards work areas and not towards private residents. All lighting associated with Glendell operations complies with *Australian Standard AS 4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting*.

The visual impact from the Glendell Mine lighting is consistent with the overall night time view of the Hunter Valley.

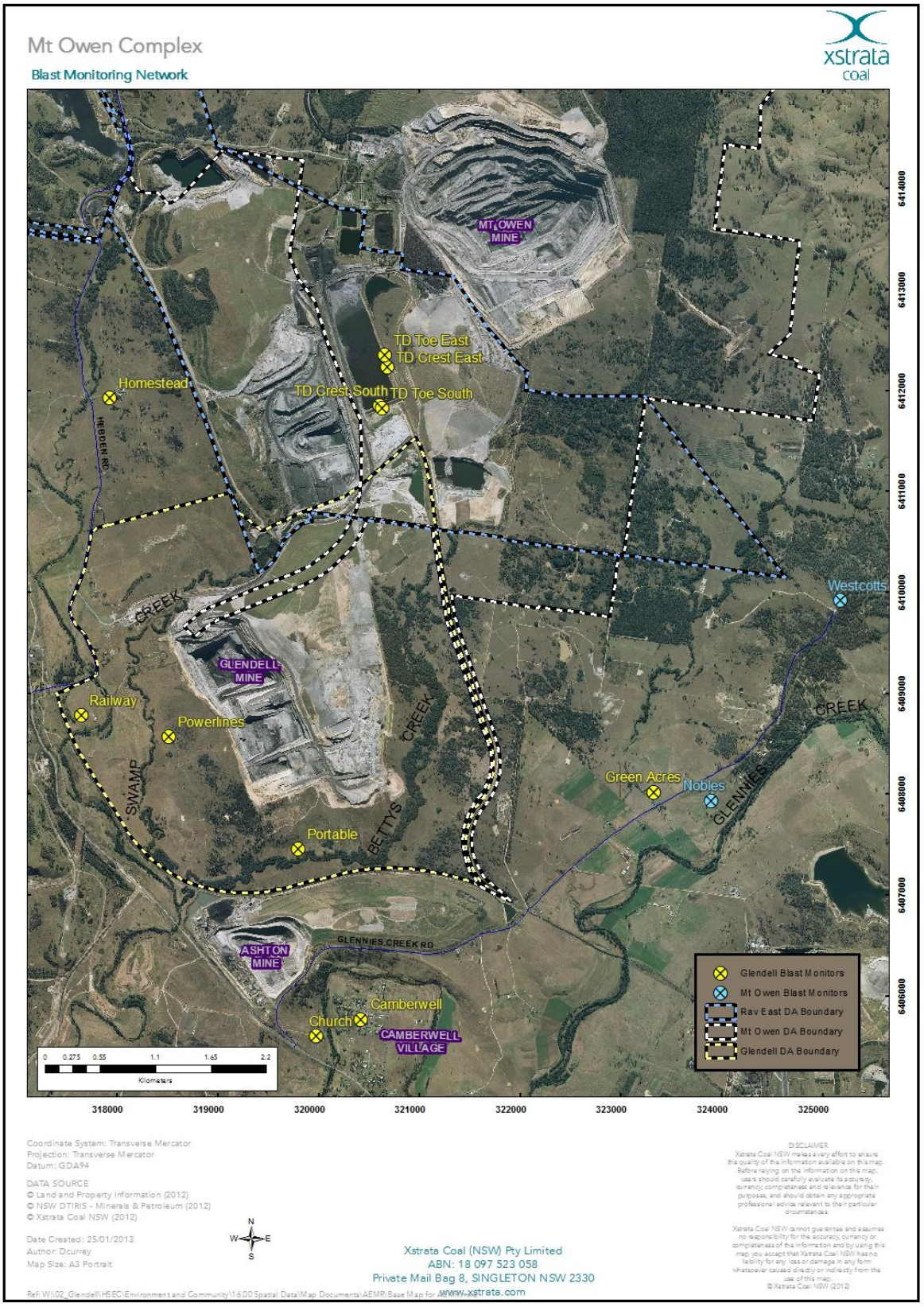
Environmental Performance

In accordance with DA 80/952, during previous reporting periods, Glendell has planted native trees into the existing tree screen adjacent to the New England Highway (as shown on Figure 2). The planting aimed at creating additional visual bunds and thickening and widening the existing tree screens.

During this reporting period the highway tree screens have been periodically maintained with ongoing watering, weed control and mulch applications to encourage vegetation survival.

An Internal Environmental Lighting Survey was conducted in 2011 however no changes in infrstructure have occurred to warrant further lighting investigations in 2012.

Figure 12
Blast Monitoring Network



2.11 ABORIGINAL HERITAGE

Environmental Management

Mt Owen Complex has an implemented Aboriginal Cultural Heritage Management Plan (ACHMP) in consultation with OEH and the local Aboriginal community.

The ACHMP provides strategies for the management of the seven remaining registered Aboriginal sites. It also provides for the management of the Bettys, Swamp and Bowmans Creek areas that fall outside the operations Disturbance Boundaries which despite being salvaged, still retain Aboriginal and archaeological values that require management.

A annual consultative meeting was convened in 2012 as part of Xstrata projects development team.

Environmental Performance

The Yorks Creek Cultural Landscape Restoration Project involves the restoration of the Upper Reaches of Yorks Creek covering approximately 200 ha (see **Figure 2)**. The project commenced in 2005 and involves a partnership between Xstrata and the local Aboriginal community. Previous surveys in the Glendell mining area have indicated that areas associated with Bowmans Creek were the most likely to have been the major focus of Aboriginal camping activity, due to the resources contained within the area. There have been a total of 43 sites recorded in previous surveys most of which consist of isolated artefact scatters.

An artefact scatter found in the north-east corner of the Glendell mining lease area was assessed as sensitive from an Aboriginal and archaeological perspective and the area is currently being managed by a broad Habitat Management Area.

Most of the artefacts found within Glendell have been salvaged under Section 90 consent #2267.

During 2012, no salvages occurred however walkover inspections were conducted on a small area south east of the Mt Owen mine and the Habitat management Zone of Glendell.

The Mt Owen Complex also utilises ground disturbance permits to ensure that works are either conducted in an area cleared under a Section 90 or a cultural heritage due dilligence assessment is conducted (and any necessary controls implemented) prior to authorisation of ground disturbance work.

2.12 FLORA AND FAUNA

Environmental Management

Fauna monitoring at the Mt Owen Complex is conducted to assess the impacts of mining on local fauna populations, including birds, reptiles, mammals and frogs. Monitoring is also undertaken in rehabilitation areas and on other land set aside for conservation purposes to look at colonisation rates of native species in these areas. Monitoring techniques include trapping, spotlighting, echolocation call analysis (for woodland bat species) and inspection of nest boxes.

Flora monitoring is conducted seasonally to assess development in regenerating forest and rehabilitation areas. Areas of remnant vegetation are used as control sites for comparison with rehabilitation areas. Information obtained from this monitoring is used to guide and continuously improve rehabilitation efforts at the mine.

Monitoring the diversity of flora species in RSF and within the rehabilitation sites has been conducted since 2000 and through this benchmarking process the success of the strategies can be assessed against the existing community. This is an important tool for developing completion criteria for the mine rehabilitation. Opportunistic and systematic surveys are undertaken, with the objective of developing a complete list of the species present. A series of reference sites have been established in the forest for comparison with rehabilitation monitoring sites and experiments.

These reference sites are surveyed annually and provide evidence over time of changes occurring in RSF and within the rehabilitation areas.

Biodiversity Offset Strategy

The Mt Owen Complex has established a comprehensive Biodiversity Offset Strategy to compensate for the disturbance of 35 ha of RSF and 59 ha of open woodland outside the forest.

The strategy was developed to offset for the disturbance of vegetation communities within the Mt Owen project area through the conservation of an initial 415 ha in offset areas adjoining the RSF and New Forest Area. The Strategy provides 'like for like' to offset habitat that will be disturbed by mining compared to habitat protected in conservation areas (see Figure 2).

Offset areas are managed to promote natural regeneration of native plant species by excluding activities such as grazing and recreation. This is complemented by direct seeding and/or planting in accessible areas. Combined with existing conservation areas at Mt Owen and the life of mine rehabilitation program, the Strategy will deliver approximately 1,800 ha of native woodland, which is approximately five times larger than the original woodland community. The long-term security of offset areas will be achieved through a range of measures.

The combined rehabilitation strategy is made up of:

- Existing Offsets (New Forest): 430 ha;
- Biodiversity Offset Strategy: 376 ha (total area once vegetation is established); and
- Mine rehabilitation: 968 ha.

Environmental Performance

Forest Fauna Surveys Pty Limited undertook surveys in 2012 across remnant and offset areas in the remaining natural area of RSF (including the Southern Remnant), the New Forest Area to the north of Ravensworth State Forest, Biodiversity Offset Areas and mine rehabilitation areas.

Since 1995, 162 bird species, 26 non-flying mammals, 21 bat species, 21 reptile and 15 amphibian species have been recorded in the RSF or adjacent land. This includes 25 threatened fauna listed on the *Threatened Species Conservation Act 1995* (TSC Act) have been recorded. These recorded threatened fauna include the Squirrel Glider, Spotted Tailed Quoll, and a number of bat and woodland bird species within the Mt Owen Complex. A further two species are defined as having the potential to occur based on evidence observed in the field including the Koala and the Large-eared Pied Bat, however there have been no recorded sightings of either.

In accordance with planning approval conditions compensatory habitat has been developed for the Green and Gold Bell Frog in Biodiversity Offset Areas and rehabilitated areas to enhance the available habitat for the species. Pond design has been constructed to provide suitable habitat for the species. Surveys were conducted during 2012 along suitable riparian vegetation areas including the rehabilitated overburden emplacement area in the north of the Mt Owen Complex have not resulted in any sightings.

Six frog species have been identified however the Green and Gold Bell Frog has not been observed during the survey or at the Mt Owen Complex since 1999. Potential explanations for the non sightings of the Green and Gold Bell Frog include habitat loss/change, predators including the Mosquito Fish and fungal diseases.

Located in the Habitat Management Zone are 49 nest boxes. These were inspected in 2012 and contained evidence of glider use. None of the bat boxes contained resident individuals present during the inspection however this is not suprising as it took several years for bats to occupy boxes at the Mt Owen Complex.

Forest Fauna Surveys Pty Limited will continue to provide information on the presence of native and introduced animals at Mt Owen Complex. Regular inspections as part of the Mt Owen Complex Landscape Management Plan will continue to assess the viable habitat for native animals in 2013.

Fauna and flora monitoring will continue into 2013 at Mt Owen Complex. Xstrata have developed an ongoing relationship with the University of Newcastle with regard to both fauna and flora monitoring. Further details on 2013 research will be included in the next AEMR.

2.13 EUROPEAN HERITAGE

Environmental Management

The Mt Owen Complex demonstrates a varied historical pattern of European habitation. Prior landuse in the area has identified a range of activities arising from dairying on the Ravensworth Estate, mixed farming and cropping to mining activities.

Environmental Performance

Mt Owen Complex has committed to several historical heritage management initiatives. Initiatives include archival recording of all sites identified within Glendell by a qualified heritage consultant to NSW Heritage Office's standards of local significance prior to the commencement of mining; and the installation of fencing to protect remaining sites from damage.

No repair or restoration works were carried out on buildings of European heritage significance during the reporting period.

2.14 BUSHFIRE

Environmental Management

Mt Owen Complex has developed a Bushfire Management Plan that is managed by XMO, Thiess and Colinta Holdings Pastoral Company. The plan aims to reduce the risk of bushfires and rapid control of outbreaks should they occur.

The plan also aims at the protection of people, property and assets along with native flora and fauna from unplanned fire events, and the utilisation of fire as a management tool to maintain or enhance native ecosystems.

Mt Owen Complex utilises a number of effective measures aimed for the prevention and control of bushfires. The reduction of fuel loads by mechanical means, grazing and through the use of controlled fires are primary means of prevention of uncontrollable wildfire. The primary means of fuel reduction at the site is through the continuation of grazing in pasture lands, tied in with mechanical clearing and some mosaic hazard reduction burning.

During 2012, the Mt Owen Complex's bushfire managemet plan was reviewed in consultation with the local Rurual Fire Service representative.

A meeting was held with representative of the local Rural Fire Service to discuss fire risks on site and to develop an understanding of the importance of fire reduction programs to be developed on site and in particular the Ravensworth State Forest, new forest and Mt Owen rehabilitation areas. Further discussions will be held in Autum 2013 in preparation for a potential back burning exercise in 2013. More details on this will be included in the 2013 AEMR.

Environmental Performance

During 2012, two small fires occurred at the Mt Owen Complex. One occurred following a lightning strike in the New Forest area and the second occurred when grass clippings and garden compost self combusted on a neighbouring property and the subsequent fire impacted on a small portion of Mt Owen buffer land. No damage to stock or infrastructure resulted from either fire.

2.15 HYDROCARBON MANAGEMENT

Small hydrocarbon spills constituted the majority of the site environmental incidents under the Mt Owen Complex EMS. All spills were cleaned up immediately preventing further contamination. A regular inspection regime is undertaken to ensure spills are identified, reported, appropriate actions taken to remediate any impacts.

During the reporting period, an increased focus has occurred in regard to the reporting of hydrocarbon spills. As a result of this vigilance, there were eleven reports of minor oil spils (<200L) in this reporting period with 14 hydrocarbon related spills occurring at the Mt Owen Complex over 200L were reported a reduction of 43% from previous years. Each event was followed up to ensure the potential for further incidents are reduced. Each event was considered reversible with no material impact to the environment.

All of the incidents were followed up and actions were taken to ensure any potential environmental impact was addressed.

Procedures are in place at the Mt Owen Complex for the effective control of hydrocarbons including bunding storage areas, safety procedures and adequate training for the safe handling of hydrocarbons. Efforts will continue to be made to ensure hydrocarbons stored onsite are managed effectively and safely.

During the 2012 Annual Inspection it was noted that lubricants were not being stored in bunds or self bunded pallets. As a result, Mt Owen have since repaired the bund cracking and have increased housekeeping inspections and monthly inspections to ensure compliance with site procedures around the storage of hydrocarbons and chemicals in the fuel facility area. All chemicals and hydrocarbons are now stored within the bunded areas.

2.16 WASTE AND HAZARDOUS MATERIAL MANAGEMENT

Environmental Management

Glendell, Ravensworth East utilise JR Richards for waste management services and Mt Owen Mine and CHPP use Remondis (formerly Thiess Services) for waste removal and management. Each system focuses on correct handling, storage, segregation, recycling and reuse of materials. Detailed reports are provided monthly to track the cost and total waste amounts produced.

The Mt Owen Complex aims to limit its potential impact on the environment and in doing so will look into the prospect of reducing the overall amount of waste produced for landfill. Waste will continue to be recycled where possible. The facilities at Mt Owen are located between the CHPP and the Main Dump and include the bath house, stores, administration building, workshop, explosive magazine and fuel storage area. Bulk diesel is stored in above ground storage tanks capable of holding 800,000 L.

Bulk fuel facilities at the Mt Owen Complex are fully bunded in areas designed to hold 110% of the largest fuel storage tank, and all emergency measures and safeguards are in place in the event of a spill. There is no potential for off-site contamination once fuel is received onsite as all handling and transport is within the contained water management system.

At Glendell explosive gases for cutting and welding are stored predominantly in size G 60 kg cylinders. Bulk diesel is stored in four 100,000 L above-ground storage tanks and in-pit mobile re-fuellers and self-bunded double skin tanks. Detonators and cord are stored in the onsite magazine.

At Mt Owen CHPP, 108,000L of diesel is stored in an above ground tank at the Rail Loadout facility for refuelling of Xstrata owned trains. In addition Mt Owen Mine is licenced to store 920,000 L of diesel in 4 bulk storage above ground tanks each with a storage capacity of 230,000L.

Increased housekeeping and internal inspections are undertaken monthly to ensure site procedures in regard to waste management are being followed.

Environmental Performance

The total amount of recycling for the reporting period was approximately 1,005 Tonnes at Glendell representing 91.75% of all waste generated was recycled and 709.3T at Mt Owen Mine with a recycle rate of 84%.

The major waste streams recycled at the Mt Owen Complex were hazardous waste oil, hydrocarbon products, effluent and paper and cardboard.

Table 31
Major Recycled Waste Streams

Waste Stream	Mt Owen	Glendell
General Waste not reported elsewhere	108.0 T	77.51 T
Paper and Cardboard	321.0 kg	133.54 kg
Waste Oil (Hazardous)*	536.8ML	542.1 ML
Oily rags	7.12 T	12.86 T
effluent	251,700 L	148,500 L
grease	3,700 kg	1,660 kg
Oil filters	15.196 T	27.28 T
Batteries (Hazardous)	6.749 T	11.84 T

*Waste oil not included in total tonnes

2.17 ENVIRONMENTAL INCIDENTS

Environmental Management

Environmental incidents at the Mt Owen Complex are classified into six categories (based on Xstrata's Internal Incident Reporting):

- **Nil Category:** below category 1;
- **Category 1**: Negligible - An incident that causes negligible, reversible environmental impact, requiring very minor or no remediation;
- **Category 2**: Minor – An incident that causes minor, reversible environmental impacts, require minor remediation;
- **Category 3**: Significant – An incident that has caused moderate, reversible environmental impact with short-term effect, requiring moderate remediation;
- **Category 4**: Serious – An incident that has caused significant environmental impact, with medium-term effect, requiring significant remediation; and
- **Category 5:** Disastrous – An incident that has caused disastrous environmental impact, with long-term effect, requiring major remediation.

Environmental Performance

Mt Owen

Mt Owen mine reported eleven environmental incidents during the reporting period. Of the incidents, nine were Category 1 and two were Category 2 incidents. All of the incidents related to minor hydrocarbon spills and all were investigated immediately with any potential environmental impact being averted. There was no environmental harm experienced with any of the minor oil spills and no offsite impacts occurred. All occurred within the open cut area and were fully contained within the existing mine water catchment. During 2012, some items of older Mt Owen equipment were replaced with new Xstrata

equipment which resulted in a reduction of oil spills in H2 of 2012. Thiess have also implemented a Managing Hydrocarbon Procedure to assist in ongoing management of hydrocarcbons within their contract operations. An additional incident also occurred in the Mt Owen buffer zone, where grass clippings located at a rental property led to a small bushfire event however this was extinguished by the RFS and no damage was sustained to private property. This has previously been mentioned in this report.

There were eleven environmental incidents during the period at the Mt Owen CHPP. These were all Category 1 incidents and consisted of small amounts of tailings being released within the CHPP area on nine occasions and a small diesel spill at the Rail refueling facility. No offsite impacts resulted in any of these incidents as all were contained within the CHPP infrastructure area. There was no environmental harm evident during any of the minor spills.

Glendell and Ravensworth East

There were 26 environmental incidents recorded at Glendell during the reporting period, representing a reduction of 47% from 2011. Of the incidents, two were considered as Category 2 and 24 Category 1 within the Xstrata internal reporting system.

The two category 2 incidents resulted from a blast that was fired on Australia Day and a small hydrocarbon spill that occurred during August 2012.

During 2012, two incidents were reported to regulatory authorities, those being the Australia Day blast and a small discharge event that occurred in March following an extensive period of excessive rainfall. As a result of these, no PINS resulted, however official warning letters were received. No further blasting non compliances occurred and there were no further water discharge events from the Mt Owen Complex. Water management has been a key focus at the complex level with sedimentation dams being key parameters at Glendell in 2012. Sedimentation dams were reviewed, desilted where required to maximise storage capacities in tiems of extreme rainfall events and water transfer infrastructure around site were improved.

The remaining incidents (Category 1) comprised of 14 small hydrocarbon spills, one coolant spill, one fume event, one broken internal water line, one noise event, one water, three hydraulic hose failures, one blast and one ground disturbance internal non compliance. No environmental harm was identified in any of the above incidents.

3.0 COMMUNITY RELATIONS

Community Management

The Mt Owen Complex is committed to contributing to local community development and ensuring all stakeholders are factually informed of its activities. This commitment is reflected in the Mt Owen Complex Stakeholder Engagement Strategy.

The Stakeholder Engagement Strategy aims to identify and understand stakeholder view's and concerns. The strategy coordinates consultation with the local community, regulatory authorities, Non-Government Organisations (NGOs), Aboriginal community and other interested parties.

The feedback obtained from the Stakeholder Engagement Strategy allows activities associated with the Mt Owen Complex to continually be reviewed and improved to better facilitate its engagement with stakeholders.

Mt Owen Complex is also actively involved in communicating its environmental and social performance internally to its employees and contractors via verbal communication sessions, toolbox talks, notice boards, intranet and email as appropriate. Inductions and regular training of all employees include detailed environmental and community components.

Community Performance

Stakeholder Discussions

During the reporting period, informal discussions continued with local landowners, SSC and other interested parties on the status of operational activities within the Mt Owen Complex. An established community response line was continued as a means of answering any stakeholders inquiries or concerns regarding the Mt Owen Complex and can be contacted on 1800 730 883.

The community response line provides an additional method of communication for stakeholders to express their concerns and allow the Mt Owen Complex to refine its operations and activities.

The Mt Owen Complex blasting hotline has continued to function as well. The blasting information hotline can be reached on 1800 248 745. The Mt Owen Complex website been upgraded to Xstrata standards with the site having control over updating the website. This allows for regular updates to be performed and data and reports to be uploaded on a regular basis.

During 2012, community consultation greatly increased across the Mt Owen Complex, with a total of 72 one on one meetings held with the local community and near neighbours.

Also, during 2012, the Upper Hunter Mining Dialogue, an initiative supported by the NSWMC, community groups, regulatory bodies and mining companies undertook several mining tours across the Upper Hunter. These tours visited the Mt Owen Complex to assess mine rehabilitation at Glendell and Mt Owen mines.

In addition, NBN television also visited Mt Owen Mine to film a short segment on mine rehabilitation. This was aired briefly in the local news session a few days later.

Newsletters

The Mt Owen Complex produces a community newsletter known as the '*Mt Owen News*'. During the reporting period a newsletter was released in July and December 2012. The Newsletter is distributed to approximately 150 residents surrounding the Mt Owen Complex and is also available on the Mt Owen Complex website (www.xstratacoalmtowen.com.au).

The newsletter provided stakeholders detail on an array of issues associated with the Mt Owen Complex. Included in the newsletter were messages from operations Managers at Mt Owen and Glendell, introductions to Environment and Community team, commnunity support schemes, Glendell MS bike riders charity report, employee profiles, and environmental updates.

Community Consultative Committee (CCC)

A key feature of the Stakeholder Engagement Strategy is the coordination and participation of regular Mt Owen Complex CCC meetings. The CCC was established, combining the Mt Owen, Ravensworth East and Glendell Mines, in accordance with Development Consent conditions to review and discuss mine development, social contributions and monitoring results relating to environmental performance.

Three CCC meetings were held during the reporting period on 16th March 2012, 20th July 2012 and 23rd November 2012.

The Mt Owen Complex CCC operates in accordance with development consent conditions and consists of local (Singleton) residents, representatives of government bodies, local landholders and Mt Owen Complex representatives.

Topics discussed were updates to Mt Owen Complex current development projects, updates on community projects and social involvement, review on environmental performance including complaints, rehabilitation and environmental initiatives, review of environmental performance and review of operational performance. The NSW Department of Planning and Infrastructure also attended one meeting during the year. In addition to those items listed, each committee meeting also discusses business arising from the previous meeting minutes, correspondence and general business. In accordance with

conditions specified in the Development Consent, minutes of each of these meetings are available on the Mt Owen Complex website (www.xstratacoalmtowen.com.au).

Representatives that attended one or more of the CCC meetings during the reporting period included:

Table 32: CCC Membership 2012

V. Scott (SSC) – 3 meetings	B. Thomas (SSC) – 2 meetings	P. Bestic (Community) – 1 meeting
G. Adamthwaite (SSC) – 1 meeting	D McIlveen (Thiess) – 3 meetings	S Palmer (GLD) – 1 meeting
A. Schiemerer (Community) – 2 meetings	M. Spitteri (Community) – 1 meeting	S Scott (XCN) – 1 meeting
W. Williams (Community) – 3 meetings	D. Oloffsson (Community) – 2 meetings	J. Hendricks (Thiess) – 1 meeting
P. York (Thiess) – 3 meetings	J. Marshall (Community) – 3 meetings	T. Wells (Mt Owen Complex) – 3 meetings
T Proctor (Umwelt) – 1 meeting	G. Cook (GLD) – 2 meetings	A. McLeod (Mt Owen Complex) – 3 meetings
D. Currey (GLD) – 2 meetings	B Harrison (DOPI) – 1 meeting	P. Simpson (Mt Owen Complex) – 2 meetings
S Monckton (MTO) – 2 meetings	V McBride (XCN) – 1 meeting	L Watts (GLD) – 3 meetings

Aboriginal Community Liaison

A Conservation Area (CA) currently exists at Mt Owen over an area of approximately 29 Ha around Yorks Creek to the west of the Mt Owen main overburden dump for protection of archaeological sites. This area is known as the Yorks Creek CA.

Mt Owen Complex consults with local Aboriginal groups to keep the Aboriginal community informed of the progress of mining operations at the Mt Owen Complex and also discuss any upcoming projects, and to seek feedback from the Aboriginal community on archaeological and operational issues.

During the reporting period a meeting was held in November 2012. Representatives from various Aboriginal groups in the Hunter Region were invited to attend and the meetings were well supported.

During the year, Xstrata Coal NSW (XCN) has developed Guiding Principles for Engagement with Aboriginal People, which describes how XCN and the Xstrata sites will engage with Aboriginal people to pursue mutually beneficial outcomes. XCN is also developing a Reconciliation Action Plan (RAP) for the Hunter Valley to build better relationships, promote understanding and create opportunities for the Aboriginal community. The RAP has 6 key focus areas which include:

- Relationships and Reconciliation;
- Skills development and employment;
- Education;
- Community and Social Involvement;
- Business Development; and
- Cultural understanding and awareness

The RAP is coordinated by XCN and provides a structured and consistent approach in engaging with Aboriginal communities around social and community issues that each site can utilise however the RAP does not include site specific cultural heritage management issues associated with site approvals or salvage activities.

Community Activities And Participation

Mt Owen Complex is committed to supporting the local community in which they operate. Mt Owen Complex's Stakeholder Engagement Strategy provides a practical management tool for stakeholder engagement. A key component of the Stakeholder Engagement Strategy is to ensure continued support of the local community.

To reflect this commitment, Mt Owen Complex was involved and supported the following diverse and innovative local community activities:

- Regular community newsletters detailing all activities of the Mt Owen Complex;
- Captain Courageous Bone Marrow Failure Research;
- 1000 K's for Kids
- Mt Pleasant Public School- Horse sports Day;
- Future Achievement Australia Foundation;
- Singleton Junior Rugby League;
- Samaritans Foundation Christmas Lunch- Singleton;

Mt Owen Complex is also supportive of educational and research initiatives that enhance student learning and provides opportunities for skills development. This is demonstrated through the relationship with the Mt Pleasant School and commitment to ongoing research programs at Mt Owen Complex in partnership with the University of Newcastle.

Xstrata Mt Owen also provides regular presentations and mine tours and participates in interactive discussion sessions with teachers, pupils and university students.

Social Contributions And Achievements

XMO recognises its importance to the local community in which it operates. Funds are allocated annually for such initiatives.

During the reporting period, Mt Owen Complex provided contributions to support local community organisations and groups including:

- Mai-Wel Group;
- Westpac Helicopter Service;
- Singleton Heights Pre School;
- Camp Quality;
- Ovarian Cancer Australia;
- Prostate Cancer Foundation;
- Singleton Fire Brigade
- Mt Pleasant Public School P&C Committee for horse sports day; and

.

Mt Owen Complex in the support of local community events and educational development will be supporting more initiatives during the next reporting period.

During 2012, $52K was donated to the local community in support of local community organisations and groups.

3.3 ENVIRONMENTAL COMPLAINTS

Environmental Management

The Mt Owen Complex Environment & Community Manager is responsible for coordinating responses to any inquiries or complaints XMO also operates dedicated complaints handling hotlines, aimed at accurately recording and following up all complaints. The toll free community hotline and emergency contact number consists of:

- Mt Owen Complex Blasting Information Line (1800 248 745);
- Mt Owen Complex Community Response Line (1800 730 883); and
- 24 hour Emergency Contact Number (02 6570 0800).

At a minimum, notification of complaints received via the community hotline is to be provided by immediate SMS to the Mt Owen Complex Environment and Community Manager, Thiess Environmental Supervisor and the Mt Owen and Glendell Production Supervisor on-shift. Complaints can be received in any other form and complaints or enquiries regarding environmental management are reported to the Mt Owen Complex Environment and Community Manager and the Thiess Environmental Supervisor. Each employee ensures all complaints are followed up immediately. All complaints are reported in the internal monthly operations report.

The details of the hotline are advertised in the local newspapers at least quarterly, via the Mt Owen Complex Community newsletters and the Mt Owen Complex website.

A procedure for handling complaints has been implemented as part of the Mt Owen Complex EMS which is in line with regulatory requirements. All complaints are thoroughly investigated, including the use of available environmental monitoring data in conjunction with operating records to determine any likely cause. Feedback to the complainant is provided as quickly as possible.

Environmental Performance

The Mt Owen Complex received a total of 54 environmental complaints in 2012, being made up of 4 for Mt Owen operations and 50 for Glendell.

A review of complaints received since 2005 for Mt Owen indicates that the number of complaints has reduced significantly with 141 to 4 complaints received in 2012. In accordance with Schedule 6, Condition 5(b) of DA 14-1-2004 and DA 52-03-99 a summary of complaints received since July 2005 is provided in Figure 14 and indicates that there has been a significant decrease in the number of complaints received.

Of the complaints received as a result of Mt Owen in 2012, one each was received for noise, dust, blasting and lighting. Each complaint was investigated and the complainant provided an explanation as to the cause of their complaint.

The total number of complaints received during the 2012 reporting period for Glendell was 50 and primarily related to noise. Blast overpressure, vibration and dust issues contributed to the minority of complaints.

Of the complaints received at Glendell, all were reported directly to Glendell Mine via the community hotline or via the OEH and/or OEH. It must however be noted that in 2012, 47 complaints received by Glendell originated from one sole complainant, with three being from other individuals.

All complaints registered were promptly investigated and monitoring data studied where required. All complainants were contacted (where possible) and provided an explanation as per the cause of their complaint.

Table 33 – Complaints received in 2012

Date	Time	Site Received	Nature of Complaint	Company Response
4/01/2012	09:15	Glendell	Noise	DoPI received a call from a resident of Camberwell and officers attended the area later that morning. E&C Coordinator advised DoPI that the noise was determined to be predominately from the highway and that a temperature inversion at the time could have caused elevated noise levels.
09/01/2012	10:00	Glendell	Noise	The complaint was investigated and an alternative phone number was provided to the resident for use until the hotline was reinstated.
30/01/2012	09:25	Glendell	Noise	DoPI and OEH received a call from a resident of Camberwell. A discussion was had with both departments and the results of the investigation were provided.
30/01/2012	14:28	Glendell	Noise	
21/02/2012	15:00	Glendell	Blast	Discussed with complainant and a meeting was arranged to further discuss the issue
28/02/2012	09:00	Glendell	Noise	OEH notified the E&C Manager of a complaint logged via their complaints line. An investigation found that Glendell was contributing to the noise and the necessary operational changes were made.
01/03/2012	09:30	Glendell	Noise	OEH received a complaint. The E&C coordinator had visited the Camberwell area earlier that morning to assess the noise levels due to the presence of an inversion. After the complaint, the data was review and the results provided to OEH.
01/03/2012	12:10	Glendell	Dust	DoPI received a dust complaint and they investigated the area. They arranged for a site inspection after which they advised that the dust issue seemed to be under control.
02/03/2012	14:14	Glendell	Noise	DoPI received a noise complaint for 10pm the night before (1 March). The results of the investigation were provided to them.
09/03/2012	14:03	Glendell	Blast	OEH received a complaint regarding the blast vibrations. The blast was within approved limits and the results were provided to DoPI.
12/05/2012	08:25	Glendell	Noise	A resident of Camberwell contacted the mine. The Mining supervisor on shift at the time drove out to Camberwell to assess the noise and altered the mining operations due to not being able to determine Glendell's contribution due to the other low frequency noise.
16/05/2012	07:28	Glendell	Noise	A complaint was regarding noise. The E&C Coordinator drove to the Camberwell area and investigated the compliant.
21/05/2012	08:04	Mt Owen Mine	Noise	Noise complaint received. Complaint was investigated and the mine was found to be within compliance levels.
23/05/2012	11:07	Glendell	Noise	EPA received an anonymous email complaint from the Camberwell area. The results of the investigation were supplied to the EPA.
15/06/2012	11:10	Glendell	Noise	DoPI received a noise complaint from a resident of Camberwell Village. The results of the investigation were provided to DoPI.
21/06/2012	08:40	Glendell	Noise	The E&C coordinator received an email from DoPI, the OEH and the resident regarding a noise complaint from a resident in Camberwell Village. The resident was asked to contact the Community Response Line to allow for immediate action to be taken. The results of the investigation were reported, and the mining supervisors were asked to assess mining operations during the night and early morning periods. The results of the investigation were provided to DoPI and OEH.
21/06/2012	14:32	Glendell	Noise	
21/06/2012	20:40	Glendell	Noise	
23/06/2012	17:25	Glendell	Noise	A complaint was received. An investigation was conducted and Glendell was found to be operating within limits
25/06/2012	09:00	Glendell	Noise	OEH received a noise complaint from a resident of Camberwell Village. The results of the investigation were provided to OEH.
30/06/2012	21:29	Glendell	Noise	A complaint was received. An Investigation showed that Glendell was operating within compliance limits.
01/07/2012	07:45	Glendell	Noise	A complaint was received. An email was also received via DoPI on Monday 2 July regarding noise complaints for Saturday night and Sunday morning (30/06/2012 and 1/07/2012). An email was also received by the OEH on Tuesday 3 July 2012. Immediate action was taken and operational changes were implemented to reduce the noise. The results of the investigation were provided to DoPI and OEH.
08/07/2012	09:09	Glendell	Noise	An email was received from DoPI regarding a complaint on the morning of 7 July 2012. The results of the investigation were provided to DoPI.
11/07/2012	09:20	Mt Owen Mine	Dust	A complaint regarding dirt and mud being deposited on the road from cars and trucks leaving the mine was received. The importance of washing all vehicles before leaving site was communicated to everyone. This complaint also related to general conditions of Hebden Road
16/07/2012	08:18	Glendell	Noise	A complaint was received and the mining supervisor investigated the noise and made the necessary operational changes.
18/07/2012	21:31	Glendell	Noise	A complaint was received via the Mt Owen complaints line and email from DoPI. The mining supervisor made the necessary operational changes at the time of the call and the results of the investigation and the requested information were provided to DoPI.
26/07/2012	09:14	Glendell	Noise	An email was received from the OEH regarding a noise complaint from a resident in Camberwell. The results of the investigation were provided to OEH.
27/07/2012	15:00	Glendell	Dust	DoPI received a complaint about excessive dust. As a result, the mine altered their operations.
29/07/2012	18:35	Mt Owen Mine	Lighting	The Snr Environmental Advisor received a call regarding the lighting and a request to move them. The Production Superintendent was notified and the lights were repositioned.
30/07/2012	08:26	Glendell	Noise	DoPI advised the E&C Coordinator of two complaints from a Camberwell resident over the weekend. No immediate action could be taken as the mine was not contacted
30/07/2012	08:26	Glendell	Noise	

				directly however the results of the investigation were provided to DoPI.
30/07/2012	17:30	Mt Owen Mine	Blast Vibration/ Overpressure	The E&C Manager was contacted regarding vibration from a blast. An investigation was conducted.
02/08/2012	21:35	Glendell	Noise	A complaint was received via the Mt Owen Community response line. The mining supervisor made the necessary operational changes.
03/08/2012	08:24	Glendell	Noise	A complaint from a resident of Camberwell Village was received via the Mt Owen Community response line. The noise was investigated by the E&C Coordinator and Mine Manager.
04/08/2012	03:41	Glendell	Noise	A complaint was received via the community response line. Operational changes were made at the time and the E&C Coordinator discussed the complaint with the resident the following morning. An offer to arrange a visit to discuss the noise management process which was declined by the resident.
06/08/2012	17:05	Glendell	Blast Dust	The complainant contacted the E&C Manager and left a voicemail they also lodged a complaint with the community response line the following morning (07/08/2012) regarding grey dust covering their property. The E&C coordinator received the compliant via the community response line and contacted the complainant and advised that a blast was fired with a westerly wind present around the time of the complaint and that Glendell would undertake a review of their blasting restrictions.
07/08/2012	08:26	Glendell	Noise	The E&C Manager and DoPI received an email from a resident of Camberwell. Operational changes had been initiated earlier that evening. The results of the investigation were provided to DoPI.
08/08/2012	15:04	Glendell	Noise	DoPI received a complaint that morning from a resident in Camberwell. The complaint was investigated and the results were provided to DoPI.
14/08/2012	08:35	Glendell	Noise	DoPI received a complaint about noise for the night before. Noise alarms had been triggered that night and the Mining supervisor made the necessary operational changes. The complaint was investigated and the results were provided to DoPI.
15/08/2012	08:45	Glendell	Noise	OEH received a complaint from a resident of Camberwell. No immediate action could be taken as the mine was not contacted directly. The E&C Manager discussed the complaint with OEH.
15/08/2012	09:00	Glendell	Noise	The E&C Manager was contacted directly about noise but complainant could not provide the time. The E&C Manager tried to investigate the complaint and contacted the resident with the results obtained.
22/08/2012	09:13	Glendell	Noise and Dust	The EPA received a complaint from a resident of Camberwell Village and the results of the investigation communicated to the OEH.
23/08/12	14:10	Glendell	Noise and Dust	The department OEH received a complaint about mine noise and dust. The complaint was investigated and found to not be related to the Mt Owen Complex.
01/09/2012	08:25	Glendell	Noise and Dust	OEH received a complaint from a resident of Camberwell regarding noise, dust and an issue with the Community Response line. The E&C Manager contacted the resident and discussed the compliant. No issue with the hotline was found.
08/09/2012	07:30	Glendell	Dust	The E&C Manager was contacted directly regarding dust being generated by the mine. The Mining Supervisor was contacted and mining operations were relocated. Shortly after DoPI called the E&C Manager with the same compliant and they were happy with the actions being implemented.
19/09/2012	09:16	Glendell	Blast Vibration/ Overpressure and Fume	EPA Requested details of a blast fired on the 14/09/2012 which was reported as “a very loud blast which had an odour”. The blast was investigated and the details sent to the EPA.
21/09/2012	09:13	Glendell	Noise	DoPI received a noise complaint from a Camberwell Village resident. The results were provided to DoPI.
4/10/2012	05:55	Glendell	Noise	The E&C Manager was contacted directly about a noise complaint however due to the lack of information no immediate action was able to be taken.
08/10/2012	13:45	Glendell	Noise	OEH received a noise complaint and the information was supplied to the OEH. No action was able to be taken as the mine was not contacted directly.
25/10/2012	12:50	Glendell	Noise	DoPI received a noise complaint from a resident in Camberwell Village. The complaint was investigated and the results were communicated to DoPI.
01/11/2012	09:41	Glendell	Noise	DoPI received a noise complaint The complaint was investigated and the results were provided to DoPI.
26/11/2012	10:34	Glendell	Noise	DoPI received a noise complaint from a resident in Camberwell Village. The complaint was investigated and the results were provided to DoPI.
09/12/2012	07:49	Glendell	Noise	A noise complaint made by a nearby neighbour was not received until the following day and as a result no immediate action could be taken.
15/12/2012	11:22	Glendell	Blast	The E&C Coordinator received an email from a resident of Camberwell regarding a blast. DoPI and OEH were also copied into the email. The blast was investigated and the results provided to DoPI and OEH.

Figure 13 - Mt Owen Complex Complaints 2012

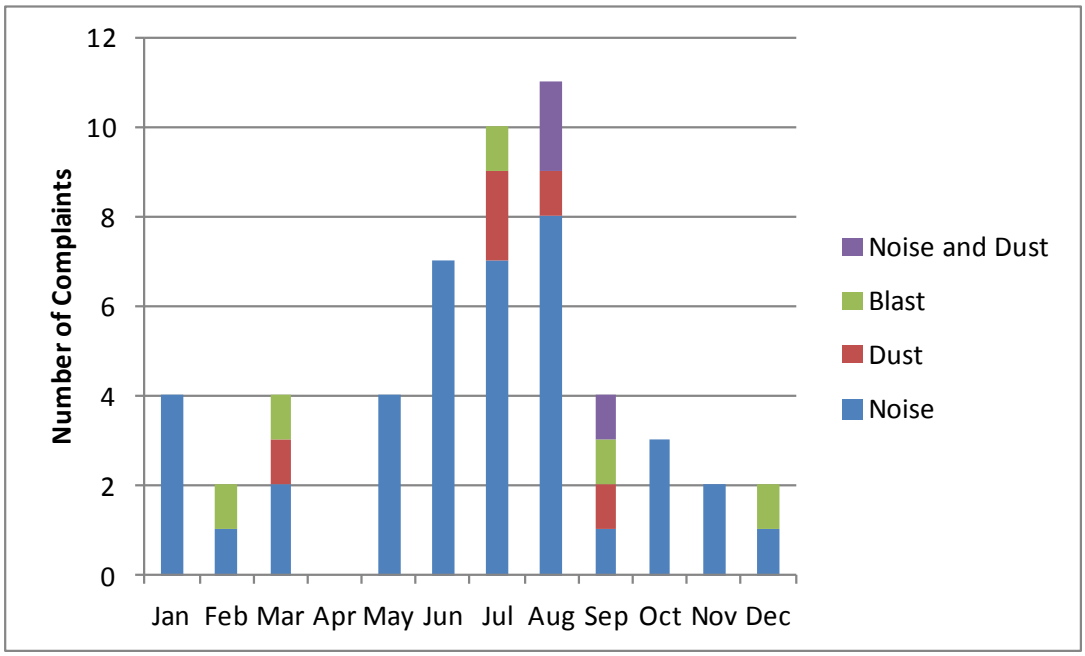
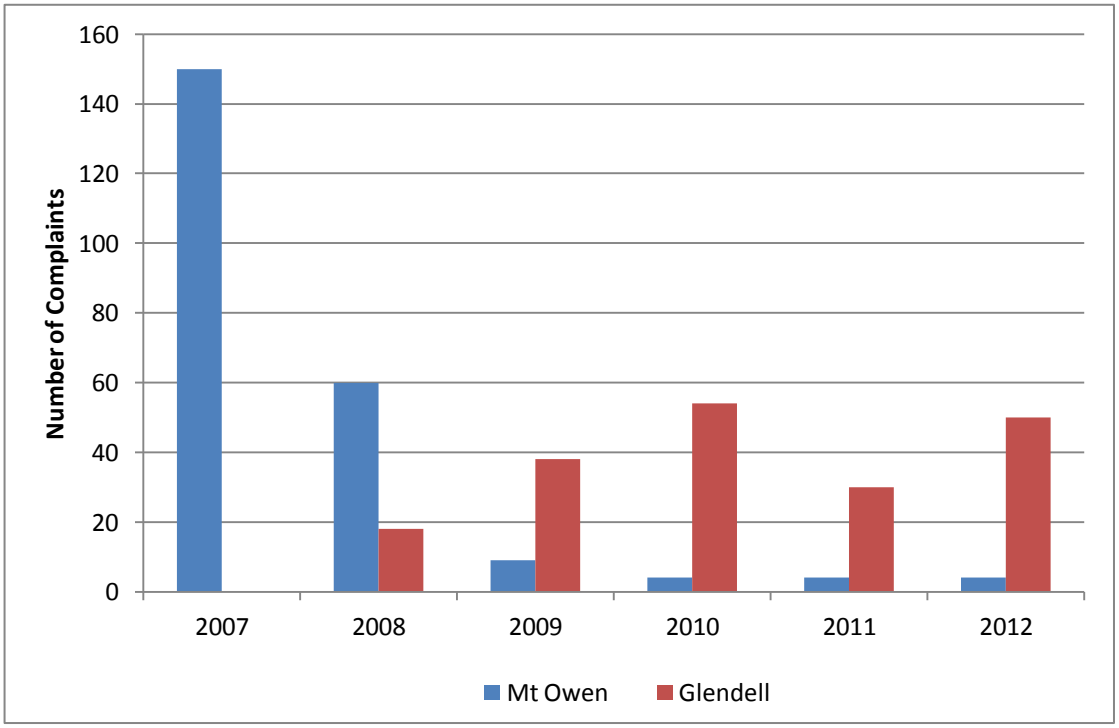


Figure 14
Comparisons of Complaint Trends 2007-2012



(Glendell commenced operations in 2008)

A number of measures have been implemented at the Mt Owen Complex to reduce noise impacts from operational activities. Existing measures include noise attenuated equipment, modification of operational activities, use of smart alarms and silent horn systems and strategic mine planning to dump low at night and SMS alert systems.

Noise remains a concern for the community for Glendell and investigations into improvement opportunities continued during the reporting year. An established real-time noise monitoring network is in use providing SMS alarms when a pre-determined criterion is exceeded. This has been adopted for both noise and dust management.

Mine planning considers environmental impacts such as winter noise (particularly at night), dust potential in the dry/windy months and visual impact. Every effort is made to provide alternative inpit or protected dumps/benches to reduce noise and dust potential during unfavourable conditions. Site lighting plant procedures also consider private residents and public road users in relation to positioning of lights.

The Mt Owen Complex will continue to liaise with our community, to manage environment and community impacts and promptly investigate and respond to queries/complaints. Complaint statistics and community feedback are also reviewed during preparation of annual site management and action plans.

Table 34
Community Issues Summary 2012

Month	Glendell Dust Complaints	Glendell Noise Complaints	Glendell Blast Complaints	Glendell Other Complaints	Mt Owen Dust Complaints*	Mt Owen Noise Complaints	Mt Owen Blast Complaints	Mt Owen Other Complaints	Total
January		4							4
February		1	1						2
March	1	2	1						4
April									0
May		3				1			4
June		7							7
July	1	7			1		1	1	11
August	1	8		2					11
September	1	1	1	1					4
October		3							3
November		2							2
December		1	1						2
Total	**4**	**39**	**4**	**3**	**1**	**1**	**1**	**1**	54

**Ravensworth East recorded no complaints during the Reporting Period*

4.0 REHABILITATION

From a complex level, 173.9 hectares of rehabilitation was completed in 2012, being made up of 121ha at Glendell and 52.9ha at Mt Owen Mine. Mt Owen Complex is a showcase for setting rehabilitation standards as the site is now listed as a "Highly Commended" site on the Global Restoration Network of the Society for Ecosystem Restoration, International.

Five land capability classes (Classes II, IV, V, VI) occur within the Glendell Mine site. The Glendell Mine site primarily consists of Class V land with areas of Class II and IV associated with the Swamp and Bowmans Creek floodplain and Bettys Creek, respectively. A minor area of Class VI land is also present within the Glendell Mine site.

The majority of the Proposed Disturbance Area is located on Class V land, which is suitable for grazing and occasional cultivation, and areas of Class VI land. Relatively minor areas of Class II and IV land are located inside the Proposed Disturbance area.

The primary objective of rehabilitation of disturbed land is to create a stable final landform with acceptable post-mining land use capability. Rehabilitation of the overburden emplacement areas and backfilled pits are conducted progressively over the life of the mine, as an integral component of mining operations. All rehabilitation works are scheduled to occur progressively as soon as practicable after mining disturbance.

In recognition of the importance of vegetation corridors to regional biodiversity, the rehabilitation strategy has been designed to link rehabilitation areas to the proposed offset areas and existing remnant vegetation. Local provenance species will be used during rehabilitation, where suitable.

Topsoiled areas will have a nominal land capability of class IV or class V, depending on slope and landscape position. Given the necessity to provide ground habitat within native woodland rehabilitation areas, the practice is to stockpile surface rock greater than approximately 500 mm diameter for use as fauna habitat features.

Rehabilitation is conducted in accordance with the MOP conceptual drawings, rehabilitation strategy and the Mt Owen Complex Landscape Management Plan.

The overall rehabilitation objective for the disturbed land is for a final land use dominated by pastures with a minimum of 30% native tree lots and corridors for the purpose of stock shade and shelter, and habitat restoration including the reestablishment of forest revegetation communities.

Table 35 shows the disturbance and rehabilitation undertaken during the reporting period and that proposed for the next reporting period.

Xstrata Glendell Mine also won the Xstrata's XC Chief Executive SD Award for Environment and Community for Glendell's environmental and community, including rehabilitation performance in 2011.

Approximately 95 ha of rehabilitation has been forecast for the next reporting period at Glendell and Ravensworth East and 17.4ha for Mt Owen mine.

During 2012, Mt Owen commenced capping of the Stage 1 Tailings void (formerly known as the Swamp Creek North Void). This area is approximately 12 hectares and involves the movment of around 523K bcm of fill in a four layered cover over the tailings area. Drainage control initially flows into a small sedimentation dam, however eventually when water quality is acceptable for direct release, it will flow into the adjacent Stringybark Creek. Initial capping of Stage 1 is due for completion in February 2013, upon which final rehabiltiation will commence and be completed by the end of Quarter 1 2013.

Rehabilitation Trials And Research

Since 1996 eleven Honours Degree and three PhD Degree candidates from the University of Newcastle have been conducting research at Mt Owen which has aided the development of the RSFVC Research Program. This program comprises two sub-programs, that is, the Forest-Woodland Reconstruction Research Program and the BORP.

The objectives of the Forest-Woodland Reconstruction Research Program are to understand plant function within the RSFVC, seek solutions to problems in the 'New Forest' and remnant vegetation areas within the Mt Owen Complex while understanding barriers to enable the success in the reconstruction of forest and woodland.

The Forest-Woodland Reconstruction Research Program studies continued to progress in 2012. During this year, a report was commissioned by Xstrata being based on the Mt Owen experience. This was prepared and completed by the University of Newcaste and focussed on reforestation of lands. The report "Establishing Native Vegetation – Principles and Interim Guidelines for Spoil Placement Areas and Restoration Lands" was published and is available to the public and other mining companies to assist them in rehabiltiation practices.

Xstrata Mt Owen's BOS commenced in 2005 and is currently being reviewed. Initially the approach was to establish forest-woodland in the offsets areas. This included:

- Identifying source vegetation capable of natural regeneration and locating progeny for long term modelling of forest composition;
- Transferring fresh topsoil from RSF to spoil;
- Experimental planting to test alternative methods of forest-woodland reconstruction; and
- Source planting and seeding for long-term modelling of forest composition.

The first phase of the BOS has been complete. A review of the progress of Phase 1 indicated that:

- Regeneration potential of native vegetation had been assessed and further research will continue in this area;
- The development of cost-effective methods of reinstating vegetation strata supported forest topsoil transfer and site preparation experiments;
- The establishment of source vegetation in a number of areas had been achieved;
- Ongoing studies on rebuilding the ecology of degraded soil has made significant progress with some unique strains of nitrogen fixing bacteria identified; and
- Best site preparation determinations have been addressed in experiments such as the site preparation experiment and source planting areas.

In addition to this research, rehabilitation monitoring has been undertaken annually at Glendell. This involves the establishment of analogue plots, transects as well as mature and young plot assessments. Older rehabilitation areas extend up to 22 years on the Ravensworth East mine, resulting in long term assessments being achieveble. When undertaking this monitoring, opportunities for continuous improvement and specific completion criteria can be reviewed.

Table 35
Mt Owen Complex Performance against MOP's

	MOP Commitment	Actual (31/12/12)	Comments
Glendell			
Pastures	211	176	Have currently exceeded the MOP target
Native Forest / Woodland	85	0	50ha not reshaped/ reforested due to future proposed mining area (RERR) and not yet been established.
Ravensworth East			
Pastures	60*	202	Have currently exceeded the MOP target
Native Forest	412*	41	Area has not been finalised due to future proposed mining area (RERR) and future tailings disposal destination. Area reflected in MOP commitment was final mine closure details and not end of MOP period.
Woodland	256.4*		
Mt Owen			
Pastures	11.6*	270	Have currently exceeded the MOP target
Native Forest	150*	205	Area is progressively being reforested. Current area reflected in MOP commitment was final mine closure details and not end of MOP period.
Woodland	256.4*		

5.0 ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

A number of activities are proposed to be undertaken at the Mt Owen Complex during the next AEMR period. Mining will continue to be undertaken in accordance with conditions outlined in Development Consents and supporting documents for operations at the Mt Owen Complex. Rehabilitation works will be targetting 112.4 hectares.

Table 36

Mt Owen Complex Rehabilitation Summary as at 31st December 2012

		Area Affected/Rehabilitated (ha)											
		TO DATE				LAST REPORT				NEXT REPORT (ESTIMATE)			
A:	**MINE LEASE AREA**	Glendell*	Rav East	Mt Owen	Total	Glendell*	Rav East	Mt Owen	Total	Glendell*	Rav East	Mt Owen	Total
A1:	Mine Lease Area				4706								4,706
B:	**DISTURBED AREAS**												
B1:	Infrastructure Area (other disturbed areas to be rehabilitated at closure including facilities, roads)	54	46	132	232	51	46	131	228	54	46	132	232
B2:	Active Mining Area (excluding items B3 - B5 below)	111.8	44.1	171.2	327.1	135	52	158	345	163.8	44.1	193.2	401.1
B3:	Waste emplacements, (active/unshaped/in or out-of-pit)	138.5	140.1	295.4	574.0	191	117	398	706	102.8	130.1	334.4	567.3
B4:	Tailings emplacements, (active/unshaped/uncapped)	0	45	65.8	110.8	0	45	51	96	0	45	53.5	98.5
B5:	Shaped waste emplacement (awaits final vegetation)	35.4	12.6	10.7	58.7	32	21	37	90	35	0	0	35
	ALL DISTURBED AREAS	339.7	242.8	720.1	1302.6	409	281	775	1465	355.6	265.2	713.1	1333.9
C:	**REHABILITATION PROGRESS**												
	Overburden Dumps	276	243	475	991	97	243	380	720	371	263	527	1161
	Infrastructure Area	0	0	0	0	0	0	0	0	0	0	0	0
C1:	Total Rehabilitated area (except for maintenance)	276	243	475	991	97	243	380	720	371	263	527	1161
D:	**REHABILITATION ON SLOPES**												
D1:	10 to 18 degrees	7.3	0	12.3	19.6	0	0	0	0	7.3	0	12.3	19.6
D2:	Greater than 18 degrees	0	0	0	0	0	0	0	0	0	0	0	0
E:	**SURFACE OF REHABILITATED LAND**												
E1:	Pasture and grasses	276	202	270	648	97	202	175	474	371	212	297.3	880.3
E2:	Native forest/ecosystems	0	41	205	246	0	41	205	246	0	51	229.7	280.7
E3:	Plantations and crops	0	0	0	0	0	0	0	0	0	0	0	0
E4:	Other (include non-vegetative outcomes)	0	0	0	0	0	0	0	0	0	0	0	0

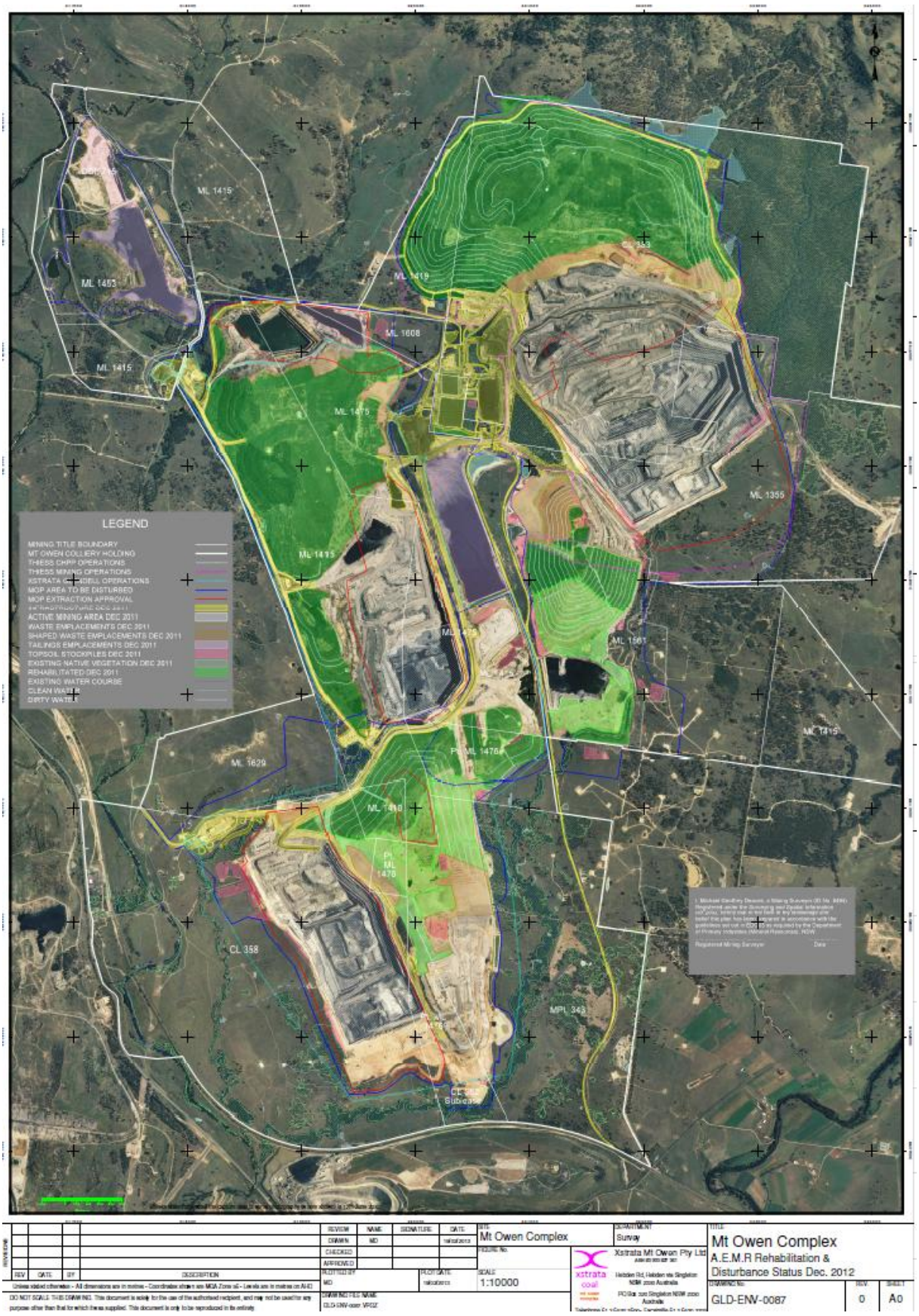


Figure 15: Annual Rehabilitation Plan

LIST OF APPENDICES (Refer to attached Document)