xstrata coal

umwelt

Xstrata Mount Owen Pty Limited

Preliminary Environmental Assessment

Mount Owen Continued Operations Project

February 2013

PRELIMINARY ENVIRONMENTAL ASSESSMENT

Mount Owen
Continued Operations Project

February 2013

Prepared by
Umwelt (Australia) Pty Limited

on behalf of
Xstrata Mount Owen Pty Limited

Project Director:	**Barbara Crossley**
Project Manager:	**Tim Browne**
Report No.	**3109/R01/FINAL**
Date:	**February 2013**

Newcastle

PO Box 3024
75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 Introduction

The Mount Owen Complex is located within the Hunter Coalfields in the Upper Hunter Valley of New South Wales (NSW), approximately 20 kilometres north-west of Singleton, 24 kilometres south-east of Muswellbrook and to the north of Camberwell village (refer to **Figure 1.1**). Operations within the Mount Owen Complex are undertaken pursuant to three separate development consents including Mount Owen Mine DA 14-1-2004 (Mount Owen Mine), Ravensworth East Mine DA 52-03-99 (Ravensworth East Mine) and Glendell Mine DA 80/952 (Glendell Mine). Current mining operations at the Mount Owen Complex include Mount Owen Mine (the North Pit) and associated infrastructure, Ravensworth East (including the existing West Pit), and Glendell (Barrett Pit). Mining operations at the Mount Owen Complex includes the integrated use of the Mount Owen coal handling and preparation plant (CHPP), coal stockpiles and train load-out facility (refer to **Figure 1.2**). Additionally, Xstrata Mount Owen Pty Ltd (XMO), are currently seeking a modification to the Ravensworth East DA, known as the proposed Ravensworth East Resource Recovery (RERR) Project which, if approved, will be incorporated in the Mount Owen Complex.

The North Pit and associated infrastructure is owned and managed by XMO, and operated by Thiess Pty Limited (Thiess). The Mount Owen open cut mine has an approved production rate of 10 million tonnes per annum (Mtpa) of run of mine (ROM) coal, the Ravensworth East mine has an approved production rate of 4 Mtpa ROM coal and Glendell has an approved production rate of 4.5 Mtpa ROM coal. The Mount Owen Complex has an approved total processing capacity of 15 Mtpa of ROM coal. XMO expect that mining will be completed within the currently approved area of the North Pit and the RERR mining area by 2018, subject to approval and market conditions. Glendell is currently planned to cease mining in 2024.

XMO has undertaken an exploration program within its mining tenements to the south of the North Pit which has identified significant additional mineable coal tonnes. The Mount Owen Continued Operations Project (the Project), will seek approval to continue mining of the North Pit to the south of the current approved pit limit (refer to **Figure 1.3**). The Project will enable extraction of approximately 60 million tonnes (Mt) ROM of additional minable coal beyond the currently approved pit shell. These additional mineable coal tonnes would extend the approved pit shell from 2018 to approximately 2026.

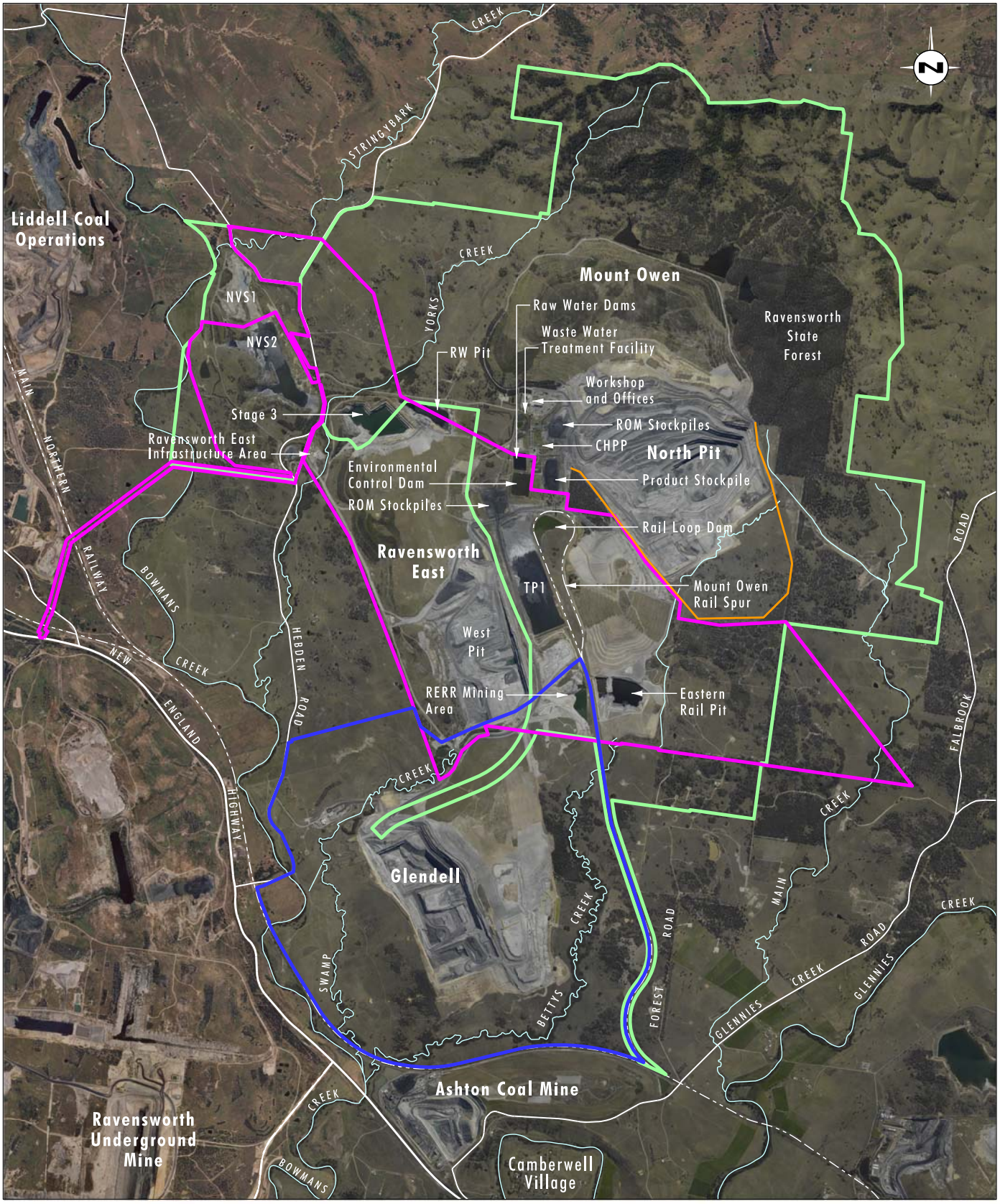
For the purposes of this Project, the Project Area (refer to **Figure 1.3**) encompasses the current approved development consent areas for Mount Owen and Ravensworth East in addition to the areas associated with the proposed rail augmentation and Hebden Road works. The proposed disturbance area is a portion of land within the Project Area that would be directly impacted as part of the Project.

As part of the Project, no changes are proposed to the approved Glendell or Ravensworth East mining operations. However, to improve operational efficiencies and management of the Mount Owen Complex operations, should the Project be approved, XMO seeks a single consolidated development consent covering the Mount Owen and Ravensworth East mines but excluding the Glendell mine (as identified in **Figure 1.3**).

XMO is seeking to increase the currently approved processing and load-out capacity at the Mount Owen CHPP from 15 Mtpa to 17 Mtpa to allow for capacity to wash ROM coal to match operational production for the Mount Owen Complex. The Project is proposing to expand the existing product stockpile pad and improve the coal handling functionality of the stockpile. The Project also seeks approval for upgrades to the mining infrastructure area (MIA) including increased capacity at the existing heavy vehicle workshop and fuel farm, and replacement of associated site services, such as the raw water system, to meet current best practice standards.

FIGURE 1.1

Locality Plan



Source: Xstrata and Mount Owen (2012)

0 1 2 3km

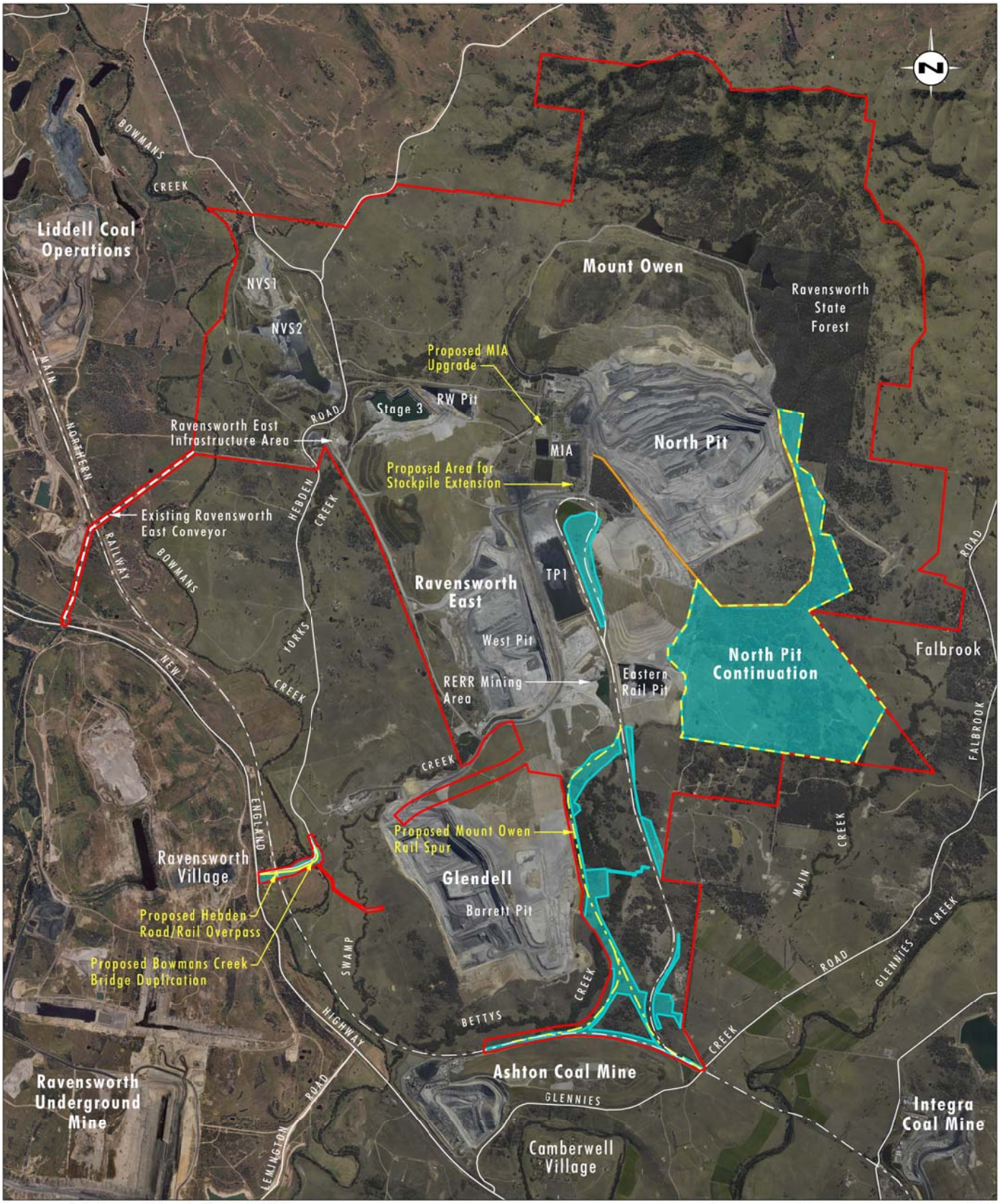
1:60 000

Legend

- Ravensworth East Mine DA Boundary (DA 52-03-99)
- Glendell Mine DA Boundary (DA 80/952)
- Mount Owen Mine DA Boundary (DA 14-1-2004)
- Approved North Pit Shell

FIGURE 1.2

Mount Owen Complex Current Operations



Source: Xstrata and Mount Owen (2012)

0 1 2 3km
1:60 000

Legend

- Project Area
- Approved North Pit Shell
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Proposed Disturbance Area

FIGURE 1.3

Proposed Mount Owen Continued Operations Project

File Name (A4): R01/3109_014.dgn
20130207 13.25

To allow for increased efficiencies within the Hunter Valley Coal Chain, the Project includes provision for augmentation of the existing Mount Owen rail spur through the construction of an additional rail line and northern turn-out west of the existing rail spur (refer to **Figure 1.3**). The existing Mount Owen rail line would be used as a siding for parking of rail fleet when not in service.

XMO currently have approval to use the existing Ravensworth East and M-series conveyor to transport ROM coal to the Bayswater and Liddell power stations. As part of this Project, XMO will maintain the current approved use of the Ravensworth East and M-series conveyor in addition to seeking approval to transport ROM coal and crushed gravel to the Liddell CHPP and Ravensworth Coal Terminal (RCT) via this existing infrastructure.

The existing employee and services access to the Mount Owen Complex is via Hebden Road from the New England Highway. With anticipated future increases in train movements on the Main Northern Line from the coal fields west of Mount Owen, the Project also seeks approval to construct an overpass over the Main Northern Rail Line on Hebden Road in order to minimise delays on Hebden Road that are a result of the level rail crossing. Further, to improve road safety, a new bridge over Bowmans Creek on Hebden Road is also proposed (refer to **Figure 1.3**). The Hebden Road upgrade works are a significant investment in improved public road infrastructure which would result in reduced traffic congestion and improved safety (refer to **Figure 1.3**).

It is proposed that tailings associated with the Project be emplaced in the Ravensworth East voids, as well as in-pit within the North Pit continuation area. The Ravensworth East voids are currently approved for tailings emplacement (refer to **Figure 1.3**).

As the Project is a development for the purposes of coal mining, the Project is State Significant Development (SSD) as defined under Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011*. Initial consultation with the Department of Planning and Infrastructure (DP&I) confirmed the appropriate approval path for this Project is a new project approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

An Environmental Impact Statement (EIS) will be prepared for the Project to accompany a Project Application following DP&I issuing Director-General's Requirements for the Project. The EIS is scheduled to be submitted in the fourth quarter of 2013.

1.1 Project Overview

The key features of the Project are outlined in **Table 1.1**. **Figure 1.3** shows the general layout of the Project.

Table 1.1 – Key Existing and Proposed Features of the Project

Key Feature	Existing Approved Operations	Proposed Operations
Mine Life	• Approved reserves estimated to be extracted from the North Pit in 2018. • Current Mount Owen Mine consent lapses 2025. • Approved reserves estimated to be extracted from the West Pit in 2013 and the current consent for the Ravensworth East Mine lapses in 2021. • Subject to approval, mining will continue at Ravensworth East Mine within the RERR mining area until 2018.	• Consent will be sought for 21 years (from date of Project Approval) to provide for contingency and other activities such as rehabilitation and tailings dam capping.
Limits on Extraction	• 10 Mtpa ROM (North Pit). • 4 Mtpa ROM (Ravensworth East).	• No change in extraction rate for the proposed North Pit continuation or Ravensworth East operations.
Mine Footprint	• North Pit and associated MIA. • Tailings Pit 1 (TP1) and Tailings Pit 2 (TP2), series of shallow box cuts (approx. 2.5 Mt coal). • West Pit. • RERR mining area (subject to approval). • Stage 3 and RW pits. • Mining to depths in excess of 270 metres below ground level. • Total coal reserve at time of approval approximately 180 Mt (2004).	• Extension of mine footprint to the south of current approved North Pit. • Mining depths to approximately 300m below ground level. • Total additional mineable coal tonnes of approximately 60 Mt ROM (North Pit)
Operating Hours	• Seven days per week, 24 hours per day.	• No change proposed.
Number of Employees	• 235 excluding contractors - North Pit. • 260 - Ravensworth East.	• Current personnel required to operate North Pit and CHPP is approximately 600. No significant change to personnel numbers required. • No change to Ravensworth East personnel numbers required. • Addition of approximately 260 personnel for construction phase for proposed infrastructure works (approximately 18 months).
Mining Methods	• Truck and excavator operations supported by ancillary equipment.	• No change to mining method proposed.
Mount Owen CHPP	• 15 Mtpa ROM coal.	• Increase CHPP processing and load-out to 17 Mtpa ROM coal.
Crushing Plant	• Ongoing operation of the existing crushing plant for the processing of site won gravels.	• No change proposed.

Table 1.1 – Key Existing and Proposed Features of the Project (cont.)

Key Feature	Existing Approved Operations	Proposed Operations
Rail Transport	• Mount Owen rail loading facility and rail loop to Main Northern Rail line.	• Addition of northern turn-out and new rail line to facilitate train turnaround movements and the park-up of trains. • No change in approved train movements.
Infrastructure	• Mount Owen CHPP and coal stockpiles. • MIA (workshop, etc.).	• Proposed product stockpile extension within previously disturbed areas. • MIA upgrades (including heavy vehicle workshop, fuel farm and fuel delivery area, raw water system).
Tailings Management	• Use of Ravensworth East voids (TP1) and West Pit for tailings emplacement. • Subject to approval tailings emplacement in RERR mining area.	• Continued use of Ravensworth East void for tailings emplacement. • In-pit emplacement within North Pit.
Road Diversions and Upgrades	• Nil.	• Hebden Road rail overpass. • New Hebden Road bridge over Bowmans Creek.
Overland Coal Transport	• Transport of ROM coal to Bayswater and Liddell Power Stations via Ravensworth East ROM coal stockpile, Ravensworth East conveyor and M-series conveyor.	• Continued transport of ROM coal to Bayswater and Liddell Power Stations via Ravensworth East conveyor and M-series conveyor. • Transfer of ROM coal and crushed gravel by existing Ravensworth East conveyor to the Liddell CHPP and the Ravensworth Coal Terminal.
Final Landform	• Current overburden emplacement approved to maximum height of 230 metres Australian Height Datum (mAHD).	• Increase overburden emplacement to a maximum height of 240 mAHD.
Development Consent/ Environmental Protection Licence (EPL)	• North Pit and associated facilities operates under Development Consent DA 14-1-2004 and EPL4460. • Ravensworth East DA 52-03-99 and EPL10860.	• Consolidate DAs for Mount Owen Mine and Ravensworth East Mine. • Consolidate EPLs for Mount Owen Mine and Ravensworth East Mine.

1.2 Purpose of the Document

This Preliminary Environmental Assessment (PEA) has been prepared to brief DP&I and relevant government agencies as part of the process of seeking Director-General's requirements (DGRs) for the Project EIS. The document will also be available on the DP&I and Mount Owen website for the community and other relevant stakeholders. The document provides an overview of the proposed Project, details of the proposed community consultation program, and introduces the outcomes of environmental and social studies available to date for the key issues proposed to be addressed in the EIS for the Project.

2.0 Existing Operations and the Proposed Project

2.1 Existing Operations

The Mount Owen Complex consists of the North Pit and associated infrastructure (being the Mount Owen Mine), Ravensworth East Mine and the Glendell Mine. The Project seeks approval specifically for the proposed continuation of mining in the Mount Owen Mine and associated upgrades to the Mount Owen Complex coal processing, service and transport infrastructure. The Project will also consider potential impacts associated with the approved and proposed operations at the Ravensworth East Mine to allow for the consolidation of the Mount Owen Mine and Ravensworth East Mine development consents.

2.1.1 Approvals and Development Consents

There are three existing development consents for the current mining operations located within the Mount Owen Complex which are listed in **Table 2.1**.

Table 2.1 – Existing Development Consents for the Mount Owen Complex

Development Consent	Date Approved	Description	Approved Production Limit	Expiry Date
DA 14-1-2004	8/12/2004	Mount Owen Open Cut Coal Mine	10 Mtpa ROM coal	2025
DA 52-03-99	2/03/2000	Ravensworth East Open Cut Coal Mine	4 Mtpa ROM coal	2021
DA 80/952	25/05/2008	Glendell Open Cut Coal Mine and Associated Infrastructure	4.5 Mtpa ROM coal	2024

The existing approved development consent boundaries for the Mount Owen Mine, Ravensworth East Mine and Glendell Mine are presented on **Figure 1.2**. The existing mining methods used are similar across the Mount Owen Complex, which consists of truck and excavators supported by ancillary equipment. ROM coal mined from the North Pit, and both Ravensworth East and Glendell is processed at the Mount Owen CHPP and transported to the Port of Newcastle via the existing Mount Owen rail spur and the Main Northern Rail Line. ROM coal is also transported to the Bayswater and Liddell power stations via the Ravensworth East and M-series conveyor on an 'as required' basis. Tailings management is currently undertaken in accordance with the existing Mount Owen development consent at four tailings emplacement areas across the Mount Owen Complex, with an additional tailings facility, the West Pit, approved upon cessation of mining in the West Pit (part of the Ravensworth East Mine).

XMO is currently preparing a modification application for the RERR Project, which, should it be approved, would allow mining of approximately 6 Mt of ROM coal within the existing mining leases (MLs) of the Ravensworth East Mine (refer to **Section 2.2** for further details regarding MLs). Should the Project be approved, XMO would seek to surrender the Ravensworth East consent and operate the Project, including finalisation of mining activities associated with the RERR Project in addition to tailings disposal in the Ravensworth East mine, under the Mount Owen development consent. For this reason, the project application for the Project covers:

- the continued Mount Owen mining and processing activities, associated facilities and transportation;
- tailings disposal strategy integrated with the use of the Ravensworth East final voids;

- completion of mining associated with the RERR Project (subject to approval); and
- final rehabilitation of both the Mount Owen and Ravensworth East disturbance areas.

2.1.2 Mount Owen Mine North Pit and Infrastructure

The history of the Mount Owen Mine to present is as follows:

- The North Pit commenced operations in November 1993 under the management of Hunter Valley Coal Company (HVCC) with the original development consent (DA 63/91) granted in November 1991 by Singleton Council. The initial approval was for the production of 1.4 Mtpa ROM coal.
- Development consent DA 6/93 was issued by Singleton Council in 1994 allowing the mine to increase production to 5.3 Mtpa ROM coal.
- Development consent DA 184/95 was granted in 1995 for the construction and operation of the rail loading facility.
- Development consent DA 97/96 was issued in 1996 for the construction of a clean water pipeline and a 90 ML clean water dam.
- Development consent DA 346-11-2001 was granted in 2002 to construct a 1030 ML storage dam, with an additional 210 ML for flood surcharge.
- The current development consent, DA 14-1-2004, was granted in December 2004 to continue the open cut operations over a 17 to 21 year mine life, with an increase in ROM coal production from 8 to 10 Mtpa.
- HVCC was acquired from BHP (by Enex). HVCC changed its name to Xstrata Mount Owen in 2006.
- In 2010, a modification approval to DA 14-1-2004 was granted to provide for the establishment of a rail provisioning facility to be installed on the existing Mount Owen Complex rail loop.

2.1.3 Ravensworth East

The Ravensworth East Mine was formerly known as the Swamp Creek Mine which had been operating since the 1960s. In 1997 a new mining lease (ML 1415) was issued after a period of care and maintenance and the mine was renamed Ravensworth East Mine. Ravensworth East Mine operates under DA 52-03-99 which originally allowed for the supply of coal to the domestic market through the transportation of ROM coal via conveyor to both the Bayswater and Liddell power stations. Subsequent modifications to DA 52-03-99 have included modifications to allow the extraction of coal for the export market following the processing of coal at the Mount Owen CHPP, an increase in the extraction rate and the emplacement of tailings from the Mount Owen operations within Ravensworth East voids.

2.2 Existing Mining Titles

Details of the existing mining titles, both coal leases (CLs) and MLs, relevant to the North Pit and Ravensworth East mining operations are presented in **Table 2.2**. **Table 2.2** also presents both the approved areas and depths of each mining title. The location of relevant mining titles contained within **Table 2.2** and other surrounding mining titles is illustrated in **Figure 2.1**.

Table 2.2 – Mining Titles Relevant to the North Pit and Ravensworth East

Lease No	Expiry Date	Area (ha)	Depth (m)
CL383*	12/11/2012	874	Surface to unlimited
ML1355	26/07/2015	439.8	Surface to unlimited
ML1419	12/11/2012	82.6	Surface to 15.24 m
CCL715	12/09/2019	82	Varying
ML1453	4/07/2020	140	Surface to 106.68 m
ML1561	17/02/2026	471.2	Surface to 15.24 m
ML 1415	4/07/2020	1,557	*Varying
ML 1475	24/11/2021	375.7	Surface to 15.24 m
ML 1476	24/11/2021	153.9	Surface to 15m below floor of Bayswater Seam
MLA 432	TBA	52	Varying

Note: * Currently being reissued

XMO currently holds Mining Leases (MLs) over all but approximately 52 hectares of the proposed disturbance area. A Mining Lease Application (MLA 432) for a remaining parcel of land (approximately 52 hectares) has been submitted to the Minister for Resources and Energy and is currently undergoing assessment. Should this MLA be approved (anticipated to be in the first half of 2013), the Project would be located wholly within XMO held MLs at the time of submission of the EIS.

2.2.1 Environment Protection Licence

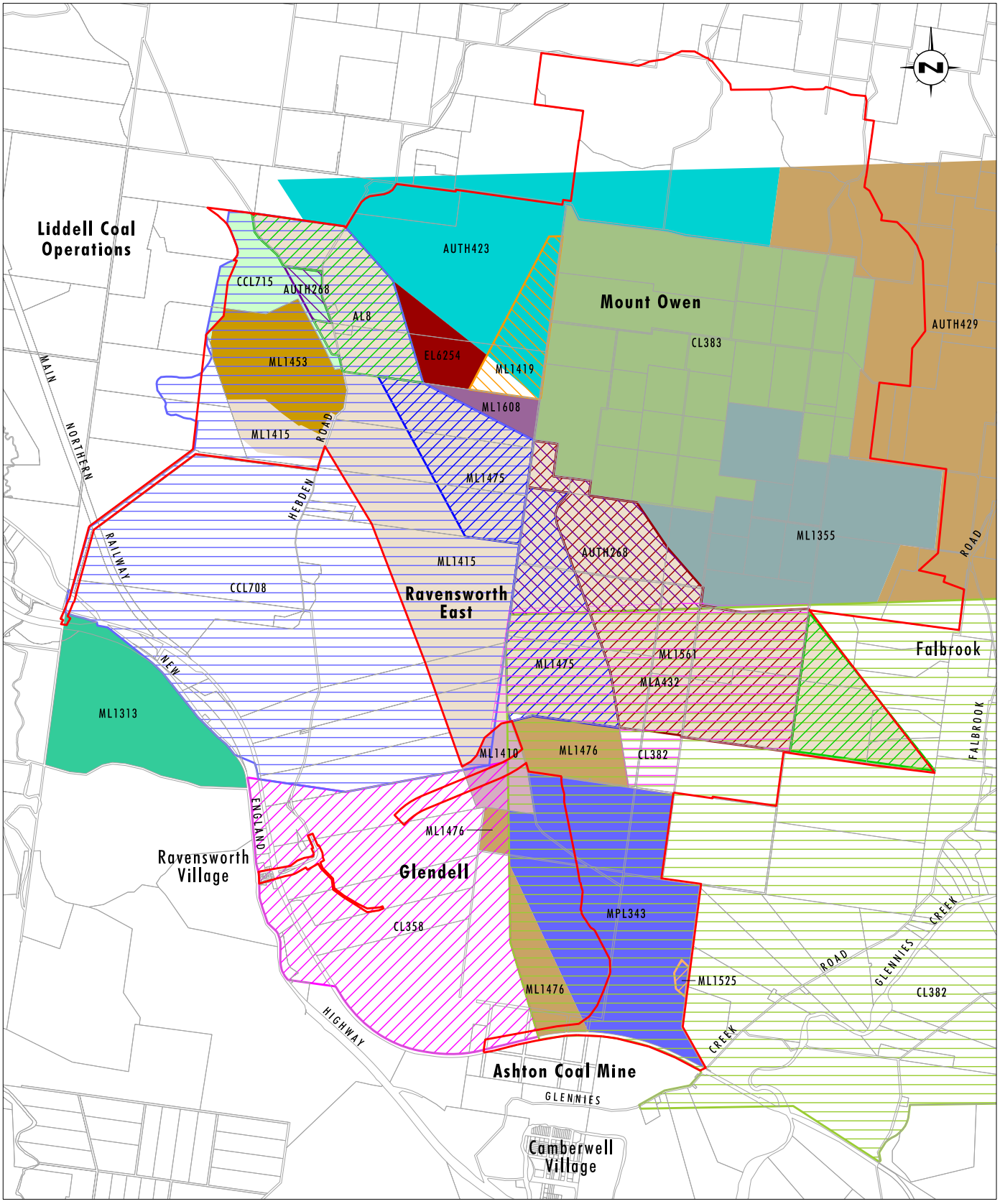
The North Pit (and associated infrastructure) currently operates in accordance with EPL4460. Operations at Ravensworth East are currently operated in accordance with EPL10860.

It is anticipated that should the Project be approved and operations associated with the Project and Ravensworth East consolidated into one development consent (refer to **Section 2.1.1**), that a consolidated EPL would also be sought.

2.2.2 Environmental Management and Monitoring

Operations at the Mount Owen Complex are undertaken in accordance with the approved Environmental Management Plans (EMPs)[1]. The individual environmental management plans and monitoring programs for the Mount Owen Complex are consolidated into an Environmental Management Strategy (EMS) and Environmental Monitoring Program, all of which are available on the XMO website (http://www.mtowencomplex.com.au).

[1] EMPs cover the entire Mt Owen Complex, i.e. North Pit, Ravensworth East Mine and Glendell Mine.



Source: Mount Owen (2012)

0 1.0 2.0 3km
1:60 000

Legend

- Project Area
- AL8
- AUTH423
- AUTH268
- CCL708
- CCL715
- CL358
- CL382
- CL383
- EL6254
- ML1355
- ML1410
- ML1415
- ML1453
- ML1476
- ML1525
- ML1561
- ML1608
- ML1419
- ML1475
- MLA432
- MPL343

FIGURE 2.1

Mount Owen Complex
Mining Titles

File Name (A4): R01/3109_075.dgn
20130207 14.01

Ongoing environmental management practices undertaken at the Mount Owen Complex incorporating the activities of the Mount Owen Mine, Ravensworth East Mine and Glendell Mine are reported in the Annual Environmental Management Reports (AEMRs). Copies of the AEMRs are also available on the XMO website.

2.3 Proposed Project

XMO is seeking approval for the Project to continue open cut mining operations in the North Pit and Ravensworth East by extending the North Pit south by approximately 361 hectares. The continuation of operations would be located wholly on land owned by XMO.

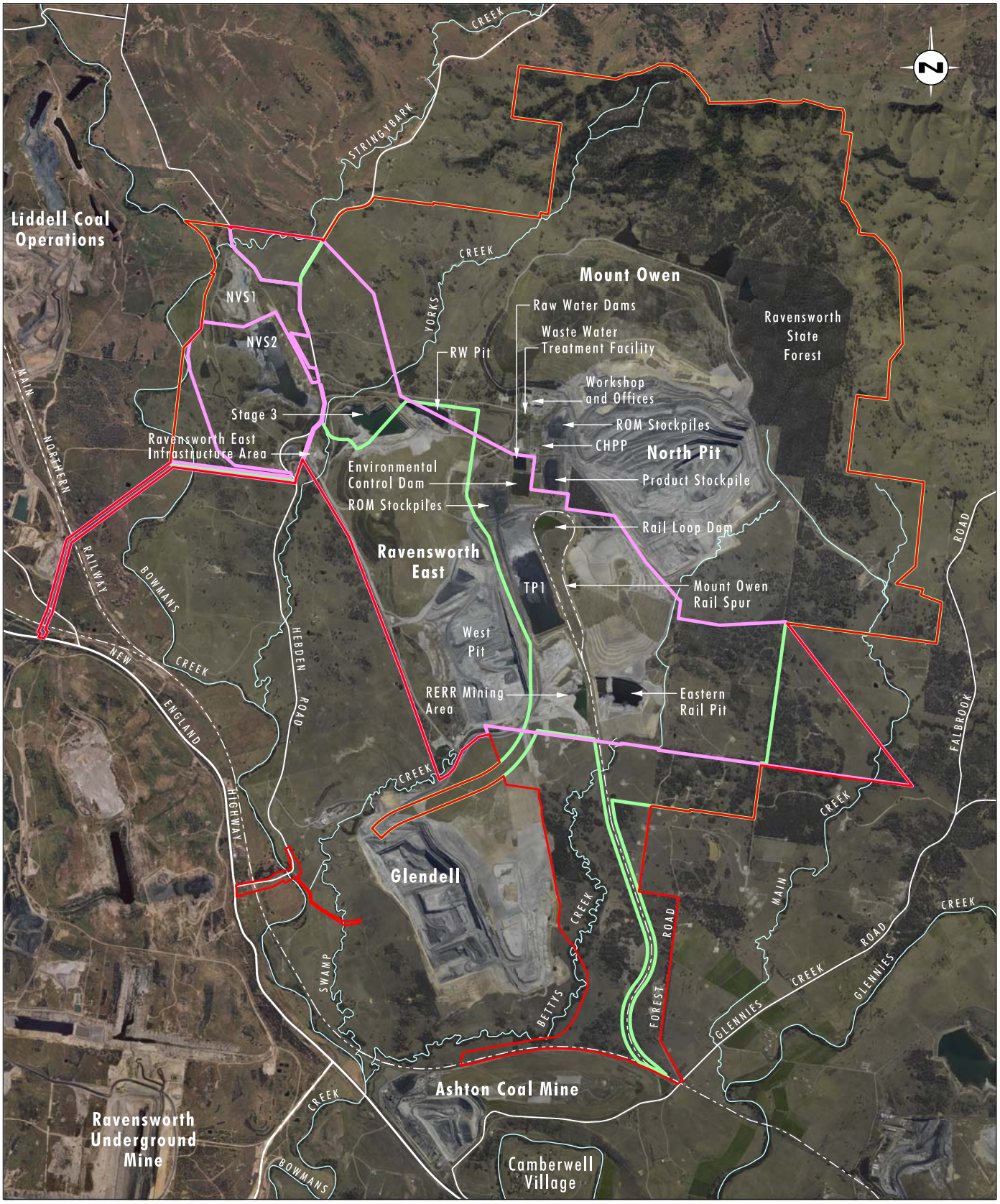
The Project Area is identified in **Figure 1.3.** **Figure 2.2** identifies the current Mount Owen and Ravensworth East development consent boundaries compared to the proposed Project Area.

XMO has undertaken detailed assessments to assist in refining the Project design, taking into consideration potential environment and community constraints and opportunities that include:

- Noise and air quality.
- Blasting.
- Ecological.
- Surface water, groundwater and water balance.
- Aboriginal archaeology, cultural heritage and historic heritage.
- Agriculture.
- Traffic and transport.
- Greenhouse gas and energy.
- Visual amenity.
- Socio-economic.
- Mine closure and rehabilitation.

Key features of the Project are illustrated on **Figure 1.3** and include:

- an approximate 361 hectare extension of the North Pit in a southerly direction (from the current approved pit shell);
- infrastructure upgrades including:
    - provision for a northern rail line turn-out and new rail line;
    - product stockpile extension;
    - CHPP improvements to processing and tailings management;
    - MIA extensions and improvements;
    - Hebden Road overpass over Main Northern Rail Line; and
    - New Hebden Road bridge crossing over Bowmans Creek;



Source: Xstrata and Mount Owen (2012)

0 1 2 3km

1:60 000

Legend

- Project Area
- Ravensworth East Mine DA Boundary (DA 52-03-99)
- Mount Owen Mine DA Boundary (DA 14-1-2004)

FIGURE 2.2

Existing Development Consent Boundaries and Proposed Project Area

- continued use of Ravensworth East voids for tailings emplacement as well as in-pit within the North Pit;
- proposed increase in the Mount Owen CHPP and rail loading from 15 Mtpa ROM to 17 Mtpa ROM; and
- an extension of mine life for 21 years (from the date of approval).

As outlined in **Table 1.1**, the Project would not increase the currently approved production rate, mining methods and operational hours. Moreover the number of operational personnel would not significantly increase.

Further details of the specific aspects of the proposed Project are provided in the following sections.

2.3.1 Extension of Current Approved North Pit to the South-East

XMO has identified significant mineable coal tonnes in the North Pit extension area through a targeted exploration program. XMO proposes to continue mining operations beyond the current approved pit shell to the south, as shown on **Figure 1.3**. It is proposed that the current approved pit shell would be extended by an additional estimated surface disturbance footprint of approximately 361 hectares. The Project would recover approximately an additional 60 Mt ROM coal with a mine design that maximises practical coal recovery within the leases held by XMO. Mining depths will vary from approximately 180 metres to 300 metres below ground level.

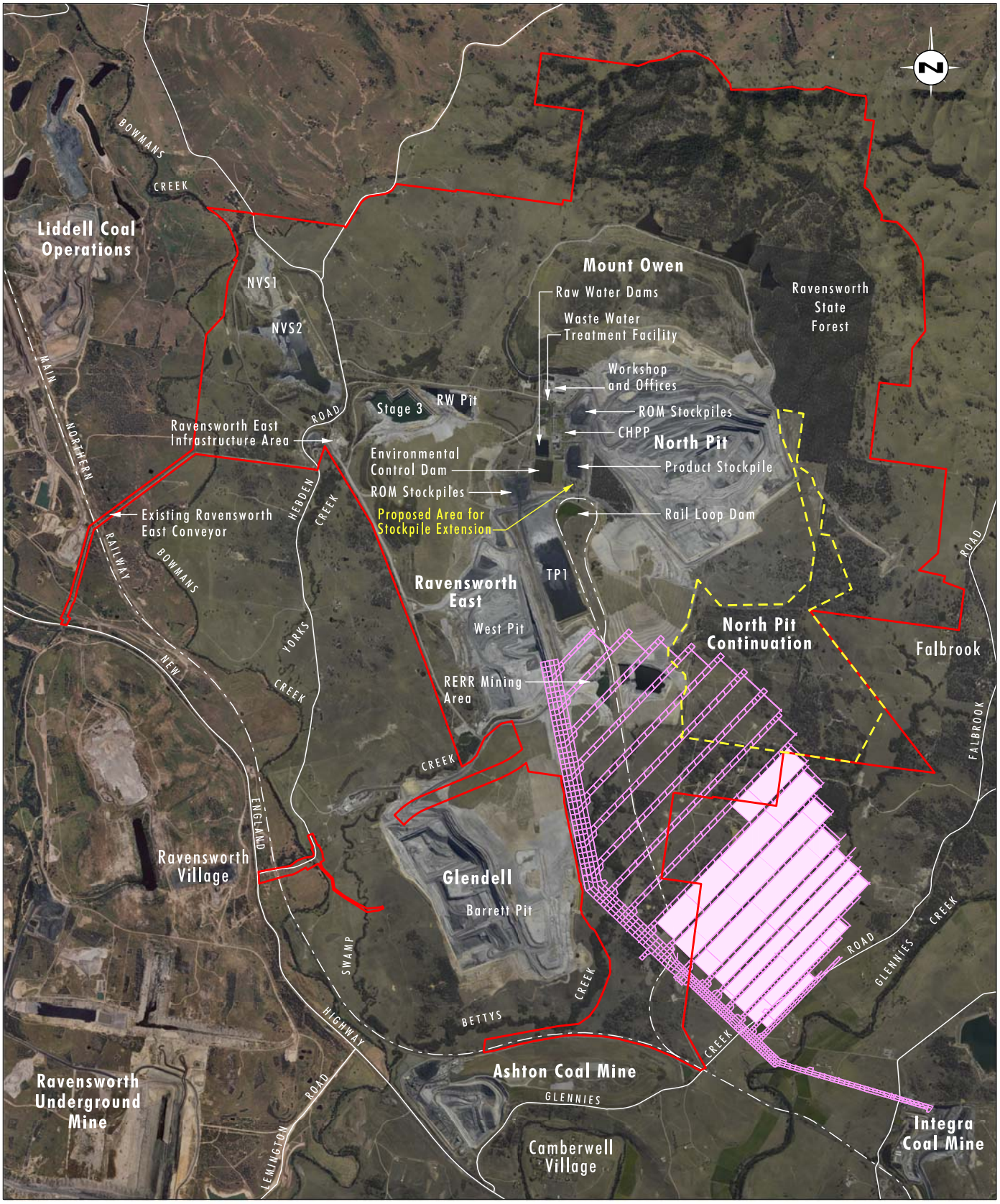
Based on the current conceptual mine plans, the continuation of the North pit will result in XMO mining over the current approved Integra underground workings (refer to **Figure 2.3**). Preliminary analysis has indentified that the vertical separation between the proposed pit floor and the Integra underground workings will be a minimum of 250 metres (refer to **Figure 2.4**) which is adequate to enable management of safety and other operational issues. XMO have commenced and will maintain consultation with Integra underground management throughout the preparation of the EIS.

2.3.2 Mine Infrastructure Area Upgrades

MIA upgrades associated with the Project include extensions and improvements to the:

- heavy vehicle workshop;
- fuel farm and fuel delivery area;
- expansion of the employee car park;
- raw water system; and
- associated services and supporting infrastructure.

The proposed MIA upgrades will be undertaken wholly within the current MIA area.



Source: Xstrata and Mount Owen (2012)

0 1 2 3km

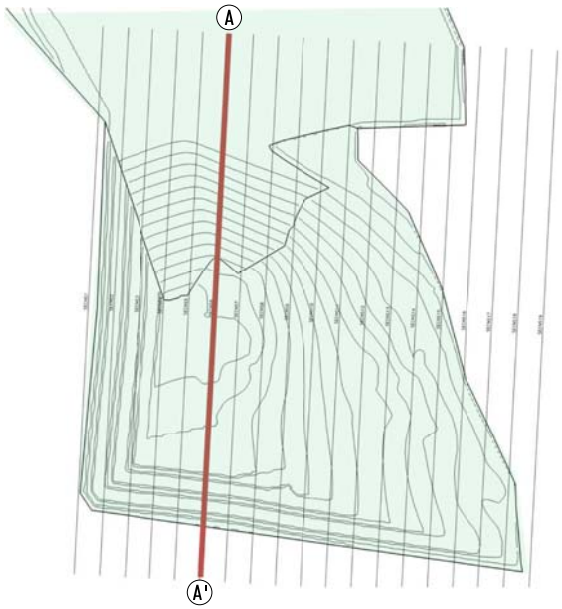
1:60 000

Legend

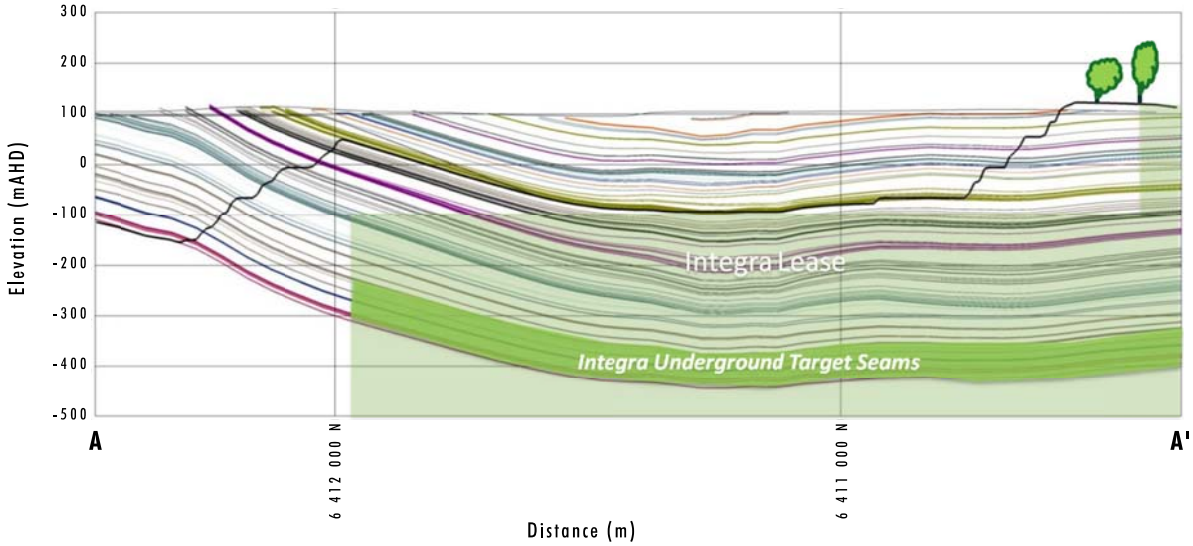
- Project Area
- Integra Mine Plan
- Proposed North Pit Continuation

FIGURE 2.3

Proposed Project Area and Integra Underground



Plan View



Section View

0 0.5 1.0 1.5km
Plan Scale 1:30 000

0 250 500 750m
Section Scale 1:15 000

Legend

- Section Line
- Integra Underground Target Seams

FIGURE 2.4

Vertical Separation North Pit and Integra Underground Mine

Source: Xstrata, Mt Owen (2012)

File Name (A4): R01/3109_078.dgn
20130109 11.39

2.3.2.1 Product Stockpile Extension

The existing product stockpile area associated with the North Pit is located to the west of the current approved pit (refer to **Figure 1.3**). These facilities were built in the 1990s and the product coal handling and stockpile system uses modern dust and water management control systems. Product coal is currently transferred from the CHPP to the product stockpile via a rail mounted stacker and reclaimed for train load-out.

To assist with managing additional product types and increased CHPP throughput the existing product stockpile is proposed to be extended to the west and south. The location of the proposed product stockpile extension is indicated on **Figure 1.3**.

2.3.3 Proposed Rail Overpass and Bowmans Creek Bridge

Hebden Road provides employee and service access to the Mount Owen Complex in addition to use by the public accessing properties and other industrial operations including the nearby Hebden and Wild Quarries. It is also an access road for the northern side of Lake Liddell and the Lake Liddell recreation area. As discussed in **Section 2.4** it is anticipated that there may be minor increases in road traffic in this area for light vehicles and trucks accessing the mine industrial area during the construction phase for proposed upgrades and works associated with the Project. As the operational workforce will not increase as a result of the Project, increases in road traffic access to the North Pit once the Project is operational are not anticipated.

Hebden Road connects with the New England Highway at two locations. These intersections are located immediately north of Lake Liddell while the southern location is at Ravensworth. The southern connection point receives the majority of movements for traffic accessing the Mount Owen Complex. The Main Northern Rail Line runs parallel to the New England Highway in this area, directly to the east. There is an existing rail level crossing at the location where Hebden Road crosses this rail line. Approximately 400 metres to the east of the rail level crossing, a single lane bridge crossing over Bowmans Creek further constrains existing traffic movements with northbound traffic given right-of-way over the bridge. With anticipated future increases in train movements on the Main Northern Line, XMO is looking to alleviate future constraints to traffic movement by constructing a rail overpass over the Main Northern Rail Line and new bridge over Bowmans Creek.

2.3.3.1 Proposed Rail Overpass

XMO proposes to construct a rail overpass for road traffic adjacent to the existing level crossing where Hebden Road crosses the Main Northern Rail Line (refer to **Figure 1.3**). Due to the anticipated increase in future train movements on the Main Northern Rail Line as a result of proposed future operations west of Mount Owen, the purpose of the proposed rail overpass construction is to improve traffic flow and reduce traffic hazards by eliminating the potential for traffic to queue back onto the New England Highway.

2.3.3.2 Proposed Bowmans Creek Bridge Duplication

Further to the east of the Main Northern Rail Line, Hebden Road crosses over Bowmans Creek via the single lane, Bowmans Creek Bridge (refer to **Figure 1.3**). As part of the Project, XMO proposes to construct a new bridge to allow for two-way traffic movements. The purpose of the new bridge is to provide further road traffic safety improvements.

2.3.4 Proposed Rail Spur and Line Duplication

XMO will continue to utilise the existing Mount Owen rail spur that currently services the Mount Owen Complex. In addition, XMO is seeking approval for the provision of an additional rail line and northern turn-out west of the existing Mount Owen rail spur (refer to **Figure 1.3**). The construction of the additional rail line and northern turn-out will allow trains that deliver coal to the existing power stations the ability to turn around within the Mount Owen balloon loop and return to Xstrata owned mines to the west for refilling. At present after unloading, these trains travel to the Port of Newcastle to turn around before heading back to the west. This northern turn-out will increase capacity along the Main Northern Rail Line by providing additional train paths between Mount Owen and the Port, which would otherwise have been taken by empty trains.

Moreover, the construction of the new rail line will reduce Xstrata's ongoing maintenance liability associated with the existing rail spur, which is subject to ongoing subsidence due to the existing Integra underground mine. The new rail line would become the main connection between the Main Northern Rail Line and the Mount Owen balloon loop. The existing rail spur would be used as a park-up area for trains that are not in service.

2.3.5 Coal Handling and Processing

XMO proposes to increase the CHPP production from 15 to 17 Mtpa ROM. The increase would be met through CHPP processing and tailings management improvements.

2.3.6 Mining Techniques and Equipment

The Project is proposed to use truck and shovel/excavator mining equipment and techniques consistent with the currently approved mining methods. However this is subject to technological advances in mining equipment which may alter the composition of the fleet.

The make-up of the mining fleet will vary from time to time throughout the life of the Project.

2.3.7 Product Transportation

Apart from utilising the proposed Mount Owen rail spur as outlined in **Section 2.3.4**, the Project will not involve any change to the current product transportation practices.

There is a proposed increase to the Mount Owen CHPP processing and load–out from 15 Mtpa to 17 Mtpa ROM coal. Given the increased efficiencies of larger train sizes used for coal haulage from the Mount Owen Complex, anticipated train movements associated with the Project will not increase from that currently approved. The current approval allows for 1636 train movements per annum. Train movements associated with the Project will not increase above what is currently approved. Notwithstanding, impacts associated with current train movements will be considered as part of the EIS.

2.3.8 Rejects and Tailing Management

Tailings emplacement is proposed to be undertaken at the Mount Owen Complex within mining areas in accordance with the Mount Owen Tailings Management Strategy. Emplacement is planned within the Ravensworth East voids and in-pit within the North Pit. Coarse reject material from the Mount Owen CHPP is incorporated into the overburden emplacement areas within the Mount Owen Complex.

Tailings from the Mount Owen CHPP will be pumped to tailings emplacement areas as required to allow sufficient time for dewatering and consolidation. Typically multiple tailings emplacement areas are required in order to achieve adequate deposition rates that will facilitate stable capping and rehabilitation at cessation. Where possible tailings disposal areas will be compartmentalised to achieve planned rise rates to assist with capping and rehabilitation works.

The current status of the tailings emplacement areas are provided in **Table 2.3** and locations illustrated on **Figure 1.3**.

Table 2.3 – Mount Owen Complex Tailings Emplacement Areas

Void	Status
North Void – Stage 1 (NVS1)	Emplacement ceased, capping underway.
North Void - Stage 2 (NVS2)	Emplacement ceased, top up use only.
Tailings Pit 1 (TP1)	Emplacement ceased, top up use only.
RW Pit	Tailings emplacement commenced 2012.
Eastern Rail Pit (ERP)	Tailings emplacement commenced 2012.
West Pit	Tailings emplacement will commence following completion of mining in the West Pit (anticipated in Q3 2013).
North Pit	Tailings emplacement during the later years of the Project to facilitate consolidation of Ravensworth East emplacement area prior to capping.

2.3.9 Coal and Crushed Gravel Transportation via Ravensworth East and M-Series Conveyor

The Mount Owen Complex, pursuant to the Ravensworth East consent, has current approval to transfer ROM coal to the Liddell and Bayswater power stations via the Ravensworth East and M-series conveyors. As part of the Project, XMO is seeking approval to transport up to 2 Mtpa ROM coal and crushed gravel on an as needs basis via the existing overland conveyor to the Liddell Colliery (Liddell CHPP) and the Ravensworth Coal Terminal (RCT) in addition to maintaining the current approval to transport ROM coal to Bayswater and Liddell power stations.

2.3.10 Rehabilitation and Final Landform

It is proposed that rehabilitation for the Project will be undertaken progressively and using practices in accordance with the existing approved Landscape Management Plan for the Mount Owen Complex, which would be updated, should the Project be approved. As part of existing operations at the North Pit, overburden emplacement currently extends to 230 mAHD. XMO is seeking approval to increase this height by 10 metres (240 mAHD) to provide flexibility in final landform design with the objective of returning to a more natural appearing landform with improved sustainability and water management.

2.4 Construction Phase

The Project would require a construction phase of approximately 18 months with construction activities being undertaken by a peak workforce of up to 260 people assuming that all infrastructure works occur concurrently. Construction activities will include:

- additional rail line and northern turn-out;
- Main Northern Rail Line Overpass;
- new Bowmans Creek Bridge;
- product stockpile extension;
- MIA extensions and upgrades; and
- other ancillary works.

Based on the current schedule for the Project, construction would likely commence towards the end of 2015, pending development approval. As previously noted, additional road traffic associated with the proposed construction activities is anticipated.

2.5 Mine Workforce and Hours of Operation

The Project will not involve any change to the current hours of operation at the North Pit and Ravensworth East (being 24 hours a day 7 days a week). As the Project is not increasing the production rates or operational equipment, the total number of the current operational workforce will not be significantly increased as a result of the Project. The construction phase of the Project will, however, require a workforce of approximately 260 people for construction works outlined in **Section 2.4**.

2.6 Alternatives and Justification

2.6.1 Project Alternatives

In addition to the alternative of not proceeding a number of alternatives were identified and explored in refining the scope and characteristics of the Project.

Underground Mining

The steep seam dips and complex geology preclude the option for economic extraction utilising underground mining methods.

Eastern Extension of Mining Area

Options to mine coal to the east of the existing Mount Owen pit shell were discounted to maintain the integrity of the Biodiversity Offset areas committed to by XMO in the 2004 approval.

Western Extension of Mining Area

Options to mine coal to the west of the existing Mount Owen pit shell were discounted due to the following considerations:

- maintaining the integrity of the remnant state forest area committed to by XMO in 2004; and
- economic constraints associated with mining through the existing Western Out-of-pit Dump and the adjacent Eastern Rail Pit tailings emplacement area.

2.6.2 Project Justification

XMO has provided considerable economic benefits at Federal, State, regional and local levels as part of its ongoing operations. XMO is committed to working with the community to minimise the impacts of its operations such that it can co-exist with the local community.

The Project will provide the following key benefits:

- maximising, within environmental constraints, coal recovery utilising existing infrastructure;
- continued employment for the life of the Project and up to 260 jobs during construction, with resultant flow on effects to the local and regional economy;
- consolidation of Mount Owen and Ravensworth East development consents;
- improved safety along Hebden Road;
- improved rail efficiencies;
- recovery of approximately 60 Mt of additional ROM coal;
- capital investment of approximately $150 million dollars;
- payment of significant royalties to the State of New South Wales; and
- significant export earnings for Australia.

Xstrata Coal, as the owner and manager of the Mount Owen Complex, has a public commitment to effective environmental management in all its operations both domestically and internationally. Xstrata's ongoing commitment to effective management of the Mount Owen Complex to minimise its environmental and community impacts provides the opportunity to realise the economic benefits of the project.

Further detailed justification for the Project will be provided in the EIS, considering the potential environment, social and economic impacts and benefits.

3.0 Planning Considerations

The Project requires development consent under Part 4 of the EP&A Act. As noted in **Section 1.0**, the Project is declared to be a State Significant Development under the provisions of the State Environmental Planning Policy (State and Regional Development) 2011 and the Minister for Planning will be the consent authority for the development. As State Significant Development, the Project is permissible provided it is not wholly prohibited by an environmental planning instrument. The Project Area is zoned 1(a) General Rural pursuant to the Singleton Local Environmental Plan (LEP) 1996. Under the provisions of the LEP the proposed development is a permissible land use with development consent.

As part of the development consent process under Part 4 of the EP&A Act, the assessment needs to also consider factors under various State Environmental Planning Policies (SEPPs) and will require approvals under other Acts, following development consent. Potentially relevant provisions are discussed in **Table 3.1** below with an indication of applicability and any approvals likely to be required.

Table 3.1 – Other Potentially Relevant Acts and State Environmental Planning Policies

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
Commonwealth Legislation		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).	Under the EPBC Act the approval of the Commonwealth Minister for the Environment (head of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)) is required for any action that may have a significant impact on Matters of National Environmental Significance (MNES), including: • World Heritage Properties; • National Heritage Places; • Ramsar wetlands; • cetaceans, migratory species, threatened species, critical habitats or ecological communities listed in the EPBC Act; • Commonwealth land; marine areas or reserves; and • nuclear actions. A number of flora and fauna species and migratory species listed in the EPBC Act have previously been recorded or potentially occur in the Project Area and an assessment of the impact on these species is required. This assessment will be a component of the ecological assessment undertaken as part of the EIS for the Project.	XMO is of the view that the Project is unlikely to have a significant impact on matters of national environmental significance however is referring those parts of the Project requiring disturbance outside that already approved under existing consents to the Minister for the Minister's decision as to whether or not the action is a controlled action under section 68(2) of the EPBC Act. The existing Mount Owen operations was deemed not be a controlled action under EPBC Act in 2004.

Table 3.1 – Other Potentially Relevant Acts and State Environmental Planning Policies (cont.)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
Native Title Act 1993 (Native Title Act)	The Native Title Act is administered by the National Native Title Tribunal. The Tribunal is responsible for maintaining a register of native title claimants and bodies to whom native title rights have been granted. These native title holders and claimants must be consulted prior to the granting of a mining lease over land to which the native title claim or right applies. This Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land.	A Native Title Extinguishment Assessment has been completed by XMO's legal advisors for landholdings within the Mount Owen Complex, including the proposed disturbance area. This assessment has confirmed that Native Title has been extinguished for all land parcels within the proposed disturbance area.
NSW Legislation – State Environmental Planning Policies		
State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP No. 33)	SEPP No. 33 requires the consent authority to consider whether an industrial proposal is a potentially hazardous industry or a potentially offensive industry. A hazard assessment is completed for potentially hazardous or potentially offensive development to assist the consent authority to determine acceptability of a Project.	The existing Mount Owen operations are not classed as hazardous or offensive development under SEPP No. 33. An assessment under SEPP No. 33 to determine whether the proposed Project is a potentially hazardous or potentially offensive development will be undertaken to determine whether a hazard assessment needs to be undertaken as part of the EIS.
State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP No. 44)	SEPP No. 44 restricts a Council from granting development consent for proposals on land identified as core koala habitat without preparation of a plan of management.	Koala species have previously been recorded within the Project Area; however, no evidence of species has been recorded since possible scats were found in 1995. A koala habitat assessment will be undertaken as part of the ecological assessment; however, no core koala habitat is expected to be identified within the proposed disturbance area.
State Environmental Planning Policy (State and Regional Development) 2011	The Projects are of a class of development listed in this SEPP. The Project therefore requires approval under Part 4 of the EP&A Act and the Planning Assessment Commission is likely to determine the Project under delegation from the Minister of Planning and Infrastructure.	The Project will be assessed under Part 4 of the EP&A Act.

Table 3.1 – Other Potentially Relevant Acts and State Environmental Planning Policies (cont.)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
State Environmental Planning Policy - (Mining, Petroleum Production and Extractive Industries) 2007 (Minerals SEPP)	Regulates the permissibility of mining and related development and specifies matters that must be considered in assessing mining developments requiring consent under Part 4 of the EP&A Act.	Part 4 of the EP&A Act requires consideration of specific issues related to the mining development including compatibility of Project with surrounding land uses. A land use/capability assessment will be undertaken as part of the Project.
State Environmental Planning Policy 55 - Remediation of Land (SEPP No. 55)	SEPP No. 55 – Remediation of Land aims to provide a state-wide planning approach to the remediation of contaminated land and to reduce the risk of harm to human health and the environment by consideration of contaminated land as part of the planning process. Under SEPP No. 55, a consent authority must not consent to the carrying out of development on land unless it has considered potential contamination issues.	No potential contamination issues have been identified within the Project Area. The Project will be designed to prevent contamination and the storage and handling of chemicals will be undertaken in accordance with Australian Standards and relevant NSW Office of Environment and Heritage (OEH) guidelines. A closure and decommissioning strategy, including a contaminated land management strategy, will be developed as part of decommissioning and closure. This management strategy will incorporate the investigation and remediation of any contaminated land and will be included in any Mining Operations Plan (MOP) submitted to the Department of Trade and Investment, Division of Resources and Energy (DRE) for approval should this Project be approved.
NSW Legislation – Acts		
Coal Mine Health and Safety Act 2002 (CMHS Act)	The principal aim of the CMHS Act is to secure the objectives of the *Occupational Health and Safety Act 2000* in relation to coal operations. It achieves this by imposing certain specific safety requirements on coal mines. This includes the requirement to obtain consent from the Minister for Mineral Resources for the establishment of emplacement areas.	Any further approvals required to be resolved on final design of the tailings strategy for the Project.
Crown Lands Act 1989 (Crown Lands Act)	The Crown Lands Act provides for the administration and management of Crown land in the eastern and central divisions of NSW. Crown land may not be occupied, used, sold, leased, dedicated, reserved or otherwise dealt with unless authorised by this Act or the *Crown Land (Continued Tenures) Act 1989*.	A Crown Road exists in the proposed North Pit mining area along the western boundary of AL8. XMO have a mining lease over this Crown Road. XMO is currently in discussions with the Crown regarding the purchase of this road.

Table 3.1 – Other Potentially Relevant Acts and State Environmental Planning Policies (cont.)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
Water Management Act 2000 (WM Act)	The Hunter Unregulated and Alluvial Water Sources Water Sharing Plan (in force under the WM Act) applies to the surface waters and alluvial groundwaters of Bowmans Creek (Jerrys Water Source) and Main Creek (Glennies Water Source), and their catchments. The Hunter Regulated River Water Sharing Plan applies to extractions from the Hunter River and Glennies Creek under the Water Management Act 2000. Relevant consideration is required for impacts on surface water and take in Bowmans Creek, Yorks Creek, Swamp Creek and Main Creek, which are all regulated within the framework of the WM Act. The WSP means that water extraction and interference licensing is required to account for any assessed baseflow loss over the life of the mine and until such time as those losses are negated.	The Project will not require approval under sections 89, 90 or 91 of the WM Act due to the exemptions outlined under section 89J of the EP&A Act; however, an approval may be required for aquifer interference under the WM Act.
Water Act 1912 (Water Act)	Certain licensing provisions of the Water Act administered by the NSW Office of Water (NOW) still apply.	Extraction of groundwater that flows into the open cut pits (from hard rock aquifers) will require licensing under Part 5 of the Water Act.
Threatened Species Conservation Act 1995 (TSC Act)	Under the EP&A Act impacts on threatened species listed under the TSC Act are required to be assessed.	All threatened species listed under the TSC Act potentially located within the Project Area will be assessed in the ecological assessment as part of the EIS.
Dams Safety Act 1978 (Dams Safety Act)	This Act requires that the NSW Dams Safety Committee (DSC) periodically review large dams that may constitute a hazard to human life and property. These dams are known as prescribed dams and are listed in Schedule 1 of the Dams Safety Act. Any new prescribed dams are to be designed to the satisfaction of the DSC.	Any dams required to be constructed will be subject to assessment in accordance with the DSC requirements to determine if any of these dams will be prescribed dams.
Protection of Environment Operations Act 1997 (POEO Act)	The POEO Act is administered by OEH and requires licences for environmental protection including waste, air, water and noise pollution control.	There are currently three EPL's within the Mount Owen Complex. It is proposed that the Mount Owen and Ravensworth East EPL's will be consolidated should the Project be approved (refer to **Section 2.2.1**).

Table 3.1 – Other Potentially Relevant Acts and State Environmental Planning Policies (cont.)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
Aboriginal Land Rights Act 1983	Under Sections 34 and 35 of the *Aboriginal Land Rights Act 1983* Land Rights claims can also be lodged by the New South Wales Local Aboriginal Land Council (LALC) or by the LALC over any Crown Lands.	There is no crown land within the proposed disturbance area.
Mining Act 1992	Under this Act a mining lease is required before any mining or specified mining activity can be carried out on the land. The *Mining Act 1992* requires all mining operations to be subject to a Mining Operations Plan (MOP) approved by the Director General of the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS).	XMO will require a revised MOP to include the Project mining area and associated operations.
Roads Act 1993	The *Roads Act 1993* is administered by Roads and Maritime Services (RMS), local council or the Department of Lands depending on the classification of the road. The RMS has jurisdiction over major roads, the local council over minor roads, and the Department of Lands over road reserves. The Act requires that applications for the closure of Crown roads be made to the Minister. Consent under Section 138 of the *Roads Act 1993* is required in order to undertake works within a road reserve.	The proposed Bowmans Creek Bridge duplication and Main Northern Line overpass will require work on a minor Road. Approval by the Council will be required for these works.

Notes: This table does not include the *Heritage Act 1979* as Section 89(J) of the EP&A Act states that State Significant Development projects are exempt from the requirement to obtain an approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*. Similarly, Aboriginal Heritage Impact Permit approvals under NPWS Act also do not apply to State Significant Development.

4.0 Stakeholder Engagement

XMO seeks to engage and consult with the community and its stakeholders to provide information relating to the environmental, social and operational performance of the Mount Owen Complex and to enable the community to provide feedback.

The engagement program that has commenced as part of the environmental impact assessment and approval process allows the opportunity for the community to provide information to XMO for consideration in project planning, to identify community needs, concerns and opportunities and to be involved in the environmental and social assessment process.

A three phase stakeholder engagement program is proposed, aligning with the phases of project development and the statutory approval schedule. The consultation processes to be undertaken are based on previous effective processes implemented for similar projects in the Hunter Valley with consultation methods and processes to be varied throughout the program as required to respond to emerging stakeholder issues or concerns. The proposed phases of engagement are presented in **Table 4.1** below.

Table 4.1 – Consultation Approach

Phase	Consultation	Consultation Methods/Approach*
Phase 1 – Defining the project and scoping of project issues.	Consultation with stakeholders undertaken in this phase to identify perceived issues associated with the project to guide EIS and associated Social Impact and Opportunities Assessment (SIOA).	Approach is proactive and informal through personal meetings/interviews. In addition, it is proposed that other communication techniques including newsletters and individual letters would be utilised to update the community of the ongoing status of the Project.
Phase 2 – Impact assessment and Strategy development.	Consultation with stakeholders is undertaken in this phase to increase stakeholder familiarity with the impact assessment process and prediction of salient impacts. Stakeholders may be presented with the preliminary outcomes of the assessment for further feedback and comment. Strategies to mitigate and enhance impacts will also be explored in this phase.	Stakeholders are brought together in group forums e.g., open days, in-focus sessions, themed dialogues, workshop processes, around key areas of interest. May also be provided with feedback consulted one-on-one, depending on the level of interest in relation to particular issues.
Phase 3 – Assessment Reporting.	Consultation with stakeholders in this phase is used to highlight key outcomes of the assessment program, document predicted impacts and outline strategies to be put in place to address impacts, should the project go ahead.	Personal meetings with affected landholders. Government briefings. Community information booklet.

Note*: Consultation Methods/Approach are examples and not limited to what is currently listed.

Phase 1 of the stakeholder engagement program is well advanced and Phase 2 has commenced. Phase 1 provided stakeholders with an introduction to the Project and gained feedback on their initial views and issues for consideration in Project planning.

4.1 Agency/Government Consultation

Agency consultation for the Project has commenced with a series of meetings to brief the government agencies and Singleton Council on the proposed Project and to broadly discuss the assessment program implementation. The following NSW State Government agencies have been briefed on the Project to date:

- DP&I;
- NOW;
- OEH; and
- DRE.

Singleton Council was briefed on 19 October 2012 and the Honorary George Souris MP was briefed on 4 December 2012. XMO also plans to meet with the Department of Health during the EIS preparation and the Commonwealth DSEWPC in February 2013.

The meetings ensure that each of the key agencies which may receive enquiries from the community has been briefed on:

- XMO's approach to the Project;
- key issues which are currently subject to assessment; and
- a general timeframe for EIS preparation.

The meeting with the DP&I also included confirmation of the approvals pathway and the likely timing for formal commencement of the approval process.

Subsequent to the meeting with DRE it provided the DP&I with correspondence supporting the Project as a 'responsible utilisation of the State's valuable coal resources (refer **Appendix 1**).

4.2 Community and Other Stakeholder Engagement

Community consultation for the Project commenced in early October 2012. Consultation consisted of one-on-one meetings with those residents in close proximity to the Project to provide a project briefing and enable initial feedback on their key issues. 58 residents were contacted with 43 meetings conducted. Some residents chose not to meet with XMO. In addition to one-on-one meetings with residents, XMO has provided project briefings to the Mt Owen Community Consultative Committee (CCC) in November 2012 and the Mt Pleasant Public School in December 2012.

Key issues identified to date through this consultation process include air quality impacts, particularly regarding the cumulative air quality impacts associated with mining across the Hunter Valley, noise impacts and final landform and final land use.

XMO, in accordance with the relevant guidelines have also commenced consultation with the Aboriginal community. At present 58 Aboriginal parties have registered an interest in the Project and will be consulted throughout the preparation of the EIS.

In addition, XMO has commenced consultation with both Integra and Ashton Coal mines regarding the Project.

5.0 Environmental and Community Context

The following sections provide an overview of the environment and community in which the Project is proposed to be developed. Further descriptions of the existing environment are contained in **Section 6.0** where specific environmental issues are discussed in further detail.

5.1 Topography and Drainage

The topography of the Project Area is characterised by an undulating and hilly landscape extending to lower areas associated with the waterways that traverse the Project Area. A notable topographical feature is a ridgeline extending north to south to the east of the Project Area. This ridgeline is the predominant topographical feature and extends to a height of approximately 360 mAHD (refer to **Figure 5.1**). Extending further north-east of the Project Area the terrain becomes more undulating and hilly.

The surrounding topography is characterised by gently sloping alluvial plains and undulating hills. Camberwell Village is situated south of a ridgeline with an elevation of approximately 60 mAHD to a peak of 95 mAHD. The Ashton open cut mine and overburden area is located between the existing Glendell Mine and Camberwell Village (refer to **Figure 5.1**) and is higher than the natural ridge line immediately adjacent to Glennies Creek.

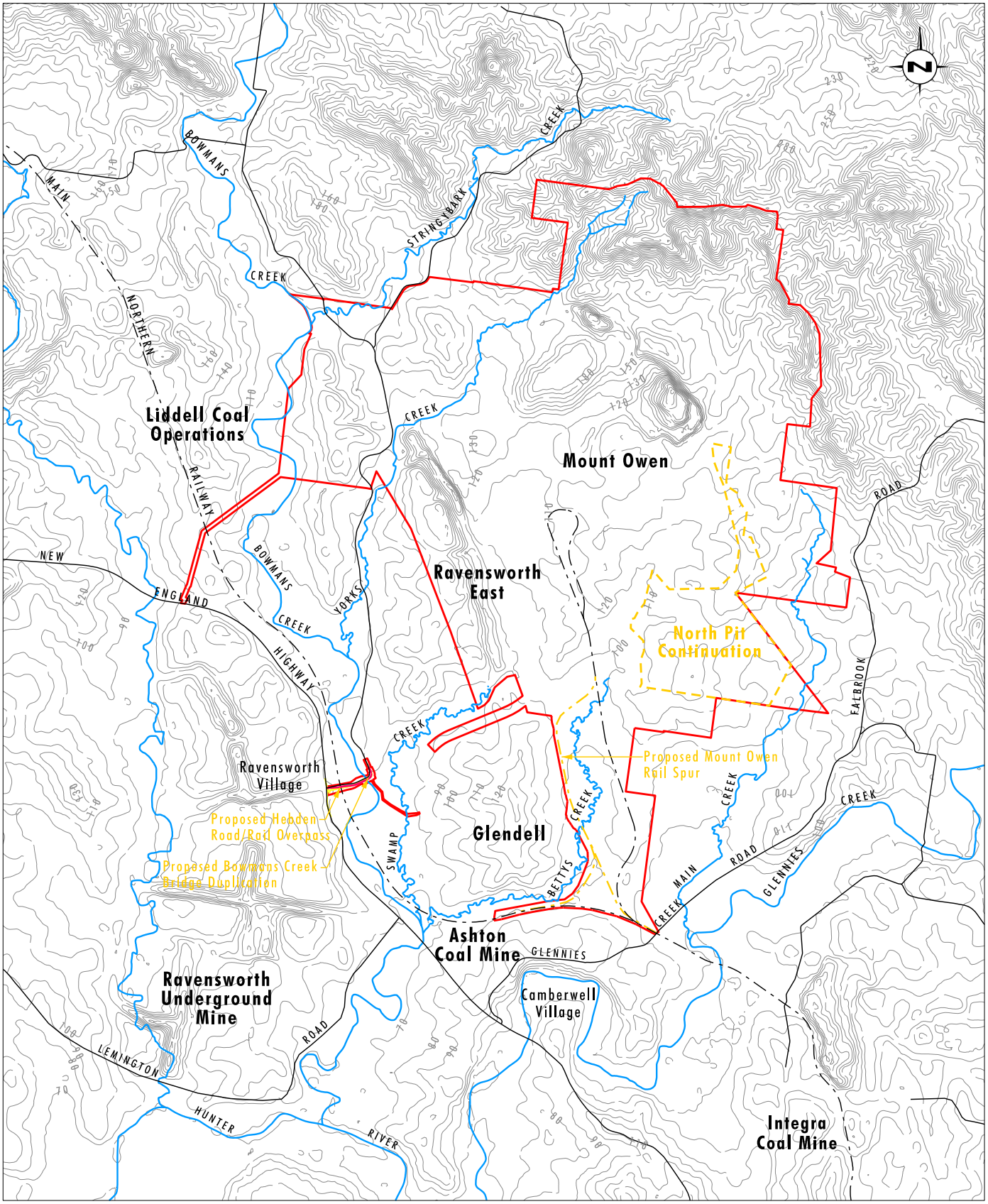
The Project Area is located within both the Bowmans Creek and Main Creek catchments. Bowmans Creek is a tributary of the Hunter River. Mining at the North Pit is primarily within three sub-catchments of Bowmans Creek, namely Yorks Creek, Swamp Creek and Bettys Creek. Areas associated with the alluvial plains of Bettys Creek, Main Creek and the Hunter River, are generally flat to gently sloping.

The ephemeral systems of Bettys Creek, Yorks Creek and Swamp Creek flow through the Project Area before flowing into Bowmans Creek. Main Creek flows for a short section through the east of the Project Area and then into Glennies Creek south of the Project Area. Bowmans Creek intersects the western extent of the existing Mount Owen Complex and continues south and joins the Hunter River approximately 4 kilometres downstream of the Project Area (refer to **Figure 5.1**).

5.2 Soils and Geology

The soil landscapes occurring within the existing Mount Owen Complex are mapped on the Singleton 1:250,000 Soil Landscapes Map Sheet (Kovac and Lawrie 1991). As illustrated on **Figure 5.2**, there are four soil landscapes which occur within the Project Area with the Bayswater Soil Landscape the dominant soil type, which is susceptible to moderate sheet and gully erosion on slopes. Salt scalds and associated erosion are also common in some areas. The soils within this soil landscape have a low fertility, are typically moderately well drained and have a moderate water-holding capacity. Soil pH varies between 5.5 and 7.0 and mass movement hazard is low.

The Hunter and Lambs Valley soil landscape occurs within a small portion of the Project Area in the vicinity of the Main Northern Rail Line overpass and Bowmans Creek Bridge. The Hunter soil landscape is susceptible to erosion along stream banks with minor sheet erosion on the adjacent terraces. The soils within this landscape vary between moderately and rapidly draining with moderate fertility levels. The Lambs Valley soil landscape is susceptible to moderate topsoil erosion and are a high to very high erosion hazard. Both soil types are imperfectly drained with low fertility levels. Appropriate erosion and sediment control measures will be incorporated into the detailed design for the road works to ensure management of erosion during and post road construction works.



Source: Mount Owen (2011) and Department of Lands (2006)
Note: Contour Interval 10m

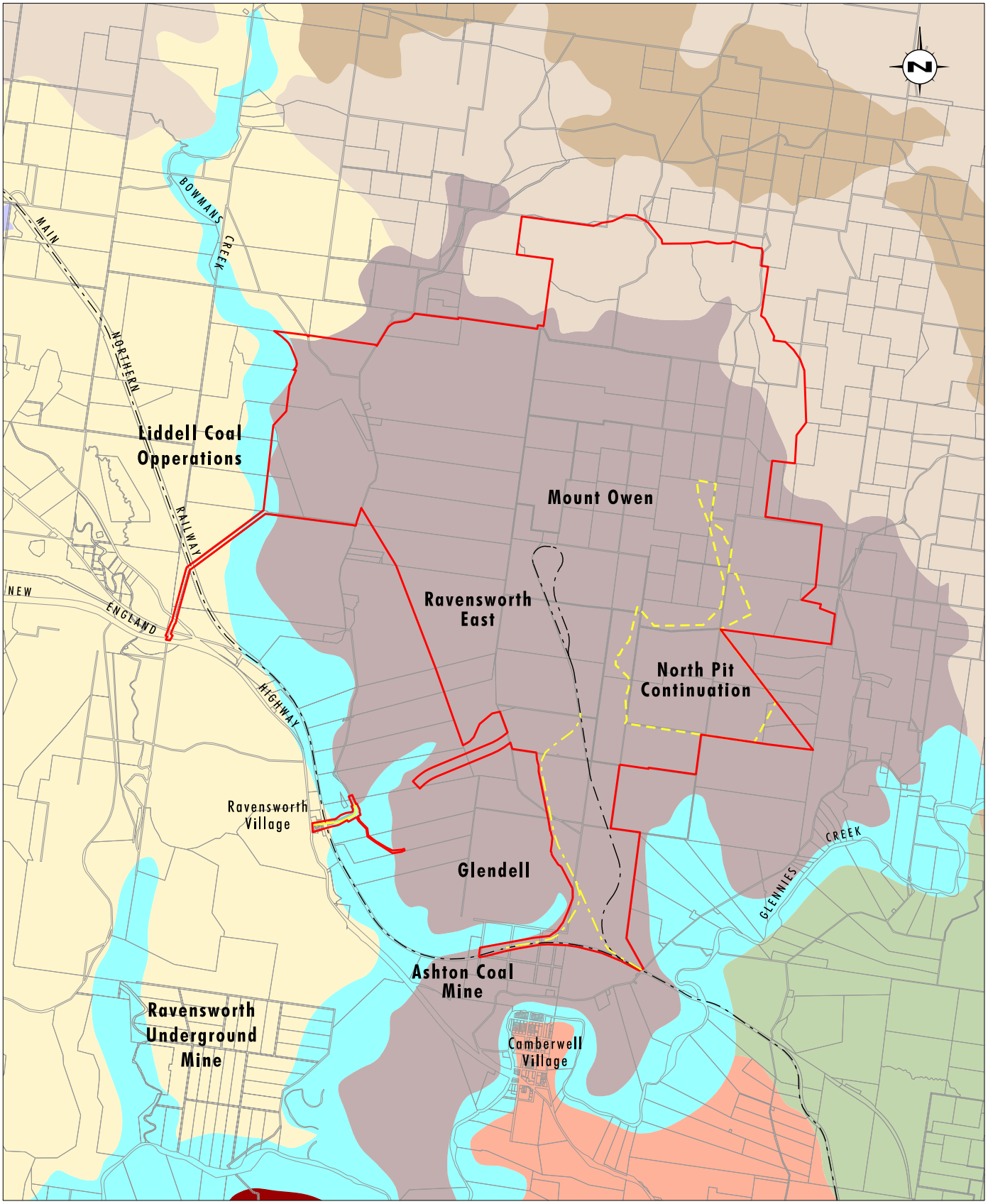
0 1.0 2.0 4.0km
1:80 000

Legend

- Project Area
- Drainage Line
- Proposed North Pit Continuation
- Rail Upgrade Works
- Hebden Road Upgrade Works

FIGURE 5.1

Topography of Mount Owen Complex and Surrounds



Source: Mount Owen (2012)

0 1.0 2.0 4.0km
1:80 000

Legend

- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works

Soil Landscapes:

- Hunter
- Rosevale
- Greenland
- Bayswater
- Lambs Valley
- Roxburgh
- Sedgefield
- Water
- Branxton

FIGURE 5.2

Soil Landscapes

File Name (A4): R01/3109_035.dgn
20130207 14.14

The Mount Owen Complex is located in proximity two regional thrust faults, the Hunter Thrust and the Hebden Thrust which limit the lateral extent of the coal seams. Seam dips vary throughout the deposit, with dips extending up to 45 degrees in areas near the Hunter and Hebden Thrusts where parallel thrusts dislocate the seam by up to 40 metres. The target coal seams are located within the late Permian Wittingham Coal Measures. The mineable coal intervals range in thickness from 0.2 to 10 metres within a stratigraphic interval of approximately 350 metres.

5.3 Agricultural Resources

5.3.1 Strategic Regional Land Use Plan

In 2012, the NSW Government released its *Strategic Regional Land Use Policy* (SRLUP) for the Upper Hunter and the NSW *Aquifer Interference Policy*, developed by NOW as a component of the SRLUP. The SRLUP aims to provide a balance between important agricultural, mining and energy sectors while ensuring the protection of the high value conservation lands and water sources.

The SRLUP includes the implementation of a Gateway Process including the site verification process which applies to all State Significant Development that involves new Greenfield projects and Brownfield projects involving expansion beyond the existing lease area for mining or coal seam gas that is on Biophysical Strategic Agricultural Land (BSAL) or Critical Industry Clusters (CICs). The SRLUP requires all State Significant Development applications for mining and coal seam gas which have the potential to impact on agricultural resources or industries to provide an Agricultural Impact Statement (AIS).

XMO currently hold the majority of MLs within the area of the proposed disturbance area (refer to **Section 2.2**), with an MLA for the remaining parcel of land (approximately 52 hectares), submitted to the Minister for Resources and Energy and currently undergoing assessment. Should this MLA be approved (expected by end of first quarter 2013), the Project would be located wholly within XMO MLs at the time of submission of the EIS. The area subject to the mining lease application is wholly owned by XMO, is within an area covered by existing development consent, and is not currently mapped as BSAL or as a CIC. It is assumed for the purposes of this PEA that the Project will be wholly within existing mining leases at the time of lodgement of the EIS (and therefore the site verification process and gateway process will not apply to the Project). However if the mining lease remains outstanding at the time of lodgement of the EIS, XMO will obtain a site verification certificate prior to lodgement of the EIS.

Further, the parcel of land which is subject to the MLA is classified as being ‘moderately low’ to ‘low’ inherent soil fertility and Class 5 to Class 8 land and soil capability (in accordance with the Inherent General Fertility of NSW and the Land and Soil Capability Mapping of NSW (OEH)). Therefore land within the MLA area does not meet the BSAL criteria.

In summary, as outlined in Section 11 of the SLRUP, we expect that the Gateway Process will not apply to the Project.

5.3.2 Land Capability

The land capability within the Project Area, as classified by the system according to Emery (undated), is presented on **Figure 5.3**. The majority of the land within the Project Area is low to moderate grade grazing lands with varying soil quality, depth/rockiness and erosion hazard, i.e. land capability classes 4[2] and 5[3].

5.3.3 Agricultural Suitability

The majority of the Project Area is located on Class 3 land, which is grazing land or land suited to pasture improvement (refer to **Figure 5.4**). Class 3 land has a moderate overall level of production. The capacity of this land for cultivation may be limited by erosion hazard, soil structural breakdown and climatic factors. Small pockets of land within the Project Area are Class 4, which is marginally suitable for grazing. State Forest owned land within the Project Area is Class 5, unsuitable for agriculture. Minor disturbance to a small area of Class 1 land (suitable for intense cultivation) is expected as part of the proposed rail overpass and construction of a new bridge on Hebden Road across Bowmans Creek.

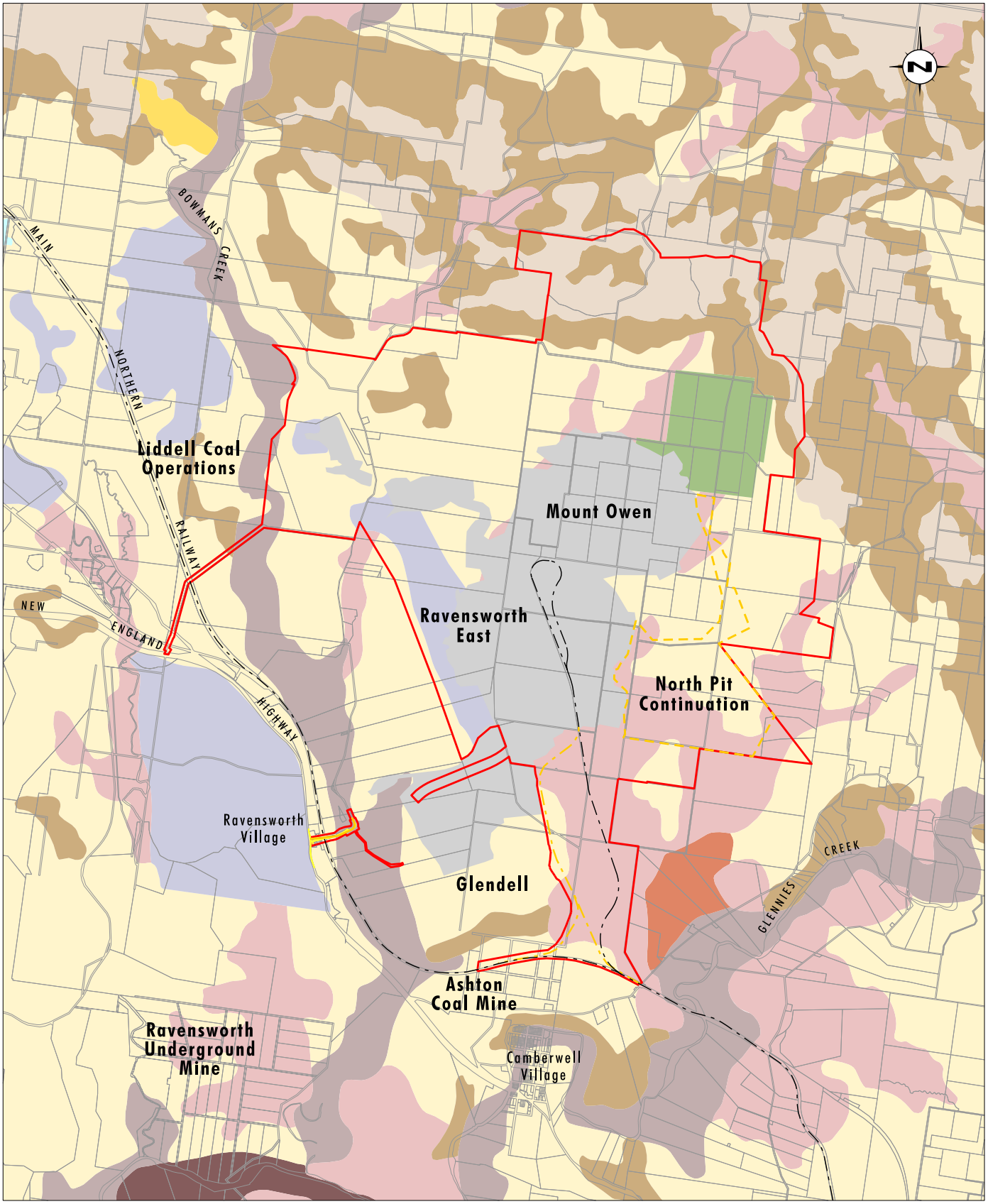
Further agricultural assessment is planned, as outlined in **Section 6.7**.

5.4 Land Ownership and Land Use

Land ownership for the Project Area and surrounds is a combination of mine owned land, privately owned land, Crown Land, State Forest and Government Authority or corporation owned land as detailed on **Figure 5.5**. **Figure 5.5** illustrates property ownership information based on private versus mine owned land and indicates which of those properties have a residence and its current acquisition status. Xstrata or its subsidiaries own the majority of land within the proposed disturbance area and large areas of land within the surrounding area for mining operations and associated buffer land (refer to **Figure 5.5**). A Crown Road is currently situated within the proposed North Pit mining area (disturbance area). This Crown Road is covered by an existing mining lease and Native Title has been extinguished. XMO is currently in discussions with the Crown regarding the purchase of this road.

The Ravensworth State Forest (State Forest) is located within the north-eastern corner of the Project Area. Adjoining the State Forest in the south is a Travelling Stock Reserve (TSR89694) managed by the NSW Rural Lands Protection Board. Following approval of the previous Mount Owen development application in 2004, as part of commitments made to establishing biodiversity offset areas, HVCC lodged an application with the then Department of Infrastructure, Planning and Natural Resources (DIPNR), for the transfer of this TSR to freehold lots within the land bank (Lot 21 DP 6842, Lot 96 DP 752470, Lots 3 and 4 DP774683). This application is still current (now within the Crown Lands Division of DTIRIS), with XMO seeking to progress this application.

[2] Land not suitable for cultivation on a regular basis owing to limitations of slope gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Comprises the better classes of grazing land.
[3] Land not suitable for cultivation on a regular basis owing to limitations of slope gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Soil erosion problems are often severe. Production is generally lower than for grazing lands in Class 4.



Source: Mount Owen (2012) and Department of Natural Resources (2007).

0 1.0 2.0 4.0km
1:80 000

Legend

- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Mining and Quarry Areas (Digitised from June 2010 Aerial)

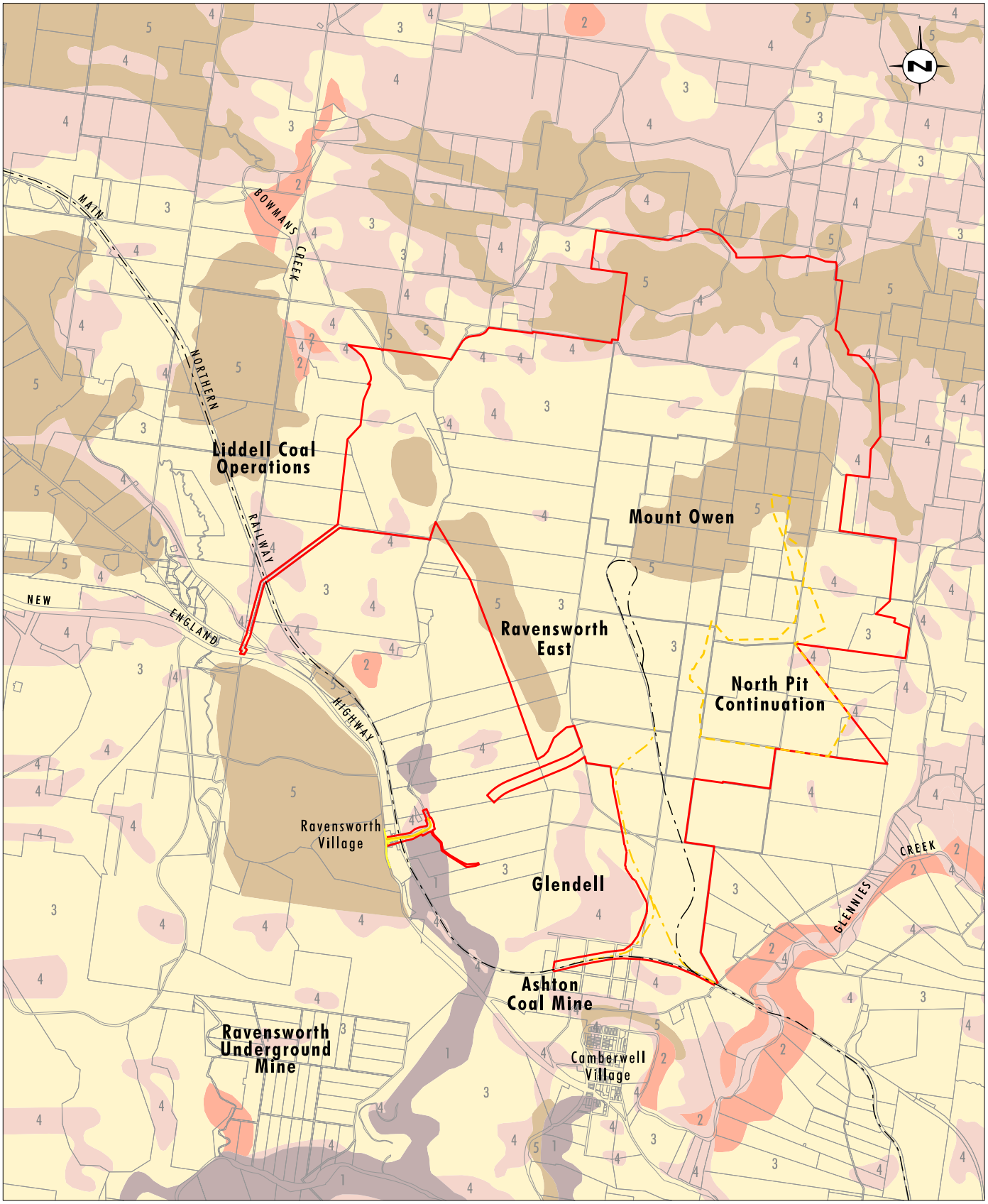
Land Capability:

- 1 Suitable for Regular Cultivation
- 2 Suitable for Regular Cultivation
- 3 Suitable for Regular Cultivation
- 4 Suitable for Grazing with Occasional Cultivation
- 5 Suitable for Grazing with Occasional Cultivation
- 6 Suitable for Grazing with No Cultivation
- 7 Other (Land best protected by green timber)
- 8 Other (Cliffs, lakes or swamps and other lands unsuitable for agricultural and pastoral production)
- M Mining and Quarrying Areas
- Water
- State Forest

FIGURE 5.3

Land Capability

File Name (A4): R01/3109_036.dgn
20130207 14.13



Source: Mount Owen (2012), Department of Environment and Planning (1980)

0 1.0 2.0 4.0km
1:80 000

Legend

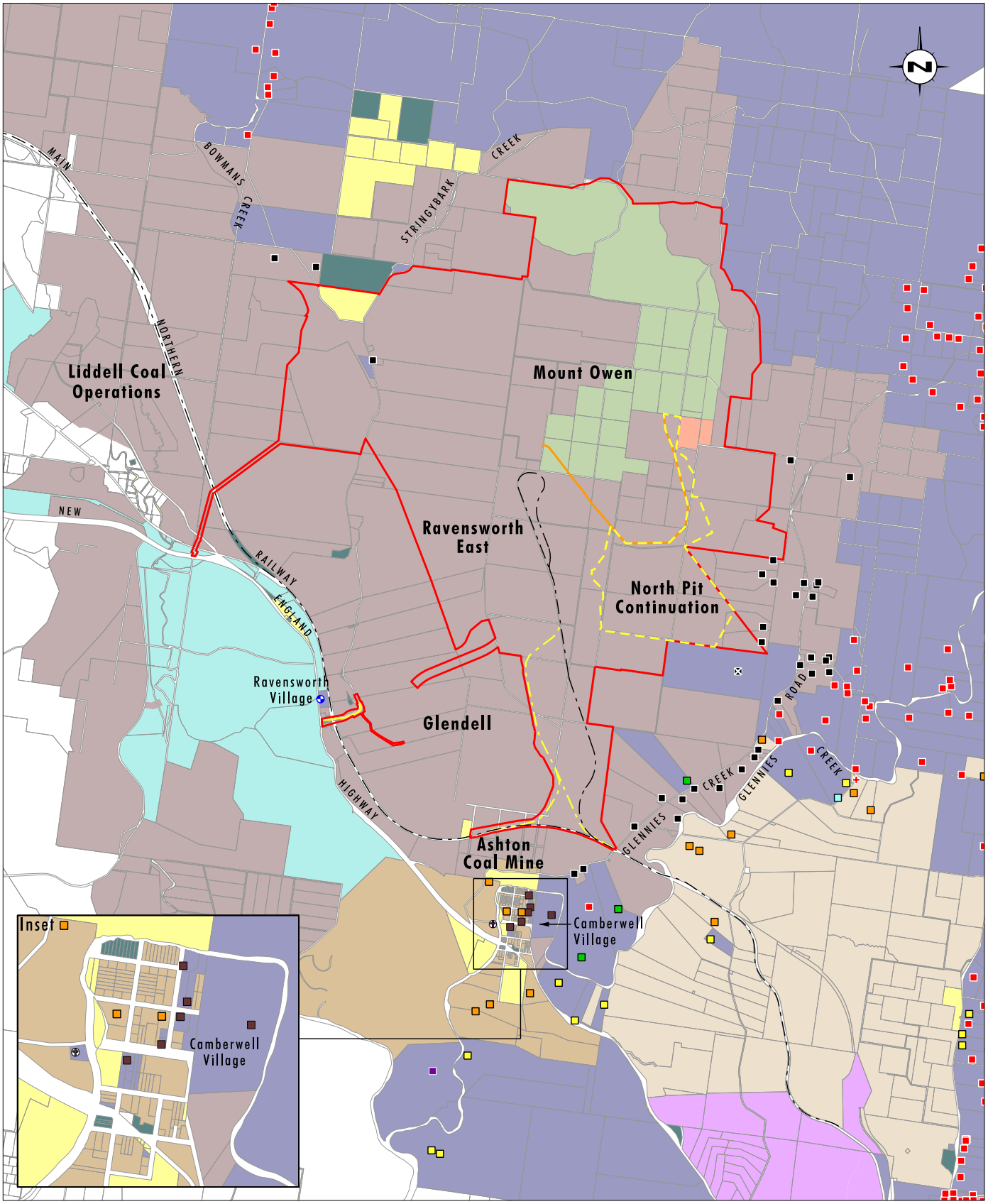
- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works

Agricultural Suitability:

- Class1: Arable land very good capability for agriculture. Uses such as intensive horticulture and cropping where there are only minor or no constraints to sustained high levels of production
- Class2: Arable land very good capability for agriculture. Uses such as intensive agriculture and cropping where there may be moderate constraints to sustain high levels of production
- Class3: Lands not suited for regular cultivation. Includes some arable and some pasture lands with moderate levels of agriculture production. Well suited to pasture improvement and can be cultivated for an occasional crop
- Class4: Land not suited for cultivation. Poor grazing or lands with seasonal grazing capabilities. Overall level of production is low
- Class5: Land not suited for agriculture. Agricultural production if any is very low

FIGURE 5.4

Agricultural Suitability



Source: Mount Owen (2011)

Inset Scale 1:30 000 (0, 0.5, 1.0, 1.5km)

Main Scale 1:90 000 (0, 1, 2, 4km)

Legend

- Project Area
- Approved North Pit Shell
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Ashton Coal
- Crown Land
- Crown Land TSR
- Government Authority
- Integra Coal
- Macquarie Generation
- Xstrata
- Private
- Rixs Creek Mine
- State Forest
- Church
- Community Hall
- Daracon Site Office
- Mine Owned Residence - Xstrata
- Mine Owned Residence - Other Mine
- Subject to Acquisition Rights - Xstrata No Dwelling
- Glennies Creek Fire Brigade
- Private Residence
- Currently Subject to Acquisition Rights - Xstrata
- Currently Subject to Acquisition Rights - Other Mines
- Currently Subject to Acquisition Rights - Dairy
- SEOC Acquisition - Noise Trigger

FIGURE 5.5

Land Ownership

File Name (A4): R01/3109_038.dgn
20130207 13.48

The nearest private landholder is located immediately to the south of the south-eastern boundary of the Project Area and currently has acquisition rights under the existing Mount Owen development consent (refer to **Figure 5.5**). There are a large number of private residences (with no acquisition rights associated with existing mining approvals) within 5 kilometres of the Project Area. The majority of residents live to the north (Greenlands), east and south-east (Falbrook and Middle Falbrook) of the Project Area. There are also private residents living to the north-west of the Project Area along Hebden Road. There are approximately five privately owned residences within Camberwell Village with the remaining residences in Camberwell predominately owned by Ashton Coal Mines Pty Limited.

Land to the south and south-east of the Project Area is owned by Ashton Coal Mines Pty Limited, associated with the Ashton Coal Project and Integra Coal associated with Camberwell and Glennies Creek Mines. RHA Pastoral Company Pty Ltd is affiliated with Integra Coal and own large areas of land surrounding Camberwell and Glennies Creek Mines. Land to the west and south-west of the Project Area is owned by a number of mining companies (including Xstrata) and Macquarie Generation (refer to **Figure 5.5**).

Mining has a large presence within the local area surrounding the Project Area with a large proportion of the surrounding properties owned by mining companies (refer to **Figure 5.5**). Cattle grazing occurs on a number of the surrounding mine-owned properties. Other land uses within the surrounding area include State Forest, Bayswater and Liddell Power Stations, grazing and rural residential holdings.

5.5 Preliminary Environmental Risk Analysis

To assist in identifying the key environmental and community issues for the Project a preliminary broad-brush environmental risk assessment has been completed and is included in **Appendix 2**. The risk assessment has been undertaken in accordance with Xstrata Coal's Risk Management Standard, which is consistent with the principles outlined in Australian Standard *AS/NZS 4360:2004 Risk Management* (Standards Australia 2004).

The results of the environmental risk assessment were used to guide the development of the environmental assessments required for the Project to ensure the environmental issues applicable to the Project were addressed and that appropriate management and mitigation are developed. The resulting scope of the EIS is discussed in further detail in **Section 6.0**.

The majority of the issues associated with the Project are considered to be moderate or low as outlined in **Table 5.1**. The high risk issues identified are air quality, noise, Aboriginal archaeology and cultural heritage impacts however it is anticipated that these risks will be reduced through the development of appropriate controls and mitigation measures.

Table 5.1 – Summary of Environmental Risk Assessment Findings

Category	Issues
High	air quality, noise, Aboriginal archaeology and cultural heritage
Moderate	water balance and surface water management, ecology, greenhouse gas and energy, agricultural lands, socio-economics, final landform and rehabilitation
Low	blasting, groundwater management, historic heritage, visual amenity, traffic

6.0 Preliminary Environmental Assessment

The key environmental and community issues for the Project have been determined through the broad-brush risk assessment (refer to **Section 5.0**) and the community consultation conducted to date (refer to **Section 4.0**). These issues are discussed below, in addition to the proposed methodologies for the assessment as part of the EIS.

6.1 Air Quality

Dust levels are a key community concern within the Upper Hunter Valley region, including dust from mining activities, cumulative dust impacts and fumes generated from mine blasts. Community consultation undertaken to date for the Project has confirmed air quality as a key issue of concern. The surrounding land use is dominated by existing mining operations and rural and rural/residential landholdings. Existing mining activities have a large presence within the surrounding area and consequently a large proportion of the surrounding properties are now owned by mining companies. The majority of the surrounding private residential properties are located to the east, south-east and south within Falbrook, Middle Falbrook and Camberwell Village, and also to the northeast of the Mount Owen Complex along Goorangoola and Falbrook Roads. The Project has the potential to change the air quality impacts from the Mount Owen Complex and this issue will be comprehensively assessed in the EIS.

6.1.1 Existing Air Quality Controls

Key air quality controls currently implemented at the Mount Owen Complex are outlined in **Table 6.1** below.

Table 6.1 – Existing Air Quality Controls

Exploration	• minimise disturbance area; • drive to conditions; • small water cart; and • rehabilitation as soon as possible.
Pre-strip operations	• minimise disturbance ahead of mining; • monitor topsoil stripping/handling activities and amend operation or cease if conditions are unsuitable; and • strip to clay until the area can be drilled.
Drill and blasting operations	• dust suppression system on drills; • wet the drill cuttings on surface; • pre-blast meteorological assessment; and • adequate stemming of holes.
Tailings emplacement	• where possible, keep tailings dams covered with water if dust is likely to be an issue; and • cap and rehabilitate as soon as practicable.

Table 6.1 – Existing Air Quality Controls (cont.)

Overburden removal and emplacement	• truck capacity and utilising planned haulage routes and distances wherever possible; • close off unnecessary haul roads and the application of water utilising water carts or the application of dust suppressants on haul roads/excavator work areas; • keep appropriate distance between truck and excavator bucket; • inspections of work area by Mining Supervisors to assess air quality/implement additional controls where necessary. • Mining Supervisors will investigate warning alarms on dust monitors and take action where necessary; • mine planning to make provision for sheltered dumping areas where possible (which can be utilised in adverse conditions); dumps at final RL are progressively rehabilitated to minimise disturbance area; and • temporary rehabilitation completed where appropriate.
Run of mine (ROM) and product coal stockpiling and transportation	• truck capacity and utilising planned haul routes and distances wherever possible; • close off unnecessary haul roads and the application of water utilising water carts or the application of chemical dust suppressants on haul roads, work areas and ROM stockpile pads; • sprays on hoppers and transfer points where required; and • covered conveyors
Rehabilitation activities	• topsoil spreading/activities on spread topsoil are managed and ceased if weather conditions are unfavourable; and • water carts are used on topsoil haulage routes.

6.1.2 Existing Air Quality Monitoring

XMO currently operates a comprehensive air quality monitoring network for the Mount Owen Complex which monitors Total Suspended Particulates (TSP) and PM_{10} 24-hour average concentrations. The network consists of 28 dust deposition gauges. There are also 5 High Volume Air Samplers (HVAS) measuring both TSP and PM_{10} 24-hour average concentrations, and 5 PM_{10} Tapered Element Oscillating Microbalance instruments (TEOMs) (refer to **Figure 6.1**). Results from the network include all emission sources in the vicinity of the Project and any contribution from surrounding mines and localised activities. Sources of particulate matter in the area would include mining activities, traffic on unsealed roads, local building and construction activities, agricultural activities, regional dust events and to a lesser extent traffic from the other local roads and other sources such as wood-burning fires.

The results from the 2011 AEMR reporting period indicated that there are no private residences experienced maximum 24 hour PM10 levels above the 50 ug/m³ criterion on more than five occasions throughout the year, maximum 24 hour PM levels above the 150 ug/m³ criterion at any occasion throughout the year and annual average PM10 levels above the 30 ug/m³ criterion.

Source: Mount Owen (2012) and Google Earth (2008)

0 1 2 4km

1:80 000

Legend

- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Depositional Dust Monitoring
- HVAS Location (dust)
- MET Station Location
- Private Residence
- Currently Subject to Acquisition Rights - Xstrata
- Currently Subject to Acquisition Rights - Other Mines
- Mine Owned Residence - Xstrata
- Mine Owned Residence - Other Mine
- Subject to Acquisition Rights - Xstrata No Dwelling
- Church
- Community Hall
- Daracon Site Office
- Glennies Creek Fire Brigade
- Dairy
- TEOM Monitoring Location

FIGURE 6.1

Mount Owen Complex Air Quality Monitoring Network

File Name (A4): R01/3109_040.dgn
20130207 14.09

6.1.3 Assessment Methodology

A detailed air quality assessment will be undertaken in accordance with the OEH's *Approved Methods of the Modelling and Assessment of Air Pollutants in New South Wales* (DEC 2005), which specifies how assessments based on the use of air dispersion models should be undertaken.

The air quality assessment will utilise the CALMET/CALPUFF suite of models to best represent the complex meteorology across the modelling domain. The CALPUFF model, through the CALMET meteorological processor, simulates complex meteorological patterns which exist in a particular region. The effects of local topography and changes in land surface characteristics are accounted for by this model.

Surface meteorological data, including hourly wind speed, wind direction and temperature, will be sourced from the SX13 meteorological station (located within the Mount Owen Complex) and other meteorological stations (should information be available) and included as required in the broader cumulative assessment model. Upper level meteorological data will be generated using The Air Pollution Model (TAPM) developed by CSIRO.

Results from the existing Mount Owen Complex air quality monitoring network, will be used as a control for modelling results.

Model predictions for Project emissions of TSP, PM_{10} and depositional dust will be compared to OEH assessment criteria to provide an assessment of the predicted air quality impacts of the Project. Modelling will include the full suite of four stage plans (Year 1, Year 5, Year 10 and Final landform) of the Project. Cumulative emissions of TSP, PM_{10} (including 24 hour PM_{10}) and depositional dust will also be modelled which will include emissions from nearby approved mines and the Project predicted emissions.

The EIS will include the full assessment report, including proposed mitigation and monitoring for the Project.

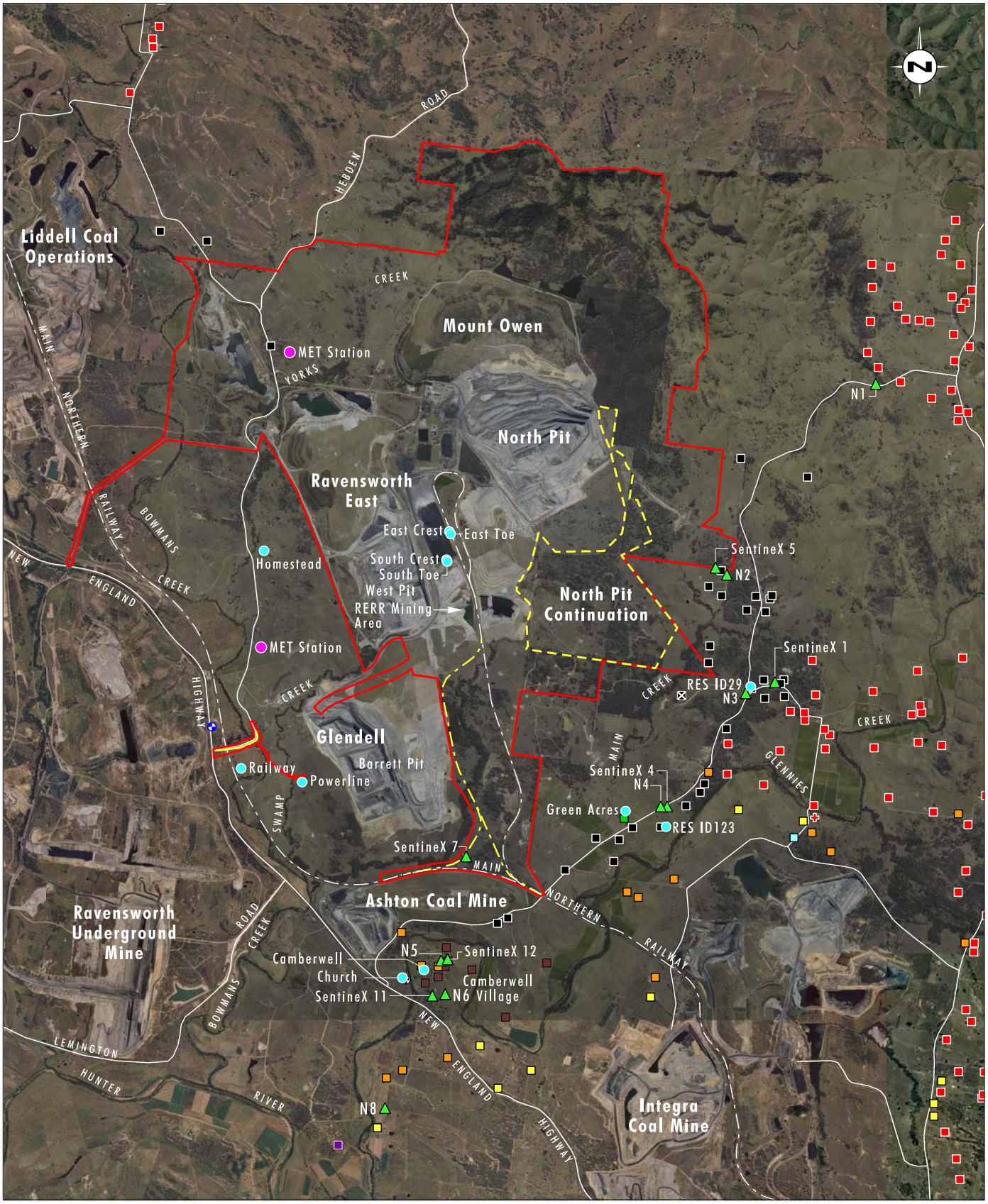
6.2 Noise

Impacts on amenity as a result of noise from mining activities are another community concern within the Upper Hunter Valley region generally, and more specifically, in the local area surrounding the Project. Community consultation undertaken to date has also confirmed noise as a key issue of concern. Mining in the North Pit is proposed to continue to the south of the current approved mining operations potentially increasing noise impacts to the east and south-east.

6.2.1 Existing Noise Management and Monitoring

The existing noise environment in the area surrounding the Mount Owen Complex is monitored on a regular basis in accordance with the approved Mount Owen Complex Noise Monitoring Program. The Mount Owen Complex also has a continuous noise monitoring network. Noise monitoring data from the Mount Owen Complex is captured via continuous noise monitors SentineX1, SentineX4 and SentineX12 (refer to **Figure 6.2**).

Following the granting of the 2004 Development Consent for the Mount Owen Complex, noise monitoring and reporting has been undertaken on a regular basis in accordance with the approved Mount Owen Complex Noise Monitoring Program (NMP).



Source: Mount Owen (2012) and Google Earth (2008)

Legend

- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Blast Monitoring Location
- Noise Monitoring Location
- MET Station Location
- Private Residence
- Currently Subject to Acquisition Rights - Xstrata
- Currently Subject to Acquisition Rights - Other Mines
- Mine Owned Residence - Xstrata
- Mine Owned Residence - Other Mine
- Subject to Acquisition Rights - Xstrata No Dwelling
- SEOC Acquisition - Noise Trigger
- Church
- Community Hall
- Daracon Site Office
- Glennies Creek Fire Brigade
- Dairy

FIGURE 6.2

Mount Owen Complex Noise and Blast Monitoring Network

File Name (A4): R01/3109_041.dgn
20130207 14.07

The compliance assessment process outlined in the NMP addresses the noise impact assessment criteria specific to Mount Owen Mine and the cumulative noise criteria. The results of the noise monitoring program are reported annually in the Mount Owen Complex AEMR.

Compliance with the site specific noise impact assessment criteria is determined using operator attended noise monitoring sessions as these provide both a measurement of the ambient noise levels at a location and a qualitative assessment of the industrial noise source's contribution, if any, to the measured ambient noise levels. The attended monitoring sessions provide a 15 minute snapshot of the noise environment for the day, evening and night periods at each monitoring location and are relevant for the meteorological conditions occurring during the monitoring sessions. As a result, a validated noise model of the mining operations is used to estimate the Mount Owen Mine noise level contribution at given locations under given meteorological conditions. The combination of the attended noise monitoring sessions, which provide quantitative and qualitative data, and the interrogation of the compliance noise model are used to determine compliance with the relevant criteria.

The Mount Owen Complex real-time noise monitoring network, located in the region surrounding the Mount Owen Complex is used to provide noise data for day, evening and night periods at each monitoring location, for the meteorological conditions that occur during the assessment period.

The Mount Owen Complex uses the real-time noise monitoring network to assist with the ongoing management of noise impacts from the mining operation. This noise monitoring records noise levels from the mine every day and sends alarms when predefined noise levels have been exceeded to prompt operational response to minimise noise impacts where such noise levels are identified as being caused by the mine. Moreover, XMO currently implement other noise management controls including:

- the use of sound attenuated mining fleet;
- provisioning for the ability to emplace overburden at different heights throughout the North Pit to reduce potential impacts; and
- modified production during times of significantly adverse weather conditions.

6.2.2 Assessment Methodology

A comprehensive noise assessment will be undertaken for the EIS in accordance with the NSW Industrial Noise Policy (EPA 2000).

The noise assessment will include:

- analysis and discussion of the existing noise environment in the Project Area and surrounds based on existing monitoring data;
- detailed assessment of the prevailing meteorological conditions;
- prediction of the noise emissions for the Project using the Environmental Noise Model:
    - modelling to derive noise emissions contributed for calm, prevailing and adverse weather conditions;
    - predicting noise emission levels at the nearest affected noise sensitive receivers for four selected stages (Year 1, Year 5, Year 10 and final landform) of the mine plan;

- assessing the potential noise impacts at the nearest affected noise sensitive receivers. This will include a probability assessment to establish the extent of the likely impacts;
- assessing all reasonable and feasible mitigation measures. This will include a sensitivity analysis of machine locations, dump designs, noise bund heights, attenuation options and equipment sound power levels;
- identifying potential further noise management and/or mitigation strategies in addition to any potential need for changes to the existing noise monitoring network for the Mount Owen Complex; and
- assessment of the cumulative impacts associated with the Project and Mount Owen Complex and other significant local noise sources, including recently approved projects.

The noise impact assessment will consider noise associated with the construction, operation and decommissioning of the proposed development, including associated rail and road traffic noise.

6.3 Blasting

Key considerations in the design of blasts include potential offsite impacts on receiver areas, including residences and other sensitive land uses due to overpressure and vibration. In addition, the potential impact of blasting vibration on infrastructure in proximity to a mining operation is an important blast management issue.

Blasting at the Mount Owen Complex occurs Monday to Saturday between 9.00 am and 5.00 pm and 9.00 am to 6.00 pm (DST). Additionally, XMO have approval for 12 blasts per year between 7.00 am and 9.00 am, and this is proposed to be maintained as part of the Project. Other key blasting management controls include:

- design and monitoring of blasts to meet vibration and airblast limits; and
- notification of blasting times to private residents within 3 kilometres of the North Pit and Ravensworth East Mines, and within 2 kilometres of Glendell Mine.

Blast monitoring locations are illustrated on **Figure 6.2**.

6.3.1 Assessment Methodology

It is proposed that blasting will be undertaken on a regular basis for both overburden removal and coal extraction. A comprehensive blast assessment will be undertaken as part of the EIS.

OEH sets guidelines for blasting based on human comfort levels. The guidelines have been adapted from the Australian and New Zealand Environment and Conservation Council (ANZECC) Guidelines *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC 1990). The ANZECC guidelines are based on human comfort levels and are much more stringent than those based on the potential for damage to structures. The fundamental criteria are that at any residence or other sensitive location:

- the maximum overpressure due to blasting should not exceed 115 dB for more than 5 per cent of blasts in any year, and should not exceed 120 dB for any blast; and
- the maximum peak particle ground velocity (PPV) should not exceed 5 mm/s for more than 5 per cent of blasts in any one year, and should not exceed 10 mm/s for any blast.

Further to the ANZECC guidelines, vibration criteria are also required for infrastructure within the surrounding area to ensure that potential impacts can be managed. The relevant criteria for blasting vibration on infrastructure such as power lines, bridges and roads will be determined in consultation with relevant agencies and/or the infrastructure owner and by reference to relevant Australian and International Standards.

Modelling of blasting impacts (vibration and overpressure) will be undertaken to identify any potential impacts on surrounding residences, existing and proposed infrastructure and sensitive environmental or historic features. This modelling will be based on blasting site rules that have been developed from the extensive history of blasting at the North Pit and will allow blasts to be designed to ensure blasting impacts are appropriately managed over the life of the Project.

6.4 Ecology

There will be no impact on any existing Mount Owen Mine conservation areas or biodiversity offset areas as a result of the Project.

As outlined in **Section 5.5**, potential impacts on ecological values are considered a moderate risk for the Project and a detailed ecological assessment will be completed by Umwelt. There has been extensive past surveys of the Mount Owen Complex site as part of environmental assessments and seasonal monitoring programs. These previous ecological surveys and assessments, coupled with information from regional vegetation mapping and threatened species information resources such as the OEH and DSEWPC threatened species databases, provide extensive information on the ecological values within the Project Area.

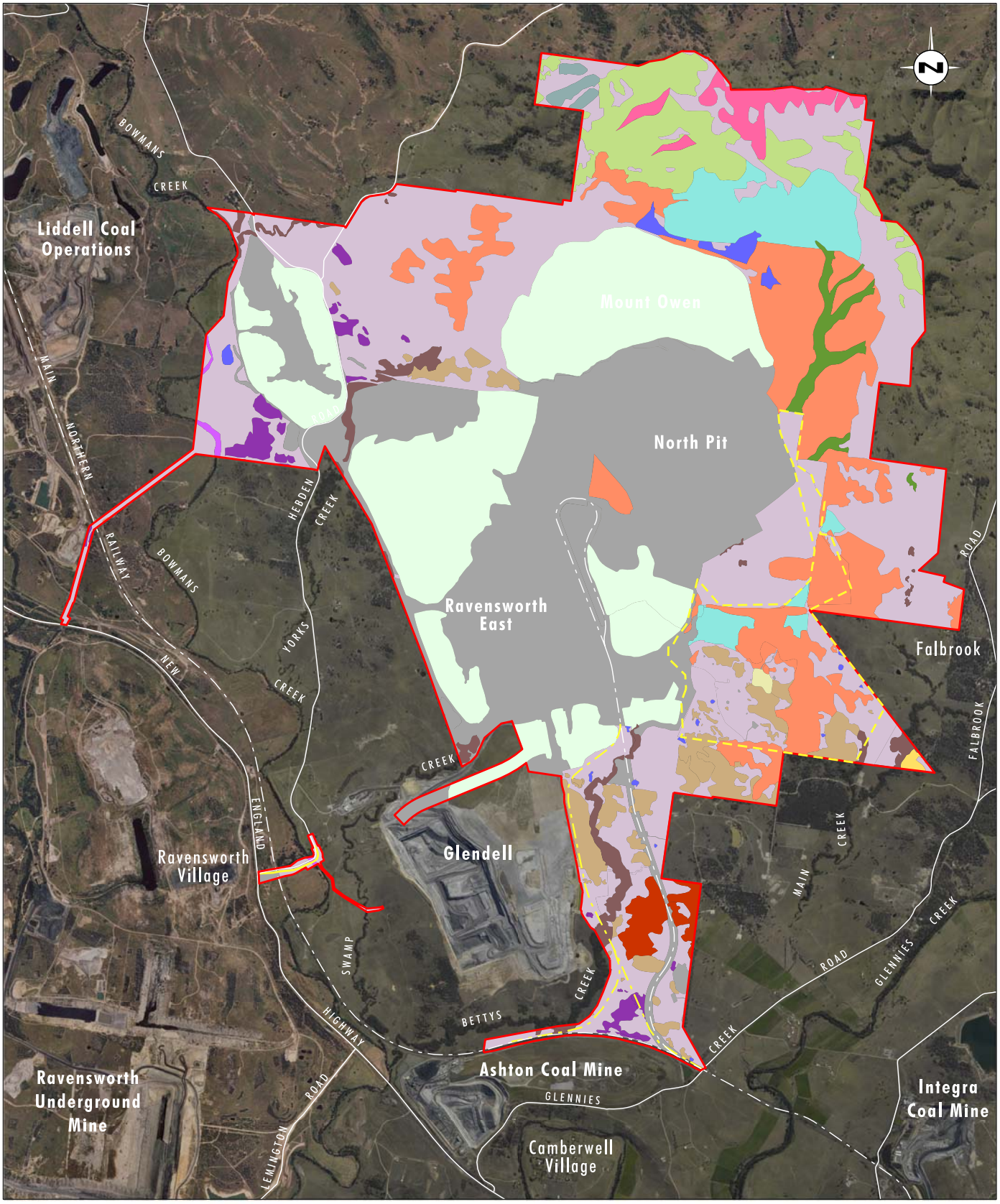
6.4.1 Existing Vegetation Communities and Fauna Habitats

Fourteen vegetation communities have been mapped at Mount Owen Complex (Umwelt 2009; Umwelt 2003; Peake 2006) (refer to **Figure 6.3**). Of these, three communities are listed as Endangered Ecological Communities (EECs) under the TSC Act within the Project Area:

- Central Hunter Grey Box Ironbark Woodland (EEC);
- Planted Ironbark – Spotted Gum – Grey Box Forest; and
- Central Hunter Ironbark – Spotted Gum – Grey Box Forest (EEC).

No threatened ecological communities (TECs) listed under the EPBC Act have previously been recorded in the Project Area or have been recorded during surveys to date for the current Project.

Fauna habitat in the Project Area is considered to be important in a local and regional context, providing habitat for at least 162 bird species, 15 amphibian species, 20 reptiles and 31 mammals (Forest Fauna Surveys and Newcastle Innovation 2010). Grassland habitats dominate the Project Area, with areas of eucalypt dominated woodland and forest habitat, with limited and highly disturbed riparian habitats occurring along Bowmans Creek and ephemeral drainage lines within the Project Area.



Source: Xstrata and Mount Owen (2012)

0 1 2 3km
1:60 000

Legend

- Project Area
- Proposed North Pit Continuation
- Rail Upgrade Works
- Hebden Road Upgrade Works

Vegetation Communities:

- Disturbed Land
- Barrington Footslopes Dry Spotted Gum Forest
- Central Hunter Grey Box - Ironbark Woodland (EEC)
- Central Hunter Box - Ironbark Woodland
- Central Hunter Bulloak Forest Regeneration
- Kunzea Closed Shrubland
- River-flat Eucalypt Forest
- Dam
- Derived Native Grassland
- Dry Rainforest
- Hunter Lowlands Red Gum Forest (EEC)
- Hunter Footslopes Sheltered Forest
- Hunter Valley River Oak Forest
- Planted Ironbark - Spotted Gum - Grey Box Forest (EEC)
- Mine Rehabilitation
- Central Hunter Ironbark - Spotted Gum - Grey Box Forest (EEC)
- Central Hunter Swamp Oak Forest

FIGURE 6.3

Preliminary Vegetation Communities

File Name (A4): R01/3109_039.dgn
20130207 14.11

6.4.2 Threatened Species and Endangered Populations

Threatened species, endangered populations and EECs (NSW listed) previously recorded in the Project Area are briefly discussed below.

6.4.2.1 Threatened Flora Species

The location of threatened species records in the local area and in the Project Area are illustrated on **Figure 6.4**. One threatened flora species (i.e. slaty red gum (*Eucalyptus glaucina*)) has been previously identified within the Project Area (within the now approved and operating mine pit). This tree has subsequently been removed as a result of approved mining activities.

Threatened flora species are not expected to comprise a significant constraint to the Project; but will be considered in the investigation.

6.4.2.2 Threatened Fauna Species

A total of 24 threatened fauna species have been previously recorded within or in proximity to the Project Area. Threatened species and records of their locations in the local area are illustrated on **Figure 6.5**.

If habitat for threatened fauna species is identified in the Project Area it will be a consideration in the development of the Biodiversity Offset Strategy for the Project.

6.4.2.3 Endangered Populations

The following endangered populations have been previously recorded within the vicinity Project Area; however, they have not previously been identified in the area of the North Pit continued operations, nor have they been found during recent detailed surveys in the Project Area:

- weeping myall *(Acacia pendula)* in the Hunter Catchment;
- Cymbidium canaliculatum population in the Hunter Catchment*;* and
- river red gum (*Eucalyptus camaldulensis)* in the Hunter Catchment.

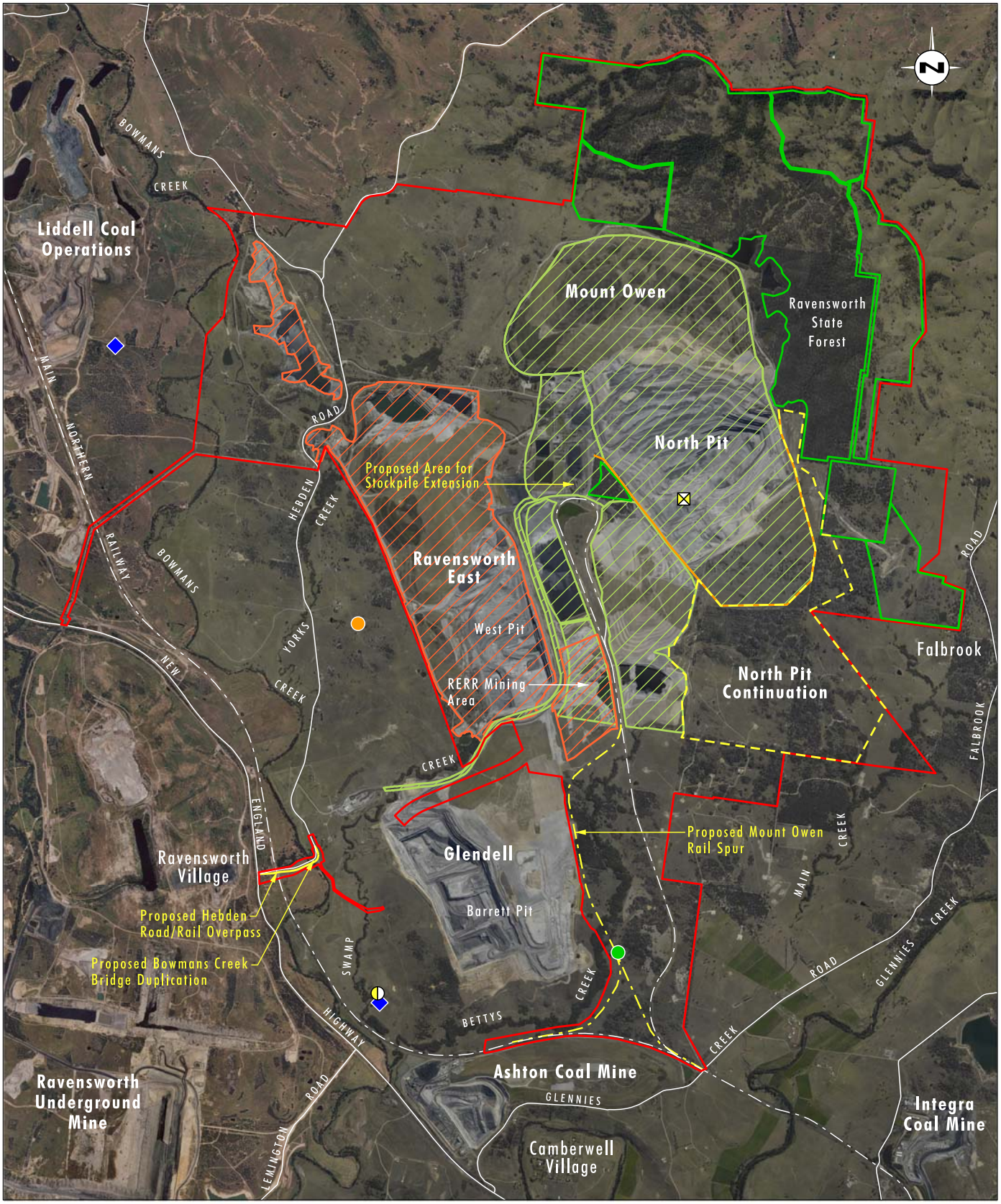
Endangered populations are not proposed to be disturbed by the Project.

6.4.2.4 Migratory Species

The Project Area is not considered to comprise *important habitat* for any of the identified migratory species, and therefore the Project is not likely to substantially modify or destroy important migratory species habitat; disrupt the lifecycle of an ecologically significant proportion of a migratory species; or result in an invasive species that is harmful to migratory species becoming established within the Project Area. The Project is not expected to result in a significant impact on migratory species.

6.4.2.5 Aquatic Species and Habitats

The aquatic habitats of Bowmans Creek are expected to be considered significant in a local and regional context and impacts on aquatic and riparian habitats would require substantial impact mitigation. The Project includes a proposed Hebden Road bridge crossing over Bowmans Creek which will be assessed in detail to minimise any potential impact to Bowmans Creek and the aquatic and riparian habitats. Moreover, the proposed rail spur would require a crossing over Bettys Creek with potential impacts assessed as part of the EIS.



Source: Xstrata, Mount Owen (2012), DECC Atlas of NSW Wildlife (2008), Umwelt (2007) and Lands NSW (2003)

Note: All information is accurate as of 15 October 2008. Overlapping records were moved slightly for display purposes. Some records, particularly those sourced from the DECC Atlas of NSW Wildlife, have variable accuracy.

0 1 2 3km
1:60 000

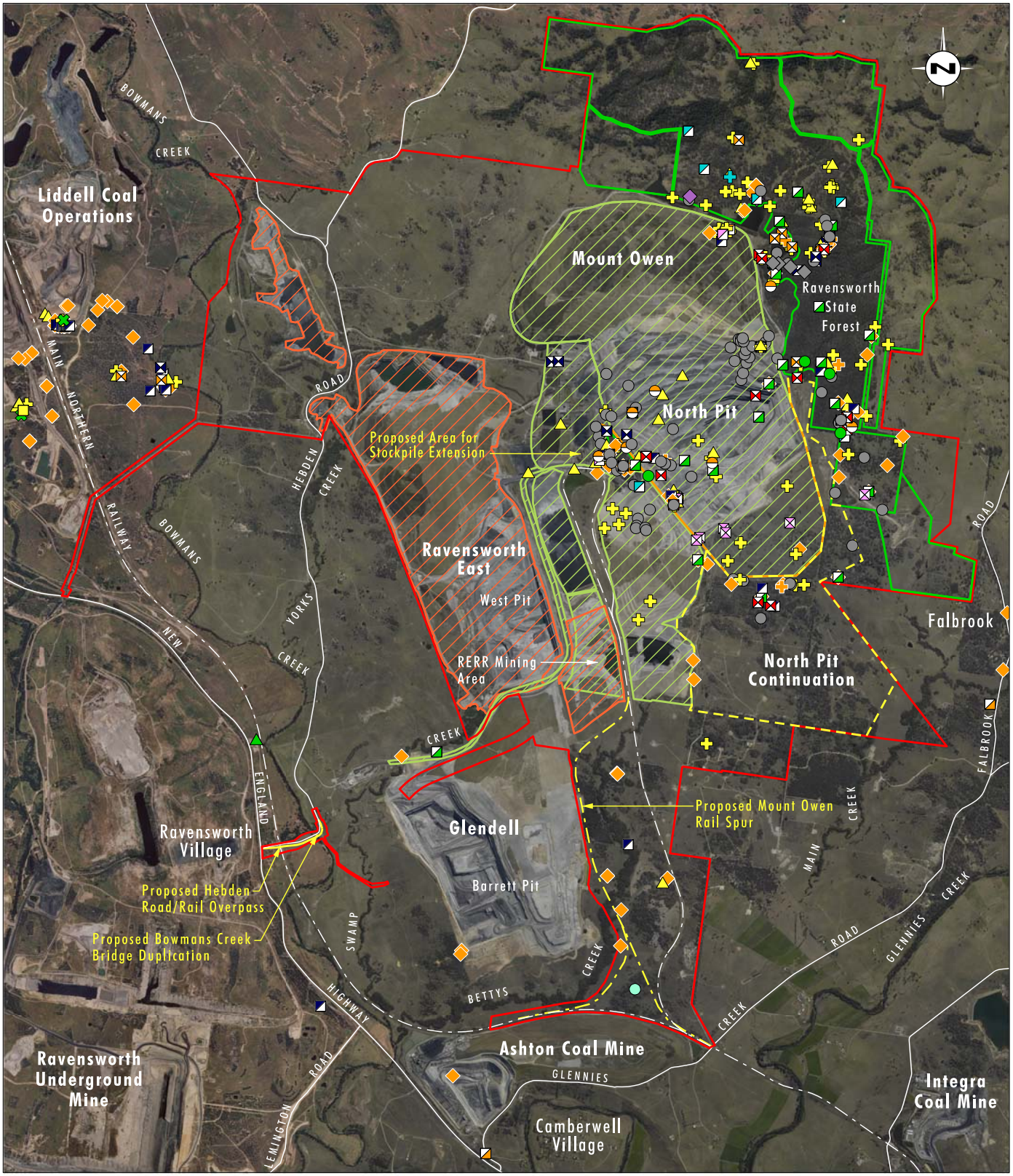
Legend

- Project Area
- Approved Mt Owen Operational Area
- Approved Ravensworth Operational Area
- Approved North Pit Shell
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Existing Offset Areas
- *Acacia pendula*
- *Eucalyptus camaldulensis*
- *Eucalyptus glaucina*
- *Cymbidium canaliculatum*
- *Bothriochloa biloba*

FIGURE 6.4

Mount Owen Complex
Threatened Flora Records

File Name (A4): R01/3109_032.dgn
20130207 13.28



Source: Xstrata, Mount Owen (2012), DECC Atlas of NSW Wildlife (2008), Umwelt (2003 & 2008), Lands NSW (2003), Fly by Night Bat Surveys, Forest Fauna Surveys and TUNRA (2006-2007)

Note: All information is accurate as of 15 October 2008. Overlapping records were moved slightly for display purposes. Some records, particularly those sourced from the DECC Atlas of NSW Wildlife, have variable accuracy.

0 1 2 3km
1:60 000

Legend

- Project Area
- Approved Mt Owen Operational Area
- Approved Ravensworth Operational Area
- Approved North Pit Shell
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Existing Offset Areas
- Green and Golden Bell Frog
- Black-chinned Honeyeater
- Black-necked Stork
- Blue-billed Duck
- Brown Treecreeper
- Diamond Firetail
- Eastern Bentwing-bat
- Eastern Freetail-bat
- Eastern Cave Bat
- Greater Broad-nosed Bat
- Grey-crowned Babbler
- Grey-headed Flying-fox
- Hooded Robin
- Koala
- Large-eared Pied Bat
- Large-footed Myotis
- Spotted-tailed Quoll
- Squirrel Glider
- Swift Parrot
- Yellow-bellied Sheathtail-bat
- Little Bentwing-bat
- Masked Owl
- Powerful Owl
- Speckled Warbler

FIGURE 6.5

Mount Owen Complex Threatened Fauna Records

File Name (A4): R01/3109_033.dgn
20130207 14.16

The Hunter River catchment does not provide habitat for any of the listed threatened aquatic species, populations and EECs listed under the *Fisheries Management Act 1994* (FM Act). No threatened aquatic species were recorded during the assessment and none are expected to occur within the Project Area.

6.4.3 Assessment Methodology

The existing baseline ecological data as described above provides adequate survey coverage over the majority of the Project Area. However, additional survey and assessment is required to ensure that the ecological assessment for the Project covers the additional proposed disturbance area. Surveys and assessment will include the following:

- flora and vegetation community surveys, mapping and assessment:
  - update review of existing published literature and past flora survey results for Mount Owen Complex;
  - additional targeted flora field surveys during spring to coincide with specific flowering times for potentially occurring threatened flora species;
  - a review and as necessary supplementing, recent detailed plot based survey work to accurately describe and map vegetation communities, including specific surveys (following established Commonwealth guidelines) to determine the presence or otherwise of the White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland CEEC and to map derived native grassland communities; and
  - focus on surveying and mapping vegetation community boundaries and condition to provide adequate information for offsetting considerations;
- fauna species and habitat surveys, mapping and assessment:
  - further targeted green and golden bell frog survey, during appropriate seasonal and weather conditions conducive to the identification of the species;
  - additional winter survey with particular focus on threatened migratory birds (regent honeyeater and swift parrot) to ensure appropriate temporal survey;
  - identify and fill gaps not previously surveyed through monitoring and focus on assessment of habitat to feed into the impact assessment and to be considered in offsetting requirements; and
  - employ a range of survey techniques (trapping, spotlighting, call-playback, Anabats, direct observational surveys, scat collection, hair tubes etc.) – targeted to particular areas requiring further base-line knowledge;
- aquatic surveys and assessment:
  - focus on Bowmans Creek and key ephemeral streams including, Bettys Creek, Swamp Creek and farm dams, where appropriate, and incorporate a detailed assessment of aquatic and riparian habitat/species, and groundwater-dependent ecosystems.

Field surveys will be designed to be generally consistent with industry standard survey guidelines published by OEH.

The Project has been designed to avoid and minimise impacts on significant ecological values wherever possible. Following the completion of the comprehensive field surveys, a detailed ecological impact assessment will be undertaken to clearly identify any residual ecological impacts of the Project. A detailed ecological offset strategy will be developed to offset any residual ecological impacts.

All relevant statutory provisions will be identified and assessed in relation to the Project, including those under the EP&A Act, the TSC Act, the EPBC Act, the FM Act, Groundwater Dependent Ecosystem Policy (DLWC 2002) and State Environmental Planning Policy 44 – Koala Habitat (SEPP 44).

6.4.4 Biodiversity Offsetting

Biodiversity offsetting options for mining projects in the Hunter Valley are currently subject to a review by DSEWPC and OEH as part of the Upper Hunter Strategic Assessment (UHSA). Following the completion of ecological assessments, a biodiversity offsetting strategy will be developed for the Project. The strategy will consider a number of guidelines, in particular the:

- OEH Principles for the use of Biodiversity Offsets in NSW (2011);
- OEH Interim Offsetting Policy (2010); and
- DSEWPC EPBC Act 1999 Environmental Offset Policy (2012).

It is envisaged that whilst minor on-site offsetting may be included, the main focus will be off-site offsetting in strategic locations, in line with OEH current thinking and XCN current approaches.

XMO does not propose to adopt a formal BioBanking approach for the Project, rather a BioBanking assessment will be undertaken to inform the development of a biodiversity offset strategy for the Project. Additionally, XMO will also seek to incorporate innovative, non land based offsets into an integrated offsetting strategy for the Project.

6.4.5 EPBC Act Referral

Although XMO does not consider that the Project is likely to have a significant impact on matters of national environmental significance (MNES) the Project is being referred under section 68(2) of the EPBC Act for the Minister to determine whether or not the action (i.e. the Project) is a controlled action.

It is proposed to meet with DSEWPC to brief them on the Project (refer to **Section 4.1**) and throughout the referral determination process to ensure the referral adequately meets their requirements and any issues requiring resolution are addressed.

6.5 Surface Water

6.5.1 Existing Environment

The main drainage features in the vicinity of the Project Area are several ephemeral creeks, typically Schedule 2 (third order or higher) which are tributaries of Bowmans Creek (Yorks Creek, Swamp Creek, and Bettys Creek) and Main Creek (tributary of Glennies Creek) and the perennial streams Bowmans Creek and Glennies Creek which flow to the Hunter River. Bettys Creek and Swamp Creek have been subject to diversion works associated with previously approved mining within the Mount Owen Complex.

The surface water quality monitoring undertaken by XMO on the ephemeral creeks is frequently affected by the lack of flow in the creeks, with sampling often being from stagnant pools (refer to **Figure 6.6**).

Source: Mount Owen (2012) and Google Earth (2008)

0 1 2 4km

1:80 000

Legend

- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Drainage Line
- Surface Water Monitoring Location
- MET Station Location

FIGURE 6.6

Mount Owen Complex Surface Water Quality Monitoring Network

File Name (A4): R01/3109_043.dgn
20130207 15.45

Existing monitoring includes a visual observation of flow conditions which is proposed to be continued as it provides a useful context to the surface water quality data.

Sampling of mine water has indicated the water is alkaline and within the discharge requirements of EPL4460, under the terms of the Hunter River Salinity Trading Scheme (HRSTS). Mine water is thus suitable for release when such discharges are permitted.

Water entering the existing open cut pit, either through groundwater interception or rainfall and runoff from disturbed areas, is currently captured in the mine water management system for the complex. The inflows to the Mount Owen Complex water balance include rainfall, runoff, groundwater inflow, licensed extraction (Glennies Creek) and transfers from the Greater Ravensworth Water Sharing Scheme (GRWSS) (i.e. between the Mount Owen Complex and Liddell and Narama mines). Water is also recovered from tailings water and re-used in the Mount Owen Complex mine water management system.

Water outflows from the water balance include CHPP use, haul road dust suppression, evaporation from storage dams and transfers to the Greater Ravensworth Water Sharing Scheme (during wet periods). XMO also have consent to discharge surplus water when required in accordance with EPL4460 via the HRSTS.

The Mount Owen Complex sources water from Greater Ravensworth Water Sharing Scheme and secondly Glennies Creek as required to meet water demands. During water surplus periods, water is returned to the Greater Ravensworth Water Sharing Scheme and where required exported off site via the HRSTS.

6.5.2 Potential Impacts

The surface water assessment will consider the Project's potential impacts on water quality and quantity, water users, and soil and water management. Impacts may result from the proposed activities such as:

- continuation of open cut mining to the south;
- waste management, including tailings disposal, associated with continued operations;
- changes to infrastructure areas;
- construction of rail crossing of Bettys Creek and road crossing of Hebden Road at Bowmans Creek; and
- increase in coal processing from 15 Mtpa to 17 Mtpa and associated water required for the proposed increase in capacity.

6.5.3 Assessment Methodology

A detailed surface water assessment will be prepared as part of the EIS for the Project. The surface water assessment will include the following:

- the likely surface water impacts as a result of the continued open cut mining including catchment changes and the potential implications of these impacts on water licensing, mine water management and downstream watercourses and water users;
- likely surface water control measures, including diversion drains and mine water management controls;

- potential for changes to surface water quality and potential erosion and sediment control measures required;
- an assessment of the potential impacts on downstream water users, environments and watercourse stability;
- cumulative surface water impacts due to the Project and other existing and approved developments; and
- a review of the Project against NSW State water policies and regulations.

As part of the assessment a detailed mine site water balance will be prepared which will include consideration of associated external supply and discharge requirements. The water balance will:

- account for available water sources;
- account for water demand for the Project;
- enable a high level assessment of demand and supply peaks and storage requirements to be explored under a range of rainfall/evaporation, groundwater make and production conditions;
- potential shortfalls in water supply and options for making up shortfalls (e.g. purchase of additional Water Allocation Licences (WALs));
- reliance on supply from adjacent mines (e.g. Greater Ravensworth Water Sharing Scheme);
- need for controlled discharge via the HRSTS;
- risk and quantities of uncontrolled spill from storages to the environment;
- include a salt balance for the Project; and
- include a final void water balance.

The water balance assessment will consider XMOs participation in the Greater Ravensworth Water Sharing Scheme.

Reporting for the surface water assessment, including the water balance, will be completed to meet the NSW environmental planning and assessment requirements.

6.6 Groundwater

Two types of groundwater are found within the vicinity of the Project, alluvial aquifers and hard rock aquifers as follows:

- the alluvial aquifers of:
  - Bowmans Creek and its ephemeral tributaries (Yorks, Bettys and Swamp Creek); and
  - Glennies Creek and its ephemeral tributary Main Creek;
- the hard rock aquifer associated with the coal measures.

The water quality within the hard rock aquifers can vary significantly. The coal seam related groundwater exhibits a water quality that is of no agricultural benefit due to high salinity. The water held in the coal measures is of poor quality being mostly brackish to saline and low yield. Groundwater quality monitoring locations are illustrated on **Figure 6.7**.

Coal measures in the vicinity of the Project are already partially depressurised as a result of current mining activity. Integra Coal's underground operations in the Middle Liddell and Hebden seams are further promoting depressurisation of coal measures to the south.

6.6.1 Potential Impacts

There are no substantive alluvial systems likely to be impacted by the Project; the current North pit shell maintains a minimum 200 metres standoff from the high bank of Main Creek in accordance with the NSW Aquifer Interference Policy. Groundwater impact modelling will be conducted to assess impact on alluvial systems associated with Glennies Creek and Main Creek.

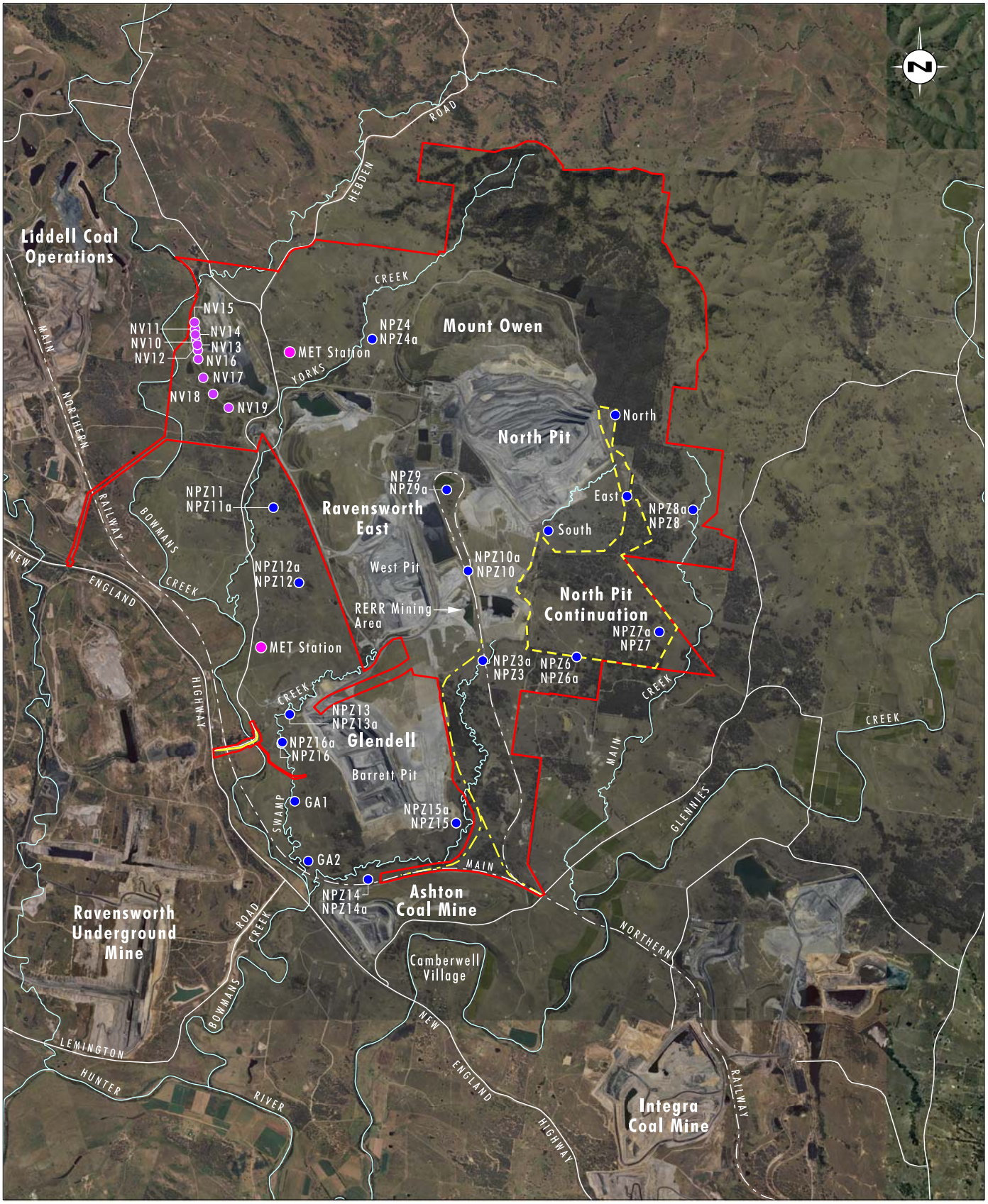
Existing borehole water supplies

Existing privately owned boreholes in the region have been identified from the NOW database. The nearest private bores are beyond four kilometres and are unlikely to be significantly impacted by the Project, although groundwater impact modelling will be conducted to confirm this.

6.6.2 Assessment Methodology

A groundwater impact assessment will be undertaken for the Project which includes the following:

- refinement of the conceptual hydrogeological model that has been developed for the Greater Ravensworth region;
- development and calibration of the regional groundwater model (currently being developed to support the Liddell Coal Operations Groundwater Impact Assessment) to focus on the local groundwater flow systems affecting the Mount Owen Complex area. This refinement of the existing model will be based on the conceptual understanding and current and historical mining operations relevant to the groundwater impact assessment;
- simulation of proposed modifications with output including but not limited to piezometric heads, drawdowns, pore pressures, groundwater flows and changes to surface drainage systems baseflows;
- simulation of inflows, depressurisation of coal measures and aquifer impacts, with reference to the Aquifer Interference Policy;
- assessment of impacts to local users; and
- impacts on groundwater dependent ecosystems (as defined by the ecological assessment), although based on existing information there are no known groundwater dependent ecosystems in the Project Area.



Source: Mount Owen (2012) and Google Earth (2008)

0 1 2 4km
1:80 000

Legend

- Project Area
- Proposed North Pit Continuation
- Proposed Rail Upgrade Works
- Proposed Hebden Road Upgrade Works
- Drainage Line
- Groundwater Monitoring Location
- Piezo (groundwater) Monitoring Location
- MET Station Location

FIGURE 6.7

Mount Owen Complex
Groundwater Quality
Monitoring Network

The groundwater impact assessment will include an assessment of the impacts on the operational water balance and management implications as follows:

- recommendations derived from the modelling results relating to the management of the groundwater resource and management of groundwater flow;
- input of groundwater data into the site water balance model and interpretation of results; and
- recommendations relating to the management of groundwater inflow to the operations and the impact groundwater may have on the operations water balance.

6.7 Agricultural Impacts

The existing land resources, land suitability and agricultural suitability of the Project Area are presented in **Section 5.0**.

6.7.1 Assessment Methodology

Recent changes in state planning now require that an Agricultural Impact Statement (AIS) be prepared as part of any EIS that is submitted in support of a development application for developments classed as State Significant Development. The NSW Government has prepared guidelines to facilitate the preparation of AIS's in NSW and to assist applicants and others to understand the information required to enable an assessment of the agricultural impacts of mining and other resource extraction proposals.

The information will form a key component of the assessment process in terms of evaluating and minimising impacts on agricultural lands.

Baseline Data Collection/Review

The AIS will also identify potential impacts to the broader agricultural industry. The requirements for the collection of appropriate and adequate baseline data varies between the data required for land within the proposed disturbance area and land located in the broader region.

The collection of baseline data will be undertaken by a combination of desktop assessment and field surveys including soil sampling in accordance with the Agricultural Impact Assessment guidelines. Following the collection and review of the baseline data a risk based impact assessment will be completed. The impact assessment includes:

- the identification of potential impacts of the Project to agricultural resources within the proposed disturbance area and the surrounding locality;
- the identification of any potential impact to agricultural productivity (including economics) within the proposed disturbance area and the surrounding locality;
- identification of further risks such as weed management, noise, air quality and socio-economic based on the outcomes of each relevant specialist study;
- identification of the total area of land that is to be removed as a direct result of the Project including the identification of the land class, agricultural suitability, soil type and carrying/cropping capacity of this land. The impact assessment will also quantify the area, including land class, agricultural suitability, soil type and carrying/cropping capacity within the locality surrounding the Project Area and provide a direct comparison to the area of land to be removed by the Project;

- review and integration with the concept mine closure study, specifically the identification of opportunities for agricultural land uses as part of the final land use for the Project Area. This review will be closely integrated with the outcomes of the biodiversity and water resources studies;

- identify if the Project will result in any water being transferred from current agriculture use as a result of the Project. If it is identified that the Project may result in the transfer of water from agriculture use, further detailed modelling would be required to facilitate the quantification of transferred water;

- a review of the potential socio-economic impacts, specifically as they may relate to agricultural support services within the locality of the Project Area. This will be incorporated into the broader social impact and opportunities assessment and economic assessment for the Project (refer to **Sections 6.13** and **6.14** respectively); and

- an analysis of potential cumulative impacts to agriculture.

Mitigation and management measures based on the outcomes of the AIS will also be identified as part of this assessment process.

6.8 Aboriginal Archaeology and Cultural Heritage

XMO has commenced a detailed consultation and engagement process with Registered Aboriginal Parties for the Project to identify traditional, historic and contemporary knowledge holders to understand the cultural significance of the proposed disturbance area. This process will be undertaken in accordance with *National Parks and Wildlife Act 1974* and the following guidelines to facilitate the development of an Aboriginal Cultural Heritage Assessment Report:

- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005);

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010);

- Department of Environment, Climate Change and Water (DECCW) 2010a. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*; and

- Department of Climate Change and Water (DECCW) 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*.

In conjunction with the preparation of the Aboriginal cultural heritage assessment being facilitated by an XMO engaged specialist consultant, an Aboriginal archaeological assessment will also be prepared for inclusion in the EIS.

6.8.1 Existing Environment

The Mount Owen Complex has been subject to extensive archaeological investigations for the Mount Owen, Ravensworth East and Glendell Mines, with archaeological surveys conducted by Brayshaw (1981 and 1982), Croft and Associates (1983), Dean-Jones (1991a, 1991b, 1991c and 1992), ERM (1995, 1999 and 2002), Barber (1993), Baker (1997), AMBS (1995 and 1998), Ruig (1996), Hughes and Sullivan (1997), HLA (2001) and Umwelt (2001, 2003a, 2003b, 2004a, 2004b, 2005, 2006).

The vast majority of the known sites within the Project Area were located in areas of low gradient (<2 degrees) within 50 metres of the creek lines or on low gradient ridge and spur crests. All creek lines have been previously assessed as having high Aboriginal cultural significance (Umwelt 2004a). Major creeks in the vicinity of the Project Area such as Bowmans Creek and Bayswater Creek are seen as particularly important, however, many more sites were located along the main channels of Swamp Creek, Bettys Creek, Yorks Creek, Main Creek, Chain of Ponds Creek and Bayswater Creek than were identified along Bowmans Creek. The Project would result in minor impacts to Bettys Creek and Bowmans Creek associated with the construction of the rail spur and Hebden Road bridge duplication respectively. The North Pit continuation pit shell has been designed to include a minimum standoff of 200 metres from the high bank of Main Creek.

6.8.2 Potential Impacts

The Project has the potential to impact both known Aboriginal sites and unidentified Aboriginal sites and areas of cultural heritage value. Potential impacts will be identified and addressed as part of the Aboriginal archaeological and cultural heritage assessments, in consultation with the Registered Aboriginal Parties. The Project would not impact the existing Biodiversity Offset Area including the sites previously identified as being significant within these areas.

6.8.3 Assessment Methodology

As part of the archaeological and cultural heritage study a comprehensive field survey will be undertaken by OzArk and the Registered Aboriginal Parties to provide data to augment the current data from the previous surveys, focusing on the proposed additional disturbance area.

In addition, an XMO engaged specialist consultant will facilitate a detailed consultation and engagement program with the Registered Aboriginal Parties and prepare a cultural heritage assessment report. The cultural heritage assessment report will clearly outline areas and places of cultural significance in addition to any potential impacts associated with the Project. The archaeological assessment report will be integrated with the cultural heritage assessment report, both of which will outline mitigation and management measures proposed to be implemented in addition to a consideration of intergenerational outcomes. Any sensitive information identified by the Registered Aboriginal Parties will be provided as separate confidential information to OEH.

6.9 Historical Heritage

Historic heritage is commonly used to describe heritage that is not Aboriginal heritage (although many historical heritage places have Aboriginal associations) and can include buildings, structures, archaeological sites/relics, works (roads, bridges etc.), precincts/conservation areas, rural landscapes and movable items. To identify if any listed historical heritage items are located within the Project Area, desktop searches were conducted of the NSW State Heritage Register and State Heritage Inventory, the Australian Heritage Database (including Commonwealth and National Heritage lists and the Register of the National Estate) and local planning instruments (Singleton LEP).

Ravensworth Public School is located outside but immediately to the west of the area associated with the rail level crossing upgrade.

6.9.1 Assessment Methodology

The historical archaeological and heritage assessment for the Project will be prepared in accordance with the relevant professional standards and guidelines, including the NSW Heritage Manual 1996, Archaeological Assessments and Assessing Heritage Significance and with consideration of the principles contained in the Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance.

The assessment will include the following:

- historical research focusing on any areas identified with potential historical heritage or archaeological significance. The research may include archival research in the State Library of NSW, State Records, Regional Libraries, a review of Singleton Council records and maps (if available) and a review of any available air photographs, parish maps;
- consultation with local historical societies;
- targeted historical land title searches to identify any areas of high historical heritage or archaeological potential;
- targeted inspection of the proposed disturbance area to identify any potential historical heritage items;
- preparation of a detailed historical and archaeological context, in which to assess the significance of any potential historical archaeological resource or heritage item present within the proposed disturbance area;
- preparation of an assessment of the significance of any identified sites in the proposed disturbance area, according to established significance assessment criteria outlined by the Heritage Branch, OEH *Assessing Heritage Significance* guidelines; and
- preparation of a Statement of Heritage Impact indicating the likely effect of proposed works on any potential historical archaeological resource or heritage item identified or previously known within the proposed disturbance area and whether further management/investigation is warranted.

6.10 Traffic and Transport

The local road network in the vicinity of the Project Area includes Hebden Road, Glennies Creek Road, Forest Road and the New England Highway. Traffic associated with the construction of the rail spur and Northern turn-out would access the construction area via Forest Road (refer to **Figure 1.2**). Access to the rail overpass and new Hebden Road bridge over Bowmans Creek would be via the New England Highway and Hebden Road. Access to the Mount Owen MIA will continue to be via the New England Highway and Hebden Road. It is anticipated that the overpass and new bridge would result in safety and efficiency improvements to the existing road network in the vicinity of the Project Area.

Product coal extracted from the Mount Owen Complex, including the Project, will continue to be transported to the Port for export via the Mount Owen rail loop and the Main Northern Rail Line.

6.10.1 Potential Impacts

It is proposed that construction associated with the Project would take approximately 18 months and require a peak construction workforce of up to 260 people. Access to the rail construction area would predominately be via Forest Road. Forest Road is currently a no through, gravel road providing access to XMO land and to surface infrastructure associated with the Integra Underground Mine. It is likely that some upgrade works would be required to the existing Forest Road to allow for construction traffic to safely use this road. Works associated with the level crossing overpass and the new Hebden Road bridge over Bowmans Creek will likely result in minor traffic delays on Hebden Road in the vicinity of the proposed works.

As the Project will not result in a significant increase to the total operational workforce, traffic volumes associated with the operation of the Project are expected to be similar to the current traffic levels.

The Project is provisioning for the construction and operation of an additional rail spur/line and northern turn-out to the west of the existing Mount Owen rail spur. XMO would utilise the proposed northern turn-out to provide trains an opportunity to turn around and travel back west towards mining operations west of the Mount Owen Complex. Moreover, the proposed additional rail line is located outside the Integra Coal underground operation subsidence zone and will also provide opportunities for trains to park up on the existing spur when not in service. It is anticipated that the additional rail line and northern turn-out would provide for increased efficiencies and reduce congestion on the Main Northern Rail Line.

6.10.2 Assessment Methodology

A comprehensive traffic assessment will be completed, as part of the EIS for the Project. The traffic assessment will assess the potential impacts associated with construction and operational traffic. The assessment to be completed as part of the EIS will include:

- a review of existing traffic count data for the nearby or potentially affected road network;
- an assessment of the existing road network that will be used in the construction and operation phases. This will include road widths, intersection treatments, compliance with current standards, existing traffic volumes and vehicle classification using the road network;
- an assessment of Hebden Road, including project access, the rail level crossing safety/capacity, the tight curve immediately to the east of the level crossing and the Hebden Road intersection with New England Highway as to safety, capacity and intersection treatment;
- an assessment of the adequacy of intersections and the general traffic routes to accommodate the proposed increase in vehicle numbers during construction; and
- assessment of the traffic and transport impacts during both the construction and operational phases of the Project including:
    - level of service on the road network;
    - physical condition of the roads related to the Project including capacity of the networks;
    - road safety issues;
    - impacts of the Project on the road network; and
    - potential cumulative impacts associated with any other approved mining and/or other projects in the area.

6.11 Greenhouse Gas and Energy

The primary sources of greenhouse gas (GHG) emissions at the Mount Owen Complex are fugitive emissions from coal seam exposure, fuel combustion used in the mining fleet, transport, blasting and electricity consumption required by the CHPP and associated infrastructure areas.

The Mount Owen Complex is currently subject to an Energy Savings Action Plan which aims to identify improvement opportunities relating to energy efficiencies and reducing greenhouse gas emissions.

GHG emissions and energy consumption and production at the Mount Owen Complex are currently reported under the National Greenhouse and Energy Reporting Framework (NGER). NGER reporting includes a review of all emission sources associated with mining operations at the Mount Owen Complex. An annual review of the Energy Savings Action Plan is also undertaken which evaluates the savings of controls implemented and identifies any additional improvement opportunities.

6.11.1 Assessment Methodology

A Greenhouse Gas and Energy Assessment (GHGEA) will be undertaken as part of the EIS to determine the projected energy consumption and greenhouse gas (GHG) emissions as a direct result of the Project. The assessment will include the combined impacts of all approved and proposed works at the Mount Owen Complex. The scope of the GHGEA includes:

- estimation of scope 1, 2 and 3 emissions associated with the construction of the Project. Greenhouse gas emissions will be calculated from data relating to the energy and materials required for the proposed construction activities;
- estimation of scope 1 and 2 life of mine (LOM) emissions generated by the operations. Emission sources will include fugitive emissions and energy use;
- estimation of scope 3 LOM emissions associated with the operation of the Project. Emission sources will include product transport and product use;
- estimation of scope 1, 2 and 3 emissions associated with the decommissioning and closure of the Project. Emission sources will include the energy required to reshape and rehabilitate the mine footprint at the cessation of mining;
- qualifying the impact of the Project's emissions on the environment;
- evaluation of the impact of the Project's emissions on state, national and international greenhouse gas emission targets; and
- assessment of the relevant reasonable and feasible mitigation measures to reduce the impact of the Project.

6.12 Visual Amenity

The visual character of the upper Hunter Valley region is characterised by a contrast of landscapes from the native vegetation areas on the slopes bordering the valley, to cleared grazing land, areas of intensive agriculture along the alluvial river flats, residential areas, major industrial developments and coal mining areas. The industrial nature of the Upper Hunter Valley is highly apparent from the New England Highway. The Liddell and Bayswater Power Stations are dominant structures in the horizon of the area. Conveyors, mined surfaces and high voltage power lines also contribute to the visual environment of the immediate region surrounding the Mount Owen Complex.

6.12.1 Potential Impacts

In general, due to the locality of the Mount Owen Complex, the surrounding topography and the well vegetated surrounding areas, most private residences are likely to have a limited visual impact of the Project. However, elements, such as overburden emplacement areas and associated infrastructure may be visible from some viewing locations.

6.12.2 Assessment Methodology

A detailed visual assessment will be undertaken using a combination of digital terrain modelling, radial analysis and the preparation of photomontages to determine potential viewing locations and assessment of the potential impacts at these locations as a result of the Project. The photomontages will include an image of the current view from pre-determined viewing locations and an image representing what the view will be from each viewing location at various stages of the Project.

The assessment will also include the preparation of three-dimensional digital visualisations of the progression of the mining operation and rehabilitation. This visualisation will be utilised for impact assessment purposes and during community engagement.

6.13 Social Impact and Opportunities Analysis

XMO actively seeks to engage and consult with the community to provide information relating to the environmental, social and operational performance of the Mount Owen Complex and enable the community to provide feedback and inform the social impact assessment. The Social Involvement Plan (SIP) within the EMS provides for the development and maintenance of relationships, trust and credibility with the local community. The SIP also details the company's annual community support program which includes donations, sponsorship, and in-kind support for a range of community, educational and environmental initiatives.

6.13.1 Potential Impacts

This Social Impact and Opportunities Assessment (SIOA) assessment process will focus particularly on the neighbouring Camberwell Village, Falbrook and Middle Falbrook areas, the Singleton Township and also the broader Hunter region.

6.13.2 Assessment Methodology

A SIOA assesses and predicts the likely consequences and opportunities of a Project in social terms. A detailed SIOA will be undertaken as part of the EIS.

There are a number of key phases in the SIOA which will aim to:

- profile the key communities;
- scope and assess the relevant issues and opportunities associated with the Project; and
- develop strategies to address the identified issues and opportunities and monitoring and management through the development of a socio-economic monitoring and evaluation program.

The scope of work for the five key tasks of the SIOA includes:

- **Task One – Profiling** (analysis of post impact/historical studies, relevant stakeholders, social indicators, media releases, secondary data and employee/contractor profiles).
- **Task Two – Scoping** (personal meetings, stakeholder briefings, project presentations, community surveys, stakeholder/community information sessions, workshops and planning processes).
- **Task Three – Impact Assessment** (regional economic assessment and sensitivity analysis, social impact assessment and evaluation and population impact project modelling).
- **Task Four – Strategy Development** (development of appropriate strategies to address the identified issues and the engagement of relevant stakeholders on agreed strategies).
- **Task Five – Monitoring and Management** (incorporation of strategies into community plans, EMP's and operations methods and development of a socio-economic monitoring and evaluation program).

6.14 Economic Impacts

There are a range of potential economic impacts associated with the Project which will be assessed as part of the EIS. These include an assessment of the economic impacts of the Project on a regional and state scale, including consideration of the benefits and costs associated with the Project.

From an economic perspective, there are two important aspects of the Project, being:

- the economic efficiency of the Project (i.e. consideration of economic costs and benefits); and
- the economic impacts of the Project (i.e. the economic activity that the Project would provide to the regional and State economy).

6.14.1 Assessment Methodology

An Economic Impact Assessment will be undertaken as part of the EIS, and will include:

- a benefit cost analysis (threshold value analysis) in accordance with the *Draft Guideline for the use of Cost benefit analysis in mining and coal seam gas proposals (2012)* of the Project;
- an economic impact assessment of the construction and operation of the Project; and
- an economic assessment of the impacts of the Project on agriculture and water resources.

6.15 Mine Closure and Rehabilitation

As described in **Section 5.0**, the majority of the land within the Project Area is low to moderate grade grazing lands with varying soil quality, depth/rockiness and erosion hazard. Moreover, the majority of the Project Area is located on Class 3 land, which is grazing land or land suited to pasture improvement.

6.15.1 Potential Impacts

The mining areas and overburden dumps will require rehabilitation both progressively and as activities are ceased. Mining of the North Pit will result in one final void. The RERR project has the potential for the creation of a final void if the intended use of the RERR mining area for tailings is not realised.

6.15.2 Assessment Methodology

A land resources, rehabilitation and decommissioning assessment will be prepared for the Project. The assessment will draw together the assessment of soils, land capability, agricultural land use, rehabilitation and decommissioning. The assessment will specifically include:

- identification of any conflict in land use from a rehabilitation and decommissioning perspective and recommendations to prevent, minimise or manage any land use conflicts;
- an assessment of potential impacts to the key agricultural industries within and surrounding the Project Area including potential economic considerations guiding the identification of final landuse options;
- integration of soils in the rehabilitation process; and
- assessment of suitable final landform rehabilitation of the Project Area with consideration given to surrounding land uses, existing agricultural suitability of the Project Area and potential future uses of the Project Area.

The rehabilitation strategy will include the identification of specific rehabilitation criteria, landuse options and closure objectives. The rehabilitation strategy will be developed as part of the design phase of the Project and in conjunction with community consultation regarding potential final land use options. The rehabilitation strategy will seek to build on existing strategies currently in place at the Mount Owen Complex.

7.0 Project Schedule

Based on the current Project timing, XMO intend to lodge the Project Application and EIS for the Project with the DP&I in the fourth quarter of 2013.

8.0 References

AMBS. (Baker, N). 1995. *Revised Proposal for Archaeological testing and Assessment Program. Mt Owen Coal Lease Extension, Bettys Creek, Hunter Valley*.

AMBS (Baker, N). 1998. *Archaeological Salvage of Bettys Creek Lease Extension, Mt Owen Mine, Hunter Valley, NSW*. Report prepared for Mt Owen Mine.

ANZECC. 1990. *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.*

Australian/New Zealand Standard (*AS/NZS). 2004. 4360:2004 Risk Management.*

Baker, N. (AMBS Consulting). 1997. *Archaeological Test Excavations of Aboriginal Sites at Bettys Creek, Mt Owen Mine, Hunter Valley, NSW*. Report to Mt Owen Mine, BHP Coal Australia in four volumes. December 1997.

Barber, M. (Resource Planning Pty Ltd). 1993. *Proposed Mt Owen Extension – Archaeological Survey of Bettys Creek*. Report prepared for Hunter Valley Coal Corporation Pty Ltd.

Brayshaw, H. 1981. *Archaeological Survey of Glendell Open Cut Coal Mine at Ravensworth*. Report prepared for Croft and Associates Pty Ltd.

Brayshaw, H. 1982. *Additional Archaeological Information Relating to Glendell Opencut Coal Mine at Ravensworth, Hunter Valley*. Report prepared for Croft and Associates Pty Ltd.

Croft and Associates. 1983. *Glendell Coal Limited, EIS*.

Dean-Jones, P. (Resource Planning Pty Ltd). 1991a. *Archaeological Report: Hunter Valley Coal Corporation Pty Ltd*.

Dean-Jones, P. (Resource Planning Pty Ltd). 1991b. *Mount Owen Coal Project, Hebden, NSW*. Report for Hunter Valley Coal Corporation Pty Ltd.

Dean-Jones, P. (Resource Planning Pty Ltd). 1991c. *Archaeological Report, Proposed Yorks Creek Conservation Zone*. Report to Hunter Valley Coal Corporation Pty Ltd.

Dean-Jones, P. (Resource Planning Pty Ltd). 1992. *Archaeological Report Subsurface Analysis Swamp Creek, Mount Owen Mine Site*. Report to Hunter Valley Coal Corporation Pty Ltd.

Department of Environment and Conservation (DEC). 2005. *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.*

Department of Environment, Climate Change and Water (DECCW). 2010. *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

Department of Environment, Climate Change and Water (DECCW). 2010a. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.*

Department of Environment, Climate Change and Water (DECCW) 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*.

Department of Land & Water Conservation. 2002. *The NSW State Groundwater Dependent Ecosystems Policy.*

Environment Protection Authority. 2000. NSW Industrial Noise Policy.

ERM. 1995. *Mount Owen Rail Project, Statement of Environmental Effects (SEE)*. Report prepared for BHP Australia Coal.

ERM Mitchell McCotter. 1999. *Archaeology and Heritage. Appendix M of Ravensworth East Mine Environmental Impact Statement*. Report prepared for Peabody Resources.

ERM. 2002. *Ravensworth East Archaeological Excavation*. Unpublished report to Coal and Allied Pty Ltd.

Forest Fauna Surveys and Newcastle Innovation 2010, Mt Owen Complex 2009 Fauna Monitoring, prepared for Mt Owen Complex.

HLA-Envirosciences Pty Limited. 2001. *Environmental Impact Statement (EIS) Ashton Coal Project.*

Hughes, P and Sullivan, M 1997. (1997. Volume 4 Appendix G - Geomorphological Report. In Baker, N 1997. Archaeological Test Excavations of Aboriginal Sites at Bettys Creek, Mt Owen Mine, Hunter Valley, NSW. Report to Mt Owen Mine, BHP Coal Australia in four volumes. December 1997.

Kovac M and Lawrie JW. 1991. *Soil Landscapes of the Singleton 1:250 000 Sheet.* Soil Conservation Service of NSW, Sydney.

Peake TC. 2006. *The Vegetation of the Central Hunter Valley, New South Wales.*

Ruig, J. 1996. *Archaeological Survey for Aboriginal Sites, Mount Owen, Hebden Road, via Singleton, Hunter Valley, New South Wales*. Application to vary consent.

Umwelt (Australia) Pty Limited. 2001. Aboriginal Archaeological Assessment Liddell Colliery Continued operations. In *Liddell Colliery Continued Operations Environmental Impact* Statement. Volume 3. Appendix 11. Prepared for Liddell Coal Operations Pty Ltd.

Umwelt (Australia) Pty Limited. 2003a. *Environmental Impact Statement.* Report prepared for Hunter Valley Coal Corporation (HVCC).

Umwelt (Australia) Pty Limited. 2003b. *Mt Owen Operations Aboriginal Archaeology Assessment*. A report prepared for Hunter Valley Coal Corporation.

Umwelt (Australia) Pty Limited. 2004a. *Aboriginal Archaeological Assessment – Glendell Open Cut Mine Project*. Report prepared for Glendell Joint Venture. July 2004.

Umwelt (Australia) Pty Limited 2004b. *Response to DEC Request for Further Information in Relation to the Aboriginal Archaeological Assessment - Glendell Open Cut Mine Glendell*. A report prepared for Glendell Joint Venture. November 2004.

Umwelt (Australia) Pty Limited. 2005. *Research Design and methodology to Accompany a Section 90 Consent and Section 87 Permit Application for the Mt Owen Operations Area Singleton, NSW*. Prepared on behalf of Hunter Valley Coal Corporation. July 2005.

Umwelt (Australia) Pty Limited. 2006. *Aboriginal Cultural Heritage Management Strategy for the Mt. Owen Biodiversity Offset Area*. A report prepared for Xstrata Mt Owen July 2006.

Umwelt (Australia) Pty Limited, 2009. *Biodiversity and Land Management Strategy Stage 2. Ecological Characteristics of XCN Non-operational Land.* Report prepared for Xstrata Pty Limited.

Xstrata Mt Owen (XMO) Pty Limited. 2012a. *Mt Owen Complex Annual Environmental Management Report 1 July 2010 – 31 December 2011*.

APPENDIX 1

DRE Correspondence

NSW GOVERNMENT | Resources & Energy

OUT12/22109

Mr David Kitto
Director
Major Development Assessment
Department of Planning and Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Mr Kitto

Mt Owen Continued Operations Project
Conceptual Project Development Plan

Xstrata Mt Owen Pty Limited is proposing an extension of the Mt Owen Open Cut Coal Mine at Ravensworth in the Hunter Valley. A Conceptual Project Development Plan (CPDP) for the project proposal was presented to technical officers of the Division of Resources and Energy (DRE) on 23 August 2012.

The Mt Owen Continued Operations Project includes:

- Continuation of open cut mining in the North Pit to the south-east, at the same extraction rate and utilizing the same mining method.
- Increase mine life by 21 years from date of modification approval (current mine approved to 2021).
- Mining in Bayswater and Lemington seams (current operations mine to the Hebden seam).
- Upgrades to mining infrastructure.
- Hebden Road Upgrade – rail overpass and duplication of bridge.

The proposed Mt Owen Continued Operations Project is within ML1561 and ML1415 held by Xstrata Mt Owen Pty Limited.

DRE supports the proposed Mt Owen Continued Operations Project as a responsible utilisation of the State's valuable coal resources and further supports the project proceeding with the States comprehensive development assessment and approvals process.

I understand that representatives from Xstrata Mt Owen Pty Limited will be in contact with you to discuss this project proposal and to progress the proposal to a Project Application.

Department of Trade & Investment, Regional Infrastructure & Services
Division of Resources and Energy
PO Box 344 Hunter Region Mail Centre NSW 2310
516 High St Maitland NSW 2323
Tel: 02 4931 6666 Fax: 02 4931 6776
ABN 72 189 919 072
www.industry.nsw.gov.au

Should you have any enquires regarding this matter please contact Sarah Jardine, A/Principal Adviser, Industry Coordination on (02) 4931 6691.

Yours sincerely

WILLIAM HUGHES
ACTING DIRECTOR
MINERALS OPERATIONS

11/9/12

CC: Vicki McBride, Approvals Manager Projects, Xstrata Coal NSW
CC: Shane Scott, Projects Superintendent Infrastructure, Xstrata Coal NSW

APPENDIX 2

Preliminary Environmental Risk Analysis

Appendix 2 – Preliminary Environmental Risk Analysis

To assist in identifying the key environmental and community issues that require detailed assessment as part of the EIS, a preliminary environmental risk analysis has been completed for the Project. The preliminary environmental risk analysis has been undertaken in accordance with Xstrata Coal Risk Management Standard, which is consistent with the principles outlined in Australian Standard AS/NZS 4360:2004 Risk Management (Standards Australia 2004). In accordance with the Xstrata risk assessment matrix, environmental risks have been categorised as 1 to 5 for the construction and operational phases of the Project.

Table 1 – Consequence Criteria

Rating	Financial Impact US$ EBIT	Investment Return US$ NPV	Health and Safety	Environment	Community/Reputation	Legal and Compliance
5	$100m+ loss or gain	$600m+ loss or gain	• Multiple fatalities, or • Significant irreversible effects to 10s of people.	• Category 5 - an incident that has caused disastrous environmental impact with long term effect requiring major remediation.	• Prominent negative international media coverage over several days. • Significant negative impact on share price for months.	• Major litigation or prosecution with damages of $50m+ plus significant costs. • Custodial sentence for company executive. • Prolonged closure of operations by authorities.
4	$20m - $99.9m loss or gain	$60m - $599.9m loss or gain	• Single fatality and/or • Severe irreversible disability to one or more persons.	• Category 4 - an incident that has caused serious environmental impact with medium term effect requiring significant remediation.	• National media coverage over several days. • Significant negative impact on share price for weeks. • Community/NGO legal actions. • Impact on local economy.	• Major litigation costing $10m+. • Investigation by regulatory body resulting in long term interruption to operations. • Possibility of custodial sentence.
3	$2m - $19.9m loss or gain	$6m - $59.9m	• Extensive injuries or irreversible disability or impairment to one or more persons.	• Category 3 - An incident that has caused moderate reversible impact with short term effect requiring moderate remediation.	• Local media coverage over several days. • Negative impact on local economy. • Persistent community complaints.	• Major breach of regulation with punitive fine. • Significant litigation involving many weeks of senior management time.

Table 1 – Consequence Criteria (cont.)

Rating	Financial Impact US$ EBIT	Investment Return US$ NPV	Health and Safety	Environment	Community/Reputation	Legal and Compliance
2	$200k - $1.9m loss or gain	$600k - $5.9m loss or gain	• Medium term largely reversible disability to one or more persons. • Significant medical treatment, disability or lost time injury <2 weeks.	• Category 2 - an incident that has caused negligible reversible environmental impact requiring minor remediation.	• Local media coverage. • Complaint to site and/or regulator.	• Breach of regulation with investigation or report to authority with prosecution and/or moderate fine possible.
1	<$200k loss or gain	<$599.9k loss or gain	• First aid treatment or minor medical treatment.	• Category 1 - an incident that has caused negligible reversible environmental impact requiring very minor or no remediation.	• No media coverage. • No community complaints.	• Minor legal issues, non-compliance and breaches of regulation.

Table 2 – Likelihood Criteria

Category	Criteria
E	• 99% probability, or • Impact is occurring now, or • Could occur within months.
D	• >50% and <99% probability, or • Balance of probability will occur, or • Could occur annually.
C	• >20% and <50% probability, or • May occur shortly but a distinct probability it won't, or • Could occur in 2 to 5 years.
B	• >1% and <20% probability, or • May occur but not anticipated, or • Could occur within 5-20 years.
A	• <1% probability • Occurrence requires exceptional circumstances • Exceptionally unlikely, even in the long term future • Occurs less than once every 20 years.

Table 3 - Risk Matrix

Likelihood Rating						
	E	II	III	IV	V	V
	D	II	III	IV	IV	V
	C	I	II	III	IV	IV
	B	I	II	III	III	IV
	A	I	I	II	III	III
		1	2	3	4	5
		Consequence Rating				

Table 4 – Preliminary Environmental Risk Analysis

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Noise generation	Degradation of noise amenity (including cumulative impacts).	Risk that active mining area is moving closer to sensitive receivers to the east and south east and construction of proposed infrastructure my result in degradation of noise amenity. Controls included as part of the Project to reduce noise impacts include truck fleet management, use of noise attenuated equipment and active management of equipment scheduling/location (e.g. night/day time dump options).	3	D	IV	An assessment of the potential impacts of the Project relating to noise is required.	Yes
		Blasting	Potential visual and health impacts from blast plume. Vibration impacts on structures and other sensitive receivers. Potential impacts from overpressure.	Risk that active mining area is moving closer to sensitive receivers to east and south east. Controls to be included as part of the Project includes the use of blast design and monitoring procedures, controlled timing and frequency of blasting and notification of blasting times to surrounding residences.	2	D	III	An assessment of the potential impacts of the Project relating to blasting is required.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Dust generation	Increased dust emissions resulting in degraded air quality and potential health impacts and impacts on amenity, including cumulative impacts.	Mining may result in degradation of local air quality through both exposure and handling of coal and overburden. In addition cumulative dust impacts associated with the construction of the proposed infrastructure and the operation of other mines in the Hunter Valley is a key issue. Dust impacts will be controlled through measures including mine design, haul road management (including watering), progressive rehabilitation and restricting or ceasing dust-generating activities during adverse meteorological conditions.	4	C	IV	An assessment of the potential impacts of the Project relating to dust generation is required.	Yes
		Surface Water	Potential impact to surface water quality and quantity, flooding damage to infrastructure	The proposed mining activities will interact with and potentially impact on surface waters including through changes to the mine water management system, water use and catchment area changes. A range of surface water management measures, including erosion and sediment structures will be incorporated into the project design and will be discussed as part of the detailed surface water assessment for the EIS.	3	B	III	An assessment of the potential impacts of the Project on surface waters will be undertaken.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
	Construction/ operation	Groundwater	Interactions and potential impacts on aquifers	The proposed mining activities will intercept groundwater and may result in impacts to groundwater users and flows. The current concept design of the North Pit maintains a minimum standoff of 200 metres from the high bank of Main Creek.	2	D	III	An assessment of the potential impacts of the Project on groundwater will be undertaken.	Yes
		Water Balance	Potential excess of water for ongoing mining operations and risk of spill	Existing site water balance model developed to identify water demand. XMO currently have water sharing arrangements with other Xstrata owned mines as part of the Greater Ravensworth Water Sharing System.	3	B	III	Water balance model to be updated and included within the EIS.	Yes
		Agricultural Lands	Impacts to Agricultural Land	Disturbance of potential agricultural land. Project to be located predominately within Xstrata owned property.	3	B	III	An assessment of the potential impacts of the Project on agriculture and agricultural enterprises will be undertaken.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Ecology	Impact to flora and fauna including threatened species and Threatened Ecological Communities (TECs), Endangered Ecological Communities (EECs) and Endangered Populations	The Project will require areas of additional disturbance which has the potential for some areas of ecological value to be impacted. An ecological survey is being completed within the Project area focussing on the proposed disturbance area. The Project is designed to reduce/minimise the disturbance area and level of offset required. The mining area will be progressively rehabilitated throughout the duration of mining.	3	C	III	An assessment of the potential impacts of the Project on ecological values is required.	Yes
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Aboriginal Cultural Heritage and archaeology	Potential impact to Aboriginal Heritage sites.	The Project will require areas of additional disturbance which has the potential for some areas of Aboriginal Heritage to be impacted. A detailed Cultural Heritage assessment and Aboriginal archaeology assessment will be completed for the Project in partnership with the Registered Aboriginal Parties. The project has been designed to minimise the disturbance area and impacts to known sites.	4	B	III	An assessment of the potential impacts of the Project on Aboriginal Cultural Heritage values and archaeology is required.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
		Historic heritage	Predicted impacts to historical heritage features from the Project	The Project will require areas of additional disturbance which has the potential for some areas of historic heritage value to be impacted. Potential for impacts on historic heritage values or site as a result of blasting. Predictive Blast modelling is undertaken prior to each blast on site. Modelling incorporates consideration of meteorological conditions. Existing blast management plan utilised at Mt Owen to monitor blasting impacts at Ravensworth Homestead and Camberwell Church which are located in close proximity to the Mt Owen Complex and are listed heritage items.	2	C	II	An assessment of the potential impacts of the Project on historic heritage values is required.	Yes
		Visual Amenity	Aesthetics of mining operations and surface facilities.	Mine design will be undertaken in consideration of visual amenity requirements. Aspects of the proposed infrastructure will be visible from public viewing points therefore these aspects of the Project will also be included in the visual assessment. XMO are seeking to design and implement a final landform that will provide undulating aspects to reduce visual impact.	2	C	II	An assessment of the potential impacts of the Project on the visual amenity of the area is required.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Greenhouse Gas	Emission of greenhouse gases from continued mining operations and infrastructure construction and contribution to climate change.	Mining equipment will require use of electricity, diesel and petrol. In addition there will be fugitive emissions from the Project. Scope 3 emissions as a result of burning product coal are also a source of greenhouse gas emissions. The construction works associated with the Project will result in energy use and the generation of greenhouse gas emissions. XMO currently implement a greenhouse gas management plan and energy savings action plan that identify key greenhouse gas reduction measures.	3	B	III	An assessment of Scope 1, 2 and 3 greenhouse gas emissions from the Project will be undertaken and appropriate management and mitigation measures identified.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Traffic	Additional traffic associated with the construction phase of the Project and impact on the road network.	The Project does not result in a significant increase to operational staff. Project design includes duplication of Bowmans Creek bridge, and construction of an overpass over the main northern rail line on Hebden Road. These proposed works will result in alterations to the existing traffic conditions and motorists may experience travel delays during construction. The construction works will require 260 employees for 18 months. It is anticipated that the proposed upgrades would result in safety improvements of the local road network.	2	B	II	Traffic impact assessment will be undertaken as part of EIS.	Yes

Table 4 – Preliminary Environmental Risk Analysis (cont.)

Project Component	Activity/Stage	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Further Assess. Required
					C	L	R		
Open-cut mining (including proposed infrastructure, road realignment and rail upgrades)	Construction/ operation	Socio-economic	The Project has the potential to result in a range of social and economic impacts, both positive and negative.	The Project does not result in a significant increase to operational staff; however it will provide ongoing employment opportunities and provide significant employment during the construction phase. An extensive stakeholder engagement program will be developed and consultation undertaken as part of the EIS. Socio economic impacts will be identified and management measures will be proposed to manage any impacts as appropriate.	3	C	III	A detailed Social Impact and Opportunities Assessment and an Economic Assessment will be completed for the Project.	Yes
Open Cut Mining	Construction/ Operation	Final landform – overburden emplacement area design	Impact on the landscape and future landuse from the final landform.	Proposed final landform will be designed to include an undulating landform. The rehabilitation and closure assessment will include consideration and management of the final void.	3	C	III	Rehabilitation and closure assessment	Yes
Open Cut Mining	Decommissioning	Final Void	Impact on final landform from the final void.	The final void will be designed to be a small as practicable. The rehabilitation and closure assessment will include consideration and management of the final void.	4	B	III	Rehabilitation and closure assessment	Yes

Newcastle

PO Box 3024
75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au