NSW GOVERNMENT | Planning

MAJOR PROJECT ASSESSMENT
Integra Underground Coal Project (08_0101)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

November 2010

Cover Photo: View of the Integra Underground Project area looking south-easterly from the Mt Owen Mining Complex

Published November 2010
NSW Department of Planning
www.planning.nsw.gov.au

EXECUTIVE SUMMARY

Integra Coal Operations Pty Ltd (Integra), a subsidiary of Vale, operates the Integra mine complex about 10 kilometres northwest of Singleton in the Hunter Valley.

The mine complex is located in an area that is dominated by large scale mining operations, and includes both open cut and underground mining operations. Together these operations are currently allowed to extract up to 10.5 million tonnes of run-of-mine (ROM) coal a year, and process it on site before railing it to domestic and export markets for use in steel making and power generation.

Integra proposes to extend its existing underground operations at the complex, and consolidate all of its previous consents/approvals for underground mining into a single project approval.

The proposal – known as the Integra Underground Coal Project – would allow Integra to continue its underground mining operations for another 25 years, and extract up to 71 million tonnes of run-of-mine (ROM) at the currently approved extraction rate of up to 4.5 million tonnes of coal a year.

The project has a capital investment value of $48 million, and would provide continued employment for 280 people.

The Department received 10 submissions on the project: 3 from government authorities, 2 from special interest groups (Xstrata and the Construction Forestry and Mining Energy Union), and 5 from the general public. Neither the public authorities nor the special interest groups object to the project. However, all of the submissions from the general public were opposed to the project. The main grounds of objection were the potential subsidence, water and cumulative impacts of the project.

The Department has carried out a detailed assessment of the merits of the project, in accordance with the requirements of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

This assessment has found that the project would have some adverse environmental impacts, including potentially significant subsidence impacts on one private residence; the extension of existing significant noise impacts over a longer period (at least another 13 years) at 2 residences, and the loss of up to 5.5 hectares of the regionally significant Central Hunter Swamp Oak Forest community.

It has also found that, over the next 12 years while open cut operations are still being carried out on site, the project would make a minor contribution to the cumulative dust and noise impacts on least another nine privately-owned properties in close proximity to the Integra mine complex.

However, the Department has recommended a range of conditions to ensure that these impacts are suitably mitigated, managed and/or offset. These conditions include requirements for Integra to acquire any significantly-affected properties upon request; to prepare and implement detailed Extraction Plans for all the underground mining operations that could cause subsidence; to implement additional measures to minimise the water, noise, dust and heritage impacts of the project; and to suitably offset the biodiversity impacts of the project.

Finally, the Department's assessment has found that the project would represent a logical extension of the existing mine complex, would make efficient use of existing facilities and equipment, and would provide major economic and social benefits to the Hunter region and NSW, including:

- continued employment for up to 280 employees;
- a direct capital investment of $ 48 million;
- the extraction of up to 71 million tonnes of ROM coal for use in steel making and power generation; and
- royalties and payroll taxes for the State Government.

On balance, the Department believes that the project's benefits sufficiently outweigh its residual costs, and that it is in the public interest and should be approved subject to strict conditions.

1 BACKGROUND

Integra Coal Operations Pty Ltd (Integra), a subsidiary of Vale, operates the Integra mine complex about 10 kilometres northwest of Singleton in the Hunter Valley (see Figure 1).

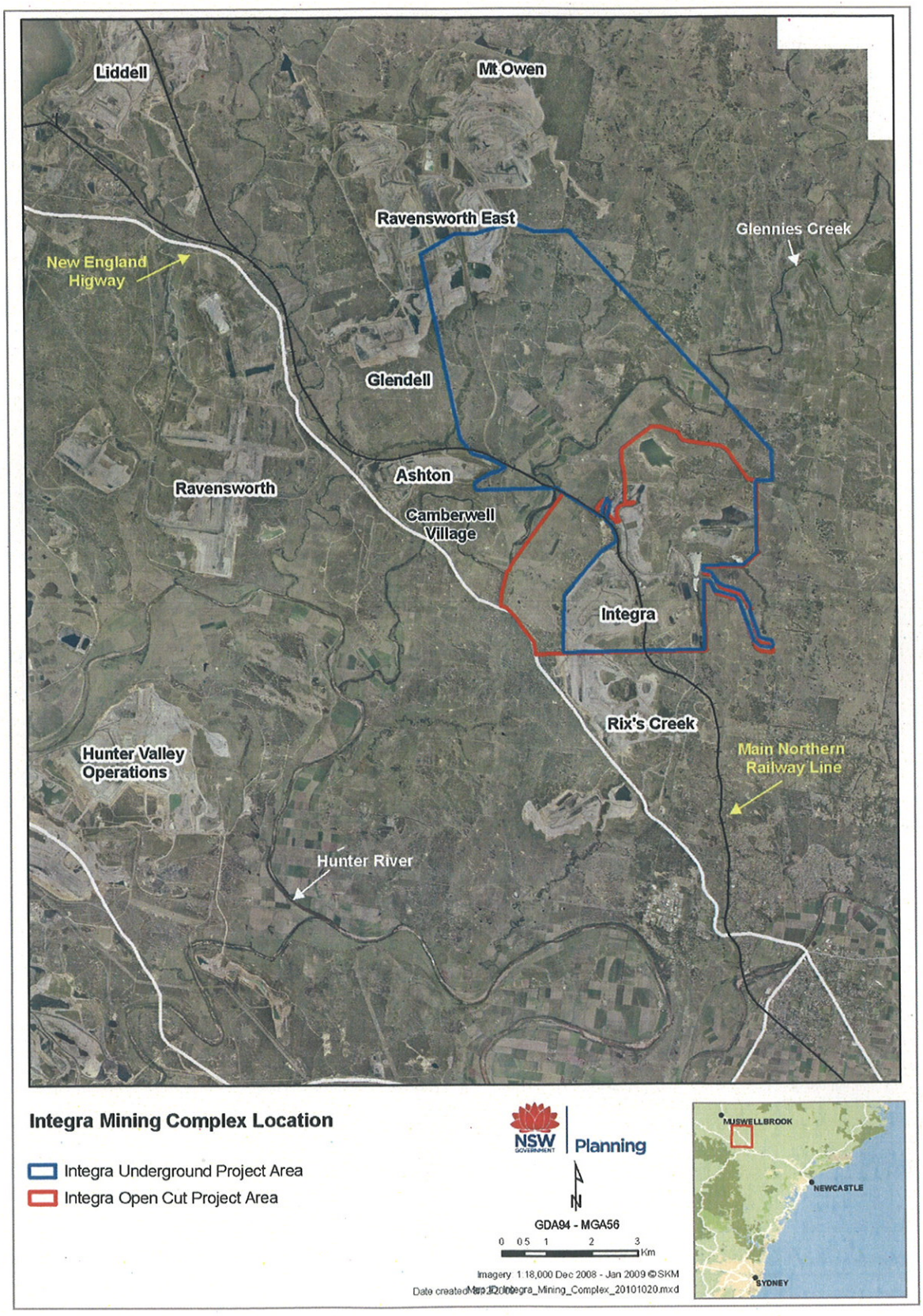

Figure 1: *Regional Context*

The complex comprises 3 separate mining areas and a range of surface facilities (see Figures 1 and 2), including the:

- Camberwell open cut mine (operating under DA 86/2889) where extraction is complete in the north pit and nearing completion in the south pit;
- Glennies Creek open cut mine (operating under MP 06_0073) where extraction is scheduled to be carried out for another 9 years; and
- Glennies Creek underground mine (operating under DA 105/90, MP 06_0213 and MP 06_0057) where extraction is nearly complete in 10 of the 17 longwall panels in the Middle Liddell coal seam.

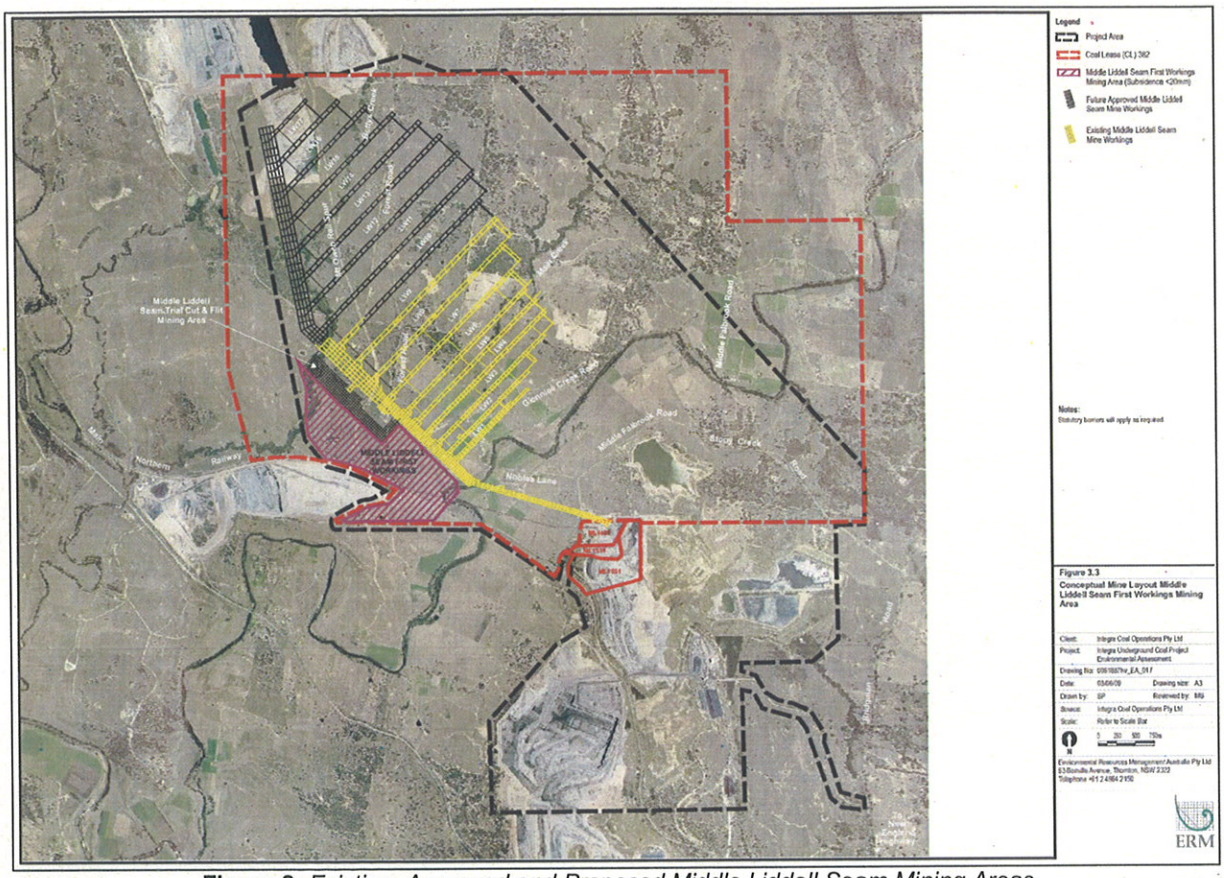

Figure 2: *Existing, Approved and Proposed Middle Liddell Seam Mining Areas*

The complex as a whole has approval to extract 10.5 million tonnes of run-of-mine (ROM) coal a year, including 6 million tonnes from the open cut mining operations and 4.5 million tonnes from the underground mining operations.

This coal is processed at the coal handling and preparation plant, which is located to the south of the mine complex, before being railed to domestic and export markets for use in steel making and power generation.

The mine complex is located in an area that is dominated by large scale and intensive mining activity. This activity has significantly altered the natural landscape. The closest mining operations (see Figure 1) are:

- Xstrata's Mt Owen mine complex to the north (comprising the Mt Owen, Ravensworth East and Glendell mines);
- Yanzhou's Ashton mine complex, Xstrata's Ravensworth mine complex (comprising the Ravensworth West, Narama and Cumnock mines), and Rio Tinto's Hunter Valley Operations mine complex to the west; and
- Bloomfield Collieries' Rix's Creek mine, which is located directly to the south of the Integra mine complex and straddles the New England Highway.

A consequence of all this mining activity is that most of the land in the area is owned by one mining company or another (see Figure 3).

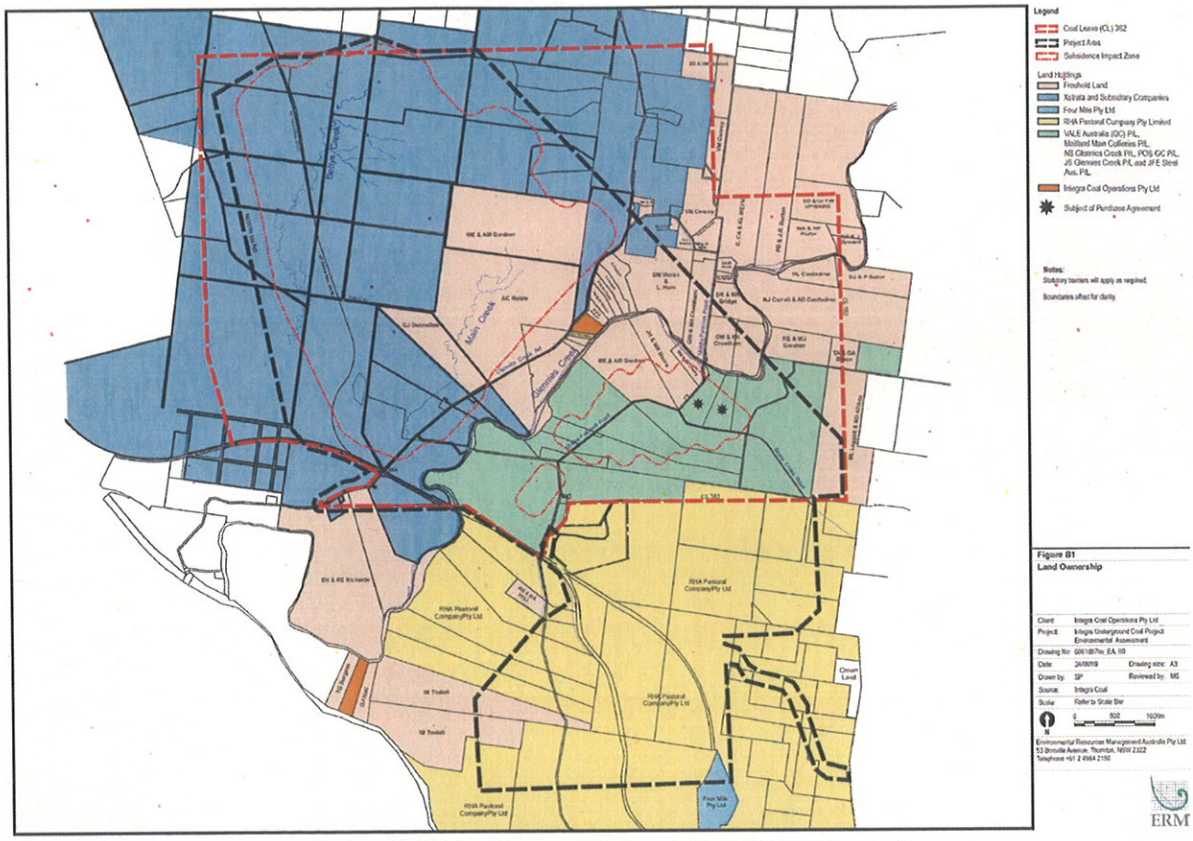

Figure 3: *Project Area and Land Ownership (July 2009)*

Nevertheless, the land surrounding these mining operations is still used for a range of agricultural activities with the land along the Hunter River and Glennies Creek being used for intensive agriculture (see Figure 1).

The nearest settlement is Camberwell Village, which lies about 2.5 kilometres to the west of the Integra mine complex (see Figure 1). Mining companies now own most of the properties in the village.

Key infrastructure in the area includes the:

- regional road network including the New England Highway, Glennies Creek Road, Forest Road, Nobles Lane, Stony Creek Road and Middle Falbrook Road;
- Main Northern Railway and associated Mt Owen Rail Spur, which crosses the underground mining operations; and
- Glennies Creek Power Station, which is located the north of the proposed extension area and to the east of Glennies Creek.

2 PROPOSED PROJECT

Integra proposes to expand its existing underground mining operations into the Hebden and Barrett coal seams, and consolidate all of its previous consents/approvals for underground mining into a single project approval.

The proposal – known as the Integra Underground Coal Project – would allow Integra to continue its underground mining operations for another 25 years, and extract up to 71 million tonnes of run-of-mine (ROM) at the currently approved extraction rate of up to 4.5 million tonnes of coal a year. Extracted coal would continue to be processed at the existing coal handling and processing plant (CHPP) on site before being railed to domestic and export markets.

The major components of the project are summarised in Table 1, and depicted in Figures 3 & 4. The project is described in full in Integra's Environmental Assessment (EA), which is attached as Appendix E.

It should be noted that Integra is concurrently seeking approval for a proposal to expand its existing open cut mining operations at the Integra mine complex, although this proposal is the subject of a

separate application. While the assessment of the merits of this proposal is the subject of another assessment report, the Department has considered the merits of both applications concurrently as well as the potential cumulative impacts of both proposals operating at the same time.

Table 2: *Project Summary*

Aspect	Summary
Project Summary	• **extraction of up to 4.5 Mtpa of ROM coal from the Middle Liddell, Hebden and Barrett coal seams for a period of up to 21 years;** • **washing this coal at Integra's CHPP and loading product coal onto trains for transport to the Port of Newcastle;** • **ongoing use and development of existing and proposed ancillary surface infrastructure;** • **disposal of coarse and fine reject material generated by the project within existing mine voids; and** • **rehabilitation of all existing natural and man-made features affected by the project.**
Project Area	4,146 hectares (ha), including all existing and proposed underground mining areas
Mining and Reserves[1]	Approximately 57 Mt of semi-hard coking ROM coal consisting of 43.43 Mt from the Hebden seam, 11.85 Mt from the Barrett Seam and an additional 1.56 Mt from the Middle Liddell seam. Integra also has a mining reserve of 14.3 Mt in the currently-approved longwalls 10-17 in the Middle Liddell seam.
Mining Methods	As existing: first workings - cut and flit mining, development of headings and roadways for each longwall panel; second workings - retreating longwall method
Project Life	25 years
Project Staging	Middle Liddell seam (LW10 – 17) Years 1 to 7 (approved) Hebden seam (H1 – H15) Years 3 to 17 (proposed) Barrett seam (B1 – B7) Years 16 to 21 (proposed)
Existing Surface Infrastructure	Continued use of all existing ancillary surface infrastructure for the life of the project, including the CHPP, coal loader and rail loop and the approved development of gas drainage boreholes above the Middle Liddell seam mining area; possible future use of the Forest Road ventilation shaft
Proposed Surface Infrastructure	The project would require construction of the following surface infrastructure: • inter-seam drift access from the Middle Liddell seam to the Hebden seam; • drift access to Barrett seam and development of minor infrastructure in the final void of the north open cut mine (including a ventilation fan, air compressors and power supply); • conveyor systems to connect the Barrett seam entries to the approved overland conveyor (not constructed) to the CHPP; • upcast ventilation shaft and main fans; • gas drainage boreholes above the Hebden and Barrett seam mining areas; and • additional pit top facilities (bath-house, offices, lamp rooms, stores facility, walkways and associated infrastructure).
Coal Extraction	No increase to the maximum extraction rate of up to 4.5 Mtpa of ROM coal is proposed
Coal Processing	Camberwell CHPP (approved to process up to 1,200 tph of ROM coal)
Coal Production	Approximately 38 Mt of product coal would be generated by the project
Water Demand and Supply	Modelling indicates overall water balance for the complex would be in equilibrium
Coarse Reject and Tailings Management	Both fine and course rejects to be emplaced on site.
Hours of Operation	24 hours a day, 7 days a week
ROM Coal Transport	Truck haulage until 31 December 2011, then via overland conveyor (approved, not constructed)
Product Coal Transport	Railed to the Port of Newcastle via the Main Northern Railway Line (as existing)
Mine Access	Middle Falbrook Road and Bridgman Road (as existing)
Creek Diversions	Bettys Creek – 2.5 km to be abandoned and 1.4 km two-stage diversion Main Creek – 2 km three-stage diversion
Rehabilitation and Offsets	An off-site biodiversity offset strategy involving the conservation of vegetation on a property adjacent to Integra's existing Northern Biodiversity Offset Area
Socio Economic Benefits	The project would provide $932 million in wages and salaries over the course of the mine life and lead to $49 million in annual supplier payments in the Hunter region. (See Sections 2.1 and 5.9)
Employment	Continued employment for 280 employees
Capital Value	$48 million
Consents/Approvals to Surrendered	• DA 105/90 — Underground mining and associated facilities, transport of coal to and use of Camberwell CHPP and train loader, and initial cut and flit mining to the south of the North West Mains; • MP 06_0213 — Underground mining within the Middle Liddell seam LW 10-17 area and associated infrastructure; and • MP 06_0057 — Construction and use of surface facilities associated with the Glennies Creek coal mine

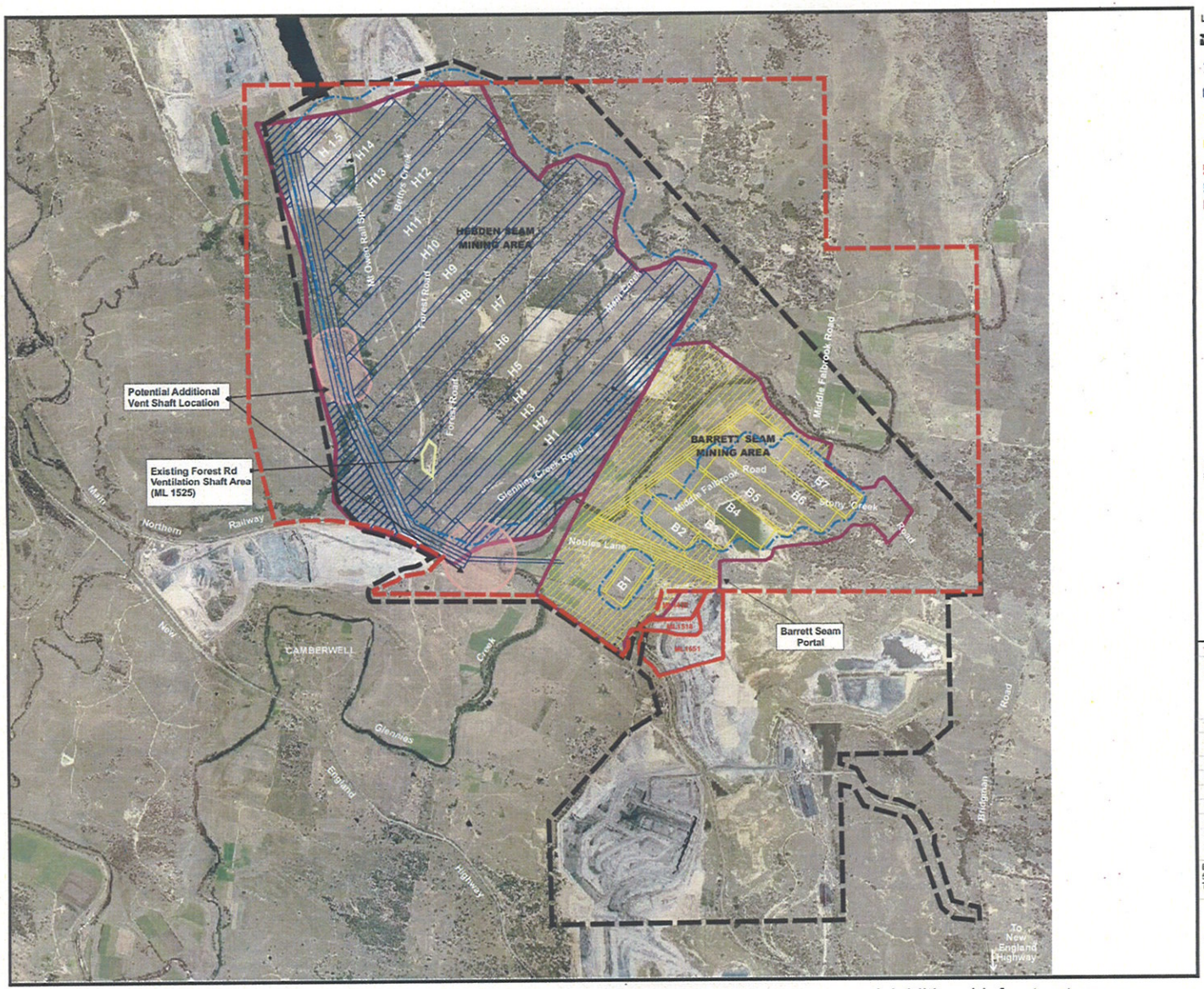

Figure 4: *Proposed Hebden and Barrett Seam Mining Areas and Additional Infrastructure*

3 STATUTORY CONTEXT

3.1 Major Project

The proposal is classified as a major project under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) because it constitutes development for the purpose of coal mining, and therefore meets the criteria in Clause 5 of Schedule 1 of *State Environmental Planning Policy (Major Development) 2005.*

Consequently, the Minister is the approval authority for the proposal.

3.2 Permissibility

The land subject to the application is zoned 1(a) (Rural) under the *Singleton Local Environmental Plan 1996.* Mining is permissible with development consent in this zone. Mining is also permissible with development consent under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.*

3.3 Other Approvals

Under Section 75U of the EP&A Act, a number of other approvals have been integrated into the Part 3A approval process and are not required to be separately obtained for the project. These include:

- heritage-related approvals under the *Heritage Act 1977* and *National Parks and Wildlife Act 1974*; and
- some water-related approvals under the *Rivers and Foreshores Improvement Act 1948* and *Water Management Act 2000.*

Under Section 75V of the EP&A Act, a number of further approvals are required to be obtained, but must be approved in a manner that is consistent with any Part 3A approval for the project. These include:

- variations to the mining lease under the *Mining Act 1992*;
- approvals under the *Mine Subsidence and Compensation Act 1961*; and
- variations to the environment protection licence under the *Protection of the Environment Operations Act 1997.*

The Department has consulted with the relevant government authorities responsible for these other approvals, and considered the relevant issues relating to these approvals in its assessment of the project (see Section 5).

None of these authorities object to the project or the recommended conditions of approval.

3.4 Exhibition and Notification

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the Environmental Assessment (EA) for the project publicly available for at least 30 days.

After accepting the EA for the project, the Department:

- made the EA publicly available from 20 July 2009 until 20 August 2009 at the:
  - Department's Information Centre;
  - Singleton Shire Council's office;
  - Nature Conservation Council's office; and on the
  - Department's website;
- notified relevant State government authorities and Singleton Shire Council by letter; and
- advertised the exhibition in the Singleton Argus newspaper.

This satisfies the requirements of Section 75H(3) of the EP&A Act.

During the assessment process the Department also made a number of documents available for viewing or download on its website. These documents included the:

- project application;
- Director-General's environmental assessment requirements;
- EA; and
- Integra's response to the issues raised in submissions.

3.5 Environmental Planning Instruments

Under Section 75I of the EP&A Act, the Director-General's report is required to include a copy of, or reference to, the provisions of environmental planning instruments that substantially govern the carrying out of the project.

The Department has considered the project against the relevant provisions of several environmental planning instruments (see Appendix F) as well as Integra's consideration of these issues (see Section 5.3 in the EA in Appendix E), and is satisfied that none of these instruments substantially govern the carrying out of the project.

3.6 Objects of the EP&A Act

The Minister is required to consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the Minister's decision on whether or not to approve the project are found in Section 5(a)(i), (ii), (vi) and (vii). They are:

To encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land,

(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats; and

(vii) ecologically sustainable development.

The Department is satisfied that the project encourages the proper use of resources (Object 5(a)(i)) and the promotion of orderly and economic use of land (Object 5(a)(ii)), particularly as the subject coal resources is located within an existing mining leave in an area that is dominated by coal mining operations, and can be carried out using existing mining facilities and infrastructure.

The encouragement of environmental protection (Object 5(a)(i)) is considered in detail in Section 5 of this report. Based on this consideration, the Department is satisfied that the impacts of the project can be mitigated and/or managed to ensure an acceptable level of environmental performance, and that the project could maintain and potentially improve the biodiversity values of the locality in the medium to long term with the provision of appropriate offsets.

Finally, the Department has fully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) throughout its assessment of the merits of the project application, and sought to integrate all significant economic and environmental considerations and avoid any serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences. Based on this consideration, the Department is satisfied that the project can be carried out in a manner that is consistent with the principles of ESD.

3.7 Statement of Compliance

Under Section 75I of the EP&A Act, the Director-General's report is required to include a statement relating to compliance with the environmental assessment requirements issued for the project.

The Department is satisfied that the environmental assessment requirements have been complied with.

4 CONSULTATION

The Department exhibited the EA for the project between 20 July 2009 and 20 August 2009. During the exhibition period, the Department received 10 submissions on the project, including:

- 3 from public authorities;
- 2 from special interest groups (Xstrata and the Construction, Forestry, Mining and Energy Union); and
- 5 from the general public.

A full copy of these submissions is attached in Appendix D.

In March 2010, Integra provided a formal response to the issues raised in these submissions which is attached in Appendix C.

Since receiving the response to submissions, the Department has carried out further consultation with the public authorities that are likely to be involved in regulating the project, and incorporated their comments into the recommended conditions of approval.

A summary of the issues raised during the consultation process is provided below.

4.1 Public Authorities

The **Department of Environment, Climate Change and Water** (DECCW) raised a number of issues in relation to the project, including:

- *Noise* – DECCW had concerns regarding the assessment undertaken for the Integra Open Cut project and recommended that Integra revise the noise assessment for the underground project (ie this project) once these issues had been resolved;
- *Flora and Fauna* – DECCW had significant concerns that the proposal would impact on threatened flora species and groundwater dependent ecosystems (including the Central Hunter Swamp Oak Forest, Rough-barked Apple Woodland, Central Hunter Bulloak Forest and Forest Red Gum), and could potentially impact habitat connectivity for arboreal threatened fauna species such as the Squirrel Glider and Brush-tailed Phascogale.
- *Biodiversity Offsets* – DECCW considered that Integra's proposed vegetation offset strategy was inadequate and recommended that any loss of vegetation or threatened species habitat be compensated in accordance with its biodiversity offsets guideline.

The issues raised by DECCW are addressed in Section 5 of this report.

The **NSW Office of Water** (NOW) initially stated that it could not support the project, as it considered that project's impacts on water resources to be potentially inconsistent with the *Water Management Act 2000,* the *Hunter Regulated River and Alluvium Water Sharing Plan* and the *Hunter Unregulated River and Alluvium Water Sharing Plan.* NOW also raised concerns regarding the proposed diversion to Bettys Creek and the project's potential impact on riverine woodland communities and threatened groundwater dependent ecosystems. However, following the provision of additional information from Integra, NOW accepts the proposal, subject to conditions.

The **Department of Industry and Investment** (I&I NSW) initially had concerns regarding potential mine subsidence impacts on water resources and built features (particularly the Mt Owen Rail Line, the Main Northern Railway and private-residences). I&I NSW recommended that Integra develop specific performance measures to manage subsidence impacts and for its proposed rehabilitation strategy. Integra subsequently specified subsidence performance measures and rehabilitation objectives for the project.

4.2 Community and Interest Groups

Of the 7 submissions from the community and a special interest group, the majority (5) were from residents in the vicinity of the project area who objected to the project. One submission (from Xstrata) did not object, and one (from the Construction Forestry and Mining Energy Union) supported the project.

The main grounds for objection were (in decreasing order of mention):

- *Subsidence* – particularly potential impacts to privately-owned residences;
- *Socio-economic*– concerns over the project's impact on the social fabric of Camberwell and surrounding communities, primarily because of:
  - the general reduction to the area's amenity associated with environmental impacts, and
  - the subsequent devaluation of properties in the area;
- *Cumulative impacts* – particularly noise, dust and greenhouse gas;
- *Water* – concerns were raised regarding the impact of subsidence on surface water resources, particularly Glennies Creek; and
- *Traffic* – concerns were raised over the potential increases in traffic using the local road network.

5 ASSESSMENT

In its assessment of the merits of the project, the Department has considered the:

- EA, submissions and response to submissions on the project (Appendices C to E);
- EA, submissions and response to submissions on the associated open cut project (see the attached Director-General's assessment report tagged B);
- previous development consents and project approvals for the underground mining operations at the Integra mine complex, including the associated environmental impact statements and environmental assessments referred to in these instruments (see Appendix G);
- Camberwell Cumulative Impact Study (see Appendix H);
- the relevant environmental planning instruments, policies and guidelines; and
- the relevant provisions of the EP&A Act, including the objects of the Act.

5.1 Subsidence

The EA includes a specialist subsidence assessment undertaken by Strata Control Technology (see Appendix E of the EA, which is attached as Appendix E).

This assessment has:

- identified all the built and natural features overlying the proposed underground mining areas;
- established the baseline condition of these features;
- predicted the subsidence effects of the proposed underground mining operations, including the potential cumulative effects associated with mining under the existing and approved underground workings in the Middle Liddell Seam (which are depicted conceptually in Figure 5 below); and
- considered the potential subsidence impacts of these effects on the built and natural features within the underground mining area.

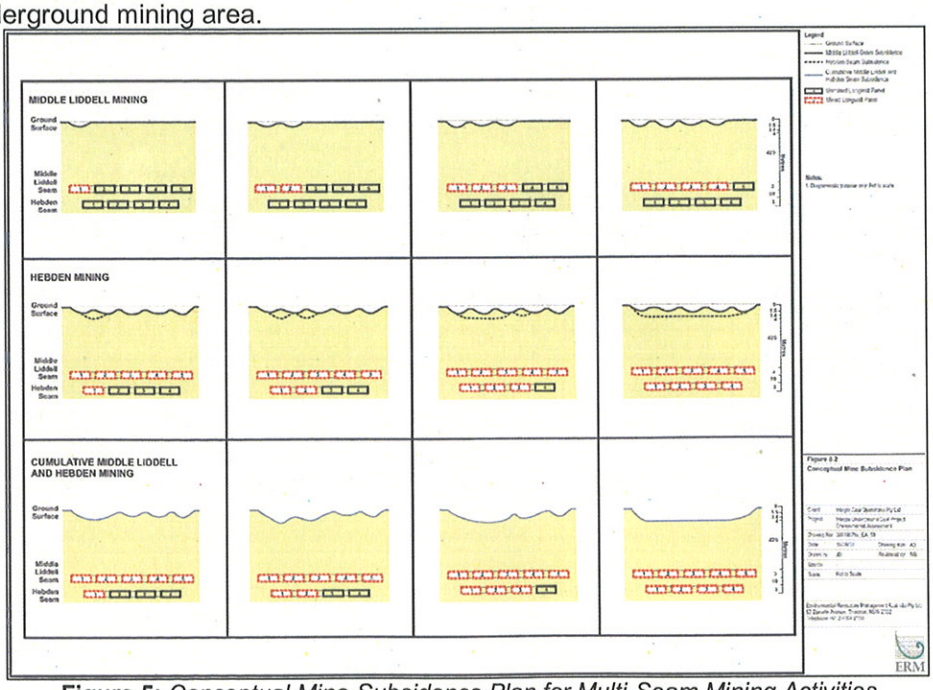

Figure 5: *Conceptual Mine Subsidence Plan for Multi-Seam Mining Activities*

The predicted subsidence effects are summarised in Table 2 and depicted in Figure 6.

Table 2: *Predicted Subsidence for Approved and Proposed Underground Mining (Longwalls)*

Mining Area	Vertical Subsidence (m)			Maximum Strain (mm/m)		Maximum Tilt (mm/m)
	Middle Liddell seam mining	Proposed mining	Total	Tensile	Compressive	
Barrett seam	N/A	1.5-2.0	1.5-2.0	16-27	21-36	50-90
Hebden seam only	0	1.3-1.6	1.3-1.6	1.7-3.9	2.3-5.2	6.8-15
Hebden seam below Middle Liddell first workings (LW 1-6)	<0.02	2.1-2.4	2.1-2.4	2.8-5.8	3.7-7.7	11-23
Hebden seam below Middle Liddell first workings (LW 7-17)	<0.02	1.7-2.0	1.7-2.0	2.2-4.8	3-6.5	9.0-19
Hebden seam below Middle Liddell longwalls (LW 1-5)	0.7-1.0	2.6-3.4	3.5-4.0	4.6-9.7	6.1-13	18-39
Hebden seam below Middle Liddell longwalls (LW 6-17)	1-1.5	2.5-3.4	3.5-4.0	4.6-9.7	6.1-13	18-39

The predictions are considered to be conservative, as they have assumed that the total vertical subsidence of the multi-seam mining would be up to 80% of the total seam height rather than the 60-70% range that is commonly used. This approach has been taken because of the limited empirical data on the impacts of multi-seam mining in both the Hunter Valley and NSW.

Both the Department and I&I NSW are satisfied that the predictions are conservative and robust, but believe that Integra should be required to monitor and validate these predictions over the life of the mine.

The specialist assessment concluded that the subsidence impacts of these effects on both built and natural features within the underground mining area can generally be mitigated, managed, and in some instances compensated for under the *Mine Subsidence Compensation Act 1961*.

Built Features

The conclusions of this assessment on the various built features within the underground mining area are summarised in Table 3.

In its submission I&I NSW noted that the Mt Owen Rail Spur could subside by up to 4 metres, which is greater than any subsidence previously experienced or managed on railway lines in NSW. It also noted that Integra had not demonstrated in the EA that it was feasible to manage the predicted impacts on the rail spur, and should be required to undertake further feasibility studies to identify the specific measures that should be implemented prior to any undermining.

In this regard, the Department notes the Integra has an agreement in place with Xstrata – the owner of the rail spur – which provides for the management of the potential impacts of the rail spur (and other mining infrastructure at Xstrata's Mt Owen mine complex), including the relocation of the rail spur if the impacts of the project are greater than predicted or difficult to manage. The Department has recommended a condition requiring Integra to ensure the rail spur remains in safe, serviceable and repairable condition during the life of the project (unless Xstrata agrees otherwise), and notes that a separate approval would be required if either Xstrata or Integra ultimately decides to relocate the rail spur.

I&I NSW also:

- noted that:
  - part of the proposed cut and flit first workings in the Middle Liddell and Hebden seams would enter the rail protection zone defined under the mining lease conditions, and require a separate approval from both I&I NSW NSW and ARTC; and
  - these workings would be designed to cause minimal subsidence (<20mm); and
- recommended that Integra be required to ensure the workings in the rail protection zone are designed to be long-term stable taking into consideration site conditions.

The Department has drafted a condition to give effect to this recommendation.

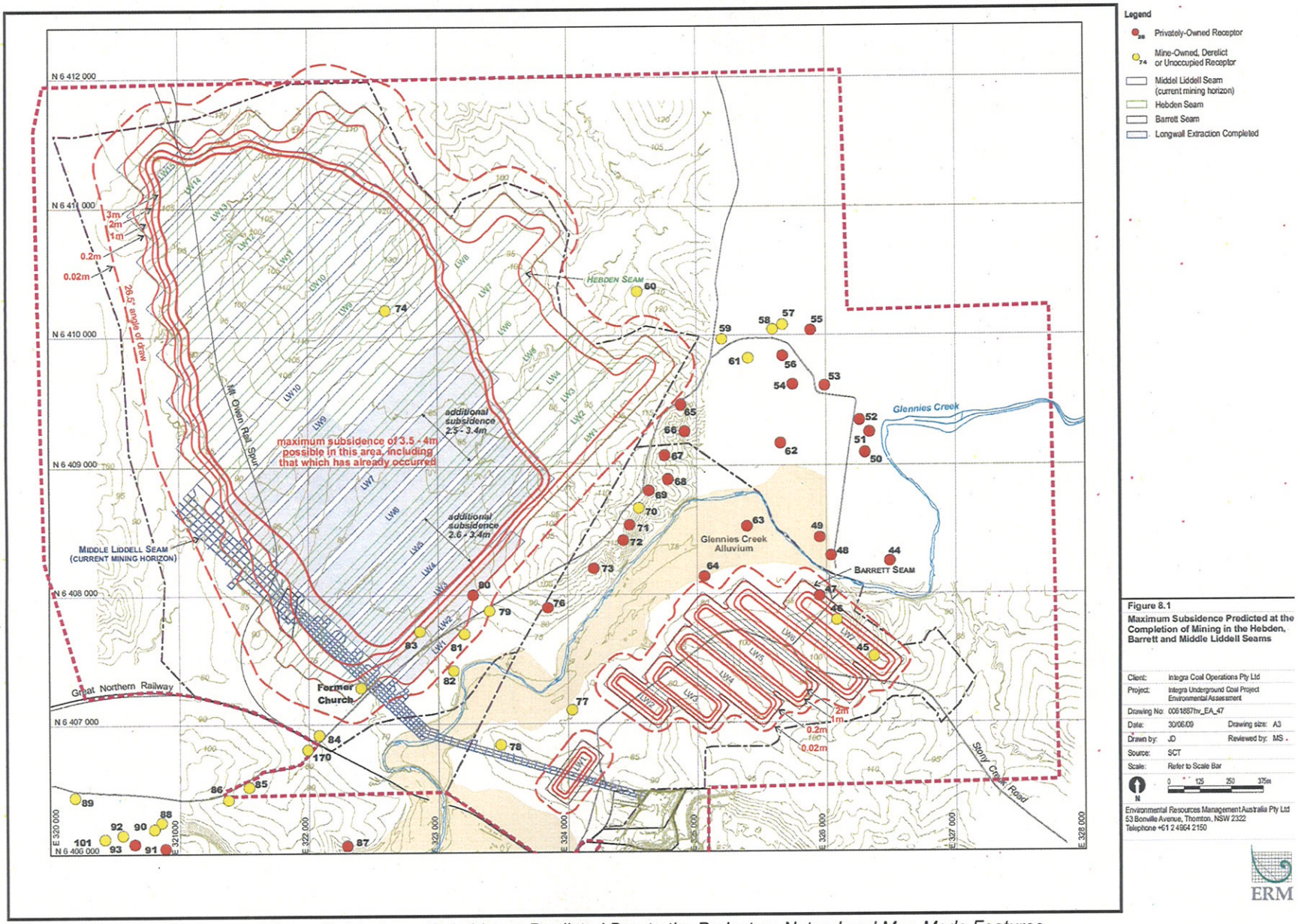

Figure 8.1
Maximum Subsidence Predicted at the Completion of Mining in the Hebden, Barrett and Middle Liddell Seams

Client:	Integra Coal Operations Pty Ltd
Project:	Integra Underground Coal Project Environmental Assessment
Drawing No:	0061887hv_EA_47
Date:	30/06.09 Drawing size: A3
Drawn by:	JD Reviewed by: MS
Source:	SCT
Scale:	Refer to Scale Bar

0 125 250 375m

Environmental Resources Management Australia Pty Ltd
53 Bonville Avenue, Thornton, NSW 2322
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ERM

Figure 6: *Maximum Subsidence Predicted Due to the Project on Natural and Man-Made Features*

Table 3: *Summary of Potential Subsidence Impacts to Man-Made Features*

Feature	Potential Subsidence Impact
Roads	• Surface cracking on Glennies Creek Road, significant impacts to Middle Falbrook Road and Stony Creek Roads and cracking/ponding on Forest Road. However, all roads would remain fully serviceable and repairable.
Glennies Creek Community Hall	• Subsidence would cause some damage to the hall that would likely require considerable re-construction work, re-levelling and remedial work to surface water drainage and sewerage.
Main Northern Railway Line	• First workings only are proposed beneath the railway line, so no perceptible subsidence movements are anticipated. Protection zone from longwall mining has been defined as a 35^{0} angle of draw plus 30 m (270 m in total).
Power Lines	• Single pole structures are present in the mining areas but are mainly located outside areas where longwall mining is proposed, so subsidence movements are expected to be low. Some tilting will probably occur so sheaves will have to be installed and some poles will have to be reset.
Telstra Cable	• Strains in the Barrett mining area would likely exceed the maximum tolerance typically expected of buried cables so provision of alternative telecommunications may be necessary. Interruption to service is considered unlikely in all other areas.
Survey Trig Station	• No significant movements expected. Post-mining surveys should be carried out.
Mt Owen, Ravensworth East and Glendell	• Open cut mining in Mt Owen and Ravensworth East pits will have ceased by the time that subsidence impacts these areas (around 2025). Glendell is likely to be unaffected by the project as it is located above an area of first workings.
Xstrata Mt Owen (XMO) Rail Spur	• Up to 4 m of subsidence is predicted but it is anticipated that the spur would be capable of being maintained in a safe, serviceable and repairable condition. If not, the spur would need to be relocated outside of the subsidence impact zone. XMO and Integra currently have a legally binding agreement in place and will develop a safety interface agreement.
XMO Bettys Creek Diversion	• Subsidence will destabilise the diversion, and earthworks would be required to regrade the stream bed once mining has taken place, as will staged temporary grading and control measures to erosional nick points.
Concrete Bridges over Bettys Creek	• The bridges will experience a full range of subsidence movements as the Hebden seam is mined and would require specific mitigation works if they are to remain serviceable.
Buried Rail Communication Cables	• Whilst communications cables are expected to remain serviceable, connection and junction box fixtures may fail and require repair. Monitoring procedures recommended.
Rail Maintenance Road	• Expected to experience full subsidence movements but should remain fully serviceable with regrading and regular maintenance.
XMO Water Supply Pipeline	• Failure of this buried water supply pipeline is unlikely. Experience over previous longwalls would determine whether it would need to be uncovered before mining.
Residential Buildings	• There are two privately-owned residences located in the subsidence impact zone (R80 and R47). The three other residences in the subsidence impact zone are mine-owned. • R80 has previously been undermined by some Middle Liddell longwalls and lies adjacent to longwall H1. It is likely to experience low levels of additional subsidence as H1 is mined. The SIA indicates that subsidence impacts on R80 would be imperceptible, with vertical subsidence expected to be <50 mm and tilts and strains of <1 mm/m. • Subsidence impacts on R47 would be vertical subsidence of 100-500 mm, permanent horizontal strains and tilts and significant structural damage. I&I NSW raised concerns that R47 may experience significant impacts beyond the Mine Subsidence Board's safe, serviceable and repairable criteria (see below). • The SIA indicates that residences and farm buildings located between Glennies Creek and Glennies Creek Road are located outside the area where subsidence is expected to be perceptible, with vertical subsidence <50 mm and tilts and strains of <1 mm/m. Similarly, residences located over cut and flit mining areas are not expected to experience subsidence of more than 20 mm as a result of the proposed mining.
Disused Building (former Church)	• Proposed mining is considered unlikely to cause more than minor cracking.
Fences and Agricultural Infrastructure	• A number of fences, farm dams, access roads and other agricultural infrastructure are expected to be impacted by subsidence, including cracking, changes in grade and dispersive erosion.
Envirogen Power Station	• No mining subsidence impacts to the plant are anticipated as longwall mining is not proposed below it. Some buried gas pipelines may be impacted, but this is unlikely to result in gas escape.
Integra-Owned Infrastructure	• Possum Skin Dam is located over the Barrett mining area but would be decommissioned prior to any subsidence taking place. Integra north open cut would have finished by the time that mining in the Barrett seam commences.

Finally, the Department notes that the subsidence impacts on the Cherry property (see property 47 on Figure 6) could exceed the safe, serviceable and reparable criteria commonly used in subsidence impact assessment. While the Department is satisfied that these impacts can be suitably managed in consultation with the landowner – by, for instance, relocating the owner for the reasonably short period when the residence would be undermined and then repairing the home as quickly as possible – it has recommended a condition requiring Integra to ensure that the impacts on the residence are restricted to within the safe, serviceable and repairable criteria (unless the landowner agrees otherwise).

The Department has also recommended a condition requiring Integra to acquire the property on fair terms at the request of the landowner, as the residence is only expected to be undermined in 15 years time and the owner may not want to remain in the property during this period while there is some uncertainty about the llikely impacts of the project on the propoerty.

Natural Features

The specialist assessment considered the potential subsidence impacts on a range of natural features, including:

- Bettys and Main Creek and their associated alluviums;
- the flora and fauna in the underground mining area; and
- the areas of archaeological or cultural significance.

The conclusions of this assessment are considered in more detail in the following sections of this report.

To ensure the potential subsidence impacts of the project are properly managed, the Department believes Integra should be required to achieve specific subsidence performance measures (see Table 4).

Table 4: *Subsidence Impact Performance Measures*

Natural and Man-Made Features	Impacts and Consequences
Water Resources	
Glennies Creek alluvial aquifer	Negligible impact
Natural watercourses	Not greater than predicted in the Underground Project EA
Xstrata Mt Owen Bettys Creek Diversions	Not greater than predicted in the Underground Project EA, unless the owner agrees otherwise in writing
Underground Project Creek Diversions	Remain hydraulically and geomorphologically stable
Other water storages and drainage lines	Not greater than predicted in the Underground Project EA
Biodiversity	
Threatened species or populations and their habitats or endangered ecological communities	Negligible impact
Built Features	
All built features, including the Main Northern Railway Line, Glennies Creek Power Station and Mt Owen Rail Spur	Safe, serviceable and repairable, unless the owner agrees otherwise in writing

The Department has also recommended a condition that would require Integra to prepare detailed Extraction Plans for all underground mining operations that could cause subsidence. These Extraction Plans would describe the detailed measures to be implemented to ensure the project complies with the subsidence impact performance measures, and remediate the impacts of the project. It would also include a Subsidence Monitoring Program to validate subsidence predictions and analyse the relationship between subsidence effects and subsidence impacts and any ensuing environmental consequences.

5.2 Surface Water

The project has the potential to impact on surface water resources in a number of ways, including:

- diverting sections of Bettys Creek and Main Creek;
- affecting water quality in downstream surface water and groundwater resources; and
- affecting flood behaviour.

The EA includes a detailed surface water impact assessment, undertaken by WRM Water & Environment Pty Ltd (WRM). The assessment includes consideration of baseline water flow and water quality conditions, the site water balance and modelling to assess impacts on surface water resources.

The project area is located within the catchments of Glennies Creek and Bowmans Creek, which are tributaries of the Hunter River. The proposed Hebden seam mining area underlies Main Creek (a minor tributary of Glennies Creek) and Bettys Creek (a minor tributary of Bowmans Creek). The Barrett seam mining area is located within the Glennies Creek catchment, on the southeastern side of Glennies Creek.

The project area comprises mainly grazing pasture with small areas of irrigated crops on the Glennies Creek floodplain and open forest in the upper reaches of the catchment. Main Creek has a total catchment area of approximately 20.8 km^2 and Bettys Creek has a total catchment area of approximately 19.5 km^2. Both are ephemeral creek systems.

The expansion of the Xstrata Mt Owen (XMO) Mining Complex has led to permanent diversion works to Bettys Creek. These include a diversion of the upper section of the creek (25% of the catchment) to Main Creek and diversions around the Eastern Rail Pit. The main diversion works so far undertaken are the west dump diversion (Diversion 1), the Eastern Rail Pit diversion (Diversion 2) and the upper catchment diversion to Main Creek (Diversion 3). A further diversion has been approved for the Glendell mine, which is likely to take place around 2012. Figure 8 shows the Integra project area in the context of surrounding mining operations, existing creeks (and associated catchment areas) and the approved XMO creek diversions. Figure 9 shows the Hebden and Barrett seam mining areas in relation to Bettys Creek and Main Creek, and predicted subsidence contours.

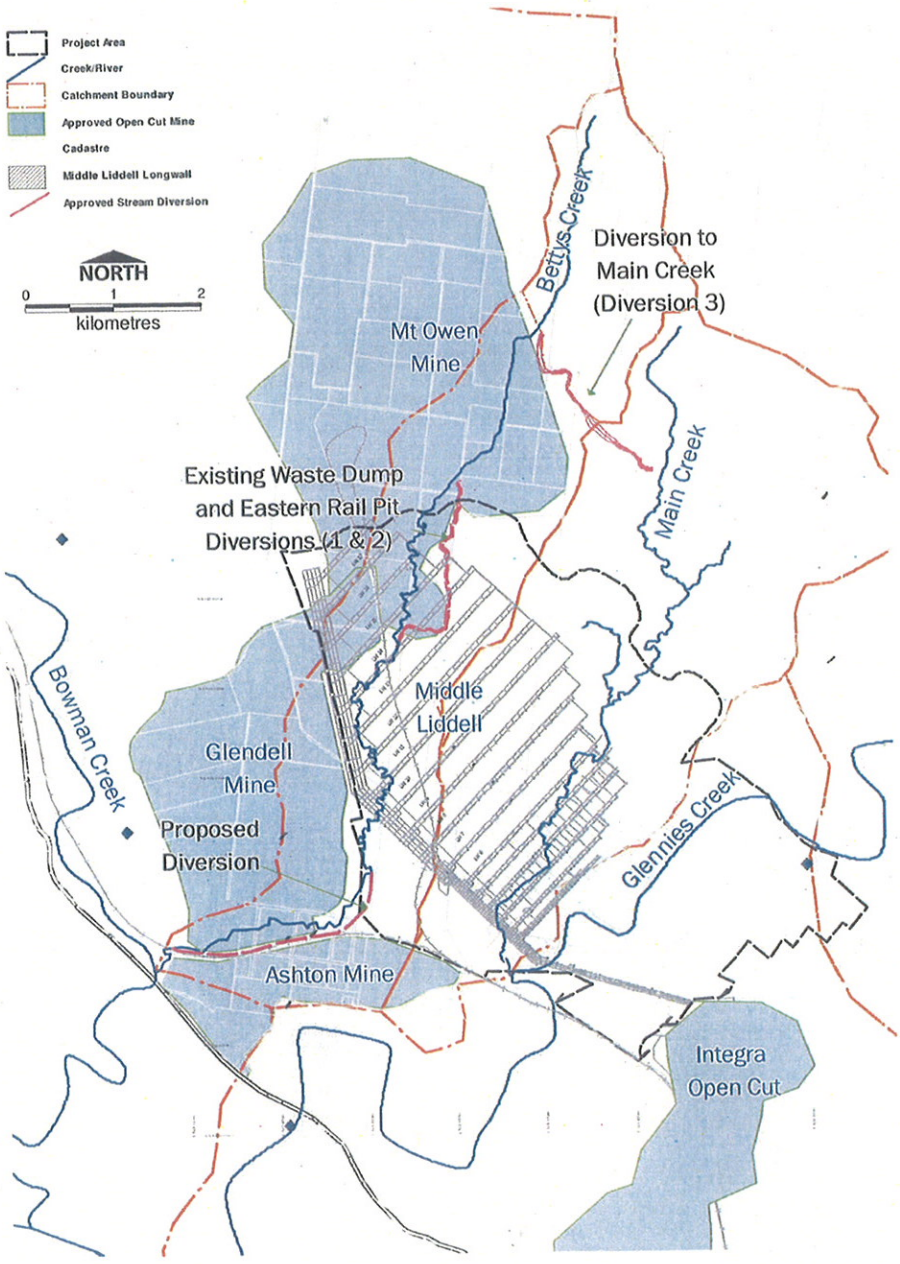

Figure 8: *Catchment Boundaries and Surface Water Resources, including Approved XMO Stream Diversions*

An assessment of project-related impacts to each creek is summarised below, and shown in Figure 9.

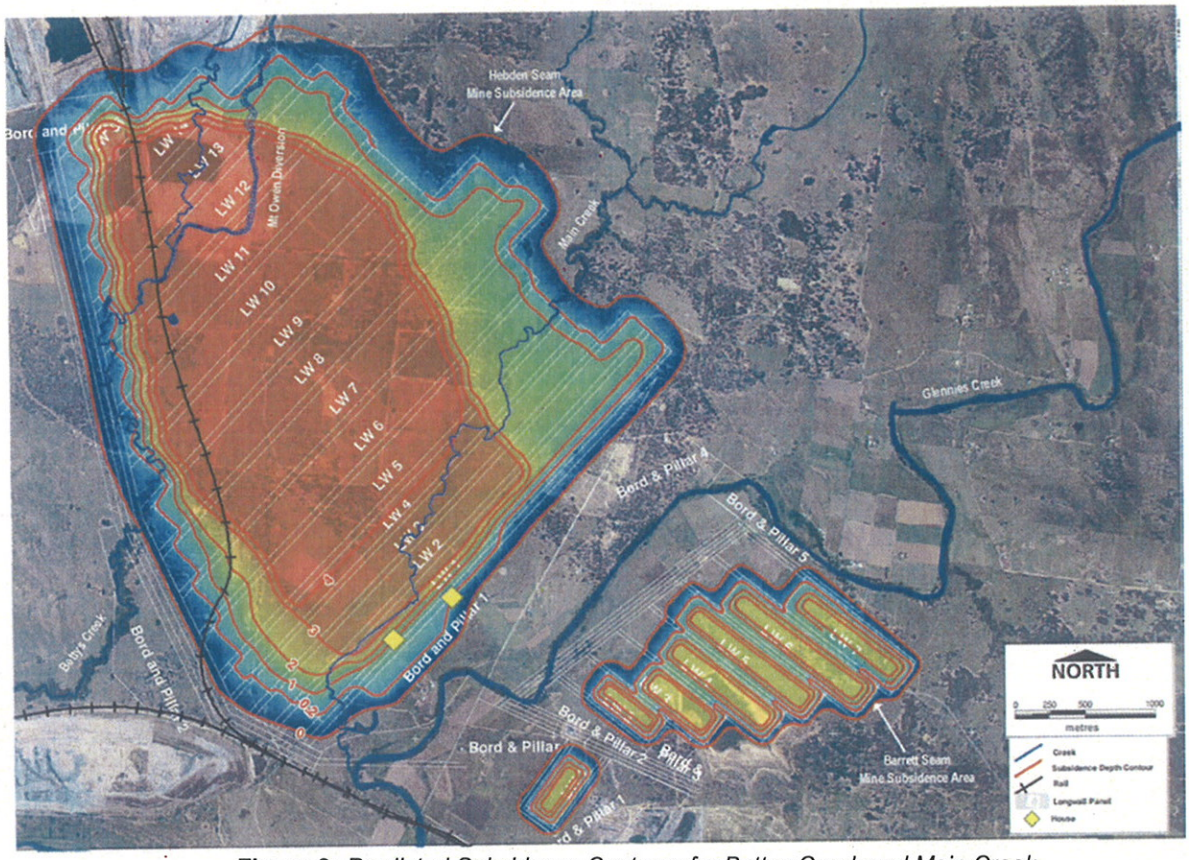

Figure 9: *Predicted Subsidence Contours for Bettys Creek and Main Creek*

Glennies Creek

In the Barrett seam mining area, the mine plan has been designed so that the Glennies Creek channel and its associated alluvium would not be undermined by longwalls, although it would be undermined by first workings. Subsidence is not anticipated from these first workings and Integra has committed to designing them to be long-term stable.

Following some initial concerns, the Department and NOW are satisfied that the Barrett seam longwalls would cause no more than negligible impacts to Glennies Creek or its alluvium. Integra has committed to maintaining a 40 m barrier between the boundary of the connected alluvium and the 20 mm subsidence contour for these longwalls. The Department has also recommended a subsidence impact performance measure which requires Integra to have no more than negligible impact on the Glennies Creek alluvial aquifer.

Bettys Creek

I&I NSW raised concerns that low-lying areas subject to multi-seam longwall mining may be impacted by inundation, ponding and erosion. In its response, Integra stated that subsidence-related ponding and breakout flow from the creek channel is anticipated for both Bettys and Main Creeks within the Hebden seam subsidence footprint, with ponding depths on the floodplain predicted to be up to 0.8 m. This may affect some agricultural land and potentially one residence owned by another colliery. The assessment indicates that subsidence of up to 4 m would cause a new overland flow path to the west of the Mt Owen Rail Spur in the lower reach of Bettys Creek. Erosion of a channel along the newly formed overland flow path could also potentially cause sedimentation and adversely impact water quality downstream.

The Department accepts that longwall mining beneath Bettys Creek would render the creek dysfunctional due to a range of significant impacts, including erosion, ponding, flooding and channel breakout. To mitigate subsidence impacts, Integra proposes to construct four drop structures in the upper reaches of the XMO creek diversion (there are drop structures already present in the middle reaches) where it drains into the mine subsidence zone to reduce the channel bed slope and associated erosion potential, and to construct a diversion along the eastern edge of the mine subsidence zone in the lower reaches of Bettys Creek (see Figure 10).

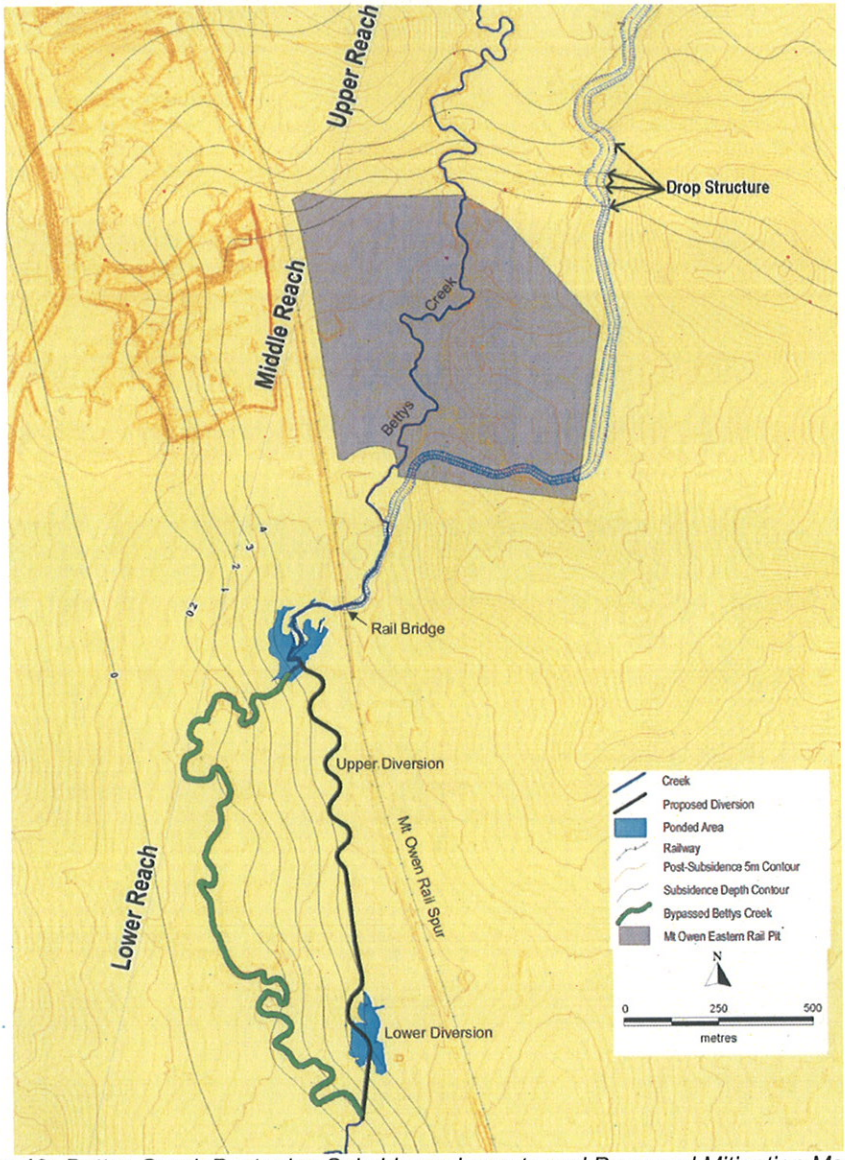

Figure 10: *Bettys Creek Post-mine Subsidence Impacts and Proposed Mitigation Measures*

NOW noted that Bettys Creek has suffered significant alteration in channel continuity and connection between the upstream and downstream reaches due to previous diversion works and recommended that the Hebden seam longwalls 9-12 be shortened to mitigate subsidence impacts on Bettys creek and the need for the proposed diversion. During the assessment process, Integra examined several such options when developing its mine plan but these were not considered viable either for mine safety or financial reasons.

The proposed diversion would extend about 1,400 m, meandering within the confines of the new floodplain created by mine subsidence. The final 150 m of the diversion would be within the existing Bettys Creek channel. About 2,500 m of Bettys Creek is expected to be abandoned, some 900 m longer than the proposed diversion.

Table 6 shows the characteristics of the proposed diversion.

Table 6: *Proposed Bettys Creek Diversion Characteristics*

Diversion Section	Length (m)	Depth (m)	Bed Grade %	Invert Level (mAHD)	
				Upstream	Downstream
Upper Creek diversion	1000	0.5-2.3	0.38	85.6	81.82
Lower Creek diversion	390	0.2-2.0	0.34	81.82	81.59

Modelling was conducted to define the hydraulic characteristics of the proposed diversion channel compared to the pre-mine channel, in comparison with hydraulic design criteria for other stream diversions in Australia (see Figures 11 & 12).

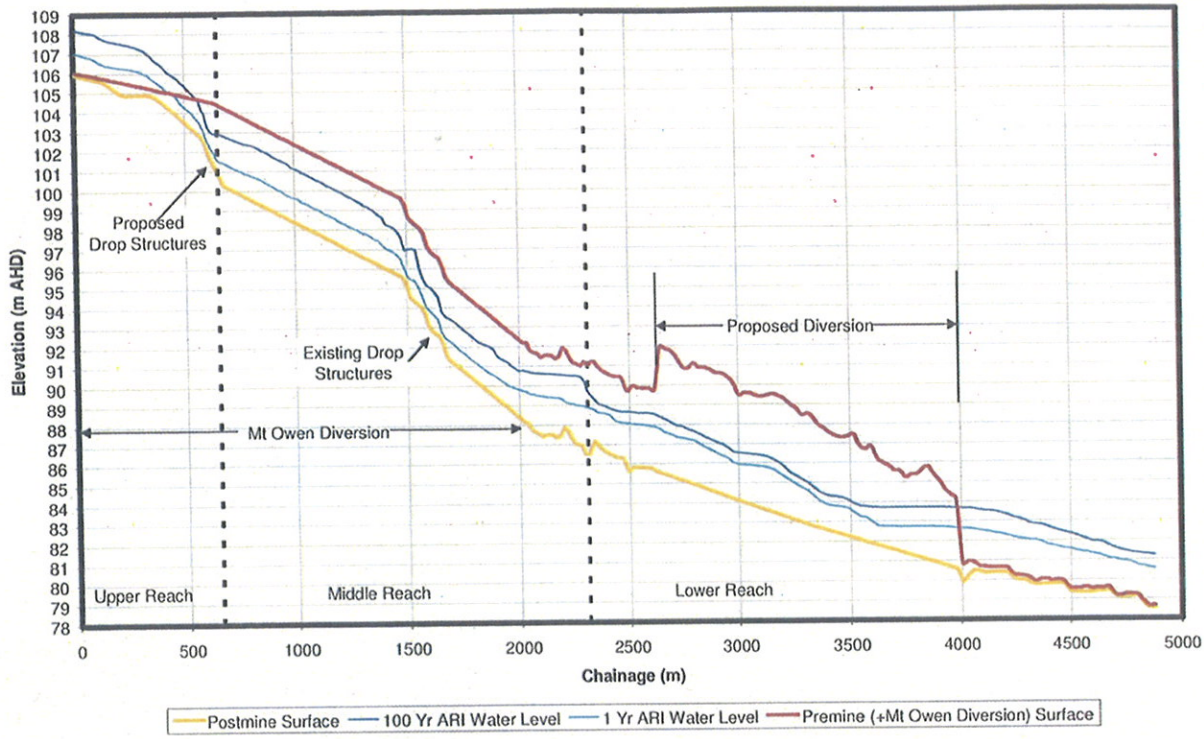

Figure 11: *Bettys Creek Pre-mining and Post-mining Long Section Profiles*

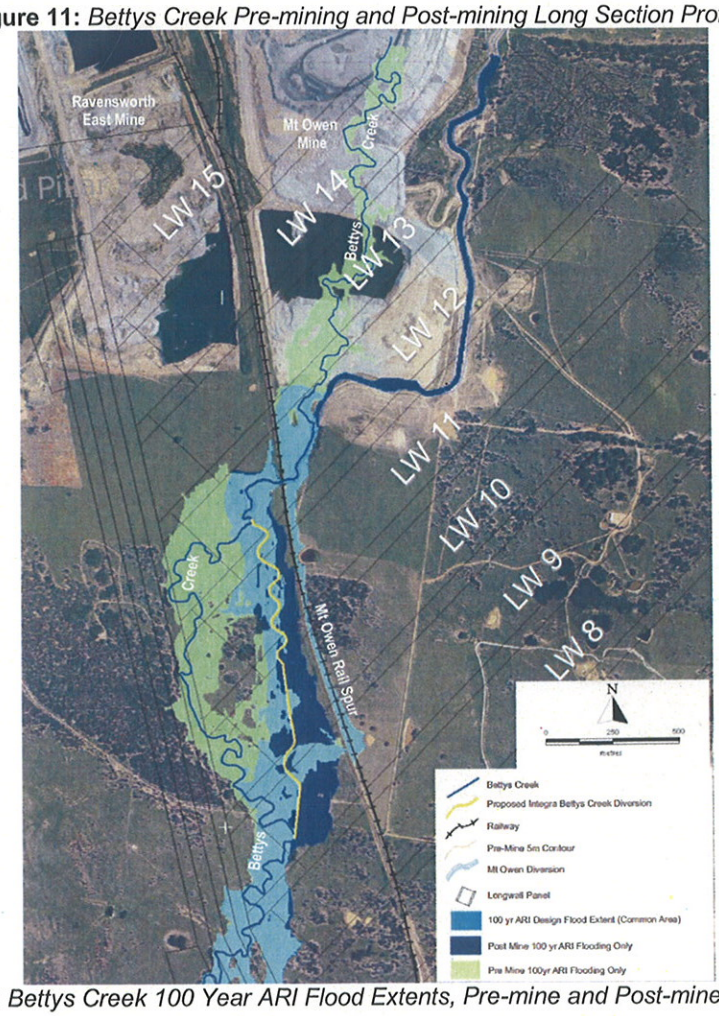

Figure 12: *Bettys Creek 100 Year ARI Flood Extents, Pre-mine and Post-mine Subsidence*

This modelling showed that the proposed drop structures would mitigate the impacts of increased bed shear, stream power and channel velocities in the upper and middle reaches of the creek (including the section of creek diverted by XMO) and that the erosion potential of the diversion is expected to be similar to that of the existing lower reach channel.

While mitigating potential subsidence impacts to Bettys Creek, the proposed diversion could potentially impact riparian vegetation along the abandoned creek corridor due to a reduction in the water flow required to sustain this vegetation. This is discussed in more detail in Section 5.4 below.

The Department is satisfied that the predicted impacts on Bettys Creek are acceptable given the fact that it has been significantly disturbed by mining in the past, is not a significant water source in the region, and is necessary to ensure the social and economic benefits of the project.

Main Creek

Similar impacts would occur to Main Creek as to Bettys Creek.

To address these impacts, Integra proposes to install two drop structures in the upper reach to mitigate potential erosion of the channel, and construct three diversion channels in the lower reaches of the creek. These works are depicted in Figure 13, and summarised in Table 7.

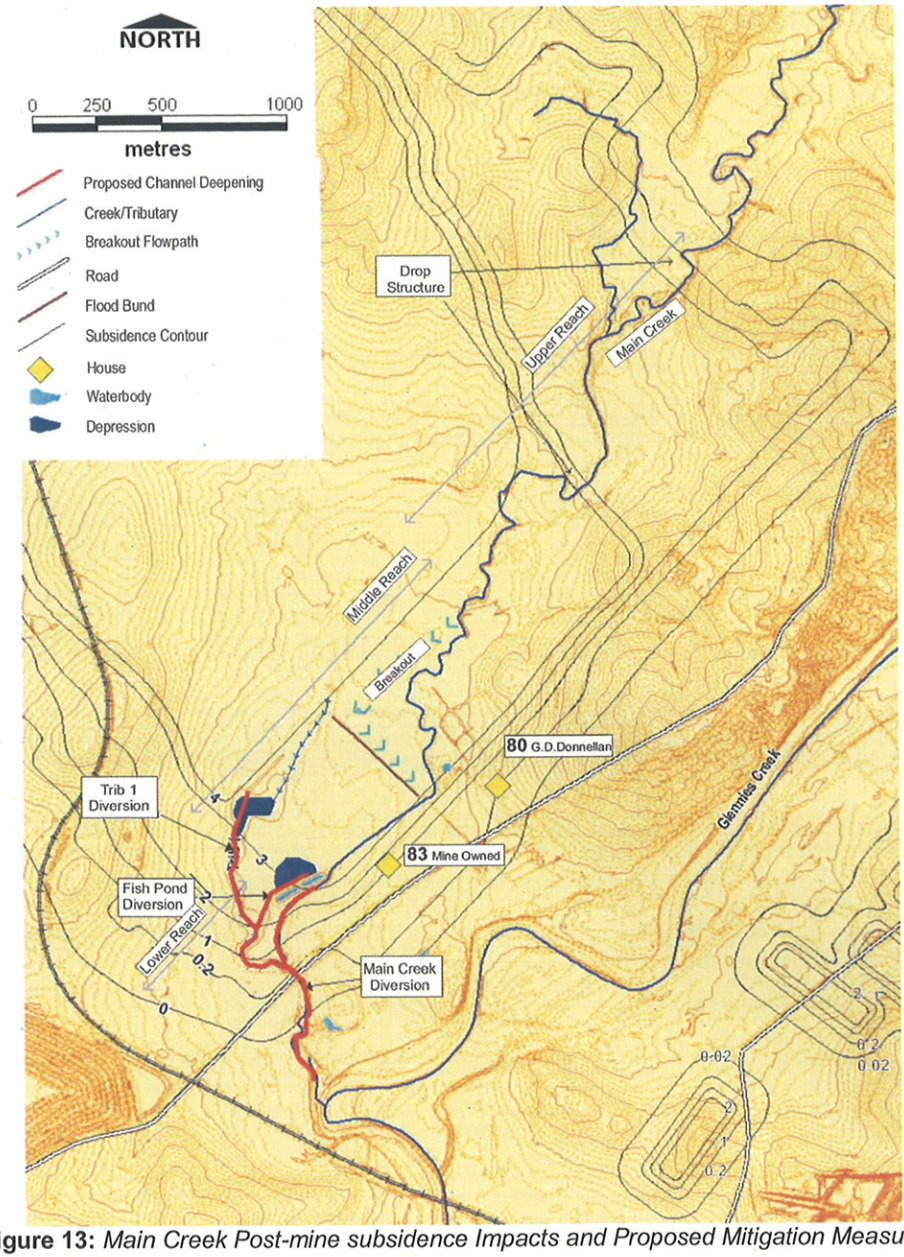

Figure 13: *Main Creek Post-mine subsidence Impacts and Proposed Mitigation Measures*

Table 7: *Proposed Main Creek Diversion Characteristics*

Diversion Section	Length (m)	Depth (m)	Bed Grade %	Invert Level (mAHD)	
				Upstream	Downstream
Main Creek Diversion	935	2.5-3	0.31	68.5	65.63
Trib 1 Diversion	790	0.5-2	0.28	69.5	67.27
Fish Pond Diversion	315	Up to 1.5	0.15	69.85	67.88

The assessment indicates that the two drop structures would mitigate the impacts of increased bed shear, stream power and channel velocities in the upper reach of the creek (see Figure 14). The erosion potential of the proposed Main Creek diversions is also expected to be lower than for existing conditions.

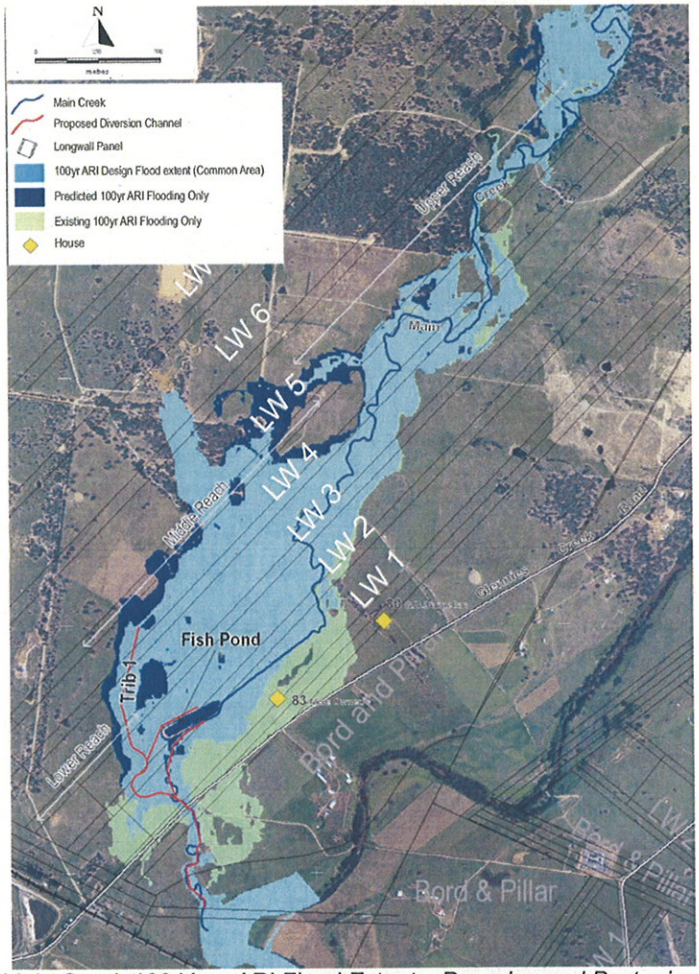

Figure 14: *Main Creek 100 Year ARI Flood Extents, Pre-mine and Post-mine Subsidence*

Minor losses to stream flow in Main Creeks due to subsidence cracking are predicted, with the assessment indicating that stream flow would not be observably reduced and that these losses would be difficult to detect from other variables affecting stream flow. The assessment also indicates that the project is unlikely to significantly affect the water quality or stability of the creek.

NOW noted that Main Creek had experienced subsidence from the approved extraction of the Middle Liddell seam, and indicated that additional subsidence was likely to increase creek degradation.

To address NOW's concerns Integra has committed to:

- preparing a response strategy to address any destabilisation of Main Creek;
- preparing a works program for conducting any necessary remedial works in Main Creek should subsidence initiate bed incision (nick points) and headward erosion;
- expanding piezometric monitoring; and
- preparing a Trigger Action Response Plan as part of a surface water and groundwater monitoring and management program.

Both the Department and NOW support the implementation of these measures.

Other Surface Water Features
Farm dams in the mining area may experience bed or bank cracking but are unlikely to be significantly affected. However, the SIA indicates that the subsidence effects of mining the Barrett seam would cause the wall of Integra's existing Possum Skin Dam (a major water management dam) to fail. To avoid this risk, Integra has committed to decommissioning this dam prior to mining the Barrett seam.

Subsidence impacts from mining the Hebden seam, including inundation, ponding and erosion, would occur on some low-lying agricultural land, which may affect some agricultural activities in the short term. The Department is satisfied these impacts can be managed under the Extraction Plans proposed for the project (see Section 5.1).

Other Water Users
The assessment indicates that there are no known surface water users along Bettys Creek and Main Creek within the area that would be affected by mining in the Hebden and Barrett seams.

There are 88 water licences along Glennies Creek downstream of the Glennies Creek Dam, with a total allocation of 13 gigalitres a year. Subsidence associated with both the Hebden and Barrett seams is not expected to impact on flows in Glennies Creek, or other water users. Integra holds a high security licence for over 400 megalitres (ML) a year, but due to the availability of water on site, additional water is rarely drawn upon to satisfy operational demands.

Site Water Balance
Integra operates an integrated water management system for clean and dirty water across the mine complex. This system, including mine water storage, clean and dirty water separation, clean water release and runoff control, would continue to serve both open cut and underground mining operations.

Modelling shows that overall water balance would remain in equilibrium for the life of the project even if the (not yet approved) Western Extension of Integra's South Pit is taken into account. The assessment predicts that the water management system can be operated to ensure no spills from the dirty water system, CHPP demands can be fully met and dust suppression demands can be met with over 90% reliability. No additional surface water infrastructure is required for the project. After Possum Skin Dam is decommissioned, it will not be replaced, since this will follow the cessation of open cut mining and the need for water management structures will diminish.

NOW noted that Integra would be required to ensure it has sufficient water to meet its operational demands. Integra committed to curtailing its mining operations to meet available water supplies, should insufficient water be available to continue all operations. The Department has recommended a condition to formalise this commitment. The Department is satisfied that the existing water management system can incorporate the requirements of the project.

In summary, the Department is satisfied with the implementation of suitable mitigation measures the surface water impacts are likely to be acceptable.

Nevertheless, the Department has recommended conditions that require Integra to:
- ensure it has sufficient water for all stages of the project;
- offset the loss of any baseflow to the surrounding watercourses, preferably via the retirement of adequate water entitlements;
- provide compensatory water supply to any owner of privately-owned land whose water entitlements are affected by the project;
- ensure that all surface water discharges from the site comply with the discharge limits in any environmental protection licence or the relevant provisions of the *Protection of the Environment Operations Act 1997* or Hunter Salinity Trading Scheme;
- carry out the proposed creek diversions to the satisfaction of the Director-General;
- rehabilitate any damage to Xstrata's Bettys Creek diversions; and
- prepare and implement a detailed Water Management Plan for the project.

5.3 Groundwater

The EA's groundwater impact assessment was undertaken by GeoTerra Pty Ltd using a mathematical model to predict the potential impacts of mining on the groundwater regime for the life of the project.

Two types of aquifer systems are present in the project area, the unconsolidated alluvium along the channels of Glennies Creek, Bettys Creek and Main Creek, and the low yielding coal seam aquifers. There is a range of existing and proposed mining operations in the area that have the potential to influence the groundwater system within the project area. The main potential groundwater impacts from existing and proposed mines nearby include coal measure depressurisation, alluvium depressurisation and changes to groundwater quality.

The groundwater impact assessment considered previous studies conducted for Integra's underground operations, the influence of proposed and existing mine workings and field measurements by Integra.

Modelling indicates that groundwater pressures within the Middle Liddell, Barrett and Hebden seams would be significantly reduced following extraction. Reductions in groundwater levels of up to 10 m may occur in the coal measures in the proposed longwall mining areas. This drawdown directly resulting from the project is expected to be significantly increased (and extended) by cumulative drawdown associated with surrounding mining operations. Modelling indicates that depressurisation of the underground workings, when combined with depressurisation from nearby open cut mines, may extend up to 5 km from the site. However, the coal seam aquifer is brackish to saline (electrical conductivity ranges from 11,000 to 21,500 µS/cm) with no beneficial use by either agriculture, stock and domestic water or groundwater dependent ecosystems (GDEs).

Standing water levels in alluvium within the project area range from 2 m to 10 m below the ground surface. Depressurisation of the underlying coal measures has the potential to indirectly cause leakage of groundwater from the alluvium of Bettys, Main and Glennies Creeks. Modelling predicts less than 1 m of drawdown is anticipated within the connected alluvium of Glennies Creek up to 2024, when mining in the Hebden seam is due to be completed. The assessment indicates that this would be less than the current variability in alluvial groundwater levels (just over 2 m) so this change is not anticipated to adversely affect stream flow or stream water quality. However, drawdown in the disconnected alluvial sediments approximately 760 m south of Glennies Creek is predicted to increase up to a maximum of 7 m in 2041. This drawdown may lead to localised reversal of the groundwater gradient (away from Glennies Creek). As these areas are located in low permeability, clay dominated sediments that are poorly connected to Glennies Creek, the groundwater assessment does not anticipate any adverse impact on flows in the creek.

Between 2024 and 2031, single seam mining would be conducted in the Barrett seam, and no longwall mining would be conducted beneath the Glennies Creek alluvium or within a set-back of 40 m from the 20 mm/m subsidence contour. This set-back is proposed by Integra in order to ensure that no subsidence-induced overburden cracking would directly affect the alluvial groundwater system. Nonetheless, the assessment indicates the project would contribute to an indirect loss of groundwater discharge (ie baseflow) to Glennies Creek resulting from downwards leakage towards the depressurised coal seams associated with mines on both sides of the creek, with flow loss to the creek from the alluvium modelled to rise from the current 7.3 ML a year to 15 ML a year in 2024 and up to 27.4 ML a year in 2041.The assessment also indicates that the continued depressurisation of the alluvium after 2031 (the end of Integra's underground workings) is due to the continued effect of other mining operations.

Groundwater within the alluvial aquifers associated with Main and Bettys Creeks is predicted to experience direct drawdown of up to 5 m in the lower section of Main Creek and up to 1 m in Bettys Creek, due to the formation of extensional cracks over the proposed underground workings. Minor losses to stream flow in Bettys and Main Creeks due to subsidence cracking is predicted, but the assessment predicts that stream flow would not be observably reduced and that these losses would be difficult to detect from other variables affecting stream flow.

The assessment indicates that one active privately-owned bore (GW67291), extracting water from the Glennies Creek alluvium, may be affected by the groundwater drawdown associated with depressurisation, with a potential drawdown up to 0.5 m. One other registered bore and three registered wells are also located within the potential drawdown area, however these are inactive. Alluvial groundwater quality in the Glennies, Bettys and Main Creek alluvium would be not reduced as a result of subsidence impacts, due to the existing high salinity in the alluvium.

Total underground mine inflows of up to 255 ML a year of brackish or saline groundwater are modelled at the end of mining in the Middle Liddell seam, along with up to 459 ML a year from the Hebden workings and up to 258 ML a year from the Barrett workings, which will be pumped to the north pit and/or the extended south pit. These remnant open cut voids would continue to act as permanent evaporative sinks, with the groundwater level unlikely to rise back to the original ground surface. The predicted groundwater drawdown for the Hebden seam and the alluvium following cessation of mining operations are shown in Figures 15 & 16. Following completion of mining operations, the rate of regional groundwater recovery would depend on the continuing depressurisation effects of numerous other coal mines in the area, some of which are expected to continue operations following 2041.

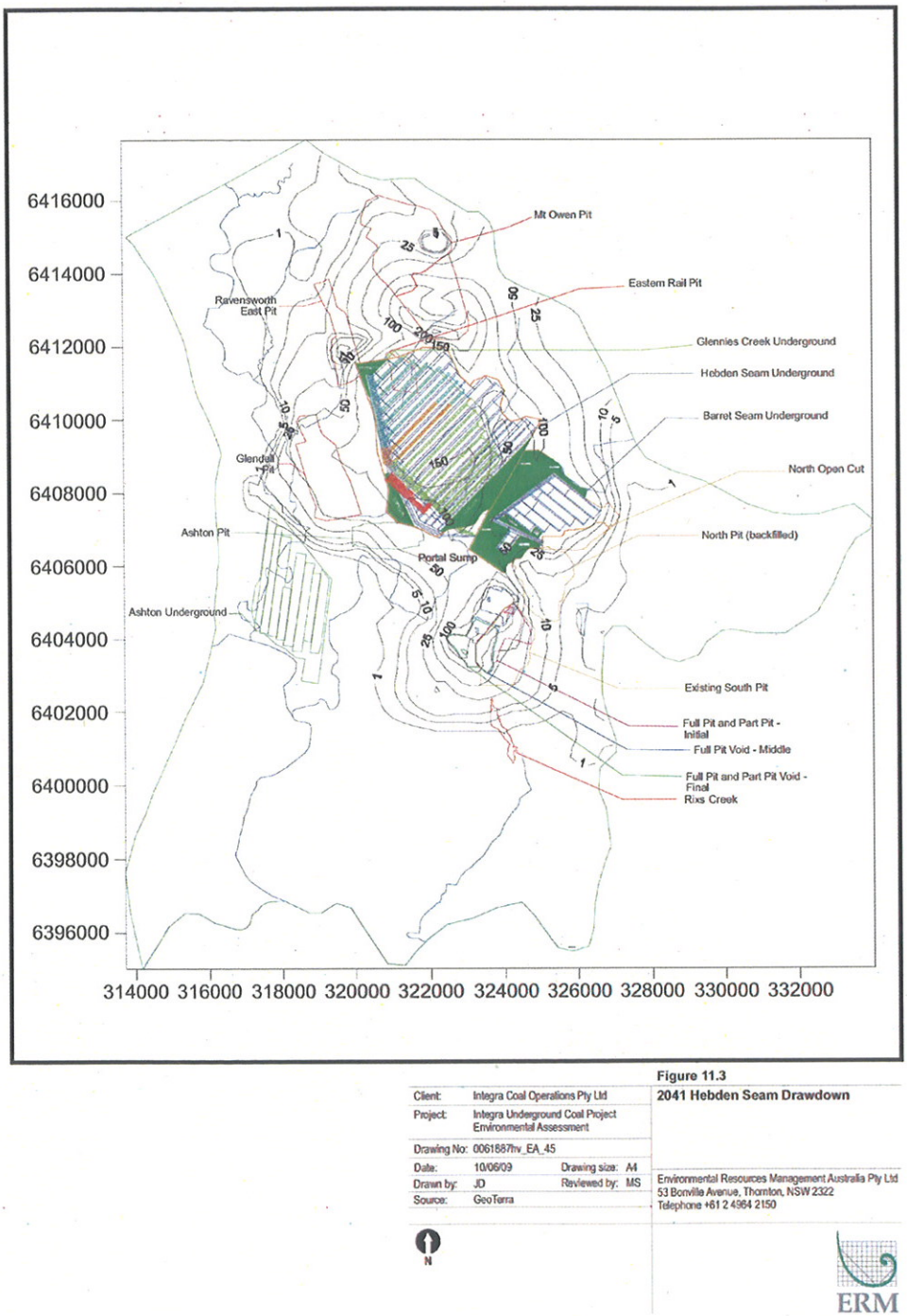

Figure 15: *Predicted Drawdown in the Hebden Seam at Conclusion of Mining (2041)*

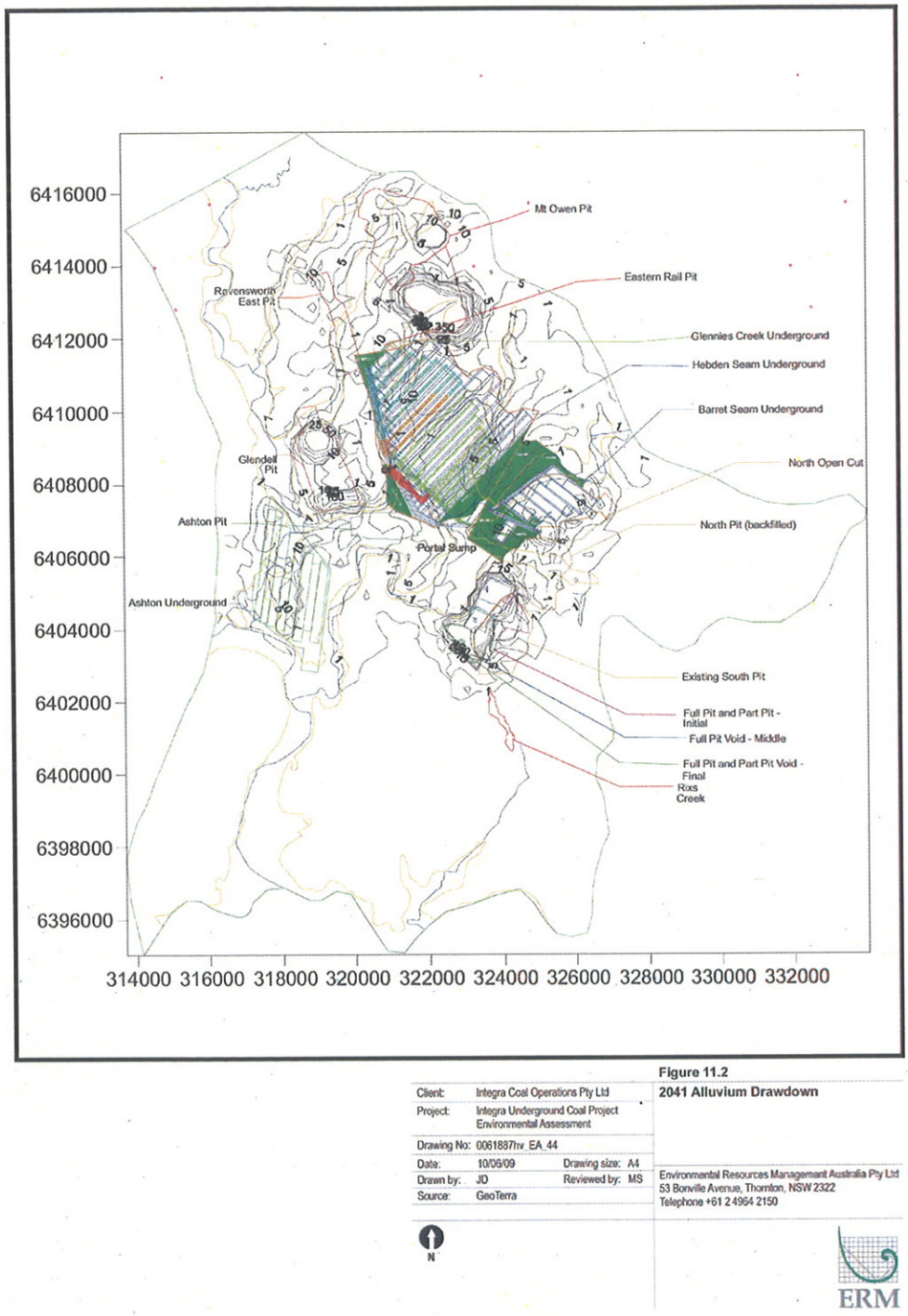

Figure 16: *Predicted Drawdown in the Alluvium at Conclusion of Mining (2041)*

NOW suggested that the accuracy of the assessment's groundwater impact predictions is dependent on the assumption of minimal interaction with any potentially occurring faults or other geological structures, and recommended that Integra undertake more-detailed geological mapping and risk assessment prior to commencement of underground mining.

However, Integra believes that geological structures can be more accurately identified and mapped during first workings development in the Hebden and Barrett seams and the risk then thoroughly assessed prior to secondary extraction.

The Department agrees with this position, and has recommended a condition requiring Integra to prepare a detailed Water Management Plan as part of any Extraction Plan for longwall mining in consultation with NOW, This plan would include accurate mapping of any geological structures in the vicinity of the proposed mining, and describe the measures to be implemented to avoid and/or the potential impacts of the project on the region's groundwater resources.

The Department is satisfied that with the implementation of these measures, along with the requirements summarized in the previous surface water section, the groundwater impacts of the project can be suitably managed to ensure there are no significant impacts on the region's groundwater resources.

5.4 Biodiversity

The EA includes a biodiversity impact assessment undertaken by ERM in accordance with the *Draft Guidelines for Threatened Species Assessment* (see the EA, which is attached as Appendix E).

This assessment included a literature review of previous studies in the area as well as targeted flora and fauna surveys to determine the conservation value of the site, and an assessment of the potential biodiversity impacts of the project paying particular attention to its ability to affect the endangered ecological communities (EECs) and threatened species habitat on the site.

The literature review and surveys identified:

- 7 vegetation communities on site (see Figure 17), including 5 hectares of the regionally significant Central Hunter Swamp Oak Forest community; and
- habitat for at least 9 threatened fauna species, including Grey-Crowned Babbler, Speckled Warbler, Brown Treecreeper, Eastern Freetail-bat, Eastern Bentwing-bat, Yellow-bellied Sheathtail-bat, Brush-tailed Phascogale, Grey-headed Flying Fox and Squirrel Glider.

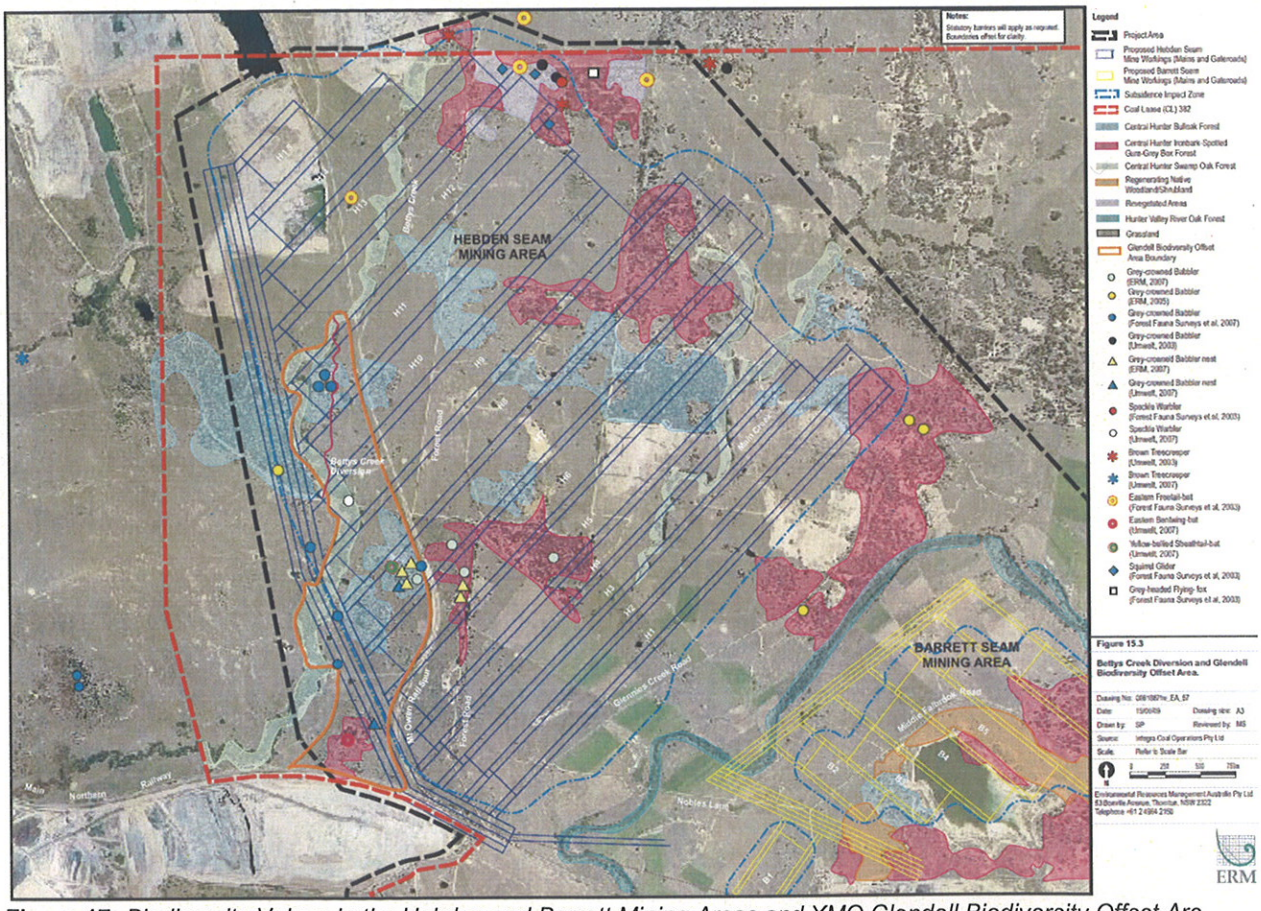

Figure 17: *Biodiversity Values in the Hebden and Barrett Mining Areas and XMO Glendell Biodiversity Offset Are*

The assessment concluded that the site is dominated by cleared grassland that has been used for agriculture for decades, and has limited conservation value. The project would result in:

- minor impacts on the vegetation in the subsidence zone, such as the leaning of some trees, which can readily be remediated;
- the loss of all 5 hectares of the regionally significant Central Hunter Swamp Oak Forest community on site, either through the abandonment of part of Bettys Creek or due to the clearing required for the proposed Bettys Creek diversion;
- the clearing of at least 12 hectares of grassland for the construction of various surface infrastructure to support the underground mining operations.

During the assessment process, DECCW asked Integra to consider alternatives to see if the predicted impacts on the regionally- significant Central Hunter Swamp Oak Forest community could be avoided as the loss of this vegetation would potentially affect the habitat connectivity of the site for threatened arboreal fauna species such as the Squirrel Glider and Brush-tailed Phascogale. Integra duly did this but concluded that none of the alternatives was warranted on social and economic grounds.

The Department agrees with Integra's conclusions, but believes that it should be required to provide a suitable offset to compensate for the predicted impacts on Central Hunter Swamp Oak Forest community.

Following the exhibition period, Integra proposed to:

- offset the predicted impacts on Central Hunter Swamp Oak Forest community by permanently conserving 9 hectares of the community in an area adjacent to its existing offset areas; and
- rehabilitate Bettys Creek to ensure that the pre-mining surface flow regime is restored and the diversion channel is stable, with self-sustaining vegetation.

An assessment of the proposed offset area was undertaken by Geoff Cunningham Natural Resource Consultants, which found that the proposed offset was of high biodiversity value.

Notwithstanding, both DECCW and the Department consider the proposed offset to be inadequate as the proposed Bettys Creek diversion would disturb the Glendell Habitat Management Area (HMA), which has been set aside to offset the impacts of the adjacent Glendell mine.

To ensure that the impacts of the project, both on the Central Hunter Swamp Oak Forest community and the Glendell HMA are suitably offset, the Department believes Inetgra should be required to permanently conserve at least 15 hectares of the Central Hunter Swamp Oak Forest community.

The Department has therefore recommended conditions require Integra to:

- revise the proposed biodiversity offset strategy to include the permanent conservation of an additional 6 hectares of the Central Hunter Swamp Oak Forest community;
- implement the revised biodiversity offset strategy; and
- prepare and implement a detailed Biodiversity Management Plan for the project.

5.5 Other Issues

The assessment raised several other key issues that are addressed in Table 9 below.

Table 9: *Assessment of Other Key Issues*

Issue	Consideration	Conclusion
Noise	• The EA includes a noise impact assessment (NIA) undertaken by ERM. The NIA considered noise impacts on nearby residents from the project alone as well as cumulative impacts. • In the Department's view, it is difficult (if not impossible) to differentiate noise emissions from Integra's open cut and underground projects. The main reason for this is that each operation, despite being managed as separate corporate entities, shares a range of infrastructure, including the Camberwell CHPP, coal loader and rail loop. • To address this, the Department required Integra to carry out a later combined NIA for both the open cut and underground operations (existing and proposed). • The revised NIA confirmed that combined noise emissions (ie including the contribution from the open cut project) would be significantly greater than the noise emissions generated by the underground project alone.	• Noise emissions from the underground project in isolation are considered to be minor, except for a handful of residences that live in close proximity to some of the underground surface infrastructure. Of these: o 2 private dwellings (80 and 153) would receive rights to acquisition on request due to significant impacts in excess of 5 dB above the criteria; and o 6 private dwellings (9, 10, 11, 13, 87 and 64) would receive rights to noise mitigation due to moderate impacts between 3 and 5 dB above the criteria. • *Cumulative noise* The NIA indicates that the project, due to it being underground mining and without any proposed increase in annual production, would not significantly increase the overall cumulative noise levels for the majority of receptors. • *Road Traffic Noise* As there would be no increase in employment from existing levels, the project would not significantly increase traffic noise impacts. • *Rail Noise* Integra is not proposing to increase current production rates and therefore rail noise would not significantly increase as a result of the proposal. In any case, rail noise was included

		as a constant component for all time periods of the NIA, to account for it occurring at variable times during the day, evening or night. • To protect the amenity of privately-owned residences, the Department has recommended a full suite of contemporary noise impact assessment criteria, including cumulative noise impact assessment criteria. This includes a second set of combined noise impact assessment criteria that would apply during the life of the open cut project. These criteria would be tightened once open cut mining ceases (ie to reflect the drop in noise emissions). • The Department is also proposing that Integra participate in the development of an integrated, regional, real-time noise monitoring network, involving other nearby coal mines (as notified by the Director-General), to improve predictive and real-time management of noise emissions. The Department has recommended conditions for an integrated Noise Management Plan for the Integra Mine Complex, including requirements to: o describe all reasonable and feasible management and mitigation measures that will be implemented; o provide for attended and real-time noise monitoring, including low frequency noise; o establish a response protocol that will be followed if noise emissions are nearing or exceeding noise criteria; and o provide for ongoing evaluation of compliance with noise criteria and the effectiveness of measures in the plan.
Air Quality	• The project has the potential to result in dust-related impacts, particularly to nearby residents. The EA includes an air quality impact assessment (AQIA) undertaken by ERM, based on dispersion modelling undertaken by Holmes Air Sciences. This AQIA was conducted in accordance with DECCW's *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales (2005).* • Air quality modelling results showed that the incremental impact of the project alone would be well within applicable health and amenity criteria (between 2% and 17%). This contributes only a fraction of dust capacity within the local air shed. • While the dust emissions of the project would contribute to the cumulative impacts of the Integra mine complex as a whole, this contribution would be very small in relative terms.	• The Department is satisfied that dust emissions from the underground project in isolation would be minor. • It is also satisifed that cumulatively, it would contribute very little dust to the local air shed when compared to the dust generated by other existing and proposed open cut mines in the vicinity. • Notwithstanding this, the Department has recommended a broad range of contemporary air qquality conditions that would require Integra to implement all reasonable and feasible mitigation measures to minimise the dust impacts of the project.
Greenhouse Gases	• The proposed project would generate direct and indirect greenhouse gas emissions (GHGEs) that contribute to global warming and climate change. • The EA includes a detailed Greenhouse Gas Assessment, undertaken by ERM, in accordance with the Commonwealth Government's *National Greenhouse Account (NGA) Factors* (2008). • The assessment calculates direct and indirect GHGEs associated with the project, including Scope 1 emissions (direct GHGEs from sources controlled by Integra), Scope 2 emissions (indirect emissions associated with the projects consumption of electricity) and Scope 3 emissions (other indirect emissions, such as those associated with the downstream combustion of product coal).	• The assessment determined that total Scope 1, 2 and 3 greenhouse gas emissions from the proposal would be approximately 121.7 Mt of CO_2 equivalent over the project life, of which Scope 3 emissions represent 84% of this total. This equates to 5.3 Mt of CO_2 equivalent per year, which represents approximately 0.0015% of Australia's annual GHGEs. • The Department is satisfied that this represents a negligible contribution to national and global greenhouse emissions, however, has recommended a condition requiring Integra to prepare a Greenhouse Gas Management Plan, which includes requirements to: o monitor greenhouse gas emissions and energy use generated by the project, o investigate and implement measures to reduce these emissions; and o describe how the performance of these measures would be implemented at the mine complex over time.

Aboriginal Heritage	• The project has the potential to impact upon existing Aboriginal heritage values due to mine subsidence and surface disturbance. Subsidence impacts alone are unlikely to significantly affect the integrity of identified Aboriginal heritage sites. • The EA identified 108 known sites within the study area, with one of these recorded as destroyed. The majority of these sites are artefact scatters and isolated finds with one site being a scarred tree. • Field surveys identified 5 new sites, comprising 2 artefact scatters and 3 isolated artefacts. • Three artefact scatters would be destroyed by the Bettys Creek diversion, and the area is considered to have potential to contain other unidentified archaeological sites. The proposed Main Creek diversions also have the potential to impact on two known artefact scatters and other unidentified sites which may be present.	• The Department recommends that Integra be required to prepare and implement a Heritage Management Plan for the mine complex. • As well as providing management and mitigation measures for identified objects/sites, the plan should also include protocols to be followed in the event that unidentified sites/objects are discovered. • The development of ventilation shafts or other minor infrastructure in the future would also need to avoid known archaeological and cultural heritage values.
Non-Aboriginal Heritage	• The project has the potential to impact on existing non-Aboriginal heritage items due to mine subsidence and surface disturbance. The EA's heritage study identified 7 historical heritage sites, of which 4 are in the project area and assessed as being of local significance. The assessment indicates that these 4 items already have approval to be removed.	• No non-Aboriginal heritage sites would be significantly impacted by the project. • The Department has recommended a condition requiring Integra to prepare a Heritage Management Plan, including measures to preserve any new items that may be found.
Traffic & Transport	• The project has the potential to impact on the local road and rail network.	• The Department is satisfied that traffic impacts of the project would be consistent with the impact of the existing operations at the mine complex. • Nevertheless, the Department has recommended that Integra be required to: o dispatch no more than 7 trains a day from the site; o dispatch no more than 3 trains a day from the site, when averaged over each calendar year; o keep accurate records of the: – amount of coal transported from the site (on a monthly basis); and – date and time of each train movement from the site; and • make these records publicly available on its website at the end of each calendar year.
Visual & Lighting	• The surface infrastructure site would operate 24 hours a day, 7 days a week and would be lit at night. Lighting from the project could impact on the amenity of neighbouring residences. • The project also has the potential to cause visual impacts due to the construction of an additional ventilation facility, gas drainage boreholes and the modifications to Bettys Creek.	• The assessment found that lighting and visual impacts would be minor as the landscape surrounding the project area is heavily dominated by mining activities and supporting infrastructure. • The Department is satisfied that visual impacts from the project would be insignificant. • Nevertheless, the Department has recommended conditions requiring Integra to take all reasonable and practicable measures to mitigate any visual impacts, and to ensure that all external lighting from the complex complies with the relevant Australian Standard.
Waste	• The project would generate additional waste products, including coal tailings and rejects. • The EA has estimated that 15.9Mt of coarse rejects and 2.6Mt of fine rejects (tailings) would be generated up to 2018, and that 7.3Mt of coarse rejects and 1.5Mt of tailings would be generated from 2018 to 2031. • As a result of the proposal, Integra's existing coal reject and tailings disposal areas have insufficient capacity to accommodate all the waste that would be generated during the proposed life of the Integra Mining Complex. • Integra has proposed a number of strategies for reject and waste management, including a short-term option for tailing emplacement.	• The Department is satisfied that there would be minimal environmental impact from Integra's proposed strategies for reject and waste management. • Nevertheless, to ensure the appropriate management of waste generated by the Integra Mine Complex the Department has recommended that Integra be required to: o minimise the waste generated by the project; and o prepare and implement a detailed Waste Management Plan for the project in consultation with I&I NSW.

Rehabilitation	• The project would cause both direct disturbance of the ground surface as a result of clearing and indirect disturbance of the ground surface as a result of subsidence, both of which would need to be rehabilitated following completion of mining.	• The Department is satisfied that Integra's rehabilitation and final land use strategies outlined in the EA, are achievable and are compatible with surrounding land uses. • Nevertheless, the Department, in consultation with I&I NSW, has developed detailed rehabilitation performance and completion criteria for the progressive revegetation and rehabilitation of the Integra Mine Complex. The Department recommends a condition requiring Integra to achieve these performance measures. • The Department also recommends conditions requiring Integra to prepare and implement a comprehensive Rehabilitation Management Plan for the Integra mine complex to the satisfaction of I&I NSW, and in consultation with DECCW, NOW, Council and the Community Consultative Committee.

5.6 Socio-Economic

The EA considers the socio-economic impacts of the project (see Appendix E).

This assessment indicates that the project would provide significant social and economic benefits to both the Hunter region and NSW, including:

- $48 million in capital investment;
- continued direct employment for up to 280 people at the Integra mine complex;
- the extraction of up to 71 million tonnes of ROM coal for use in steel making and power generation;
- $2,315 million in payments to suppliers of goods and services over the life of the project;
- $932 million in salaries and wages over the life of the project; and
- $1,322 million in production royalties and taxes to the government over the life of the project.

The Department agrees with the conclusions of this assessment, and notes that these benefits can be obtained mostly through the use of existing infrastructure and plant. The Department also recognises that society is currently heavily reliant on coal to meet its basic energy needs, and is predicted to remain so during the life of this project.

Notwithstanding these benefits, the Department acknowledges that the project is likely to result in adverse environmental impacts on at least 3 private properties, and contribute towards the generation of adverse environmental impacts on another 9 private properties in conjunction with the existing and proposed open cut mining operations at the Integra mine complex.

While the Department considers these impacts to be justified when the broader socio-economic benefits of the project are taken into consideration, it has recommended a range of conditions to ensure these impacts are kept to a minimum, and provide the affected landowners with voluntary acquisition rights. These rights will enable affected landowners to leave the area at any stage of the project, and secure suitable compensation for their properties.

6 RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the project (see Appendix B), and summarised these conditions in Appendix A.

These conditions are required to:

- prevent, minimise, and/or offset adverse impacts of the project;
- set standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

The Department has given careful consideration to the form that the conditions should take, given that this project application (MP 08_0102) has been considered in parallel with that for the Integra Underground Coal Project (MP 08_0101).

Given the integrated nature of the operations at the mine complex, the Department considers that it is appropriate for a single approval instrument to be issued in satisfaction of both project applications. This will lead to a straightforward and streamlined document, with minimal overlap and potential for confusion.

Integra has considered and accepted both the proposed format of the approval instrument and the conditions as recommended.

7 CONCLUSION

The Department has carried out a detailed assessment of the merits of the project, in accordance with the requirements of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

This assessment has found that the project would have some adverse environmental impacts, including potentially significant subsidence impacts on one private residence; the extension of existing significant noise impacts over a longer period (at least another 13 years) at 2 residences, and the loss of up to 5.5 hectares of the regionally significant Central Hunter Swamp Oak Forest community. It has also found that, over the next 12 years while open cut operations are still being carried out at the Integra mine complex, the project would make a minor contribution to the cumulative dust and noise impacts on least another nine privately-owned properties in close proximity to the Integra mine complex.

However, the Department has recommended a range of conditions to ensure that these impacts are suitably mitigated, managed and/or offset. These conditions include requirements for Integra to acquire any significantly-affected properties upon request; to prepare and implement detailed Extraction Plans for all the underground mining operations that could cause subsidence; to implement additional measures to minimise the water, noise, dust and heritage impacts of the project; and to suitably offset the biodiversity impacts of the project.

Finally, the Department's assessment has found that the project would represent a logical extension of the existing mine complex, would make efficient use of existing facilities and equipment, and would provide major economic and social benefits to the Hunter region and NSW, including:

- continued employment for up to 280 employees;
- a direct capital investment of $ 48 million;
- the extraction of up to 71 million tonnes of ROM coal for use in steel making and power generation; and
- royalties and payroll taxes for the State Government.

On balance, the Department believes that the project's benefits sufficiently outweigh its residual costs, and that it is in the public interest and should be approved subject to strict conditions.

8 RECOMMENDATION

It is RECOMMENDED that the Minister:

- **consider** the findings and recommendations of this report;
- **approve** the project application, subject to conditions; and
- **sign** the attached instrument of project approval (see Appendix B).

3/11/10

David Kitto
Director

5.11.10

Chris Wilson
Executive Director

5/11/10

Richard Pearson
Deputy Director-General

S Haddad

Sam Haddad
Director-General

7/11/2010.