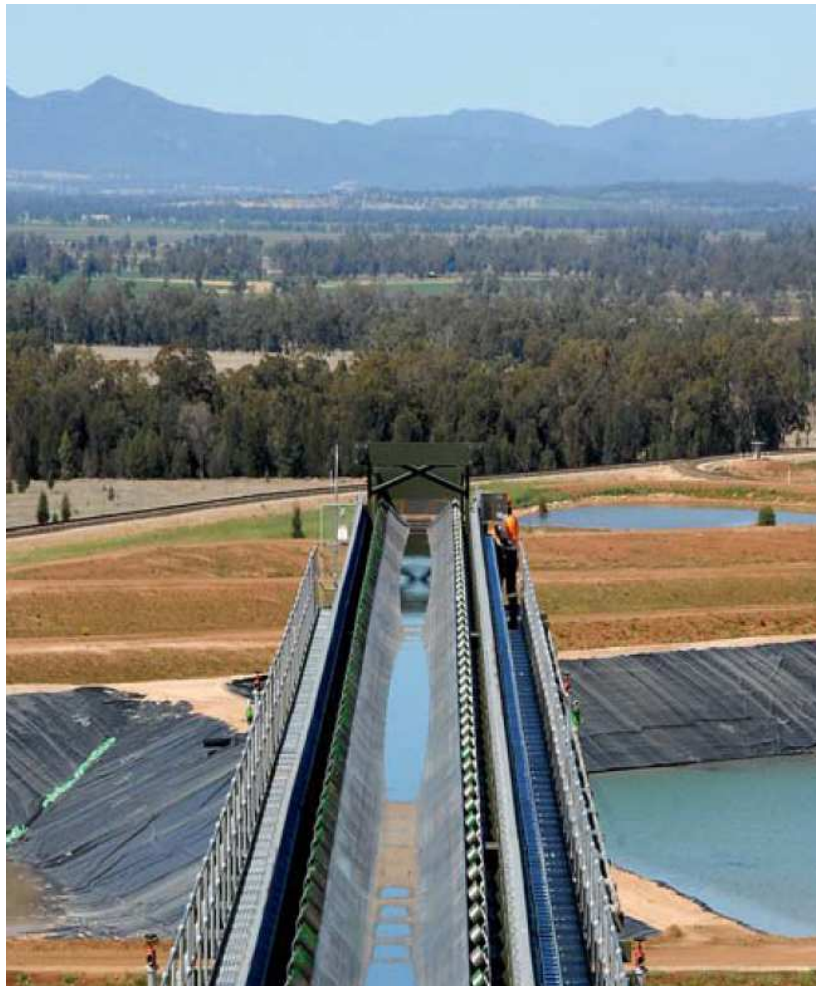




Planning

MAJOR PROJECT ASSESSMENT Narrabri Coal Project - Stage 2 (08_0144)



Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979
July 2010

Cover Photo: View to the east across the Namoi Valley from the Stage 1 train loading conveyor (2009).

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EXECUTIVE SUMMARY

Narrabri Coal Operations Pty Ltd (NCO) owns and operates the Narrabri underground coal mine, located approximately 30 kilometres (km) southeast of Narrabri and 10 km northwest of Baan Baa.

The proposal – known as the Stage 2 Narrabri Coal Project – involves the introduction of longwall mining methods to the Stage 1 Narrabri Coal Project, increasing coal production from 2.5 to 8.0 million tonnes a year, constructing and operating a range of associated infrastructure including a coal handling and preparation plant, a ventilation shaft and fan, mine dewatering and gas drainage facilities and a combined water supply/disposal pipeline between the mine site and the Namoi River. NCO would extract 170 million tonnes (Mt) of coal at an annual rate of up to 8.0 Mt of run-of mine (ROM) coal, crush and prepare this coal on site, and then rail it to the Port of Newcastle for export.

The project has a capital investment value of \$295 million and would contribute up to \$36 million a year in wages. It would employ up to 75 workers during its construction and an additional 98 people at maximum capacity, increasing the mine's overall workforce to 211. Over its life, the mine would extract coal worth \$17 billion and provide annual royalties of up to \$35 million at full production as well as tax income to various levels of Government.

The proposal constitutes a 'major project' under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), and consequently the Minister is the approval authority for the project application.

The Department exhibited the Environmental Assessment (EA) for the project for seven weeks from 18 November 2009, and received nine submissions, including seven from government authorities, and one each from a union and the general public. None of the government authorities objected to the proposal, although they did raise a number of issues for consideration and/or recommended conditions of approval. The issues raised were primarily related to potential subsidence impacts on the environment, including ground and surface water management, Aboriginal cultural heritage, biodiversity impacts and appropriate offsets. Other issues raised included air quality and noise management, potential socio-economic impacts, rail traffic impacts and rehabilitation of the site.

Only the public submission objected to the project, raising concerns about the company's performance in constructing Stage 1 of the project and particularly focussing on existing and potential noise impacts at his residence. In April 2010, NCO purchased the property owned by the objector and this has been taken into account in the Department's assessment.

The Department has assessed the project application, EA, submissions on the project, and NCO's response to submissions in accordance with the relevant requirements of the EP&A Act, including the objects of the Act and the principles of ecological sustainable development, and is satisfied that there is sufficient information available to determine the application. The response to submissions included a commitment to provide a revised off-site Biodiversity Offset Strategy (BOS) as an alternative to the on-site BOS that has been included in the EA. The Department considers that the revised BOS offers superior conservation outcomes to that originally proposed.

The Department is satisfied that the proposal can meet applicable amenity, health and environmental standards. The Department is also satisfied that the residual environmental and socio-economic impacts of the project can be adequately mitigated and/or managed and has recommended a comprehensive range of conditions to ensure this occurs.

In addition, the Department's assessment recognises the significance and need for the project in terms of satisfying international energy demands, bolstering the regional and NSW economies, and generating employment in the State.

The Department believes that the project represents a logical progression of NCO's existing Stage 1 mining operations, is satisfied that its benefits sufficiently outweigh its costs and it is able to be conducted in a manner that is consistent with the objects of the EP&A Act. Consequently, it believes the project is in the public interest and should be approved subject to conditions.

1 BACKGROUND

1.1 Project Location

Narrabri Coal Operations Pty Ltd (NCO), a joint venture in which Narrabri Coal Pty Ltd is the major partner (77% share), owns and operates the Narrabri Mine, located approximately 28 kilometres (km) southeast of Narrabri and 28 km northwest of Boggabri (see Figure 1).

Narrabri Coal Pty Ltd is a wholly owned subsidiary of Whitehaven Coal Limited (WCL) which has substantial coal mining interests in the Gunnedah Basin. WCL currently owns three mines in the Basin and the Whitehaven Coal Handling and Preparation Plant at Gunnedah, and has interests in three other mines. The Stage 2 project is part of WCL's strategy to supply export markets with low ash, high energy coal from the Gunnedah Basin.

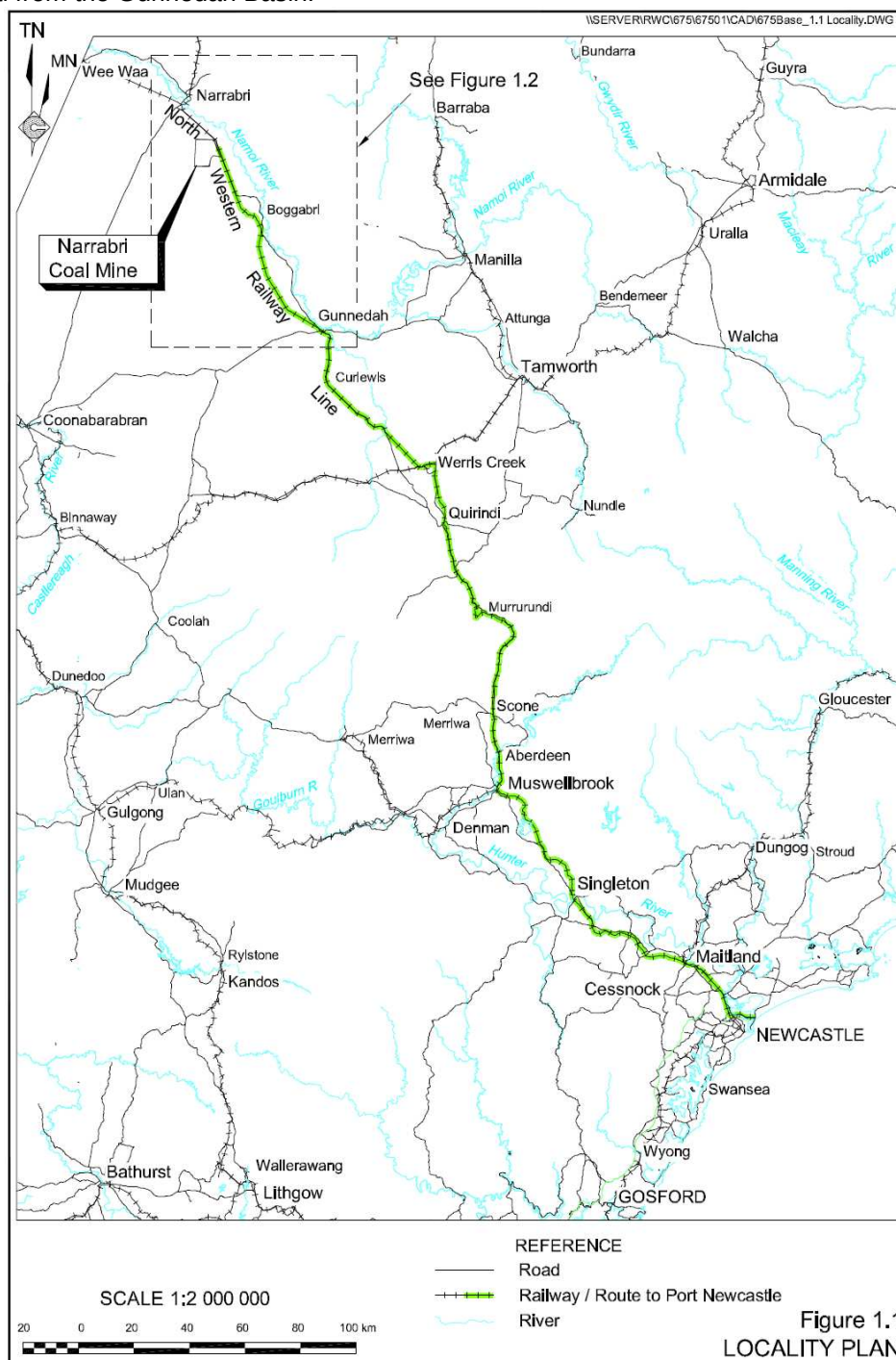


Figure 1: Project Location

1.2 Project Setting

The mine site covers an area of approximately 5210 hectares (ha), the majority of which is freehold agricultural and forested land. NCO currently owns in excess of 80% of the lands overlying the proposed mining areas. A small section of the site is located within the Pilliga East and Jacks Creek State Forests (see Figure 2).

The mine site is located within the Namoi Valley which forms part of the Murray Darling Basin. The site is generally gently sloping and does not support any permanently-flowing watercourses. The eastern two-thirds of the site is / has been used for grazing and dryland cereal cropping. Since April 2008, when construction began, the mine's Stage 1 surface facilities have removed some of this land from agricultural production.

The western third of the site is forested, of which a portion is contained within State Forests, which support forestry activities.

Although the Namoi Valley supports highly-productive irrigated agricultural areas, these are located on the alluvial lands adjacent to the river and are at least three kilometres east of the mine site. The area surrounding the mine has a relatively low population, resident in individual farmhouses on sheep / dryland cropping properties. The nearest population centre is Baan Baa, located 10 km to the south and consisting of about 20 houses. The larger population centres of Narrabri and Boggabri are located 28 km to the northwest and southeast from the mine respectively, along the Kamilaroi Highway.

Although coal mining has occurred in the Gunnedah area since 1860, mining has not previously occurred in the Narrabri area. The nearest mines are the Boggabri and Tarrawonga coal mines which are located about 30 km to the southeast of the site.

1.3 Project History

Approval for Stage 1 of the Narrabri Coal Project (05_0102) was granted by the Minister for Planning in November 2007, permitting the construction and operation of an underground coal mine and the extraction, processing and transportation by rail of up to 2.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal (see Figures 3 and 4).

Coal production commenced in June 2010. Since April 2008, NCO has established all surface facilities approved as part of Stage 1. Difficult geological conditions have delayed construction of the three mine access tunnels (drifts) from the surface entry points in the box-cut to the Hoskissons Seam, located about 180 metres (m) below the ground surface. Each drift is about 3 km in length and must be excavated through solid rock, some of which is volcanic in origin and extremely hard.

Coal extraction under Stage 1 is approved to be via "continuous miners", mining machines that create intersecting tunnels within the coal seam. These tunnels provide the framework for mine ventilation and are configured to form blocks of coal that could be extracted by longwall mining techniques, if approved as part of Stage 2. Even with reliance on continuous miners and less efficient production rates when compared to longwall mining, Stage 1 was considered to be economically viable.

Late in 2009, NCO sought a modification to the Stage 1 approval, in order to achieve an earlier commencement date for certain "long lead-time" activities and to prevent potential delays in bringing the mine "on-line" for future longwall coal production. These activities include:

- construction (but not operation) of a Coal Handling and Preparation Plant (CHPP), within the pit-top area;
- a change in the sequence of underground panel roadway development;
- construction and use of a ventilation shaft (the West Mains ventilation shaft) and associated surface infrastructure, in place of the main ventilation drift;
- construction and use of a small diameter vertical ventilation shaft (ie rear of panel ventilation shaft), associated with Stage 2 Longwalls 1 to 3;
- construction and use of gas (and potentially water) pre-drainage infrastructure, involving drilling from the surface into and along the coal seam, generally within the area of Stage 2 Longwalls 1 to 3; and
- construction and use of supporting infrastructure such as access tracks, electricity supply lines, surface water control features and gas/water pipelines.

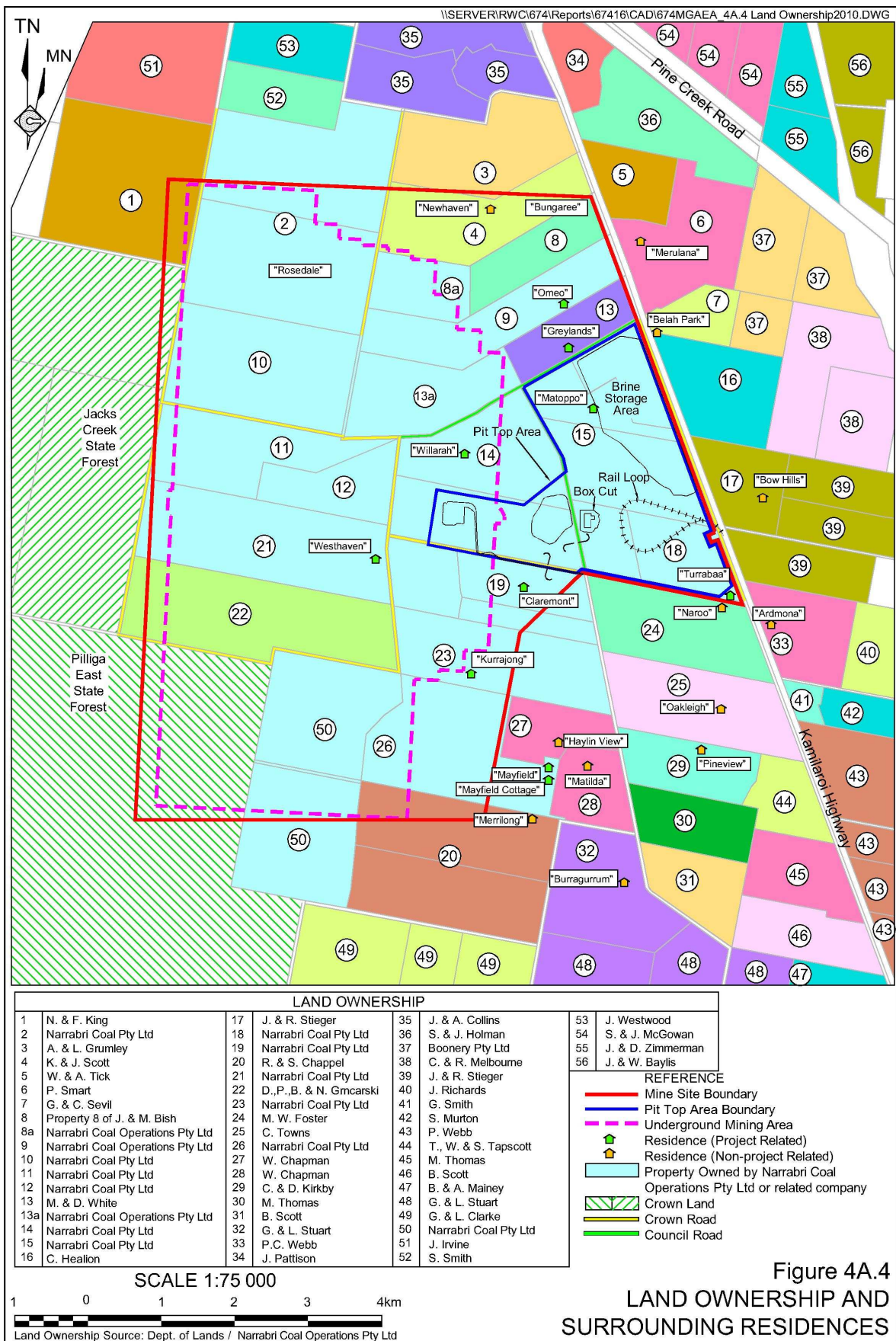


Figure 2: Land Ownership (April 2010) and Approved Stage 1 Layout.



Figure 3: Aerial View of Stage 1 Pit Top (under construction 2009)

This early construction modification application was approved in March 2010, subject to conditions that included a requirement to produce and implement a reactive noise management plan for the mine's operations.

NCO is fully aware of the commercial risk to which it was exposed when it sought early approval for these works, which were also components of its Stage 2 project application (already on foot). NCO has not removed these components from its Stage 2 project application. Should Stage 2 be determined by way of refusal, or in a manner that prevents NCO from utilising the infrastructure included in the recent modification, then the company would bear the financial cost of having initiated construction of infrastructure that it may not be able to use.

Should Stage 2 be determined by way of approval, then NCO has committed to the surrender of its Stage 1 approval and the integration and regulation of all activities on the mine site under a single project approval.

2 PROPOSED PROJECT

2.1 Stage 2 Proposal

The Stage 1 project approval, as modified in March 2010, now permits immediate construction of a significant proportion of the surface infrastructure for which approval was earlier sought in the July 2008 Stage 2 project application. However, the Stage 2 project application remains an application to operate a longwall underground mine and the infrastructure necessary to support the extraction, processing and transportation of 8.0 Mtpa of ROM coal. The key components of the proposal are summarised in Table 1, and depicted in Figures 4 and 5. The proposal is described in full in the EA in Appendix E.

Table 1: Key components of the Stage 2 Narrabri Coal Project

Aspect	Description
Project Summary	Operation of an underground longwall coal mine, extracting up to 8.0 Mtpa of ROM coal for processing and supply to export markets. Construction and operation of additional mine surface facilities.
<i>Mining and Reserves</i>	Extraction of coal from the Hoskissons coal seam, using continuous miner and longwall methods. Movable reserve of 230 Mt, of which approximately 170 Mt would be recoverable – based on a mining height of 4.2 m in the lower ply of the Hoskissons Seam (up to 9.4 m at maximum seam height).
<i>Mine area</i>	Area of Mining Lease - 5210 ha. Area of proposed underground mining – 3603 ha. Pit-top area – 76 ha.
<i>Project Life</i>	An expected project life of 30 years. However, approval would be limited to 21 years.
<i>Coal Production</i>	Production of up to 8.0 Mtpa of ROM coal.
<i>Coal Processing</i>	ROM coal to be screened and crushed to less than 50 mm before processing in the CHPP and stockpiling. Coal rejects from the CHPP expected to be 5% of ROM coal. Both fine and coarse rejects to be emplaced on-site.
<i>Construction</i>	Stage 2 mine surface facilities would involve constructing: ▪ a CHPP (approved by Stage 1 modification); ▪ mine ventilation infrastructure (West Mains ventilation shaft and fan, approved by Stage 1 modification); ▪ a coal reject emplacement area; ▪ a water transfer pipeline between the mine site and the Namoi River; ▪ brine storage and evaporation ponds; ▪ additional product coal stockpiles; and ▪ additional infrastructure for mine ventilation, water management and gas drainage.
<i>Water Demand and Supply</i>	Water would be sourced primarily from underground workings and from surface storages, which is anticipated to meet projected water requirements. Additional water supply would be obtained, if required and subject to water licensing requirements, from the Namoi River, by use of the water transfer pipeline.
<i>Minewater Management</i>	Initially, excess minewater would be pumped to the surface and evaporated from purpose-built ponds. Prior to the capacity of the ponds being exceeded, minewater would be directed to a reverse osmosis water conditioning plant for treatment. Raffinate ¹ would be discharged to the Namoi River. Brine would be held and evaporated in additional storage ponds and ultimately disposed to underground workings.
<i>Employment</i>	Peak construction workforce of about 75 and peak operational workforce of 211 employees – an increase of 98.
<i>Hours of Operation</i>	Operational hours would remain unchanged at 24 hours a day, 7 days a week.
<i>Construction Hours</i>	Underground construction would take place 24 hours a day, 7 days a week. Construction of the pit-top surface facilities would be undertaken Monday to Friday 7.00 am to 10.00 pm. Construction of shaft and gas drainage boreholes would take place 24 hours a day.
<i>Product Coal Transport</i>	Product coal would be loaded onto trains and transported to the Port of Newcastle via the North Western Branch Railway, as for Stage 1. Daily average train numbers would increase from 2 to 5.
<i>Mine Access</i>	No change - via the existing access road from the Kamilaroi Highway.
<i>Biodiversity Offset Strategy</i>	An off-site Biodiversity Offset Strategy involving the conservation of vegetation on a property adjacent to the Mt Kaputar National Park.

¹ Raffinate is good quality water produced by a water conditioning plant, lower in salinity than the water fed into the plant. The “waste” produced by the plant is brine.

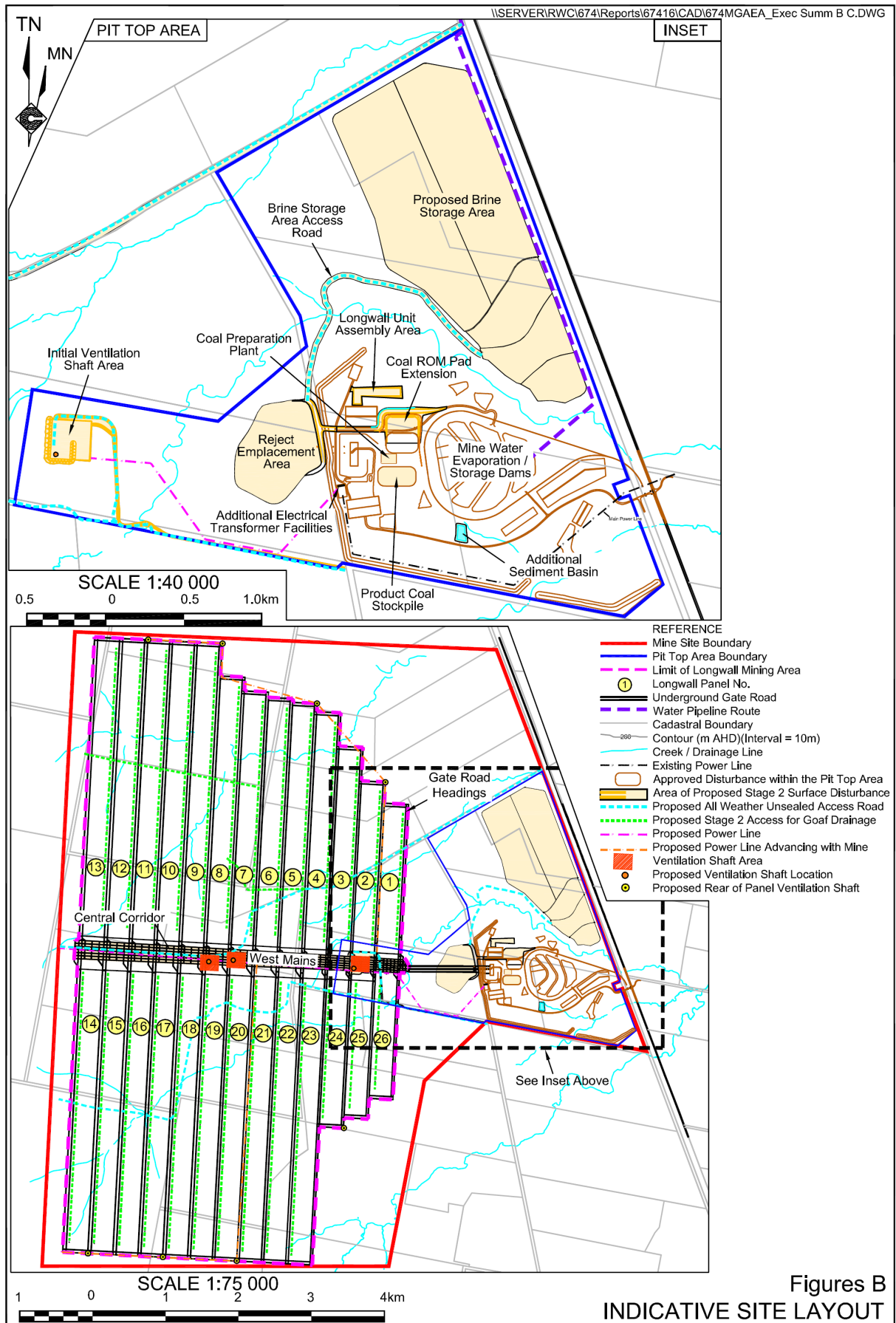


Figure 4: Stage 2 Indicative Layout

2.2 Revised Biodiversity Offset Strategy (BOS)

NCO's Stage 2 proposal included a commitment to establish, within 3 years of project approval, an on-site BOS utilising company-owned forested land in the western portion of the mine site which would conserve 547 ha of native vegetation as an offset for the 210 ha of native vegetation that would be directly disturbed or destroyed by the project's activities.

The Department was dissatisfied with both the quality of the BOS offered by NCO and the proposed three-year delay in its finalisation. NCO responded by offering a revised BOS that would involve the conservation of vegetation on a property adjacent to the Mt Kaputar National Park. This proposal is included in NCO's response to submissions and is considered further in Section 5.2.

3 STATUTORY CONTEXT

3.1. Major Project

The proposal is classified as a major project under Part 3A of the 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 for Planning is the approval authority. However, the Deputy Director-General, Development Assessment and Systems Performance, may determine the application under the Minister's delegation of 25 January 2010.

3.2. Permissibility

The proposed Stage 2 underground longwall mine and additional surface infrastructure is located on the same lands as the approved Stage 1 Narrabri Coal Project. It is located within Narrabri Shire LGA and is zoned 1(a) (General Rural), under the *Narrabri Local Environmental Plan 1992* (Narrabri LEP). This zone permits underground mining and associated surface activities with development consent.

The proposed water pipeline from the mine site to the Namoi River would mostly traverse road easements, as well as a road reserve, a travelling stock reserve, a small portion of private land and the Northwestern Rail Line corridor. Within these areas, development for the purposes of a pipeline is permitted with consent. The private land holding and travelling stock reserve are zoned 1(a) (General Rural) and the rail corridor is zoned 5(b) (Special Uses – Railways). The pipeline is permissible within the road easements and reserve, as the Narrabri LEP adopts the *Environmental Planning and Assessment Model Provisions 1980*. Clause 14(b) of the Model Provisions allows a consent authority to grant consent for "a purpose which may be carried out either with or without consent of the consent authority on land adjoining that road". The relevant adjacent lands are either zoned 1(a) or 5(b), and accordingly the pipeline is permissible with consent.

3.3. Exhibition and Notification

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

- made the EA publicly available from 18 November 2009 until 6 January 2010 at the:
 - o Department's Information Centre;
 - o Narrabri Shire Council's offices ;
 - o Gunnedah Shire Council's offices;
 - o Nature Conservation Council's offices;
 - o Narrabri Mine's Site Office; and on the
 - o Department's website;
- notified relevant State government authorities and Narrabri and Gunnedah Shire Councils; and
- advertised the exhibition in the Narrabri Courier and Gunnedah's Namoi Valley Independent.

This satisfies the requirements in 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 the Department's website. These documents included the:

- project application;
- Director-Generals environmental assessment requirements;
- EA; and
- NCO's responses to issues raised in submissions.

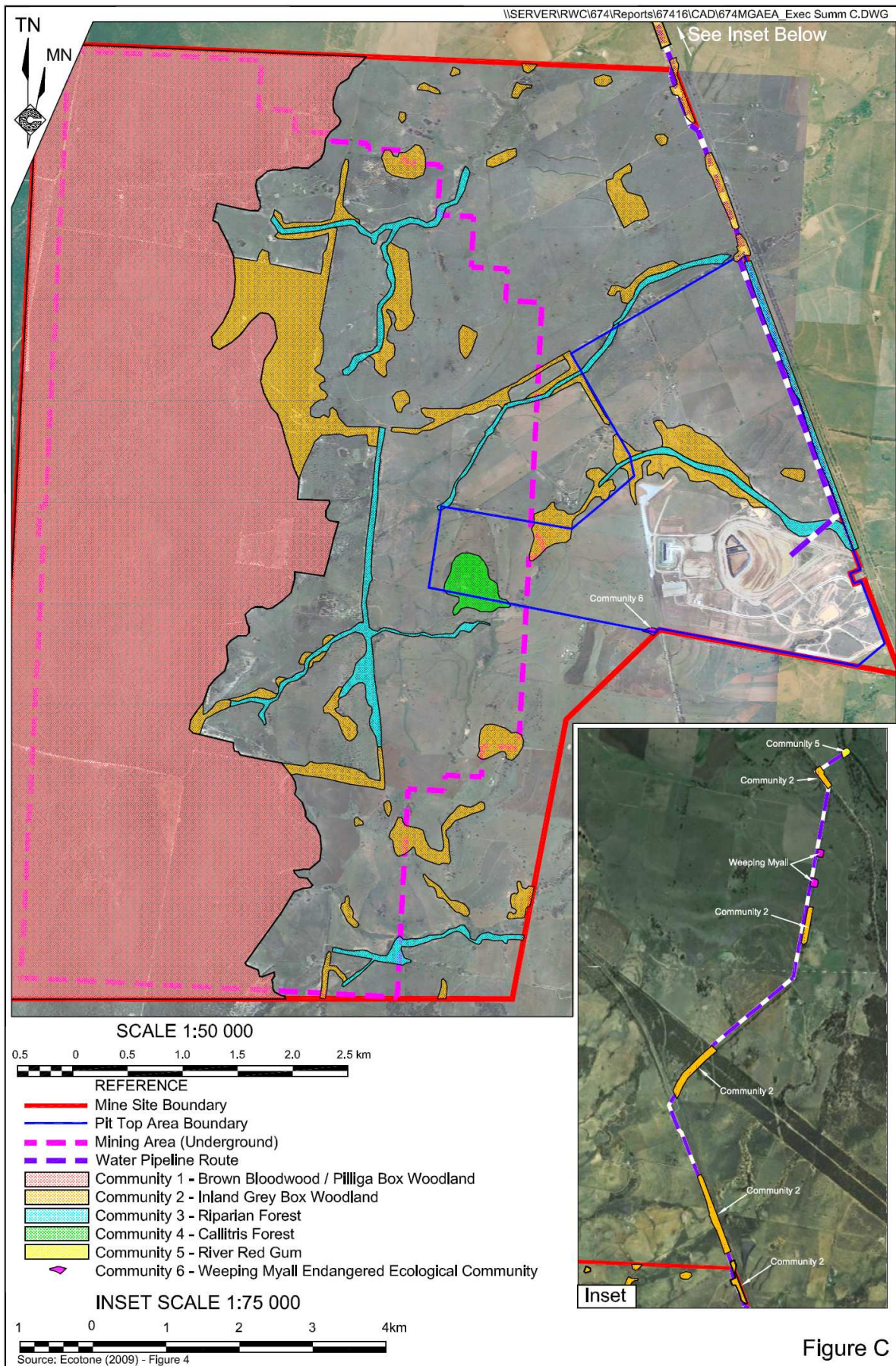


Figure 5: Vegetation Communities on the Minesite and Pipeline Route

3.4. 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. These objects are detailed in Section 5 of the Act, as follows:

“The objects of this Act are:

- (a) 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,*
 - (iii) the protection, provision and co-ordination of communication and utility services,*
 - (iv) the provision of land for public purposes,*
 - (v) the provision and co-ordination of community services and facilities,*
 - (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,*
 - (vii) ecologically sustainable development; and*
 - (viii) the provision and maintenance of affordable housing; and*
- (b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State; and*
- (c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.”*

The objects of most relevance to the Minister’s decision on whether or not to approve this project are those under Section 5(a)(i), (ii), (iii), (vi) and (vii).

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD “requires the effective integration of economic and environmental considerations in decision-making processes” and that ESD “can be achieved through” the implementation of the principles and programs including the precautionary principle, the principle of inter-generational equity, the principle of conservation of biological diversity and ecological integrity, and the principle of improved valuation, pricing and incentive mechanisms. In applying the precautionary principle, public decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and an assessment of the risk-weighted consequences of various options.

The Department has fully considered the objects of the EP&A Act, including the encouragement of ESD, in its assessment of the application. The assessment seeks to integrate all significant economic, social and environmental considerations and avoid any serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences.

NCO has also considered a number of alternatives to the project, including the alternative of not proceeding, and considered the proposal in the light of the ESD principles.

3.5. Environmental Planning Instruments

Under Sections 75I(2)(d) and 75I(2)(e) of the EP&A Act, the Director-General’s report for a project is required to include a copy of, or reference to, the provisions of any State Environmental Planning Policy (SEPP) that substantially governs the carrying out of the project and any environmental planning instrument (EPI) that would (except for the application of Part 3A) substantially govern the carrying out of the project and that have been taken into consideration in the assessment of the project.

The EA contains a thorough review of the relevance of all SEPPs and EPIs applicable to the project and a summary of these has been provided in Appendix D. All relevant SEPPs and EPIs have been taken into consideration in the environmental assessment of the project.

3.6. 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 Director-General's environmental assessment requirements have been complied with.

3.7. *Environmental Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) addresses Commonwealth Government interests concerning protection of matters of National Environmental Significance. If a proposal is likely to have a significant impact on matters of National Environmental Significance, it must be referred to the Commonwealth Minister for Environment, Water, Heritage and the Arts. That Minister is then required to determine whether the EPBC Act applies, ie whether the proposal is a "controlled action" under that Act.

NCO referred the Narrabri Stage 2 Coal Project to the Commonwealth Department of Environment, Water, Heritage and the Arts, which deemed the project to be a "controlled action" as significant impacts to the threatened species *Bertya openens* and the Superb Parrot were considered to be likely. For reasons to do with the timing of the declaration as a controlled action, the Commonwealth is conducting its own assessment of the project, rather than accrediting the NSW assessment.

4 ISSUES RAISED IN SUBMISSIONS

The Department received a total of nine submissions following exhibition of the project:

- 7 from public authorities;
- 1 from a special interest group (CMFEU); and
- 1 from the general public, Mr Mark Lennox, the owner of *Kurrajong*, which was subsequently purchased by NCO.

A summary of the issues raised in submissions is provided below. A full copy of these submissions is attached in Appendix C.

4.1 Public Authorities

The **Department of Environment, Climate Change and Water** (DECCW) identified several issues that it considered should be addressed by way of conditions of approval to either set limits on environmental impacts or else require further investigation / calibration / clarification prior to implementation of aspects of the proposal. Provided these matters are addressed to its satisfaction, DECCW would be in a position to extend the mine's Environmental Protection Licence (EPL) to cover the proposed Stage 2 construction and operational activities. The issues identified by DECCW included:

- noise impacts (especially at *Kurrajong*) and the need for direct measurement of temperature inversion strength at, or in the vicinity of, the mine site;
- assessment of impacts and provision of offsets for salt loads associated with the proposed discharge of water from the mine's water treatment plant to the Namoi River;
- improved modelling and calibration of impacts associated with brine re-injection to worked out underground mining areas; and
- an inadequate biodiversity offset proposal for impacts caused by proposed vegetation clearing.

DECCW also provided advice on air quality, greenhouse gas emissions, Aboriginal heritage, subsidence monitoring and management, and waste management.

The **NSW Office of Water** (NOW) within DECCW provided similar comment to DECCW in terms of the proposed discharge of treated water to the Namoi River and brine re-injection. NOW also raised concerns about, or provided comment on:

- water licensing;
- groundwater monitoring, in part, to address inherent uncertainties with groundwater modelling at a greenfields site;
- surface water monitoring;
- riparian management; and

- avoidance of impacts to groundwater of the Namoi Valley alluvium.

Industry and Investment NSW (I&I NSW) supported the proposed mine development as an appropriate use of the State's coal resources but had some residual concerns. It recommended that potential impacts of mining-induced subsidence should be addressed in an Extraction Plan to be prepared by NCO, including impacts to vegetation caused by ponding and impacts to streams. NCO should also be required to submit a detailed site rehabilitation plan. I&I NSW provided similar comments to those of DECCW and NOW about the need to offset increased salt loads to the Namoi River and the need for comprehensive surface and ground water monitoring programs, including the monitoring of leachate from the reject emplacement area.

The **Namoi Catchment Management Authority** (Namoi CMA) highlighted similar concerns to DECCW, NOW and I&I NSW regarding potential impacts from the discharge of treated water to the Namoi River, brine re-injection and the need for a comprehensive water and leachate monitoring program.

The **Roads and Traffic Authority** (RTA) did not object to the project and indicated that management of oversize loads and the proposed pipeline crossing under the Kamilaroi Highway would need to be in accordance with the RTA's regulations.

Gunnedah Shire Council (GSC) expressed concerns over potential impacts to road traffic flow within the town of Gunnedah due to the increased closure of rail level crossings attributable to an increased frequency of coal trains. GSC identified a need for a road traffic study to assess these impacts. GSC also sought additional contributions to the mine's Stage 1 Community Enhancement Program.

Narrabri Shire Council (NSC) supported the project on the basis of economic benefits to the Shire from the proposed expansion of the mine. NSC stated that it has reached agreement with NCO about an additional \$1.5 million contribution to construct a swimming pool in Narrabri as part of an improved Community Enhancement Program.

4.2 Community and Interest Groups

There were 2 submissions from the community and special interest groups.

The **Construction, Mining, Forestry and Energy Union** (CMFEU) supported the proposed expansion of the mine and requested that the project be approved by the Minister.

Mr Mark Lennox opposed the project on several grounds, mostly associated with amenity impacts predicted at his residence on the *Kurrajong* property, inaccuracies in the EA and perceived poor environmental performance by NCO under the Stage 1 approval.

In April 2010, NCO purchased the *Kurrajong* property and the Department now considers this property to be "project-related" in terms of assessment of the project's impacts.

4.3 Response to Submissions

NCO provided responses to the issues raised in submissions, other than to Mr Lennox's submission, due to its purchase of *Kurrajong* (see Appendix B).

The full response to submissions was made publicly available on the Department's website.

5 ASSESSMENT

Key documents considered during the Department's assessment include NCO's:

- EA (including the appendices); and
- response to submissions; including the revised BOS.

The Department's assessment has also had regard, where relevant, to the recommendations of the Southern Coalfield Inquiry (SCI) as the DGRs for the project required NCO to consider and incorporate the findings of the Southern Coalfield Inquiry in the EA. It has also taken into account the submissions made following exhibition of the EA and the peer review of specialist subsidence, groundwater and surface water studies included in the appendices to the EA.

5.1 Mine Subsidence

5.1.1 Introduction

NCO is proposing to extract 26 longwall blocks from the Hoskissons Coal Seam as Stage 2 of the Narrabri Coal Project. The 26 panels are set out as two groups of 13 north-south trending panels, oriented on each side of an east-west trending set of main gateroads (the northern and southern panels). The depth of cover to the seam varies between 160 and 380 m, which are typical values for Australian coal mines. The seam dips at a low rate from the east to the west, dropping some 70 - 100 m over a distance of 4 km. Seam thickness varies from 4.0 m to 10.4 m. The maximum seam thickness proposed to be extracted using the longwall is 4.2 m, with the mining height in the development roadways being 3.5 m. Up to 5.2 m of lesser quality coal would be left in the roof.

The proposed maximum longwall void width is 305 m. This width is within the usual range of 250 m to 400 m for longwall panel widths in NSW. Longwall panels are proposed to be up to 4.1 km in length. At a daily extraction rate of 15 m, it would take about a year to completely mine each longwall panel. The chain pillars between adjacent longwall panels are proposed to be 95 m in length and in areas of least depth of cover would be 24.6 m wide. With increasing depth of cover, the chain pillars would be formed with increased widths, reaching a maximum of 37.6 m for the deepest sections of the mine. The increased width in the pillars is a response to increased deformation forces experienced at depth and to ensure that these pillars remain stable during the mining process.

The current land use above the underground mining area includes land holdings in the eastern two-thirds that are primarily used for livestock grazing and cereal cropping. The western third consists of native woodlands, including Jacks Creek and Pilliga East State Forests. NCO currently owns 81% of all land holdings above the proposed longwalls (see Figure 2).

The surface terrain is generally flat in the east with two low-level ridges with moderate slopes in the west. Pine and Kurrajong Creeks and their tributaries are ephemeral watercourses that drain the site towards the northeast. Topographic relief above the proposed longwalls ranges from 270 m AHD in the east to 370 m AHD in the west.

There are no surface features or infrastructure that are particularly sensitive to subsidence effects, impacts and environmental consequences. For instance, the lands overlying the proposed mining area:

- do not contain any cliffs or steep slopes that are particularly vulnerable to mass movement and cracking caused by subsidence. The maximum slope of land in the mining area is 20° and slopes average only 3°. Accordingly:
 - there are no areas of cliff lines that could have been used as Aboriginal rock shelters or be prospective for Aboriginal rock art sites; and
 - the potential for subsidence effects to cause impacts such as changes to stream gradients or increased erosion by changes to slope gradients is limited;
- do not have any privately-owned residences;
- do not have any substantial public infrastructure, such as sealed roads, highways, railways, pipelines or regional power supply lines; and
- all streams in the area are ephemeral and no higher than 3rd order.

The features that are associated with the landscape include scattered Aboriginal artefacts and scarred trees, farm houses (owned by NCO), sheds, soil conservation banks and dams, and several access roads and tracks.

5.1.2 Subsidence Effects, Impacts and Consequences

The approach taken in this assessment report follows that taken in the SCI in considering subsidence effects separately to their impacts and consequences. The SCI defined the terms *subsidence effect*, *subsidence impact* and *environmental consequence* in respect of subsidence and natural features. This assessment extends the use of these terms to also include man-made structures and surface modifications. The term *subsidence effect* describes subsidence itself. *Subsidence effects* are defined as deformations of the ground mass due to mining, being all mining-induced ground movements including both vertical and horizontal displacement, tilt, strain and curvature. So-called 'systematic' or conventional components of subsidence (vertical displacement, tilt, and tensile and compressive

strain) are those effects that are normally associated with a flat-dipping seam in level topography, unaffected by major geological structures such as faults and dykes.

Additional 'non-conventional' subsidence components can arise in steep or incised topography, especially in the presence of high horizontal stresses, such as occur in the Southern Coalfield. These components include valley closure, upsidence and far-field horizontal movements.

Any physical change to the fabric or structure of the ground, its surface, or man-made features is described as a *subsidence impact*. The term *consequence* is used to describe any change in the amenity or function of a feature that arises from an impact. In turn, some consequences may give rise to *secondary consequences*. Consequences related to natural features are *environmental consequences*. By way of example, tensile strain due to the ground surface being 'stretched' as a result of undermining is a subsidence effect, a crack resulting from this tensile strain is a subsidence impact, loss of water down the crack is an environmental consequence, and the drying of a water dependent ecosystem as a result of this loss of water is a secondary environmental consequence.

Conventional Subsidence Effects

The EA's subsidence impact assessment (SIA) was undertaken by Ditton Geotechnical Services (DgS). This assessment was peer reviewed by Professor Bruce Hebblewhite, one of Australia's leading experts in mine subsidence and Chair of the Southern Coalfield Inquiry. DgS predicted conventional subsidence parameters using empirical modelling techniques whose accuracy is dependent on calibration to a database of existing results representative of the site in question.

However, the Narrabri Mine is a greenfields site (ie a mining area where no local prior knowledge of ground response to underground mining exists) and it has been necessary to make predictions using proven empirical modeling techniques developed in other coalfields with similar geological conditions. Engineering science has also been applied in the form of established analytical models of overburden and chain pillar behaviour to compare to, and correlate with, the empirical model results.

The Department agrees with Professor Hebblewhite's review of the DgS subsidence assessment, in which he observed:

The overall subsidence assessment carried out by DgS appears to adopt a conservative approach, based on the application of a combination of empirical prediction methodologies and some fundamental theoretical design calculations. As such, it is anticipated that the predictions of subsidence effects made in the report are likely to represent "upper bound" subsidence figures.

A qualification to the above overall comment is the fact that any empirical methodology is heavily dependant on a sound and comprehensive database, in order to be able to offer a high degree of confidence in prediction of effects and impacts. In the case of the DgS predictions, these have been largely based on empirical data gathered from the Newcastle Coalfield, since there has been no previous longwall mining in the Gunnedah Basin. Whilst DgS has made a thorough review of any likely parameters (primarily geological) which might result in variations to subsidence behaviour between Newcastle and Gunnedah, the fact remains that the predictions will have a higher confidence associated with them once a database from the Gunnedah region is established in the future. This having been said, the conservative approach referred to above should provide for an adequate degree of risk mitigation against the concern over lack of a local database, at least for the initial area of longwall extraction.

Subsidence predictions in the SIA have been made using an empirical model developed in 2003 for an ACARP research project on the effect of massive sandstone and conglomerate channels on subsidence development above longwalls in the Newcastle Coalfield. The empirical prediction model enables post-mining subsidence profiles (from which all other subsidence parameters are derived) over multiple longwall panels to be estimated, based on the subsidence above extracted panels and solid chain pillars respectively. Reference has also been made to published information regarding the subsidence-reducing potential of dolerite sills spanning over South African underground coal mines.

There are three geological units in the overburden which have been assessed for their potential to reduce subsidence due to their spanning or bridging behaviour and bulking characteristics. The units in ascending order above the seam are the Digby Conglomerate, an unnamed basalt sill intrusion and a basalt lava flow known as the Garrawilla Volcanics, located near the surface (see Figure 6). Based

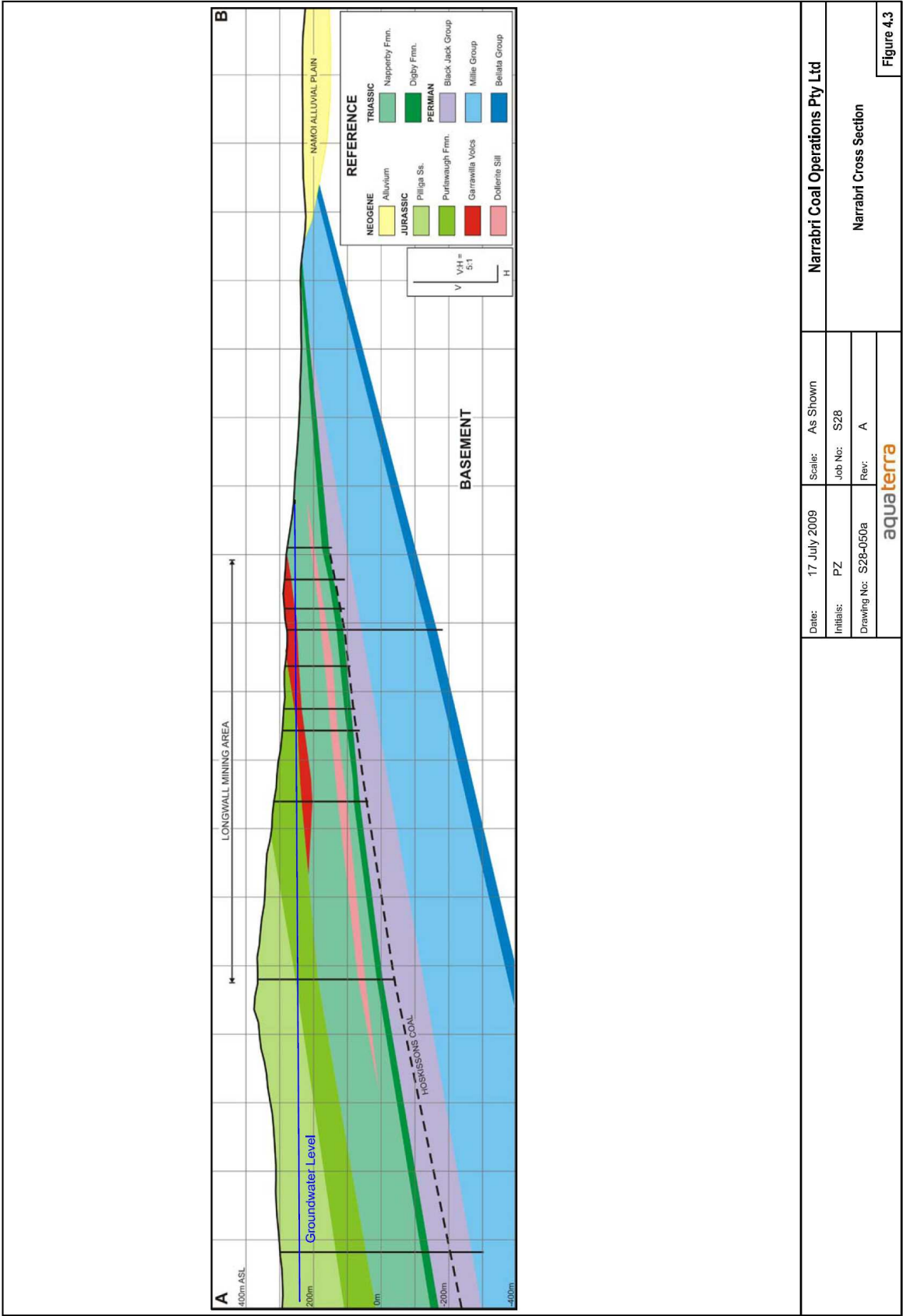


Figure 6: Mine Site Geological Cross Section

on strength testing of these units from bore cores, an empirical data base and an analytical Voussoir Beam model, it is assessed that only the Garrawilla Volcanics has the potential to reduce subsidence, and this is only where it has high strength (ie Laboratory Unconfined Strength > 60 MPa) and thickness (> 30 m), which is mainly in the north and west of the proposed mine.

The maximum vertical subsidence for the panels is predicted to range between 2.17 and 2.44 m (52% to 58% of mining height) without spanning Garrawilla Volcanics, and between 0.79 and 2.44 m (19% to 58% of mining height) if spanning Garrawilla Volcanics are present (see Figures 7 and 8). A comparison of these figures demonstrates that, if the Garrawilla Volcanics “act as a bridge”, maximum vertical subsidence would be reduced by over 1 m for much of the overlying lands. However, maximum vertical subsidence is predicted to be 2.44 m in both scenarios due to the absence or low strength of the Garrawilla Volcanics in some areas of the mine.

The problem of assessing a greenfields site is particularly evident in trying to predict whether or not the Garrawilla Volcanics would act as a “spanning unit”. There are simply no data available from prior longwall mining in the Gunnedah area to predict its behaviour on an empirical basis. The Department has therefore based its assessment of subsidence effects, impacts and consequences on the premise that the Garrawilla Volcanics cannot (at this stage) be relied upon to act as a “spanning unit”. That is, the predicted subsidence effects that have been assessed are those shown in Figure 7. The Department expects that subsidence effects would, for many areas of the mine, be substantially less than those shown in Figure 7, but cannot confidently predict just where such areas would be located.

Maximum panel tilts are predicted to range between 1 and 51 mm/m. The maximum tensile and compressive strains are expected to range from 2 mm/m to 19 mm/m.

Conventional Subsidence Impacts and Consequences

Surface gradient increases or decreases of up to 6% (3°) are predicted along creeks (see Figure 9). In this figure, maximum stream gradient changes occur for “Case 3”, which represents maximum predicted subsidence *without* the spanning of the Garrawilla Volcanics and with minimum subsidence over the chain pillars. This scenario maximises the potential for relative change in surface levels, and consequently, maximises the potential for changes in stream gradients and for ponding to occur. “Case 1” is similar to Case 3, with the exception that a higher degree of subsidence is predicted over the chain pillars. As can be observed in Figure 9, the changes to stream gradient are almost identical, although marginally reduced. “Case 2” considers the effect of spanning Garrawilla Volcanics, and provides a prediction of less relative change to ground levels and stream gradients than the other two cases. Existing instability of steep, eroded creek channel banks could be exacerbated by mine subsidence cracking and tilting. Increased erosion (ie head cuts) and sedimentation may develop above chain pillars where surface gradients are predicted to change by more than 2%.

Based on post-mining contour predictions (using the Case 3 scenario), potential ponding depths of 0.5 to 1.5 m may occur within creek lines and contour banks above small sections of relatively flat land overlying Longwalls 1-4 (see Figure 10). Other than the sites shown in Figure 10, all ponding, with the exception of one location on Kurrajong Creek, is predicted to remain within the confines of the stream banks.

Surface cracking and shearing within tensile and compressive strain zones are predicted to range in width from 20 to 190 mm at cover depths ranging from 380 to 160 m respectively. Strain concentrations in near surface rock (ie ridges), could double the above crack widths to 400 and 600 mm respectively.

Direct hydraulic connection to the surface, due to sub-surface fracturing above the panels, is considered unlikely to occur, as cover depths are > 150 m. However, subsurface aquifers within 110 to 180 m above the panels (ie 50 to 70 % of the cover depth) may be affected by direct hydraulic connection to the workings, with significant long-term increases to vertical permeability.

Indirect or discontinuous sub-surface fracturing could interact with surface cracks where cover depths are < 215 m. Stock-watering dams are likely to be damaged by mine-induced cracking and/or shearing, potentially resulting in dam wall breach or storage losses through the base of the dam. Creek flows could also be re-routed to subsurface pathways, re-surfacing downstream. This is only likely to occur where shallow surface rock is present, and conversely is unlikely to occur where deep soil profiles exist.

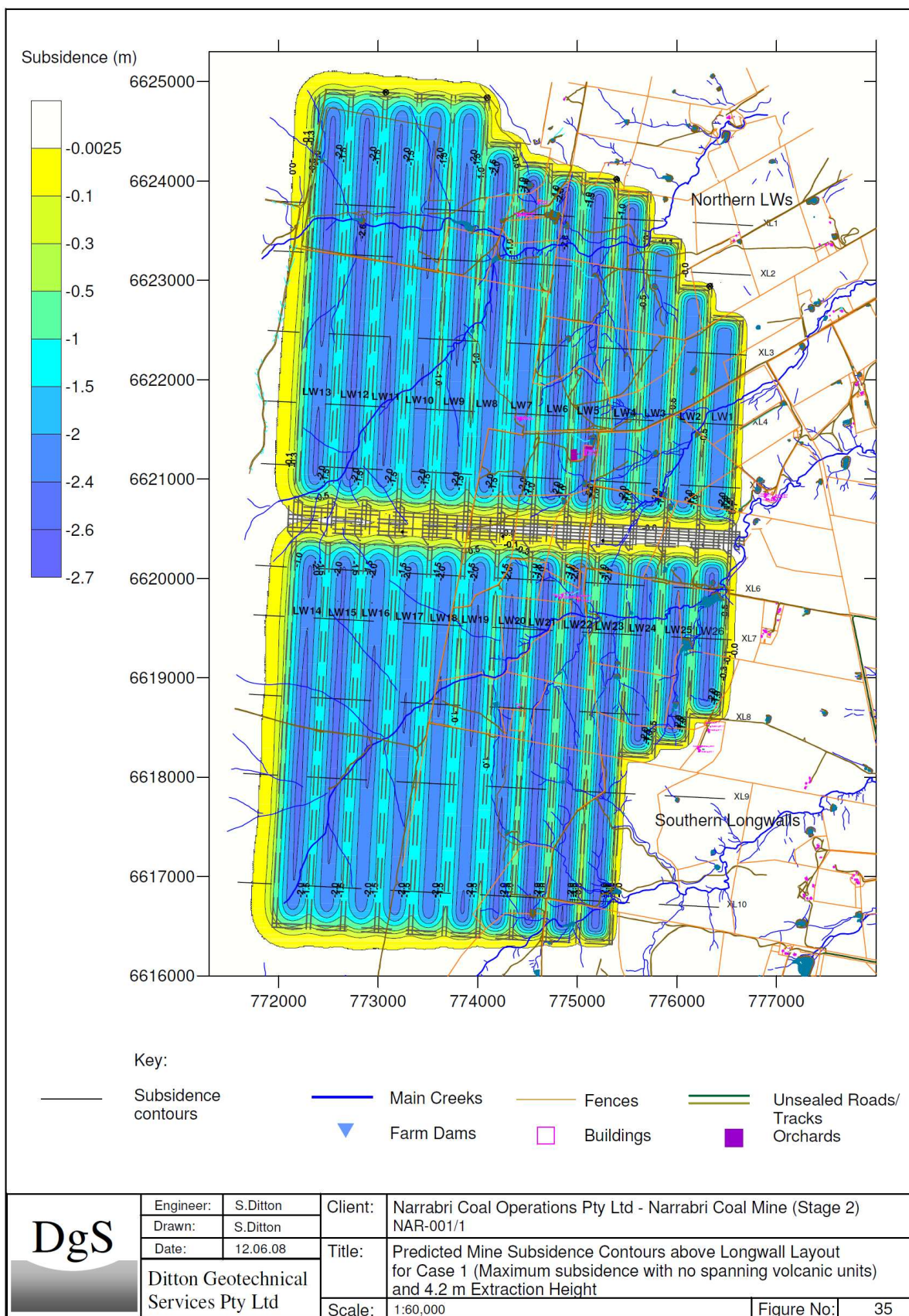


Figure 7: Predicted Subsidence – Worst Case, without Spanning Garrawilla Volcanics

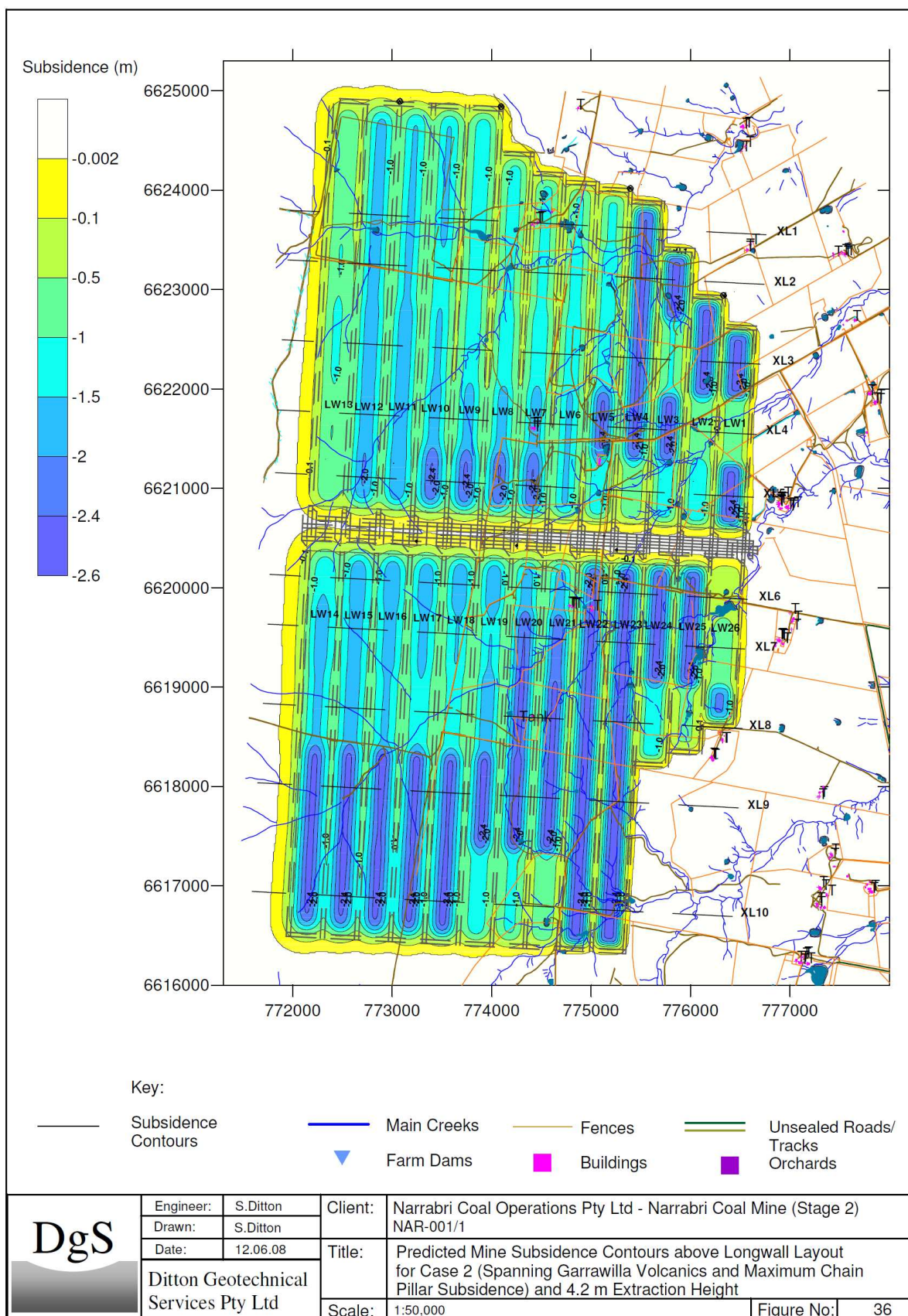


Figure 8: Predicted Subsidence – Scenario with Spanning Garrawilla Volcanics

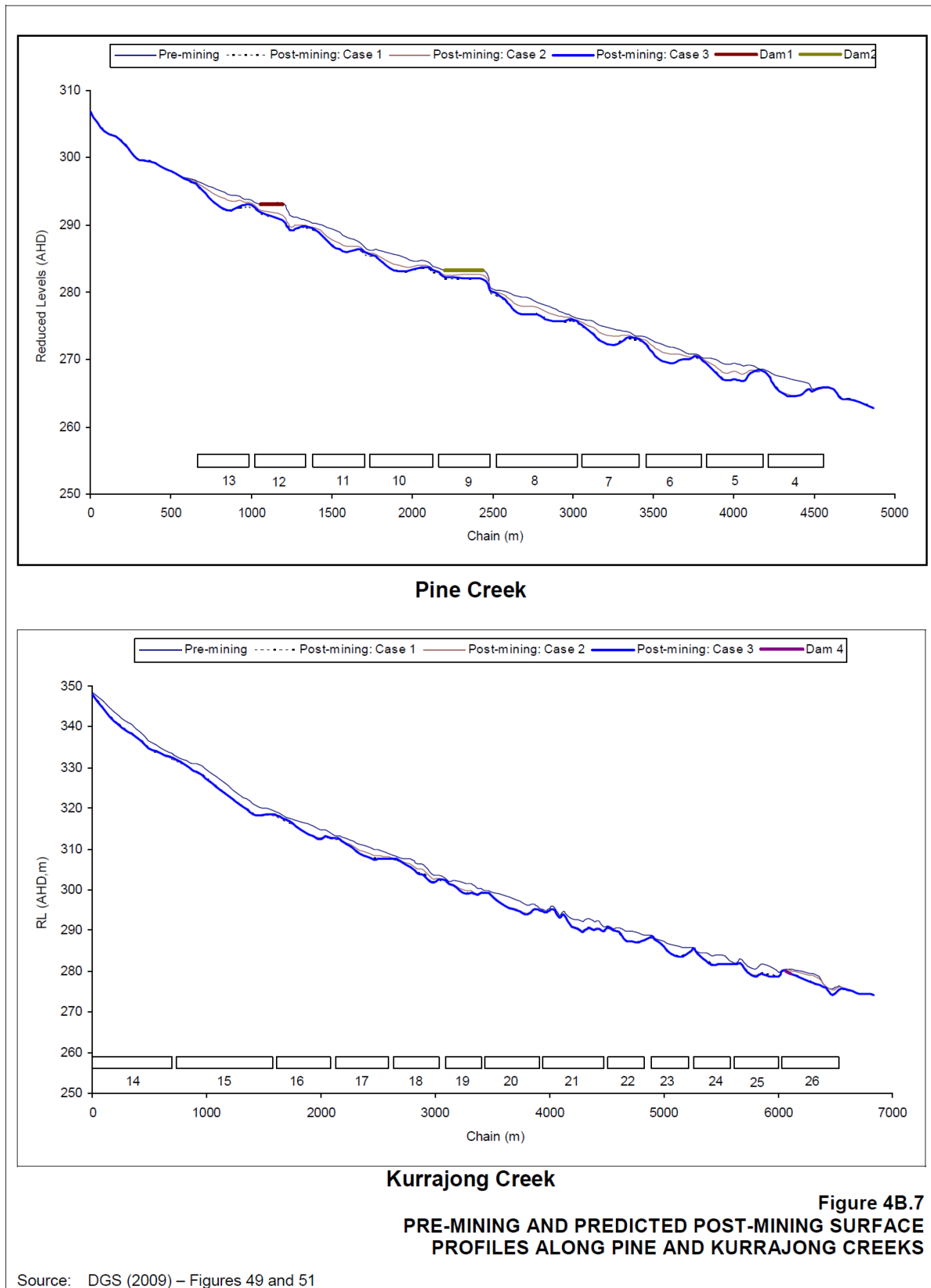


Figure 9: Predicted Change to Stream Gradients

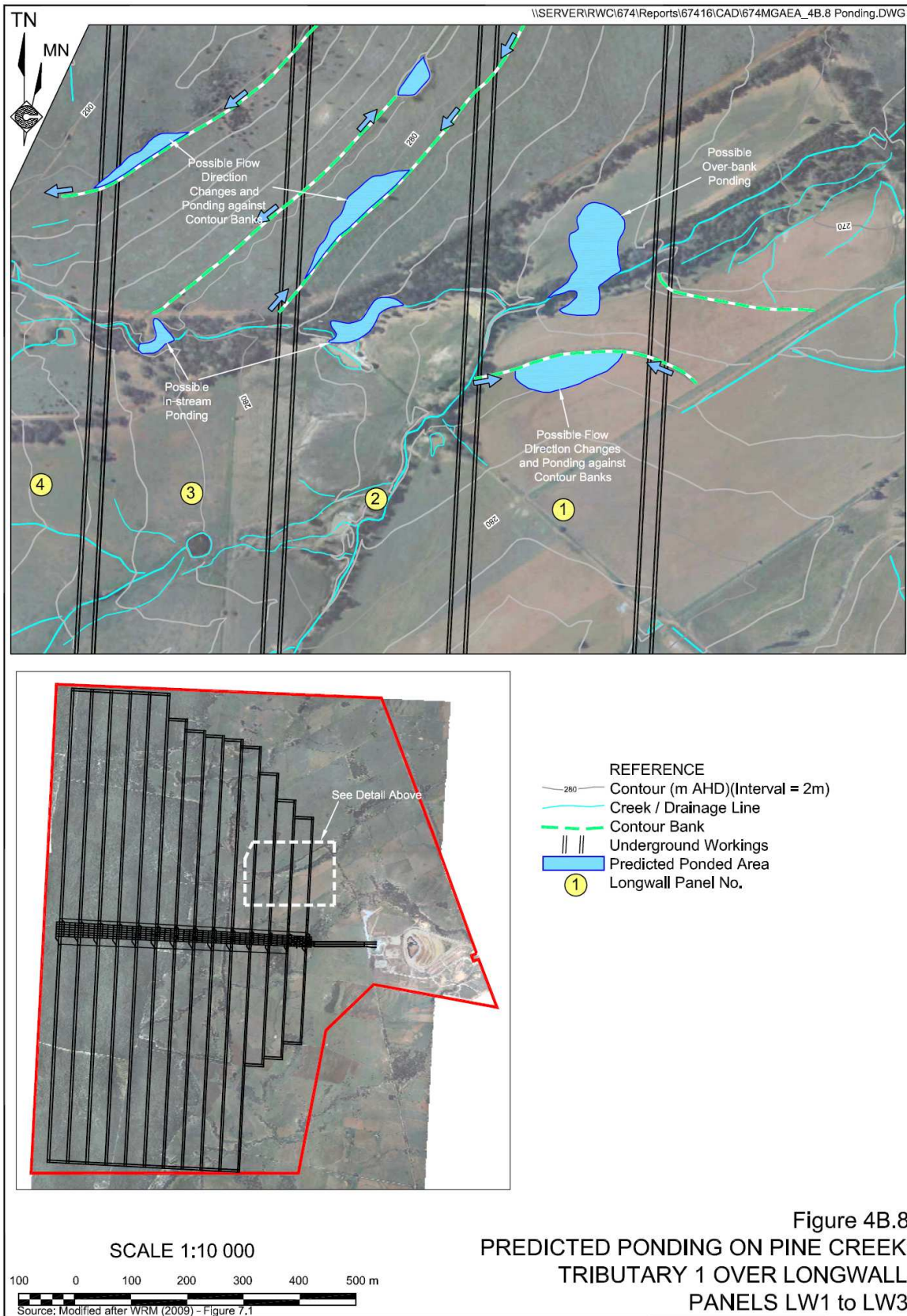


Figure 10: Predicted Ponding for Longwalls 1 to 3

Aboriginal sites such as the isolated artefacts or scatters and scarred trees that exist within the site are unlikely to be directly affected by mine subsidence. A set of grinding grooves on Pine Creek Tributary 1 could be impacted, should displacement occur of the sandstone floaters in which they are located. Indirect, but largely unpredictable, impacts may occur to Aboriginal sites if changes to surface slopes were to increase erosion or sedimentation. In the first instance, artefacts would be at risk of being removed by erosion, and in the second, at risk of becoming buried and “lost” to the local Aboriginal community. The Department is unaware of any Aboriginal sites of high sensitivity to subsidence impacts that should be afforded special protection measures. Such measures are more likely to be considered in areas of cliffs, waterfalls or deeply incised valleys where exposed rock is more likely to contain Aboriginal art or occupation sites of high significance. Areas of exposed rock or cliffs are not features of the site.

Infrastructure above the mine site is commensurate with a scattered rural population. It consists of eight farm houses, sheds, water supply equipment (bores, windmills, pumps, troughs, pipelines and farm dams), electricity supply and access roads and tracks. Although subsidence impacts are predicted for farm houses and buildings that could prevent their use for a period of up to two years, all of these structures are owned by NCO, and are not considered further. Mine subsidence is likely to cause cracking and heaving on NSC’s unsealed roads and the company’s tracks in the mining area. These tracks are predicted to remain fit for use, although they should be inspected on a regular basis to ensure that this is so. If roads and tracks warrant repair, then maintenance (grading) and possible infilling of cracks would be undertaken to restore them to their current condition.

Non-Conventional Subsidence Effects and Consequences

As the valleys across the Narrabri Mine site are broad and there is a lack of thick, massive beds of conglomerate and/or sandstone along the creeks and valleys, the development of upsidence and valley closure is likely to be negligible. If upsidence does occur, then it may cause some minor, localised deviation of surface flows along ephemeral creek beds into sub-surface routes above the longwall panels.

Horizontal movements caused by longwall mining beyond the angle of draw are referred to as far-field horizontal displacements. Far-field displacements generally only have the potential to damage long, linear features such as pipelines, bridges, railway lines and dam walls. This phenomenon is strongly dependent on:

- cover depth;
- distance from the goaf edges;
- maximum subsidence over the extracted area;
- topographic relief; and
- horizontal stress field characteristics.

The far-field movements outside a distance equal to one times the cover depth from the longwall extraction limits are unlikely to generate strains or movement sufficient to cause cracking or damage to the surface. Given these factors, it is assessed that the North Western Branch Railway Line and Kamilaroi Highway, which are > 1.9 km away from the closest proposed longwall extraction area, are very unlikely to be affected by far-field movements.

5.1.3 Subsidence Monitoring

As the Narrabri Mine is located on a greenfields site, the establishment, implementation and interpretation of a rigorous subsidence monitoring program is very important. This program needs to be established well-ahead of mining causing subsidence and to provide accurate and timely information to check the accuracy of subsidence predictions. This is a fundamental tenet of empirical subsidence modelling – that measured subsidence effects of mining activities are used to refine the subsidence predictions for future mining activities.

“Primary subsidence” is directly related to the retreating longwall face. Primary subsidence at a given location is likely to commence at a distance of about 50 to 100 m ahead of the retreating longwall face; accelerate up to rates from 50 to 300 mm/day when the face is 0.2 to 1 times the cover depth past this point; and decrease to < 20 mm/week when the face is > 1.5 times the cover depth past this point. “Residual subsidence”, due to re-consolidation of the goaf, represents approximately 5 to 10% of maximum final subsidence and will be on-going for several months after primary subsidence ceases. “Secondary subsidence” is also expected to develop when adjacent panels are subsequently extracted, due to the compression of chain pillars when subject to increasing abutment loads. This

effect is likely to occur for up to three adjacent longwalls. It is important that the subsidence monitoring program for the Narrabri Mine continue until after the full subsidence effects are experienced for each longwall panel.

In the case of the Narrabri Mine, subsidence monitoring from early longwall panels (nominally longwalls 1 to 4) is planned to be used to refine the subsidence predictions for later longwall panels. The subsidence assessment provided by DgS has identified that there are knowledge gaps concerning how the planned mining layout and extraction parameters would interact with the local geology. As with all geological predictions, even if these interactions are well understood, local scale geological variations (such as faults, dykes, thickness and strength of “spanning units”) can lead to significant local deviations between measured subsidence effects and predicted effects.

Professor Hebblewhite, in his peer review advised that:

.....it is strongly recommended that a comprehensive monitoring program for subsidence effects, and impacts, be undertaken – particularly during the initial longwall mining activity (at least for longwall panels 1 to 4). This monitoring should be used for a process of ongoing back-analysis against predicted effects. Such back analysis should then form the basis of a thorough recalibration exercise to re-analyse the prediction of surface subsidence effects for the future longwall panels.

He also concluded that the subsidence monitoring program proposed in the EA “is appropriate for the subsidence issues anticipated”. This program includes:

- transverse and longitudinal subsidence monitoring lines, across and along both the northern and southern panels;
- a survey line along the banks of sensitive creeks (Kurrajong and Pine Creeks);
- a minimum of three pegs spaced 10 m apart in a line or triangle at any feature of interest (ie dam walls, archaeological sites) to measure subsidence, tilt and strain;
- a minimum of two baseline surveys to establish survey accuracy; and
- visual inspections conducted before, during, and after mining and mapping of damage caused by mining.

As well as line-based ground surveying, Aerial Laser Scanning (ALS) techniques may also be used, which would allow comprehensive ground movement monitoring over the entire panel. The ALS may be linked into the established terrestrial baseline surveys and would provide subsidence data to within +/- 0.15 m. The ALS scans will also provide a more thorough picture of subsidence trough development along creeks and surface terrain generally, without the need for intrusive surveys or monitoring pegs (which can be a hazard to livestock and be damaged by farming activities).

The Department agrees with Professor Hebblewhite, and is satisfied that that proposed subsidence monitoring program is appropriate for the Narrabri Mine.

5.1.4 Conclusion

The Department is satisfied that the best-available methodology has been used to predict subsidence effects, impacts and consequences for the Narrabri Mine. The SIA conducted by DgS has referenced and applied the outcomes of the Southern Coalfields Inquiry and has been peer reviewed by the Chair of that Inquiry, Professor Bruce Hebblewhite. This peer review supports the conclusions and the recognised limitations of the SIA.

The main limitation of the assessment is that, as a greenfields site, Narrabri Mine is unable to draw upon and benefit from subsidence measurements of any previous longwall mining in the Gunnedah district. To overcome this limitation, conservative assumptions have been made that are reasonably expected to result in overprediction of subsidence effects and resultant impacts and consequences.

The predicted subsidence impacts and consequences are considered by the Department to be acceptable. This is due, in part, to favourable topography and an absence or low density of surface features and structures that may be damaged by subsidence impacts. Additionally, as NCO owns over 80% of all lands to be undermined, most impacts to structures would occur to mine-owned infrastructure – including all eight residences located over the mining area.

The Department has recommended a condition of approval that requires NCO to prepare and implement an Extraction Plan for its planned longwall mining activities. One component of the Extraction Plan is that NCO would be required to prepare and implement a Subsidence Monitoring Program to validate its subsidence predictions and analyse the relationship between measured subsidence effects and impacts and any ensuing environmental consequences.

5.2 Groundwater

5.2.1 Introduction

The EA's groundwater, or hydrogeological, impact assessment was undertaken by Aquaterra Consulting Pty Ltd using a mathematical model to predict impacts of longwall mining. This assessment is based on field investigations and a 3D groundwater model developed by Aquaterra. The purpose of the modelling is to assess potential impacts on local alluvial and hard rock aquifers, as well as possible interactions with the Namoi River. It also predicts the likely dewatering requirements of the mine over time.

This assessment was peer reviewed by Dr Noel Merrick, who is a co-author of the *Groundwater Flow Modelling Guideline* developed and published by the Murray Darling Basin Commission in 2001. This guideline is widely used for hydrogeological impact predictions (including this assessment) for groundwater systems west of the Great Dividing Range in NSW. Dr Merrick completed the following tasks:

- review of Aquaterra's groundwater model against the guidelines of the Murray Darling Basin Commission;
- provision of feedback to the modelling team during the course of model development; and
- provision of a peer review of Aquaterra's completed report.

Dr Merrick has participated in several steps of the modelling process - initially at the conceptualisation stage, subsequently at calibration and revised calibration stages, and also during prediction scenarios. Dr Merrick's view is that *"in no way was model development constrained"* by matters such as timing or lack of finance. He also found that *"the model has been developed competently, and is suitable for addressing environmental impacts and...dewatering rates"*.

As stated by Dr Merrick:

The model has adopted a few practices that are at the leading edge of best practice. First, development headings are recognised as early causes of depressurisation and are explicitly represented in the model. Second, pillars between mined panels are retained explicitly in the model because depressurisation above the pillars should not be as severe as it will be in the fractured zone above the goaf. Third, the material property values above the goaf are informed by external subsidence modeling and experience gained elsewhere.

5.2.2 Groundwater Impact Assessment

Figure 11 shows the locations of installed piezometers and registered bores in the vicinity of the proposed longwall mining layout. These 29 sites comprise the mine's groundwater monitoring network and sample both Namoi River alluvial and regional hard-rock water resources. Data from these sites were used to contribute to the mathematical regional groundwater model developed to model mining impacts. Figure 12 shows two conceptual 3D representations of this model, for both the surface topography and at the level of the Hoskissons Seam. The mine layout is denoted as a grey block in the surface topography figure and as an orange block in the working seam figure. The model is used to predict the impacts to regional groundwater resources and the volumes of water likely to be pumped from the mine over its life. Each square in the figures represents an individual model cell. The model extends 75 by 52 km and incorporates the Namoi River and its tributaries and alluvium.

The two main potential impacts of proposed longwall mining on the hydrogeological environment are:

- local and regional lowering of groundwater levels within the upper geological strata, due to groundwater inflows to the mine workings, particularly as a result of enhanced permeability of the rock units within the fractured and goaf zones above the longwall panels. Some lowering of groundwater levels may also occur as a result of increased rock storativity due to the stress relief fracturing caused by mining; and
- possible impacts on near-surface groundwater, including the alluvial groundwater system of the Namoi Valley, and groundwater baseflow contributions to the Namoi River and other surface drainages.

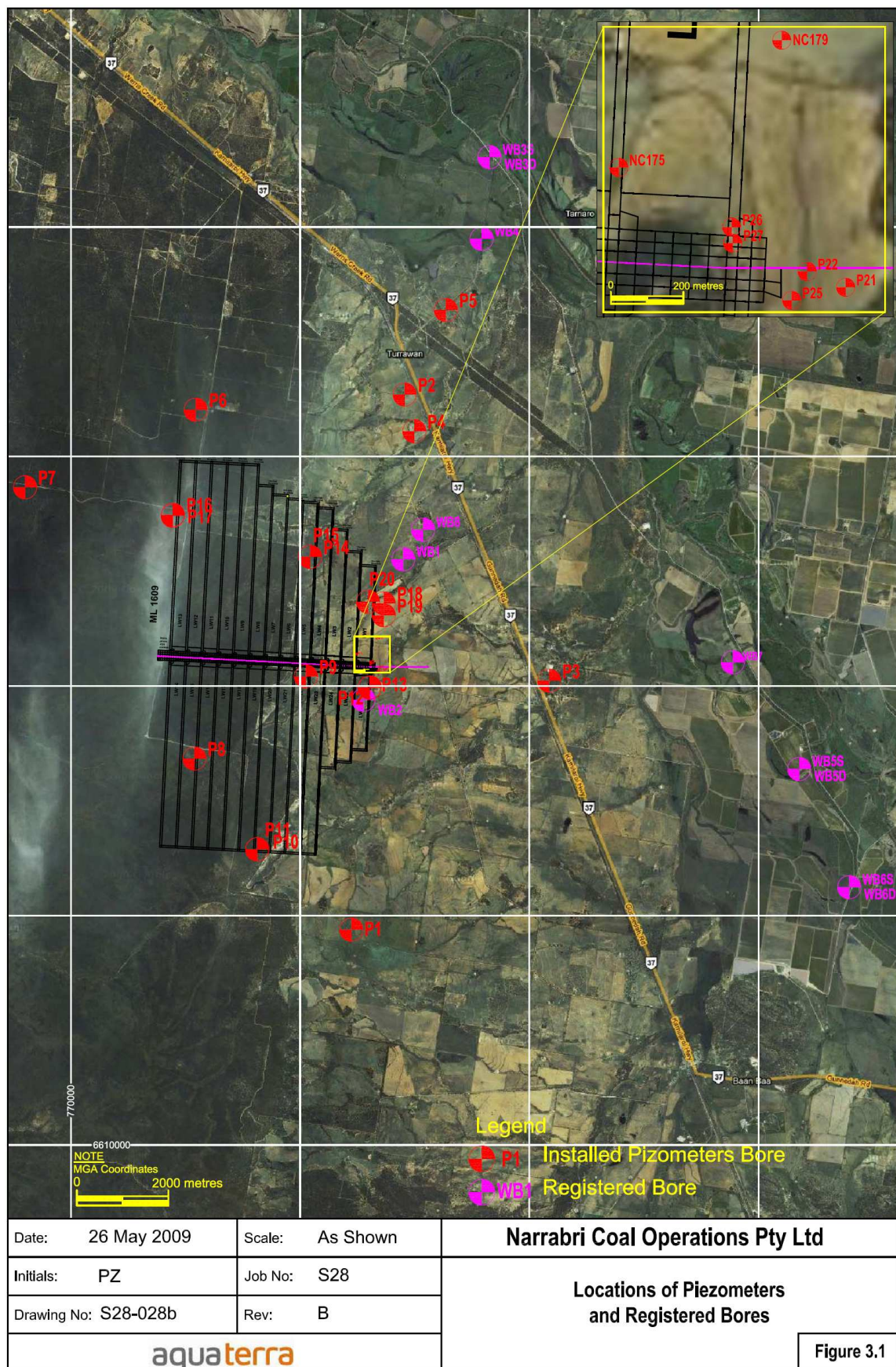


Figure 11: Longwall Layout and Groundwater Monitoring Locations

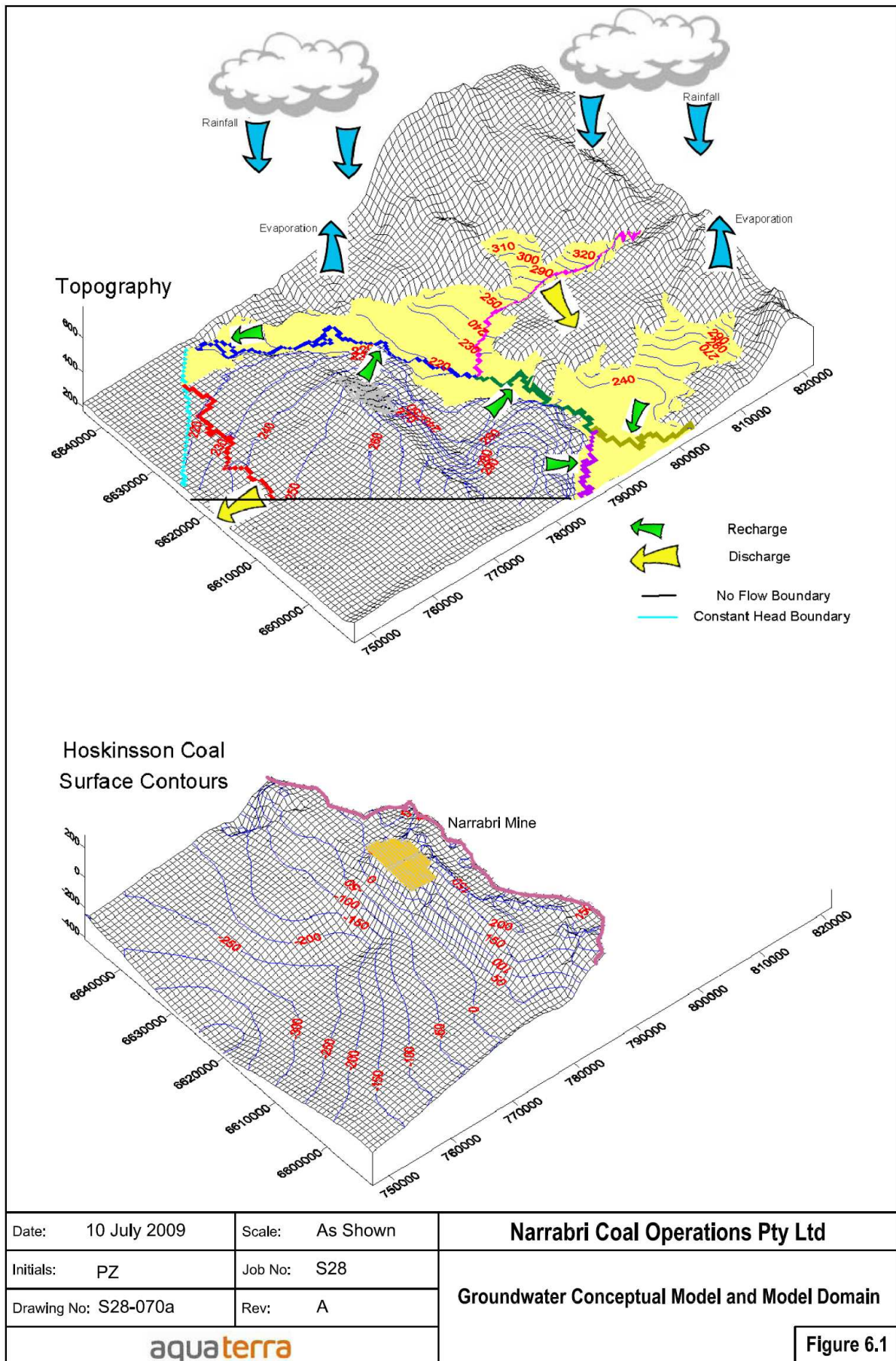


Figure 12: Conceptual Groundwater Model

The Pilliga Sandstone, which forms part of the intake beds for the Great Artesian Basin, is located well above the coal seam. The SIA predicted that there would be no connective cracking between mining in the Hoskissons Seam and the Pilliga Sandstone, and therefore impacts to the Great Artesian Basin are expected to be minimal. The model predicts that groundwater flux from the Pilliga Sandstone to the Garrawilla Volcanics changes by less than 0.03 megalitres/day (ML/d) as a result of mining operations. That is, the flux changes from 8.48 ML/d at the start of mining operations to 8.45 ML/d at Year 29, which is a reduction of less than 0.4%.

As can be seen on Figures 11 and 12, the mine is proposed to be located at least 5 km from the alluvials of the Namoi River.

The modelled predictions of groundwater impacts are based on 29 years of longwall mining followed by 100 years of recovery after the cessation of mining. Many of the inputs to the model have been based on professional judgement, as the mine is a “greenfields” site and measurements of parameters such as horizontal permeabilities for fractured strata are not yet available. Aquaterra has conducted both sensitivity and uncertainty analyses, which have not significantly altered the predicted outcomes of the model. However, both the Aquaterra report and Dr Merrick’s peer review highlight the advisability of improvements to the groundwater monitoring regime as a necessary and prudent approach to the uncertainties of mining a greenfields site.

In summary, the drawdown plots and hydrographs produced by Aquaterra show that:

- drawdowns in the Namoi Valley alluvium are predicted to be less than 0.1 m;
- drawdowns in the water table within the regolith at the end of mining are predicted to be less than 1 m in areas close to the mine. Within the mine footprint area, drawdown is limited to less than 5 m;
- within the Triassic Napperby Formation above the sill, drawdowns of up to 5 m are predicted adjacent to the mine at the end of mining. Predicted drawdowns of 1 m or more are limited to the area within 0.5 km of the mine; and
- at the end of the 100 year recovery period, water levels in all hydrogeological units are predicted to have recovered to close to pre-mining levels.

The predicted groundwater drawdown for the Hoskissons Seam after 29 years of mining and 100 years following the cessation of mining are shown in Figures 13 and 14. The groundwater impact assessment concluded that:

- groundwater inflows to underground workings would gradually increase over the first 20 years of mining from an initial 80 ML/year (0.22 ML/d) in Year 1 to a peak inflow rate of 1394 ML/year (3.82 ML/d) in Year 20, before declining steadily thereafter to a rate of 365 ML/year (1.0 ML/d) in the final year of the project (Year 30);
- large drawdowns are predicted to occur within the Permian coal measures close to the mine, as a result of groundwater flows into the mine. The drawdown cone is predicted to be relatively steep, and drawdowns exceeding 10 m would be limited to around 6 km to 7 km to the west, north and south, and around 2 km to the east of the underground workings. The drawdown to the east would be limited by the truncation of the coal seam by an overlying stratigraphic unconformity. The region of >1 m predicted drawdown in the Hoskissons Seam extends approximately 20 km to the west, 10 km from the mined areas to the south and to the north, but not to the east past this unconformity (where the seam is absent);
- predicted groundwater level impacts in the overlying Napperby Formation at the end of mining are much less pronounced. Drawdowns of 1 m or more are predicted to extend a maximum of approximately 10 km to the west of the mine site;
- impacts on Jurassic strata would be extremely small, and there would be effectively no measurable impact above the Purlawaugh Formation aquitard (ie in the Great Artesian Basin intake beds);
- predicted drawdowns in the surficial unconsolidated aquifer at the end of mining are very small, generally <1 m;
- predicted impacts on river baseflows are very small. The most impacted river reach is the closest section of the Namoi River to the east. Baseflow in this reach is predicted to reduce by a maximum of around 0.22 ML/d, but this is only 2% of the total calculated baseflow contribution to this reach of around 10.3 ML/d;
- post-mining, baseflows in all reaches of the Namoi River are predicted to recover to levels equal to pre-mining baseflows after 100 years; and

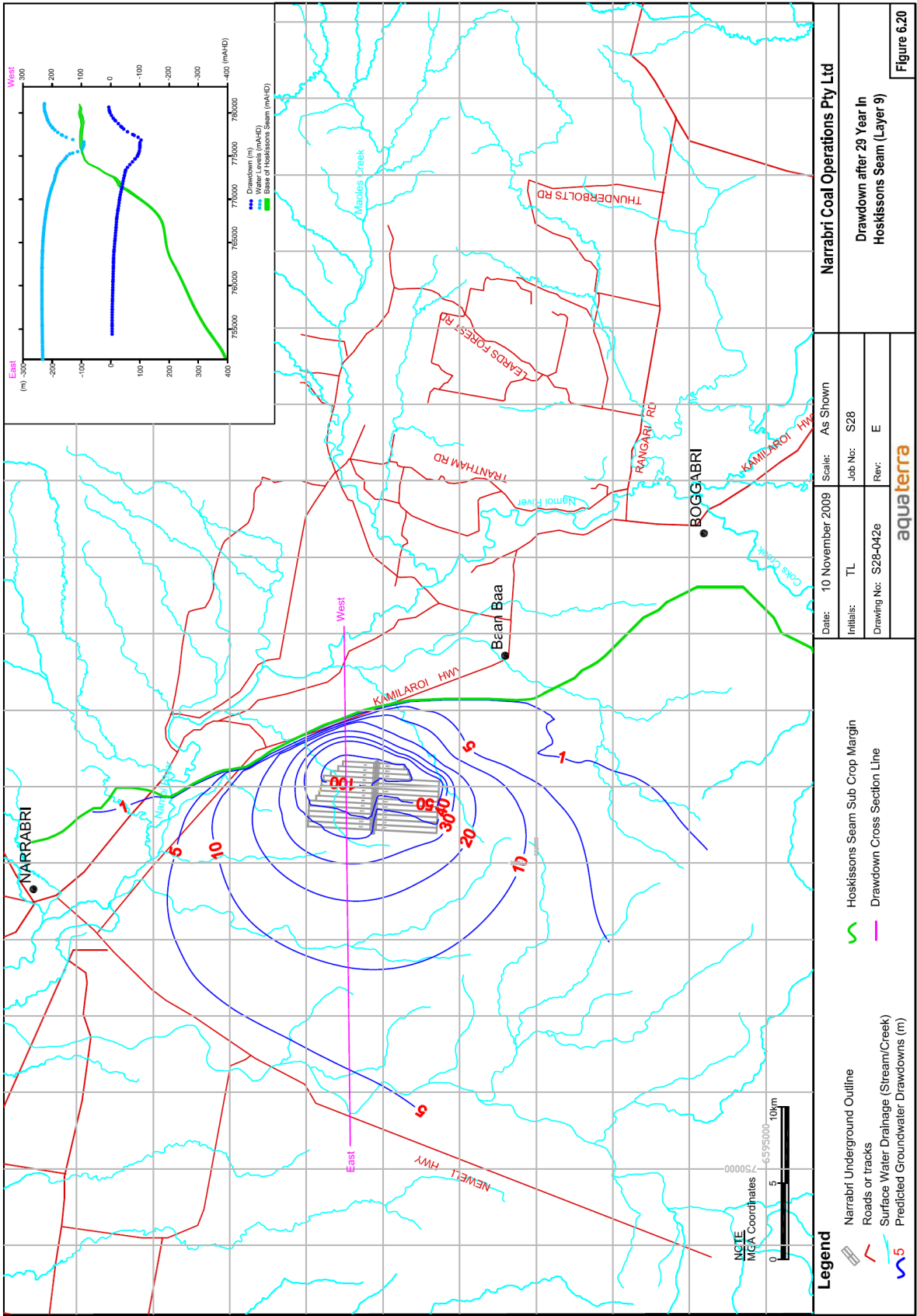
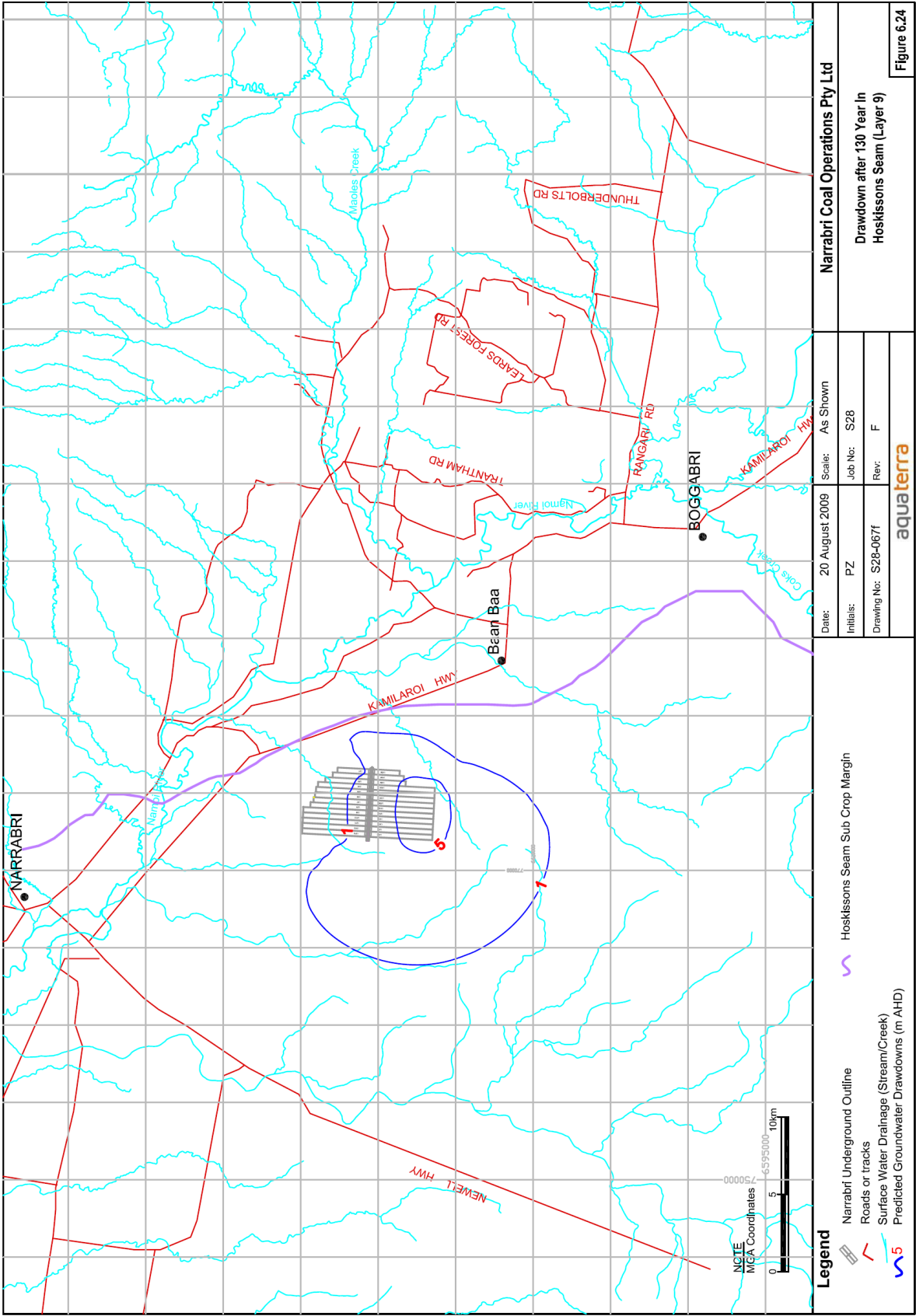


Figure 13: Predicted Drawdown in Hoskissons Seam at End of Mining



- post-mining potential for offsite migration of re-injected brine is limited to 1 km in Jurassic strata and less than 2 km in Triassic-Permian strata after 100 years of recovery. No upward migration of saline water to the Pilliga Sandstone is predicted to occur.

5.2.3 Groundwater Monitoring

As the Narrabri Mine is located on a greenfields site, the establishment, implementation and interpretation of a rigorous groundwater monitoring program is very important, as with subsidence monitoring. The groundwater monitoring program established for Stage 1 of the mine has proven to be invaluable in informing the groundwater assessment for Stage 2. However, both Aquaterra and Dr Merrick have recommended that the groundwater monitoring program be expanded and enhanced to monitor the impacts of mining on groundwater resources and to confirm, or otherwise, the predictions of the Stage 2 groundwater impact assessment.

Dr Merrick has recommended the installation of additional vibrating wire piezometers fitted with data loggers to record the effects of mining over time. The Department supports this recommendation and has recommended a condition of approval that requires NCO to prepare and implement a Groundwater Management Plan for its planned Stage 2 longwall mining activities. One component of this Plan is that NCO would be required to prepare and implement a Groundwater Monitoring Program to validate its predictions and to prepare a groundwater response plan to be implemented if predicted impacts exceed certain trigger values. This would be in the form of a Trigger-Action-Response-Plan (TARP).

5.2.4 Conclusion

The Department is satisfied that state-of-the-art methodology has been used to predict groundwater, impacts for the Narrabri Mine. The groundwater impact assessment conducted by Aquaterra has been peer reviewed by Dr Noel Merrick, a recognised expert in groundwater modelling and the groundwater resources of the Murray Darling Basin. This peer review was interactive during the development and calibration of the groundwater model and supports the conclusions of the groundwater impact assessment.

As a greenfields site, the Narrabri Mine is unable to draw upon groundwater monitoring of any existing longwall mining in the Gunnedah district. To address this limitation, sensitivity and uncertainty analyses have been undertaken to test the effects of changed assumptions to hydrogeological properties such as fractured strata permeabilities. These analyses have indicated that the modelled outcomes are robust.

The predicted groundwater impacts are considered by the Department to be both reliable and acceptable.

5.3 Surface Water

The construction of surface infrastructure for Stage 2 would disturb up to 210 ha of the site and could therefore cause erosion and increased turbidity of surface water flowing from the site. Additionally, construction of the brine storage facilities and reject emplacement areas has the potential to increase erosion and affect surface water quality. Subsidence would also lead to changes in the gradients of stream channels which may cause increased erosion in those sections of the streams with steepened gradients. If left unchecked, over time headward gully erosion could develop and degrade the streams. Overall, the risk of stream bed instability is not high due to the relatively small changes of slope expected in stream channels (up to 3°).

The Department has recommended that the existing Stage 1 Site Water Management Plan be reviewed, updated if necessary, and extended in scope to cover all Stage 2 activities involving surface disturbance. Additionally, a stream inspection regime should be implemented as part of the overall subsidence monitoring program so that, if any gully erosion were to be induced, it would be detected at an early stage and stream stabilisation works would be undertaken in a timely manner.

NCO also proposes to construct a water treatment plant to manage mine water intercepted by underground mining operations or gas drainage activities. This process will produce brine which would be directed to the brine storage area and raffinate (water of good quality and low in salinity – less than 350 mg/L salinity). Some of the raffinate is proposed to be discharged to the Namoi River.

Raffinate is also proposed as the supply of high-quality water required by longwall mining equipment. As mining progresses, the amount of groundwater removed from the mine and treated would steadily increase to the point where a surplus of raffinate is expected in Year 8. Up until this time, the mine is predicted to harvest sufficient water from sediment dams and groundwater to supply underground mining requirements, the CHPP's demand for process water and dust suppression supplies. Should a series of very dry years be encountered it may be necessary for NCO to obtain off-site water supplies. One supply option is to draw water from the Namoi River and pipe it to the mine. NCO has water access licences that would allow it to draw water from the river, subject to the water allocation rules attached to those licences.

From as early as Year 6, surplus raffinate would need to be managed. The base case option considered by NCO is that this water would be discharged to the Namoi River. However, NCO would explore other options such as supply for irrigation purposes, should they be identified. The daily volume of raffinate for disposal is expected to reach a maximum of 2.1 ML in year 18 (760 ML for the year). Even though this water would be of good quality (and better than the quality of either the Namoi river or its baseflow), it still represents an addition to the river salt load. DECCW considers that this additional salt should be offset by actions to reduce salinity within the Murray-Darling Basin. NCO has committed to entering into an agreement and to contribute funds to the "Cap and Pipe Bores" Program to ensure that there is a sufficient salt credit for NCO to "offset" all planned discharges of salt over the life of the mine. The Department recognises the value of this commitment by the mine. However, it is unconvinced that the discharge of treated water of better quality than that of the river warrants an "offset", as such. While it is clear that the overall salt load of the river would increase, the environmentally critical parameter is not salt load but salt concentration. The discharge of raffinate would dilute existing salt concentrations, which is an environmental benefit, not an impact deserving of an offset. However, the Department has recommended that NCO be required to further investigate any effects on the ecological values of the Namoi River likely to be caused by raffinate.

Subject to these requirements, the Department is satisfied that NCO can effectively control and manage surface water impacts by reviewing and extending its Stage 1 Site Water Management Plan to incorporate the Stage 2 surface activities and stream channel inspections, and if necessary, undertake remedial works.

5.4 Noise and Vibration

The EA includes a noise impact assessment (NIA) undertaken in accordance with DECCW's *Industrial Noise Policy* (INP) and *Environmental Criteria for Road Traffic Noise* (ECRTN).

The NIA identified 14 non-project related residences in the vicinity of the mine (see Figure 2) and assessed impacts during construction and various operational phases of the mine by using a DECCW-approved computer noise model (ENM). The mine is located in a generally quiet rural environment. Since the NIA was conducted:

- one landowner has entered into an agreement to accept predicted noise impacts (R15 – *Greylands*);
- one parcel of land no longer supports a residence (R17 – *Bungaree*, occupied caravan removed); and
- one landowner has sold his property to the company (R11 – *Kurrajong*).

The existing noise impact assessment criteria for Stage 1 of the mine are set at 35 dB(A) for Day, Evening and Night periods for both construction and operational noise. Both the Department and DECCW consider that these criteria should apply for Stage 2 of the mine.

The NIA modelled 5 different scenarios which represent typical worst-case noise emissions for the construction phase and at times when longwall mining operation occur either in the north (Longwalls 1-13) or the south (Longwalls 14-26). For all operational scenarios, noise generating activities associated with surface infrastructure were considered (coal processing, train loading, maintenance activities and general pit-top vehicle movements). Brief descriptions of these scenarios are:

Scenario 1: Establishment of additional surface facilities, roadworks, main ventilation shaft and pre-drainage above Longwall (LW) 1.

Scenario 2a: All surface plant and train loading activities occurring. Goaf drainage pumps above LW 1 and pre-drainage construction above LW 2 and LW 3.

Scenario 2b: As for Scenario 2a with brine storage pond construction in the northern corner of the allocated area.

Scenario 3a: All surface plant and train loading activities occurring. Goaf drainage pumps above LW 24 and pre-drainage construction above LW 25 and LW 26.

Scenario 3b: As for Scenario 3a with brine storage pond construction in the southeastern corner of the allocated area.

5.4.1 Construction Noise

Noise impacts from construction activities are represented by Scenario 1. Modelling of this scenario predicted that noise impact assessment criteria would be exceeded at several nearby privately-owned residences (*Bow Hills, Ardmona, Naroo, Oakleigh, Haylin View, Newhaven and Belah Park*) under noise-enhancing meteorological conditions (inversions or southeast winds) by up to 9 dB(A).

In recognition that there is a level of uncertainty associated with noise prediction models and estimations of potential noise reductions, the Department typically applies policy as set out in Table 2.

Table 2: Noise Impact Management Measures

Noise Impact	Criteria Exceedance	Management Required
Marginal	1-2dB(A)	Project noise mitigation, if possible
Moderate	3-5dB(A)	Project noise mitigation, plus noise mitigation at residence
Significant	>5 dB(A)	Acquisition on request

To address the predicted exceedances, NCO has committed to:

- only operate two earthmoving scrapers under inversion conditions, in place of the six scrapers that were included in the modelling exercise; and
- attenuate noise emissions from drill rigs operating above the northern extremities of the longwall panels. Methods of attenuation proposed include orientation of drill rigs with noisiest sides directed away from residences, suspension of activities under inversion conditions and the erection of temporary noise barriers (such as shipping containers) around the drill rig in the direction of residences.

These restrictions are predicted to reduce noise impacts for “southern” residences by 4 dB(A) and “northern” residences by 10 dB(A). Should these predictions be correct, exceedances of noise impact assessment criteria should be no greater than 5 dB(A). No residence would be subject to acquisition on request, and two “southern” residences would be entitled to noise mitigation measures at the residence.

However, a degree of uncertainty remains as to just how effective the proposed mitigation measures would be in practice. They depend on mine management being aware of the noise impacts of the mine's activities at about 10 residences under a range of changing meteorological conditions, and management then being able to reliably implement appropriate mitigation measures in a timely manner.

The Department believes that such a noise mitigation scheme could only be effectively implemented if mine management has access to real-time noise monitoring data, and measurement of inversion strengths at the mine. In March 2010, the conditions of approval for Stage 1 of the mine were modified to require the company to produce and implement a Noise Management Plan based on access to real-time noise monitoring data for the most affected residences. The Department believes that this Noise Management Plan should be revised to include consideration of the construction and operational activities of Stage 2 of the mine.

5.4.2 Operational Noise

The extraction of coal would be carried out underground and ROM coal would then be transported to the surface via a series of underground conveyors. These activities would not generate noise for residential receivers. The coal would then pass through a rotary breaker, and be processed in the CHPP before being stockpiled and loaded onto trains for dispatch. These activities would take place at the pit-top, and the resulting operational noise could impact on the amenity of residential receivers. In addition, noise emissions from the construction and operation of mine ventilation shafts, coal seam gas extraction and dewatering facilities located above the mining area have the potential to impact particular residences at different times during the life of the mine.

Scenarios 2a, 2b, 3a and 3b are all operational scenarios. Modelling of each of these scenarios predicted exceedances, at some time during the life of the mine, of noise impact assessment criteria at 7 non-project related residences. The more severe of these exceedances were predicted to occur under noise enhancing meteorological conditions. The NIA also found that noise emissions from the proposed rotary breaker and CHPP could be excessive.

Consequently, the NIA considered the implementation of the following noise mitigation measures:

- fully enclosing the rotary breaker by a shed composed of tilt-up aerated concrete panels (or similar);
- fully cladding the CHPP with steel sheeting;
- lining at least 50% of the internal surface of the exterior walls of the CHPP with acoustic insulation;
- eliminating the use of a bulldozer on the reject emplacement area under inversion conditions;
- restricting the rate at which reject may be trucked to the emplacement area to a maximum of one truck per 15 minutes under inversion conditions; and
- restricting the use of drill rigs at the northern end of Longwalls 1-4 and the southern end of Longwalls 24-26 under inversion conditions.

The NIA considered that these measures would reduce the noise impacts of the project as far as reasonably and feasibly possible. With these measures in place, the NIA predicts that the noise impact assessment criteria would only be exceeded at the *Bow Hills* and *Naroo* residences, but that such exceedances would be limited to less than 5 dB(A). Noise impacts for all other residences are predicted to comply with relevant criteria.

The NIA had predicted that the *Kurrajong* residence would be strongly impacted by noise emissions from drilling activities above Longwalls 24-26 and that the landowner would be entitled to request that NCO acquire the property due to these impacts. However, as NCO has subsequently acquired this property, impacts at *Kurrajong* are not considered further.

For mining operations in NSW, the Department recommends that noise mitigation measures (such as double glazing, building insulation and/or air conditioning) be offered for privately-owned residences if noise emissions from the mine are equal to or exceed the noise impact assessment criterion by 3 dB(A). For the Narrabri Mine, the Department has recommended a condition of approval that would require NCO to offer these measures to residents should project-related noise impacts at their home be equal to or exceed 38 dB(A).

In addition to these mitigation measures, residents whose properties experience previously unpredicted project-related noise levels that are systemically greater than 40 dB(A) would be offered an option of either entering into a negotiated agreement with NCO or, at their request, requiring NCO to purchase their property. The conditions of approval recommended by the Department would require NCO to purchase such properties on terms that would allow the owners to relocate to another property within the local region.

To ensure that noise impacts from the mine are well-managed and monitored, the Department has proposed conditions of approval that require NCO to:

- meet the existing noise impact assessment criterion of 35 dB(A) for the combined activities of Stages 1 and 2, except when otherwise predicted after the implementation of reasonable and feasible noise mitigation measures (ie at *Bow Hills* and *Naroo*);
- be able to monitor temperature inversions and noise impacts in real-time;
- produce and implement a revised “reactive” Noise Management Plan to cover all Stage 2 activities;
- undertake acoustic mitigation measures (such as double glazing, building insulation and/or air conditioning) at *Bow Hills* and *Naroo* and any other privately-owned residence if project-related noise impacts equal or exceed 38 dB(A); and
- purchase any privately-owned property on request should noise impacts generated by the mine exceed 40 dB(A).

5.4.3 Other Noise and Vibration Impacts

The NIA predicts that the applicable noise impact assessment criteria would be met for:

- low-frequency noise emissions from surface infrastructure;
- potential sleep disturbance from the project's activities;
- rail noise impacts;
- road traffic noise impacts; and
- overpressure and ground vibration from blasting activities associated with shaft construction.

5.4.4 Conclusion

The NIA has identified that relatively short-term exceedances of the relevant noise impact assessment criteria would occur at *Bow Hills* and *Naroo*. The recommended conditions of approval provide reasonable and feasible noise mitigation measures for these residences, should monitored noise impacts exceed 38 dB(A).

The key measures proposed (real-time noise monitoring and a revised "reactive" Noise Management Plan) would give NCO the tools and information to closely manage its operations in terms of acoustic impacts. Currently, NCO has no way of knowing the strength of inversions at its site, and no precise real-time knowledge of the noise levels being generated by its operations. In the future, this information would be available to NCO to implement reactive noise management measures, and adjust its operations to ensure continued compliance. With the proposed measures in place, noise impacts from the project could be controlled in a manner that would allow local residents and regulatory agencies to have confidence that the predictions of the NIA, after the implementation of reasonable and feasible noise mitigation measures, would not be exceeded.

5.5 Aboriginal Heritage

The Aboriginal heritage assessment provided in the EA considered the potential environmental impacts on identified and unidentified Aboriginal cultural heritage sites as a result of proposed construction and mining activities. The assessment referred to the existing archaeological record, consulted with the local Aboriginal community, undertook a field survey of the areas likely to be disturbed on the mine site, considered the significance of identified sites and assessed the significance of any impacts.

The field survey was conducted in four distinct components. These were:

- detailed survey of the lands above Longwalls 1 to 7;
- reconnaissance survey of the lands above Longwalls 8 to 26. This survey targeted areas of higher archaeological potential, such as areas adjacent to watercourses;
- detailed survey across the footprint of the brine storage ponds; and
- detailed survey along the route of the proposed water pipeline between the mine site and the Namoi River.

Figure 15 shows the location of Aboriginal heritage sites identified as a result of the survey. Of the sites identified, about 80% contained 1 to 5 artefacts and only 4 contained in excess of 20 artefacts. The Narrabri Local Aboriginal Land Council (LALC) has advised that impacts to all sites recorded during the field survey should be avoided. Further, that the sites should be preserved and that proposed boreholes should be relocated in order to avoid impacts.

The EA assessed the scientific significance of these sites and artefacts and concluded that the majority are of low scientific significance as they are of low to very low artefact density (<10 artefacts) and situated in disturbed contexts. However, a number of sites (sites 38, 39, 106-112) occur in an environment in which there are likely to be many more artefacts, and may provide useful information on knapping strategies, material choice, material use, and intra-site activity areas. A fireplace (site 43) is considered to be of higher scientific significance because, through the collection of charcoal and ash remains, the age of the site may well be obtained, allowing a better understanding of the period of Aboriginal occupation of the region. Site 10b consists of 3 grinding grooves located in two rock floaters in the channel of Pine Creek. All of the sites recorded in the brine storage area were considered to be of low scientific significance.

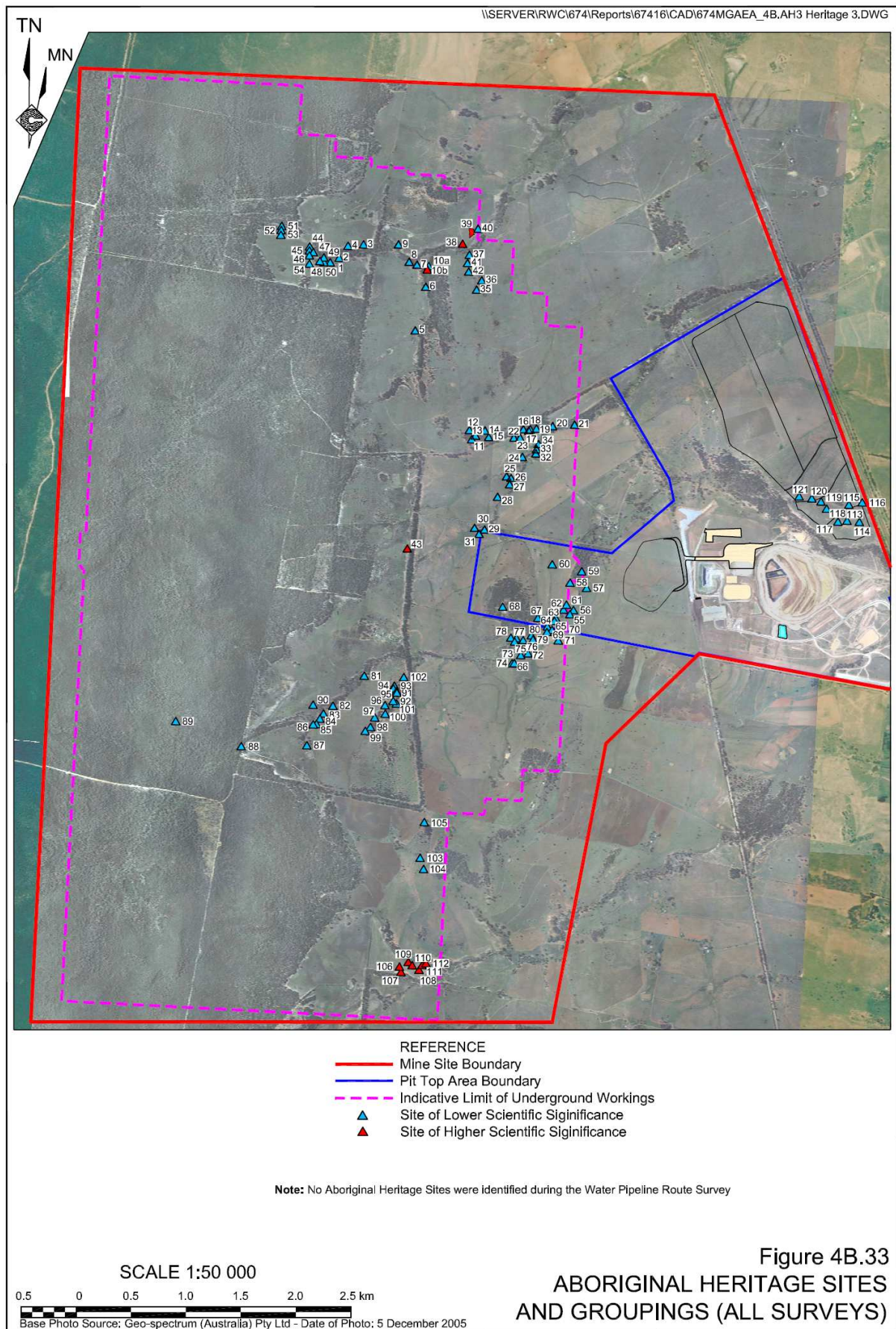


Figure 15: Location of Known Aboriginal Heritage Sites

NCO has proposed a number of management measures for sites and artefacts discovered during the field survey. In-situ protection of sites is proposed for those sites identified as having scientific significance, specifically noted by Aboriginal stakeholders or having higher artefact density. These sites would be protected from accidental damage by vehicles by the erection of fencing, and signs identifying the site as an "Environmental Protection Zone".

The Department considers that there would be no direct impacts on the identified sites in most cases, as NCO has committed to modifying surface activities, if possible, to avoid identified sites and fencing off the most culturally and scientifically significant sites to avoid disturbance. In the event that avoidance of an identified site is not possible, NCO has committed to salvaging, cataloguing and securely storing all artefacts that would have been disturbed by mining activities. All salvage activities would be undertaken in accordance with an Aboriginal Cultural Heritage Management Plan (ACHMP) to be developed in consultation with the local Aboriginal community and the Department. Under the ACHMP, site salvage would be a last resort, and on this basis, the Department considers that the impact on Aboriginal cultural heritage would be minimised.

The EA predicted that subsidence impacts on the scarred tree site (site 20) would either be minimal, or nil, because the tree's root system would likely resist any change in local drainage and / or surface cracking. The three axe-grinding grooves occur on sandstone floaters (site 10b) and the only subsidence effect is expected to be vertical displacement, which would not impact on the grooves. All of the artefact scatters and isolated artefacts occur on actively degrading surfaces, and have a high likelihood of having already been displaced by slope-wash, stock movement, land clearance, ploughing, harrowing and vehicular traffic. Thus, very few artefacts are likely to remain precisely in their original depositional context. Any subsidence or cracking is likely to displace artefacts vertically, however, this is unlikely to have any significant impact on the natural processes affecting horizontal displacement. On this basis, the Department considers that the likely impact to the scarred tree site, axe grinding grooves and / or open artefact scatters from subsidence will be minimal.

NCO has justified its proposal to not undertake detailed survey of the lands associated with Longwalls 8-26 prior to project approval on the basis that by the time its activities potentially impact these areas (either surface disturbance or subsidence impact), additional Aboriginal sites may become exposed by erosional processes and other Aboriginal materials may be removed or obscured by these same processes. NCO has therefore instead committed to undertaking progressive, detailed Aboriginal heritage surveys prior to mining or other operations impacting these areas.

The Department has some reservations about this approach, as the longwall panel layout is set in place from the commencement of mining operations and does not provide for the option or redesigning the mine layout to avoid impacts to sites of high significance, should these be located by subsequent detailed surveys. However, on balance, the Department is prepared to accept the company's approach, as the landforms of the area, the archaeological report, and the results of the reconnaissance survey indicate that the likelihood of locating additional sites of high scientific significance is not high.

The Department has recommended conditions of approval requiring the preparation of a revised ACHMP in consultation with the local Aboriginal community and the Department, and the completion of detailed Aboriginal heritage surveys prior to any surface disturbing activities or subsidence in any particular area. The Department is satisfied that, with the above measures in place, the impacts of the project on items of Aboriginal heritage significance would be acceptable.

5.6 Biodiversity

5.6.1 Threatened Species

The EA provides an assessment of the project's likely impacts on flora and fauna undertaken using a combination of literature reviews and field surveys. The resulting information was used to address the requirements of Part 3A of the EP&A Act and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). State forests to the immediate west of the mine site are completely vegetated and have high biodiversity values. The vegetated areas of the mine site are contiguous with the State forests and add considerably to the overall biodiversity values of the local area.

Three endangered ecological communities (EECs) listed under the *Threatened Species Conservation Act 1995* (TSC Act) were recorded within the study area during field surveys (see Figures 5 and 16). Inland Grey Box Woodland was found to be the dominant vegetation community within the plains area in the eastern two thirds of site. It occurs as modified and generally disturbed (ie grazed) remnant patches. A small, disturbed remnant patch of Myall Woodland occurs along a dirt road to the southwest of the mine's pit top and two smaller patches occur along a road in the water transfer pipeline corridor, close to the Namoi River. Patches of marginal Brigalow EEC occur in the Pilliga community in the undulating western third of the site. The latter two EECs are also listed under the Commonwealth EPBC Act as Weeping Myall Woodland and Brigalow (*Acacia harpophylla* dominant and co-dominant) respectively. Minor impacts are expected on the Inland Grey Box Woodland and Brigalow EECs, but not to the extent that they would be at risk of local extinction.

Fifteen threatened species listed by the TSC Act were recorded during field surveys (see Figure 17). These are the:

- Pale-headed Snake;
- Glossy-black Cockatoo;
- Turquoise Parrot;
- Superb Parrot;
- Speckled Warbler;
- Grey-crowned Babbler;
- Varied Sittella (preliminary determination);
- Diamond Firetail;
- Koala;
- Eastern Pygmy Possum;
- Black-striped Wallaby;
- Yellow-bellied Sheath-tail bat;
- Little Pied Bat;
- Eastern Long-eared Bat; and
- Delicate Mouse.

Two other threatened species, the Squirrel Glider and Spotted-tailed Quoll are likely to occur on the site, but were not recorded during field surveys.

Six threatened or migratory species listed under the EPBC Act were recorded during field surveys, namely, the:

- Superb Parrot;
- White-throated Needletail;
- Rainbow Bee-eater;
- Yellow-bellied Sheath-tail Bat;
- Eastern Long-eared Bat; and Delicate Mouse.

Potentially suitable habitat exists on the site for a further 18 threatened or migratory species that were not identified on the site during field surveys. While impacts are expected to be minor on all species, there is potential for the loss of some individual Delicate Mice, Eastern Pygmy Possums and Pale-headed Snakes. Such losses may occur if individuals fall into, and/or are unable to climb out of, surface cracks caused by mine subsidence. The potential for impact on these species would need to be monitored throughout the life of the mine. One vulnerable plant species, *Bertya opposens*, was located within the western part of the mine site.

Two additional listed flora species (*Cadellia pentastylis* and *Lepidium aschersonii*) and several ROTAP species are also considered to have potential to occur on the site. However, it was concluded that none are likely to occur on the site.

The project is considered to be a controlled action under the EPBC Act by the Commonwealth Department of Environment, Water, Heritage and the Arts as it considers there are likely to be significant impacts on two listed threatened species - Superb Parrot and *Bertya opposens*. As noted in section 3.7, the Commonwealth is conducting its own assessment of the project, rather than accrediting the NSW assessment.

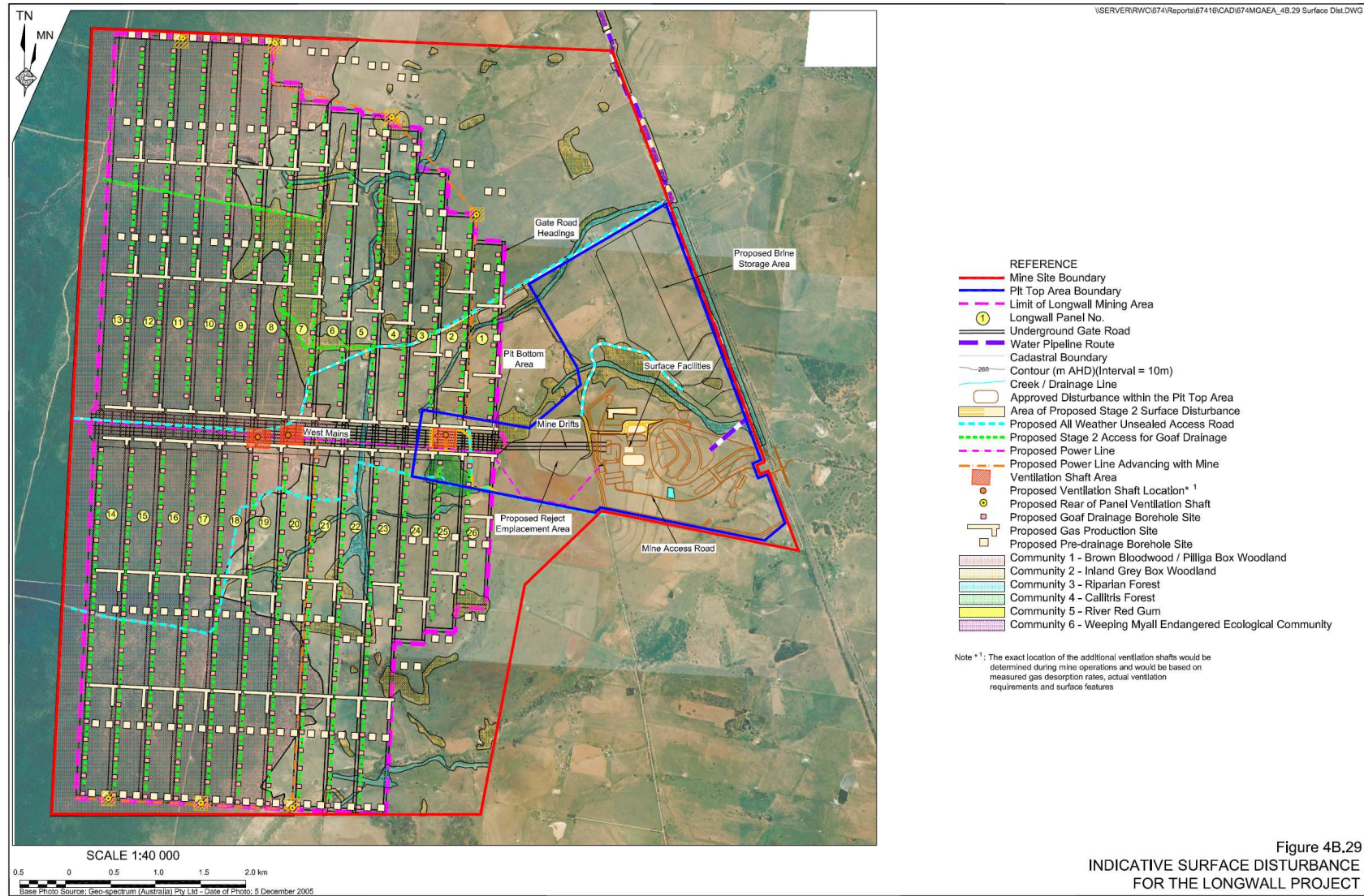


Figure 16: Surface Disturbance (Impact on Vegetation Communities)

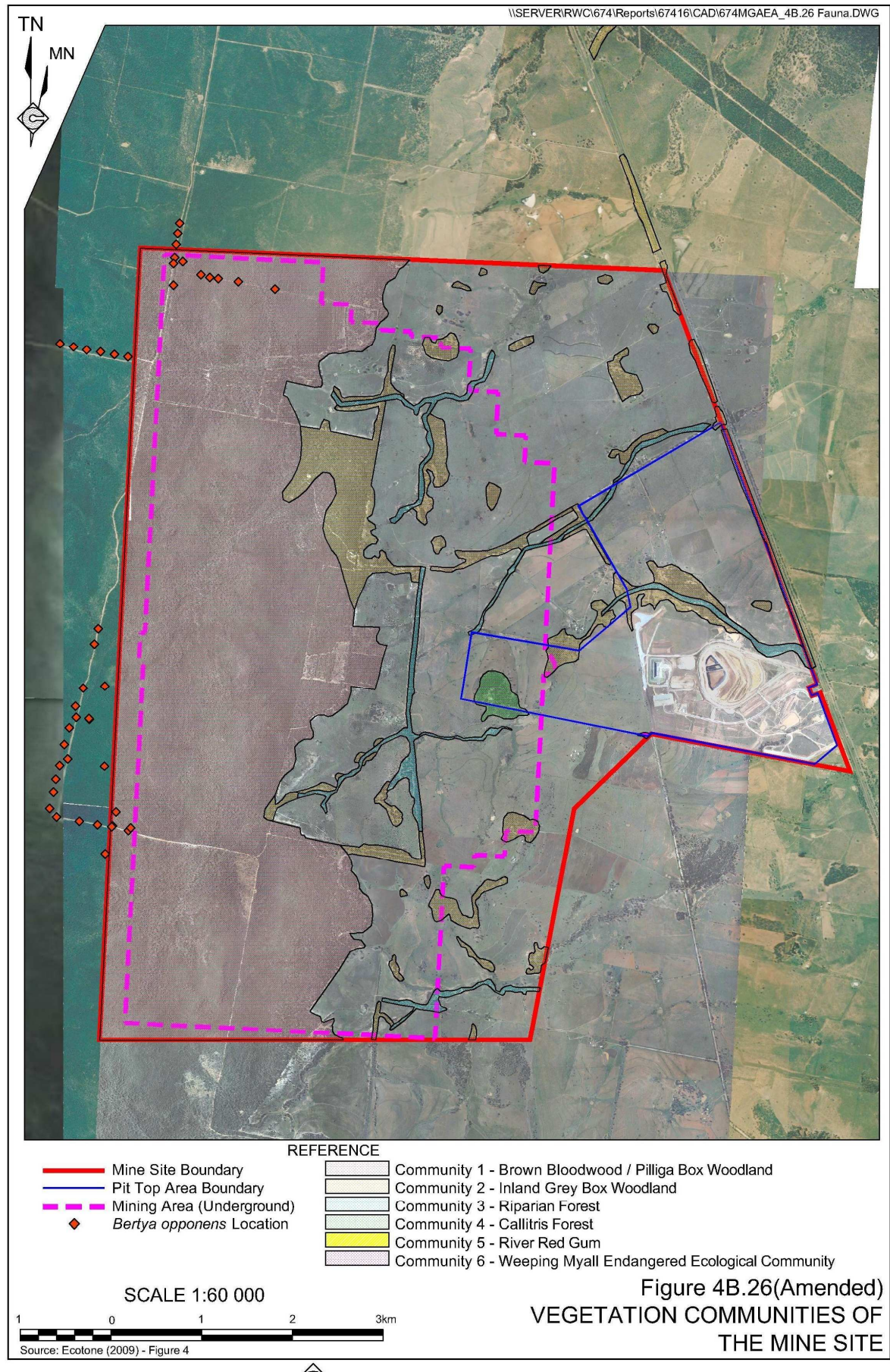


Figure 17: Location of Threatened Species

Impacts on threatened flora species may occur due to the clearing required for surface infrastructure and possibly as a result subsidence effects such as ponding. With the exception of *Bertya opposens*, these are likely to be negligible. The Department considers that there is a low risk of long-term impacts to *Bertya opposens*. This species is present in the adjacent Jack's Creek State Forest to the west, with an estimated population in excess of 5 million individuals. This is the largest known population of this species.

Bertya opposens was found to be relatively abundant (possibly several thousand individuals) in the northwestern section of the proposed mining area (Longwalls 10-13). These individuals represent the eastern margin of the large populations centred in Jacks Creek and East Pilliga State Forests. Seed germination for *Bertya opposens* seems to be triggered by fire events and soil disturbance. Accordingly, should the project disturb any soil populated by *Bertya opposens*, this should not impede regeneration of the species and rehabilitation of disturbance sites.

Nonetheless, the Department's view is that disturbance of *Bertya opposens* should be avoided, if possible. The Department has recommended a condition of approval that requires NCO to prepare and implement a Flora and Fauna Management Plan prior to vegetation clearing or longwall mining. A component of this Plan is that a qualified ecologist must conduct a search of proposed clearance areas, specifically searching for *Bertya opposens*. Should this species be located, NCO would be required to relocate its surface infrastructure to avoid impacts, if reasonably and feasibly possible.

As of 2009, there is only one record of the Superb Parrot on the site (4 individuals overflying the area), and single records within 10 and 20 km of the site. The site is located towards the margin of the known range of the Superb Parrot, and is well-outside its known breeding area. In the area of proposed longwall mining operations, there are 2,494 ha of native vegetation. Of this, up to 210 ha are proposed to be cleared for mining-related surface infrastructure, such as water and gas drainage boreholes, pipelines, access tracks and power lines.

DECCW maintains that this area should be increased by 50% to cater for edge effects. Even if 315 ha were to be considered as the area of affected vegetation, this represents 13% of the existing vegetation on site, with direct clearing representing up to 8%. The estimates of clearing stated in the EA are worse-case estimates and it is quite possible that less than 210 ha would ultimately be cleared. For instance, clearing of access tracks is based on clearance of the full width of the track, whereas in practice, usually only a minimum width for vehicle passage would be cleared by removal of above surface vegetation, leaving groundcovers and rootstock intact. Additionally, NCO is unsure of whether all its indicated surface-to-in-seam drilling sites would be required (and the resultant vegetation clearance that this would entail). The amount of vegetation that would be cleared as a result of this project is therefore quite likely to be less than 8% that has been calculated as a worse-case.

The Department believes that as the superb Parrot is a highly mobile species it may be dissuaded from using parts of this foraging area by construction activities, and also potentially by noise or light associated with pit top facilities or 24-hour construction. However, due to the relatively small area and linear nature of the habitat to be disturbed and the ease with which birds can cross any disturbed areas, the Department believes that there would be a negligible impact to population numbers, breeding cycles or long-term ability of the species to survive. Potential impacts would therefore be limited to a relatively minor, and ultimately temporary, reduction in foraging habitat in which there is no current record of foraging activity or presence on the ground. However, any such impacts would be cumulative to existing clearing of foraging habitat across the Parrot's range, which is a likely cause of the species' decline.

Overall, the Department considers the potential impacts to the Superb Parrot are not significant, but should nevertheless be offset by the provision of alternative foraging habitat, in proportion to the actual losses caused by NCO's proposed clearing. Any offset containing foraging habitat for the Superb Parrot would also benefit a range of nectar-dependent birds that are affected, to some degree, by the loss of this type of foraging habitat.

5.6.2 Biodiversity Offset Strategy

The Department and DECCW believe that, in addition to its commitment to rehabilitate all areas of vegetation disturbance caused by the project, NCO should provide a suitable Biodiversity Offset Strategy (BOS) to offset the impacts of the project on flora and fauna. As a component of the project, NCO initially proposed that an area of vegetated land in the western portion of the mining area would

be conserved. This proposed BOS (see Table 3) would have provided 547 ha of native vegetation in compensation for up to 210 ha of direct disturbance associated with the project.

Table 3: Summary of On-site BOS proposed in EA

Vegetation Community	Area on Mine Site	Area Subject to Direct Disturbance	Area to be Conserved	Offset Ratio (Area Conserved : Area Disturbed)
Brown Bloodwood Pilliga Box Woodland	2058	178.9	465.7	2.6: 1
Inland Grey Box Woodland EEC	318	24.8	78.7	3.2: 1
Riparian Forest	98	4.1	2.9	0.7: 1
Callitris Forest	20	2.7	0.0	
Weeping Myall EEC	0.3	0.0	0.0	
Total	2494.3	210.5	547.3	2.6: 1
All areas are hectares. These areas are maxima as a substantial proportion of the native vegetation proposed to be cleared for the surface to in-seam drilling may not eventuate.				

Both Departments believe the initial BOS was not adequate, due to the intensity of gas and water drainage infrastructure proposed for the same area. By way of illustration, the proposed BOS would have;

- 1 power line easement;
- 8 parallel access tracks at approximately 200 m intervals;
- 14 gas production sites;
- 28 pre-drainage borehole sites; and
- 80 goaf drainage borehole sites.

With this intensity of disturbance and activity in the proposed BOS, the Department does not believe it could adequately fulfil a biodiversity offset function. Consequently, NCO, the Department and DECCW have explored the parameters for an alternative, off-site BOS. NCO has identified three properties within the Narrabri-Boggabri district that it would be willing to purchase for the purposes of a BOS. These sites offer the potential to offset vegetation losses on a basis of “maintain or improve” conservation outcomes, with the exceptions that they do not contain a direct offset for the Inland Grey Box Woodland EEC and Brown Bloodwood / Pilliga Box Woodland that represents foraging habitat for the Superb Parrot, nor do these sites provide an offset for any losses of the threatened plant, *Bertya opposens*.

However, two of the properties investigated by NCO are adjacent to the Mt Kaputar National Park and contain lands that could be added to the DECCW estate for conservation purposes. These properties contain vegetation types that may be considered to be of higher conservation value than the Brown Bloodwood / Pilliga Box Woodland proposed to be disturbed by the project. DECCW has indicated that it would favour additions to the national park, provided that the areas to be incorporated are a good match to the conservation values of the park and that they are supported by ancillary measures such as fencing and weed control.

NCO has committed to undertake, as part of the offset program, ongoing monitoring of on-site vegetated areas to establish the extent of subsidence impacts on woodland vegetation, as well as the extent of edge effects of mine-related disturbance during the life of the mine. The Department supports this approach because it would encourage NCO to reduce its vegetation impact footprint to reduce the extent of its overall offset obligation.

During the period of finalising the details of the BOS, the Department believes that NCO should reconsider its requirements for surface infrastructure areas and seek out opportunities to reduce the amount of vegetation clearing required. These measures may include reducing the length or width of access tracks and reducing or combining sites for gas, water and ventilation facilities. In addition, NCO should be encouraged to decommission and rehabilitate these sites as soon as they are no longer

needed. Accordingly, there exists a very real possibility that direct disturbance impacts would be much less than 210 ha. The requirements for a BOS should be directly related to the actual area of disturbance and demonstrated edge effects. This will act as an incentive for NCO to ensure that it constructs surface infrastructure in a manner which minimises impacts on native vegetation.

The Department believes that an appropriate off-site BOS (or off-site with some on-site components) can be achieved for the project to maintain or improve conservation outcomes and substantially protect identified EECs and threatened species. The Department has recommended conditions of approval that require NCO to:

- provide a detailed assessment of offset proposal/s involving the property/ies (agreed to by DECCW) adjoining Mt Kaputar National Park to confirm the ability of either of these property/ies to meet “like for like or better” and “maintain or improve” conservation outcomes;
- include and assess proposals to offset impacts to the Inland Grey Box EEC, *Bertya opposens*, and provide foraging habitat for the Superb Parrot;
- include proposals on offsetting both direct and indirect impacts (ie edge effects) of the project; and
- determine the best overall combination of lands to provide a suitable offset.

5.6.3 Mitigation Measures

The EA recommended that the following mitigation measures are applied for the project:

- establishment of offsets to compensate for cleared habitat;
- development of weed management procedures;
- rehabilitation and revegetation of disturbed areas with native and locally occurring species;
- preparation and implementation of an annual fauna monitoring program;
- establishment and implementation of tree-felling procedures;
- completion of habitat hollow provision assessment prior to each vegetation clearing campaign;
- implementation of erosion/sediment control; and
- implementation of control protocols for root-rot fungus.

The Department considers the proposed mitigation measures are appropriate and has recommended a condition of approval that requires NCO to produce and implement a Flora and Fauna Management Plan that incorporates these measures. The establishment of a suitable BOS is subject to other recommended conditions of approval.

5.6.4 Conclusion

The Department considers that flora and fauna surveys conducted on the site by NCO are comprehensive and provide a sound basis to assess the impacts of the proposal on biodiversity values. The Department accepts NCO's assessment of impacts with the exception that indirect (or edge effects) have not been fully considered. The Department has recommended that NCO be required to produce, and then implement, a Flora and Fauna Management Plan, designed to mitigate the impacts of all clearing and other mining-related activities.

The Department considers the BOS first proposed in the EA is inadequate due to the intensity of proposed surface infrastructure works within the lands proposed to be conserved. In conjunction with DECCW, the broad parameters of an off-site BOS have been identified, and properties adjacent to Mt Kaputar National Park are considered by the Department to offer every likelihood of providing most, if not all, the attributes of a suitable BOS. The Department proposes that NCO be required to finalise, within six months, a suitable off-site BOS to the satisfaction of the Director-General.

5.7 Socio-Economic Benefits and Impacts

The EA relied on a 2005 specialist socio-economic assessment undertaken for Stage 1 of the Narrabri Mine, which was revised to take into account the changes likely to result from the economic expansion and increase in intensity due to the implementation of Stage 2.

Stage 1 of the mine was predicted to provide an economic boost to the Gunnedah-Narrabri region without causing undue impact to the provision of social services in the region. This has proved to be the case, with the increase in employment at the mine able to be accommodated without placing excessive strain on local social services or infrastructure. Some impacts have been noticed in the ability of local traditional rural and service industries to attract and retain staff, who are drawn to

employment in the mining industry by the offer of higher wages. Otherwise, the evidence is that local social infrastructure such as the provision of housing, educational and health facilities and local transport infrastructure have been able to cope with the increased demand caused by Stage 1. A comparison of Stage 1 and 2 workforce characteristics is provided in Table 4.

Table 4: Stage 1 and 2 Workforce Characteristics

	Estimated Workforce	
	Stage 1 Operations	Longwall Operations
Total workforce	113	211
Local workforce	43	80
Non-local workforce	70	131
Number residing in Narrabri	32	59
Number residing in Gunnedah	32	59
Number residing in smaller townships and rural settings	6	13

As indicated in Table 4, Stage 2 of the mine is estimated to employ 98 additional full-time workers. Of these, it is estimated that 61 additional workers would move to the local region, with resultant demands on housing and social services. These demands would be more difficult to accommodate than those caused by Stage 1, due to the takeup of capacity by Stage 1 and the demands of other mining projects in the district (Boggabri, Rocglen and Sunnyside mines). However, the EA has demonstrated that most demands would be met. For instance, a survey of real estate agents indicated that some housing is currently available for purchase and that there is a sufficient supply of housing “in the pipeline” to meet the likely increased demand. However, demand for labour associated with Stage 2 is likely to exacerbate shortages of workers in the rural and local service industries.

NCO has recognised that its project would place some strain on local community infrastructure. It has consulted with both Narrabri and Gunnedah Councils about the expansion of its existing Community Enhancement Programs, designed to offset some of the negative social impacts associated with the development of the mine which are difficult to quantify. Agreement has been reached with Narrabri Council that NCO will provide a \$1.5 million contribution towards the construction of a swimming complex in Narrabri. Likewise, agreement has been reached with Gunnedah Council that NCO will provide a \$100,000 contribution towards community enhancement projects and an additional contribution to a traffic study assessing the impacts of increased closures of level crossings in the town.

To date, the Narrabri Mine has contributed economically to:

- growth in housing, retail, commercial and industrial development of land;
- increased retail and commercial services in the towns of Gunnedah, Boggabri and Narrabri;
- improved rail freight and air services to the region;
- improved social and cultural services;
- increased employment;
- increased employment diversity; and
- increased training and further education opportunities.

An analysis of the spending associated with the mine over the past two years shows that in excess of \$148 million has been invested by NCO, with almost \$47 million or 31% spent in the local region (see Table 5). Approximately 26% of the \$295 million capital cost to establish Stage 2 of the mine would be related to construction labour, on-site facilities construction and materials. A significant proportion of this capital would be spent locally. The remaining 74% of the capital costs would be directed overseas and throughout Australia for the purchase of the longwall equipment and coal processing equipment.

NCO anticipates that annual labour costs would be in the order of \$36 million, once mine production reaches the 8 Mtpa level. A significant proportion of this money would be retained locally through payment of employees and local contractors. Additionally, consumables and the purchase of sundry materials would inject a significant amount of money into local services and suppliers, as well as those based in the Hunter Valley and beyond.

Table 5: Stage 1 Narrabri Mine Payments

	Invoices from Narrabri Coal Mine - Commencement of project to 30 June 2009	
	\$	% of total expenditure
Total Invoices	148 633 020	100.00
Local Region – Narrabri (Narrabri, Boggabri and Wee Waa)	37 084 150	24.95
Local Region – Gunnedah	9 638 505	6.48
Regional NSW – Hunter / Newcastle	34 923 590	23.50
Regional NSW – Other	30 641 780	20.62
Sydney/Suburban	11 639 677	7.83
Interstate	24 705 318	16.62

Royalties of up to \$35 million per year would be payable to the NSW government when full production is reached which would contribute to the State economy, as would port and rail access fees. Considerable economic benefits would accrue for the Australian Government through the export value of the coal (approximately \$450 million per annum based on current coal prices) and the personal and company taxes paid.

The Department is satisfied that NCO has adequately assessed the social and economic impacts of the project, and that the social and economic benefits that would accrue from approval of the project would substantially outweigh the social and environmental impacts that are likely to occur.

5.8 Other Issues

Other issues relating to the project are outlined in Table 6.

Table 6: Other issues

ISSUE	CONSIDERATION	IMPACT
<i>Greenhouse Gases</i>	Stage 2 operations would add to the mine's greenhouse gas (GHG) emissions, primarily by way of pre-drainage activities. These are specifically designed to remove GHGs (carbon dioxide and methane) from the coal seam in advance of mining operations. Coal seam gas from the mine is predicted to consist of 90% carbon dioxide and 10% methane. This mix of gases is unsuitable for use as a fuel as it is non-combustible. Consequently, NCO proposes to vent this gas to the atmosphere for dispersal, adding to GHG emissions from the mine. The mine has an approved Energy Savings Action Plan (ESAP) and is currently required to comply with condition 39 of schedule 3 of the mine's approval to "implement all reasonable and feasible measures to minimise greenhouse gas emissions from the underground mining operations to the satisfaction of the Director-General". One means of minimising GHG emissions would be to minimise site clearance and soil disturbance. The Department considers that the currently approved ESAP should be revised to account for the increased GHG generation associated with the proposed Stage 2 operations.	Minor
<i>Soils</i>	Soils in the area are non-saline, but in some instances, quite sandy and prone to erosion. The Department has recommended that the mine's existing Erosion and Sediment Control Plan be reviewed, updated if necessary, and be extended in area to cover all proposed Stage 2 activities that involve ground disturbance. The potential for increased erosion as a result of mine subsidence is considered under Section 5.1.2.	Minor
<i>Rail Traffic</i>	The average number of laden coal trains generated by the project would increase from 2 to 5 a day, with a maximum of 8 a day. Coal is yet to be produced or dispatched from the mine and residents living close to the rail line to Newcastle are therefore likely to perceive an increase over time of up to 16 train movements a day. Cumulative impacts associated with the movement of coal on the rail line to Newcastle would increase, particularly for those towns with level crossings (Baan Baa, Boggabri, Gunnedah, Curlewis, Werris Creek, Quirindi and Scone). Gunnedah Council, in particular, has concerns about the effects of trains blocking level crossings for increased periods of time. The Department supports Council's request for NCO to provide funds for a traffic impact study to better define these rail traffic impacts on local road traffic flow and safety.	Minor cumulative impacts, likely to increase over time.
<i>Primary Production</i>	Stage 1 of the mine has already removed 76 ha of land from sheep grazing and wheat cropping. Stage 2 would remove further lands from grazing, mainly by the construction of the brine storage and reject emplacement areas. Stock may need to be excluded from	Minor

ISSUE	CONSIDERATION	IMPACT
	some lands due to the creation of surface cracks by mine subsidence. Forestry activities are unlikely to be affected by the project. Overall, the project would result in a localised removal of about 120ha from agricultural production. On the cessation of mining most former agricultural lands would be returned to agricultural production, most likely grazing. The Department accepts that there would be minor long-term diminution of local agricultural capacity, should the project proceed.	
<i>Air Quality</i>	Construction of the proposed surface facilities and use of access tracks and the rejects emplacement area would generate dust emissions. The Department is satisfied that the existing impact assessment criteria should continue to apply to the project. The maximum 24 hour average PM₁₀ criterion is predicted to be exceeded on two occasions in per year at "Ardmona" and 4 occasions per year at "Naroo". All other relevant air quality criteria are predicted to be met by the project. As conservative assumptions have been utilised in the Air Quality Impact Assessment, these exceedances may not be realised in practice. The Department has recommended that the mine's current Air Quality Monitoring Program be reviewed to ensure that it remains suitable for Stage 2 operations.	Minor
<i>Traffic</i>	The additional light vehicle movements associated with increased staff numbers and heavy vehicle deliveries of materials for construction are small compared to existing traffic volumes on the Kamilaroi Highway, the road used to access the mine. As part of the Stage 1 approval, NCO was required to upgrade the intersection of the mine's entry road with the Highway. The RTA has indicated that it does not wish to raise any traffic issues regarding Stage 2. The Department is satisfied that the additional traffic impacts are likely to be negligible.	Negligible
<i>Lighting</i>	The construction of the West Mains ventilation shaft would occur at night and the construction of the CHPP could occur until 10 pm. Stage 1 conditions of approval require that all outdoor lighting should conform to the relevant Australian Standard and that no lights should shine above the horizontal. The Department believes that compliance with these conditions would ensure that additional lighting impacts would be negligible.	Negligible
<i>Visual</i>	As shown in Figure 2, NCO owns land on which it proposes to construct additional infrastructure. This land provides a visual buffer between the mine's surface facilities and many of the surrounding privately-owned residences. Most individual pre-drainage facilities are constructed in a matter of weeks and remain operational for up to a few years. The relatively minor visual impacts of this infrastructure are therefore temporary. The proposed West Mains ventilation fan would be surrounded by a bund to reduce noise and visual impacts. The Department is satisfied that there are no additional visual mitigation measures required.	Negligible
<i>Odour</i>	Odour modelling of the mine's odour emissions predicted the highest level of impact for any neighbouring residence would be 0.5 Odour Units (OU) compared to the relevant criterion of 6 OU. On this basis, odour impacts from the mine are predicted not to occur.	Nil

6 RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the project (see Appendix A). These conditions are required to:

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

NCO accepts the imposition of these conditions.

7 CONCLUSION

The Department has assessed the project application, EA, submissions on the project and the response to submissions in accordance with the relevant requirements of the EP&A Act, including the objects of the Act and the principles of ESD.

The assessment has found that the project would result in some adverse residual environmental impacts, primarily by way of direct disturbance of up to 210 ha of native vegetation for the construction of surface infrastructure required for mine ventilation and gas and water drainage facilities for

underground workings. These disturbance areas include 25 ha of Inland Grey Box Woodland EEC and minor impacts to the vulnerable plant species, *Bertya oppenens*.

To offset impacts caused by disturbance of native vegetation, NCO offered to provide an on-site BOS. However, this offset would be greatly fragmented by the construction and use of surface infrastructure. Consequently, both the Department and DECCW requested that NCO provide an alternative BOS. In-principle agreement has been achieved on the provision of an off-site offset that would provide adequate compensation for the biodiversity impacts of the project. The recommended conditions of approval provide for the finalisation of the details of this BOS within six months of project approval.

Other impacts are not predicted to be significant, and the Department is satisfied that they can be minimised, mitigated, managed or offset through the imposition of a comprehensive range of conditions of approval.

The assessment has also found that the project offers a number of significant social and economic benefits for the region, as it would:

- increase full-time employment at the mine by 98 workers to 211 in total;
- attract \$295 million in capital investment;
- directly provide \$36 million in wages and salaries each year;
- provide \$1.5 million to Narrabri Council and \$100,000 to Gunnedah Council for the enhancement of community facilities; and
- generate significant royalty and tax income for the Government.

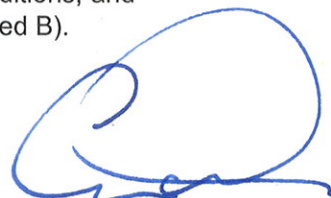
On balance, the Department believes that the project represents a logical progression of operations at the Narrabri Mine and is satisfied that its benefits sufficiently outweigh its costs and the project is able to be conducted in a manner that is consistent with the objects of the EP&A Act. Consequently, it believes the project is in the public interest and should be approved subject to conditions.

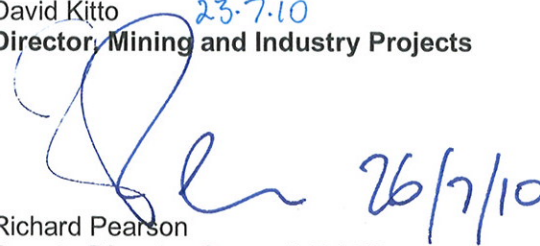
8 RECOMMENDATION

It is RECOMMENDED that the Deputy Director-General, Development Assessment and Systems Performance:

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


for David Kitto 23.7.10
Director, Mining and Industry Projects

 23.7.10
Chris Wilson
Executive Director, MPA

 26/7/10
Richard Pearson
Deputy Director-General, DASP

APPENDIX A – CONDITIONS OF APPROVAL SUMMARY

See the attached Instrument of Approval (tagged B).

Aspect	Condition	Requirement
Schedule 2: Administrative Conditions		
Terms of Approval	5	Approval for mining restricted to 21 years
	6	Restriction on production to 8.0 million tonnes of coal a year
	7	All coal to be transported by rail
	9	Requirement to enter into planning agreements with Narrabri and Gunnedah Councils
	10	Surrender of Stage 1 project approval
Schedule 3: Specific Environmental Conditions – Mining Area		
Subsidence	1	Subsidence impact performance measures
	2	Requirement to carry out first workings in accordance with approved mine plan
	3-4	Production of an extraction plan
Schedule 4: Specific Environmental Conditions – Surface Facilities Area and General		
Noise	1	Noise impact assessment criteria
	2-5	Notification of landowners and mitigation; noise management plans; continuous improvement
Air Quality	6	Air quality impact assessment criteria
	7	Air quality management
Metrological Monitoring	8	Suitable metrological monitoring
Water Management	9	Requirement to recalibrate groundwater model
	10-12	Management of water discharges
	13	Water management plan
	14	Site water balance
	15	Erosion and sediment control plan
	16	Surface water monitoring program
	17	Raffinate discharge and transfer control monitoring plan
	18	Groundwater monitoring program
	19	Integrity of evaporation and storage ponds
	20-21	Brine storage and management
Heritage	22-24	Aboriginal cultural heritage management plan
Transport	25-26	Requirement to maintain mine access road intersection and Greylands and Scratch Roads
	27	Gunnedah traffic management study
Visual Impact	28-29	Requirement to minimise the project's visual and lighting impacts
Greenhouse Gas	30-32	Energy Savings Action Plan and GHG minimisation
Waste Minimisation	33	Requirement to monitor and minimise waste
Schedule 5: Rehabilitation and Offsets		
Rehabilitation	1-2	Requirement to rehabilitate the site in a progressive manner.
	3-5	Landscape Management Plan; Rehabilitation Management Plan; Mine Closure Plan
Offsets	6-7	Biodiversity Offset Strategy
Schedule 6: Environmental Management, Monitoring Auditing and Reporting		
Environmental Management	1-3	Environmental Management Strategy, management plan requirements and revision of strategies, plans and programs
Reporting	4-6	Requirement to report incidents, regularly review and report on environmental performance
Auditing	7-8	Requirement to undertake regular independent environmental audits
CCC	9	Requirement for a Community Consultative Committee
Access to Information	10	Requirement to publicly report environmental management plans/programs/strategies, and monitoring results
Schedule 7 Additional Procedures for Air Quality and Noise Management:		
Notification of Landowners	1-2	Notify the Director-General and affected landowners if impact assessment criteria is breached
Independent Review	3-4	Landowners may request independent review of impacts
Land Acquisition	5-7	Requirement to acquire land within 3 months of receiving a written request from landowners with acquisition rights.

APPENDIX B – RESPONSE TO SUBMISSIONS

See attached CD-ROM entitled *Stage 2 Narrabri Coal Project: Response to Submissions*, dated May 2010.

APPENDIX C – SUBMISSIONS

See attached CD-ROM entitled *Stage 2 Narrabri Coal Project: Submissions*.

APPENDIX D – ENVIRONMENTAL PLANNING INSTRUMENTS

Narrabri Local Environmental Plan 1992

See discussion in Section 3.2.

State Environmental Planning Policy (Major Development) 2005

See discussion in Section 3.1.

State Environmental Planning Policy (SEPP) Mining, Petroleum Production and Extractive Industries 2007 (Mining SEPP)

Part 3 of the Mining SEPP lists a number of matters that a consent authority must consider before determining an application for consent for development for the purposes of mining, including:

- compatibility with other land uses;
- natural resource management and environmental management;
- resource recovery;
- transport; and
- rehabilitation.

These matters are not required to be considered for projects under Part 3A of the EP&A Act. Nevertheless, the Department has considered these matters in its assessment report. Based on this assessment, the Department is satisfied that the project is able to be managed in a manner that is generally consistent with the aims, objectives and provisions of the Mining SEPP.

State Environmental Planning Policy (Infrastructure) 2007

In accordance with clause 104 of the Infrastructure SEPP (and equivalent provisions of the now repealed *SEPP 11 Traffic Generating Developments*), the application was referred to the DTI. The DTI raised no objection to the project.

SEPP No. 33 – Hazardous and Offensive Development

SEPP 33 requires consideration of whether an industrial proposal is a potentially hazardous or offensive industry. This is defined as a development that *'would pose a significant risk in relation the locality: to human health, life or property; or to the biophysical environment, and includes a hazardous industry and a hazardous storage establishment'*.

The EA details management considerations for various aspects such as waste management, fuel storage and emergency response. All hazardous materials would be managed in general accordance with the company's existing management procedures that have successfully operated for the nearby Tarrawonga and Whitehaven coal mines. An Environment Protection Licence (EPL) would be obtained for the proposed development. As such, the Department is satisfied that the proposal is generally consistent with the aims, objectives, and requirements of SEPP 33.

SEPP No. 44 – Koala Habitat Protection

A single Koala scat was identified during the survey of the site; however, no further evidence of a resident Koala population was identified. On this basis, and as the only food tree species identified on the site, *Eucalyptus albens*, was found at densities below 15% within the woodland, the EA could not determine whether the project site represents 'core' Koala habitat. The EA concluded that, due to the small areas of woodland proposed to be cleared; this would not affect the lifecycle of the Koala. The possible impact would be further mitigated by the proposed pre-clearing surveys to be undertaken prior to each clearing campaign.

SEPP No. 55 – Remediation of Land

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. In particular, this policy requires consideration of whether a development requires a consent for remediation works or not and requires

that remediation works meet certain standards and notification requirements. It also requires a consent authority to consider whether, if land is contaminated, it is suitable in this state for the proposed development.

The Department is satisfied that the proposal is generally consistent with the aims, objectives and requirements of SEPP 55.

Orana Regional Environmental Plan (REP) No 1 –Siding Spring

The mine site is 140 km northeast of the Siding Spring Observatory and lies within the Siding Spring Observatory Dark Skies Region. Under Part 8 of the REP, consultation and/or concurrence is only required for locations within 100 km of the observatory. Consequently, the REP has not been considered further. However, the Department has recommended a condition of approval requiring NCO to minimise lighting impacts from the project and for lighting not to be directed above the horizontal.

APPENDIX E – ENVIRONMENTAL ASSESSMENT

See attached CD-ROM entitled *Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project*, dated November 2009.