Spur Hill Underground Coking Coal Project

Application for a Gateway Certificate

Technical Overview

SPUR HILL
UNDERGROUND COKING COAL

OVERVIEW

The Spur Hill Underground Coking Coal Project (the Project) is a proposed development of an underground coal mining operation with a mine life of up to 25 years. The Project is located east of Denman and south-west of Muswellbrook in the Upper Hunter Valley, New South Wales (NSW).

Spur Hill Management Pty Ltd (SHM) is lodging an application for a Gateway Certificate (a Gateway Application) for the Project as the area includes land verified as biophysical strategic agricultural land (BSAL) and land mapped as equine critical industry cluster and viticulture critical industry cluster (in the NSW *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*).

The Project is an underground mining operation which mitigates local issues, notably dust, visual amenity and impacts to agricultural resources.

The Gateway Application is considered at a very early stage before a development application and Environmental Impact Statement are lodged. The Gateway Application includes only the Project components that require a new mining lease.

Agricultural Context of the Project Area

The land within the Project area is primarily used for agricultural (predominantly cattle grazing), and rural residential purposes. The most common enterprise within the Project underground mining area is producing weaners/vealers on natural pastures (Short and Thomson, 2013).

A small vineyard is located in the Project area (the Callatoota Estate) with approximately 26 hectares of grape vines and a small winery which processes and bottles wine from grapes grown on the estate. The Callatoota Estate is owned by Spur Hill Agricultural Pty Limited (SHA).

There are no equine enterprises within the Project area.

Strategies to Minimise Potential Impacts on Agriculture

SHM would implement the following strategies to minimise potential impacts on agriculture:

- mitigation of impacts on agricultural resources and enterprises during the mine planning and design process;
- development of Property Subsidence Management Plans for each individual holding that may be affected;
- management and remediation of subsidence impacts;
- holding appropriate water licences for any water taken directly or incidentally for the Project;
- management of potential impacts on groundwater users;
- ongoing groundwater monitoring and groundwater model validation;
- mitigation of visual amenity impacts; and
- ongoing management of SHA-owned land.

Impacts on Strategic Agricultural Land

Detailed production information was collected on each agricultural enterprise by La Tierra during the preparation of the Agricultural Impact Assessment that supports the Gateway Application. The estimated annual gross value of agricultural production from within the Project area is $1.25 million, which represents 3.7 percent (%) of agricultural production within the Muswellbrook local government area, 0.6% within the Upper Hunter region, and 0.01% of NSW production (Short and Thomson, 2013).

The supporting documentation to the Gateway Application considers the potential impacts of the Project on BSAL, equine critical industry cluster and viticulture critical industry cluster. The key conclusions of these assessments are:

- With the implementation of the proposed subsidence management measures, there would be no significant change to the long-term agricultural productivity of the Project area as a result of subsidence impacts on agricultural land (Short and Thomson, 2013).
- The proposed location of the mine infrastructure area and coal handling and preparation plant reject emplacement areas are not on BSAL (McKenzie Soil Management Pty Ltd, 2013).
- The Project is predicted to meet the 'Level 1' minimal impact considerations for highly productive groundwater (HydroSimulations, 2013).
- There are no equine enterprises within the Project area, therefore the Project would not cause any change to land use with respect to the equine critical industry cluster (Short and Thomson, 2013).
- The Project would not cause any change to land use with respect to the viticulture critical industry cluster as subsidence impacts on the vineyard within the Project area can be remediated (Short and Thomson, 2013).

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1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

Spur Hill Management Pty Ltd (SHM) is seeking consent to develop an underground coal mining operation in the Upper Hunter Valley, herein referred to as the Spur Hill Underground Coking Coal Project (the Project). The Project is located east of Denman and south-west of Muswellbrook, New South Wales (NSW) in the Muswellbrook local government area (LGA) (Figure 1).

The Project area includes land verified as biophysical strategic agricultural land (BSAL) and land mapped as equine critical industry cluster (Equine CIC) and viticulture critical industry cluster (Viticulture CIC) (in the NSW *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* [Mining SEPP]).

This is a Technical Overview of the application for a Gateway Certificate (Gateway Application) pursuant to clause 17F of the Mining SEPP.

The Gateway Application demonstrates that the Project can meet the relevant criteria for BSAL, Equine CIC and Viticulture CIC.

1.2 SCOPE OF APPLICATION

The Gateway Application will be assessed by the Mining and Petroleum Gateway Panel (the Gateway Panel) for potential impacts of the Project on strategic agricultural land and its associated water resources. The Gateway Panel undertakes its assessment in accordance with the relevant criteria outlined in clause 17H(4) of the Mining SEPP that apply specifically to BSAL, Equine CIC and Viticulture CIC.

The Gateway process applies to State significant mining development that requires a new mining lease. The Project area, as described in this document, is defined as the extents of Exploration Licence (EL) 7429. Components of the Project that are outside of the proposed new mining lease are not subject to the Gateway Application. These excluded Project components are identified in this document (Section 3.3).

The Gateway Panel considers projects at a very early stage before a development application and Environmental Impact Statement (EIS) is lodged. SHM will undertake further consultation, mine planning, detailed design and environmental assessment on aspects that are not relevant to the Gateway Application. The outcomes of additional work and consideration of any Gateway Certificate will be documented in the EIS.

1.3 BACKGROUND

Historic exploration activities were undertaken within or near the Project area by the Joint Coal Board in 1949, the Bureau of Mineral Resources in the 1950s, the Department of Mines in the 1970s and the Carpentaria Exploration Company in the 1970s and 1980s.

EL 7429 was granted to Spur Hill U.T. Pty Ltd & Spur Hill No.2 Pty Limited on 18 December 2009 for a period of 5 years as part of a competitive tender process. A Review of Environmental Factors for exploration activities within EL 7429 was lodged with the (then) NSW Department of Primary Industries (DPI) – Mineral Resources in July 2011. Approval was granted to conduct exploration under EL 7429 in September 2011.

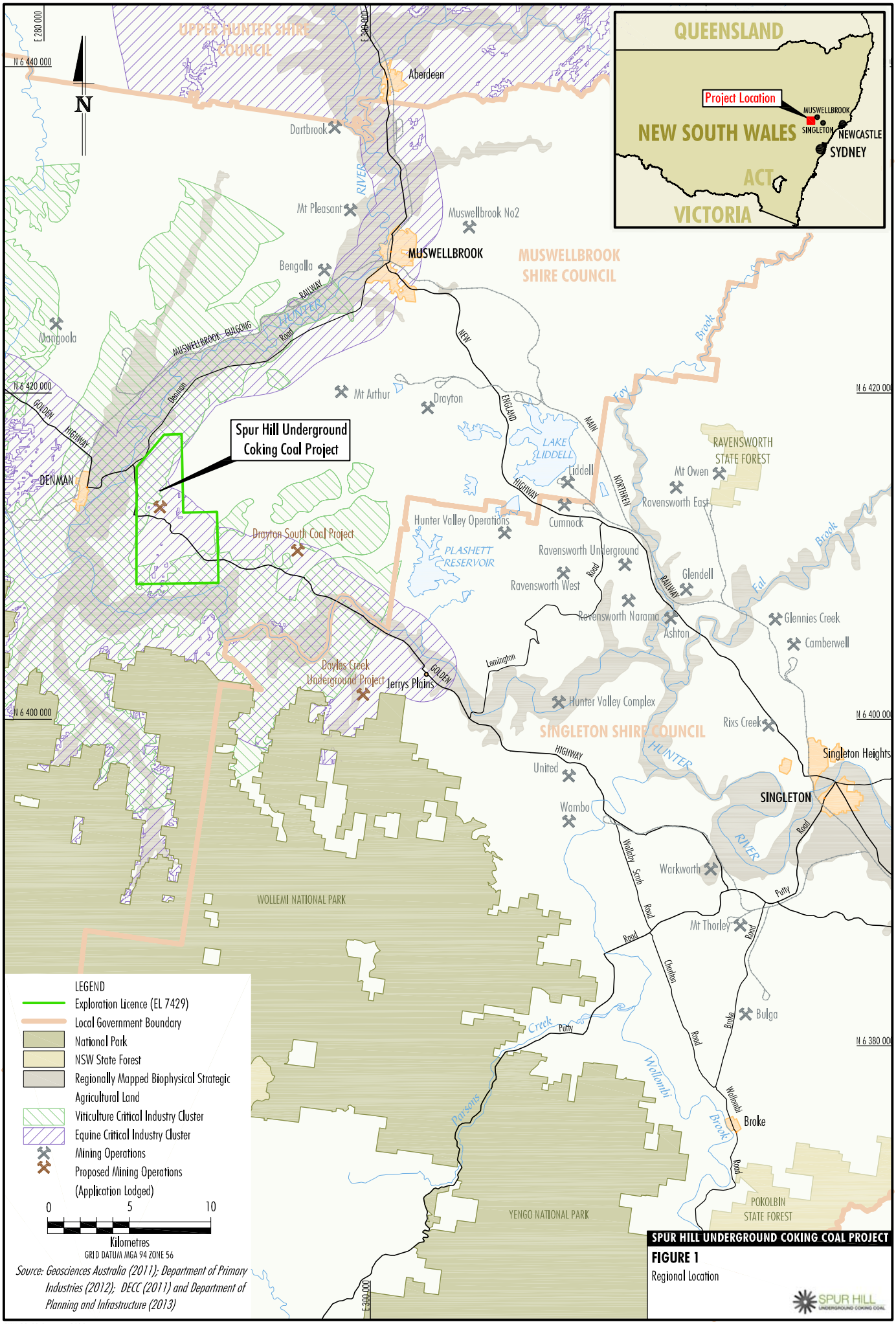
SHM manages the Project on behalf of the joint venture between Spur Hill U.T. Pty Ltd and Spur Hill No. 2 Pty Limited. SHM is managed by Spur Hill No. 2 Pty Limited, which is a wholly owned subsidiary of Malabar Coal Limited, an Australian Stock Exchange (ASX) listed company.

SHM commenced exploration activities and environmental studies in early January 2012.

1.4 PROJECT OVERVIEW

The Project is a proposed development of an underground coal mining operation with a mine life of up to 25 years (including construction, development and operation).

The Project underground mining area would be located entirely within EL 7429 (Figure 2). The Project would also include development of facilities for handling, processing and transportation of coal.



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The Project would include the following activities:

- longwall mining from a number of seams in the Wittingham Coal Measures within the underground mining area of EL 7429;
- production of up to 8 million tonnes per annum (Mtpa) run-of-mine (ROM) coal;
- development of mine access drifts and mine infrastructure area, including administration offices, bathhouse, workshop compound, store buildings, coal stockpile areas, bunded fuel tank, laydown areas, car parking and access road;
- development of ventilation surface infrastructure and gas drainage infrastructure;
- construction and operation of a coal handling and preparation plant (CHPP);
- development of coal transportation infrastructure;
- construction and operation of train load-out facility including rail spur and loop;
- emplacement of waste rock excavated during the construction of access drifts and shafts and CHPP coarse rejects and fines generated during the initial processing of ROM coal;
- progressive development of sumps, pumps, pipelines, water storages and other water management equipment and structures;
- ongoing exploration activities within EL 7429;
- surface monitoring, rehabilitation and remediation of subsidence effects; and
- other associated minor infrastructure, plant, equipment and activities.

The Gateway Application applies to those activities within the proposed mining lease (Section 3.3).

1.5 CONSULTATION TO DATE

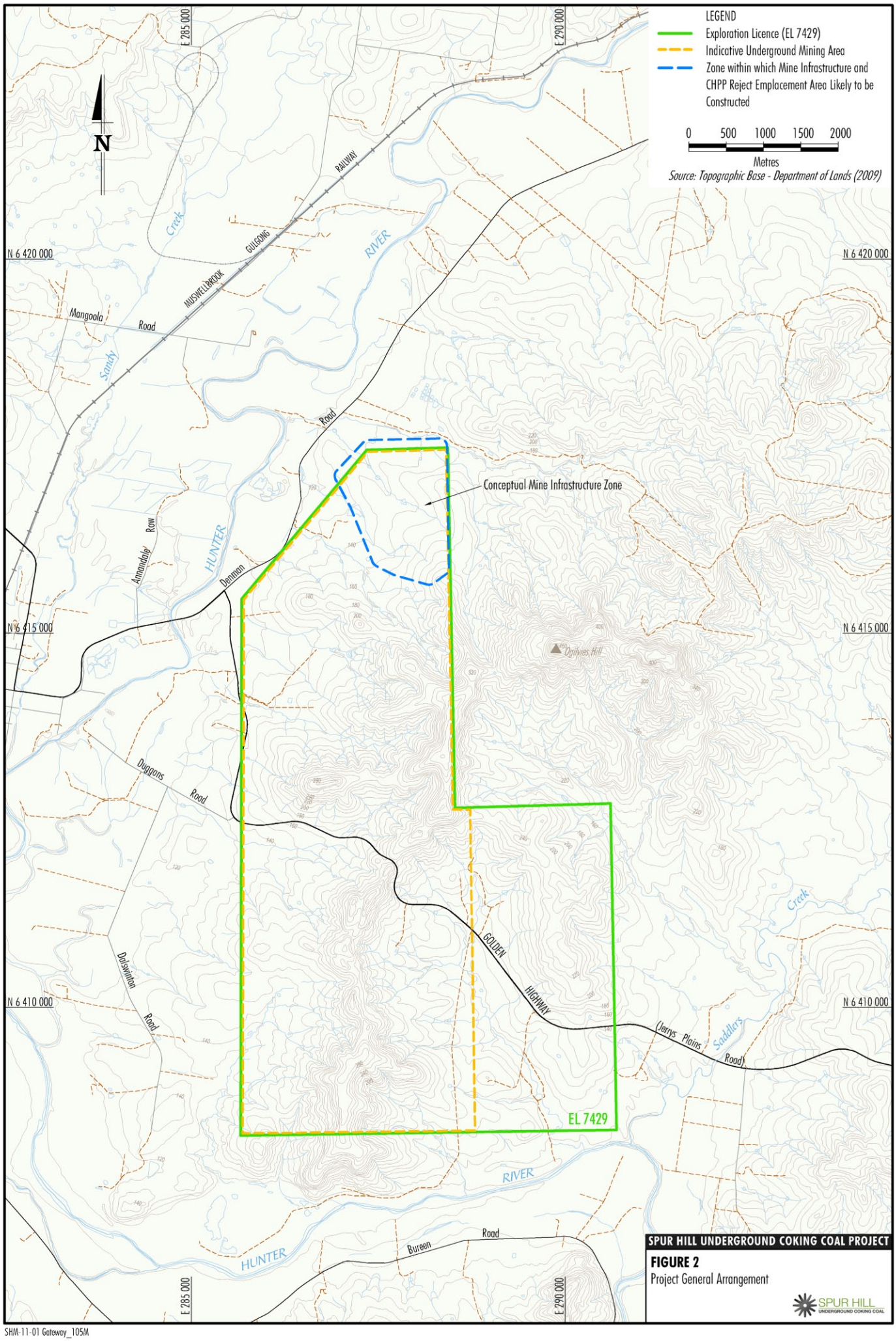
Consultation undertaken by SHM to date in relation to the Project has included:

- Ongoing consultation with local landholders regarding the Project and access for exploration and environmental baseline studies.
- Commencing in 2010, ongoing consultation with representatives of the Division of Resources and Energy (DRE) regarding exploration activities in EL 7429.
- Ongoing consultation with the NSW Department of Planning and Infrastructure (DP&I) regarding the status of environmental baseline studies and the lodgement of this Gateway Application.
- Conceptual Project Development Plan meeting with representatives of the DRE on 21 August 2012, with a status update provided on 14 October 2013.
- Consultation during March 2013 with the DPI (Office of Agricultural Sustainability and Food Security) and Muswellbrook Shire Council about exploration activities in EL 7429.
- Involvement in the Strategic Biodiversity Assessment for Coal Mines in the Upper Hunter Valley with the NSW Office of Environment and Heritage (OEH), DP&I, Department of Trade and Investment, Regional Infrastructure and Services (NSW Trade & Investment) and the Commonwealth Department of the Environment (DotE).
- Meetings with Darley (neighbouring horse stud) on 11 August 2008 (Director Corporate Services) and 9 August 2011 (General Manager).

La Tierra Pty Limited (La Tierra) (Terry Short and Tiffany Thomson) engaged with landholders in the Project area through on-property meetings, inspections and telephone and email discussions.

In addition, Dr David McKenzie (McKenzie Soil Management Pty Ltd [McKenzie Soil Management]) presented the results of the soil surveys to landholders in the Project area that had requested additional information on soil management for their property.

Plate 1 – Soil Surveys within the Project Area



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SHM is committed to contributing to the local community and has provided donations or sponsorship to:

- Denman Public School;
- St Joseph's Primary School;
- Denman Aged Care;
- Dalswinton Rural Fire Service;
- Upper Hunter Education Fund;
- Upper Hunter Wine and Food Affair;
- Denman Children's Centre;
- Denman and Sandy Hollow Junior Rugby League Football Club;
- Denman Rugby League Football Club;
- Denman Men's Shed; and
- Denman Pony Club Showjumping Championships.

SHM has a long-term community contributions plan which will expand as the Project transitions through its development phases and into operations.

Plate 2 – Dalswinton Rural Fire Service

1.6 PROJECT TEAM

The Gateway Application was prepared by Resource Strategies Pty Ltd and La Tierra with specialist input provided by the following organisations:

- SHM project team (*project design, consultation, alternatives and justification*);
- Resource Strategies project team (*co-ordination of specialist studies for Gateway Application*);
- La Tierra (Terry Short and Tiffany Thomson) (*agricultural impact assessment*);
- McKenzie Soil Management (Dr David McKenzie) (*agricultural resource assessment*);
- HydroSimulations (Dr Noel Merrick) (*preliminary groundwater assessment*);
- Mine Subsidence Engineering Consultants (MSEC) (James Barbato) (*subsidence assessment*); and
- Ashurst (*legal review*).

1.7 DOCUMENT STRUCTURE

The documentation supporting the Gateway Application comprises a Technical Overview (this document) and an Agricultural Impact Assessment (AIA).

The AIA prepared by La Tierra is supported by specialist subsidence, soil and groundwater studies (all of which are provided in the supporting documentation for the Gateway Application).

A summary of the sections in this Technical Overview is presented below:

Section 1	Provides an introduction to the Project and this Gateway Application.
Section 2	Provides an overview of the agricultural resource and activities in the Project area and surrounding localities.
Section 3	Provides a concise description of the Project, indicates the types of activities that would be undertaken, provides a Project justification and describes the alternatives considered.
Section 4	Identifies management, mitigation and remediation strategies that would be implemented to minimise the potential impacts on strategic agricultural land.
Section 5	Provides a summary of the assessment of the Project against the relevant criteria for BSAL, Equine CIC and Viticulture CIC.
Section 6	Provides a summary of the key outcomes of the Gateway Application supporting documentation.
Section 7	Lists the documents referred to in Sections 1 to 6 of this Technical Overview.

2 AGRICULTURAL CONTEXT

A brief summary of the agricultural context of the Project area is provided below. Further detail on agricultural enterprises and individual properties is provided in the AIA.

Topography and Water Resources

The topography of the Project underground mining area is dominated by a prominent vegetated ridgeline that trends southwards from near Ogilvies Hill through Denman Gap to the Hunter River in the south (Figures 2 and 3). The area ranges in elevation from a maximum of 330 metres (m) Australian Height Datum (AHD) in the eastern mid-section of the site, to a minimum of 100 m AHD in the south-eastern corner near the Hunter River.

The Project area is within the Hunter River catchment, with the Hunter River passing on the north-western and southern sides of the EL 7429 boundary (Figure 2). The Project area drains to the Hunter River via ephemeral drainage lines from the ridgeline. The drainage lines in the Project area are unnamed first, second, third and fourth order streams. There are no perennial rivers or streams within the boundaries of the area.

The natural groundwater levels within the site are expected to be topographically controlled, with groundwater flowing from higher to lower levels. The site is bounded on two sides by the Hunter River and its associated alluvium. Saddlers Creek and its alluvial tract join the Hunter River near the south-eastern corner of EL 7429 (Figure 2).

In the region, the majority of groundwater usage for agriculture is taken from the Hunter River alluvial aquifer. There is approximately 29,055 ML/year of groundwater entitlement in the Hunter River alluvial aquifer (Department of Water and Energy, 2009).

Land Use

The types of agricultural industries within the surrounding locality include beef cattle, dairy cattle, horse breeding and viticulture (Short and Thomson, 2013).

The land within the Project area is primarily used for agricultural (predominantly cattle grazing), and rural residential purposes. A small vineyard is located on a property in the north-west of the exploration area.

Agricultural enterprises within the Project area are summarised on Figure 3. The most common enterprise within the Project area is producing weaners/vealers on natural pastures (Short and Thomson, 2013). Within the Project area are pockets of denser woodland vegetation (generally on the steeper slopes), which are occasionally used to graze cattle.

Approximately 100 hectares (ha) of irrigated cropping land is located within EL 7429, but outside of the Project underground mining area (Figure 3).

The small vineyard located in the Project area (the Callatoota Estate – Property 9, Figure 3) is comprised of approximately 26 ha of grape vines and includes a small winery which processes and bottles wine from grapes grown on the estate. The estate includes a cellar door. The Callatoota Estate is owned by Spur Hill Agricultural Pty Limited (SHA), a company owned by Spur Hill No. 2 Pty Limited and Spur Hill U.T. Pty Ltd. Other vineyards in the surrounding locality are shown on Figure 4.

No equine enterprises are located within the Project area. While some properties hold horses for private use, no horse agistment at a commercial scale is conducted within the Project area. Horse studs in the surrounding locality are shown on Figure 4.

Infrastructure such as fences, yards, sheds, dips, windmills, troughs and miscellaneous agricultural equipment are located across the Project area. No feedlots are located within the Project area.

Plate 3 – Cattle Grazing within the Project Area

Source: Short and Thomson (2013).

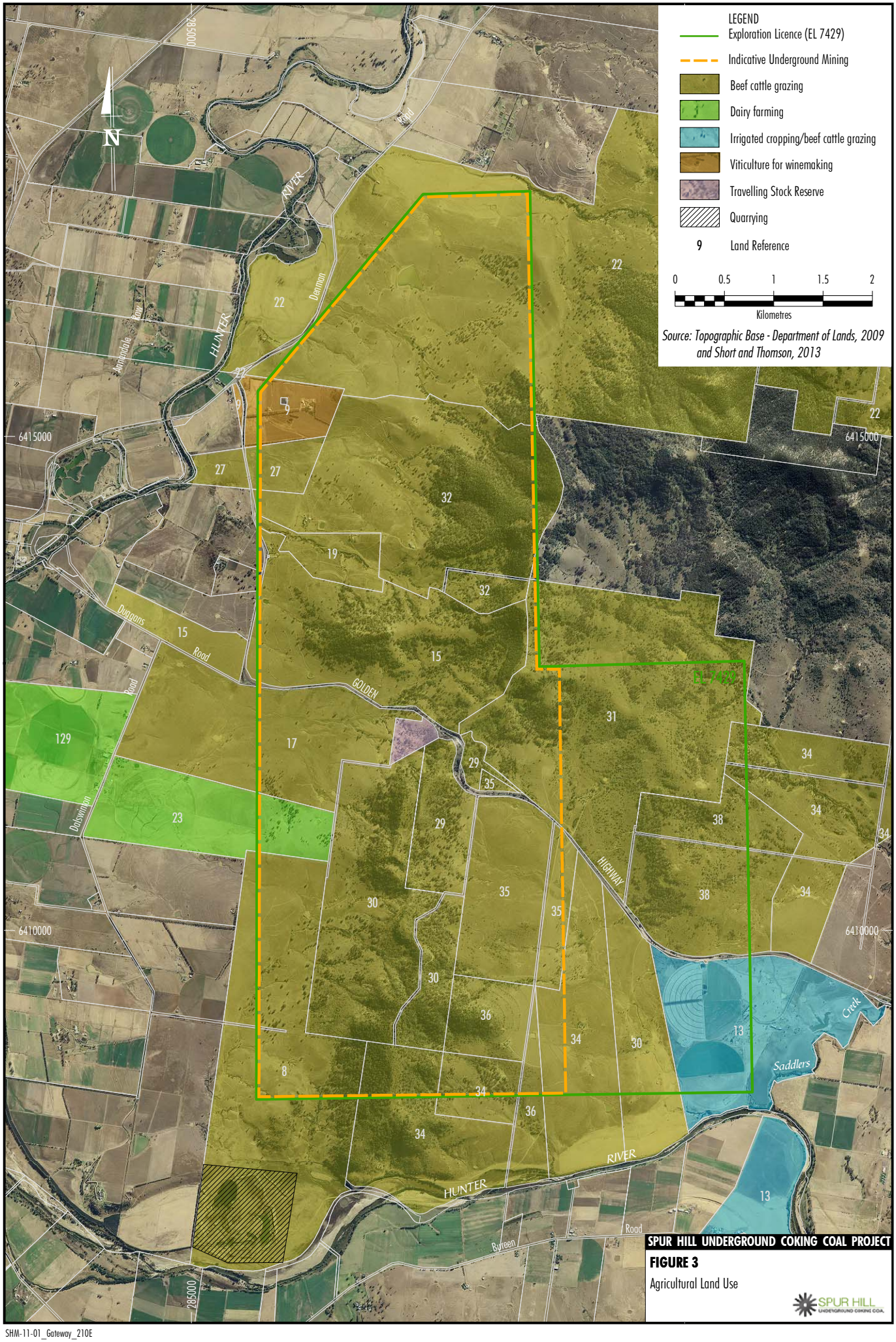

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FIGURE 3

Agricultural Land Use

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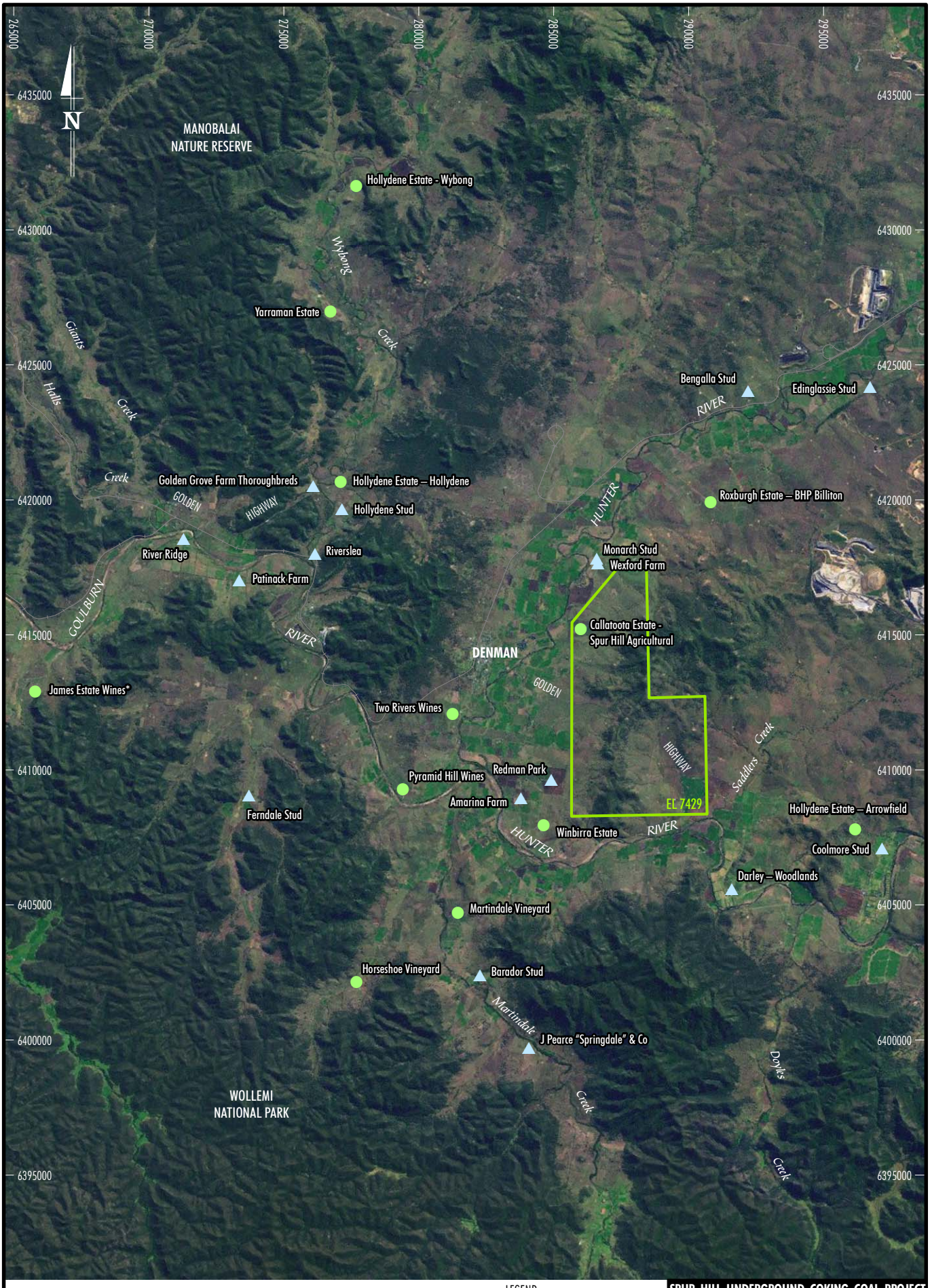

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Detailed production information was collected on each agricultural enterprise by La Tierra during the preparation of the AIA. The estimated annual gross value of agricultural production from within the Project area is $1.25 million, which represents 3.7 percent (%) of agricultural production within the Muswellbrook LGA, 0.6% of agricultural production within the Upper Hunter region, and 0.01% of NSW agricultural production (Short and Thomson, 2013).

3 DESCRIPTION OF THE DEVELOPMENT

The Project is a proposed development of an underground coal mining operation with a mine life of up to 25 years (including construction, development and operation).

The Project underground mining area would be located entirely within EL 7429 (Figure 2). The Project would also include development of facilities for handling, processing and transportation of coal.

Table 1 provides a summary of activities associated with the Project.

3.1 EXPLORATION ACTIVITIES, GEOLOGICAL FEATURES AND COAL RESOURCE

Historic exploration activities undertaken within or near the Project area are summarised in Section 1.3.

EL 7429 was granted on 18 December 2009 for a period of 5 years and SHM commenced exploration activities in early January 2012. Aeromagnetic surveys have been conducted and 26 exploration boreholes have been drilled by SHM to date.

Table 1
Overview of the Spur Hill Underground Coking Coal Project

Project Feature	Project
Mine life	Up to 25 years (including construction, development and operation).
Mining method and ROM coal production	Longwall mining from a number of seams in the Wittingham Coal Measures. Production of approximately 154 million tonnes (Mt) of ROM coal over the life of mine.
Mine infrastructure area	Development of a mine infrastructure area comprising administration offices, bathhouse, workshop compound, store buildings, coal stockpile areas, bunded fuel tank, laydown areas, car parking and access road.
CHPP and train load-out facility	Construction and operation of a CHPP and associated infrastructure. Production of up to 8 Mtpa ROM coal. Construction and operation of a train load-out facility including rail spur and loop. Development of a coal transportation corridor between the mine infrastructure area and train load-out facility.
Ventilation and gas drainage	Development of ventilation infrastructure and gas drainage infrastructure.
Water management	Development of a water management system comprising water storages, sumps, pumps, pipelines, sediment control, mine dewatering, and sewage treatment. Development of a water management strategy based on a detailed site water balance. Water management may include reuse of water on-site, storage of water on-site, licensed water extraction, consideration of treatment and beneficial use and/or release through salinity credits under the Hunter River Salinity Trading Scheme.
Hours of operation	24 hours per day, seven days per week.
Operational workforce	Up to approximately 300 personnel (excluding service providers and general management) at peak production.
Power supply	Power supply infrastructure would be constructed for the Project.
Exploration	Ongoing exploration activities within EL 7429.
Monitoring of subsidence Impacts	Monitoring of subsidence and subsidence impacts over the proposed underground mining and mine development areas.
Remediation and rehabilitation works	Progressive rehabilitation of surface disturbance areas (e.g. exploration drill pads). Ongoing surface rehabilitation, mitigation and remediation works. Rehabilitation of mine related infrastructure areas at the end of the Project life.

During the life of the Project, geological activities would continue to be undertaken ahead of the underground mining operations to investigate geological structure and coal quality as input to detailed mine planning and engineering studies. These activities would include in-seam and surface-to-seam drilling, magnetic, electromagnetic, gravimetric and seismic investigations.

Stratigraphy

The Project is located in the Hunter Coalfield in the northern part of the Permo-Triassic Sydney Basin, which forms the southern portion of the Sydney-Gunnedah-Bowen Basin (Department of Mineral Resources [DMR], 1988).

The target seams are located within the Jerrys Plains Subgroup, forming part of the upper and middle units of the Wittingham Coal Measures (Figure 5). The Jerrys Plains Subgroup consists of banded coal seams that split and merge. Tuffaceous claystones are characteristic throughout the sequence, adding to the banded nature of the coal seams within the Project area (DMR, 1988).

The Wittingham Coal Measures contain a number of mineable seams throughout the Hunter Coalfield, but of these coal seams, the Whynot Seam, Bowfield Seam and the Warkworth Seam are presently considered to be of economic significance to the Project.

Above the target seams, the stratigraphy of the area consists of a sequence of sandstone, siltstone and laminate units within the Wittingham Coal Measures and Newcastle Coal Measures (Figure 5).

Seam Characteristics

A summary of the target seams is provided in Table 2.

Table 2
Seam Characteristics of the Underground Mining Area

Seam	Depth of Cover (m)	Seam Thickness (m)
Whynot Seam	160 – 340	2.5 – 3.5
Bowfield Seam	350 – 490	1.9 – 3.7
Warkworth Seam	400 – 570	2.4 – 5.0

Source: MSEC (2013).

The Whynot Seam would produce high quality ultra low ash soft coking coal. The Bowfield Seam would produce a high quality semi-soft coking coal. The Warkworth Seam would produce a combination of both thermal and semi-soft coking coal.

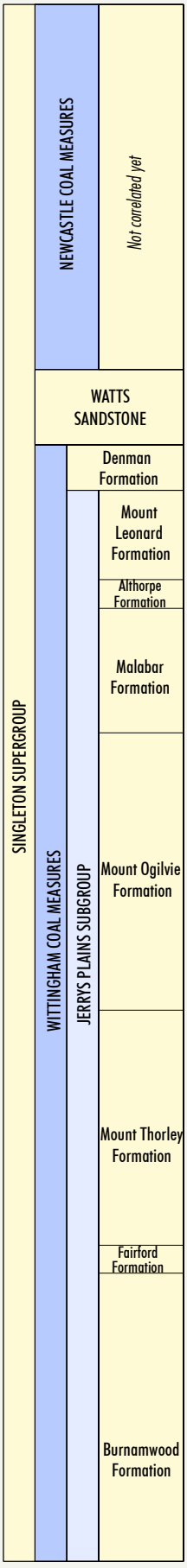
Coal Resource

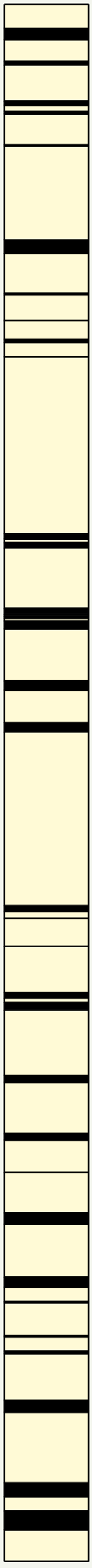
The indicated and inferred coal resource within the target seams (Whynot, Bowfield and Warkworth) in the underground mining area is approximately 252 Mt. The target recoverable coal from these seams for the Project is approximately 154 Mt of ROM coal.

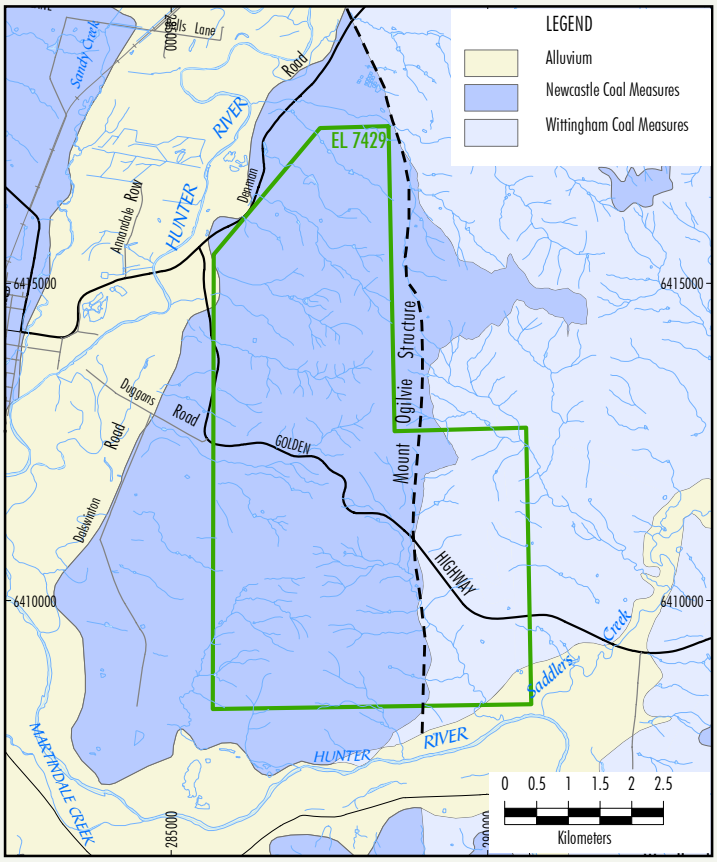
3.2 PROJECT ACTIVITIES

The Project general arrangement is shown on Figure 2. The Project would include the following activities:

- longwall mining from a number of seams in the Wittingham Coal Measures within the underground mining area of EL 7429 for a mine life of up to 25 years;
- production of up to 8 Mtpa ROM coal;
- development of mine access drifts and mine infrastructure area, including administration offices, bathhouse, workshop compound, store buildings, coal stockpile areas, bunded fuel tank, laydown areas, car parking and access road;
- development of ventilation surface infrastructure and gas drainage infrastructure;
- construction and operation of a CHPP;
- development of coal transportation infrastructure;
- construction and operation of train load-out facility including rail spur and loop;
- emplacement of waste rock excavated during the construction of access drifts and shafts, and CHPP coarse rejects and fines generated during the initial processing of ROM coal;
- progressive development of sumps, pumps, pipelines, water storages and other water management equipment and structures;
- ongoing exploration activities within EL 7429;
- surface monitoring, rehabilitation and remediation of subsidence effects; and
- other associated minor infrastructure, plant, equipment and activities.







Source: Topographic Base - Department of Lands, 2009; MGBS, 2013 and Geological and Mining Services Australia, 2013

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FIGURE 5
Geology of the Project Area

SPUR HILL UNDERGROUND COKING COAL

Development Activities

The initial construction phase of the Project would be approximately 2 years and would include the following activities.

Site Access and Site Services

- Construction of an access road from Denman Road to the mine infrastructure area.
- Installation of temporary erosion and sediment controls (e.g. filter fencing and bales).
- Development of administration offices, bathhouse, workshop compound, store buildings, bunded fuel tank, laydown areas and car parking.
- Construction of water management infrastructure, including sumps, pumps, pipelines, water storages and other water management equipment and structures.
- Installation of ancillary infrastructure (e.g. internal roads, electrical infrastructure, potable water supply, sewage treatment, site security).

Coal Handling Infrastructure

- Construction of ROM coal and product coal handling areas.
- Construction of a CHPP.
- Construction of train load-out facility including rail spur and loop.
- Construction of coal handling and transportation infrastructure between the mine access drifts, ROM coal handling area, CHPP and train load-out facility.

Mine Access and Underground Mine Development

- Excavation of a boxcut, portals and mine access drifts and use/emplacement of excavated waste rock during construction activities (e.g. for visual bunding, hardstand areas, dam embankments and road embankments).
- Installation of ventilation infrastructure.
- Delivery and assembly of mining equipment.
- Development of underground main roadways and gate roads for longwall panels.
- Installation of underground conveyor systems.
- Delivery and installation of longwall mining machinery.

Other development activities that would occur over the life of the Project would include:

- development of ventilation surface infrastructure and gas management systems;
- progressive development and augmentation of sumps, pumps, pipelines, water storages and other water management equipment and structures;
- progressive development of the underground conveyor systems and services; and
- replacements and upgrades to roadway development and longwall mining machinery.

Underground Mining Operations

The Project would involve mining from the following coal seams (Figure 5) using longwall mining methods:

- **Whynot Seam;**
- **Bowfield Seam; and**
- **Warkworth Seam.**

The Wambo Seam may be mined opportunistically where the Whynot and Wambo Seams coalesce or preferentially to the Whynot Seam in some locations where the Wambo Seam characteristics are better than the Whynot Seam. The locations where the Wambo Seam may be mined will be finalised as part of further exploration and planning and documented in the EIS.

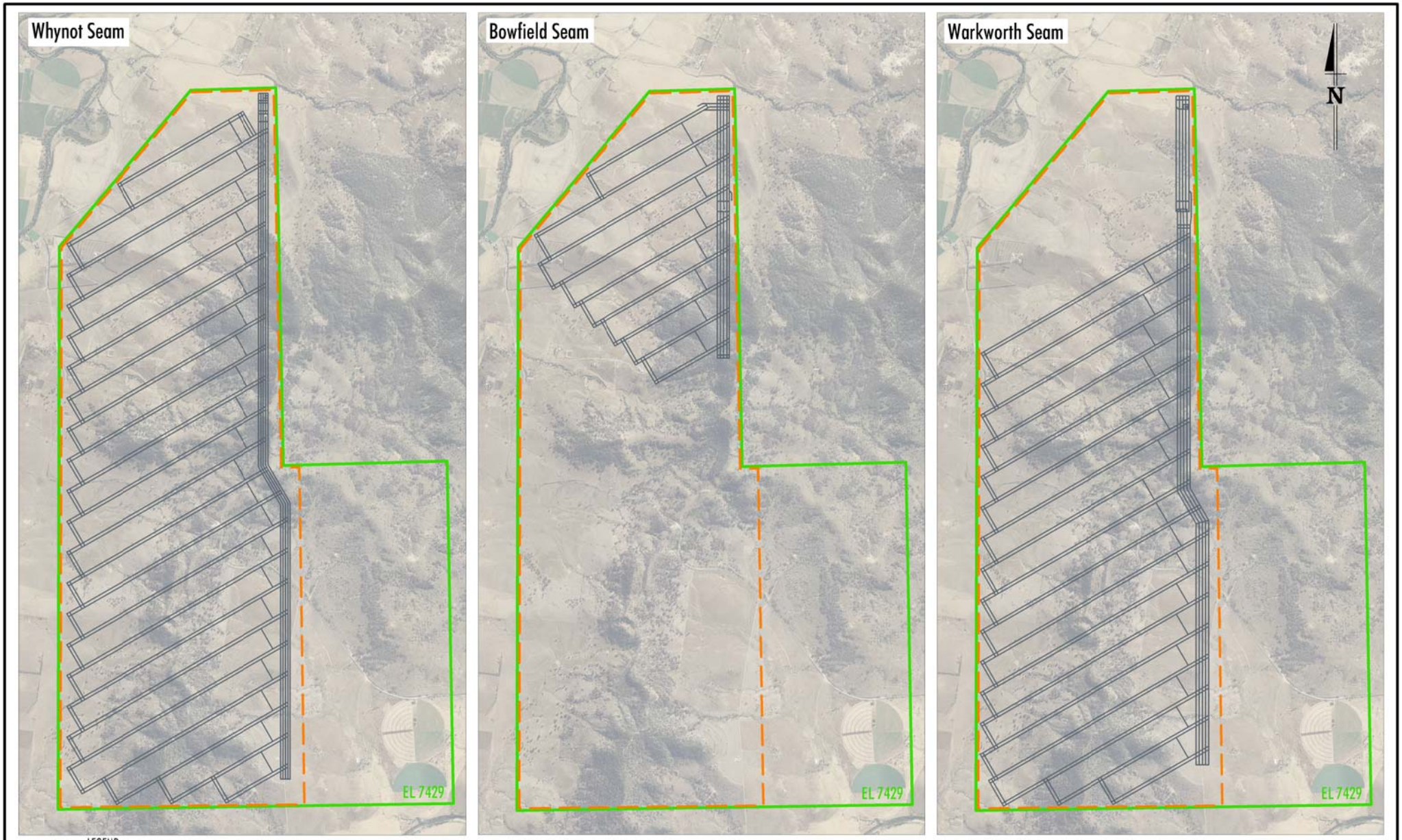
Longwall mining would occur from one longwall unit. Underground mining activities would be undertaken 24 hours per day, 7 days per week.

The full seam thickness would be extracted where possible during the Project underground operations. Mining would be constrained by a practical minimum extraction thickness of 1.8 m and a practical maximum extraction thickness of 4.5 m.

During the development of the EIS and over the life of the Project, the mining layout may vary from that shown on Figure 6 to take account of the outcomes of further geological work and planning, including: localised geological features; mine economics; coal market demand; detailed mine design considerations; and adaptive management.

The mining layout over any given period would be documented in the relevant Mining Operations Plan and Extraction Plans.

Longwall mining involves extraction of rectangular panels of coal defined by underground roadways constructed around each longwall block.



SPUR HILL UNDERGROUND COKING COAL PROJECT

FIGURE 6
Indicative Mining Layout

SPUR HILL UNDERGROUND COKING COAL

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The shearer associated with the longwall travels back and forth across the width of the coal face progressively removing coal in slices from the panel. Once each slice of coal is removed from the longwall face, the hydraulic roof supports are moved forward, allowing the roof and a portion of the overlying rock to collapse behind the longwall machine (referred to as forming the 'goaf').

Extraction of coal by longwall mining methods results in the vertical and horizontal movement of the land surface. The land surface movements are referred to as "subsidence effects".

The type and magnitude of subsidence effects is dependent on a range of variables which include the mine geometry and topography, the depth of mining, the number of seams mined, the coal recovery from each seam, the nature of overlying strata and other geological factors.

Predictions of the likely subsidence effects and impacts from the longwall mining operations are provided in the Subsidence Assessment (MSEC, 2013) appended to the AIA. The consequences of the subsidence on agricultural activities are assessed in the AIA.

Other associated infrastructure and activities would include:

- personnel and materials access via main drifts from a mine infrastructure area;
- materials handling and transport systems to convey coal from the longwall and development faces to the surface;
- underground equipment (e.g. shearers, continuous miners, conveyors, bins) and mobile fleet (e.g. load haul dump vehicles, drill rigs, shuttle cars, personnel carriers);
- ventilation systems for air intake and to exhaust air from the mining areas;
- gas management systems to monitor and control the concentrations of mine gases; and
- water management systems to transfer groundwater that accumulates in underground workings to the surface.

The final location of surface infrastructure (where required) would be determined through detailed mine planning, environmental assessment outcomes and consideration of alternatives, and would be documented in the EIS.

Infrastructure and Services

A mine infrastructure area would be developed on Property 22 in the northern portion of EL 7429 or on Property 22 directly adjacent to EL 7429 (Figures 2 and 3).

The location and design of the mine infrastructure area would be determined through detailed mine planning, environmental assessment outcomes and consideration of alternatives, and would be documented in the EIS. The mine infrastructure area is anticipated to involve approximately 80 ha of disturbance.

The mine infrastructure area would comprise the following:

- boxcut and portals, mine access drifts, shafts and ventilation infrastructure;
- ROM and product coal stockpiles and handling areas and associated conveyors;
- CHPP and associated conveyors, transfer points and surge bins;
- administration offices and workers amenities (e.g. bathhouse);
- workshop compound, store buildings and bunded fuel tank area;
- laydown areas and car parking;

Plate 4 – View from Ridgeline Looking South

- water management infrastructure, including sumps, pumps, pipelines, water storages and other water management equipment and structures; and
- other ancillary infrastructure (e.g. internal roads, electrical infrastructure, potable water supply, sewage treatment, site security).

Access to the mine infrastructure area would be via a dedicated sealed access road from Denman Road.

ROM Coal Handling and Coal Preparation

A CHPP (coal handling and preparation plant) would be constructed and operated as a component of the Project. ROM coal would be stockpiled at the mine infrastructure area prior to feeding to the CHPP.

The CHPP would be typical of those in the Hunter Valley with the capability of producing various products, notably: soft coking coal, semi-soft coking coal, and export quality thermal coal.

CHPP Reject Management

Approximately 25 million bank cubic metres of CHPP reject material would be produced over the life of the Project, including coarse and fine rejects. Fine rejects would be dewatered.

The Project would require emplacement areas for the management and disposal of coarse and fine rejects generated during the initial processing of ROM coal at the CHPP.

The location and design of emplacement areas would be determined through detailed mine planning, environmental assessment outcomes and consideration of alternatives, and would be documented in the EIS.

The active emplacement area would be kept to a practicable minimum and as each section of fill reaches the designed height and landform, topsoil would be applied and revegetation works would be commenced.

As part of the Project mine planning and environmental assessment process, SHM is investigating the feasibility of complementary options for the management of coarse and fine rejects during the Project life, including beneficial uses and/or underground emplacement.

Water Management

The Project water management strategy would be developed as part of the detailed site water balance model and would be based on the following:

- separation of undisturbed area runoff from disturbed area runoff;
- collection and reuse of surface runoff from disturbed areas;
- capture of groundwater inflows and reuse as process water;
- storage of water on-site;
- licensed water extraction to supplement water supply; and
- consideration of treatment and beneficial use and/or release through salinity credits under the Hunter River Salinity Trading Scheme.

A site water balance model would be developed for the Project as part of the EIS as it is requires detailed mine planning.

Plate 5 – Ephemeral Streams in the Project Area

Rehabilitation Activities, Remediation Works and Offsets

The Project rehabilitation programme would include:

- progressive rehabilitation of minor Project surface disturbance areas; and
- rehabilitation of surface disturbance areas at the cessation of the Project, such as the mine infrastructure area.

The final land use of the mine infrastructure area would include areas for agricultural land uses and would be developed through the EIS process, as it requires detailed consultation with relevant stakeholders.

Minor Project surface disturbance areas that would be progressively rehabilitated include those associated with surface exploration activities, surface gas drainage works, access tracks, environmental monitoring and management activities (e.g. installation of monitoring equipment) and mine subsidence surface impacts. These areas would be rehabilitated to their previous land use (e.g. agricultural use or native vegetation).

A Subsidence Assessment has been undertaken for the AIA which indicates that surface mine subsidence impacts may include surface cracking and land deformation, changes to water drainage, changes to surface water resources, changes to groundwater resources and impacts to built features that may affect agricultural land use (MSEC, 2013). Potential subsidence impacts are described further in Section 5 and MSEC (2013).

Remediation would be undertaken as required during Project operations to minimise hazards to persons, livestock and native fauna and long-term potential environmental impacts.

A biodiversity offset package may be developed as part of the EIS for disturbance of native vegetation to maintain or improve biodiversity in the long-term (consideration of biodiversity impacts is not required for the Gateway Application). The location of any biodiversity offset areas would be subject to detailed survey and assessment.

3.3 ACTIVITIES NOT THE SUBJECT OF THIS GATEWAY APPLICATION

The train load-out facility (including rail spur and loop), product coal transportation infrastructure and other linear infrastructure (e.g. power supply infrastructure, water supply pipelines) would not require a mining lease and therefore do not fall within the definition of “mining or petroleum development” under clause 17A of the Mining SEPP. These activities would not require a Gateway Certificate and have been excluded from this Gateway Application.

The location of the train load-out facility (including rail spur and loop), product coal transportation infrastructure and other linear infrastructure would be documented and assessed in the EIS.

Plate 6 – Example of Subsidence Remediation

3.4 WORKFORCE

Employment of up to approximately 400 personnel would be required for the construction of the Project. The construction phase would be approximately 2 years.

During operation, the Project would employ up to 300 personnel.

3.5 SUMMARY OF PROJECT DISTURBANCE AREAS

Surface development for the Project that is the subject of this Gateway Application would disturb approximately 200 ha and would include the mine infrastructure area, emplacement of rock excavated during the construction of access drifts and shafts, emplacement of CHPP rejects, ventilation and gas drainage infrastructure, service boreholes and exploration activities.

This disturbance may involve minimal temporary disturbance (<1 ha) to BSAL associated with ventilation and gas drainage infrastructure, service boreholes, exploration activities and remediation activities.

3.6 PROJECT JUSTIFICATION OVERVIEW

The Project would facilitate the creation of employment opportunities for up to 300 employees during the operational phase of the Project. The Project would generate annual royalties to the State in the order of $40 million to $60 million, in addition to other Federal government contributions, such as tax payments.

Full justification of the Project on social, environmental and economic grounds, including consideration of the principles of Ecologically Sustainable Development and a cost benefit analysis, would be included in the EIS.

Alternatives Considered

Alternatives to the proposed location, mining methods and scale have been considered by SHM in the development of the Project description. An overview of the alternatives considered is provided in the points below:

- **Project Location** – the location of the Project is determined by the presence of coal seams, exploration tenure and ability to transport product coal to market.
- **Mining Method** – the Project is solely an underground mining operation which mitigates local issues, notably dust, visual amenity and impacts to agricultural resources. The Project does not include any open cut mining. Due to the coal seam thickness and strike, longwall mining methods are the preferred mining method over bord and pillar.
- **Scale** – the indicated and inferred resources within the Whynot, Bowfield and Warkworth Seams is estimated at approximately 252 Mt (as at November 2013). Resource definition and exploration drilling conducted by SHM indicates that these seams are the most optimal seams for an underground mining operation.

Alternatives to be Considered

Further consideration of alternatives to location, scale, methods and management would be undertaken as a component of comprehensive assessment undertaken for the EIS. These alternatives will include:

- locations for surface infrastructure (mine infrastructure area, CHPP, train load-out facility) in consideration of detailed mine planning and environmental assessment outcomes (e.g. potential impacts on ecology and amenity);
- options for transportation of coal to the train load-out facility, for example traditional conveyors or new-technology conveyors;
- opportunities for the use of coal processing and train load-out facility at nearby mining operations as an alternative to the development and operation of a new CHPP and train load-out facilities for the Project;
- panel layout, panel width and pillar width, in consideration of mine economics, safety, subsidence and environmental aspects;
- measures to avoid, mitigate, rehabilitate/remediate, monitor and/or offset the potential impacts of the Project; and
- options for the management of coarse and fine rejects (e.g. beneficial uses and/or underground emplacement).

4 STRATEGIES TO MINIMISE POTENTIAL IMPACTS ON AGRICULTURAL LAND

4.1 MINE PLANNING AND DESIGN

SHM is still undertaking detailed mine planning, environmental assessment and consideration of alternatives. The outcomes of these processes would be documented in the EIS.

SHM would consider impacts on agricultural resources and enterprises during the mine planning and design process.

The mine infrastructure area and CHPP reject emplacement areas would be designed and located to avoid impacts on BSAL.

4.2 SUBSIDENCE MANAGEMENT

Subsidence Management Plan/Extraction Plan Process

Prior to causing any subsidence, the Project would be required to prepare and submit a Subsidence Management Plan (SMP) for approval by the DRE. This is an approval required by standard conditions of mining leases for underground coal mines in NSW.

In addition, it is likely that any Development Consent would include a requirement for an Extraction Plan that would be prepared to the satisfaction of DP&I.

SMPs and/or Extraction Plans would be required to include a Property Subsidence Management Plan for each individual property that may be affected.

It is noted that the Project is located within the Muswellbrook Mine Subsidence District proclaimed under the NSW *Mine Subsidence Compensation Act, 1976*. Within proclaimed mine subsidence districts, it is mandatory to obtain the Mine Subsidence Board's approval to subdivide, erect or alter any improvements on land.

A Property Subsidence Management Plan would be provided to the landholder/occupier prior to mining in the area and would include:

- **easy-to-read plan of the property in relation to the final mining layout;**
- **details of predicted subsidence impacts and associated probabilities of these impacts occurring;**
- **the expected timing of mine subsidence;**
- **a specific subsidence monitoring plan to monitor subsidence impacts during and following mining, including visual inspections and structure surveys;**
- **implementation of appropriate pre-mining mitigation measures to minimise impacts, where appropriate;**
- **development of appropriate remedial measures for any subsidence impacts, including a process to mitigate, repair, replace or compensate any impacts in a timely manner;**
- **development of Trigger Action Response Plans; and**
- **contact details for SHM should any further information be required.**

SHM would develop a built features management plan for the Golden Highway in consultation with Roads and Maritime Services, Mine Subsidence Board, Muswellbrook Shire Council, and other stakeholders and technical experts. This specific management plan would contain monitoring methodologies and schedules, and management responses to maintain safety and serviceability of the Golden Highway.

Subsidence Management and Remediation

Temporary remedial actions to mitigate the potential subsidence impacts could include the following:

- erection of temporary electric fencing to maintain paddock-level stock security during subsidence;
- construction of temporary stock watering systems to maintain paddock-level grazing viability during subsidence (e.g. tanks and troughs);
- regrading of farm access tracks during and post subsidence;
- erosion control measures in surface drainage lines;
- repair of vineyard infrastructure, including trellises and irrigation systems; and
- drainage works to prevent ponding or semi-permanent submersion of BSAL.

Remediation of grazing land affected by subsidence would be undertaken as required during Project operations to minimise hazard to persons, livestock and native fauna and long-term potential environmental impacts.

The requirement and methodology for any subsidence remediation techniques would be determined in consideration of:

- potential impacts of the unmitigated impact, including potential risks to public safety and the potential for self-healing or long-term degradation;
- potential impacts of the remediation technique, including site accessibility; and
- consultation with relevant stakeholders (including landholders).

Remediation would generally be undertaken using conventional earthmoving equipment (such as backhoe or grader), and would include:

- in-fill of minor surface cracks by cultivation of the ground surface;
- in-fill of larger surface cracks with suitable soil or other material;
- localised reshaping to limit the potential for water ponding; and/or
- stabilisation of disturbed areas with temporary erosion controls (e.g. silt fences) and long-term measures (e.g. vegetation planting).

Plate 7 – Fencing of Subsidence Cracks Prior to Remediation

Minor cracks (i.e. less than 50 millimetres [mm]) that develop are not expected to require remediation as geomorphological processes would result in these cracks filling naturally over time.

4.3 MANAGEMENT OF WATER RESOURCES

Management of water resources would include:

- holding appropriate water licences under the *Water Management Act, 2000* and *Water Act, 1912* for any water taken directly or incidentally for the Project;
- management of potential impacts on groundwater users; and
- ongoing groundwater monitoring and validation of the groundwater model throughout the Project life.

These aspects are described further below.

Water Licensing

Under the *Water Management Act, 2000*, all water taken by aquifer interference activities is required to be accounted for within the extraction limits set by any relevant Water Sharing Plans. The Water Sharing Plans relevant to the Project are the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009* (the HUAWSP) and the *Water Sharing Plan for the Hunter Regulated River Water Source, 2003* (HRRWSP). Therefore, licensing under the *Water Management Act, 2000* is required to account for any loss of water resulting from the Project to the water sources to which the abovementioned Water Sharing Plans apply.

Licensing to account for water taken from the coal seams and adjacent hardrock under the NSW *Water Act, 1912* is also required for any mine inflows from the porous rock aquifer.

The predicted annual groundwater volumes required to be licensed over the life of the Project are summarised in Table 3.

SHA currently holds aquifer access licences (WAL 18196 and WAL 18201) under Part 2 of the *Water Management Act, 2000*, which have a combined entitlement of 125 unit shares under the HUAWSP. SHA also holds regulated river (general security) licences (WAL 1143, WAL 1220, WAL 770 and WAL 771) under Part 2 of the *Water Management Act, 2000*, which have a combined entitlement of 1,222 unit shares under the HRRWSP. SHA holds regulated river (high security) licence WAL 769 with an entitlement of 3 unit shares.

It is considered these licences would be adequate to account for the potential indirect take of water from the alluvial aquifer and Hunter River associated with the Project (HydroSimulations, 2013). The predicted take would be refined during the development of the EIS and over the progression of the Project life to more accurately predict potential take.

There is no embargo on licences in the Hunter under the *Water Act, 1912*. SHM will apply for adequate licences for take associated with the porous rock aquifer prior to Project commencement.

SHM will also obtain any necessary surface water licences required for operational purposes under the HUAWSP or the HRRWSP.

Management of Potential Impacts on Groundwater Users

There would be no appreciable drawdown impacts within the highly productive Hunter River alluvial aquifer as a result of the Project.

Drawdown impacts are predicted within the less productive Permian strata that may affect some groundwater users.

Table 3
Estimated Water Licensing Volumes

Regulatory Instrument	Management Zone/ Water Source	Predicted Annual Volume Requiring Licensing (Megalitres per Year)	
		During Project Operation	Post-Mine Closure
Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009	Hunter Regulated River Alluvial Water Source (u/s Glennies Creek Management Zone)	Average: 0 Maximum: 0	Average: 4 Maximum: 6
Water Sharing Plan for the Hunter Regulated Water Source, 2003	Hunter River Management Zone 1	Average: 0 Maximum: 0	Average: 11 Maximum: 17
Water Act, 1912	Porous Rock (Hunter Extraction Management Unit)	Average: 1,230 Maximum: 1,750	Average: <1 Maximum: <1

Source: HydroSimulations (2013).

The modelled drawdown effects on local groundwater aquifers are preliminary results that would be refined for the EIS. During the mine life SHM would use the results of a groundwater monitoring programme, and additional geological and hydrogeological information to refine the groundwater model and model predictions.

In order to prevent Project-induced impacts on the water supply availability of non-SHM owned bores, SHM would develop and implement a Groundwater Management Plan. The Plan would include:

- a compilation of the available information on the construction and use of each existing bore and spring in the potentially affected area;
- details of an inspection of each bore by a suitably qualified hydrogeologist (where permission from the owner was granted);
- details of the groundwater monitoring programme (location, parameters, frequency and reporting) to be used by SHM to monitor and detect impacts on local aquifers; and
- details of monitoring triggers and corresponding measures to mitigate Project-induced impacts on water supply availability.

Mitigation measures could include, but are not necessarily limited to lowering of pumps, deepening of bores, or provision of new bores/alternative water supplies.

Groundwater Monitoring and Model Validation

SHM has implemented a baseline groundwater monitoring network for the Project. The monitoring network established for the Project would be maintained, and regular measurement of groundwater levels within all vibrating wire piezometers and standpipes would be conducted.

Plate 8 – Groundwater Monitoring in the Project Area

Monitoring of groundwater inflow rates and the quality of groundwater inflow would also be conducted once mining commences.

The groundwater model predictions for the Project would be validated following the completion of mining of the first longwall panel. Further reviews of the groundwater model would be conducted every five years during the Project life.

Should actual groundwater levels/inflows significantly differ from those predicted, an adaptive management approach would be applied to manage potential impacts.

4.4 MANAGEMENT OF VISUAL AMENITY IMPACTS

Building materials for the mine infrastructure area would be non-reflective and appropriately coloured in shades such as green and beige to merge with the natural landscape. A visual screen and/or bund would be constructed adjacent to the Denman Road easement to further minimise potential visual impacts.

Attention would be given to restrict lighting so that lights are not directed towards Denman Road, including the use of directional lighting where possible.

4.5 REHABILITATION

Minor Project surface disturbance areas that would be progressively rehabilitated include those associated with surface exploration activities, surface gas drainage works, access tracks, environmental monitoring and management activities (e.g. installation of monitoring equipment) and mine subsidence surface impacts. These areas would be rehabilitated to their previous land use (e.g. agricultural use or native vegetation).

Other surface disturbance areas, including the mine infrastructure area, would be rehabilitated at the cessation of the Project.

The final land use of the mine infrastructure area would include areas for agricultural land uses and would be developed through the EIS process, as it requires detailed consultation with relevant stakeholders.

Other than clearing vegetation, general soil resource management practices would involve the stripping and stockpiling of soil resources prior to any mine-related disturbance.

The objectives of soil resource management for the Project would be to:

- Identify and quantify potential soil resources for rehabilitation.
- Optimise the recovery of useable topsoil and subsoil during stripping operations.
- Manage topsoil and subsoil reserves so as not to degrade whilst stockpiled.
- Establish effective soil amelioration procedures to maximise the availability of soil for future rehabilitation.
- Take into account the need to provide soil conditions that minimise the risk of soil loss via wind and water erosion during and after rehabilitation.

McKenzie Soil Management has developed detailed soil resource management measures that would be considered in the preparation of the EIS and Rehabilitation Management Plan for the Project.

4.6 MANAGEMENT OF SHM-OWNED LAND

SHA-owned land will continue to be leased or licensed to allow similar agricultural activities to continue on the property. SHA will maintain viticulture activities at the Callatoota Estate vineyard while there is demand for these products.

SHA has also implemented land improvement works, such as fence and track repairs, where possible, to improve the properties it owns. SHA has undertaken improvements at the vineyard and winery including instituting a vineyard management program aimed at returning the existing vines to full productivity and upgrading certain structural features within the winery.

4.7 ONGOING CONSULTATION ACTIVITIES

A stakeholder engagement programme has been developed for the Project. Key objectives of this programme are to:

- inform government and public stakeholders about the progress and nature of the Project;
- recognise and respond to local interest or concerns regarding the Project; and
- continue the ongoing dialogue between local landholders and SHM.

Stakeholder consultation, including engagement with landholders affected by the Project area, will continue throughout each phase of the Project.

The issues raised and outcomes of the stakeholder engagement programme would be reported in the EIS.

The EIS consultation programme would include a variety of consultation mechanisms such as:

- public availability of key documents (e.g. the request for Director-General's Requirements and the EIS);
- provision of Project information on the SHM website (www.spurhillunderground.com.au/) and Malabar Coal website (www.malabarcoal.com.au);
- ongoing consultation with the local community and landowners, including formation of a Community Consultative Committee following the grant of a Gateway Certificate;
- meetings with the general community including Aboriginal groups and directly affected landowners;
- meetings with relevant government agencies; and
- community information brochures and community information sessions.

The consultation would include, but not necessarily be limited to, the following government agencies and authorities:

- DP&I;
- OEH (including the Heritage Branch);
- NSW Environment Protection Authority;
- NSW Trade & Investment (including the DRE);
- DPI (including the NSW Office of Water and Agriculture NSW);
- NSW Roads and Maritime Service;
- NSW Treasury;
- Mine Subsidence Board;
- Muswellbrook Shire Council; and
- DotE.

Consultation with the Australian Rail Track Corporation (ARTC) and coal chain operators would be undertaken to discuss potential rail movements. Consultation would also be conducted with Port Waratah Coal Services and Newcastle Coal Infrastructure Group.

SHM will consult with nearby mining operations to investigate opportunities for infrastructure sharing and management of potential cumulative impacts.

5 CONSIDERATION OF GATEWAY CRITERIA

5.1 BIOPHYSICAL STRATEGIC AGRICULTURAL LAND

Verification of Biophysical Strategic Agricultural Land

A site inspection and soil survey was conducted as part of the Agricultural Resource Assessment by McKenzie Soil Management and included 159 soil test pits across the Project area and immediate surrounds.

Based on the site inspection and soil survey, McKenzie Soil Management conducted an assessment of the BSAL status across the Project area in accordance with the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (Interim Protocol) (NSW Government, 2013a). The Interim Protocol outlines 12 steps that must be satisfied to meet BSAL characteristics (Figure 7).

The ridgeline through the Project area has slopes greater than 10% (Figure 8) and therefore cannot be considered BSAL under the Interim Protocol. The majority of soil test pits (92%) did not meet the criteria for BSAL, with salinity and alkalinity in the subsoil being the main limiting factors (McKenzie Soil Management, 2013).

One soil map unit, Soil Landscape 'LSc', had a dominant Dermosol soil type with BSAL characteristics and comprised an area greater than 20 ha (Figure 8). This soil map unit is located on the lower slopes and is derived from colluvium. This area (86 ha) is considered to be verified BSAL for the purpose of this Gateway Application.

Consideration of Relevant Criteria

The AIA prepared by La Tierra includes an assessment of the potential impacts of the Project on BSAL, including consideration of the relevant criteria in the Mining SEPP. A summary of this assessment is provided in Table 4. The assessment indicates that the Project would not significantly reduce the agricultural productivity of any BSAL

Plate 9 – Soil Test Pit 55 with BSAL Characteristics

Source: McKenzie Soil Management (2013).

Short and Thomson (2013) note that for the mining of any coal resource, the underground longwall mining method has lower-order potential impacts on agriculture than open cut mining.

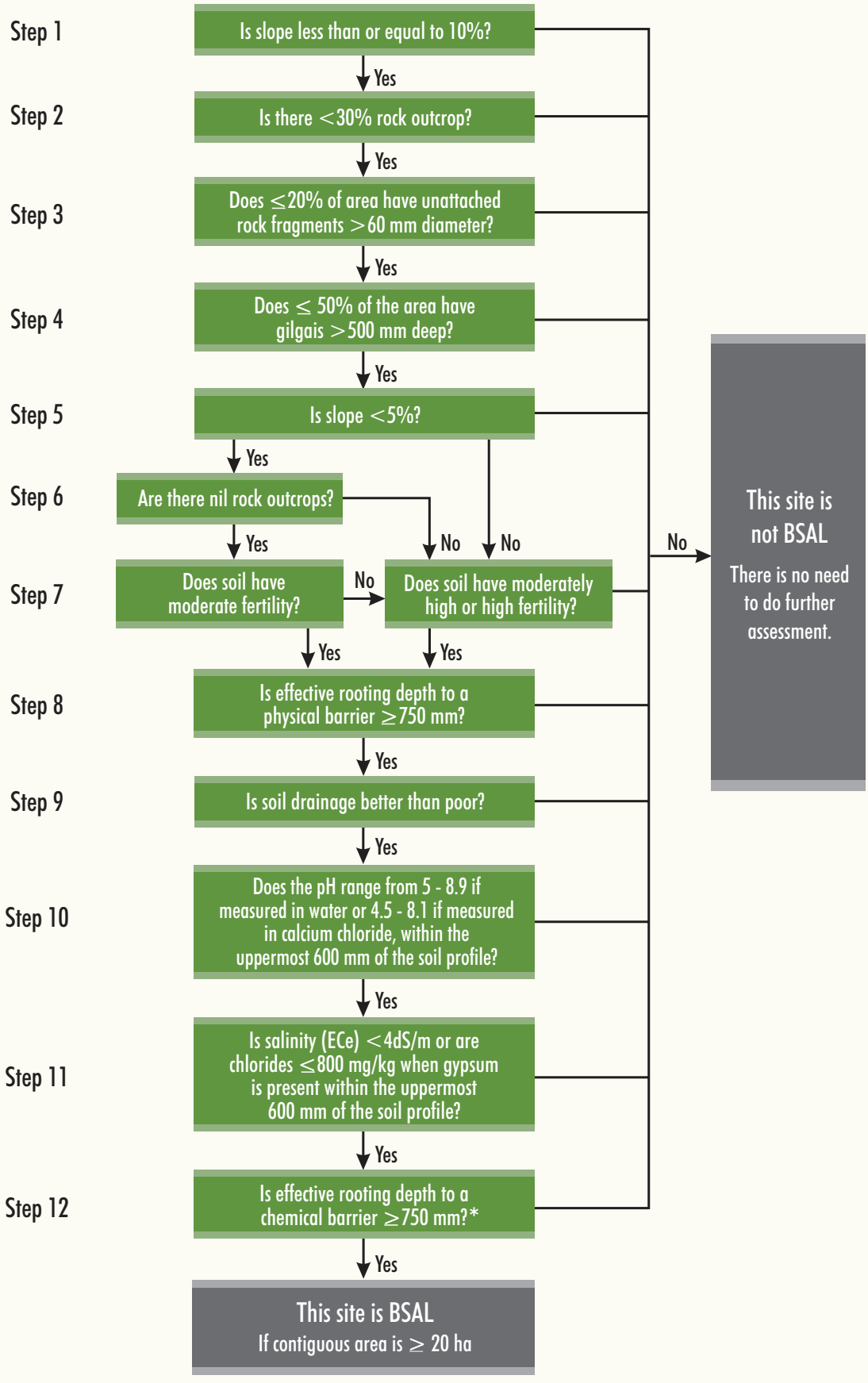
The foremost agricultural impacts of underground longwall mining are the nature, extent and timing of surface subsidence, and the location and lifespan of surface infrastructure.

The majority of Project infrastructure the subject of this Gateway Application would not be located on verified BSAL. The Project may involve minimal temporary disturbance (<1 ha) to BSAL associated with ventilation and gas drainage infrastructure, service boreholes, exploration activities and remediation activities.

Potential Subsidence Impacts

La Tierra has assessed the potential impacts of subsidence on BSAL supported by a Subsidence Assessment prepared by MSEC.

Subsidence may cause surface cracking and land deformation, changes to water drainage, changes to surface water resources, changes to groundwater resources and impacts to built features that may affect agricultural land use.



* In accordance with Section 6.10 of the Interim Protocol

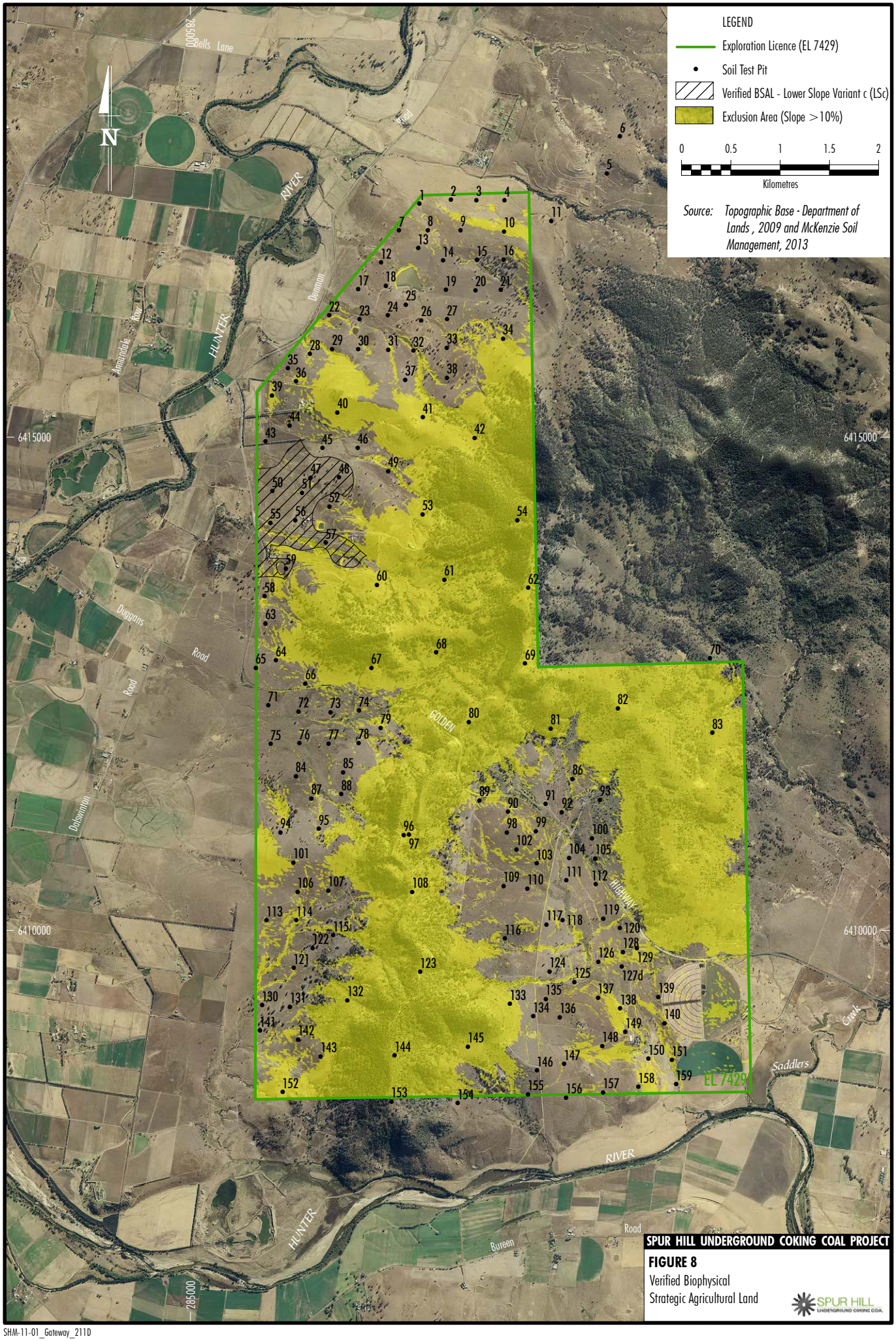
Source: After NSW Government (2013)

SPUR HILL UNDERGROUND COKING COAL PROJECT

FIGURE 7

Flow Chart for Site Verification of Biophysical Strategic Agricultural Land

SHM-11-01_Gateway_001A



SPUR HILL UNDERGROUND COKING COAL PROJECT

FIGURE 8

Verified Biophysical Strategic Agricultural Land

SPUR HILL UNDERGROUND COKING COAL

SHM-11-01_Gateway_211D

Table 4
Summary of Consideration of Relevant Criteria for Biophysical Strategic Agricultural Land

Criteria[1]	Assessment
That the proposed development will not significantly reduce the agricultural productivity of any biophysical strategic agricultural land, based on consideration of following:	
(i) any impacts on the land through surface area disturbance and subsidence,	The Project would cause negligible disturbance to BSAL except for subsidence (Section 3.5). The Project would cause the 86 ha area of BSAL to be subsided by <4 m maximum. This area is currently pastured and utilised for grazing of beef cattle and would be rehabilitated. Subsidence would not affect the agricultural land and soil capability within the Project area (i.e. land and soil capability classes and the relative proportions of these). Subsidence would not cause adverse impacts to BSAL.
(ii) any impacts on soil fertility, effective rooting depth or soil drainage,	Subsidence would not affect the agricultural land and soil capability within the Project area (i.e. land and soil capability classes and the relative proportions of these). The Project would not cause the soil fertility, rooting depth or soil drainage of BSAL to be changed.
(iii) increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to pH,	Subsidence would increase the micro-relief of BSAL in the Project area. However, this would not affect the agricultural land and soil capability class of this BSAL. The Project would not reduce the agricultural productivity of verified BSAL.
(iv) any impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy),	The Project meets the 'Level 1' minimal impact considerations for highly productive groundwater outlined in the Aquifer Interference Policy.
(v) any fragmentation of agricultural land uses,	The Project would not fragment any agricultural land uses.
(vi) any reduction in the area of biophysical strategic agricultural land.	The Project would not cause any reduction in the area of BSAL.

Source: After Short and Thomson (2013).

[1] Clause 17H(4)(a) of the Mining SEPP.

Cracks may form on the land surface, potentially in any location above the longwalls. Cracks would be typically between 20 mm and 50 mm in width within BSAL. Remediation would be undertaken as required to minimise hazard to persons and livestock.

With the implementation of the proposed subsidence management measures, Short and Thomson (2013) consider there would be no significant change to the long-term agricultural productivity of the Project area as a result of subsidence impacts on agricultural land.

Impacts on Highly Productive Groundwater

The alluvial aquifer associated with the Hunter River is a significant source of water for agriculture, due to its capacity to store groundwater, capacity for groundwater flow, water quality and proximity to better farming soils (Short and Thomson, 2013). The Hunter River alluvial aquifer is a "highly productive aquifer" as defined by the NSW Office of Water.

A preliminary groundwater assessment has been completed by Dr Noel Merrick of HydroSimulations in accordance with the Aquifer Interference Policy (NSW Government, 2013b).

The preliminary groundwater assessment was based on predictions from a numerical groundwater model developed in consideration of the Australian Groundwater Modelling Guidelines (National Water Commission, 2013). HydroSimulations (2013) consider the Project model may be classified as Class 2 (effectively "medium confidence") under the Australian Groundwater Modelling Guidelines.

The Project is predicted to meet the 'Level 1' minimal impact considerations for highly productive groundwater outlined in the Aquifer Interference Policy. In particular HydroSimulations (2013) predicts the Project would result in:

- no known risks to high priority groundwater dependent ecosystems and high priority cultural sites as no such ecosystems or sites are listed in the relevant Water Sharing Plans;

- less than 2 m drawdown at any privately-owned bore in the Hunter River alluvial aquifer and no effect on users of the Hunter River alluvial aquifers;
- no change in the beneficial use groundwater quality category of the Hunter River alluvial aquifer; and
- negligible change in long-term average salinity in the Hunter River as a result of changes in groundwater.

Following determination of the Gateway Application, the results of the preliminary groundwater assessment and its supporting numerical model would be refined for the EIS.

5.2 EQUINE CRITICAL INDUSTRY CLUSTER

Approximately 96% of EL 7429 is mapped as Equine CIC in the Mining SEPP. In October 2013, the NSW Government released revised mapping of critical industry clusters for exhibition that substantially reduced the area of Equine CIC to approximately 33% of EL 7429.

The core business in the Equine CIC is horse breeding to produce a primary product of foals for customers, with the highest value found within the thoroughbred sector (Short and Thomson, 2013).

The Upper Hunter thoroughbred horse breeding industry is centred on Scone in the Upper Hunter LGA and extends into the Muswellbrook LGA (Short and Thomson, 2013). Horse studs within vicinity of the Project area are shown on Figure 4.

There are 26 horse studs within the Muswellbrook LGA, including stallion farms, broodmare agistment and yearling preparation (Short and Thomson, 2013). Darley Woodlands Stud and Coolmore Stud (Figure 4) are two of the largest studs within the Upper Hunter Valley.

The Equine CIC is supported by businesses specialising in health services, research and development services, legal services, bloodstock agents, farriers, feed suppliers, feed producers, horse transport, landscape architecture and trades/technical services (Short and Thomson, 2013). There is also support infrastructure such as racing facilities, transport, education and tourism.

There are no equine enterprises within the Project area, therefore the Project would not cause any change to land use with respect to the Equine CIC.

The AIA prepared by La Tierra includes an assessment of the potential impacts of the Project on the Equine CIC, including consideration of the relevant criteria in the Mining SEPP. A summary of this assessment is provided in Table 5. The assessment indicates that the Project would not have a significant impact on the Equine CIC.

Table 5
Summary of Consideration of Relevant Criteria for Equine Critical Industry Cluster

Criteria[1]	Assessment
That the proposed development will not have a significant impact on the relevant critical industry cluster, based on consideration of following:	
(i) any impacts on the land through surface area disturbance and subsidence,	There are no equine enterprises within the Project area. There are 5 equine enterprises within 2 kilometres (km) of the Project area boundary. Surface area disturbance and subsidence by the Project would have no effect on existing equine enterprises.
(ii) reduced access to, or impacts on, water resources and agricultural resources,	There are no equine enterprises within the Project area. There are 5 equine enterprises within 2 km of the Project area boundary. The Project would not cause reduced access to, or impacts on, water resources or agricultural resources of any equine enterprises.
(iii) reduced access to support services and infrastructure,	The Project would not cause reduced access to support services or infrastructure of any equine enterprises.
(iv) reduced access to transport routes,	The Project would not cause reduced access to transport routes of any equine enterprises.
(v) the loss of scenic and landscape values.	The Project would not cause loss of scenic or landscape values of any equine enterprises.

Source: After Short and Thomson (2013).

[1] Clause 17H(4)(b) of the Mining SEPP.

SHM recognises the key concerns of the equine industry identified through consultation are:

- potential impacts on visual amenity;
- potential impacts on transport corridors;
- potential impacts on the availability of labour; and
- potential impacts on the availability and quality of water in the Hunter River for irrigation of pasture.

These concerns are addressed in relation to the Project below.

Impacts on Visual Amenity

The Project is solely an underground mining operation which mitigates impacts on visual amenity.

The mine infrastructure area and CHPP reject emplacement area may be visible by people travelling along Denman Road between Denman and Muswellbrook and from Monarch Stud and Wexford Farm.

Building materials for the mine infrastructure area would be non-reflective and appropriately coloured in shades such as green and beige to merge with the natural landscape. A visual screen and/or bund would be constructed adjacent to the Denman Road easement to further minimise potential visual impacts.

The mine infrastructure area would not be visible from the Darley Woodlands Stud or Coolmore Stud (Figure 4) and would be more than 6.5 km and 9.5 km from the Darley Woodlands Stud and the Coolmore Stud, respectively. This distance is greater than the distance between the Darley Woodlands Stud and the limit of the approved Mt Arthur Mine open cut mining operation (approximately 6.5 km).

The Golden Highway is an RMS-signposted Tourist Route. The mine infrastructure area would not be clearly visible from the Golden Highway with only limited views available from a distance.

Impacts on Transport Corridors

The Golden Highway provides a road link between Singleton and Dubbo, and is a tourist route and thoroughfare for goods and services travelling between the coast and Central Western NSW. The Golden Highway has been identified as a primary route for clients, visitors and staff travelling to Coolmore Stud (Michael Wright, 2013).

Plate 10 – Golden Highway

Annual average daily traffic in 2010 along the Golden Highway in the vicinity of the Project was provisionally estimated at 2,810 axle pairs[1] by NSW Roads and Maritime Services (GTA Consultants, pers. comm., 26 September 2013).

Product coal from the Project would be transported by rail and the Project would not include transportation of coal by public road.

Project traffic generation on local roads would include employees travelling to work (light vehicles) and deliveries to site (light and heavy vehicles). The majority of employees would likely travel to the Project via Denman Road from Muswellbrook, the New England Highway or Denman, with some employees travelling via the Golden Highway.

Project traffic on the Golden Highway would not be significant compared to current total traffic. Notwithstanding, SHM would conduct a detailed road transport assessment for the EIS that would identify any measures required to maintain or improve the capacity, efficiency and safety of the Golden Highway and the broader road network.

The Golden Highway bisects the Project underground mining area. SHM would develop a built features management plan for the Golden Highway in consultation with Roads and Maritime Services, Mine Subsidence Board, Muswellbrook Shire Council, and other stakeholders and technical experts. This specific management plan would contain monitoring methodologies and schedules, and management responses to maintain safety and serviceability of the Golden Highway.

[1] One axle pair is equivalent to one passenger vehicle.

Impacts on Availability of Labour

The equine industry has identified the shortage of skilled labour available to work on the studs as a constraint for the industry (Muswellbrook Shire Council, 2012).

The majority of the Project underground mining workforce would be specialised, skilled trades and professionals that would be sourced from the existing labour pool in the mining industry within the Hunter region and more broadly in NSW and Queensland. The Project may involve the employment of some local semi-skilled and unskilled personnel that could be sourced from the non-mining portion of the labour pool.

A survey of mining companies in 2012/13 determined there are approximately 12,653 residents of the wider Hunter region directly employed in the mining industry (full-time equivalent) (NSW Minerals Council, 2013). The Project workforce (up to 300 personnel) represents 2.4% of the total mining workforce in the Hunter region. The Project also represents less than 2% of the labour force in the Muswellbrook and Singleton LGAs (19,568 in 2011, Australian Bureau of Statistics [ABS], 2013).

Short and Thomson (2013) concluded that the Project would not have any adverse or material impact on the surrounding locality's employment rate in the agricultural sector.

Impacts on the Hunter River

The Hunter River is a regulated river, that is, flows are regulated by a major storage or dam to deliver regular water for industry, agricultural and town water supplies. Access to water within regulated rivers is controlled by the issue of access licences and setting limits on the water for extraction on an average yearly basis (available water determinations). There is a limit on the number of access licences for the Hunter River and extraction of water from the Hunter River can only occur by obtaining an existing access licence.

SHA currently holds access licences for the Hunter River and would only extract water for the Project in accordance with access licences. Therefore water use for the Project would not affect surface water availability for the equine industry.

The Groundwater Assessment for the Gateway Application (HydroSimulations, 2013) concluded:

- the Project would not affect users of the Hunter River alluvial aquifers;
- the Project would result in no change in the beneficial use groundwater quality category of the Hunter River alluvial aquifer; and
- the Project would result in negligible change in long-term average salinity in the Hunter River as a result of changes in groundwater.

Therefore the Project would not affect the quality and availability of surface water and groundwater for the equine industry.

5.3 VITICULTURE CRITICAL INDUSTRY CLUSTER

Approximately 44% of EL 7429 is mapped as Viticulture CIC in the Mining SEPP. In October 2013, the NSW Government released revised mapping of critical industry clusters for exhibition that substantially reduced the area of Viticulture CIC to approximately 15% of EL 7429.

Wine production contributes to agricultural production and tourism in the Upper Hunter region, and there are a number of vineyards surrounding the Project (Figure 4). ABS data indicates there are approximately 2,700 ha under vine in the Upper Hunter region (Short and Thomson, 2013).

The overall commercial viability of many vineyards is thought to rely on tourism, specifically cellar door wine sales (Short and Thomson, 2013). The Viticulture CIC is supported by businesses specialising in hospitality, agronomy, equipment/supplies and trades/technical services (Short and Thomson, 2013). There is also support infrastructure such as tourism, transport and education.

There is one vineyard (Callatoota Estate) located within the Project area with approximately 26 ha under vine (less than 1% of the total area in the Upper Hunter). The Callatoota Estate (Property 9, Figure 3) also includes a small winery which processes and bottles wine from grapes grown on the estate and a cellar door. The Callatoota Estate is owned by SHA, a company owned by Spur Hill No. 2 Pty Limited and Spur Hill U.T. Pty Ltd.

The AIA prepared by La Tierra includes an assessment of the potential impacts of the Project on the Viticulture CIC, including consideration of the relevant criteria in the Mining SEPP. A summary of this assessment is provided in Table 6. The assessment indicates that the Project would not have a significant impact on the Viticulture CIC.

Table 6
Summary of Consideration of Relevant Criteria for Viticulture Critical Industry Cluster

Criteria[1]	Assessment
That the proposed development will not have a significant impact on the relevant critical industry cluster, based on consideration of following:	
(i) any impacts on the land through surface area disturbance and subsidence,	The Project would cause subsidence to one vineyard within the Project area. There are two additional vineyards within 2 km of the Project area. Subsidence would not affect the agricultural land capability of the affected vineyard. Appropriate mitigation measures would ensure that surface subsidence has no adverse impact on this viticulture enterprise, as demonstrated at the Beltana Mine. There would be no impact on any viticulture enterprise as a result of surface area disturbance.
(ii) reduced access to, or impacts on, water resources and agricultural resources,	The Project would not cause reduced access to, or impacts on, water resources or agricultural resources of any viticulture enterprise.
(iii) reduced access to support services and infrastructure,	The Project would not cause reduced access to support services or infrastructure of any viticulture enterprises.
(iv) reduced access to transport routes,	The Project would not cause reduced access to transport routes of any viticulture enterprises.
(v) the loss of scenic and landscape values.	The Project would not cause loss of scenic or landscape values of any viticulture enterprises.

Source: After Short and Thomson (2013).

[1] Clause 17H(4)(b) of the Mining SEPP.

Potential impacts on the Callatoota Estate include surface cracking, potential water ponding, and damage to vineyard trellises and irrigation infrastructure. Surface cracking and ponding would be rehabilitated using conventional earthmoving equipment. Other subsidence effects on trellises, irrigation infrastructure and vines can be successfully mitigated, as demonstrated at the Beltana Mine (Short and Thomson, 2013).

SHA will maintain viticulture activities at the Callatoota Estate vineyard while there is demand for these products. Therefore the Project would not affect the viability of the viticulture industry in the Upper Hunter.

The Project would not materially affect any other viticulture enterprises (Short and Thomson, 2013).

Short and Thomson (2013) concluded that the Project would not cause any change to land use with respect to the Viticulture CIC.

Plate 11 – Callatoota Estate Vineyard

6 CONCLUSION

The Project is solely an underground mining operation which mitigates local issues, notably dust, visual amenity and impacts to agricultural resources.

The supporting documentation to the Gateway Application considers the potential impacts of the Project on BSAL, Equine CIC and Viticulture CIC.

The key conclusions of these assessments are:

- With the implementation of the proposed subsidence management measures, there would be no significant change to the long-term agricultural productivity of the Project area as a result of subsidence impacts on agricultural land (Short and Thomson, 2013).
- The proposed location of the mine infrastructure area and CHPP reject emplacement areas are not on BSAL (McKenzie Soil Management, 2013).
- The Project is predicted to meet the 'Level 1' minimal impact considerations for highly productive groundwater (HydroSimulations, 2013).
- There are no equine enterprises within the Project area, therefore the Project would not cause any change to land use with respect to the Equine CIC (Short and Thomson, 2013).
- The Project would not cause any change to land use with respect to the Viticulture CIC as subsidence impacts on the vineyard within the Project area can be remediated (Short and Thomson, 2013).

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Plate 6 and Plate 7 courtesy of Donaldson Coal Pty Limited.

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