



# **Dolwende Quarry**

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SSD Application Supporting Document

**Upper Hunter Holdings Pty Ltd**

**22 April 2014**

**Project No. 2013.006**

# Dolwendeer Quarry

## SSD Application Supporting Document

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# 1. Introduction

This Supporting Document has been prepared by KMH Environmental Pty Ltd (KMH) to accompany a State Significant Development (SSD) application by Upper Hunter Holdings Pty Ltd (UHH), for a proposed quarry on the property “Dolwendee”, near Denman in the NSW Hunter Valley.

The proposed Dolwendee Quarry (the “Project”) is targeting extraction of ridge gravel from a resource comprising sandstone and conglomerate parent material. The total resource proposed for extraction under this development application has been estimated at more than 5 million tonnes, hence the project meets the definition of State Significant Development as identified under Schedule 1, Clause 7 of State Environmental Planning Policy (State and Regional Development) 2011.

The SSD application and Supporting Document is to be submitted to NSW Planning and Infrastructure in order to obtain the Director-General’s Requirements (DGRs) for preparation of an Environmental Impact Statement (EIS) that will be required to support the SSD application.

## 1.1. Project Applicant

The applicant for the proposed Dolwendee Quarry is Upper Hunter Holdings Pty Ltd.

## 1.2. Outline of this Supporting Document

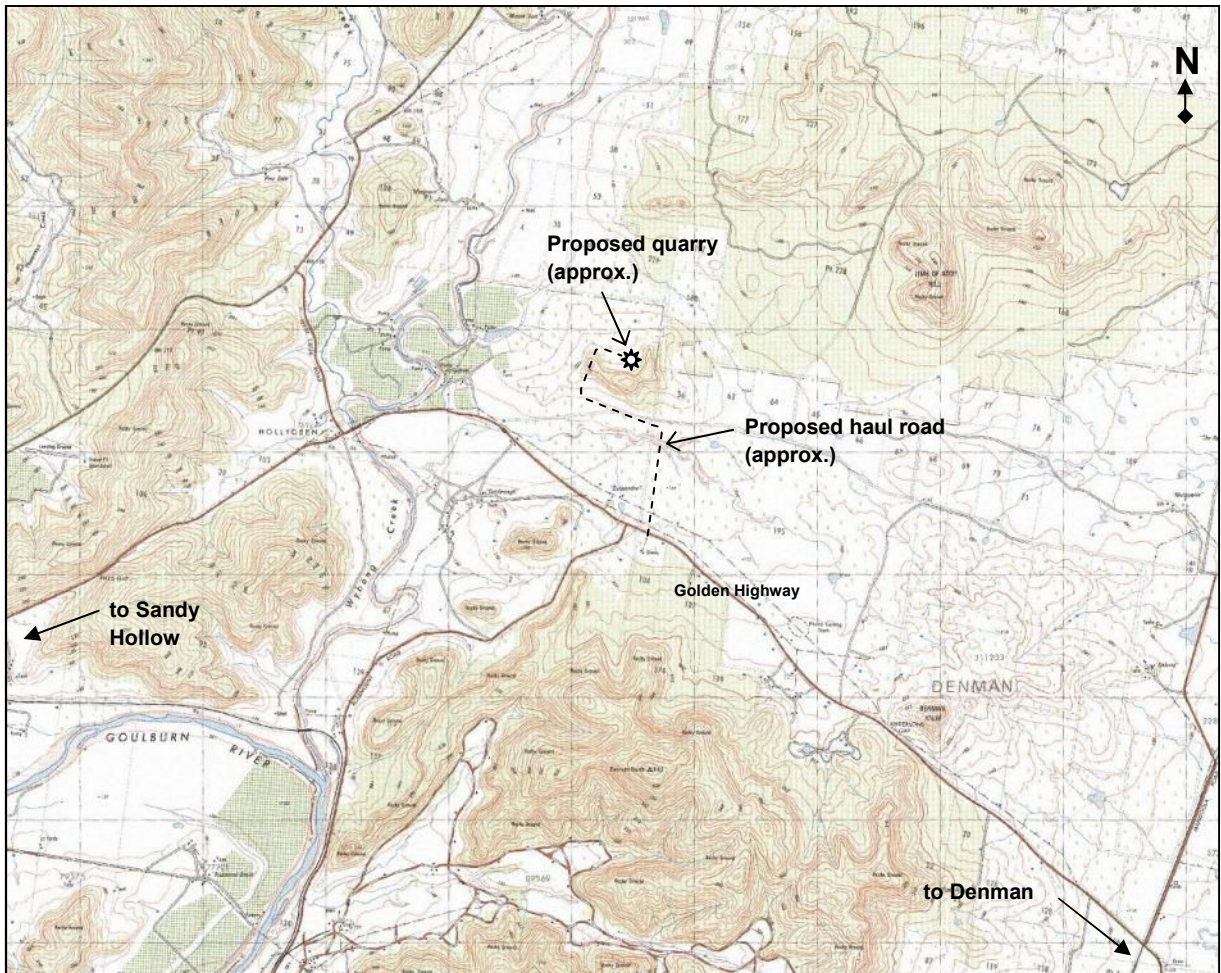
This Supporting Document has been prepared to provide information about the project, to assist in formulating the DGRs. It provides:

- a preliminary description of the proposed Project including the Project Area (Section 2);
- an overview of the relevant planning legislation and approvals process (Section 3); and
- a preliminary environmental assessment (Section 4) summarising the existing conditions, potential impacts and proposed EIS assessment methodology, for a range of environmental aspects.

## 2. The Project

### 2.1. Location

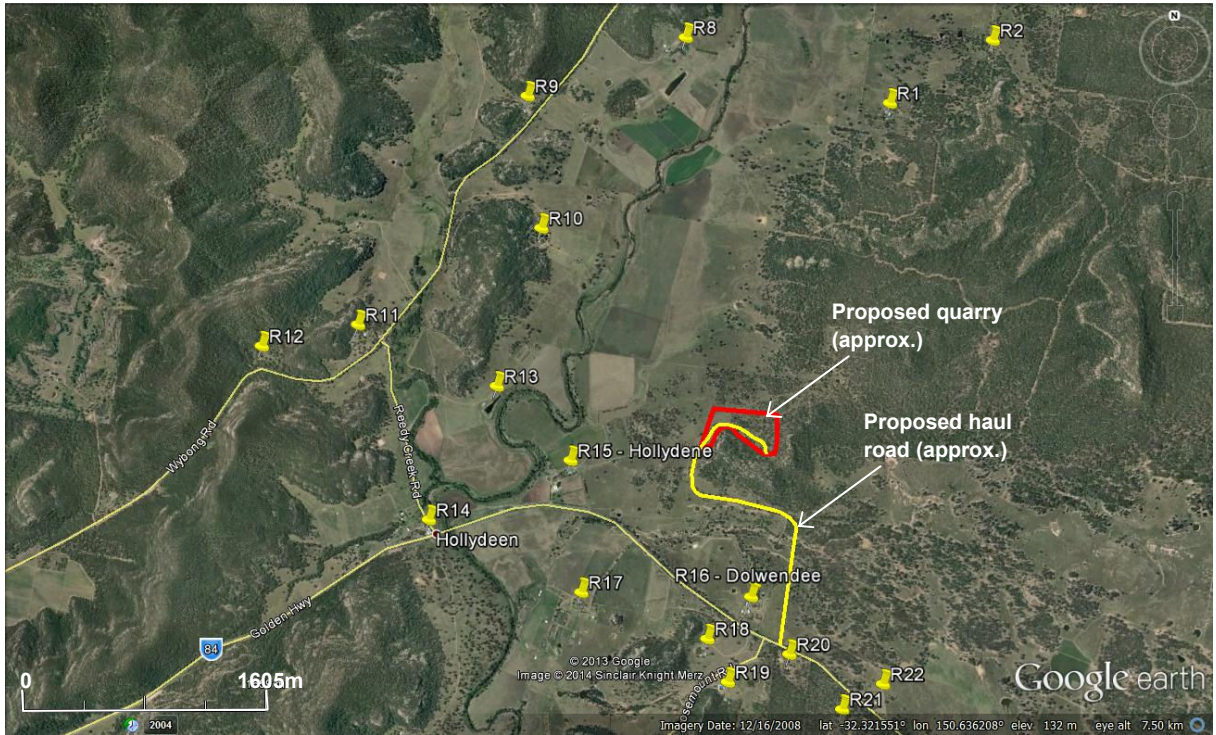
The proposed Dolwende Quarry is located on the northern side of the Golden Highway, approximately 7 km by road to the northwest of Denman in the NSW Hunter Valley. Figure 1 indicates the project location.



Source: Sandy Hollow 1:25,000 Topographic map

**Figure 1** Locality Map

Figure 2 provides context to the proposal, indicating the approximate position of the quarry and haul road on an aerial image of the area sourced from Google Earth. Also shown in Figure 2 are the approximate locations of the nearest potentially sensitive receivers (mainly rural residences) and the location of the Dolwende homestead.



Source: Google Earth

Figure 2 Site Context

## 2.2. Property Details and Ownership

The proposed Project occurs on a rural property known as “Dolwendee”, comprising Lots 1, 2, 3 and 4 in DP 1160936. The proposed quarry is to be located over Lot 2 with a haul road from the quarry to the Golden Highway crossing Lots 3 and 4 within an existing right of carriageway. The property Dolwendee is owned by Upper Hunter Holdings.

## 2.3. Project Area

The Project Area (Figure 3) for the purpose of the SSD application comprises Lots 2, 3 and 4 in DP 1160936. The proposed Project occurs within the Muswellbrook Local Government Area.

The Project Area includes lands required for establishment and operation of the quarry, haul road and intersection establishment. The Project Area comprises a quarry footprint of approximately 10.7 hectares located on Lot 2, in addition to an internal haul road approximately 2.5 km long which traverses (in order from the Golden Highway intersection) Lot 3, Lot 4 and Lot 2 on the Dolwendee estate. Figure 4 describes the proposed quarry plan, indicating the approximate quarry footprint within Lot 2. The Project Area would be further refined and described in the EIS.

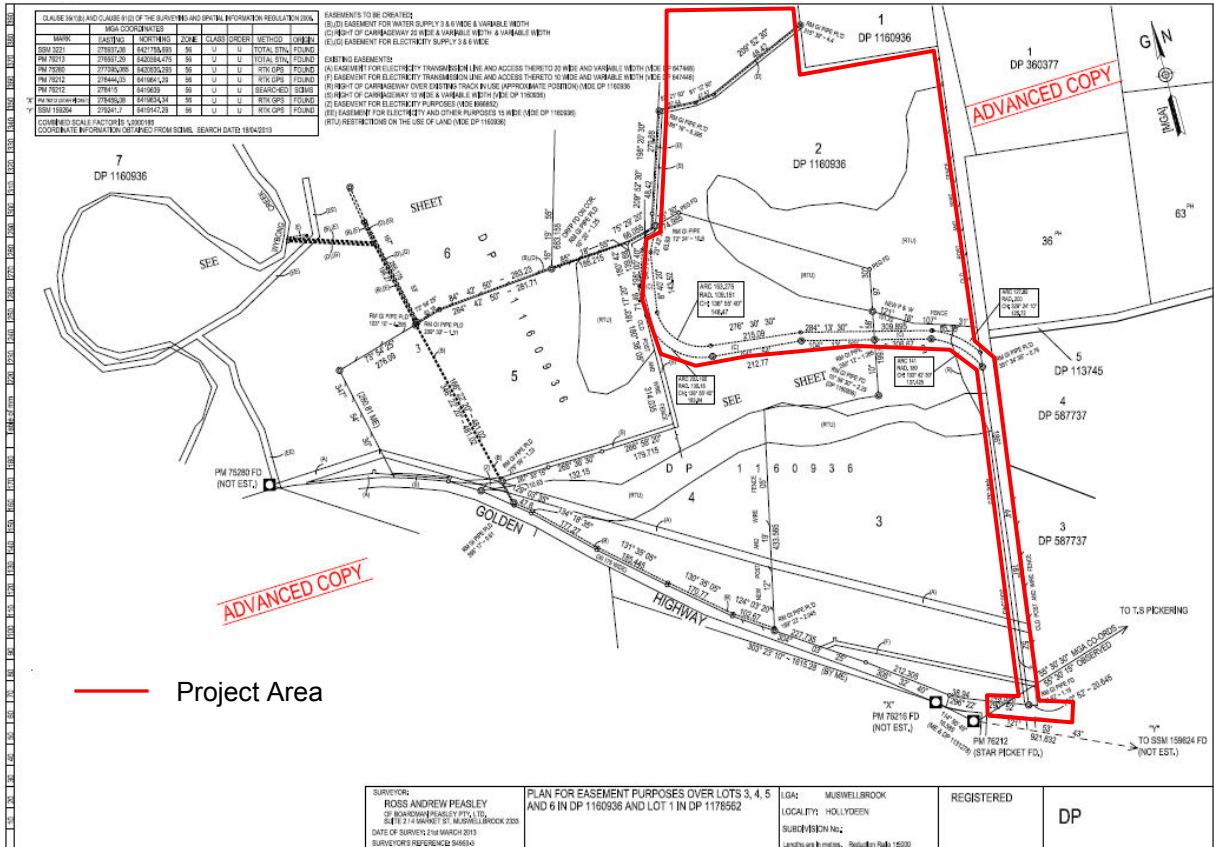


Figure 3 Project Area

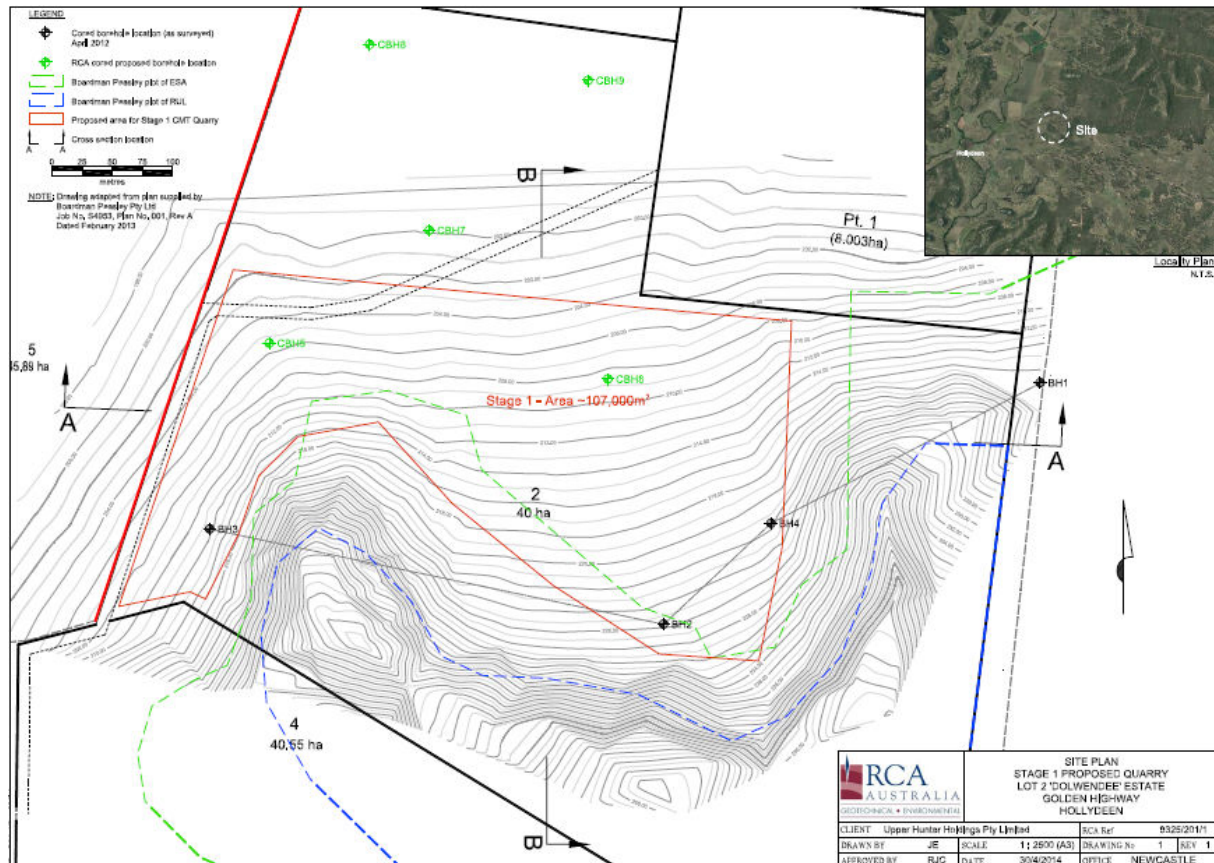


Figure 4 Quarry Plan

## **2.4. Description of the Locality**

### **2.4.1. Environmental Setting**

The Project occurs on rural lands that have been largely cleared, and have historically been used for cattle and sheep grazing. The property contains some patches of remnant and regrowth native vegetation. The largest intact area of native vegetation is associated with a prominent rocky ridge, near where it is proposed to develop the quarry.

The local topography is characterised by gentle rises and slopes, though is dominated by a prominent horseshoe-shaped hill and sandstone ridgeline. The proposed quarry is located on the northwest facing slopes to the north of this ridgeline. The landscape is relatively stable with only minor localised areas of sheet erosion evident.

The property drains to Wybong Creek (a tributary of Goulburn River) which is located approximately 1 km west of the proposed quarry. An intermittent watercourse known as Lynch's Gully occurs in the southern part of the property and drains westwards to Wybong Creek. Lynch's Gully displays some gully erosion and has been the subject of soil conservation works in the past.

### **2.4.2. Current and Historical Land Use**

The quarry area has been historically cleared for agriculture. It is unknown exactly when clearing occurred, but regrowth trees to 30cm diameter at breast height (dbh) exist on the site, indicating the event was not recent. Additionally, trees from the original structured vegetation community were retained (greater 80cm dbh), presumably for shade for livestock. The adjacent hillside supports structurally intact native vegetation (The Enviro Factor, 2008). This area is still used for grazing purposes.

A report on the agricultural capability of the land was prepared by consulting agronomist Ross Watson, and is provided in Appendix A. This indicates that the area of the proposed quarry is of low agricultural capability (Class 4 and 5 agricultural land). It comprises slopes with skeletal soils and has been used historically for low intensity cattle and sheep grazing. Productive agricultural areas do occur on an adjoining property (ie the Class 2 and 3 agricultural land associated with the creek flats of Wybong Creek) though are not involved in this proposed development and would not be impacted or rendered inaccessible by the proposed quarry.

### **2.4.3. Surrounding Land Use**

The site is surrounded by other cleared rural properties to the south and west. Otherwise it is surrounded by the Xstrata-operated Mangoola Coal Mine site to the north and east.

### **2.4.4. Surrounding Residences**

The proposed quarry is relatively distant from neighbouring rural residences. There are a number of residences to the south and west of Dolwende on the southern side of the Golden Highway, the closest being approximately 1.5 km from the proposed quarry. Several of these neighbouring residences are relatively close to the proposed haul road intersection with the Golden Highway, which is about 100 m east of the Rosemount Road intersection.

There are a small number of rural residences approximately 2 km to the west of the proposed quarry in the vicinity of the Hollydeen shop, on the corner of Reedy Creek Road and Golden Highway. A number of more distant residences occur to the north of the proposed quarry, further up the Wybong Valley. The nearest neighbouring residences to the north and east have been acquired by Xstrata Mangoola Coal as buffer lands.

## 2.5. Project Description

### 2.5.1. Description of Resource

Geological testing has been undertaken to assess the extent and nature of gravel resource. This testing to date has included a number of back-hoe dug test pits to expose surface materials, as well as four cored boreholes completed by Terratest Drilling within a targeted area on Lot 2 (Figure 4). The four cored bores were drilled vertically to depths ranging from 27.15 m to 30.1 m, and borelogs were prepared by Hunter Geotechnics. The bores encountered a sequence of conglomerate and pebbly sandstone with occasional lithic sandstone layers.

A report by RCA Australia (RCA, 2014) comprising an assessment of the exploration results to date and a preliminary resource estimate is attached at Appendix B. The resource assessment utilised geological information obtained from the 4 cored boreholes and subsequent analysis of sampled materials.

Materials assessment by RCA indicated the following resource properties:

- Crushed conglomerate (blended with minor amounts of sandstone) would be expected to produce pavement material suitable for unsealed rural roads;
- Crushed conglomerate/minor sandstone would be expected to produce a sub-base material suitable for sealed rural roads;
- Crushed conglomerate/sandstone would be expected to produce good unsealed hardstand type pavement material; and
- It is likely that the finer material produced from crushing of conglomerate/sandstone rock could be processed to meet pipeline trench back fill requirements for drainage works.

### 2.5.2. Resource Estimate

The RCA (2014) resource estimate report (Appendix B) indicates a preliminary Stage 1 quarry footprint of approximately 10.7 hectares. This quarry footprint was developed based on environmental constraints and instructions from the proponent, which included a preference to restrict the quarry footprint to Lot 2. Preliminary plan and cross-section drawings of a conceptual quarry were developed for the Stage 1 area for the purpose of resource estimation. The conceptual quarry design resulted in a total depth of up to 35 m with benched batters comprising 4 m wide benches at a maximum vertical interval of 10 m. Drawings 1 to 4 in RCA (2014) (Appendix B) provide plan and cross-section drawings of the Stage 1 quarry.

Volumetric calculations indicate the proposed Stage 1 quarry comprises a potential construction materials resource of some 2.8 Million cubic metres, allowing for conceptual batter arrangements. Based on the results of density testing the average core density is 2.318 Tonnes/m<sup>3</sup>. Multiplying the estimated volume of Stage 1 by the average density yields an estimated construction material resource of some 6.5 million tonnes.

The assessment confirms an Indicated Resource exceeding 5 million tonnes within Lot 2, which is targeted for extraction under the proposed Project. Consequently the proposal meets the definition of State Significant Development.

The EIS would provide a thorough description of the resource based on the existing and any additional required geological testing.

### 2.5.3. Extraction Rate and Quarry Life

UHH seeks approval to extract and transport to market an average of 250,000 tonnes of extractive material per year. The extraction rate is expected to fluctuate according to demand for product.

Based on the current Indicated Resource size in excess of 6.5 million tonnes, the proposed quarry Project is expected to have a life of approximately 26 years.

Should further exploration identify additional resource, the quarry life could extend well beyond this subject to obtaining any necessary additional approvals.

#### **2.5.4. Quarry Description**

The proposed quarry is to be a conventional open cut operation with an expected footprint of approximately 10.7 hectares which would contain the active extraction area, raw material and product stockpiles, crushing and screening plant, and ancillary facilities including a small office, amenities and car parking space. An internal haul road approximately 2.5 km long would connect the quarry to the Golden Highway. Figure 4 provides the preliminary quarry plan which would be further defined for the EIS.

The EIS would provide a detailed description of the quarry layout including staging plans and sequence of operation. The quarry staging would be planned to minimise environmental impacts during all stages of its operations; for example, by limiting quarry-related disturbance to only approved areas, minimising forward stripping of topsoil and overburden, locating noisy and dust-generating plant so as to minimise noise and dust impacts, and implementing necessary stormwater controls prior to major disturbance.

#### **2.5.5. Description of Quarry Operations**

Material would be extracted using an excavator to dry “rip” the material out. Investigations to date indicate it will not be necessary to blast.

A crushing and screening plant would be provided to produce the desired aggregates. The use of mobile diesel powered crushing/screening plant is being investigated to enable the plant to be located close to the extraction face, and so provide maximum machine productivity and output. In this case the excavator would load the crushing plant directly.

Should fixed crushing and screening plant be favoured, a front end loader (FEL) will be used to transfer product from the extraction face to the crusher hopper. The FEL will also move finished products from screens into stockpiles and attend to loading out trucks on demand. In the event the loader has numerous trucks to load out, the excavator can walk to the crusher and continue to load the hopper to keep production going through the system. The intention is to schedule truck movements and loading times as far as practicable to optimise efficiency of operations and reduce plant movements.

At the end of the day time will be allocated for maintenance checks and greasing of machinery along with general housekeeping of the yard. A water cart is proposed for dust suppression.

#### **2.5.6. Products**

The initial operations are expected to focus on production of a small range of crushed products that require minimal processing or blending. These include a 7-14mm material suitable as road sub-base, and a 14-20mm material suitable for mine blast hole “stemming”.

A wider range of products may be developed in the future depending on material suitability, local demand and economic factors. The EIS would provide an outline of the planned range of products and their intended markets.

#### **2.5.7. Equipment**

Only limited plant and equipment is required, including:

- Diesel Generator;
- 30T Excavator;
- Loader with 3 m<sup>3</sup> bucket and scales with printer etc;
- Crushing and screening plant; and

- Water cart.

All equipment would be diesel powered. It is yet to be decided whether fixed or mobile crushing and screening plant would be used.

The EIS would provide a detailed list of the plant and equipment needs of the site.

#### **2.5.8. Hours/Days of Operation**

The proposed hours of operation are:

- 7am to 6pm Monday to Friday;
- 8am to 1pm Saturday; and
- No work on Sundays or public holidays.

#### **2.5.9. Transport**

Product would be transported to market via an internal 2-lane haul road approximately 2.5 km long, thence to the west or east via the Golden Highway. Haul trucks are expected to include truck/trailer combinations and b-doubles, which carry some 33 and 39 tonnes each respectively. Based on an extraction rate of up to 250,000 tonnes per annum, and some 270 days operation per year, the proposed quarry would generate up to some 25 to 30 laden vehicles per day.

Over a 10 hour working day, this is equivalent to some two to three trucks per hour (four to six movements two-way).

The EIS would provide a detailed description and plans of the haul road and intersection treatments. Consultation with RMS would occur over the intersection design and any necessary approvals from RMS such as a Works Authorisation Deed (WAD) sought.

#### **2.5.10. Facilities and Employees**

The quarry would be operated by between 3 and 4 people, including Site Manager, equipment operators and administration/sales staff. Staffing amenities and facilities to be provided include:

- Administration/office building;
- Lunchroom;
- Amenities, toilets, showers;
- Car parking spaces; and
- Caretaker/Manager residence.

#### **2.5.11. Services**

Potable water for drinking and washing would be supplied by water tanker and roof water tanks. Non-potable water would be used in the quarry principally for dust suppression and would be sourced from stormwater runoff collected locally in the pit and sediment basins, in the first instance, with a backup supply available from the existing licensed 30ML dam at the adjoining Hollydeen property over which a registered easement exists that would entitle the applicants to convey water from the dam to the quarry.

Sewerage would be managed onsite in an appropriate onsite sewage management system with onsite effluent disposal. Council approval would be sought as necessary for the onsite sewage management system (ie under Section 68 of the Local Government Act 1993).

Options for power supply are still being considered and include running mains power or providing a renewable energy source (such as solar) supported by a generator.

A fixed telephone line is not anticipated. Telecommunications would be via mobile phone network and satellite and/or wireless internet.

### **2.5.12. Project Need and Justification**

The Dolwendee Quarry is proposed to maximise the economic and productive use of the land which contains a viable geological resource with limited alternative uses. The agricultural capability of the land is low and historical use of the land has been limited to low intensity sheep and cattle grazing.

The number of construction and mining projects currently under way or beginning in the next 12 months has led to demand outstripping supply for the type of extractive products to be produced at the quarry. Such projects include the proposed Golden Highway Upgrade and upgrade to local roads, various coal mine expansions, agribusiness proposals and local residential subdivisions, all of which are close to the proposed quarry.

The proposed quarry will result in generation of employment and demand for products and services, and would contribute to economic activity in the local area. It would provide a source of aggregates not currently available in the local area, reducing the need to transport materials long distances by road into the subject area.

### **2.5.13. Alternatives**

There are few alternate uses for the land/quarry area in question. The grazing qualities of this area are limited at best and the rugged nature of the terrain allows for limited alternate uses.

The soils of the proposed gravel extraction area are relatively infertile solodic soils. The agronomists report (Appendix A) confirms that no prime agricultural land would be affected.

## 3. Statutory and Planning Considerations

The EIS would provide a detailed review of statutory and planning considerations including relevant Commonwealth, State and Local Government legislation and environmental planning instruments. A summary of key statutory considerations is provided in this chapter.

### 3.1. Commonwealth Legislation

#### 3.1.1. Environment Protection and Biodiversity Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) states that an action which *has, will have or is likely to have a significant impact on a matter of national environmental significance*, may not be undertaken without prior approval of the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities. The following are identified by the Act as matters of national environmental significance (MNES):

- World Heritage properties and National Heritage places;
- wetlands of international importance (including Ramsar Wetlands);
- listed threatened species, ecological communities and migratory species protected under international agreements;
- commonwealth marine areas;
- nuclear actions; and
- an action by the Commonwealth, or an action on Commonwealth land which is likely to have a significant impact on the environment.

Preliminary investigations have indicated that the Project Area has the potential to contain listed threatened species and ecological communities. No other MNES have been identified in the vicinity of the proposal. Further studies would be conducted during the preparation of the EIS to determine whether a referral to the Minister is required.

#### 3.1.2. Native Title Act 1993

The *Native Title Act 1993* administers processes relating to the recognition, protection and determination of native title and dealings with native title land. Native title is concerned with the rights and interests of Aboriginal and Torres Strait Islander peoples in relation to land and water in Australia and its territories.

A search of the National Native Title Register, the Register of Native Title Claims, and the Register of Indigenous Land Use Agreements would be undertaken as part of the EIS.

### 3.2. NSW Planning Legislation and Environmental Planning Instruments

The following NSW legislation and Environmental Planning Instruments may have relevance to the proposal and would be considered during the environmental assessment.

#### 3.2.1. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (the EP&A Reg) provide the framework for assessment and approval of development in NSW.

Under the provisions of Part 4, Section 89C of the EP&A Act the proposed Project is SSD if a State environmental planning policy declares the development to be SSD. The proposed Project is declared by State Environmental Planning Policy (State and Regional Development) 2011 to be SSD (refer Section 3.2.3).

Section 89D of the EP&A Act states that the Minister is the consent authority for SSD. However, the Minister may delegate the consent authority function to the Planning Assessment Commission (PAC), the Director-General or to any other public authority.

Section 89J of the EP&A Act outlines a range of approvals that are not required to be obtained for an approved SSD project. These include the following that could be relevant to this Project:

- a permit under section 201, 205 or 219 of the *Fisheries Management Act 1994*,
- an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*,
- an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*,
- an authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act repealed by that Act) to clear native vegetation or State protected land,
- a bush fire safety authority under section 100B of the *Rural Fires Act 1997*,
- a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.

### **3.2.2. Protection of the Environment Operations Act 1997**

The Environment Protection Authority (EPA), which is part of the NSW Office of Environment and Heritage (OEH), issues environment protection licences (EPLs) to the owners or operators of various industrial premises under the *Protection of the Environment Operations Act 1997* (POEO Act). Licence conditions relate to pollution prevention and monitoring, and cleaner production through recycling and reuse and the implementation of best practice.

Schedule 1 of the POEO Act outlines a range of Scheduled Activities for which an EPL is required. Clause 19 of Schedule 1 describes Extractive Industries and declares that a land based extractive industry involving the extraction, processing or storage of more than 30,000 tonnes per year of extractive materials, is a scheduled activity. An EPL will be required for the proposed Project.

### **3.2.3. State Environmental Planning Policy (State and Regional Development) 2011**

*State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP) identifies development that is SSD under Section 89C of the EP&A Act. Schedule 1, Section 7 of SRD SEPP prescribes the following conditions for the classification of 'extractive industries' as SSD:

(1) *Development for the purpose of extractive industry that:*

- (a) *extracts more than 500,000 tonnes of extractive materials per year, or*
- (b) *extracts from a total resource (the subject of the development application) of more than 5 million tonnes, or*
- (c) *extracts from an environmentally sensitive area of State significance.*

The proposed Project is development that is included in Schedule 1 of the SRD SEPP as it is an extractive industry that is to extract from a resource (the subject of the development application) of more than 5 million tonnes.

### **3.2.4. State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industry) 2007**

*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industry) 2007* (Mining and Extractive SEPP) outlines where various activities are permissible both with and without development consent and defines developments that are prohibited, exempt or complying developments. The Mining and Extractive SEPP declares that extractive industry may be carried out with development consent on any land on which development for the purpose of agriculture or industry

may be carried out (with or without development consent). The Project area is zoned RU1 Primary Production (RU1 zone). Extractive industry is permissible with consent in the RU1 zone.

### **3.2.5. State Environmental Planning Policy (Infrastructure) 2007**

Division 17, Subdivision 2, section 104 of State Environmental Planning Policy (Infrastructure) 2007 (SEPP Infrastructure) requires that development specified in Column 1 of the Table to Schedule 3 of this planning instrument must be referred by the consent authority to the NSW Roads and Maritime Service (RMS) for assessment if the conditions under Column 2 or Column 3 of the Table are met.

As the Proposal is an 'industry' with an area in excess of 5,000m<sup>2</sup>, to be located on land with access to a classified road, the DA will need to be referred to the RMS.

### **3.2.6. State Environmental Planning Policy No. 33 – Hazardous and Offensive Development**

*State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33) requires the consent authority to consider whether an industrial proposal is a potentially hazardous or offensive industry that without the implementation of appropriate impact minimisation measures would, or potentially would, pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment.

A risk screening of the Project will be performed in accordance with the document entitled Applying SEPP 33 2nd edition, (DUAP, 1997), however, as the only hazardous materials to be used / stored on the Project Site would be restricted to well managed diesel fuel, lubricants, hydraulic fluids and other hydrocarbon products, the Project is unlikely to classify as hazardous or potentially hazardous industry.

### **3.2.7. State Environmental Planning Policy No 44 – Koala Habitat Protection**

*State Environment Planning Policy No 44 – Koala Habitat Protection* (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas.

The Project is located within the Muswellbrook Local Government Area (LGA), to which the SEPP applies. As such, Muswellbrook Council would be consulted in relation to the presence and management of any Koala habitat. An assessment for the presence of Koala habitat and feed trees would also be undertaken as part of the EIS.

### **3.2.8. State Environmental Planning Policy No 55 – Remediation of Land**

*State Environmental Planning Policy No 55 – Remediation of Land* provides consistent state wide planning and development controls for the remediation of contaminated land. There are no known contaminated sites within the Project Area, however the EIS would consider the potential for contaminated land to be encountered based on historical land use and appropriate mitigation measures would be identified where appropriate.

### **3.2.9. Muswellbrook Local Environmental Plan 2009**

*Muswellbrook Local Environmental Plan 2009* (Muswellbrook LEP) provides development standards for the Muswellbrook Local Government Area. As previously detailed, the Project Area is zoned RU1 Primary Production (RU1 zone). Extractive industry is permitted with consent within the RU1 zone.

The objectives of the RU1 zone would be considered in preparing the EIS. However, it is noted that SEPP (Mining and Extractive) effectively removes the need to address or satisfy provisions of the LEP.

### 3.2.10. Other Relevant Legislation

While the EP&A Act provides the framework for the planning and development approvals system in NSW, there are a number of other Acts and Regulations of relevance. These would be identified and considered during the preparation of the EIS. A summary of key additional pieces of legislation follows:

#### **Fisheries Management Act 1994**

Under the *Fisheries Management Act 1994* (FM Act), approval is required from Department of Primary Industries (Fisheries NSW) for activities involving dredging and reclamation (section 201), blockage of fish passage (section 219) and harming of certain marine vegetation in a protected area (section 205). A licence is required under section 220ZW of the Act for activities likely to harm or damage threatened species, populations or ecological communities.

The Project would not involve dredging or reclamation works, would not result in harm to marine vegetation and would not block fish passage. However, some disturbance of a minor watercourse (Lynch's Gully) may be required during construction of the haul road and installation of culverts. Pursuant to section 115ZG of the EP&A Act, permits under section 201, 205 and 219 of the FM Act are not required for an approved Project under Part 5.1 of the EP&A Act.

Given the proposed works, it is considered unlikely that there will be harm or damage to threatened species, populations or ecological communities listed under the FM Act, however, further ecological investigations would be undertaken as part of the EIS to determine the need for a licence under Section 220ZW of the FM Act. Consideration would also be given to the need for maintenance of fish passage for any new creek crossings. Given the Lynch's Gully is a dry gully that flows only intermittently, it is highly unlikely that this represents fish habitat.

#### **Heritage Act 1977**

Consent is required under Part 4 of the *Heritage Act 1977* (Heritage Act) for development which alters, moves or damages any part of a listed heritage item. An excavation permit is required under section 139 of the Heritage Act to 'damage, despoil, move or alter' a relic.

Pursuant to section 115ZG of the EP&A Act, approval under Part 4 or a permit under section 139 of the Heritage Act is not required for a Project approved under Part 5.1 of the EP&A Act. Notwithstanding this, a search of relevant Heritage registers would be undertaken and if necessary a detailed heritage investigation undertaken to assess the impact on any listed or identified non-indigenous heritage items in the Project Area.

#### **National Parks and Wildlife Act 1974**

Under section 90 of the *National Parks and Wildlife Act 1974* (NPW Act), consent is required to destroy, deface or damage an Aboriginal object or Aboriginal place. Pursuant to section 115ZG of the EP&A Act a permit under section 90 of the NPW Act is not required for a Project approved under Part 5.1 of the EP&A Act.

No Aboriginal heritage items or places are currently listed on the National, State or Local heritage registers as being present within the Project Area. A search of the AHIMS register identified that while there are no registered Aboriginal sites within the Project Area, there are a large number of sites within several kilometres of the Project Area.

An Aboriginal heritage assessment was undertaken by Victor Perry of Junburra Aboriginal Consultancy Services in 2008 as part of a previous subdivision application, and included consultation with the Aboriginal community and a walkover site assessment of the property. These investigations did not identify any items or places of Aboriginal heritage within the area of Project Area. The presence of Aboriginal objects and/or areas of cultural heritage would be confirmed as part of the EIS.

### **Threatened Species Conservation Act 1995**

The *Threatened Species Conservation Act 1995* (TSC Act) provides legal status for biota of conservation significance in NSW. A comprehensive flora and fauna survey would be undertaken for the EIS to identify the presence of any threatened species or endangered ecological communities, assess the potential impact of the Project on the ecological resources, and identify the strategies for management and mitigation of potential impact.

In 2008 a preliminary Flora and Fauna Assessment was undertaken by The Enviro Factor to assess the impacts of a proposed quarry on the property. This assessment found an area of EEC and a number of threatened species could be impacted by the proposal. Further investigations would be undertaken to build on information collected during this preliminary assessment.

### **Water Management Act 2000**

Under section 56 of the *Water Management Act 2000* (WM Act) an access licence is required for water extraction. Section 89 of the Act relates to water use approvals. Section 91 relates to activity approvals and provides that certain types of development and activities that are carried out in or near a river, lake or estuary are “controlled activities” and require an activity approval. Section 91 also provides that aquifer interference activities require an aquifer interference approval.

Pursuant to section 115ZG of the EP&A Act a permit under section 89, 90 (with the exception of aquifer interference) and 91 of the WM Act is not required for Projects approved under Part 5.1 of the EP&A Act.

The EIS would assess the impacts on groundwater and identify whether an aquifer interference approval or groundwater license is required.

The Project is within the area covered by the Water Sharing Plan for the Wybong Creek Water Source. The Water Sharing Plan covers the waters of the Wybong Creek Water Source including all water occurring on the land surface, including any lakes and wetlands in this water source, along with the groundwater within the alluvial sediments associated with the rivers in this water source whilst excluding any groundwater contained in fractured rock aquifers.

## 4. Preliminary Environmental Assessment

### 4.1. Introduction

This section provides a preliminary assessment of the environmental and social issues associated with the Project. Numerous environmental investigations of the Dolwende property have already been completed in recent years, some specifically for the planned quarry and others for a recently approved subdivision. These previous studies provide a baseline understanding of the existing environment and the potential environmental impacts associated with the quarry, and include:

- Flora and Fauna Assessment (the Enviro Factor, August 2008). This study addressed the development of a quarry though the precise details of the operations were not finalised at the time. It is likely that this assessment would need to be updated for the EIS;
- Aboriginal Cultural Heritage Assessment (Victor Perry, July 2008). This report addressed a previous subdivision. It is likely that this study would need to be updated for the EIS to meet the requirements of current guidelines, specifically the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (OEH, 2010);
- Preliminary Agricultural Appraisal of “Dolwende” Denman – Proposed Ridge gravel Extraction (Ross Watson Agriculture, 2014). This assessment determined the agricultural value of the lands affected by the proposal and confirms that the quarry would be confined to lands with low agricultural production potential;
- Traffic Report for Proposed Gravel Quarry (Colston Budd Hunt & Kafes, November 2012). This report addresses traffic flows and intersection details for the planned quarry. It is assumed that this assessment would be adequate for the EIS;
- Exploratory drilling undertaken by Terratest and logging of 4 boreholes by Hunter Geotechnics (April 2012);
- Resource Assessment (RCA Australia, 2014)
- Laboratory assessment of rock samples and assessment of resource quality (RCA, July 2012);

The preliminary design of the proposed quarry and haul road has been undertaken in consideration of the findings of these assessments, with a view to minimising environmental and social impacts where feasible. Similarly, the final design of the quarry would be advised by the findings of further environmental assessments through the EIS process, to avoid and mitigate impacts where possible.

The following matters are likely to present the key environmental issues for assessment and would be evaluated in detail during preparation of the EIS:

- Flora and fauna (including threatened species and endangered ecological communities);
- Aboriginal cultural heritage;
- Traffic, transport and access;
- Noise and vibration;
- Landscape and visual amenity; and
- Surface water and groundwater management.

A number of additional issues that are expected to have more minor potential environmental impacts would also be considered in the EIS, including:

- non-Aboriginal heritage;
- soils and geology;
- air quality;

- agricultural land capability;
- socio-economic impacts, including on important agricultural industries;
- waste management; and
- contaminated land.

The key issues are discussed further in the following sections.

## 4.2. Flora and Fauna

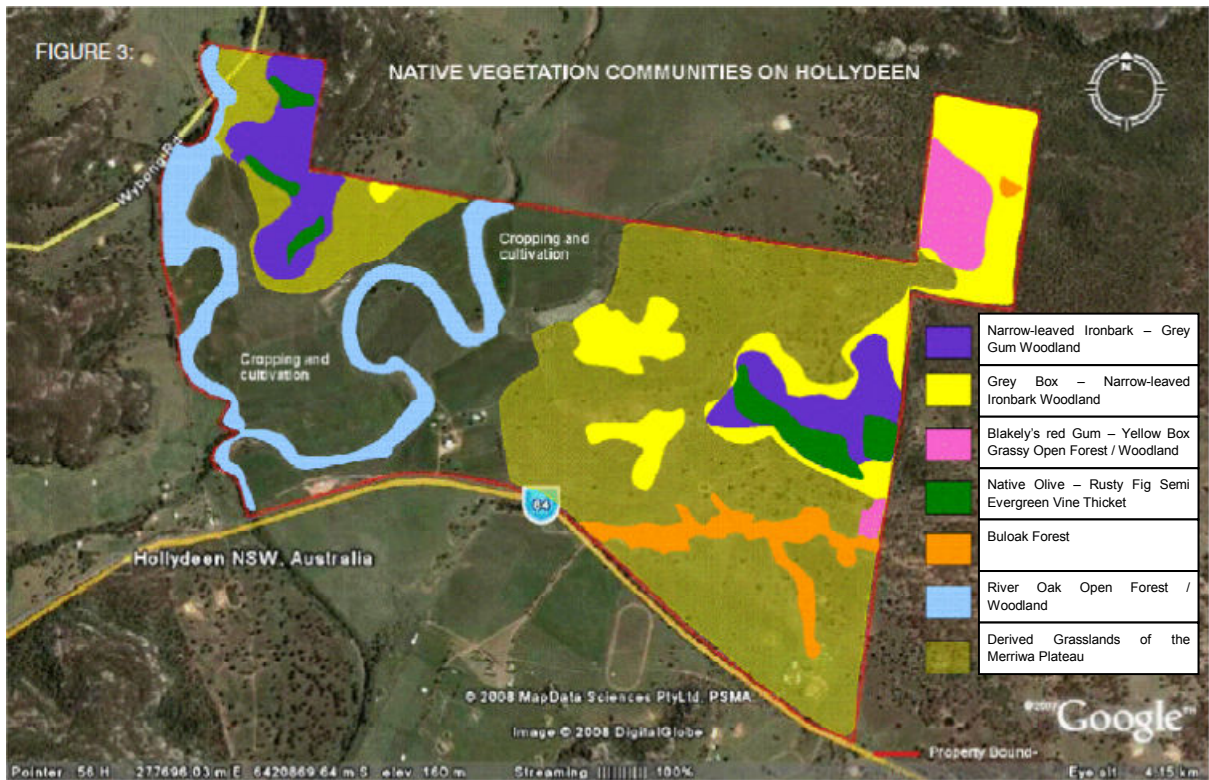
### 4.2.1. Existing Conditions

A Flora and Fauna Assessment of the Dolwendee property was undertaken by the Enviro Factor in 2008 with the aim of assessing potential impacts of a proposed quarry on flora and fauna, especially in regards to critical habitat, threatened species, populations or ecological communities, or their habitats. General details only of the quarry proposal were available at the time; however, the area assessed is consistent with the quarry location now proposed.

A field inspection was carried out over a 3 day period from the 19<sup>th</sup> to 21<sup>st</sup> July 2008. This inspection involved a number of site descriptions and random traverses of the proposal site identifying and recording the vegetation communities present and their condition; all flora species present, including any threatened species, populations and endangered ecological communities; the presence of fauna habitat features; and any incidental sightings of threatened fauna.

The Enviro Factor (2008) report found:

- The site of the quarry (5.6ha) and the haulage road has been previously cleared, however the event was not recent allowing a regrowth woodland community to develop. In addition, scattered old growth trees remain from the original clearing event. The adjacent rocky ridge comprises a mosaic of shrubby woodland vegetation types in good condition;
- Four vegetation communities occur on the quarry area or the site of the proposed haulage road (see Figure 5). These communities are Narrow-leaved Ironbark – Grey Gum Woodland; Grey Box – Narrow-leaved Ironbark Woodland; Blakely's Red Gum – Yellow Box Grassy Open Forest / Woodland; Derived Grasslands of the Merriwa Plateau;
- The haulage route intersects an area of 1.2ha of Blakely's Red Gum-Yellow Box Woodland dominated by (*Eucalyptus blakelyi*) which constitutes White Box Yellow Box and Blakely's Red Gum Woodland listed as an endangered ecological community under the NSW Threatened Species Conservation Act 1995 (TSC Act). This area of ecological community will be retained within remnant vegetation on the property; and
- No fauna survey was undertaken but opportunistic sightings of the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) and Brown Treecreeper (eastern subsp) (*Climacteris picumnis victoriae*) listed as Vulnerable under the TSC Act were recorded adjacent to the quarry area. Additionally, the area is considered to provide habitat for a further 38 threatened fauna species, 18 threatened flora species and 8 migratory species listed under the State and Commonwealth legislation.



Source: The Enviro Factor (2008)

Figure 5 Vegetation Communities

#### 4.2.2. Method of Assessment

The potential impacts of the construction and operation of the proposed quarry would be quantified by a detailed flora and fauna assessment, including updated surveys as required supplementing the previous assessment by The Enviro Factor (2008). The assessment would include identification of appropriate and specific mitigation and management measures.

The survey would be tailored to address the relevant Director General's Requirements (DGRs) and is likely to include: threatened flora survey within areas to be disturbed; baseline fauna surveys to include all fauna groups in areas where previous survey has not occurred (or occurred outside of the preferred survey season); and targeted surveys for threatened species most likely to be impacted by the proposal.

Flora and fauna investigations will be undertaken in accordance with the *draft Guidelines for Threatened Species Assessment* (DEC 2005) and the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft)* (DEC 2004). Assessment will include significance assessments for all threatened species, populations and ecological communities following the heads of consideration and the *draft Guidelines for Threatened Species Assessment under Part 3A* (NPWS 2002) for listing under the TSC Act; and the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (DEC 2005).

The proposed Project activities will be assessed also in relation to the Commonwealth EPBC Act, including identification of any Commonwealth referrals required.

### 4.3. Noise and Vibration

#### 4.3.1. Existing Conditions

The existing environment is characterised by moderate to high background noise levels from Mangoola Mine. The main existing noise sources are the mining operations of Mangoola Coal and road traffic on the Golden Highway.

Mangoola Coal have a current application with the NSW Department of Planning and Infrastructure (06-0014 MOD 6 – Extraction Rate Increase) that has the potential to increase mine-generated noise impacts over the subject lands.

Landscape features should substantially suppress noise emissions to the south or east from the proposed quarry. Noise-sensitive receivers (residences) to the north and west of the proposed quarry operations, with greatest potential to be affected by extractive operations, are all at least 2 km from the site. This distance reduces potential noise impacts on surrounding landowners.

The operations of haul trucks could increase road traffic noise and this is likely to be most significant at the site intersection with Golden Highway.

#### 4.3.2. Method of Assessment

A noise impact assessment would be undertaken to assess potential impacts from activities such as construction of the haul road, quarrying operations and road transport of quarry materials. This assessment would be undertaken in accordance with relevant NSW noise policies, including (as appropriate) the *NSW Industrial Noise Policy* (EPA, 1999), the *NSW Road Noise Policy* (DECCW, 2011) and the *Interim Construction Noise Guideline* (DECC, 2009). It is likely to include:

- Identification of noise-sensitive receivers;
- Baseline noise monitoring at the nearest sensitive receivers;
- Determination of project specific noise objectives;
- Predicting noise emissions from the Project, both from extractive operations and product haulage;
- Noise modelling to assess noise generation from the proposed activities and compliance with the project specific noise criteria;
- Consideration of cumulative noise impacts particularly in relation to the operations of Mangoola Coal Mine and existing road noise on the Golden Highway; and
- Identification of mitigation measures to reduce any unacceptable impacts.

A qualitative vibration impact assessment would be undertaken. Given there will be no blasting and the relatively large distance between the proposed quarry and sensitive receivers, it is anticipated that vibration impacts would be negligible.

### 4.4. Traffic, Transport and Access

#### 4.4.1. Existing Conditions

The Project Area fronts the Golden Highway which connects Singleton, Jerrys Plains and Denman in the east with Merriwa and Dubbo in the west. In the vicinity of the site the Golden Highway provides a two lane two-way carriageway with sealed shoulders and a 100 kilometre per hour speed limit. The nearest marked intersection is with Rosemount Road on the southern side of the Golden Highway.

Currently there are two entrances to the proposed quarry development site which will be consolidated by the application to one entrance which is adjacent the Rosemount Road intersection.

#### 4.4.2. Method of Assessment

Colston Budd Hunt and Kafes Pty Ltd (2012) have prepared an assessment of traffic implications of the proposed gravel quarry. It is intended to rely substantially on the results of this recent assessment in preparing the EIS.

The traffic assessment was based on the following assumptions:

- Quarry producing up to 250,000 tonnes per year;
- Material transported from site via an internal haul road and proposed new two-way intersection with the Golden Highway, approximately 100-120 m east of Rosemount Road;
- Material extracted from the quarry would be carried by truck/trailer combinations and b-doubles, which carry some 33 and 39 tonnes each respectively. Based on an extraction rate of up to 250,000 tonnes per annum, and some 270 days operation per year, the proposed quarry would generate up to some 25 to 30 laden vehicles per day; and
- Over a 12 hour working day, this is equivalent to some two to three trucks per hour (four to six vehicles two-way). This is a very low number, equivalent to an average of only one vehicle every 10 to 15 minutes.

The traffic assessment included a review of road conditions, traffic flows and intersection operation. The assessment found that there are good sight lines at the proposed access point on Golden Highway in both directions (some 350 metres to the east and some 250 to the west).

Traffic generated by the proposed gravel quarry would have its greatest effects during weekday mornings and afternoons when it combines with other traffic on the surrounding road network. In order to gauge traffic conditions, counts were undertaken during weekday morning and afternoon peak periods at the intersection of Golden Highway with Rosemount Road.

The results of the traffic counts are provided in Table 1.

**Table 1 Existing Two-Way (sum of both directions) Peak Hour Traffic Flows**

Road	Location	AM Peak Hour	PM Peak Hour
Golden Highway	East of Rosemount Road	190	170
	West of Rosemount Road	190	160
Rosemount Road	South of Golden Highway	10	20

The SIDRA program was used to assess the operation of the Rosemount Road intersection and determine the level of service (LOS). This found that the intersection is operating with average delays for the highest delay movement less than 15 seconds per vehicle during morning and afternoon peak periods. This represents levels of service A/B, a good level of service.

The assessment found that the very low traffic volumes turning to and from the proposed new access road would not require special treatment at the intersection of Golden Highway. The intersection would operate at a good level of service, equivalent or better than the nearby Rosemount Rd intersection, and there are good sight lines in both directions on Golden Highway. Traffic from the proposed development is therefore not expected to result in any unusual safety issues at the intersection.

Engineering consultants RHM Consulting Engineers have prepared preliminary plans of the proposed entrance and road upgrades to the Golden Highway which provide for a left turn in deceleration lane and a right turn in passing lane. Road and Maritime Services (RMS) would be consulted regarding the

findings of the traffic assessment and the design of the proposed intersection. Any necessary approvals from RMS such as a Works Authorisation Deed (WAD) would be sought.

## **4.5. Aboriginal Cultural Heritage**

### **4.5.1. Existing Conditions**

Aboriginal people have occupied the NSW landscape for at least 40,000 years. The evidence and important cultural meanings relating to this occupation are present throughout the landscape, as well as in documents and in the memories, stories and associations of Aboriginal people. Therefore, activities that disturb the landscape may impact on Aboriginal cultural heritage (DECCW, 2010). The Hunter Valley contains areas that are highly significant to Aboriginal people. There is a comprehensive record of past occupation and use of the Hunter Valley landscape and its resources by Aboriginal people.

A search of the AHIMS register identified that there are no registered Aboriginal sites within the Project Area; however, there are numerous sites within several kilometres of the Project Area. The site is close to landscape features that are often associated with the presence of Aboriginal objects, including permanent waterways, ridge lines and cliff faces.

An Aboriginal Cultural Heritage Assessment was undertaken by Victor Perry of Junburra Aboriginal Consultancy Services in 2008, to address a proposed subdivision. The assessment considered the Project Area in its entirety, including the area of the proposed quarry and haul road. It is noted that Mr Perry is a Registered Native Title Claimant and has been endorsed by the Wonnarua Traditional Owners to carry out cultural heritage assessments within their tribal boundaries.

The assessment included consultation with the local community via direct contact with key Traditional Owner groups as well as more broadly through advertisements in print media seeking registrations of interest in the project. Junburra Aboriginal Consultancy Services subsequently undertook fieldwork over two days to identify the cultural heritage values of the site, including the presence or otherwise of Aboriginal objects.

During the survey no Aboriginal objects were found and it was recommended that there were no constraints to the proposed subdivision.

### **4.5.2. Method of Assessment**

To assess whether the proposed Project may harm Aboriginal objects or Aboriginal places, a Due Diligence Assessment would be conducted in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010). The Due Diligence Assessment would be undertaken by an Aboriginal cultural heritage consultant and would utilise the findings of the previous cultural heritage assessment, including field survey, conducted by Junburra Aboriginal Consultancy Services. The previous survey covered the proposed quarry area and included consultation with the Aboriginal community. It is anticipated that this previous work would be updated through review of any new information and further consultation with the Aboriginal community. Additional field surveys may be undertaken if considered necessary to inform the assessment.

The Aboriginal cultural heritage assessment would be undertaken in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011). Its scope would be guided by any formal requirements outlined in the DGRs and may be shaped to some extent by the findings of the due diligence assessment. The proponent would be guided by the consultant to ensure their obligations for assessing Aboriginal cultural heritage are met in accordance with relevant NSW codes of practice, and State and Commonwealth law.

## **4.6. Non-Aboriginal Heritage**

### **4.6.1. Existing Conditions**

Searches of Commonwealth and State heritage registers as well as Muswellbrook Council LEP were conducted. There are no heritage items listed as occurring within the Project area. There is a site of local heritage significance listed on Muswellbrook LEP that is several kilometres from the proposed quarry – “Hollydeen Shop”, located at cnr Reedy Creek Road and Golden Highway. The proposed quarry would not impact on this heritage site.

### **4.6.2. Method of Assessment**

A historical heritage assessment would be undertaken to confirm the absence of any heritage values within the Project Area. This assessment would rely on relevant heritage registers as well as a site inspection. Specialist historic heritage consultants would not be involved unless a potential heritage item is identified that might be affected by the Project; however this is considered very unlikely.

## **4.7. Soils and Geology**

### **4.7.1. Existing Conditions**

Soil Landscapes of the Singleton 1:250,000 Sheet (Kovac & Laurie, 1991) indicates that much of the Dolwende property contains the Sandy Hollow Soil Landscape and this includes the proposed quarry area. The rocky escarpment south of the proposed quarry is described as Lees Pinch Soil Landscape while the alluvial flats adjacent Wybong Creek are described as Wollombi Soil Landscape.

The Sandy Hollow Soil Landscape covers undulating rises and slopes within the Goulburn Valley on sandstone, gravel and shale parent material of the Narrabeen Group. The main soils are red and yellow Solodic Soils on the lower slopes. Red Earths occur midslope directly adjacent to sandstone benches with Siliceous Sands. Alluvial soils occur along major drainage lines. Soil salinity, high erodibility and poor drainage are constraints that can occur across this landscape.

### **4.7.2. Method of Assessment**

Soil disturbance would occur during the operation of the quarry. This includes disturbance to native soils during stripping and stockpiling of topsoil and overburden, construction and operation of the haul road, and stockpiling of processed quarry materials. Erosion of disturbed soils is a key potential impact that would be assessed.

A description of the existing soils and geology, their susceptibility to degradation, and an assessment of potential impacts would be undertaken as part of the EIS and is expected to include:

- A description of the existing soils and geology, and evaluation of soil constraints such as erodibility, sodicity and salinity;
- Assessment of erosion hazard using the Revised Universal Soil Loss Equation (RUSLE);
- Desk-top identification of potential for pre-existing soil contamination on-site, and of the potential for quarry operations to cause contamination;
- Identification of key activities with the potential to impact on soils; and
- Development of mitigation measures to manage soil-related impacts, including a conceptual soil and water management plan.

## **4.8. Visual Amenity**

### **4.8.1. Existing Conditions**

The existing landscape has a rural character comprising rolling hills which are predominantly cleared, with a backdrop of vegetated rocky ridges and mountainous areas in the distance. The built environment comprises scattered rural residences and farm buildings.

### **4.8.2. Method of Assessment**

A Visual assessment will be undertaken to assess potential impacts to visual amenity associated with the proposed Project. The visual analysis will include assessing potentially affected surrounding residences and viewing locations, including public roads.

A view point analysis will be conducted from a number of vantage points with an emphasis on residences to the north and northwest that may have visibility of the proposed Project. Potential vantage points from public roads, including Wybong Road and Golden Highway, would also be considered. Photographs will be compiled to describe these vantage points and assist in the visual analysis. The visual assessment will focus on the degree of visual modification likely to be experienced from different vantage points, and the sensitivity of those changes.

Based on the available information, it is anticipated that visual impacts are not likely to be significant for the surrounding vantage points and residential locations due to their relatively large distance from the Project Area and the obscuring effects of topography.

## **4.9. Surface Water Hydrology**

### **4.9.1. Existing Conditions**

The dominant surface water drainage feature of the area is Wybong Creek, a tributary of Goulburn River, which occurs approximately 1 km west of the proposed quarry. The property drains to Wybong Creek mainly via sheet flow over gently sloping north, north-west and south-facing slopes. There is one large and several small dams on the property.

An intermittent creek (Lynch's Gully) occurs in the southern part of the property and drains to the west to Wybong Creek. Lynch's Gully displays some gully erosion and has been the subject of soil conservation works in the past. The proposed haul road would cross Lynch's Gully and a new culvert is proposed for this purpose. The proposed extraction area is not located near any existing drainage lines.

### **4.9.2. Method of Assessment**

An assessment of potential impacts on surface water would be undertaken for the EIS, including evaluation of water quality and quantity impacts, and impacts on existing drainage lines. The assessment would include an estimate of water demand for the quarry and evaluation of water supply options. The property currently holds a high security surface water license and the EIS will investigate the provision of water to the quarry under this existing water entitlement, if needed.

A conceptual soil and water management plan would be prepared as part of the EIS to address the management of surface water around the quarry, including erosion and sediment control requirements, management of clean and dirty water, design and location of sediment basins, and revegetation/rehabilitation requirements. Recommendations for operational surface water monitoring would be provided, as necessary.

## **4.10. Groundwater**

### **4.10.1. Existing Conditions**

The proposed quarry is located on elevated ground that is likely to form part of a groundwater recharge area. The four exploration boreholes that occur within the proposed quarry footprint were recently dipped using a water level probe to measure standing groundwater levels. This investigation was compromised by some collapse within the wells, which were never constructed as monitoring wells, meaning they were unable to be dipped to their drilled depths. Nevertheless, groundwater was not encountered in any boreholes and the depths reached by the water level probe ranged between 11 m and 25 m.

### **4.10.2. Method of Assessment**

The quarry has the potential to intercept a local fractured rock groundwater aquifer, if one exists. A hydrogeological investigation would be undertaken as part of the EIS to assess the presence or otherwise of groundwater at the depths likely to be intercepted by quarry operations. The significance of groundwater interactions and impact on groundwater resources would be assessed.

It is noted that boreholes have been drilled within the proposed quarry footprint for the purpose of geological resource assessment. These boreholes and potentially additional boreholes will be established as monitoring wells and baseline groundwater data collected to inform the assessment. Recommendations for operational groundwater monitoring would be provided, as necessary.

## **4.11. Air Quality**

### **4.11.1. Existing Conditions**

The proposed Project is located on rural lands adjoining Mangoola Coal Mine. Air quality at present is affected by the mining operation. Otherwise, local air quality would be affected to some degree by activities including dust generation from light vehicles on unsealed farm roads, vehicle exhaust emissions and general agricultural activities..

### **4.11.2. Method of Assessment**

A qualitative air quality assessment will be undertaken to:

- Determine baseline air quality in the area and identify existing activities impacting air quality;
- Assess activities associated with the proposed Project that could impact on air quality, including through emission of dust and other air impurities;
- Assess potential air quality impacts on nearby receivers; and
- Identify mitigation measures to control air emissions.

The key potential air quality impacts associated with the proposed Project are dust emissions from exposed areas including product stockpiles, plant manoeuvring areas and heavy vehicles using the haul road. The crushing and screening plant is another potential source of dust generation.

Mitigation measures are available that can be highly effective in controlling dust at small quarries. These include:

- appropriate siting and screening of dusty operations, so as to minimise exposure to prevailing winds;
- watering of exposed surfaces such as stockpiles and haul roads;
- use of synthetic soil stabilisers to provide longer term dust control, where appropriate;
- optimising quarry layout to minimise movements of mobile plant, eg by placing crushing plant close to the quarry face; and
- progressive revegetation of disused areas, where practicable.

On the information available, it is considered that there is a low risk of air emissions from the proposed Project impacting on surrounding receivers or contributing significantly to the cumulative impacts of other surrounding activities. This assessment is influenced by the large distance between the potential dust-generating activities and surrounding receivers; the relatively small scale and nature of the proposed operations; and the known effectiveness of available dust controls. On this basis it is considered that detailed air quality modelling is not necessary to assess the impacts of the Project, and that a qualitative assessment outlining a detailed dust mitigation program, will adequately address the needs of the proposed Project.

#### **4.12. Socio-economic Issues**

A socio-economic assessment would be undertaken that considers the existing social and economic environments and the effects (positive or negative) that may arise from construction and operation of the proposed Project. This would include considerations of factors such as:

- Generation of employment, investment and use of local products and services;
- Potentially adverse impacts on local communities due to road traffic, dust, noise, vibration and visual impacts;
- Consultation with stakeholders including neighbouring residents, to gauge community support and any concerns for the project.

## 5. Conclusion

This Supporting Document has been prepared to accompany a development application for State Significant Development, for a proposed new quarry at “Dolwendee”. It provides information to assist in compiling the Director-General’s Requirements for the proposed Project. The proposed Project seeks extraction from a resource totalling more than 5 million tonnes and so meets the definition of State Significant Development.

In summary, the proposed Dolwendee Quarry is targeting extraction of a ridge gravel resource to produce a range of aggregate types. The quarry is expected to be a relatively small operation, with a targeted extraction rate up to 250,000 tonnes per year. Raw material would be dug from the ground using a 30T excavator (or similar) and stockpiled for processing. Product would be processed onsite by crushing and screening to produce the range of desired products. A haul road would be constructed between the proposed quarry location and the Golden Highway.

It is believed that the proposed Project is well situated to minimise potential impacts on the environment and on the border community. It is located in a relatively remote location distant from sensitive receivers. A high degree of visual screening would be afforded by the natural topography.

Key environmental issues that would be assessed in detail as part of the Environmental Impact Statement include, but are not limited to:

- Flora and fauna (including threatened species and endangered ecological communities);
- Aboriginal cultural heritage;
- Traffic, transport and access;
- Noise and vibration;
- Landscape and visual amenity; and
- Surface water and groundwater management.

The Dolwendee Quarry is proposed to maximise the economic and productive use of the land which contains a viable geological resource, with limited alternative uses. The applicant has identified a local demand for the products that would be produced by the quarry. The proposed quarry will result in generation of employment and demand for products and services, and would contribute to economic activity in the local area.

## Appendix A

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### Agronomist's Report

28<sup>th</sup> April 2014.



**THE DIRECTORS**

**UPPER HUNTER HOLDINGS P/L**

**PO BOX 69**

**DENMAN.NSW. 2328**

Dear Directors,

**PRELIMINARY AGRICULTURAL APPRAISAL of**  
**“DOLWENDEE” DENMAN**  
**PROPOSED RIDGE GRAVEL EXTRACTION.**

This report is to confirm that I, Ross Watson, Consulting Agronomist, Ross Watson Agriculture P/L of Scone inspected the property known as “Dolwendee” at Denman, NSW, in August and December 2013 to provide an initial agricultural appraisal of the site and assess the potential impacts of a gravel quarry on the agricultural land and the environment.

**Property Description.**

The proposed gravel quarry is located on the property now known as “Dolwendee”, Denman, which is owned by Upper Hunter Holdings.

“Dolwendee” occupies Lots 1,2,3 and 4 in DP 1160936 . The property covers a total area of some 163 ha. Lot 1 is 40.3 ha, Lot 2 is 41.53 ha, Lot 3 is 40.62 ha and Lot 4 is 40.58 ha. (See Fig 5)

The proposed quarry is to be located wholly on the property known as “Dolwendee” and in particular on Lot 2 with a haul road from the quarry to the Golden Highway crossing Lots 3 and 4 within an existing right of carriageway. (See reference property maps Fig 5 showing allotments).

The proposed gravel extraction site is located on Lot 2, on the north eastern section of the property known as “Dolwendee ” Denman. See Fig 5.

The property “Dolwende” is located approximately 8.5 km NW of Denman along the Golden Highway.

**The property Dolwende covers an estimated area of some 163 ha**

I have estimated that the property consists of the following agricultural land classes

**Table 1. Estimated Agricultural Land Profile “Dolwende” Denman.**

Agricultural Land Class	Description	Dolwende 163 ha	
		Estimated Area	% of Farm area
Class 1	Arable land suited to continuous cultivation for uses such as intensive horticulture and field crops. Constraints to sustained high levels of production are absent or minor	0	0
Class 2	Arable land suited to regular cultivation for such as intensive horticulture and field crops. Constraints to sustained levels of production are minor to moderate.	0	0
Class 3	Land suited to occasional cropping but not continuous cropping. Best sown to perennial sub tropical pastures. Production risks managed through a pasture phase, conservation tillage and or no till farming. Constraints to sustained levels of production are moderate	20	12
Class 4	Land suited to grazing but not cultivation. Agriculture is based on native pastures and or improved pastures established using minimum tillage techniques. Overall level of production is comparatively low due to major environmental constraints.	91	56
Class 5	Land not suited to agriculture or only light grazing. Agricultural production, if any is low due to major environmental constraints	52	32

*From Table 1, it can be seen that, in my opinion, the major agricultural land class on “Dolwende” , the site of the proposed gravel quarry is considered to meet the guidelines of Class 4 + 5 agricultural land, which has a low overall agricultural production potential.*

*“Dolwende” is estimated to be 12% Class 3 , 56 % Class 4 and 32% Class 5 Ag Land. The overwhelming majority, of the property, some 88% of the property meets the guidelines of low productivity Class 4+ 5 Agricultural Land . No prime (Class 1+2 ) agricultural land is contained on Dolwende. .*

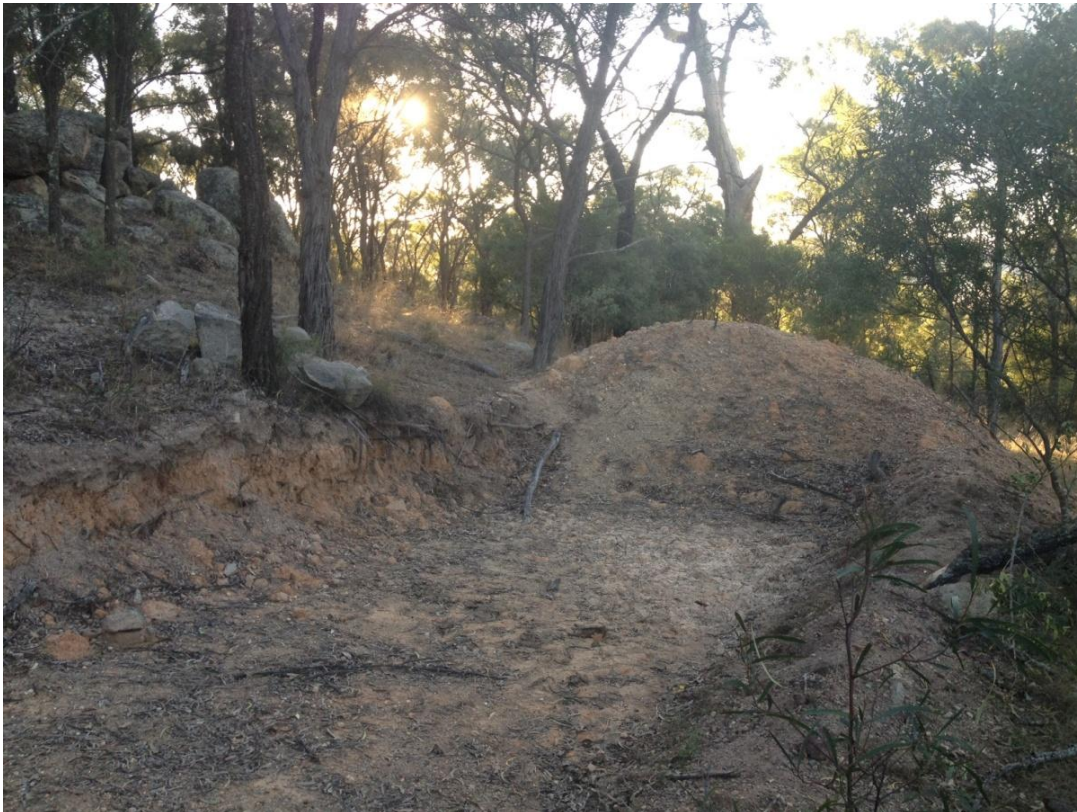
**The gravel extraction quarry, on Dolwende ,will be confined to entirely Class 4 Agricultural land some Class 5, Non Agricultural land. See Fig 6 showing Agricultural Land Classes on Dolwende.**

**Figures 1-4 provide images of the typical site presentation at the proposed quarry site.**

**Fig 1. Typical Site presentation at Proposed Gravel Quarry Site on Dolwendee. Class 4 Ag Land in foreground, Class 5 Ag Land in background.**



**Fig 2. Typical Class 4/5 Ag land in the proposed quarry area on Dolwendee.**



**Fig 3. Typical Class 4/5 Ag land in the proposed quarry area on Dolwendee.**

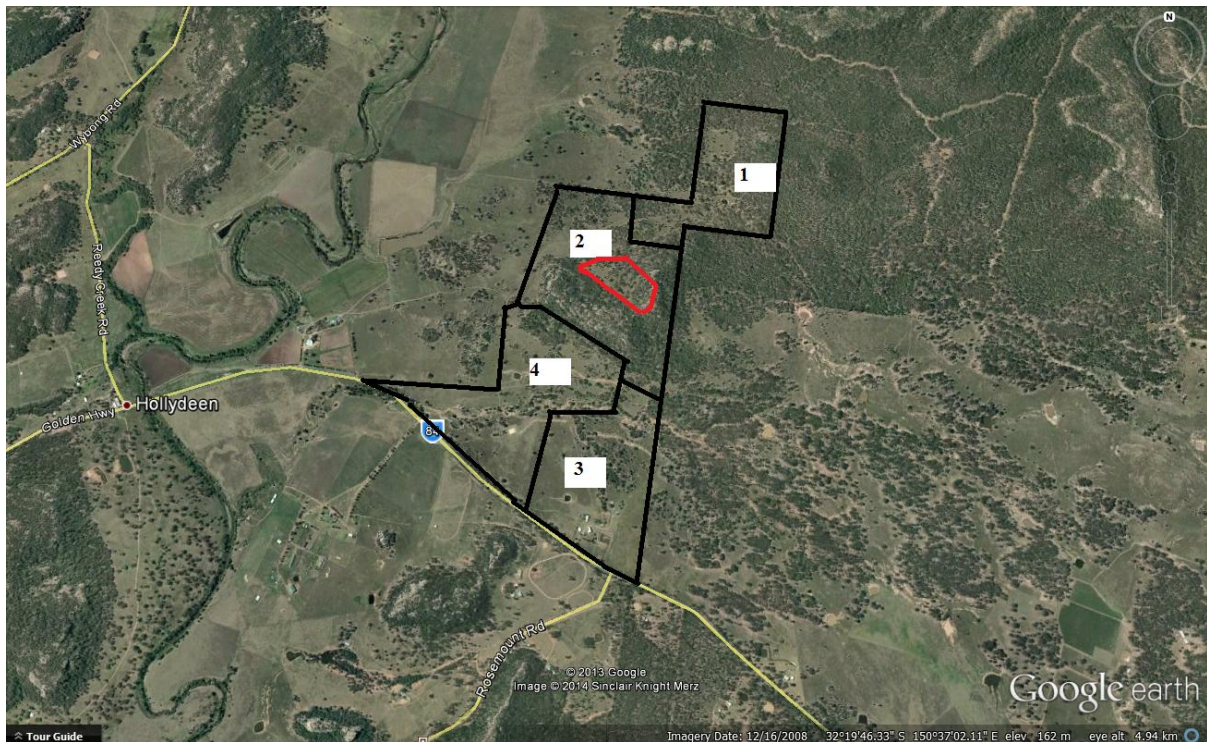


**Fig 4. Typical general landscape presentation at Proposed Gravel Quarry Site on Dolwendee.**

**Note: Class 4 Ag Land in foreground, Class 5 Ag Land in background at Dolwendee.**

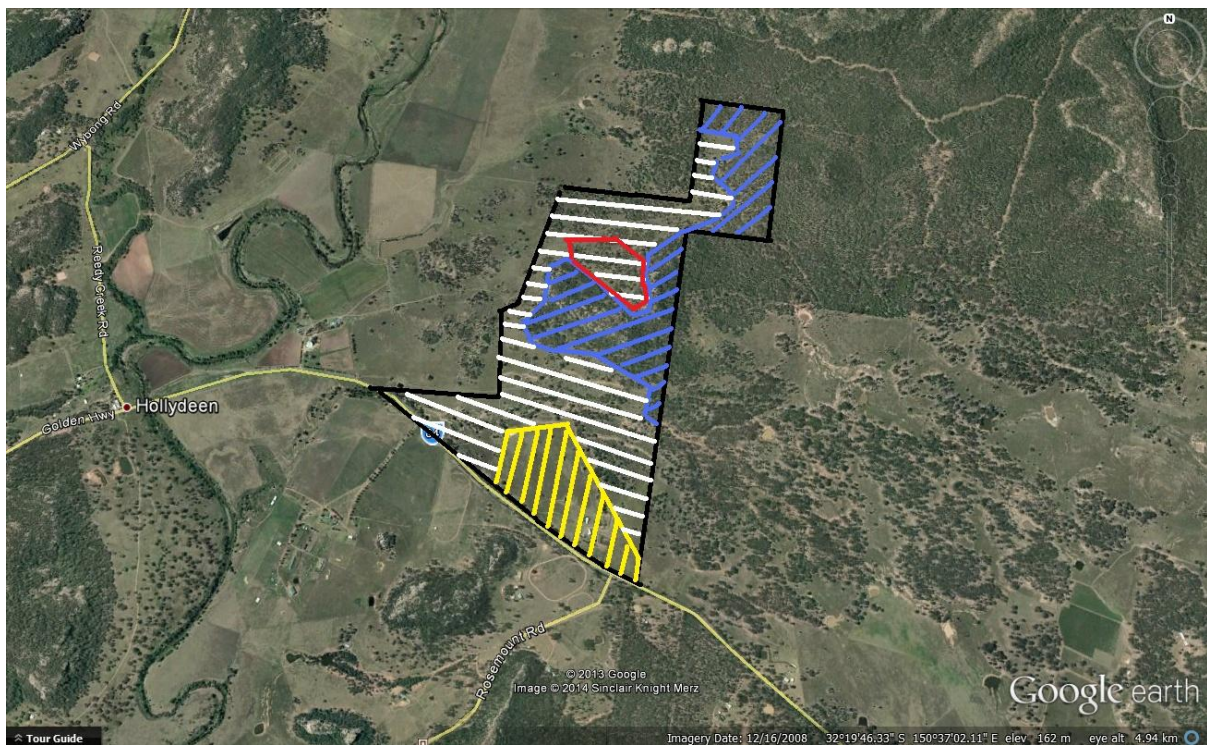


**Fig 5. Allotments on “Dolwende” Denman. NSW.**



**Prepared by Ross Watson Agriculture P/L Scone. April 2014.**

**Fig 6. Agricultural Land Classes and Proposed Quarry Location on “Dolwende” Denman.**



**Key Agricultural Land Classes- Class 3- Yellow : Class 4 - White : Class 5 Blue.**

**Red line is proposed quarry area.**

## **“Dolwendee” Gravel Quarry Extraction Site**

**Gravel Extraction Quarry covers an measured area of 10.7 ha. This site occupies in my opinion, an estimated 9 ha of Class 4 Agricultural land and 1.7 ha of Class 5 Non Agricultural land.**

**The proposed extraction area represents less than 7 % of the Dolwendee property area and does not include any prime or good agricultural land.**

The soils of the proposed gravel extraction area are of low agricultural value. (See Fig 1-4.) They are solodic soils /sedimentary deposits, gravelly textured . Top soils are moderately to strongly acidic with the sub soil being slightly acidic to neutral in pH. The soils are very deficient in major and minor plant nutrients, have low water holding capacity, are imperfectly drained, are loose to hard setting and moderately permeable. The topsoil is weakly structured gravelly loam textured overlaying a reddish, yellow or brown medium clay subsoil.

They have a moderate to high erosion hazard and propensity to structural breakdown once disturbed. They are a soil with medium to low shrink swell characteristics.

Soils with these features have limited agricultural value .

The native vegetation over the site is dominated by narrow leaved ironbark, cypress pine, narrow leaf apple and native grasses. (See Fig 1-4.) This vegetation is not unique or limited in existence in this region. It is typical of the vegetation on this lower class agricultural or non agricultural land in the area.

### **Potential Impacts on Environment and Agricultural Land Use .**

The following issues are highlighted.

*Agricultural Land Use:* This nominated area of the proposed gravel quarry has a low to very low agricultural production potential and would therefore not significantly lower the overall agricultural productivity potential of this property or the surrounding district.

No highly productive agricultural areas are involved in this proposed development. Current or future agricultural activities, (such as livestock grazing on native pastures) although of limited value and potential, could continue to be conducted on the remaining area on the property. The property Dolwendee has limited agricultural production potential.

*Nominated important Land Use areas :* Based on the broad scale Regional Maps provided by Muswellbrook Shire Council and NSW Primary Industries, this proposed development **does not** appear to be located on any “*Important Equine Land*” or “*Important viticultural land area*”.

In my opinion, the land on Dolwendee, which is predominately Class 4 and 5 Ag land , is not suitable for equine or viticultural development.

It should also be emphasized that this proposed gravel extraction activity will not directly involve or impact on any prime or good agricultural land ie Class 1,2 or 3 agricultural land, which may be considered for equine or viticultural usage.

***No prime or good agricultural land would be alienated by the proposed gravel excavation area on Dolwendee. The nominated boundaries of this development are confined to Class 4 and 5 agricultural land , and only represent less than 7 % of the total property area.***

*Protection of Wybong Creek.* The proposed development is located 1000-1500 metres from the Wybong Creek. *At this distance, and with an effective grassland buffer zone dense native pasture and timber regrowth surrounding the site over this distance , there is no perceived risk of soil sediment entering or contaminating this creek from this proposed quarry.* This dense vegetation zone surrounding the proposed quarry should act as a very effective sediment trap and buffer zone. The natural soil sediment would not pose any contamination risk to the vegetated land surrounding the site. The suitable construction of run off dams , silt traps and vegetation buffer zones would be recommended to prevent unwanted or excessive silt/soil movement off site. The progressive and permanent revegetation of the site after extraction is completed will also be needed to stabilise, revegetate and protect the previously disturbed area and prevent unwanted weed invasion.

*Visual Impacts:* The visual amenity of the area should be considered . It would appear that the proposed quarry would be largely be obscured from view from the main traffic and tourism flow along the Golden Highway between Denman and Sandy Hollow, due to the visual protection that will be provided by the heavily timbered sandstone escarpment and ridge located in the eastern area of the property. The proposed quarry would be located on the northern side of this natural barrier. The visual amenity of the area could be reduced when viewed from the minor traffic route of Reedy Creek Road.

*Dust and Noise Impacts:* It is conceivable that these proposed activities may generate some impacts outside the site. It is expected that this activity may generate on occasions some noise and dust impacts on surrounding land holders and nearby equine or agricultural activities , as a result of truck movements and machinery operations, in the process of excavating , loading and delivering such soil/gravel based material. Detailed studies as required under an EIS would clarify the potential impacts of these events.

*Equine Establishment nearby:* The equine establishment is located approximately in a 1.0 to 2.0 km radius, in a south westerly direction from central area of the proposed gravel quarry. At this stage there is no perceived direct impacts, on this equine operation, from this proposal. Some consultation with these nearby landholders should be undertaken to gain an appreciation of their level of concerns , if any.

It is expected that any impacts could be minimised and managed to prevent adverse impacts on surrounding activities or land holders .This would need to be addressed in their development consent to prevent direct impacts on existing and future agricultural or equine activities or development.

*Coal Mining Land Adjoins:* It should be noted that the land surrounding this property on the eastern, northern and western boundaries of the this property ,is currently owned by Mangoola Coal is now approved to extract 10 mtpa of coal . The potential impacts of this type of development are likely to be more significant than those potentially created from this development proposal.

I trust that this information and report is of some assistance in the consideration of your development application.

Regards

Ross Watson

Consulting Agronomist

Ross Watson Agriculture P/L Scone.

## Appendix B

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### Resource Assessment

*[Note borelogs have been removed from the attachment due to electronic file size restriction]*

RCA ref 9325-201/1

30 April 2014

Upper Hunter Holdings Pty Limited  
c/- KMH Environmental  
Level 1, 81 Hunter Street  
NEWCASTLE NSW 2300

Attention: Mr Adam Bishop

Geotechnical Engineering

Engineering Geology

Environmental Engineering

Hydrogeology

Construction Materials Testing

Environmental Monitoring

Noise & Vibration

Occupational Hygiene

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**PRELIMINARY RESOURCE ESTIMATE  
FOR PROPOSED STAGE 1 CONSTRUCTION MATERIALS QUARRY  
'DOLWENDEE', GOLDEN HIGHWAY, HOLLYDEEN**

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## **1 INTRODUCTION**

This report presents a preliminary resource estimate for Stage 1 of a proposed Construction Materials Quarry (herein referred to as proposed quarry - Stage 1) to be located in Lot 2 of the 'Dolwende' Estate near Hollydeen.

The purpose of this preliminary resource estimate is to determine if a construction materials resource equal to or in excess of 5 million tonnes exists within Lot 2 of the 'Dolwende' Estate.

This preliminary geotechnical resource estimate of the proposed quarry - Stage 1 was undertaken at the request of Mr Gary Williams, as per email instructions dated 11 February 2013. It is understood that Mr Gary Williams is acting on behalf of Upper Hunter Holdings Pty Limited.

The preliminary resource estimate of Stage 1 of the proposed quarry is based on review and analysis of four cored boreholes drilled on site, preliminary materials testing results and supplied plans of client nominated quarry location and environmentally sensitive areas affecting the proposed quarry area.

## 2 PREVIOUS INVESTIGATION

As part of the investigation of a potential quarry location, four (4) cored bores were drilled at client specified locations in the vicinity of a proposed quarry area, located within Lot 2 of 'Dolwendee', as shown on **Drawing 1**, attached. The cored boreholes BH1 to BH4 were drilled to depths ranging from 27.15m to 30.1m, as per client nominated depths. Copies of the cored borehole logs and core photographs for BH1 to BH4 are attached.

In brief, BH1 to BH4 encountered a sequence of conglomerate and pebbly sandstone with occasional lithic sandstone. Only BH1 encountered a claystone band and a coal band; which could be used as bedding 'marker' units.

Unfortunately these 'marker' units were not encountered in BH2 to BH4, therefore no estimation of bedding dip could be undertaken.

## 3 INFERRED GEOLOGY

Reference to NSW Geological Survey (NSW GS) geo-referenced 1: 100,000 Hunter Coalfield Geology Google overlay indicated the client proposed quarry - Stage 1 area traverses the geological boundary between the Wollombi Coal Measures Glen Gallic Sub-group and the overlying Narrabeen Group Widden Brook Conglomerate, as shown on **Drawing 2**, attached. Based on NSW GS mapping it appears BH1 was located within the mapped extent of the Glen Gallic Sub-group and BH2 to BH4 were located within the mapped extent of the overlying Widden Brook Conglomerate.

The rock core recovered from BH1 to BH4 appears to be consistent with the geology shown on the NSW GS 1: 100,000 Hunter Coalfield Geology sheet.

The nearest cross-section on the NSW GS 1: 100,000 Hunter Coalfield Geology sheet indicates the base of the Wollombi Coal Measures dips in a westerly direction at approximately 10°. Reference to NSW DMR notes for the Hunter Coalfield indicates the Widden Brook Conglomerate directly overlies the Greigs Creek Coal Seam (the uppermost coal seam in the Wollombi Coal Measures) with little or no erosion (washout) in many places.

## 4 PREVIOUS MATERIALS ASSESSMENT

A preliminary assessment of material quality based on tactile appraisal and point load testing of the core recovered from BH1 to BH4 and experience with similar material was presented in RCA Australia (RCA) report 9325-101/0 dated 18 July 2012. In brief, the preliminary material assessment concluded the following:

- Crushed conglomerate/sandstone would not be expected to meet aggregate requirements due to particle durability. The shape and size of the pebbles would also limit the yield of aggregate and size range that can be produced.
- Crushed conglomerate/sandstone would not be expected to meet the RMS pavement material requirements for sealed roads (QA 3051 2011). In particular, the wet/dry strength criteria would be unlikely to be met.

- Crushed conglomerate (blended with minor amounts of sandstone) would be expected to produce pavement material suitable for unsealed rural roads.
- Crushed conglomerate/minor sandstone would be expected to produce a subbase material suitable for sealed rural roads.
- Crushed conglomerate/sandstone would be expected to produce good unsealed hardstand type pavement material.
- It is likely that the finer material produced from crushing of conglomerate/sandstone rock could be processed to meet pipeline trench back fill requirements for drainage works, by removing plastic fines.

The preliminary assessment recommended materials testing of representative sections of the rock core retrieved from cored boreholes be undertaken. As a first pass, material testing could comprise the following:

- Acid rock potential (*not yet undertaken*).
- California Bearing Ratio test after crushing of core and pre-treatment (*four tests completed in Sept-Oct 2012*).
- Plasticity index (*four tests completed in Sept-Oct 2012*).
- Point load strength (*completed in April 2012*).
- Unconfined compressive strength (*not yet undertaken*).
- Wet/dry strength ratio (*not yet undertaken*).

Limited laboratory testing comprising California Bearing Ratio, Plasticity Index and Point Load Strength was undertaken on representative sections of the rock core retrieved from cored boreholes BH1 to BH4. A summary of the limited laboratory materials test results completed to date is presented in **Table 1**.

**Table 1** Summary of Limited Material Test Results

BH No.	Core Sample		Test Result	
	Depth (m)	Description	CBR (%)	PI (%)
BH 1	8-11	DW-SW Crushed pale brown-grey conglomerate	50/50	6
BH 2	24-26	SW-Fresh Crushed pale grey conglomerate	40/45	3
BH 3	3-5	DW Crushed pale brown conglomerate	50/60	2
BH 4	10-12	DW Crushed pale brown conglomerate	40/40	3

A material assessment based on the results of limited laboratory testing was presented in RCA report 9325/1 dated 13 September 2012. The limited test results supported the preliminary assessment presented in RCA report 9325-101/0 dated 18 July 2012, as summarised above.

## 5 ADDITIONAL INVESTIGATION RESULTS

### 5.1 SITE INSPECTION

A site inspection was carried out by an RCA principal engineering geologist in March 2013 to assess the existing surface conditions in the vicinity of the proposed quarry location, including the sandstone cliffs and slopes of a hilltop plateau remnant. A panoramic view of western portion of Lot 2 'Dolwende' Estate is presented in **Photograph 1** below.



**Photograph 1** *Panorama of western portion of Lot 2 'Dolwende' Estate, note rock outcrop/cliff faces of hilltop plateau remnant in middle-right background.*

No surface expression of deep-seated slope instability was observed within the client proposed quarry location or its immediate environs during site inspection in March 2013.

Past rock falls well embedded in soil profile were observed around the base of the rock cliffs that comprise the hill top plateau remnant, as shown in **Photograph 2**. It appears the observed rock falls have resulted from differential weathering of rock outcrop creating rock overhangs that fail once the underside of a natural rock mass defect is exposed and/or 'root jacking' of rock blocks by trees propagating in natural rock mass defect(s).



**Photograph 2** *Central southern area of proposed quarry - note several boulders (old rock fall/roll boulders) on right-hand side slope.*

### 5.2 GROUNDWATER OBSERVATIONS

No groundwater was observed prior to rock coring water recirculation drilling techniques commencing in BH1 to BH4 in April 2012.

At the request of RCA the client dipped the boreholes in June 2013 to determine if there was any standing groundwater in boreholes. The groundwater observations from the client borehole inspection are presented in **Table 2**.

**Table 2** Summary of Client Groundwater Observations in BH1 to BH4 June 2013

BH No.	Surveyed Collar RL (m AHD)	BH drilled depth (m)	BH inspected to depth (m)	Comments
BH1	216.71	30	16	No free water encountered. BH had collapsed below inspection depth.
BH2	225.61	30.1	25	As above
BH3	211.58	30	11	As above
BH4	221.56	27.15	20	As above

### 5.3 ROCK CORE DENSITY

To facilitate resource estimation, laboratory core density testing was undertaken on representative sections of rock core retrieved from BH1 to BH4 in March 2013. The test results indicated the mean core density is 2.318 Tonnes/m<sup>3</sup>.

## 6 STAGE 1 QUARRY CONSTRAINTS

Based on the limited drilling and materials testing, it was agreed by the quarry proponents that Stage 1 of the proposed Quarry should be constrained by:

- depth of the existing cored boreholes, nominally 30m;
- Lot 2 boundaries; and
- environmentally sensitive areas identified by regulatory authorities.

RCA advised that Stage 1 of the proposed quarry should be setback from the existing sandstone cliffs and steep slopes to:

- prevent the proposed quarry development affecting the stability of existing hilltop sandstone cliffs, rock formations and steep slopes;
- allow for construction of a safety berm to provide a safety berm around top of quarry walls; and
- allow for construction of a perimeter drain to divert upslope runoff around the proposed quarry safety berm.

KMH Environmental recommended a 20m buffer from the NSW Government Restricted Use of Land (RUL) area to allow for safety berm and diversion drains to constructed between the RUL area and the perimeter of Stage 1 of the proposed quarry.

Based on the limited geotechnical data available at this stage of the planning process the conceptual design adopted for the proposed quarry walls comprises batters up to 10m in height, with 4m wide benches, as discussed in next section of this report.

## 7 PRELIMINARY RESOURCE ESTIMATION FOR STAGE 1 QUARRY

Based on the development constraints discussed above, RCA plotted a potential plan area for Stage 1 of the proposed quarry in Lot 2 of the 'Dolwendee' Estate, as shown in **Drawing 1**, attached. The proposed plan area for Stage 1 occupies an area of some 10.7 hectares as measured using AutoCAD 2010 software.

Reference to the NSW Geological Survey 1:100,000 Hunter Coalfield Sheet that covers the proposed quarry - Stage 1 area in Lot 2 of the 'Dolwendee' Estate indicates the geological units encountered in the cored boreholes extend to the north of the existing borehole locations, as shown on **Drawing 2**, attached. However, it is likely that the thickness of the Narrabeen Group conglomerate encountered in BH2 to BH4 decreases towards the geological boundary with the Wollombi Coal Measures.

The inferred location of the geological boundary with the Wollombi Coal Measures is located along the proposed northern extent of Stage 1, as shown on **Drawing 2**, attached.

Additional cored boreholes CBH5 and CBH6 as shown on **Drawings 1 and 2** are needed to confirm construction material resource extends north of existing cored borehole locations, within the proposed quarry - Stage 1 area and provide additional data needed for geotechnical stability analysis.

Geotechnical cross-sections of the proposed quarry - Stage 1 conceptual design used for resource estimation are presented in **Drawings 3 and 4**, attached. It should be noted these conceptual cross-sections have been drawn at a 5 to 1 vertical exaggeration.

The conceptual quarry wall arrangements for the proposed quarry - Stage 1 shown on attached **Drawings 3 and 4** have been drawn based on:

- 2H: 1V batter for soil/EW rock where adjacent ground surface slopes towards the proposed quarry;
- 1.5: 1V batter for soil/ EW rock where adjacent ground surface slopes away from the proposed quarry and/or at transition from EW to HW rock;
- benches nominally cut at 5.7H: 1V back into slope, four (4) metres wide and at a maximum vertical interval of ten (10) metres;
- 0.5H: 1V batter for DW to SW competent massive bedrock (as encountered from depths of 4.5 to 7.5m in BH1 to BH4) to a maximum height of ten (10) metres;
- 100H: 1V quarry floor sloping away from high walls to facilitate pit drainage;
- a maximum quarry depth of 32-35m to suit depth of investigation completed to date.

The conceptual benched batter parameters listed above yield an overall quarry high wall slope of approximately 1.15H: 1V to 1.3H: 1V, which is considered geotechnically appropriate until further investigation and stability analysis is completed, as discussed in the next section of this report.

Measurements used in calculating the volume of the potential construction materials resource are shown on **Drawings 3 and 4**.

Allowing for conceptual batter arrangements, volumetric calculations indicate the proposed extent of Stage 1 of the proposed quarry as shown in **Drawings 1 to 4** comprises a potential construction materials resource of some 2.8 Million cubic metres.

Based on the results of density testing the average core density is 2.318 Tonnes/m<sup>3</sup>. Multiplying the estimated volume of Stage 1 (~2.8 Million cubic metres) by the average core density yields:

- An estimated construction material resource of some **6.5 Million Tonnes** for Stage 1 of the proposed quarry.

## 8 FURTHER INVESTIGATION

As part of the planning process for Stage 1 of the proposed Quarry it is recommended:

- Proposed cored boreholes CBH5 and CBH6 are drilled to nominal depth of 60m. Nominal locations for CBH5 and CBH6 are shown on **Drawings 1 and 2**.
- CBH5 and CBH6 should be drilled to intersect 'marker' units and BH collar surveyed for estimation of bedding dip within the proposed quarry area for global stability analysis of quarry wall design options.
- Flushing of boreholes after drilling completed, then installation of piezometers to monitor groundwater levels monthly over a one to three year cycle prior to quarry construction.
- Clean out and drill BH2 or BH4 to 60m and install a piezometer as part of the groundwater monitoring programme.
- Additional materials testing as recommended in 9325-101/0 should be completed.
- It may be appropriate to conduct shear box tests on pervasive bedding partings and/or joint sets, if suitable samples are recovered from the additional cored boreholes to be used in global stability analysis of conceptual quarry design.
- Carry out stability analysis on quarry wall options for quarry design and management plan.

From a geotechnical point of view there is scope for expansion and deepening of the proposed Quarry in Lot 2 once Stage 1 is complete. Further investigation would need to include CBH7 to CBH9 to assess feasibility of potential for quarry expansion (Stage 2) and quarry deepening (Stage 3), as shown on **Drawings 3 and 4** attached. Nominal locations for CBH7 to CBH9 are shown on **Drawings 1 and 2**.

Additional boreholes CBH7 to CBH9 are needed to:

- confirm the construction material resource extends north of proposed Stage 1 quarry area into the remainder of Lot 2;
- intersect 'marker' units for estimation of bedding dip within the proposed quarry area;
- provide additional samples for material testing;
- provide additional data for quarry wall stability analysis; and

- assess the potential resource to depth of 60m.

Yours faithfully

**RCA AUSTRALIA**



Jeremy Everitt  
Principal Engineering Geologist



Robert Carr  
Principal Geotechnical Engineer

Attachments:

Drawing 1 – Site Plan, Stage 1 – proposed quarry.







Drawing 2 – Inferred Geology, Stage 1 – proposed quarry

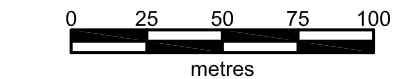
Drawing 3 – Conceptual Geotechnical Section A-A through Stage 1 – proposed quarry

Drawing 4 – Conceptual Geotechnical Section B-B through Stage 1 – proposed quarry

BH1 to BH4 Cored Borehole Logs and Photographs.

**LEGEND**

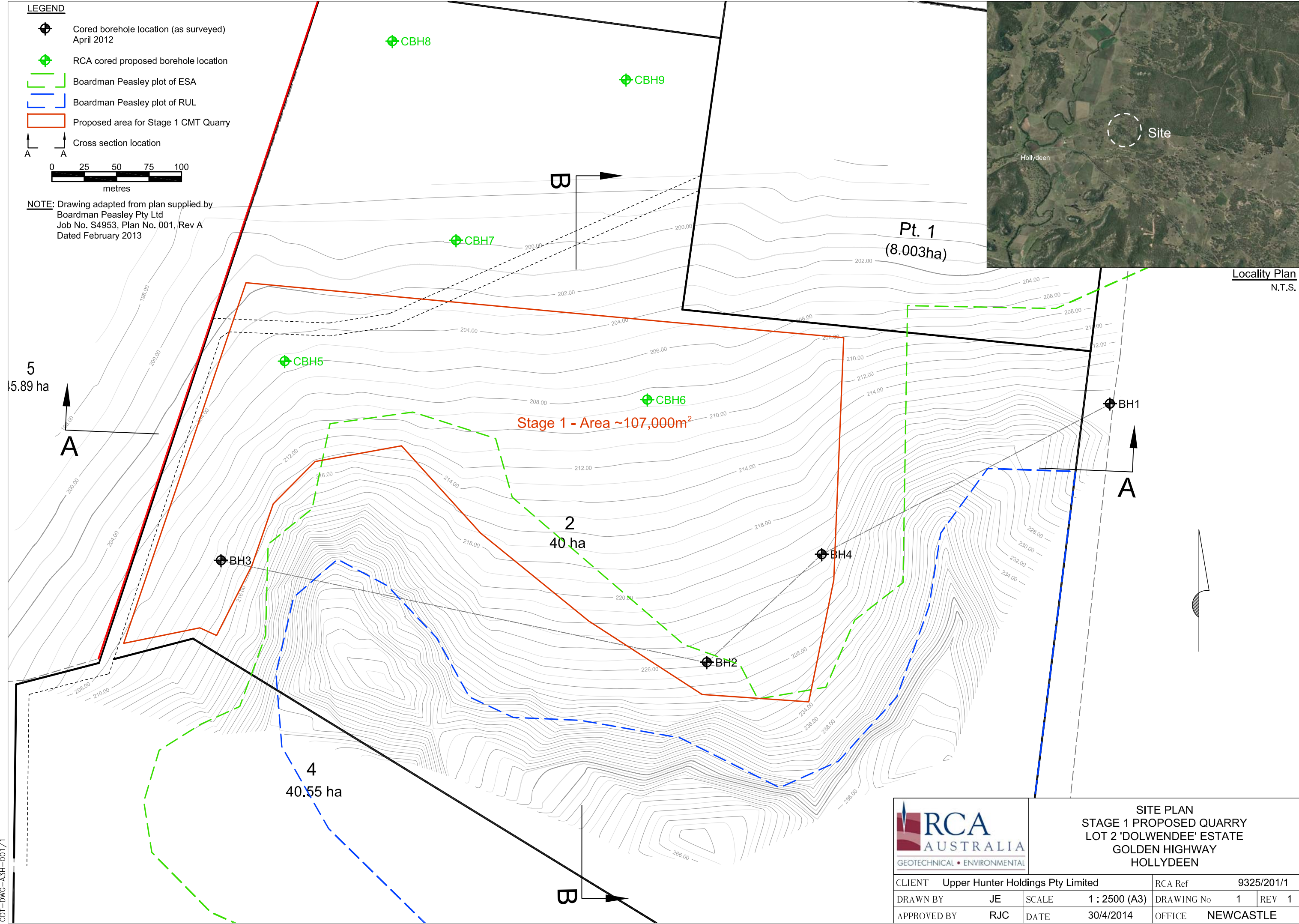
-  Cored borehole location (as surveyed) April 2012
-  RCA cored proposed borehole location
-  Boardman Peasley plot of ESA
-  Boardman Peasley plot of RUL
-  Proposed area for Stage 1 CMT Quarry
-  Cross section location



NOTE: Drawing adapted from plan supplied by Boardman Peasley Pty Ltd  
Job No. S4953, Plan No. 001, Rev A  
Dated February 2013



Locality Plan  
N.T.S.

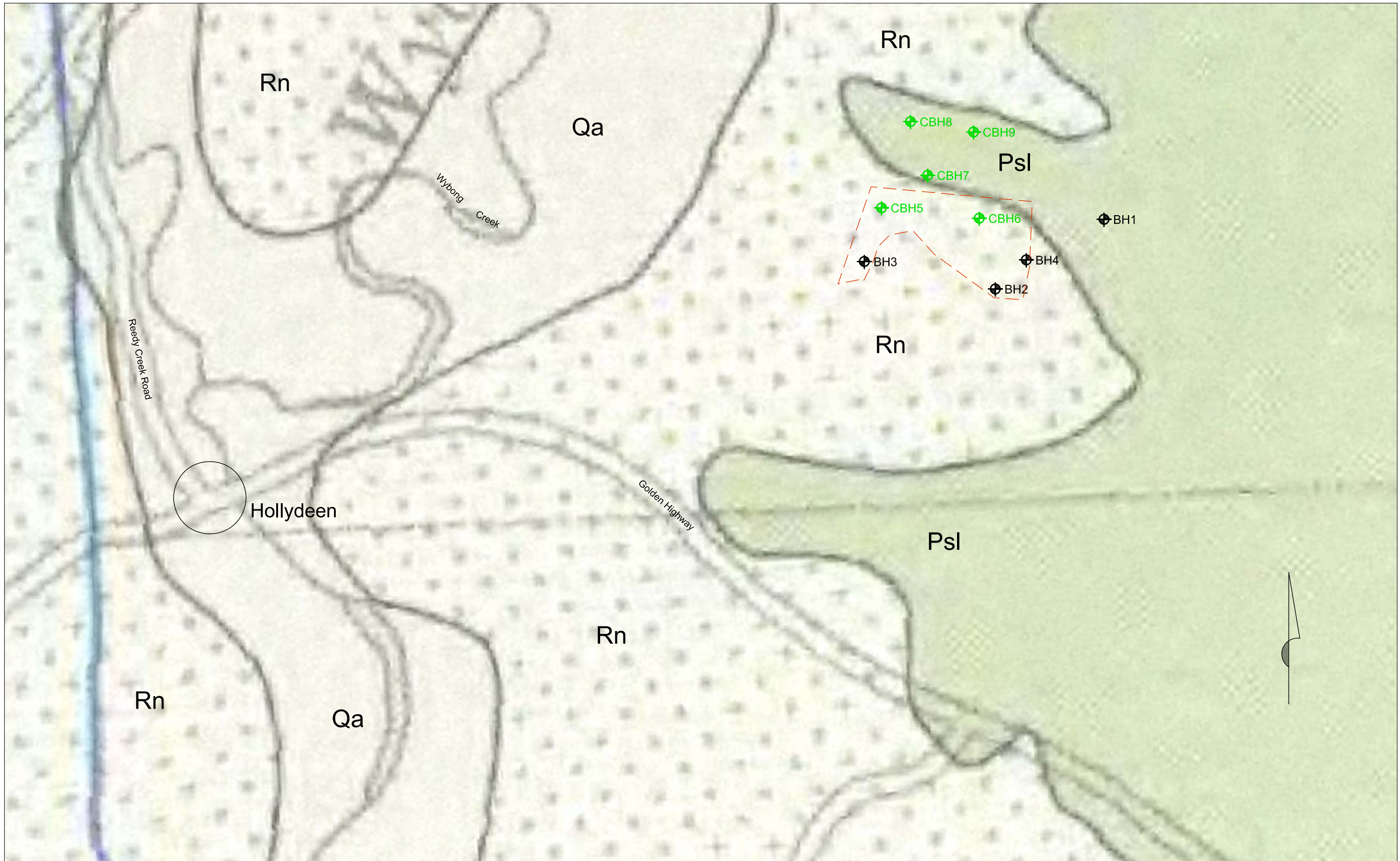


CDT-DWG-A3H-001/1






SITE PLAN  
STAGE 1 PROPOSED QUARRY  
LOT 2 'DOLWENDEE' ESTATE  
GOLDEN HIGHWAY  
HOLLYDEEN

CLIENT	Upper Hunter Holdings Pty Limited	RCA Ref	9325/201/1
DRAWN BY	JE	SCALE	1 : 2500 (A3)
APPROVED BY	RJC	DATE	30/4/2014
		DRAWING No	1
		REV	1
		OFFICE	NEWCASTLE



**LEGEND**

-  Cored boreholes, April 2012
  -  RCA proposed cored borehole location
  -  Proposed area for Stage 1 CMT Quarry
- 0      20      40      60  
metres

**NSW Geological Survey Geology**

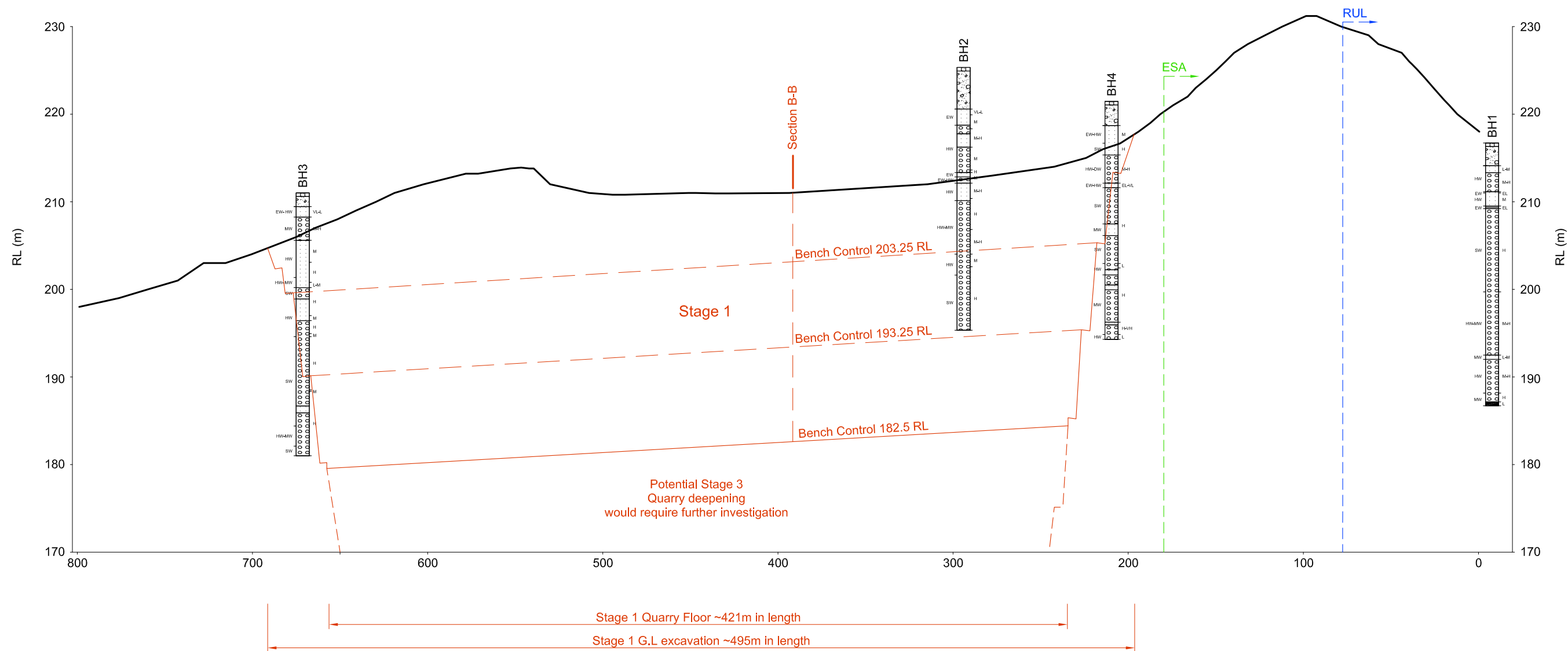
Symbol	Name	Description
Qa	Quaternary Alluvium	Silty, sand, gravel
Rn	Narrabeen Group	Conglomerate & Sandstone, with minor siltstone, Claytone
Psl	Wollombi Coal Measures	Coal seams, claystone, siltstone, sandstone, conglomerate

Geology based on NSW DMR Hunter Coal field Regional Geology, 1 : 100000 (1993)



INFERRED GEOLOGY  
STAGE 1 PROPOSED QUARRY  
LOT 2 'DOLWENDEE' ESTATE  
GOLDEN HIGHWAY  
HOLLYDEEN

CLIENT	Upper Hunter Holdings Pty Limited	RCA Ref	9325/201/1
DRAWN BY	JE	SCALE	1 : 10000 (A3)
APPROVED BY	RJC	DATE	30/4/2014
		DRAWING No	2
		REV	1
		OFFICE	NEWCASTLE



**Geotechnical Section A-A Through  
Stage 1 CMT Quarry Conceptual Design for Resource Estimation**  
Conceptual Quarry Design for Resources Estimation Based on:

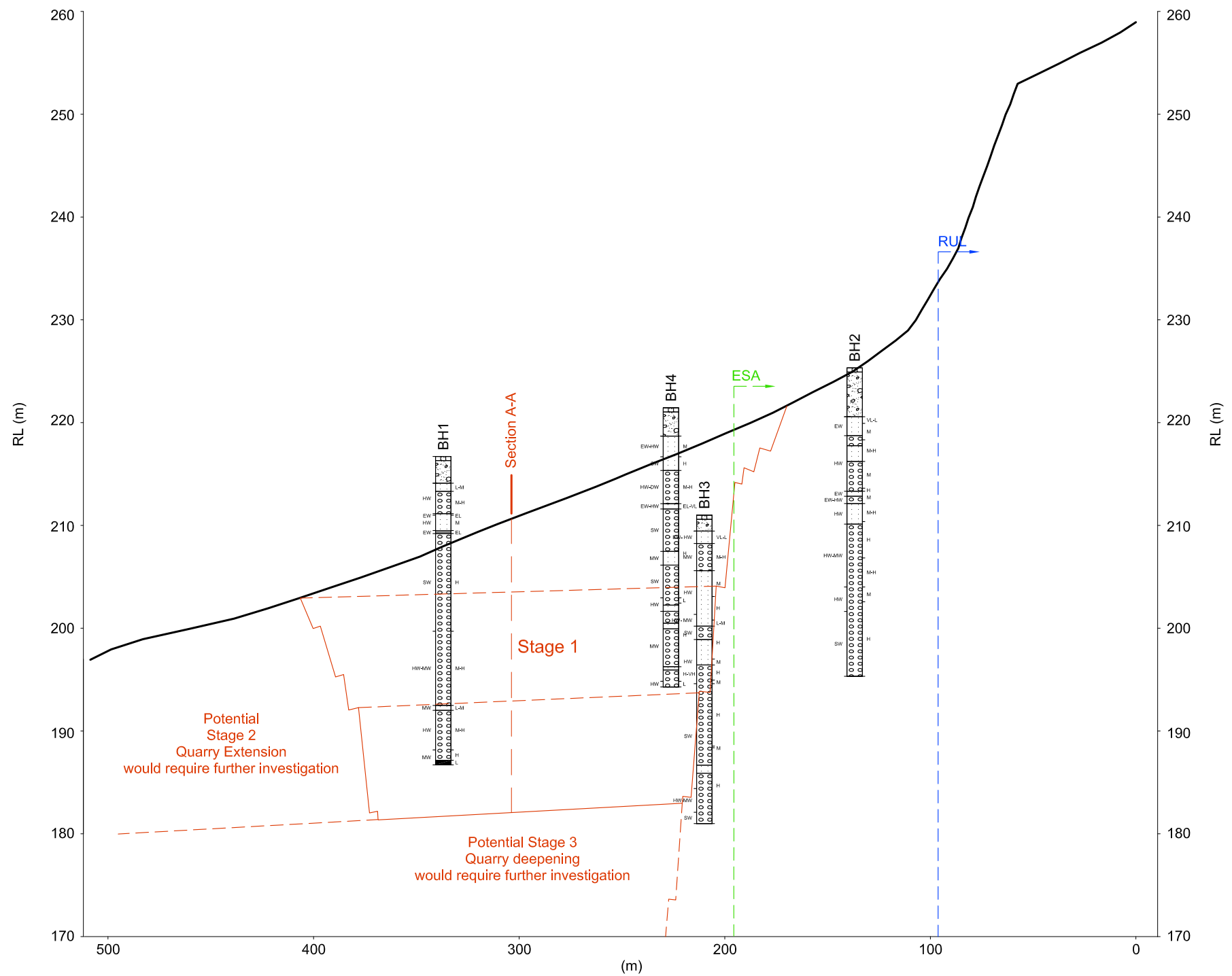
1. 2H:1V batter for Soil/Extremely weathered rock, where adjacent ground surface slopes towards quarry
2. 1.5H:1V batter for Soil/EW rock, where adjacent ground surface slopes away from quarry
3. 5.7H:1V benches nominally 4m wide at maximum interval of 10m
4. 0.5H:1V batter for HW-SW competent massive bedrock, maximum height of 10m
5. 100H:1V adopted slope of quarry floor to promote drainage
6. Maximum quarry depth of 30m to suit depth of investigation boreholes

Scale  
Horizontal = 1 : 2500  
Vertical = 1 : 500  
Vertical Exaggeration 5 to 1



**CONCEPTUAL GEOTECHNICAL SECTION A-A  
STAGE 1 PROPOSED QUARRY  
LOT 2 'DOLWENDEE' ESTATE  
GOLDEN HIGHWAY  
HOLLYDEEN**

CLIENT	Upper Hunter Holdings Pty Limited	RCA Ref	9325-201/1
DRAWN BY	JE	SCALE	As Shown
APPROVED BY	RJC	DATE	29/4/2014
DRAWING No	3	REV	1
OFFICE	NEWCASTLE		



Stage 1 Quarry Floor ~147m wide  
 Stage 1 G.L excavation ~235m wide

**Geotechnical Section B-B Through  
 Stage 1 CMT Quarry Conceptual Design for Resource Estimation**

Conceptual Quarry Design for Resources Estimation Based on:

1. 2H:1V batter for Soil/Extremely weathered rock, where adjacent ground surface slopes towards quarry
2. 1.5H:1V batter for Soil/EW rock, where adjacent ground surface slopes away from quarry
3. 5.7H:1V benches nominally 4m wide at maximum interval of 10m
4. 0.5H:1V batter for HW-SW competent massive bedrock, maximum height of 10m
5. 100H:1V adopted slope of quarry floor to promote drainage
6. Maximum quarry depth of 30m to suit depth of investigation boreholes

**Scale**

Horizontal = 1 : 2500

Vertical = 1 : 500

Vertical Exaggeration 5 to 1



CONCEPTUAL GEOTECHNICAL SECTION B-B  
 STAGE 1 PROPOSED QUARRY  
 LOT 2 'DOLWENDEE' ESTATE  
 GOLDEN HIGHWAY  
 HOLLYDEEN

CLIENT	Upper Hunter Holdings Pty Limited	RCA Ref	9325-201/1
DRAWN BY	JE	SCALE	As Shown
APPROVED BY	RJC	DATE	29/4/2014
DRAWING No	4	REV	1
OFFICE	NEWCASTLE		