### 7.1.3 Assessment Methodology

A flora and fauna impact assessment will be completed for the Project by Cumberland Ecology in accordance the *DECC Draft Guidelines for Threatened Species Assessment* (DEC, 2005b).

The scope of the flora and fauna impact assessment will include:

- A desktop review of relevant databases and extensive available relevant literature to identify flora and fauna species and communities potentially found within the Project Boundary;
- Seasonal surveys to comply with DECCW's recommendations for survey;
- Mapping the distribution of vegetation communities in the Project Boundary by ground survey and air photo interpretation;
- Listing of flora species and descriptions of vegetation communities within the Project Boundary;
- Targeted searches for threatened flora species, threatened ecological communities and critical habitat (as listed under the schedules to the TSC Act and EPBC Act) that may potentially occur in the Project Boundary;
- An aquatic survey at the proposed Hunter River pumping station;
- Habitat assessment of the Project Boundary;
- Assessment of impacts on listed vegetation communities and threatened flora and fauna species;
- Preparation of a BioBanking Assessment for the Project; and
- Identification of any impact mitigation measures necessary for the Project.

As noted in **Section 4.9.1**, an EPBC Referral will be submitted to DSEWPaC for determination.

## 7.2 ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE

### 7.2.1 Background

A previous Aboriginal Archaeology assessment has been compiled by SKM (2000) for the area within EL 5460. This report provides background to the existing archaeology known to be present within the area.

The survey identified 33 Aboriginal heritage sites comprising of 29 open camp sites, two scarred trees and two stone procurement (quarry) sites. In addition, the length of the lower reaches of the major and minor tributaries of the Saddlers Creek contained continuous artefact scatter.

### 7.2.2 Potential Impacts

Potential impacts on Aboriginal archaeology and cultural heritage identified in the preliminary environmental risk assessment include the removal of archaeological sites and items within the proposed disturbance areas of Drayton South (see **Appendix A**). This will include any sites which may be identified during further proposed surveys for the Project.

Further assessment will be completed for inclusion in the EA to determine the impacts of the Project upon Aboriginal archaeology and cultural heritage. The community will be engaged in strict accordance with the DECCW Guidelines (2010) to ensure community involvement and recommendations are recorded and encompassed within management and mitigation measures.

### 7.2.3 Assessment Methodology

The Aboriginal archaeology and cultural heritage impact assessment for the Project will be by AECOM Australia Pty Ltd (AECOM) and will be conducted in accordance with the *National Parks & Wildlife Act 1974* and DECCWs *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

The proposed scope of the Aboriginal archaeological and cultural heritage impact assessment includes:

- Desktop review, including Aboriginal Heritage Information Management System (AHIMS) database search, Native Title Search, and a review of previously completed studies conducted in the area to assist in the development of a predictive model;
- A field-based archaeological and Aboriginal cultural heritage impact assessment with members of the local Aboriginal community. The fieldwork will focus on identifying any additional sites of Aboriginal cultural heritage within the disturbance area and revisiting existing sites that were previously classified as being of high significance with members of the Aboriginal community;
- Preparation of an Aboriginal archaeology and cultural heritage impact assessment to meet the DECCW guidelines and the expectations of the local Aboriginal community. This will include an assessment of any additional Aboriginal cultural heritage issues or places identified during the site visit;
- Aboriginal stakeholder consultation in accordance with the DECCW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*; and
- Development of appropriate management and mitigation strategies for any Aboriginal heritage sites that are identified to be disturbed.

## 7.3 NON-ABORIGINAL HERITAGE

### 7.3.1 Background

An extensive desktop study has been conducted to identify any potential non-Aboriginal heritage present within a 10km radius of the Project. A number of non-Aboriginal heritage sites associated with the agricultural settlement of the area were identified, none of which fall within the Project Boundary.

### 7.3.2 Potential Impacts

The Drayton South pre-feasibility study has identified three potential non-Aboriginal heritage sites that may be impacted by the Project including Edderton Homestead Complex, Plashett Homestead and Woodlands Stud.

The Edderton Homestead is located approximately 200 m north of the boundary of EL 5460 on

lands held by HVEC for Mount Arthur Coal Mine. Given the close proximity of this site to the Project, an assessment of cumulative blasting impacts to this site will be required. It should be noted that, under the approval for the Mount Arthur Underground Project (PA 06_0091), Mount Arthur Coal has committed to a full archival recording of this site prior to any potential disturbance. Further, HVEC has publicly noted that the site may need to be demolished, should subsidence impacts from the Mount Arthur Underground Project cause significant structural damage.

Plashett Homestead is located approximately 2 km to the south of the proposed mining areas and therefore has the potential to be disturbed by blasting impacts associated with the Project.

Woodlands Stud Homestead is located approximately 5 km south of the proposed mining areas and is therefore not expected to be disturbed by blasting associated with mining activities for the Project.

Further assessment will be completed for inclusion in the EA to determine the impacts of the Project upon non-Aboriginal archaeology.

### 7.3.3 Assessment Methodology

A non-Aboriginal heritage impact assessment will be completed by AECOM for the Project in accordance with relevant guidelines, legislation and in particular the standards of the NSW Heritage Council. The scope of assessment will include:

- A review of any relevant existing heritage assessment reports and other sources of information pertaining to heritage items in the region;
- A field survey of the area within the Project Boundary with an emphasis on sites identified during preliminary research and areas with archaeological potential and the recording of any items located;
- Assessment of the heritage significance of identified items within the proposed disturbance areas;
- Preparation of a heritage impact assessment for the Project which considers the potential for impact on any significant adjacent heritage items; and
- Identification of any necessary impact mitigation measures.

## 7.4 SURFACE WATER

### 7.4.1 Background

The Project lies within the catchment of the Hunter River in the upper reaches of some first and second order ephemeral creeks which drain into this main watercourse. The Hunter River flows from west to east, immediately to the south of the Project. The Hunter River supplies water to the Hunter Valley region for domestic, industrial (including mining), environmental, irrigation and stock-watering purposes.

Saddlers Creek lies within the Project Boundary to the north-west of Drayton South, flowing from north-east to south-west, where it joins the Hunter River. Saltwater Creek is an ephemeral creek on which Plashett Dam has been constructed. It is situated outside of the Project Boundary to

the south-east of Drayton South. In periods of heavy rain fall, Saltwater Creek also flows into the Hunter River.

Surface water monitoring has been undertaken at a number of locations within the Project Boundary since 1998. The surface water monitoring program has recorded pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS) and Total Suspended Solids (TSS) within Saddlers Creek (see **Figure 2**).

Saddlers Creek has previously been identified by the Catchment Management Authority (CMA) as deleteriously impacting on the water quality within the Hunter River downstream of its confluence. In partnership with Anglo American, the CMA has undertaken stream line restoration works on this creek, with the potential remaining for further works to be collaboratively funded by Anglo American in the future.

A preliminary surface water assessment has been undertaken to determine the potential impacts that may result from the Project on the local surface water environment. The surface water assessment has not identified any 'fatal flaws' in regard to the potential impacts on surface water surrounding the Project area.

Further assessment will be completed for inclusion in the EA to determine the impacts of the Project upon surface water.

### 7.4.2 Potential Impacts

Potential surface water impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Potential for increased turbidity impacting on downstream water quality;
- Potential for discharge of surplus water and / or additional demands on existing water sources;
- Changes to the catchment area, with consequent impacts on catchment yields and drainage downstream of the site; and
- Post-mining surface water impacts on catchment yields, water quality and drainage.

### 7.4.3 Assessment Methodology

A surface water impact assessment (including mine water management and sediment and erosion control) will be conducted for the Project by WRM Water and Environment, the scope of which will include:

- A review of any existing surface water assessment reports, including mine water balances;
- Identification of surface water resources or usage in the vicinity of the site which could be impacted by the Project;
- Assessment and description of the existing surface water hydrology, including drainage, surface water quality and downstream water usage;
- A relevant flood assessment for the Project. This will include identification of relevant mitigation measures as required;

- Assessment of the potential for any other surface water impacts both on and off-site resulting from the Project;
- Brief assessment of post-mine surface water impacts such as drainage, rainfall runoff and a description of the predicted final void water levels as determined by the groundwater consultant in their final void predictive modelling;
- The development of appropriate surface water management strategies for all water types generated by the Project (including the existing Drayton Mine) including mine pit water, process water and runoff from disturbed and undisturbed areas;
- The development of a daily time step water balance model for the life of the Project which incorporates the existing Drayton Mine; and
- Identification of any surface water impact mitigation measures necessary for the Project.

## 7.5 GROUNDWATER

### 7.5.1 Background

A recent hydrogeological assessment has been undertaken for the Drayton South area by Australasian Groundwater and Environmental Consultants (AGE) (2010) to provide an understanding of the existing groundwater regime of the area within and surrounding Drayton South. The study involved the development of a conceptual groundwater model for Drayton South , based on geological and topographical maps of the area, and on the results of previous studies.

From the model, the groundwater system is considered to consist of three aquifer systems:

- Alluvium along the Hunter River, Saddlers Creek and Plashett Dam / Saltwater Creek;
- Weathered bedrock (regolith); and
- The coal seams of the Permian Wittingham Coal Measures.

The Permian Wittingham Coal Measures are not considered to be a significant aquifer and, while some coal seams may show an elevated hydraulic conductivity, the dominant interburden sections are of very low hydraulic conductivity. Only the weathered bedrock (regolith) directly below the ground surface may have a higher hydraulic conductivity, due to weathering. Recharge to the aquifers is assumed to occur at varying rates over the entire conceptual model area.

The shallow alluvial sands and gravel deposits associated with the ephemeral creeks that traverse the site are quite thin and irregular in occurrence, and do not appear to contain a permanent groundwater resource. The Hunter River alluvial deposits are significant sources of groundwater, however these deposits do not occur within the proposed mining area.

Anglo American has also been collecting monitoring bore data across EL 5460 as part of their EMP since 1998 (see **Figure 2**).

Regional aquifer pressures support a flow regime consistent with topography. Elevated pressures occur in topographically high areas while low pressures are evident along the more significant

drainage pathways, this being towards the south-west. The potentiometric surface in the Permian coal measures grades from RL160m in the north-east to RL115m in the south.

The Hunter River alluvial aquifer has a variable electrical conductivity in the range of 644 µS/cm – 6700 µS/cm. This reflects the dominant recharge at the time, being either more saline from the underlying coal measures or slightly improved quality from rainfall or the river itself. The pH ranges from 6.9 (slightly acidic) to 8.4 (slightly alkaline). Surface water in Saddlers Creek is brackish, which indicates recharge from underlying coal measures.

The groundwater contained within the Permian coal measures is typical of hard, coal seam water. Maximum Australian Drinking Water Standards (ADWS) are exceeded for TDS, chlorine and a range of metals. It is of poor quality and not suitable for drinking or freshwater aquatic ecosystems. The TDS content ranges from approximately 300 mg/L to 8920 mg/L and the pH is near neutral (median 7.1).

### 7.5.2 Potential Impacts

Potential groundwater impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Groundwater drawdown effects, changes to groundwater flow directions and changes to groundwater quality;
- Potential for depressurisation of aquifer systems in the area through mine void dewatering;
- Increased groundwater inflows to the pits;
- Loss of groundwater yield at existing bore locations; and
- Long term changes (post mine closure) to groundwater levels, groundwater quality and flow direction.

### 7.5.3 Assessment Methodology

A groundwater impact assessment will be conducted for the Project by AGE. The scope of assessment will include:

- Identification of groundwater resources (including the location of all privately owned groundwater bores) in the vicinity of the site which could be impacted by the Project;
- Assessment of the potential for any groundwater impacts resulting from the Project, including modelling the cumulative groundwater impacts of the Project with existing industry or approved mining Projects (including groundwater impacts on each identified privately owned bore);
- Development of a MODFLOW SURFACT Groundwater Model for the Project which incorporates the Project, the completion of mining at Drayton Mine and all relevant adjacent proposed mining activity;
- An assessment of the potential for contamination from tailings dam leachate / co-disposed materials to enter and impact on the local and regional groundwater system;
- Assessment of post-mine groundwater impacts including predicted final void water levels;

- A high level cumulative assessment which will include comments on other, not yet approved but potentially relevant adjacent mining Projects;
- Confirmation of alluvium limits and extent of mining impacts;
- The development of groundwater management strategies;
- Identification of any groundwater impact mitigation measures necessary for the Project; and
- A recommended post approval groundwater monitoring and management program.

## 7.6 NOISE AND BLASTING

### 7.6.1 Background

The Project is situated in an area with various land uses. These include open cut mining (to the north), power stations to the north-east and horse studs and various other agricultural uses in the south-east and west. These land use activities that surround the Project influence the background noise environment upon which further assessments for the Project will be based.

As part of the existing EMP, Anglo American has been monitoring background noise levels in the area surrounding the Project Boundary (see **Figure 2**). Additional attended and unattended noise monitoring will be undertaken as part of the EA for inclusion in the noise assessment for the Project.

### 7.6.2 Potential Impacts

Potential noise and blasting impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Noise generation from operational activities associated with open cut mining;
- Noise associated with the loading and transport of coal along the existing rail spur and rail loop;
- Traffic noise associated with the transport of construction materials, personnel, consumables, and waste materials to and from the site;
- Noise generation associated with short term construction activities;
- Cumulative noise impacts with surrounding industry; and
- Blasting vibration and overpressure impacts at near neighbours.

### 7.6.3 Assessment Methodology

A noise and blasting impact assessment will be conducted for the Project by Bridges Acoustics. The scope of assessment will include:

- Assessment of site meteorology and background noise levels to determine likely criteria for the Project;
- Assessment of construction and operation noise impacts (including sleep disturbance, low frequency vibration and traffic noise);
- Blasting assessment for the Project including comment on the potential effects of blasting on horses;
- Assessment of train movements on Antiene Rail Spur;

- Assessment of cumulative impacts for both those Projects currently being assessed and at a higher level for future potential coal mining and power station developments; and
- The development of suitable mitigation and management measures including any required modifications to existing monitoring networks.

## 7.7 AIR QUALITY AND GREENHOUSE GAS

### 7.7.1 Background

The Project is situated in an area with various land uses. These include open cut mining (to the north), power stations to the north-east and horse studs and various other agricultural uses in the south-east and west. These land use activities that surround the Project influence the background air quality environment upon which further assessments for the Project will be assessed as required.

As part of the existing EMP, Anglo American has been monitoring background concentrations of dust deposition and $PM_{10}$ in the area surrounding the Project Boundary (see **Figure 2**). This background data will be included in the air quality assessment for the Project.

### 7.7.2 Potential Impacts

Potential air quality and greenhouse gas impacts as a result of the Project (as identified in the preliminary environmental risk assessment (**Appendix A**)) include:

- Dust generation from land disturbance (vegetation clearing and topsoil stripping);
- Dust generation from open cut mining activities (blasting, loading and movement of haul trucks, overburden emplacement and in-pit activities);
- Short term dust impacts associated with construction activities;
- Greenhouse gas emissions (Scope 1 and 2) as result of the actual mining operations and the associated use of energy by mining equipment and coal processing infrastructure; and
- Greenhouse gas emissions (Scope 3) as a result of non-mining activities at the site and in the combustion of product coal in the energy generation process.

### 7.7.3 Assessment Methodology

An air quality and greenhouse gas impact assessment will be conducted for the Project by PAE Holmes in accordance with DECCWs Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2005a) and the Australian Greenhouse Office's (AGO) *Factors and Methods Workbook* (AGO, 2005).

The scope of assessment will include:

- Review of air quality monitoring data to confirm background levels;
- Assessment of site meteorology and background air quality levels to determine likely criteria for the Project;
- Assessment of construction and operational air quality impacts;

- Determination of scope 1, 2 and 3 greenhouse gas emissions for the Project as required by latest, best practice methodology;
- Assessment of the air quality impacts with approved industry as point source;
- Assessment of cumulative impacts for both those Projects currently being assessed and at a higher level for future potential coal mining and power station developments;
- Literature review and development of a scope for a study into the effects of dust on horse health and their athletic performance; and
- The development of suitable mitigation and management measures including any required modifications to existing monitoring networks.

## 7.8 TRAFFIC AND TRANSPORT

### 7.8.1 Background

The principal road network adjacent to the Project area is shown on **Figure 1** and includes:

- Thomas Mitchell Drive (north east of Drayton Mine providing access to Drayton Mine, the Mount Arthur Coal complex, the Muswellbrook Industrial Estate, and smaller local roads and private properties);
- New England Highway (North east of the Drayton Mine intersecting Thomas Mitchell Drive with a T junction configuration);
- Drayton Mine access road (A private road intersecting Thomas Mitchell Drive approximately 1.1 km from the New England Highway);
- Golden Highway (Also known as Jerrys Plains Road, is situated to the south of the Project area) is a significant rural road that serves vehicular traffic travelling from the lower Hunter to Denman and the central west of NSW;
- Edderton Road (Intersects Denman Road approximately 10 km south-west of Muswellbrook and runs in a north-south direction through the middle of Drayton South);

The proposed realignment of the Edderton Road / Golden Highway intersection will be undertaken in consultation with the MSC and RTA, the respective asset owners of the two roads. All design and construction work associated with the realignment will be undertaken in accordance with applicable design guidelines and standards.

### 7.8.2 Potential Impacts

Specific traffic and transport impacts identified in the preliminary environmental risk assessment include an increase in local traffic flows along Thomas Mitchell Drive during the construction and ongoing operational phases of the Project. The upgrade of local roads and the proposed realignment of the Edderton Road / Golden Highway intersection will also require the management of traffic around the road works.

Both Coolmore Stud and Woodlands Stud have noted that Edderton Road is critical to their operations, as it provides an important transport link to the Scone Vet Services, upon which they rely. On this basis, the proposed realignment will need to be carefully designed to consider

stakeholder requirements (both local stakeholders, such as Woodlands Stud and Coolmore Stud, but also MSC and the RTA) and constructed so as not to impede quick, reliable access.

A key Project requirement is that traffic generated by the site are not permitted to use Edderton Road This effectively addresses a major stakeholder concern regarding increased traffic movements and interactions with Coolmore Stud and Woodlands Stud thoroughbred horse traffic and through traffic at Jerrys Plains.

### 7.8.3 Assessment Methodology

A traffic and transport impact assessment will be completed for the Project by DC Traffic Engineering in accordance with the *Guide to Traffic Generating Developments* (RTA, 2002). The scope of assessment will include:

- Review of any previous traffic impact assessments undertaken for the surrounding area;
- Assessment of site traffic and transport levels to determine likely criteria for the Project;
- Design of traffic counts program and its implementation, if required;
- Assessment of existing, construction and operation traffic impacts (including cumulative) and the performance on the key intersections;
- Assessment of traffic movements on existing road networks adjacent the Project;
- Relevant assessment in relation to realignment of Edderton Road including quantification of impacts on road users; and
- Mitigation and management measures including any required modifications to existing traffic networks.

## 7.9 VISUAL

### 7.9.1 Background

The topography of the Project area consists of moderate undulating foothills to steeply sloping hills over open paddock grazing land. The topographic elevation ranges from approximately RL 100 m near the Hunter River, up to RL 200 m where a distinct ridgeline dissects the Project Boundary in a north-east south-west trend. The land surface within is primarily cleared, open-paddock grazing land, with minimal tree cover and good grass cover.

Visually sensitive receivers are located to the south of Drayton South. These include the thoroughbred horse studs of Darley Australia and Coolmore Australia and the Arrowfield Estate vineyard. The Wolfgang property is located to the west. These key stakeholders have verbally or formally documented their concerns in relation to the visual impacts of the Project, focusing on views of the active mining areas, overburden emplacement areas (OEA), infrastructure and night lighting impacts from key vantage points, both on and off their properties.

Potential visual impacts and the concerns of the key stakeholders have driven the development of the mine plans for the Project. This has ultimately resulted in the development of a co-existent mine plan which carefully considers and attempts to screen the proposed mining area from sensitive receptors, using a combination of natural features and topography, bunding and tree screening. Of note is that the development of the co-existent mine plan has resulted in the

requirement for substantial bunding to be constructed within the initial years of development, in advance of mining, to successfully screen the mining operations from Coolmore stud.

### 7.9.2 Potential Impacts

During the early stages of the Project planning phase, a landscape architect worked with the mine planners and engineers to refine the mine plan to be as visually pleasing to sensitive receptors, as far as is practicable.

Despite this, some views of the Project will be available from areas surrounding the Project; however, it is considered that with ongoing consultation, technical review and liaison, additional mitigation strategies can be developed and implemented to result in an acceptable visual impact.

Further assessment will be completed for inclusion in the EA to determine the level of potential visual impacts resulting from the Project. As necessary a landscape architect will also work with some of the key stakeholders (i.e. neighbouring horse studs) to develop Property Landscape Management Plans to further assist in visual mitigation at the receiver.

### 7.9.3 Assessment Methodology

A visual impact assessment will be completed for the Project by JVP Visual Planning and Design and Greenpond. The scope of assessment will include:

- An assessment of the existing visual setting within and surrounding the Project area;
- A review of the mine plan to recommend any suggested additional 'engineering required' mitigation measures for visual impacts;
- Defining preliminary visual impacts and developing mitigation measures for the Project (to include lighting assessment);
- Preparation of representative photomontages from surrounding locations;
- Drive by model for the realigned Edderton Road and Golden Highway; and
- Identify and describe mitigation and management measures.

## 7.10 SOCIAL IMPACT ASSESSMENT

### 7.10.1 Background

A social assessment has recently been completed to assess the existing social environment surrounding the Project and to identify any potential impacts. The Project area lies within the LGAs of Muswellbrook and Singleton in the Hunter Valley of NSW. The Muswellbrook LGA encompasses the townships of Muswellbrook, Denman, Sandy Hollow, Wybong, McCully's Gap, Kayuga, Baerami and Merriwa. The Singleton LGA comprises the townships of Singleton, Broke, Bulga, Belford, Camberwell and Jerrys Plains. Jerrys Plains is the closest township to the Project area and is located approximately 10 km to the south-east.

The Muswellbrook LGA contains a population of approximately 15,200 persons, while the Singleton LGA comprises of approximately 21,900 persons. Both areas have relatively young populations with growth rates of 3% and 7%, respectively, between the 2001 and 2006 census period. A diverse range of sporting, cultural and recreational activities (including wineries and horse studs) are available for tourists visiting the Muswellbrook and Singleton LGAs. A number

of establishments provide accommodation within the LGAs, many of which are located within or associated with the vineyard areas across the region.

Employment-generating industry within the Muswellbrook and Singleton LGAs is dominated by mining, with 16.3% to 19.3% of the total labour force employed in this sector. Other major industry sectors include: retail sector (9.8-10.1%); agriculture, forestry and fishing (5.0-9.1%); manufacturing sector (7.1-7.3%); and accommodation and food service providers employing (6.4-7.0%) of the total labour force. The Muswellbrook LGA had an unemployment rate of 5.4% and 4.2 % for the Singleton LGA.

### 7.10.2 Potential Impacts

The Project has the potential to have significant positive impacts on the local and regional economy as a result of the capital costs of the Project, contractor and employee salaries, associated local spending and contributions to community enhancement programs.

There is the potential for new large mining projects to dominate the existing local economy and employment within the region. As the location of the Project is in close proximity to Arrowfield Estate and two major horse stud operations owned by Coolmore Australia and Darley Australia, concerns have been raised by these stakeholders in terms of the impact of the Project on their current economic viability. However, given that the Project will be relying on the existing workforce of Drayton Mine this is not anticipated to be a material issue.

The estimated population growth to the region during the operation phase of the Project is expected to provide additional economic impetus to improve the regional prosperity of the Muswellbrook and Singleton LGAs. There are potential social impacts as a result of additional ongoing demand for community services and infrastructure.

### 7.10.3 Assessment Methodology

Hansen Bailey will complete a comprehensive social impact assessment which will identify any potential impacts of the Project on the local and regional community, paying particular attention to the demand it may generate for the provision of additional infrastructure and services.

The assessment will also identify the beneficial and potential adverse impacts of the Project from a social perspective. The assessment of impacts will take into account the relevant demographic, social, cultural and economic profiles and will include an estimation and analysis of the Project's economic parameters. The social amenity and use of the Project Boundary and adjacent areas for rural, agricultural, equine, tourism, fishing, recreational, industrial, education or residential purposes will be described.

## 7.11 ECONOMICS

### 7.11.1 Background

The commencement of mining within the Project Boundary will involve significant capital investment, ongoing operational expenditure and the continued employment of the existing Drayton Mine workforce. The Project will contribute to flow on economic effects such as the creation of indirect employment opportunities and significant expenditure at a local and State level.

### 7.11.2 Potential Impacts

The Project will ensure the continuation of mining at Drayton Mine and will rely upon the existing Drayton Mine workforce over 26 years. In doing so, it will further strengthen the local economy and create significant revenue at both State and Federal levels. The Project will provide revenue to the State government through the payment of royalties and taxes contributing to the NSW economy.

The Project will also result in additional and ongoing demands on community infrastructure and services (such as skill levels, trade, health and educational opportunities and population demographics) and impacts to the immediate environment. Preliminary investigations have confirmed that the Project will provide a net production benefit to society of several billion dollars.

### 7.11.3 Assessment Methodology

The economics impact assessment will be completed for the Project by Gillespie Economics in accordance with DoPs '*Guideline for economic effects and evaluation in EIA*' (2002).

The scope of assessment will include:

- An assessment of the economic impacts of the Project including both a benefit cost analysis and regional economic impact analysis;
- An economic justification for the use of the required land and water resources required by the Project;
- Any necessary mitigation measures, as required.

The economic analysis will assess the potential incremental economic costs and benefits of the Project to the community (i.e. consideration of economic efficiency). This will not only include a consideration of the regional economic impact or economic activity generated by the Project but also any incremental costs and benefits to the environment.

## 7.12 GEOCHEMISTRY

### 7.12.1 Background

A recent desktop geochemical assessment of overburden / interburden and potential coal reject materials has been completed for Drayton South. The findings of this assessment included the following:

- Overburden / interburden material of Drayton South is likely to be geochemically benign, with very low total sulphur content and therefore, negligible acid generating potential. This material should contain low concentrations of total metals and is likely to generate alkaline surface runoff/seepage with relatively low concentrations of soluble salts and trace metals;
- Whilst it is possible that material associated with uneconomic coal seams could be less benign than bulk interburden / overburden from Drayton South, this material is likely to make up a very small proportion of the total overburden / interburden volume reporting to storage facilities;
- Some overburden / interburden is likely to be sodic, prone to dispersion and erosion, and unlikely to be suitable for rehabilitation purposes without amelioration measures;

- There is likely to be a lack of suitable topsoil material at Drayton South, due to its shallow nature and the potential presence of sodic / dispersive material;
- Coal rejects derived from the target seams are likely to contain relatively low concentrations of total sulphur, a significant proportion of which is likely to be present as (non-acid forming) organic sulphur. It is expected that the risk of acid generation from coal rejects will be low; and
- The concentration and solubility of environmentally significant metals in coal rejects is likely to be low and within applicable soil and water quality guideline concentrations.

Further assessment will be completed for inclusion in the EA to determine any potential geochemical issues related to the Project.

### 7.12.2 Assessment Methodology

Further geochemical assessment will be completed for the Project by RGS Environmental Pty Ltd. The scope of assessment includes:

- A brief review of any additional data from exploration drilling programs and an updated sampling and geochemical testing specification including sampling locations, methodology and proposed geochemical testing;
- A site visit providing additional rigour to the geochemical assessment and to ensure that final conclusions are robust and based on a sound sampling and testing methodology;
- A geochemical test program designed to assess the degree of risk from oxidation of pyrite, acid generation and leaching of soluble metals and salts. The assessment will include characterisation of standard soil parameters including salinity, cation exchange capacity, potential nutrients and major metal compositions; and
- Identification of any impact mitigation measures necessary.

## 7.13 SOILS AND LAND CAPABILITY

### 7.13.1 Background

The Soil Landscapes of Singleton, 1:250 000 sheet, prepared by Kovac (1991) was reviewed as to identify the soil types and land capability of the Project area. The land capability of the Drayton South area was assessed in accordance with the NOW rural land capability assessment system, which classifies land on soil erosion hazard and versatility of use. The system allows for land to be allocated into eight potential classes (with land capability decreasing progressively from Class I to Class VIII).

The following soil types were identified by Kovac to be present within the proposed mining area:

- Brays Hill (br);
- Liddell (ld);
- Bayswater (bz); and
- Hunter (hu).

Further as described in **Section 7.12** there is likely to be a lack of suitable topsoil material for Drayton South, due to its shallow nature and the potential presence of sodic / dispersive material.

Land required to be disturbed as a result of the Drayton South will be required to be rehabilitated to a stable, self-sustaining condition. At a minimum, rehabilitation will plan to achieve the same classification as prior to commencement of mining. In order to achieve this, effective conservation and management of the existing topsoil and sub-soil resource will be facilitated so as to ensure its effectiveness as a rehabilitation medium.

### 7.13.2 Potential Environmental Impacts

Many of the soil types within the Project Boundary include soil horizons with a slight to high potential for dispersion. Consequently such soils are likely to be subject to sheet, rill and gully erosion if left unprotected during construction or mining operations.

Potential impacts on soil structure, integrity and fertility may occur as a consequence of extended periods of topsoil storage. This would potentially affect rehabilitation success and the long term sustainability of rehabilitated areas.

The post mining land capability of the Project will be modified from its original condition and will need to be addressed as part of the assessment. The land capability will be largely influenced by the mine plan, post mining land use plans and the final landform design. The presence of final voids or water storage areas will also influence the final land use potential and capability.

### 7.13.3 Assessment Methodology

A soils and land capability impact assessment will be completed for the Project by Environmental Earth Sciences. The scope of assessment includes:

- Review of previous relevant assessments;
- Completion of soil test pit excavations and other site investigations to determine soil types, nominal depths, land suitability and land capability classifications;
- Soils assessment of areas to be disturbed in accordance with the requirements of the DII guidelines;
- Pre and post mining land capability and classes assessment in accordance with DII and NOW guidelines;
- Pre and post mining agricultural suitability assessment in accordance with DII agriculture guidelines;
- Assessment of available topsoil resources for mining and infrastructure area rehabilitation, management and mitigation measures;
- A detailed description of the proposed mine rehabilitation process of the mine site, including that of washery waste emplacement areas proposed at the existing Drayton Mine;
- Assessment of suitable post-mining land uses for the open cut operations; and
- Identification of any impact mitigation measures necessary.

## 7.14 REHABILITATION, LAND USE AND FINAL LANDFORM

### 7.14.1 Background

The Upper Hunter region has a long history of rural land use for a variety of agricultural and industrial activities, predominantly grazing and coal mining. The current dominant land uses within and adjacent to the Project area include thoroughbred horse breeding, open cut coal mining, power generation, viticulture, agriculture and rural residential areas.

Rehabilitation planning for the Project will be undertaken progressively to ensure the total area of disturbance at any one time is minimised to reduce the potential for wind-blown dust, visual impacts and increased sediment-laden runoff.

Rehabilitation will be designed to be compatible with the surrounding landform (with a consideration of the progression of neighbouring mining operations), stable and able to support final land use(s). To ensure a stable final landform, the majority of the overburden emplacement slopes will be shaped to 10 degrees or less; consistent with current industry standards.

Anglo American will aim to restore land disturbed by mining to a condition similar to that which existed prior to mining. It is anticipated that with good land management practices, final rehabilitation of the Project will restore the native vegetation communities to a similar extent of its original coverage.

Rehabilitated land from the Project will be predominantly topsoil and comprised of a mixture of native grasses and native trees representing habitat of the existing grassland and woodland values. Revegetation undertaken will be consistent with the surrounding landscape aiming to link remnant native vegetation communities with re-established habitat areas. The rehabilitation strategy for the Project will focus on biodiversity and the establishment of habitat for threatened species.

### 7.14.2 Potential Impacts

Throughout its operation, the Project will require the disturbance of large areas of grassland and some small patches of open woodland. As such the requirement for progressive and expedient rehabilitation across the Project Boundary will be employed throughout the life of the Project. In this regard and as discussed in **Section 3.1**, the mine plan has been specifically designed to obtain the maximum area of rehabilitation available throughout the life of the Project.

A long term rehabilitation strategy will be developed to ensure that the disturbed land is returned to as close as possible to its original state once mining operations have ceased.

### 7.14.3 Assessment Methodology

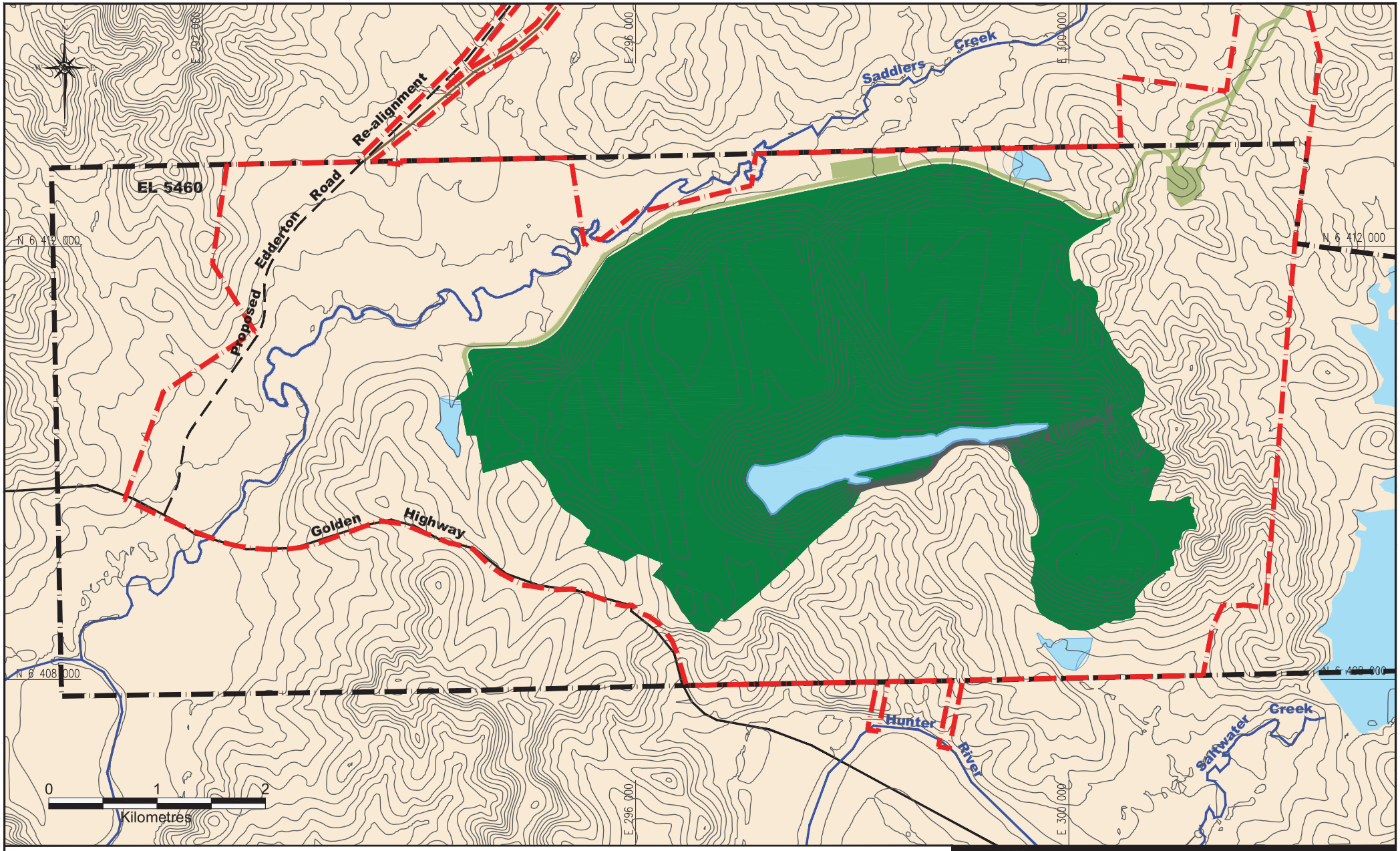
The proposed mine plan and ultimate final landform for Drayton South maintains the development of an undulating, largely free-draining and stable landform consistent with the surrounding environment. Further planning and detail will be provided in the EA with regard to the establishment of existing vegetation communities and the final landform.

A conceptual final landform for the Drayton South is illustrated on **Figure 15**, which will be further refined for inclusion in the EA. The final landform will be developed via progressive rehabilitation

with a focus of developing a stable and undulating, free-draining landform utilising native grasses and native trees representative of the surrounding landscape habitat as far as practical.

The EA will include a detailed description of the proposed rehabilitation strategy for the Project Boundary, having regard to the key principles in the *'Strategic Framework for Mine Closure'* (ANZMEC-MCA, 2000). Detailed descriptions of the following will be included in the EA:

- Rehabilitation objectives, methodology and proposed completion criteria;
- Nominated final land use, having regard to any strategic land use planning or resource management plans or policies; and
- The potential for integrating this strategy with any other offset strategies in the region.




- Project Boundary
- Drayton South EL Boundary
- Proposed Edderton Road Re-alignment Option 1
- Proposed Edderton Road Re-alignment Option 2
- Completed Rehabilitation
- Road & Infrastructure Rehabilitation
- Final Void Water Storage
- Dams

Hansen Bailey

AngloAmerican

# DRAYTON SOUTH

## Conceptual Final Landform

| Cad File: 07223A.dwg | Date: 21.02.11 | Drawn: CP | Figure 15 |
|---|---|---|---|

# 8 PRELIMINARY PROJECT JUSTIFICATION

Society is greatly reliant on coal to meet basic energy needs and steel production. With the continuing increase in population and the fact that there are a number of countries that currently do not benefit from extensive electricity distribution networks, it is expected that the demand for thermal coal for energy production will continue to rise. The Project involves the mining of up to at least 100 Mt of ROM coal by both open cut and highwall mining methods and will contribute to the supply of significant quantities of valuable thermal coal to meet increasing international demand.

The Project will provide Anglo American with a new Project Approval that will ensure the continuation of operations for the existing Drayton Mine which is currently scheduled to close in 2015. This will secure employment for the existing Drayton Mine workforce and ensure that the local, State and Federal socio economic benefits that are created by Drayton Mine continue by enabling the recovery of a valuable coal resource from an area that has long been set aside for mining by the NSW Government.

Drayton South is located south of Muswellbrook within the Hunter Valley Coal Fields. Coal mining within this area has occurred for more than 100 years and the region contains a well known coal deposit. In particular the area in which the Project is proposed has long been set aside for the purposes of coal mining with prospecting initially commencing in the late 1940s and more extensive exploration activities being conducted from the 1960s up until the present day. Previously development consent for a coal mine and associated ML have been granted over the area.

The development of Drayton South is a logical transfer and progression of the existing mining operations at Drayton Mine to extend the life of the operation and to utilise the existing infrastructure and equipment fleet. The existing mine voids will also be utilised for the purpose of disposing coarse rejects and tailings from the CHPP. This will allow the optimisation of the Drayton Mine final landform and will reduce closure liabilities.

Drayton Mine has a proven history of best practice environmental management, which will continue to be applied to the Project. Drayton Mine currently operate their own Safety, Health, Environment and Community Management System (SHECMS) which is certified to ISO 14001 & AS 4800, and will be revised to include the Project to ensure environmental and social impacts are carefully monitored, mitigated and managed. Drayton Mine has continued to meet its environmental monitoring predictions and criteria in all areas.

Extensive consultation with key neighbouring stakeholders during the project planning phase has been positive in developing constructive relationships and has resulted in the development of a co-existent mine plan that maximises resource recovery while minimising environmental and social impacts on stakeholders.

A full EA conducted in accordance with the Director-General's EARs will investigate and report on the social, environmental and economic impacts from the Project in accordance with the objectives of the EP&A Act.

# 9 REFERENCES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# APPENDIX A

*Preliminary Environmental Risk Assessment*

**DRAYTON SOUTH COAL PROJECT**

**PRELIMINARY ENVIRONMENTAL RISK ASSESSMENT**

***for***

***Anglo American***

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| Ecology | Vegetation clearing | Loss of biodiversity and disruption to threatened flora and fauna or habitats | 3 | 5 | 20 (S) | A Flora and Fauna Impact Assessment will be completed for the Project by Cumberland Ecology in accordance with (at least) the *DECC Draft Guidelines for Threatened Species Assessment*.<br>Database analysis, literature review and field surveys will identify threatened flora and fauna which may be impacted by the Project.<br>A referral will be compiled to fulfil requirements of the Environmental Protection and Biodiversity Conservation Act 1999. Offset properties will be investigated.<br>Mitigation measures will be determined as necessary for the Project including the development of an offsets strategy, if required. |
| | | Disturbance to Federally listed species | 3 | 5 | 20 (S) | |
| Archaeology and Cultural Heritage | Vegetation clearing, blasting and topsoil stripping | Disturbance of Aboriginal artefacts, sites or places of cultural heritage significance | 3 | 4 | 17 (S) | An Aboriginal Archaeological and Cultural Heritage Impact Assessment for the Project will be undertaken by AECOM Australia Pty Ltd in accordance with the *National Parks & Wildlife Act 1974: Part 6 Approvals Interim Community Consultation Requirements for Applicants* and DECCWs *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| | | | | | | The Assessment will include a desktop review, database, Native Title and literature search of previously recorded Aboriginal Cultural Heritage information.<br>A field survey will take place with members of the Aboriginal community and mitigation and management strategies will be developed as appropriate. |
| | | Disturbance of non-Indigenous heritage sites | 2 | 3 | 8 (M) | AECOM Australia Pty Ltd will complete a Non-Indigenous Heritage Assessment in accordance with the standards required by the Heritage Office of NSW. The Assessment will include a review of existing heritage assessment reports and a field survey of the Project area. Heritage significance will be assessed.<br>Mitigation measures will be identified and implemented as appropriate for potential impacts. |
| Water Management | Topsoil stripping, haul roads, un-rehabilitated spoil | Dirty water runoff entering local waterways | 3 | 4 | 17 (S) | A Groundwater Impact Assessment will be conducted for the Project by Australasian Groundwater and Environmental Consultants (AGE).<br>The Groundwater Assessment will include the identification of groundwater resources which may be impacted by the Project, modelling of cumulative groundwater impacts and development of a Modflow Groundwater Model for the Project. The Groundwater |
| | Coal extraction and overburden removal | Groundwater inflow into pit | 2 | 3 | 8 (M) | |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| | | Drawdown of aquifers on surrounding private water users | 2 | 3 | 8 (M) | Assessment will additionally include an analysis of contaminant potential from tailings dam leachate of post-mine groundwater impacts, cumulative assessment of future adjacent mine impacts, confirmation of alluvium impacts and extent of mining impacts, as relevant.<br><br>The Groundwater Assessment will also propose groundwater mitigation and management strategies as required.<br><br>A Surface Water Impact Assessment will be conducted for the Project by WRM Water & Environment. This Assessment will include a review of existing surface water assessment reports, the identification of surface water resources, assessment of existing surface water hydrology, assessment of potential surface water impacts on and offsite, assessment of post-mine surface water impacts and predicted final void water levels.<br><br>The Surface Water Impact Assessment will also include the development of surface water management strategies, mitigation measures and development of a water balance model for the life of the Project incorporating cumulative impacts with adjacent operations.<br><br>A relevant flood water Impact Assessment will be conducted by WRM Water and Environment for Saddlers Creek. |
| | | Cumulative impacts with surrounding users | 4 | 2 | 14 (S) | |
| | Coal processing and production | Water demand for dust suppression and coal washing | 1 | 4 | 7 (M) | |
| | Water discharges into local waterways | Surface water contamination | 3 | 3 | 13 (S) | |
| | | Contaminated water from wash down bays, etc | 3 | 3 | 13 (S) | |
| | Flooding | Increased flood levels and erosion of catchment | 3 | 2 | 9 (M) | |
| Acoustics | Coal, rejects and overburden haulage | Excessive Noise generation at sensitive receivers | 3 | 3 | 13 (S) | A Noise and Blasting Impact Assessment will be conducted for the Project by Bridges Acoustics in accordance with (at least) the *Industrial Noise Policy 2000*. |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| | Plant and equipment working in-pit and on overburden dumps | | 3 | 3 | 13 (S) | The Assessment will determine likely criteria for the Project and include an assessment of operational and construction noise impacts, a blasting assessment, assessment of the extension of train movements and noise impacts with approved industry as point source and the assessment of cumulative impacts for current proposals.<br>The Noise and Blasting Impact Assessment will also develop appropriate mitigation and management measures. |
| | Train movements on rail loop and spur | | 2 | 3 | 8 (M) | |
| | CHPP operation and stockpiles | | 2 | 3 | 8 (M) | |
| | Coal loading at rail loop | | 2 | 3 | 8 (M) | |
| | Product Coal Transport | | 2 | 4 | 12 (M) | |
| | Increased traffic movements | | 1 | 4 | 5 (L) | |
| | Blasting | Overpressure and ground vibration impacts at sensitive receivers | 3 | 3 | 13 (S) | A blasting Impact Assessment will be conducted for the Project by Bridges Acoustics as part of the Noise and Blasting Impact Assessment described above. |
| Visual | Overburden emplacement | Visual impact to surrounding | 3 | 4 | 17 (S) | A Visual Impact Assessment will be completed for the Project by JVP Visual Planning and Design and Greenpond to assess the visual |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| | Active Mining | receivers | 2 | 3 | 8 (M) | impacts of the Project and identify mitigation and management measures, as appropriate.<br>The Assessment will include analysis of the existing visual setting, definition of preliminary visual impacts, lighting assessment and comment on potential cumulative impacts. |
| | Lighting from mobile and fixed equipment, buildings and potential night glow | | 3 | 4 | 17 (S) | |
| Air Quality | Vegetation clearing, drilling and topsoil stripping | Wind blown dust and machinery exhaust fumes contributing to elevated dust levels | 3 | 3 | 13 (S) | An Air Quality and Greenhouse Gas Impact Assessment will be conducted for the Project by PAE Holmes in accordance with the '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*' (DEC, 2005).<br>The Assessment will include confirmation of background levels, determination of site criteria, assessment of construction and operation of air quality impacts, determination of greenhouse gas emissions, assessment of air quality impacts with approved industry, assessment of cumulative impacts and a literature review.<br>The Assessment will also develop any suitable mitigation and management measures needed. |
| | Overburden emplacement | | 3 | 3 | 13 (S) | |
| | Uncovering of coal | | 3 | 3 | 13 (S) | |
| | Coal, rejects and overburden haulage | | 3 | 3 | 13 (S) | |
| | Coal processing and transport | | 2 | 4 | 12 (M) | |
| | CHPP operation and stockpiles | | 2 | 3 | 8 (M) | |
| | Combustion of diesel fuel | Greenhouse gas emissions | 2 | 3 | 8 (M) | The air quality Impact Assessment will assess greenhouse gas Scope 1, 2 and 3 emissions in accordance with the Australian Greenhouse |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| | Electricity use | | 2 | 3 | 8 (M) | Office's (AGO) '*Factors and Methods Workbook*' (AGO, 2005) as part of the Air Quality and Greenhouse Gas Impact Assessment described above. |
| | Downstream Impacts from the Burning of Coal | | 2 | 3 | 8 (M) | |
| | Blasting | Greenhouse gas emissions, fume and dust Generation | 3 | 2 | 9 (M) | Blasting effects will be assessed as part of the Air Quality and Greenhouse Gas Impact Assessment. |
| Socio-Economics | Increased Employees residing in local communities | Social Impacts | 3 | 2 | 9 (M) | Hansen Bailey will prepare a social assessment for the Project considering the stakeholder engagement program and impacts predicted for the Project.<br>Mitigation measures will be determined as required. |
| | | Economic Impacts | 2 | 2 | 5 (L) | Gillespie Economics will undertake a detailed economics assessment determining both local and regional impacts from the Project. |
| Geochemical | Overburden Placement | Potentially acid forming materials affecting soil and water resources | 3 | 2 | 9 (M) | RGS Environmental Pty Ltd will undertake a Geochemical Impact Assessment on the potential for PAF and NAF from overburden and rejects materials of the Project.<br>Management and mitigation measures will be determined as required. |
| Rehabilitation and Final | Topsoil Stripping and land | Loss of productive topsoil | 2 | 3 | 8 (M) | A Soils and Land Capability Impact Assessment will be completed for the Project by Environmental Earth Sciences. |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| Landform | preparation | Deterioration of land capability | 2 | 3 | 8 (M) | The Assessment will include a review of previous relevant assessments, soil test pit excavations, soils assessments of areas to be disturbed, pre and post mining land capability and classes assessment, pre and post mining agricultural suitability assessment, assessment of available topsoil resources, a description of the proposed mine rehabilitation process and an assessment of suitable post-mining land uses.<br>The assessment will also suggest any required impact mitigation measures. |
| | Rehabilitation | Erosion | 2 | 3 | 8 (M) | The proposed mine plan and ultimate final landform for the Project is planned to maintain an undulating, free-draining and stable landform consistent with the surrounding environment, as practical.<br>Further planning and detail will be provided in the EA with regard to the establishment of existing vegetation communities and final landform. |
| | | Weed invasion | 1 | 3 | 4 (L) | |
| | | Feral animal invasion | 1 | 3 | 4 (L) | |
| | Final Landform | Unstable landform | 2 | 2 | 5 (L) | Final rehabilitation objectives and quality will also be assessed in the EA.<br>Further planning and detail will be provided in the EA with regard to the mitigation of unstable landform, poor drainage and erosion. |
| | | Poor drainage | 2 | 2 | 5 (L) | |
| | | Erosion | 2 | 3 | 8 (M) | |

| Issue | Aspect | Impact | Risk Assessment | | | Environmental Assessment Scope |
|---|---|---|---|---|---|---|
| | | | C | L | R | |
| Traffic and Transport | Increased vehicle movements from employees, deliveries and train loading | Increased traffic movements | 2 | 2 | 5 (L) | A Traffic and Transport Impact Assessment will be completed for the Project by DC Traffic Engineering in accordance with at least the *'Guide to Traffic Generating Developments'*.<br>The Assessment will include a review of previous traffic impact assessments undertaken for the surrounding area, determination of likely criteria for the Project, design of a traffic counts program, assessment of existing, construction and operational traffic impacts, assessment of traffic movements on existing road networks and assessment for the realignment of Edderton Road.<br>The Assessment will also describe any required impact mitigation and management measures. |
| | Road Upgrades | Public Perception | 2 | 2 | 5 (L) | |
| Waste | General waste management | Land contamination | 1 | 2 | 2 (L) | A relevant assessment waste assessment will be undertaken for inclusion in the EA and an indicative Waste Management System will described for the Project which shall provide management procedures to ensure the environmentally responsible disposal, tracking and reporting of all relevant waste generated on site. |
| | Rejects management | Water contamination | 2 | 3 | 8 (M) | |
| | Sewage management | | 2 | 2 | 5 (L) | |
| Hazards | Storage and Handling | Soil and water contamination | 2 | 2 | 5 (L) | A relevant level of hazard assessment in accordance with SEPP33 will be undertaken for the Project, although it is not anticipated that large quantities of hazardous materials will be required for the Project. |
| | Bushfire | Fire hazard | 2 | 3 | 8 (M) | A relevant bushfire hazard assessment will be undertaken for the Project with relevant mitigation defined as required. |

## DRAYTON SOUTH COAL PROJECT

### Risk Assessment Tools: Matrix for Determining Level of Risk

| Loss Type | Hazard Effect/Consequence | | | | |
|---|---|---|---|---|---|
| | **1 Insignificant** | **2 Minor** | **3 Moderate** | **4 High** | **5 Major** |
| **(S/H) Harm to People (Safety/Health)** | First aid case. Exposure to minor health risk. | Medical treatment case. Exposure to major health risk. | Lost time injury. Reversible impact on health. | Single fatality or loss of quality of life. Irreversible impact on health. | Multiple fatalities. Impact on health ultimately fatal. |
| **(EI) Environmental Impact** | Minimal environmental harm (L1 incident). | Material environmental harm (L2 incident, remediable short term). | Serious environmental harm (L2 incident remediable with LOM). | Major environmental harm (L2 incident remediable post LOM). | Extreme environmental harm (L3 incident irreversible). |
| **(BI/MD) Business Interruption/Material Damage and Other Consequential Losses** | No disruption to operation. Five percent loss of budgeted operating profit. | Brief disruption of operation. Ten percent loss of budgeted operating profit/listed assets. | Partial shutdown. Fifteen percent loss of budgeted operating profit/listed assets. | Partial loss of operation. Twenty percent loss of budgeted operating profit/listed assets. | Substantial or total loss of operation. Twenty-five percent of loss budgeted operating profit/listed assets. |
| **(L&R) Legal and Regulatory** | Low level legal issue. | Minor legal issue. Non compliance and breaches of the law. | Serious breach of the law. Investigation/report to authority, prosecution and/or moderate penalty. | Major breach of the law. Considerable prosecution and penalties. | Very considerable penalties and prosecutions. Multiple law suits and jail terms |
| **(R/S/C) Impact on Reputation/Social/Community** | Slight impact. Public awareness may exist but no public concern. | Limited impact. Local public concern. | Considerable impact. Regional public concern. | National impact. National public concern. | International impact. International public attention. |
| **Likelihood** | **Risk Rating** | | | | |
| **5 Almost Certain** | 11 (M) | 16 (S) | 20 (S) | 23 (H) | 25 (H) |
| **4 Likely** | 7 (M) | 12 (M) | 17 (S) | 21 (H) | 24 (H) |
| **3 Possible** | 4 (L) | 8 (M) | 13 (S) | 18 (S) | 22 (H) |
| **2 Unlikely** | 2 (L) | 5 (L) | 9 (M) | 14 (S) | 19 (S) |
| **1 Rare** | 1 (L) | 3 (L) | 6 (M) | 10 (M) | 15 (S) |

## Likelihood Rating

| Likelihood | Examples |
|---|---|
| **5**<br>**Almost Certain** | The unwanted event has occurred frequently; occurs in order of one or more times per year and is likely to reoccur within one year. |
| **4**<br>**Likely** | The unwanted event has occurred infrequently; occurs in order of less than once per year and is likely to reoccur within five years. |
| **3**<br>**Possible** | The unwanted event has happened in the business at sometime or could happen within 10 years. |
| **2**<br>**Unlikely** | The unwanted event has happened in the business at sometime or could happen within 20 years. |
| **1**<br>**Rare** | The unwanted event has never been known to occur in the business or it is highly unlikely that it will occur within 20 years. |

## Risk Rating

| Risk Rating | Risk Level | Guidelines |
|---|---|---|
| 21 to 25 | (H) High | A high risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised immediately. |
| 13 to 20 | (S) Significant | A significant risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as soon as possible. |
| 6 to 12 | (M) Medium | A moderate risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as part of the normal management process. |
| 1 to 5 | (L) Low | A low risk exists that management's objectives may not be achieved. Monitor risk, no further mitigation required. |

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

**SINGLETON**
**T** 02 6575 2000
**F** 02 6575 2001
6/127-129 Pitt Street,
Singleton NSW 2330
**Postal** PO Box 473,
Singleton NSW 2330

**hansenbailey.com.au**