6 Assessment of socio-economic impacts

The AIS guidelines require assessment of socio-economic impacts of the project with regard to agricultural support services and processing and other value-adding industries (Section 6.1); local and regional employment (Section 6.3); and visual amenity, landscape values and tourism infrastructure (Section 6.2). This chapter addresses these matters.

6.1 Agricultural support services and processing industries

The predominant impact on local throughput of agricultural production would be on beef cattle. Peak throughput losses would occur in the construction phase of the project and the Berrima Rail project. The total maximum reduction of livestock (refer Section 5.4) is estimated to be 665 for the construction phase and 278 for the operation phase. The Southern Regional Livestock Exchange has an annual throughput of about 60,000 head. Hence, potential loss of throughput ranges from 0.5 to 1.1%. The total number of cattle in Wingecarribee, as of the last agricultural census in 2012, was about 35,000 which suggest that more than 50% of plant throughput is sourced outside of the local region and that a 1.1 to 2.6 % increase in imports would maintain production with a proportionally smaller increase in total transport costs.

The predicted reduction of the livestock production for the Wingecarribee region is 1.9% during construction, and only 0.8% during operations, and therefore will have a negligible impact on the regional agricultural support services and processing industries. Further, this means that critical mass thresholds are not required to be estimated (Section 4.3 of AIS technical notes, DPI 2013). As noted in Section 5.4.3, there will be an increase in throughput from the improved productivity of the rest of the Hume Coal affiliated properties.

6.2 Visual amenity, lighting and cumulative impact

Tourism is an important industry in the region, and includes B&B and farmstay accommodation, cellar door sales at the various wineries in the region. The wineries and accommodation are mostly to the south and south-west of the project, centred around the township of Sutton Forest, and along the Illawarra Highway.

The project design has progressively evolved to reduce its scale and impacts, including visual impacts, particularly through the specific siting of the surface infrastructure precincts such that they are shielded from view by existing topography and vegetation. The project will not have significant adverse visual impacts on the region surrounding the project area. Due to existing mature vegetation in the landscape, and the area's topography and rural nature, the project will be shielded from view.

Nonetheless, the development of the project will result in some changes to the landscape especially in the early stages prior to maturation of screen landscaping. Such changes will be noticeable to viewers from certain viewpoints surrounding the project.

6.2.1 Visual impact assessment

A visual impact assessment was carried out for the project, the results are presented in the *Visual Impact Assessment Report* (EMM 2017g). The primary assessment tools for determining the significance of potential visual impact were site inspections, photographs of the views from the selected viewpoints and photomontages to determine the level of change to assess visual impacts, taking into consideration the nature of the landscape, topography, the distance between the viewpoint and the proposed installation, as well as the type of view experienced. Figure 6.1 shows the locations of the assessed viewpoints.

The majority of viewpoints were assessed as having negligible potential of experiencing a significant visual impact as a result of the project. Viewpoints 3, 4, 5 and 7 would have partial views of the infrastructure. Mitigation measures include tree planting to screen the proposed infrastructure.

6.2.2 Lighting

Existing sources of night lighting in the immediate vicinity of the project area are minimal due to its rural setting. The only likely sources are rural residential properties, farm machinery and vehicles on roads. Motorists travelling north-south along the Hume Highway provide a moderate source of lighting in the evening hours.

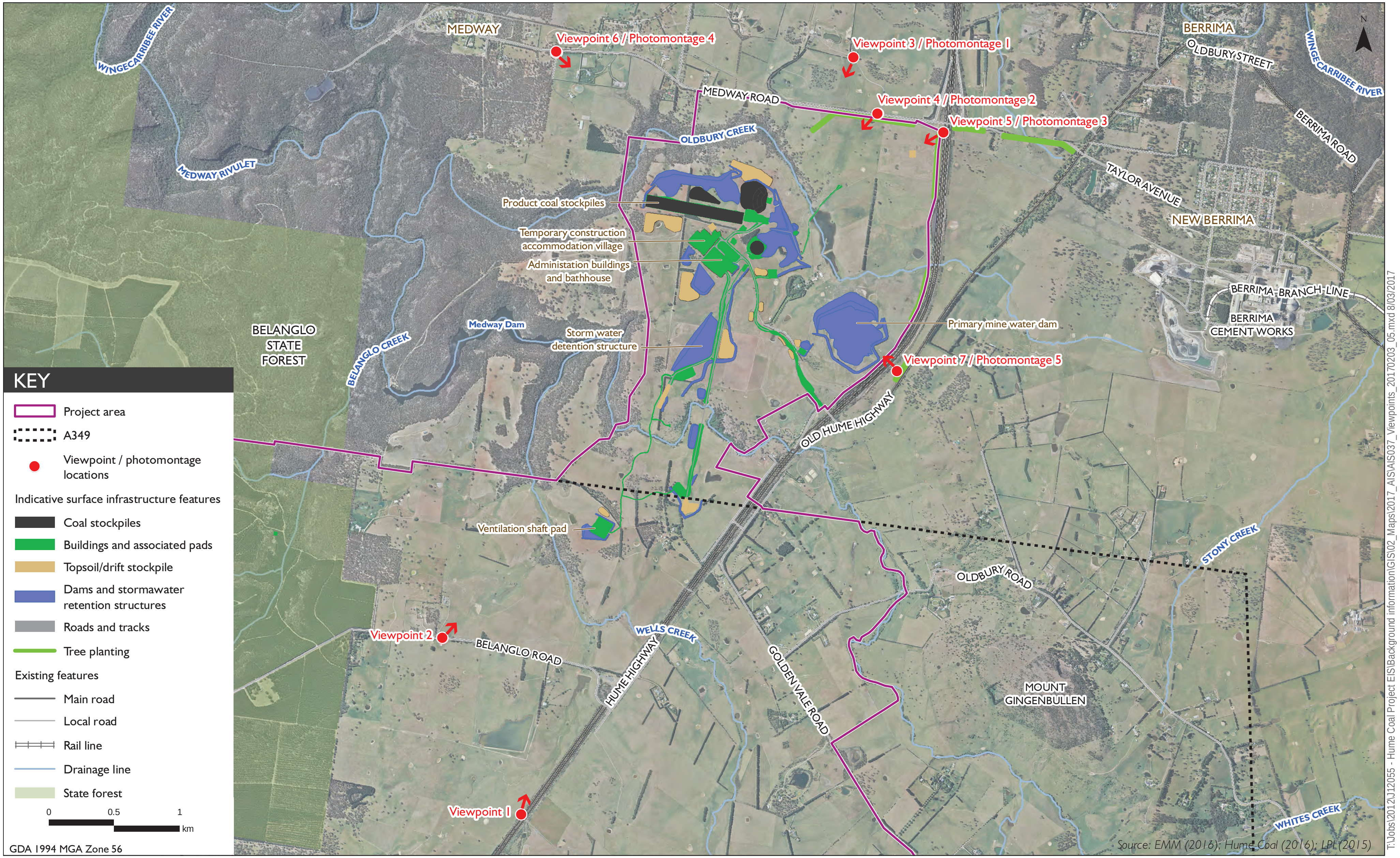
Australia Standard 4282 (AS4282) *Control of Obtrusive Effects of Outdoor Lighting* sets out guidelines for the control of the obtrusive effects of outdoor lighting and gives recommended limits for relevant lighting levels to contain these effects within tolerable levels.

Lighting protocols for the project will adopt the following principles:

- operational protocols for setting up of mobile lighting plant will require lighting is directed away from external private receptors;
- lighting sources will be directed below the horizontal to minimise potential light spill;
- light systems will be designed to minimise wastage;
- screening of lighting will occur where possible, for viewers internal and external to the project; and
- lighting of light coloured surfaces, which have greater reflectivity, will be avoided.

6.2.3 Cumulative assessment

The area surrounding the project is predominantly rural-residential in character. There are a few industrial and manufacturing facilities developments, including cement works, brickworks, metal fabrication, mining equipment manufacture and quarries. The Berrima Cement Works, Omya Moss Vale plant and the Berrima Feed Mill would have a visual significance in the region due to their height. Given the distance between these industrial developments and low concentration of such developments in the area, and that the visual impacts arising from the project-related surface infrastructure at the majority of viewpoints assessed is negligible, it is considered that the cumulative impact of the project and the existing development within the region will be minimal.



Viewpoint and photomontage locations

Hume Coal Project

Agricultural Impact Statement

Figure 6.1

6.3 Local and regional employment impacts

The following information has been reproduced from the Social Impact Assessment (EMM 2017h).

A peak workforce of approximately 400 fulltime equivalent employees will be required during the construction phase. Given the highly specialised skills that will be required, it is expected that the majority will be sourced from outside the local area, and therefore these workers will relocate to the area during construction. It was therefore decided to house workers in temporary accommodation within the project area. This arrangement will mean that the presence of non-local construction workers will not place excessive pressure on local short-term accommodation supply which would disrupt the tourism industry. In addition, the village will eliminate project-related effects on the general availability of rental accommodation. The availability of a construction accommodation village will also help Hume Coal to attract skilled construction workers and minimise any risks to the project's development schedule from a skills shortage.

The operations phase of the project will extend for 19 years. Initially, the operations workforce will number approximately 100 workers and then grow to a peak of approximately 300 workers in Year 5. The operations workforce will consist of both semi-skilled and skilled mine operators and maintenance staff, requiring varying levels of experience. In the early commissioning and build-up phases, a core of experienced workers will be needed. However, as capacity for training increases over time there will be a greater opportunity to recruit less experienced workers. Hume Coal will give priority to local recruits who meet required criteria.

For work health and safety (WHS) reasons, Hume Coal will require all workers, including those involved in mine closure, to live within 45 minutes travel time from the project. This policy will minimise the risk of fatigue related travel accidents, given that most will be working 12 hour shifts. The catchment area includes most of Wingecarribee Shire as well as some localities in adjoining shires. Since all workers will be required to reside in this workforce catchment area, most population and social change arising during all phases of the project will occur here.

Population change associated with the project will occur in three ways – workers renting for an initial period of time before purchasing a home, relocating workers moving to the area and 'local' workers who currently reside in the outer parts of the workforce catchment area but choose to relocate closer to the project area. These ratings suggest that relocating workers will mostly move to Moss Vale and Mittagong. The next most attractive town is Bowral, where more highly paid workers are likely to reside.

6.3.1 Population change associated with the operations phase

The operations phase will extend for 19 years and will require a peak workforce of 300 people. There are two local recruitment scenarios:

- Scenario 1: 70% local recruitment (ie 210 local recruits and 90 external recruits); and
- Scenario 2: 50% local recruitment (ie 150 local recruits and 150 external recruits).

It is assumed that relocating operations workers will be accompanied by their families as they will be long term residents in the area. Based on a 2.7 person household size, and a workforce size of 300 people, there will be a total population increase of 243 people under Scenario 1 and 405 people under Scenario 2.

This population increase will be distributed throughout the workforce catchment area which is mostly located in Wingecarribee LGA and also extends into parts of Wollondilly, Kiama, Shoalhaven and Goulburn Mulwaree LGAs.

6.3.2 Population change associated with the closure phase

The closure and relinquishment phase of the mine involves active works associated with the decommissioning of the mine followed by a period of long term land management. Active closure works involve the decommissioning and clearing of surface infrastructure and the rehabilitation of the site such that it can support land uses similar to those which existed before the occurrence of mining. Following this, Hume Coal land will enter into a period of long term land management in which the success of rehabilitation activities will be monitored.

Active works associated with the mines closure are expected to run for around two years. During this time up to 10% of the operational workforce (30 people) will be retained. Workers to be retained will be selected from the operational workforce on a merit basis. Active closure and relinquishment works will run for approximately two years. Following the initial two year period the mine will enter a period of long term management. This will require the long term commitment of three to five workers.

The closure of the mine is likely to result in a decrease in population in the local area due to job losses and workers moving away in search of new employment opportunities. It is therefore difficult to predict the number of workers who will migrate out of the area following the closure of the mine given that this will depend on the availability of jobs in the area at the time.

6.3.3 Regional employment

The agricultural industry within the Wingecarribee Shire directly employs approximately 630 people (ABS 2011) which accounts for 3.3% of total employment within the Shire. The main industries of employment are health care and social assistance, retail trade and manufacturing.

There is a downward trend in agricultural employment as a percentage of total employment over the ten year period to 2011. The trend is downward but considerably less pronounced in employment numbers. The difference is due to employment growth in other industries. Between 2001 and 2011, there was significant growth in employment in mining (73.6%), public administration and safety (34.0%) and administrative and support services (33.1%). This growth has resulted in low levels of unemployment. Unemployment rates in Wingecarribee LGA, reported at 3.6% in March 2015 compared with 5.9% across NSW.

In Section 5.4, the foregone agricultural values and flow on impacts of lost production associated with the project, calculated that there would also be some limited local impacts on employment, which would equate to 0.2 FTE with DPI (2016) stocking rates and 0.4 FTE applying the stocking rates achieved under Hume Coal's ownership. There would also be minor flow-on effects of 0.14 FTE and 0.28 FTE applying the DPI (2016) stocking rates and stocking rates achieved under Hume Coal's ownership, respectively.

A breakdown of employment in the Wingecarribee shire by agricultural enterprise is shown in Table 6.1 (ABS 2011b). The main agricultural production employers are beef cattle farming (over 42%) followed by dairy and horses, comprising a total of 65% of direct agricultural employment.

Employment in service industries related to agriculture was small and as with agriculture contracting, despite reasonably strong growth in agricultural output, real growth in the value of agriculture production was about 10% between 2006 and 2011. It therefore seems reasonable to assume that demand for services has not declined and would include a range of other general and specialist services and infrastructure.

Table 6.1 Agricultural industry employment in Wingecarribee Shire (ABS 2011b)

Enterprise	Employment (number of persons)	Percentage
Agriculture, forestry and fishing, nfd	4	0.6
Agriculture, nfd	44	6.6
Nursery production (outdoors)	20	3.0
Floriculture production (outdoors)	10	1.5
Mushroom growing	35	5.3
Vegetable growing (outdoors)	19	2.9
Fruit and tree nut growing, nfd	3	0.5
Grape growing	10	1.5
Berry fruit growing	10	1.5
Olive growing	6	0.9
Other fruit and tree nut growing	3	0.5
Sheep farming (specialised)	8	1.2
Beef cattle farming (specialised)	282	42.3
Sheep-beef cattle farming	12	1.8
Other grain growing	4	0.6
Dairy cattle farming	56	8.4
Horse farming	58	8.7
Total	**606**	**91.0**
Forestry	4	0.6
Logging	4	0.6
Forestry support services	5	0.8
Other agriculture and fishing support services	22	3.5
Total with services and associated primary industries	**636**	**100**

Notes: * nfd: not further defined.*

7 Mitigation measures

The AIS guidelines require identification of mitigation measures; specifically, project alternatives, monitoring programs, trigger response plans, and demonstrated capacity for the rehabilitation of disturbed lands to achieve the final land use and planning for progressive rehabilitation that minimises the extent of disturbance. This chapter addresses these matters.

7.1 Project alternatives

The final project design is the result of an iterative process undertaken to achieve a project design that represents leading practice in underground coal mining: one that provides efficient extraction of the resource, environmental protection and socio-economic benefits.

The design and siting of elements of the project were evaluated and a number of fundamental aspects were given particular scrutiny. In addition to the mining method and mine plan, alternatives in relation to other aspects of the project were considered, including surface infrastructure location and design, reject emplacement, water management, accommodation for construction workers, and site access.

7.1.1 Mining method and mine plan

Hume Coal considered numerous mining methods and layouts, such as longwall, miniwalls, bord and pillar and non-caving methods, evaluating each against the objectives of technical, financial and environmental optimisation. Due to the nature and location of the deposit, open cut mining methods were never considered to be appropriate. To develop a viable project that would have acceptable social and environmental impacts, a mining system needed to be identified that would meet the following objectives:

- minimise groundwater impacts;
- minimise subsidence impacts;
- have the flexibility to deal with surface and geological constraints; and
- be able to accommodate underground reject emplacement.

The mining system alternatives were considered against their ability to achieve these objectives. Ultimately the chosen mining system was selected because it provided a good fit with the technical and environmental imperatives of the project.

7.1.2 Surface infrastructure location

Numerous surface infrastructure locations and designs were examined (Table 7.1) as the mine plan developed with each evaluated against the criteria of technical, financial and environmental optimisation. This has broadly been by a two stage process, to firstly identify a suitable site and to then refine the surface infrastructure design within that site.

The primary requirements in identifying a suitable location for the project's surface infrastructure were:

- proximity to the underground mining area;
- proximity and access to important services and infrastructure, particularly the rail network;

- land availability, that is, Hume Coal must already own or likely be able to purchase the land; and
- a suitably sized area, relatively free from environmental, urban and other constraints specifically to enable:
  - avoidance of more densely populated areas and areas with fragmented land ownership;
  - avoidance of flood-prone land, defined as land that would be inundated by a 1% annual exceedance probability (AEP) rainfall event, that is, an event that on average occurs once every 100 years;
  - avoidance of large tracts of native vegetation;
  - integration with the existing topography and landform by selecting a relatively flat site where the need for cut and fill is minimised, and with the site surrounded by landforms and/or vegetation that would minimise exposure from the Hume Highway and other sensitive viewing points;
  - minimisation of the number of watercourse and road crossings by new infrastructure; and
  - concealing surface infrastructure from sensitive receptors as much as possible, to minimise the potential for visual, noise, dust and amenity impacts.

Table 7.1 Alternative surface infrastructure locations considered

	Location	Main reasons rejected
1.	Between Exeter and the Illawarra Highway	Proximity to the village of Exeter and associated potential for visual, noise, dust and amenity impacts. Longer section of Main Southern Rail Line to traverse than other options, with limited train paths available. This option was close to the site of the previously proposed Austen and Butta rail spur and pit top, and was rejected by Hume Coal very early on.
2.	Central A349, east of Hume Highway	Distance from the rail line - extensive overland conveyors required over numerous properties, with substantial cost and increased disturbance footprint.
3.	North of A349, near Berrima Cement Works	Potential cumulative noise, visual and dust impacts at New Berrima, because of the site's proximity to other industrial facilities including the Berrima Cement Works and Austral Bricks shale quarry. Limited land available for purchase.
4.	Central northern A349, west of Hume Highway, and extending north of A349	Not applicable – selected as preferred option.

7.1.3 Surface infrastructure designs considered

Alternative designs were evaluated at each of the surface infrastructure locations under consideration. Once the preferred location was chosen, Hume Coal worked with engineering and environmental specialists to develop and refine the project components and their layout within that site. The design had to satisfy the same requirements listed in the preceding section for selecting a location. Hume Coal was also seeking to:

- minimise the disturbance footprint as much as practicable and avoid direct impacts on features like Mereworth House and gardens, which is a locally listed heritage place owned by Hume Coal;

- position the drift portals (for mine access and egress) and associated mine infrastructure close to the underground mining area; and

- position the CHPP and coal stockpiles outside Medway Dam's catchment and close to rail. While the project's water and wastewater management system is designed to avoid off-site movement of contaminants and sediment, it was considered that there could be community concerns associated with having these in its catchment.

Conceptual layouts of the various options were prepared. These were then subject to environmental investigations and a series of workshops held to further optimise the design and mitigate potential impacts. This included consideration of air, noise, visual, heritage and ecological factors. Examples of the refinements made to the initial concepts as a result of preliminary environmental investigations and baseline monitoring include:

- The resultant design completely avoids State-listed heritage items and direct impacts to locally-listed heritage items, and avoids most threatened fauna habitat, endangered tree species and Aboriginal heritage sites.

- The surface infrastructure, inclusive of the ventilation fans, was originally proposed to be closer to the Hume Highway, but was shifted west and north to increase its set-back from sensitive receptors on the highway's eastern side to reduce the potential for adverse noise, dust and amenity impacts on nearby receptors.

- Other innovative and leading practices which minimise noise and dust generation.

7.1.4 Reject emplacement

The first two alternative mining methods investigated for the project; longwall and miniwalls, included surface reject emplacement in the project design. One of the advantages of the adopted mining system is that the void spaces left from the extraction of coal will be kept open, thereby allowing reject emplacement underground and removing the need for surface reject emplacement. This option has been incorporated into the final project design as it has many environmental advantages, in particular reducing the surface disturbance footprint and removing the air quality, noise and visual impacts associated with traditional surface emplacement of reject material.

7.1.5 Water management

Water management was recognised as a crucial design consideration, along with subsidence impacts, from the start of the project planning process back in 2011. Groundwater inflows, groundwater recovery, and surface water/groundwater connectivity were identified as key project matters, with the effective management of these aspects being essential to ensuring impacts from the project would be acceptable.

In recognition of the importance of groundwater and surface water issues, Hume established a water advisory group (WAG) in 2011. Generally, the WAG met on a quarterly basis throughout the project planning and environmental assessment phases, acting as an advisory committee for the development of both a mine plan and water management system that would result in acceptable impacts.

The options for managing water, particularly within the underground workings, evolved as the mining method and plan evolved. The main options considered are listed below.

- Recirculation – this option involves collecting groundwater that flows into the mine workings and recirculating it back into the sealed up mined-out voids behind bulkheads. The principal benefits of this option are reduction of the groundwater 'take', and the associated groundwater drawdown and recovery time.

- Managed aquifer recharge (MAR) – this option involves injecting water extracted from the underground workings back into the Hawkesbury Sandstone. The particular application considered was reinjection prior to the availability of volume behind the bulkheads during the early stages of mining.

- Water treatment and discharge to creeks.

The option adopted for managing water involves a combination of filling up the sealed underground panels, and beneficial use as mining process water.

7.1.6 Site access

A number of options for vehicle access to the project area were considered. Various configurations using Mereworth Road and Medway Road interchanges to provide northbound and southbound Hume Highway access respectively were considered, along with the construction of a new link road in various locations to access the mine site.

Construction of a new mine access intersection on the Hume Highway on the western side was also considered, permitting left turn access only to and from the western side of the Hume Highway in the vicinity of the Golden Vale Road access, about 1 km north of Belanglo Road. Whilst this was a low cost option as it would require the shortest length of link road connection to the mine, the creation of a new intersection, requiring left turn acceleration and deceleration lanes, has the potential to create traffic conflicts with the existing Belanglo Road and Golden Vale Road access intersections. This option would also involve significant detour distances for traffic approaching from the north on the Hume Highway. For these reasons it was not considered further.

Access options were also considered that involved right hand turns across the Hume Highway. These were rejected early on given the right hand turn requirement and the significant cost implications of constructing an intersection, as well as the associated traffic flow and safety issues on the highway.

During the site access investigations it was decided that no new access points would be created from the Hume Highway. Road access to the surface infrastructure area, as presented in this EIS, will therefore be from Mereworth Road.

7.1.7 Workforce sourcing and accommodation

A number of aspects were looked at in the project planning phase in relation to the construction and operational workforce, including construction worker accommodation and sourcing of the operational workers.

Both the use of existing local accommodation or building a temporary accommodation village for construction workers were considered. A peak workforce of approximately 400 full-time equivalent employees will be required during the construction phase. Given the highly specialised skills that will be required, it is expected that the majority will be sourced from outside the local area, and therefore these workers will relocate to the area during construction. This meant there was potential for the project to be competing with the local tourism industry for beds during peak periods. It was therefore decided to house workers in temporary accommodation within the project area. This arrangement will mean that the presence of non-local construction workers will not place excessive pressure on local short-term accommodation supply which would disrupt the tourism industry. In addition, the village will eliminate project-related effects on the general availability of rental accommodation. The availability of a construction accommodation village will also help Hume Coal to attract skilled construction workers and minimise any risks to the project's development schedule from a skills shortage.

In relation to the operational workforce, for work health and safety reasons, Hume Coal will require all workers to live within 45 minutes travel time from the project area. This policy will minimise the risk of fatigue related travel accidents, given that some production employees will be working afternoon and night shifts. Given the utmost importance placed on safety, no other options were considered in this regard.

7.2 Management

To manage the potential risks identified in Section 5, the following management practices will be implemented. Monitoring programs (Section 7.3) will be used to determine the effectiveness of management, and will serve to trigger any additional mitigation (Section 7.4).

7.2.1 Groundwater

The groundwater modelling has determined the potential drawdown on individual boreholes over the life of the project. Further assessment at individual bores will be required to determine what "make good" provisions might be required. Hume Coal will be required to provide 'make good' provisions for landholders that incur impact above the AIP minimal impact threshold (refer to Section 5.2.1).

7.2.2 Surface water

The water management system will minimise the risk of contaminants from the site mixing with downstream water supplies. The following principles will be adopted:

- water runoff from undisturbed catchments being diverted around or away from the infrastructure and into natural watercourses via clean water diversion drains;
- water runoff from the disturbed area within the mine surface infrastructure footprint being directed to the water management system for storage and use in mine operations; and
- clean water runoff (ie runoff has not come into contact with coal) being discharged to Oldbury Creek if it meets the adopted first flush and water quality criteria. If it does not exceed the adopted first flush criteria it will be transferred to the primary water dam.

7.2.3 Geochemistry

i Coal and coal reject

Coal and potential coal reject materials will be amended with limestone to eliminate the risk of acid generation and acid mine drainage (AMD).

ii Coal reject disposal

The majority of the coal reject materials will have been returned to the underground workings during the operational phase. However, the temporary coal reject stockpile will remain on the surface and will need to be relocated to the underground workings during decommissioning.

To create a safe and efficient placement of reject underground during operations, a coal reject management plan will be developed that will be based on a risk management strategy.

During operations, the coal product stockpiles will have been subject to standard water management and monitoring practices which would have identified if any elevated acidity or metals were present in runoff water. The addition of alkaline materials (eg agricultural limestone) would have been added to the temporary coal reject stockpile as required to maintain pH levels in the neutral pH range, to avoid any potential environmental impacts due to the surface runoff and/or seepage from these materials.

After the coal rejects from the temporary stockpile have been removed, the soil pad under the stockpiles should be soil tested for pH and metals, and if any contamination is found the material should be removed and buried in the underground workings, or excavated and disposed at a licensed facility if there is only a small quantity.

iii Underground workings

Testing by RGS (2016) clearly demonstrates the value of amending the reject material with limestone prior to emplacement in the subsurface, to provide the alkalinity required for acid buffering and preventing increased metals solubility. This approach will be adopted during mining activities as a conservative safeguard for the quality of the local groundwater resource.

iv Drift spoil

Based on the benign nature of the drift spoil materials, no special management measures are required for their handling and storage at the project.

7.2.4 Subsidence

The Subsidence Management Plan will outline the systematic monitoring required to maintain compliance to that plan. The primary subsidence management consideration is to conform to the proposed mine design which will involve continual survey verification of the underground mine workings.

7.2.5 Topsoil

i Loss of soil resource

To mitigate the risks of insufficient soil being available, soil requirements will be accurately determined before construction works commence. An inventory of stripped and stockpiled soil will be prepared, and any additional soil requirements identified. Hume Coal will preferentially strip topsoil however subsoil will be stripped and used for rehabilitation if a short fall in the available inventory is identified.

Top soil and subsoil will be stripped and stockpiled. The soil stripping procedure has been designed to maximise the salvage of suitable materials so pastures can be reinstated to a condition that will support appropriate livestock carrying densities. These measures will be consistent with leading practice and incorporate the full range of reasonable and feasible mitigation methods for soil stripping, with the goal of minimising the degradation of soil nutrients and micro-organisms.

Topsoil and subsoil will be stockpiled, with stockpiles designed and located to prevent contamination, development of anaerobic conditions, and to avoid erosion and dust generation. The stockpiles will be seeded with grasses so that they remain stable and be regularly inspected for weeds.

These requirements are further addressed in the proposed rehabilitation management strategy (EMM 2017i).

ii Soil quality reduced

To minimise structural decline of soil, the amount of compaction of soils during stripping and stockpiling will be minimised. This can be achieved by using suitable machinery and stockpile development techniques. Nutrient decline will occur during stockpiling of soils, but can be minimised by managing stockpile methods and heights. Any nutrient decline can be amended at the time of rehabilitation by utilising fertilisers and amendment techniques (eg gypsum application). The recommendations made in the topsoil stripping procedure and the stockpiling procedure (EMM 2017i) addresses all of these risks to soil degradation.

Areas used for stockpiling of overburden and coal product will be compacted to minimise potential for water infiltration. If any contamination does occur, the soil material will be removed and disposed of appropriately. All surface water runoff from these stockpiles will be directed to the mine runoff dams. If the coal rejects are found to be potentially acid forming, the risk can be managed by adding fine limestone to the coal reject stockpile.

7.2.6 Erosion and sedimentation

The Kandosolic Redoxic Hydrosol soils are sodic and will be highly erosive, and are therefore not recommended to be used in rehabilitation. These soils are restricted to the drainage channels, and are likely to be boggy and waterlogged. The Dystrophic Yellow Kandosol soils are slightly sodic and have the potential to be subject to erosion, particularly on a slope. Therefore soil erosion management will be implemented during construction activities. Drainage structures have been designed for the infrastructure areas to manage water runoff for the life of the operations. Sediment control measures will also be used during construction in accordance with the guideline *Managing Urban Stormwater, Volume 2E Mines and Quarries* (DECCD 2008).

To minimise the risk of loss from wind and water erosion to stockpiled topsoil, a vegetative cover will be established. Stockpiles will also be located where they are not exposed to overland or flood flow.

Soil may erode after the topsoil has been spread on the rehabilitated areas. Soil erosion and sediment control will be considered where there could potentially be off-site impacts to waterways, as well as impacts to the rehabilitation itself.

7.2.7 Dust

The dust management plan which will be implemented during operations will include rehabilitation activities. Management methods during operations include the use of water sprays and a wet process for coal handling, fully enclosed conveyor transfer points for the managing of product coal and coal rejects, water or surface veneering of product stockpiles, and covered rail wagons.

7.2.8 Pests and weeds

The spread of declared noxious weeds (and other invasive weeds that could impact revegetation success and/or plants that are undesirable to grazing stock) will be managed across the project area through a series of control measures, including:

- herbicide spraying or scalping weeds ;
- post-mining use of rehabilitated areas as a working farm, with associated management practices; and
- rehabilitation inspections to identify potential weed infestations.

7.2.9 Hydrocarbons, chemicals and wastes

To manage any potential contamination sources, waste management practices in accordance with the site Environmental Management System will continue to be implemented during rehabilitation. For example:

- hydrocarbons at the project will be stored in bunded areas designed in accordance with the relevant Australian Standards;
- waste products that are removed from the project will be appropriately disposed of at licensed facilities; and
- sewage generated post-decommissioning will be minimal (ie after the on-site sewerage treatment facility is removed). Any such waste (eg portable toilets) will be transported off site for appropriate disposal at a licensed facility by a licensed waste contractor.

7.2.10 Bushfire

To prevent or manage bushfire risks, a bushfire management plan will be implemented. A hot works permit system will be used during construction, operations and rehabilitation works. The targeted coal seams are low risk for spontaneous combustion, and the targeted Wongawilli seam has had no recorded combustion events when mined elsewhere in the basin (Beamish 2014). It is not expected that spontaneous combustion will be a risk in the closure phase of the operation.

7.2.11 Stakeholders

It is proposed to develop and implement a social impact management plan (SIMP) for the project. SIMPs detail strategies to use during the construction, operation, and closure and rehabilitation phases of the project to monitor, report, evaluate, review and proactively respond to social change.

7.3 Monitoring

Monitoring programs to assess predicted versus actual impacts from the project on aspects that have the potential impact on agriculture are summarised below. The results of the monitoring will inform the trigger response plans (Section 7.4).

7.3.1 Groundwater

A comprehensive groundwater monitoring program is in place and will be continued for the duration of the project, and in the post-closure phase. Monitoring will include routine measurement of groundwater depths, quality and other parameters required for a comprehensive analysis of the groundwater system.

Further details are presented in Chapter 13, Section 4 of Appendix E of the EIS.

7.3.2 Surface water

A surface water monitoring program is already established, and will continue to be carried out at designated locations and for the parameters established in the water assessment and any licence requirements.

Monitoring surface water will confirm that key water quality parameters remain within appropriate criteria. This may include:

- pH, Electrical Conductivity, total dissolved solids (TDS), acidity and alkalinity;
- major anions (sulphate, chloride) and major cations (calcium, magnesium, sodium and potassium), initially on a quarterly basis (for 12 months), and then on an annual basis throughout the life of mine; and
- analysis of soluble metals (aluminium, arsenic, antimony, arsenic, boron, cadmium, chromium, cobalt, copper, fluoride, iron, lead, manganese, molybdenum, nickel, selenium and zinc).

Further details are presented in Chapter 13, Section 4 of Appendix E of the EIS.

7.3.3 Geochemistry

Water quality samples will be regularly tested from the water quality monitoring sites shown on Figure 5.2 of the EIS:

- pH, Electrical Conductivity, total dissolved solids (TDS), acidity and alkalinity;
- major anions (sulphate, chloride) and major cations (calcium, magnesium, sodium and potassium), initially on a quarterly basis (for 12 months), and then on an annual basis throughout the life of mine; and
- analysis of soluble metals (aluminium, arsenic, antimony, arsenic, boron, cadmium, chromium, cobalt, copper, fluoride, iron, lead, manganese, molybdenum, nickel, selenium and zinc).

7.3.4 Subsidence

The Subsidence Management Plan will outline the proposed subsidence monitoring program. The primary subsidence management consideration is to continually undertake survey verification that the underground mine workings are as per the design.

Surface monitoring will be established using survey points which are founded on solid rock. If any surface features are identified that are particularly sensitive to subsidence, they will be added into the surface monitoring program.

Further details are presented in Section 8 of the *Subsidence Assessment* in Appendix L of the EIS.

7.3.5 Topsoil stockpile

The topsoil stockpile locations will be accurately surveyed and data recorded about the soil types and volumes present.

The stockpiles will be monitored for the establishment of noxious weeds and control programs will be implemented as required.

7.3.6 Erosion and sedimentation

Surface water monitoring will include sediment loads. Inspections of sediment control dams will identify if the system is working as designed, and remediation will be implemented if it is not.

7.3.7 Noise and dust

A network of air quality and meteorological monitoring equipment is already in place at the project area, and includes real-time measurements of meteorological conditions and particulate matter concentrations (PM_{10} and $PM_{2.5}$). This equipment will form the basis for air quality monitoring to be conducted during the life of the project and including within an Air Quality Management Plan.

Monitoring of the ventilation shaft emissions will also be undertaken by a suitably qualified stack testing company once the mine is at full operation to verify the assumptions within this modelling assessment.

7.3.8 Pests and weeds

Surface infrastructure areas, topsoil stockpiles, water dam walls and surrounds, and Hume owned properties will be periodically monitored for the presence of pests and weeds. Control programs for noxious weeds will be implemented as required. Weed monitoring will also be undertaken after the site has been rehabilitated.

7.3.9 Stakeholders

As outlined in Section 8, stakeholder and community consultation will be carried out through all stages of the project, including prior to closure. A SIMP will be implemented.

7.3.10 Traffic

The *Traffic Management Plan* will be developed that will include a comprehensive monitoring regime for the duration of the project. Monitoring will include annual traffic volume surveys and daily recording of the amount of coal transported from the project including times and dates of train movements.

Further details are presented in Chapter 13, Section 4 of the *Traffic and Transport Assessment* in Appendix M of the EIS.

7.3.11 Rehabilitation

Rehabilitation objectives are given in Section 7.6.2. Rehabilitation will be monitored against the completion criteria. After completion of all planned rehabilitation works and activities the following key aspects will be monitored:

- evidence of any erosion or sedimentation;
- success of initial establishment of vegetation;
- the extent of weed infestation (primarily noxious weeds, but also other weeds that may be inhibiting pasture restoration);
- the integrity of graded banks, diversion drains, waterways and sediment control structures;
- the general stability of the rehabilitation areas; and
- all water quality and availability criteria specified in approval conditions.

If rehabilitation is not progressing satisfactorily, so as to achieve the final completion criteria, further measures will be adopted, such as re-seeding and/or application of fertilizers. Depending on progress after the initial monitoring, further monitoring may become less frequent and limited to a smaller range of criteria, but this will only occur in a way that would enable continued compliance with approval conditions.

7.4 Trigger response plans

The only risk that was assessed to have a potentially high risk (with no controls) to agriculture in the region was associated with groundwater. The potential risk to agriculture was identified as the potential loss of groundwater for agricultural users, resulting from groundwater drawdown associated with dewatering activities.. A comprehensive mitigation program has been designed to offset the potential impacts on groundwater users by ensuring that any losses are “made good”, which is also a requirement of the AIP. The AIP outlines the required triggers and remediation. As “make good” provisions are required to be enacted for bores that experience 2 m or more drawdown as a result of the project, this risk is reduced substantially.

Further details are presented in Chapter 13 of Appendix E of the EIS. The thresholds are presented in Section 13.3.1.

Management of medium and low risks is referenced in Section 7.2. An overview of the triggers and appropriate responses for these risks are provided in Table 7.3. These triggers will be confirmed in the management plans for the respective environmental aspects to be prepared in consultation with the relevant government agencies, subject to the project’s positive determination.

Table 7.2 Trigger response for medium and low risk impacts

Monitoring program	Trigger	Trigger Response
Surface water	Monitoring of runoff identifies elevated levels of potential contaminants	Incident investigation process implemented; additional control methods implemented if required
Geochemistry	Monitoring of runoff identifies elevated levels of potential contaminants	Incident investigation process implemented; additional control methods implemented if required
	Coal rejects identified as PAF	Coal rejects will be treated by the addition of alkaline material (such as agricultural limestone) and placed as backfill in the underground mine workings
	Water in underground workings is acidic or has increased metal concentrations above trigger concentrations	An investigation initiated to determine if there is a need for additional alkaline treatment of water in the underground workings
Subsidence	Monitoring of ground levels identifies an area of subsidence exceeds predictions	Regular monitoring and survey verification of the coal pillars, implement relevant measures in subsidence management plan
Topsoil	Insufficient topsoil identified	Topsoil will be spread at a shallower thickness and/or only on selected parts of the site. Subsoil will be used as a topsoil substitute rather than returned as subsoil under the topsoil
	Topsoil material is degraded	Fertilisers and other soil additives will be added to the topsoil and subsoil to improve fertility and structure
Erosion and sediment control	Monitoring of runoff identifies elevated levels of sediment	Incident investigation process implemented; additional control methods implemented if required
Noise and air quality	Dust monitoring exceeds licence limits	Incident investigation process implemented; additional control methods implemented if required
	Dust complaint from a stakeholder	Incident investigation process implemented; additional control methods implemented if required
Pest and weed management	Noxious weed infestation found in or around the project area	Control program implemented
	Large infestation of weeds found on topsoil piles or rehabilitation area	Control program implemented
Hydrocarbon, chemical and waste management	Spillage of hydrocarbon, chemical or other contaminant	Clean-up implemented
	Contamination assessment at closure identifies an area of contaminated soil	Clean-up implemented
	Waste materials left on site	Clean-up implemented
Stakeholders	Stakeholders express dissatisfaction about an aspect of the project	Stakeholder engagement process implemented

7.5 Degree of uncertainty and basis of assumptions

The reasons for choosing the course of each remedial action, monitoring regime, or management action have been based on the detailed assessments carried out by each of the expert technical reports that form the basis of the Hume Coal Project EIS (EMM 2017a). The assumptions made and the levels of uncertainty are outlined in each of the technical assessments.

7.6 Demonstrated capacity to achieve final land use

7.6.1 Rehabilitation goals

The overriding goal for the rehabilitation strategy (*Rehabilitation and Closure Strategy* – EMM 2017i) is to return disturbed land to a condition that is stable, and supports the proposed post-mining land use which is predominantly grazing with improved pasture. The surface disturbance area is existing Hume Coal affiliated farmland, and it is proposed that the rehabilitated land will be incorporated back into the operating farm. Specifically, the rehabilitation goals are:

- restoration of a safe and stable landform;
- reinstatement of soil profile and function and creation of landforms that are compatible with surrounding topography; and
- re-shaped landform permitting land uses of grazing with improved pasture.

7.6.2 Rehabilitation objectives

Rehabilitation objectives have been further defined.

- All infrastructure that is not to be used as part of the future intended land use, is removed so that the site is safe, free from hazardous materials, and will not pose a threat of environmental harm.
- There is no residual contamination of soil or water on site that is incompatible with the intended land use or that poses a threat of environmental harm.
- Underground workings are sealed and present no safety risks for humans and animals now and in the long-term.
- The rehabilitated land is suitable for the planned land use and is compatible with the surrounding landscape.
- The rehabilitated land is stable, and does not present a risk of environmental harm downstream of the site or a safety risk to the public/ stock/ native fauna.
- Returned soil on the rehabilitated land is able to support the planned land use.
- Vegetation establishment is adequate and able to support the desired land use. The rehabilitated land is sustainable for the long term and only requires maintenance that is consistent with the final land use.
- Runoff water quality is similar to, or better than, the pre-disturbance runoff water quality.
- Ground level and surface stability is not impacted by the presence of the underground workings.

7.6.3 Rehabilitation completion criteria

Rehabilitation criteria will be used as the basis for assessing when rehabilitation of the project is complete. The interim completion criteria which have been developed and presented in the *Rehabilitation and Closure Strategy* (EMM 2017i) are given in Table 7.3. The interim completion criteria will be updated during the preparation of a detailed rehabilitation plan, in consultation with relevant stakeholders.

Table 7.3 Interim completion criteria at each phase of decommissioning and rehabilitation

Objective	Primary Domain	Completion criteria	Indicator
Phase 1 – Decommissioning (ie removal of equipment and infrastructure)			
All infrastructure that is not to be used as part of the future intended land use will be removed so that the site is safe, free from hazardous materials, and will not pose a threat of environmental harm.	Infrastructure	Removal of all above ground services (power, water, communications) that have been connected on site as part of the project and that will have no future use. Decommissioning and removal of all plant, equipment and associated surface infrastructure. All access roads and tracks not required for the future intended land are removed and rehabilitated.	Certification by a suitably qualified person
	Water management area	Removal of all water management infrastructure (including pumps, pipes and power).	Certification by a suitably qualified person
	Underground management area	All exploration drill holes undertaken on the mining lease have been rehabilitated or converted to water bores.	Certification by a suitably qualified person
There is no residual contamination of soil or water on site that is incompatible with the intended land use or that poses a threat of environmental harm.	Infrastructure	No stockpiled materials of coal product or coal reject to remain on the surface of the project area. Any hazardous material or potential sources of contamination have been isolated, remediated or removed.	Certification by a suitably qualified person
Underground workings are sealed and present no safety risks for humans and animals now and in the long-term.	Underground management area	Sealing and backfilling of drifts and vent shafts in accordance with approved design and relevant guidelines.	Certification by a suitably qualified person
	Infrastructure	Where risk mitigation measures include bunds, safety fences and warning signs, these have been erected in accordance with relevant guidelines and Australian Standards.	Certification by a suitably qualified person
Phase 2 – Landform Establishment (ie earthworks)			
The rehabilitated land is suitable for the planned land use and is compatible with surrounding landscape.	Infrastructure, Water management area, Stockpiles	Rehabilitated land is contoured in similar form to the existing and/or surrounding topography.	Rehabilitated land surveyed for extent, height and slope

Table 7.3 Interim completion criteria at each phase of decommissioning and rehabilitation

Objective	Primary Domain	Completion criteria	Indicator
The rehabilitated land is stable and does not present a risk of environmental harm downstream of the site or a safety risk to the public/ stock/ native fauna.	Infrastructure, Water management area, Stockpiles	If engineered structures to control water flow are required (eg contour banks, channel linings, surface armour, engineered drop structures and other required measures), they are installed and functioning.	Certification by a suitably qualified person
		Rehabilitated land does not exhibit any signs of continued erosion greater than that exhibited at a comparable reference site (with similar chemical and physical characteristics including slope to the rehabilitated site).	Certification by a suitably qualified person
		Dimensions and frequency of occurrence of erosion of rills and gullies are no greater than that in comparable reference site(s).	Rate of soil loss; certification by a suitably qualified person
Phase 3 – Growth Medium Development (ie topsoil spreading)			
Returned soil on the rehabilitated land is able to support the planned land use.	Infrastructure, Water management area, Stockpiles	Soil thickness is adequate to support growth of pasture species suitable for desired land-use.	Soil depths
		Site soil characteristics (eg pH, salinity, nutrient content , sodium content, rockiness, depth of soil, wetness and plant available water capacity) are able to support growth of pasture species suitable for desired land-use.	Soil testing of relevant soil physical properties
Phase 4 – Ecosystem and Land Use Establishment (ie vegetation establishment)			
Vegetation establishment is adequate and able to support the desired land use.	Infrastructure, Water management area, Stockpiles	Vegetation growth parameters are no less than that exhibited at a comparable reference site.	Biomass, percent cover, height and vigour of plant species
		The abundance of declared plants (weeds) identified in rehabilitated areas in no greater than comparable reference sites.	Percentage weed cover
Phase 5 – Ecosystem and Land Use Sustainability (ie established vegetation is able to support post-mining land use)			
The rehabilitated land is stable and does not present a risk of environmental harm downstream of the site or a safety risk to the public/ stock/ native fauna	Infrastructure, Water management area, Stockpiles	Rehabilitated land does not exhibit signs of continued erosion greater than that exhibited at a comparable reference site (with similar chemical and physical characteristics including slope to the rehabilitated site).	Rate of soil loss; certification by a suitably qualified person
		Dimensions and frequency of occurrence of erosion of rills and gullies are no greater than that in comparable reference site(s).	Certification by a suitably qualified person

Table 7.3 Interim completion criteria at each phase of decommissioning and rehabilitation

Objective	Primary Domain	Completion criteria	Indicator
Phase 6 – Land Relinquishment			
The rehabilitated land is sustainable for the long-term and only requires maintenance that is consistent with the final land use.	Infrastructure, Water management area, stockpiles	The re-established topsoil/subsoil is capable of supporting the targeted pasture regime on a sustained basis.	Physical and chemical soil properties.
		Pasture establishment is consistent with the range of species suitable for the targeted pasture regime.	Pasture species present
		Pasture establishment is in good health and provides adequate cover.	Ground cover, biomass, etc
Runoff water quality is similar to, or better than, the pre-disturbance runoff water quality.	Infrastructure, Water management area, stockpiles	Downstream surface water quality at monitoring locations is not negatively impacted when trends indicated by results from baseline monitoring and the five years previous to closure are compared to monitoring results for the rehabilitated landform.	Surface water quality
Ground level and surface stability not impacted by the presence of the underground workings.	Underground management area	Mine survey plans are developed by a registered mine surveyor as mining progresses and provided to DRE annually and following completion of mining.	Mining has been undertaken generally in accordance with designs and tolerances that provide for long-term geotechnical stability.

7.6.4 Methods to achieve successful rehabilitation

Topsoil and subsoil will be stripped and stockpiled during construction. The soil stripping procedure has been designed to maximise the salvage of suitable materials so pastures can be reinstated to a condition that will support appropriate livestock carrying densities. These measures will be consistent with leading practice and incorporate the full range of reasonable and feasible mitigation methods for soil stripping, with the goal of minimising the degradation of soil nutrients and micro-organisms.

Topsoil and subsoil will be stockpiled, with stockpiles designed and located to prevent contamination, development of anaerobic conditions, and to avoid erosion and dust generation. The stockpiles will be seeded with grasses so that they remain stable and be regularly inspected for weeds.

Disturbed land will be re-profiled once surface structures are removed by re-instating depressions which were filled for mine development, removing dams and bunds so that water is not permanently retained and undertaking deep ripping of compacted areas.

Soil will be applied at an approximate depth of 0.3m, to provide sufficient depth for plant growth, in a manner which minimises any degradation of soil characteristics. The soil will then be lightly scarified on the contour and seeded with pasture grasses.

Pasture grass species will be chosen to suit the chosen grazing strategy, as well as species that are suitable for fast establishment of an initial cover crop.

Access controls will be implemented to protect public safety. They will include fencing around any potentially dangerous areas and notices alerting the public to any safety risks.

7.6.5 Examples of successful rehabilitation

Research on grazing of rehabilitated land generally suggests that the sustainability of rehabilitated land is particularly sensitive to stocking rates, so it is necessary to manage the land so it is not overgrazed. For example:

- In the Appalachian region of Kentucky USA, more than 400,000 ha of surface mines had been reclaimed as hay and pastureland, and a study carried out in 1997 on these rangelands showed that grazing could be sustainable if stocking rates were of a low density, but not at a high density (Teutsch, Collins and Ditsch, 2008).

- In Australia, many of the rehabilitated pastures have not actually been used for grazing. Grigg, Shelton and Mullen (2000) indicated that possibly half of an estimated 12,500 ha of rehabilitation in Queensland (Qld) had been sown with pasture grasses, but cattle had not been formally returned. At that time, there had been no requirement to demonstrate that the rehabilitated pastures could actually support grazing. Grigg et al (2000) concluded that the Qld rehabilitated mined lands with pasture were relatively sensitive, due to land being too steep and with spoils which were highly erodible and consequently overgrazing needed to be avoided.

- In 2012, Maczkowiack et al. developed a profile of risk factors likely to influence land management of grazing on rehabilitated mined land. In the Bowen Basin region of Qld, it was concluded that mining of post-mining land was likely to be low risk where the land productivity is high enough to support commercial cattle grazing and where land was managed by local graziers who were mindful of appropriate stocking rates.

There are several trials currently being carried out on Australian mine sites which compare production between mined and unmined pastures. Initial results only are reported at this stage:

- A four-year project is currently being carried out in the Upper Hunter which is looking at the sustainability and profitability of livestock grazing on rehabilitated mined land. The NSW Department of Primary Industries is managing the project, which is being carried out at Coal & Allied's Hunter Valley Operations and BHP Billiton's Mt Arthur Coal mine site. The NSW Minerals Council (NSWMC, 2015) reports that in the trials second year the cattle at rehabilitated sites have been gaining significantly more weight (0.4 kg/day) than on unmined control pastures. There is a greater herbage mass available for grazing on the rehabilitated sites. Soil quality at the rehabilitated sites is deficient in sulphur and phosphorous compared to the control sites.

- A grazing trial on rehabilitated land at a coal mine west of Toowoomba (New Hope Acland Pastoral Company) has also shown initial promising results with cattle grazing on rehabilitated pastures gaining 0.7 kg/day more than the unmined control site (Beef Central 2015). The rehabilitated land had been spread with 30cm of stockpiled soil over the deep ripped and profiled mine spoil before being sown with pasture species. Comparisons of rooting depth with the unmined land were comparable, and so were the soil chemical properties. The spoil did not have any soil chemical properties that would inhibit pasture growth (ie not sodic or saline).

- A trial carried out at Glencore's Liddell Open Cut Mine in the Hunter Valley carried out a 20 month trial that compared Charbray steers grazing on rehabilitated and un-mined land (Maitland Mercury, 2014). The steers grazing on the rehabilitated pastures were on average heavier and therefore returned an extra $220/head. The rehabilitated pastures were made up of Rhodes grass, legumes, kikuyu and fertiliser. The unmined land had native grasses. Blood tests were also taken to test whether the cattle on rehabilitated land were healthy.

The research referred to is not an exhaustive literature review, but it does indicate that grazing of rehabilitated mined land can be successful when: grazing is a sustainable land use in the region (ie soil and climate able to support good pasture growth), and the gradient of the site is not too steep (to manage potential soil erosion), the stocking rates are managed to prevent over-grazing, and suitable pasture species are sown. The project has a suitable climate and soils for grazing, the site will be re-profiled to the gradient of the land before mining (gentle rolling hills), and will be sown with suitable pasture species. Therefore, as long as stocking rates are sustainable, it is considered that the rehabilitation program will be successful at returning the land to agricultural production.

7.6.6 Planning for progressive rehabilitation

Rehabilitation of areas containing early and temporary works or facilities will occur progressively. In particular, once the construction accommodation village is vacated and pipeline and powerlines relocated, the affected areas will be rehabilitated.

There is limited opportunity for any other progressive rehabilitation as almost the entire surface infrastructure will remain for the duration of the project.

The rehabilitation phase at the end of mine life will be approximately two years duration.

8 Consultation

The AIS guidelines require information on the stakeholder engagement strategy implemented for the project. An overview is provided in this chapter.

8.1 Overview of stakeholder engagement process

Hume Coal has been actively engaging with stakeholders since 2011, when its exploration program began. Hume Coal has wanted inform stakeholders about the project and has sought to build relationships and seek feedback in order to address stakeholders' views in the project's planning, design and environmental assessment.

Project stakeholders have been systematically identified and a comprehensive stakeholder list compiled for targeted engagement. Broad stakeholder groups identified include Commonwealth and State government agencies, ministers and local members; WSC; landholders within the project area; local community members and businesses; those who travel to the Southern Highlands for work; industry representative groups; special interest groups; Aboriginal groups; utility, port and service providers; existing and potential future employees and apprentices; and the media.

A comprehensive stakeholder engagement program took place over five years and invited virtually all interested parties to have their say about the project. The concerns and issues raised have been taken into account in the project's design so that it either avoids the concern, provides mitigation or exploits the opportunity.

Community consultation has been, and will continue to be, key to mine planning and understanding the project's potential impacts on the local community. Stakeholders will also be engaged in the closure process and involved with closure plan development which will be prepared and refined as the project progresses towards completion.

The following information is a summary of the stakeholder consultation that has been carried out to date, and has been reproduced from the *Social Impact Assessment* (EMM 2017h).

8.2 Consultation undertaken

A range of consultation tools have been employed by Hume Coal to continually inform stakeholders about the project. These are outlined in Table 8.1.

Table 8.1 Consultation tools

Item	Summary
Project website: www.humecoal.com.au	Hume Coal has a dedicated project website which provides up to date information about the project, environmental matters and local engagement initiatives. Project fact sheets, bulletins and newsletters are available on the website, as well as links and contact details for people to provide feedback or request further information.
Community shop front Shop 7, 256 Argyle Street Moss Vale 02 4868 1233	Community members are able to speak directly with Hume Coal's community liaison team by phone or face-to-face at the shop front in Moss Vale, where an information display and fact sheets are also available.

Table 8.1 Consultation tools

Item	Summary
Hume Coal head office Unit 7-8 Clarence House Clarence Street Moss Vale 02 4869 8200	Community members are able to speak directly with Hume Coal's project team or technical staff by phone or face-to-face at the head office in Moss Vale.
Project email address	Hume Coal has three dedicated email addresses to liaise with stakeholders on a range of matters. This includes a general project email address (info@humecoal.com.au), an email address for media enquiries (media@humecoal.com.au) and an email address for Hume's charitable foundation (charitablefoundation@humecoal.com.au).
Information sessions	Hume Coal held a number of community information sessions during the project planning phase to provide information about the project and its environmental studies to members of the community. These were held across the Wingecarribee LGA between 2012 and 2016.
Briefing and representation	Hume Coal has provided a number of project briefings to interested stakeholder groups within Wingecarribee LGA, including local businesses and industry groups. Hume is also a member of many of these groups and has attended executive meetings as members.
Communication materials	Hume Coal has issued formal letters to landholders and community members as required. These letters generally provide project updates including environmental monitoring results. Bulletins and fact sheets are also distributed locally and are available in the community shop front and on Hume Coal's website. Community updates are also published in local newspapers and emailed to those registered on Hume Coal's mailing list.
Media communications	Project information is communicated through media releases, local newspaper publications and radio segments.
Surveys and focus groups	Telephone surveys and facilitated focus groups are undertaken to gauge public opinion and understand peoples' views on the project.
Advisory groups	Hume Coal established two advisory groups, the social reference group (SRG) and water advisory group (WAG). These groups generally hold quarterly meetings and include representatives from the local community.

8.3 Issues identified

Table 8.2 provides a summary of matters related to agriculture raised by community and specialist interest groups during the consultation programme to date.

Table 8.2 Community and special interest groups — matters raised relating to agriculture

Theme	Matters raised
Groundwater	Impacts on groundwater including drawdown depth and contamination
	Impacts on private bores
	Groundwater recovery time
	Impacts of groundwater drawdown on agriculture
	Groundwater monitoring and management
	Water for future generations

Table 8.2 Community and special interest groups — matters raised relating to agriculture

Theme	Matters raised
Surface water	Impacts to Medway Dam
	Will Wingecarribee Shire water supplies be used?
Agriculture	Loss of productive agricultural land
	Possibility of land being BSAL
	Location of soil sampling points
Air quality	Dust impacts on surrounding land uses
	Dust mitigation and management measures
Visual	Impacts on visual amenity
Subsidence	Impacts on houses
	Impacts of a panel failure
	Impacts on water supplies
Transport	Vehicle access to the mine
	Congestion impacts on local road network
Social	Benefits to landholders in the project area
	Source of workers
	Residential location of workers
Economy	Opportunities for local businesses and suppliers
	Impacts on tourism industry
	Impacts on local land and property prices

9 Conclusion

The AIS was prepared in accordance with the SEARs related to agriculture, assessment recommendations from the DRE and with reference to outcomes of stakeholder engagement. It addressed all requirements of the NSW DPE (2015) AIS guideline.

The extensive technical investigations that took place over several years, development and refinement of the project, has resulted in leading practices in mine design, in regards to underground mining method and layout that results in negligible subsidence, and limited potential impacts on agricultural resources. All mitigated risks on agricultural resources were assessed as low.

The potential disturbance of agricultural land from the project is limited to the temporary disturbance of the surface infrastructure area, which will occur wholly on Hume Coal affiliated land. This land will be returned to its pre-mining land use; that is, an agricultural land use comprising grazing on improved pasture.

The highest identified unmitigated risk to agriculture was identified as the potential loss of groundwater for agricultural users, resulting from groundwater drawdown associated with dewatering activities. Hume Coal is committed to implementing the necessary 'make good' arrangements in accordance with the AIP to effectively manage the potential for adverse impacts on agricultural resources from bore drawdown. Therefore, the residual level of risk was assessed as low.

There will be minor temporary foregone agricultural production values during construction and operation of the project.

A comprehensive mitigation program will be implemented to manage potential impacts on agricultural resources. This will include monitoring and, where appropriate, establishment of triggers and appropriate responses. In addition, rehabilitation criteria will be used as the basis for assessing when rehabilitation of the project is complete. The interim completion criteria have been developed and presented in the Rehabilitation and Closure Strategy.

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