



Planning &
Environment

**STATE SIGNIFICANT
DEVELOPMENT ASSESSMENT
Bylong Coal Project
(SSD-6367)**



Assessment Report
Section 89E of the
Environmental Planning and Assessment Act 1979

March 2017

Cover Photo – Bylong Valley.

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EXECUTIVE SUMMARY

KEPCO Bylong Australia Pty Ltd (KEPCO) is proposing to develop the Bylong Coal Project (the project), a new open cut and underground coal mine approximately 55 kilometres (km) northeast of Mudgee in the Mid-Western Regional local government area.

The project comprises:

- two open cut mining areas and associated out of pit emplacement areas;
- underground mining using longwall mining methods;
- constructing and operating a range of infrastructure to support the mine including a Coal Handling and Preparation Plant, a workforce accommodation facility, and a water supply borefield;
- transporting coal to the Port of Newcastle for export via a new rail spur and loading facility;
- realigning and upgrading local road infrastructure; and
- progressively rehabilitating the site.

The mine is proposed to operate over a 25 year period, with an initial 2 year construction period, an open cut mining stage of 8 years and underground mining for 19 years (including concurrent operations for a 4 year period). The project would extract 125 million tonnes of run of mine (ROM) coal at a maximum extraction rate of 6.5 million tonnes a year.

The project has a capital investment value of over \$1.5 billion, and would generate around \$793 million (\$290 million present value) in royalties for the NSW Government.

The project is declared to be State Significant Development (SSD), and the Minister for Planning is the consent authority for the development under the *Environmental Planning and Assessment Act 1979* (EP&A Act). However, the development application falls within the Minister's delegation to the NSW Planning Assessment Commission (Commission) dated 14 September 2011, because there were more than 25 public submissions that objected to the application and as a consequence, it must be determined by the Commission.

On 9 January 2017, the Minister for Planning asked the Commission to review the project in the light of the issues raised in submissions and hold public hearings during the review. In its terms of reference, the Minister has asked the Commission to:

- consider the Environmental Impact Statement (EIS) for the project, all issues raised in public and agency submissions, and any other information provided on the project during the course of the review;
- assess the merits of the project as a whole having regard to all relevant NSW Government policies, paying particular attention to:
 - the impacts on the water and agricultural resources of the Bylong Valley;
 - the social impacts on the Bylong village and surrounds;
 - impacts on heritage values associated with the Tarwyn Park property, including natural sequence farming;
 - the justification for the open cut stage of the project; and if necessary,
- recommend appropriate measures to avoid, minimise, and/or manage significant impacts of the project.

Once the Department receives the Commission's review report, it will finalise its assessment of the merits of the project having regard to any recommendations of the Commission, and refer the application back to the Commission for determination.

KEPCO also needs to obtain an approval from the Commonwealth Minister for the Environment and Energy under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to potential impacts on threatened species and water resources. The assessment process under the EP&A Act has been accredited under a bilateral agreement with the Commonwealth Government. Under this agreement, the assessment of both State and Commonwealth matters has been integrated into a single assessment process.

Consultation

The Department publicly exhibited the EIS for the project from 23 September until 6 November 2015. The Department received 364 submissions, including 14 from public authorities, 35 from special interest groups and organisations, and 315 from individuals.

Of the 350 submissions from special interest groups and the general public, 336 objected, 12 supported, and 2 submissions made comments on the project.

Of the 315 submissions from individuals, 14 were from residents within the Bylong Valley area, 66 were from residents residing in the region (within around 60 km of the project), and 235 were from other locations.

Of the 14 submissions from local residents, 2 supported the project and the remaining 12 objected.

The majority of submissions objected to the project with a range of concerns that focused on:

- *agriculture and associated water resources* – particularly impacts on Biophysical Strategic Agricultural Land (BSAL) and the Equine Critical Industry Cluster (CIC) including the costings used in the Agricultural Impact Statement, loss of water from agricultural production to mining and the ability to rehabilitate soils back to BSAL;
- *social impacts and the loss of amenity* - on the Bylong village and the surrounding rural community, including the loss of community through KEPCO's acquisitions in the Bylong Valley area, the lack of consultation by KEPCO and the operation of the proposed workforce accommodation facility in the local area;
- *biodiversity impacts* - from clearing and subsidence on threatened species and the adequacy of the biodiversity offset, including subsidence areas for offsets
- *heritage impacts* – including Aboriginal heritage sites and heritage values associated with the Bylong cemetery (and requirement for exhumation of burials) and the Tarwyn Park property, known for the implementation of 'natural sequence farming' principles;
- *traffic impacts* - on the local and regional road network including closure of local roads, increased traffic through Wollar village and Munghorn Gap Nature Reserve and road safety concerns;
- *subsidence impacts* - on infrastructure including the Bylong Valley Way and road users and the Bylong State Forest and subsidence damage;
- *economics* – including accounting for externalities, coal price fluctuation, impacts on tourism and support for local stimulus, employment and royalty payments; and
- *justification for the mine* - particularly for open cut mining including impacts associated with noise, dust, vibration, water resources, biodiversity, archaeology and heritage, visual amenity, agriculture and land resources.

Other issues that were raised in objections included including amenity and health related impacts from noise/blasting, air quality impacts from dust and diesel emissions, greenhouse gas emissions with a need to reduce reliance on fossil fuels and visual/light impacts on the scenic landscape along Bylong Valley Way and visual and lighting impacts at rural receptors.

The majority of the submissions that were in support of the project were from residents living in the Mid-Western Region, particularly in regional centres such as Mudgee. The key reasons for support of the project related to its employment and broader economic benefits for the region.

The Department visited the site on several occasions, and held a public meeting in Bylong village during the exhibition of the project to explain the development assessment process, answer questions and listen to concerns.

The Department also commissioned independent experts to review the assessment of social, groundwater and economic impacts of the project outlined in the EIS in response to specific concerns raised in submissions from individuals, special interest groups and organisations.

Mine Design

KEPCO has outlined in the EIS how the mine was designed to avoid and/or minimise impacts on a number of key features in the locality, including:

- watercourses and alluvial aquifers, with a minimum 150 metre buffer from the alluvium;
- prime agricultural land, particularly associated with the alluvial areas;
- Bylong village and rural residential receptors;

- prominent cliff lines above the underground mining area; and
- visual impacts along the Bylong Valley Way.

KEPCO made changes to project components during the assessment process to address concerns raised in submissions, including reducing the size and location of the proposed groundwater borefield to minimise impacts on other water users, modifying underground mining to minimise impacts on cliff lines, and an additional offset area to compensate for biodiversity impacts.

Open Cut

Concerns were raised in submissions about the justification for the open cut component of the project, suggesting that the mine should be restricted to underground mining only.

KEPCO has made a number of arguments to support the proposed open cut, emphasising that the project would not proceed unless the open cut is approved. In particular, KEPCO argues:

- *integrated operation* – the proposed open cut and underground has been designed as an integrated operation with the open cut providing storage capacity for coal rejects and mine water from both the open cut and underground mining operations;
- *additional infrastructure* – an underground operation would require a range of additional surface infrastructure to be developed, including tailings dams, emplacement areas and water storages, each of which would result in additional environmental risks that would need to be carefully managed;
- *surface disturbance* – an underground mining operation would still require substantive clearing and land disturbance (400 hectares compared with around 1,000 hectares as proposed);
- *optimisation to minimise environmental impacts* – the size of the open cut has already been significantly reduced to address environmental constraints including, avoiding alluvial floodplain areas, BSAL and coal resources in closer proximity to Bylong village and the Bylong Valley Way,
- *resource sterilisation* – the project involves extraction of only 8% of the in-situ open cut coal reserves in the authorisation area, and the removal of the open cut would result in sterilisation of over \$2 billion worth of coal resources, or around 26% of the total coal resource proposed to be extracted;
- *environmental impacts* – the amenity and environmental impacts associated with the operation of the open cut can be managed to an acceptable standard noting that:
 - almost all the land potentially affected by noise and dust from the open cut mining operations has been acquired by KEPCO;
 - the operation of the project including the borefield (mainly required for the open cut stage) and the open cut mine is predicted to meet the NSW Government's minimal impact requirements on water users, with KEPCO holding full water entitlements for the alluvial water source; and
 - the incremental impacts on native vegetation from the open cut would be fully offset in a comprehensive biodiversity offset strategy;
- *no final voids* – the open cut pits would be used for co-disposal of rejects and water storage during operations, and would be progressively backfilled so that there would be no final voids at the end of mining;
- *employment* – the operation of the open cut would generate almost 200 additional jobs; and
- *economic viability* – an underground only option would significantly impact the economic viability of the project, as a result of increased operating costs and reduced cash flow during the first few years of mining, with economic analysis indicating a negative net present value (NPV) of \$89 million (compared to a positive NPV of over \$800 million for the proposed project), based on realistic input assumptions in relation to coal price and exchange rates.

Workforce Accommodation Facility

Concerns have been raised by Mid-Western Regional Council and in submissions about the proposed workforce accommodation facility (WAF) for the construction phase of the project.

Council has a policy of encouraging the growth and development of existing regional centres, such as Mudgee and Rylstone, and has consistently opposed the development of stand-alone mine worker camps within its local government area. This position is based on concerns about social integration of mine workers with the broader community, and previous experience with other mining projects, which demonstrates that construction workforce numbers are often overestimated and that the region has sufficient capacity to accommodate any increase in demand associated with mining projects such as Bylong.

The Department has examined the arguments for and against this aspect of the project, and supports Council's position on this matter. Accordingly, the Department has recommended that the WAF not be constructed for the project, unless KEPCO can demonstrate that there is insufficient capacity available to support the construction workforce, in consultation with Council and the Community Consultative Committee (CCC), recommended for the project.

Both Council and KEPCO support the Department's recommended approach.

Assessment

Amenity Impacts

The Bylong Valley and surrounding area has a population of around 100 people, mainly living on rural properties. Bylong village comprises 3 dwellings within or near the village precinct and there is also a general store (with associated residence), the Bylong Community Hall and the Anglican Church in the village precinct.

The vast majority of privately-owned land in the vicinity of the project is now owned by KEPCO, including 2 of the 3 residences in Bylong village.

The Department's assessment found that the project would comply with applicable air quality and blasting criteria at all privately-owned residences.

However, even with the implementation of all reasonable and feasible mitigation, the assessment found that there would be a significant exceedance as defined under the *NSW Government's Voluntary Land Acquisition and Mitigation Policy* (>5 dB exceedance) of the 'intrusive' noise criteria of 35 dBA at 1 privately-owned residence located near Bylong village, with a further 5 residences (over four landholdings) in the areas surrounding the mine predicted to be moderately affected by noise (3-5 dB exceedance). A further 3 residences (owned by the one landowner) to the west of Bylong village would be marginally affected (1-2 dB exceedance).

The noise assessment is based on worst-case scenarios with all equipment assessed to be operating under noise enhancing weather conditions, and once open cut mining ceases in Year 8, noise from the underground operations is predicted to comply with the applicable criteria, apart from some marginal exceedances (1 dBA) at 2 residences near Bylong village.

It is noted that the noise levels at all but the most affected residence would remain below the NSW Environment Protection Authority's (EPA's) recommended 'acceptable' night-time noise amenity criteria of 40 dBA for a rural area, as defined under the *NSW Industrial Noise Policy* (INP), and well below the maximum night-time amenity criteria of 45 dBA.

KEPCO has committed to the development of a real-time noise monitoring and management system for the project, which uses a combination of real-time monitoring and weather forecasting to predict and prevent noise exceedances from occurring. Real-time noise management systems have proven effective in managing noise impacts at other open cut mines in NSW, particularly for residences where marginal exceedances are predicted in the modelling.

KEPCO advises that it has sought to acquire the significantly affected property (Receiver 60) and is well advanced in negotiations to acquire all but one of the moderately affected residences. If these negotiations are successful, there would only be 1 moderately affected residence (Receiver 58) in the vicinity of the mine that would not be owned by KEPCO.

In circumstances where the acquisition and mitigation criteria are likely to be exceeded, the *NSW Voluntary Land Acquisition and Mitigation Policy* encourages mining companies to either acquire the property or reach an agreement with the affected landowners. Accordingly, the Department considers that KEPCO should use its best endeavours to acquire or reach a negotiated agreement with the owners of Receiver 58 and 60 prior to the determination of the project.

In the absence of finalised acquisitions or agreements, and in accordance with the *NSW Voluntary Land Acquisition and Mitigation Policy*, the Department has recommended that KEPCO be required to:

- acquire the significantly affected property (Receiver 60), if requested by the landowner; and

- implement additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the 5 residences which are predicted to be moderately or significantly affected by noise, if requested by the landowner.

Finally, given the marginal exceedances predicted at the remaining property (which has 3 residences), the Department considers any noise impacts can be effectively managed to comply with applicable criteria through the implementation of the real-time management and monitoring system, as required under the recommended conditions.

Subsidence Impacts

Underground longwall mining would result in subsidence effects and impacts over 1,714 hectares, principally on land owned by KEPCO and in the Bylong State Forest.

There are no residences located within the subsidence area, and the subsidence assessment predicts that there would be no subsidence impacts on adjoining National Parks, or on the KEPCO-owned Tarwyn Park property or its natural sequence farming areas.

The subsidence effects are largely confined to woodland and agricultural areas and impacts on built infrastructure such as roads can be managed in accordance with standard practice and procedures.

The Department recommends that comprehensive Extraction Plans be prepared and implemented in consultation with key Government agencies and property owners, including a specific plan and performance objectives for the Bylong Valley Way to ensure the road remains safe.

Water Resources

Impacts on water resources was a key concern raised in submissions on the project, particularly by landowners who rely on water from the Bylong River alluvial water source for irrigation of crops and water supply for stock.

The groundwater modelling undertaken for the project predicts that there would be minimal drawdown impacts on privately-owned bores, such that the project would comply with the minimum impact criteria of the *NSW Aquifer Interference Policy*. This follows additional peer reviews of the groundwater model, independent expert review on behalf of the Department, and expert advice from the Department of Primary Industries – Water (DPI-Water).

Following advice from the independent expert and DPI-Water the Department accepts that the groundwater assessment provides a conservative assessment of drawdown impacts, including comprehensive sensitivity and uncertainty analysis.

The modelling showed that under the worst-case scenario model run there is no predicted drawdown in the alluvium at the closest privately-owned bore, located on the Eagle Hill property. KEPCO also re-designed its borefield layout, reducing the number of bores it needed and located the borefield further away from landowners located in the nearby Growee River catchment.

The Department has recommended that an extensive groundwater monitoring network continue to be developed, ongoing model calibration and validation be undertaken, and that in the unlikely event that there are impacts from the project on private water users, compensatory water supply be provided.

KEPCO currently holds sufficient water licences to account for all the water required for the operation of the mine from the productive alluvial aquifers, but may require additional licences associated with the interactions of the mine with the deeper and poorer quality hard rock aquifers at some stage during the project. Both the Department and DPI-Water consider there is sufficient depth in the market to accommodate the water take from the project. However, the Department has recommended that KEPCO be required to demonstrate it has adequate water supply prior to commencing both the open cut and underground operations.

Overall, the Department considers that KEPCO has designed the project to avoid significant impacts on key water resources, particularly by avoiding direct disturbance of the highly productive alluvial aquifers and optimising the borefield to avoid impacts on other groundwater users.

Agriculture

The Bylong Valley predominantly supports agricultural land uses including cropping and stock grazing. Historically there was also a productive equine industry, including thoroughbred studs, although there are now no operating horse studs in the area.

The Department's assessment has found that the project would not directly impact the areas on the Tarwyn Park property used for natural sequence farming, apart from an access road at the edge of the property adjacent to the Sandy Hollow-Gulgong Railway. KEPCO has committed to maintaining and monitoring the natural sequence farming techniques and providing access to external groups for ongoing research.

The project would disturb up to 1,160 hectares of agricultural land of low to moderate land capability (as classified using OEH's *Land and Soil Capability Assessment Scheme 2012*) with around 140 hectares of land with high agricultural capability. While around half the site is mapped as BSAL and Equine CIC, the area is primarily used for grazing and the estimated value of agricultural production that would be foregone if the mine proceeds is approximately \$2.7 million a year.

The mine avoids the highest quality agricultural land on the site, and KEPCO proposes to rehabilitate the soils in mined areas to a BSAL-equivalent standard in accordance with strict criteria for fertility and productivity standards.

The Department of Primary Industries – Agriculture (DPI-Agriculture) does not object to the agricultural impacts of the project, and is satisfied that the proposed rehabilitation outcomes can be achieved subject to the implementation of a range of management and monitoring measures that have been incorporated into the Department's recommended conditions.

Given the location of the coal resources, KEPCO has sought to avoid impacts on the most important agricultural land on the site and the water resources that support agricultural production. The Department also notes that in the longer term, the land disturbed by the project would be returned to production, however this would require careful management and monitoring during the rehabilitation of the mine.

Heritage Impacts

The project would directly and indirectly impact a number of Aboriginal cultural heritage sites, including two rock-shelters, a grinding groove, and some sandstone cultural features in the subsidence area with high regional significance. There is also a rock shelter with high significance adjacent to the proposed open cut, although impacts on this site can be managed through careful blast design.

KEPCO has consulted with relevant Aboriginal stakeholders to devise a recording and salvage program for Aboriginal sites, and both the Department and the NSW Officer of Environment and Heritage (OEH) consider that the impacts of the project on Aboriginal cultural heritage in the locality can be managed with the implementation of these measures. These measures include pre-mining archival recordings of all sites and cultural features, test excavation and surface collection of sites, continued monitoring of sites potentially indirectly impacted and protection of sites predicted to be outside any direct or indirect impact area.

Despite this, OEH has raised concerns about the cumulative impact of mining in the region on Aboriginal cultural heritage values, and has recommended a regional study into rock art sites and further investigations in the proposed offset areas. These recommendations have been incorporated into the recommended conditions.

The project would also directly or indirectly impact on a number of historic heritage items, including the Upper Bylong Cemetery (now located on KEPCO-owned land), which would require exhumation of burials.

KEPCO has consulted with descendants of persons buried in the cemetery and committed to prepare a detailed Burials Management Plan, in accordance with the requirements of the *Public Health Regulation 2012*. KEPCO is also required to obtain separate statutory approvals from NSW Health for exhumation and reburial in accordance with this Regulation.

The project would directly impact a part of the Tarwyn Park property, which is partially located within the footprint of the open cut. This property is known for the development of natural sequence farming

principles, has operated as a horse stud, and is also the burial site of dual Melbourne Cup winner, Rain Lover. However, direct impacts from mining on the Tarwyn Park homestead and natural sequence farming area, which is located within the floodplain, would be avoided.

In response to these issues, the Department has recommended that a Historic Heritage Management Plan be prepared and implemented, incorporating KEPCO's commitments and a number of additional requirements of the Department to minimise and/or mitigate heritage impacts.

Biodiversity

The project would clear around 232 hectares of native woodland and 521 hectares of derived native grassland vegetation, including 78 hectares of endangered ecological communities (EECs) woodland, 186 hectares of EEC grassland and 180 hectares of habitat for the endangered Regent Honeyeater, along with habitat for other threatened species. About 1,698 hectares of native vegetation is also within the subsidence area which has the potential to be indirectly impacted.

In accordance with the *NSW Offsets Policy for Major Projects* and the associated *Framework for Biodiversity Assessment (FBA)*, KEPCO has designed the mine to avoid and/or mitigate impacts on biodiversity as far as practicable, particularly given the location of the coal resource relative to the remnant native vegetation and known populations of threatened flora.

KEPCO proposes to compensate for residual impacts through a comprehensive biodiversity offset strategy, incorporating around 3,806 hectares of native vegetation across 7 offset areas, with 4 of these offsets adjoining nearby National Parks. These offset areas would be secured in perpetuity and managed through Biobanking Agreements.

With proper governance, both the Department and OEH consider that the offset strategy has the potential to improve biodiversity values and habitat connectivity in the region in the longer term, particularly as the strategy requires the restoration and enhancement of biodiversity values on areas of land that have been degraded over time.

Economic Impacts

This assessment found that the project would result in the following social and economic benefits for the region as well as the State as a whole:

- employment for up to 470 mine workers at full production, with 275 persons employed during underground only operations;
- generating around \$290 million (present value) in royalties for the NSW Government;
- around \$302 million in company taxes to the Commonwealth Government;
- increased economic activity in the local and regional economy including 830 direct and indirect jobs and \$624 million in annual business turnover for the regional economy;
- approximately \$7.25 million in developer contributions through a Voluntary Planning Agreement with Mid-Western Regional Council for community services and other local initiatives.

The Benefit Cost Analysis (BCA) completed for the project estimated that the net economic benefit to Australia of the project would be in the order of \$596 million. In the light of the complexity in estimating net benefits of projects and views raised in public submissions, the Department commissioned the Centre for International Economics (CIE) to undertake an independent review of the economic assessment.

CIE made some technical comments in relation to the BCA and some assumptions, but concluded that these issues would not have a material impact on the BCA's key finding, that the project would have net benefits to Australia and NSW. That is, the project's economic benefits would significantly outweigh its costs, from an economic perspective.

Social Impacts

As with most mining developments, the project has the potential to result in both positive and negative social impacts. These impacts would be experienced differently by different communities, groups and individuals.

Positive impacts of the project, including those associated with employment, would largely benefit communities residing in the broader region, including Mudgee and Rylstone.

Negative impacts would primarily affect the Bylong community including residents in the village and its surrounds, their families and others who feel connected to the village as a result of the loss of community through acquisitions in the Bylong valley area, the operation of a WAF in the local area and impacts on regional infrastructure and services.

KEPCO has been acquiring land in and around the site, with the result that there are now very few privately-owned properties remaining in the immediate vicinity of the mine, including in Bylong village. This has resulted in significant social impacts and a decline in the local population in the immediate vicinity of the mine that would take many years to recover.

The Department also acknowledges that the social impacts of the project are directly linked to the other environmental impacts, including amenity and health impacts, water and agriculture, heritage and biodiversity, traffic and visual impacts. While the project would largely meet relevant criteria and acceptable impact levels set under NSW Government policy for residents remaining in the area, the Department acknowledges that there would be residual social impacts borne by the local community.

The Department has therefore recommended a comprehensive suite of conditions for mitigating and managing these residual impacts of the project, including a requirement for KEPCO to prepare and implement a Social Impact Management Plan.

The plan would need to be prepared in consultation with the Council, the Community Consultative Committee and the local community, and include an adaptive management and mitigation program to minimise and/or mitigate negative social impacts during construction, operations and following closure of the mine. The Department has also recommended that all management plans required under the consent be prepared in consultation with the Community Consultative Committee.

The Department considers that the implementation of the SIMP would assist in minimising social impacts during construction and operations, and would provide a framework for maintaining the built and social fabric of Bylong village and surrounds to the greatest extent practicable following the cessation of mining.

It is also generally consistent with the Department's draft Social Impact Assessment policy which emphasises the need to involve affected communities in identifying and developing measures to address any negative social impacts associated with mining.

Summary

The Department has assessed the development application, EIS, submissions on the project, the Response to Submissions, and a range of additional information in accordance with the requirements of the EP&A Act.

It has also considered the independent expert reviews of the project's groundwater, social and economic assessments and concerns of the local community, particularly about the social, amenity and environmental impacts of the project, including the justification for the proposed open cut and the WAF.

Based on its assessment, the Department considers that the impacts of the open cut component of the project can be managed subject to affording mitigation and acquisition rights to a number of landowners in the vicinity of the mine, although the Department considers that KEPCO should use its best endeavours to acquire or reach agreement with the owners of these properties prior to determination of the application by the Commission. The Department does not support the proposed WAF as there is likely to be sufficient capacity in the region to accommodate the construction workforce for the project.

The impacts on the local community and the environment are acknowledged, and a range of detailed conditions are recommended to ensure that these impacts are effectively minimised, mitigated and/or compensated for. These conditions incorporate the recommendations of relevant government authorities where applicable.

With the implementation of these conditions, the Department considers that the project achieves a reasonable balance between recovering the coal resource and avoiding, minimising and/or offsetting adverse social, amenity and environmental impacts.

On this basis, the project is approvable, subject to the recommended conditions.

1. PROPOSED PROJECT

1.1 Proponent

KEPCO Bylong Australia Pty Ltd (KEPCO) is proposing to develop the Bylong Coal Project (the project), a new open cut and underground coal mine located approximately 55 kilometres (km) northeast of Mudgee in the Mid-Western Regional local government area (see Figure 1).

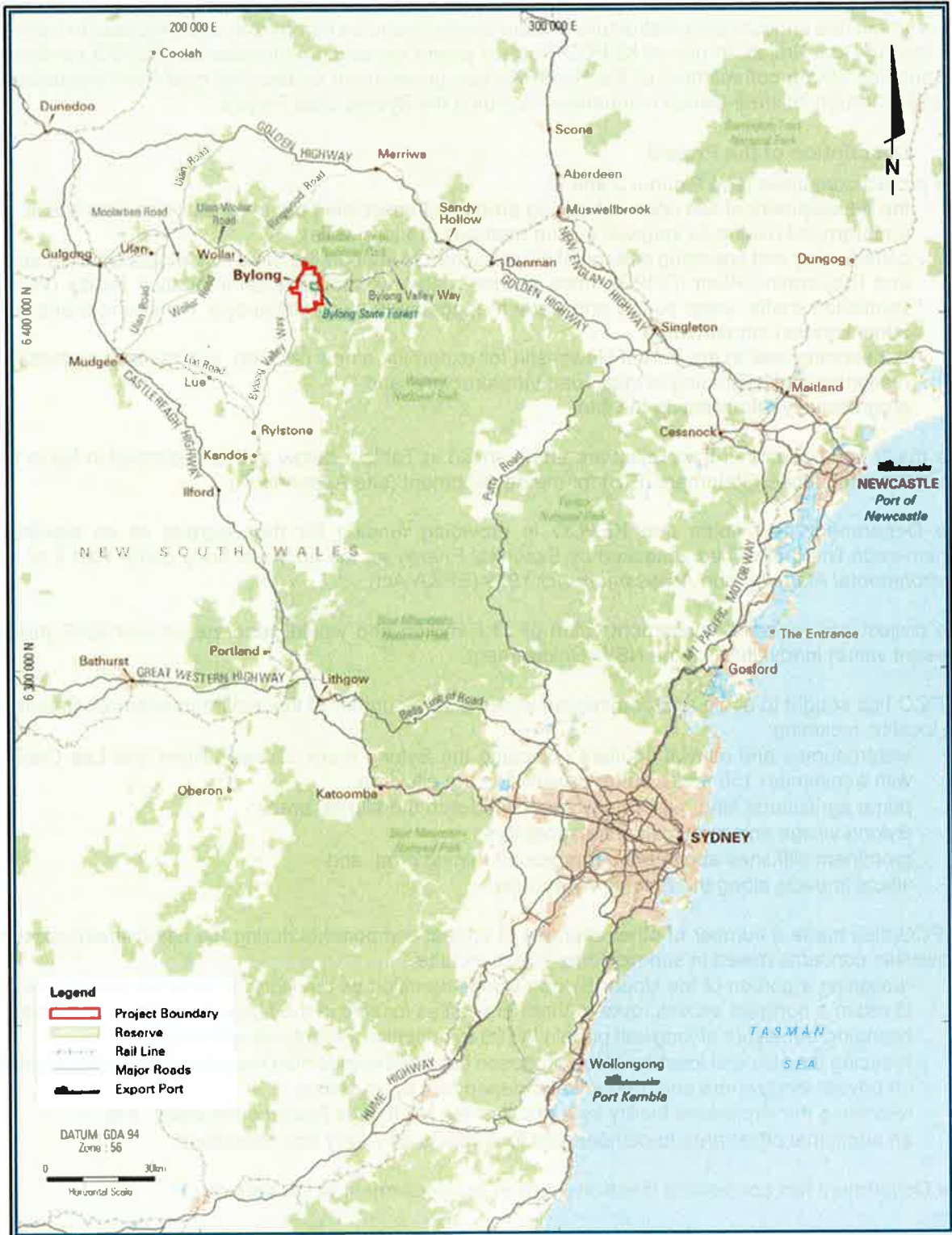


Figure 1: Location of the Bylong Coal Project

KEPCO is a subsidiary of Korea Electrical Power Corporation (KEPCO Korea) and is the leading electricity utility company in Korea, providing around 85% of Korea's power requirements. The South Korean Government is a majority shareholder in KEPCO Korea.

KEPCO Korea is seeking to diversify and secure stable coal supplies from overseas sources and has identified the Bylong Coal Project as a key strategic resource for supply of thermal coal for its power generation over the next few decades. Coal provides around 30% of total power generation in South Korea.

The Department notes that since the development application was lodged, the South Korean government has announced a restructure of state-owned resource companies and proposes to transfer the Bylong Coal Project to one of KEPCO Korea's power generation subsidiaries. KEPCO confirmed the ongoing strong commitment of the South Korean government to sourcing coal from international sources through its state-owned companies, including the Bylong Coal Project.

1.2 Description of the Project

The project comprises (see Figures 2 and 3):

- the development of two open cut mining areas and associated out of pit emplacement areas;
- underground mining by longwall mining methods (15 longwalls);
- constructing and operating a range of infrastructure to support the mine including a Coal Handling and Preparation Plant (CHPP), mine access roads, workforce accommodation facility (WAF), ventilation shafts, water supply and water management, electricity supply, communications, and administration infrastructure;
- transporting coal to the Port of Newcastle for export via a new rail loop, and rail loading facility;
- realigning and upgrading of local road infrastructure; and
- progressively rehabilitating the site.

The major components of the project are summarised in Table 1 below and is described in full in the Environmental Impact Statement (EIS) for the development (see Appendix A).

The Department also notes that KEPCO is providing funding for the upgrade of an electricity transmission line that will be assessed by Essential Energy as the approval body under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The project has a capital investment value of \$1.5 million and would generate around \$290 million (present value) in royalties for the NSW Government.

KEPCO has sought to avoid and/or minimise impacts on a number of key environmental constraints in the locality, including:

- watercourses and alluvial aquifers (including the Bylong River, Growee River and Lee Creek), with a minimum 150 metre buffer provided to the alluvium;
- prime agricultural land, particularly associated with the alluvial areas;
- Bylong village and rural residential receptors;
- prominent cliff lines above the underground mining area; and
- visual impacts along the Bylong Valley Way.

KEPCO also made a number of other changes to project components during the assessment process to address concerns raised in submissions. These include:

- realigning a portion of the Upper Bylong Road, identified as the North Link Road (see Figure 3), to retain a northern access route to three properties located in the Upper Lee Creek catchment;
- changing the layout of longwall panel LW106 to minimise impacts on cliff lines;
- reducing the size and location of the proposed borefield to minimise the risk of drawdown impacts on private landowners and groundwater dependent ecosystems;
- relocating the explosives facility as a result of the North Link Road construction; and
- an additional offset area to compensate for impacts on Fuzzy Box Woodland.

The Department has considered these changes in its assessment of the project.

Table 1: Key Components of the Bylong Coal Project

Aspect	Description
<i>Project Life</i>	25 years, including an initial two year construction only period and 23 year active mining period. The 23 year operational period includes open cut mining for 8 years and underground mining for 19 years, with concurrent operations for 4 years.
<i>Mining and Reserves</i>	Extraction of 124 million tonnes of run-of-mine coal (ROM) to produce about 90 million tonnes of product coal. Extraction of coal by open cut and underground mining methods, comprising: <ul style="list-style-type: none"> • 33 million tonnes of ROM coal by open cut methods; and • 91 million tonnes of ROM coal by longwall mining methods from 15 longwall panels.
<i>Target Coal Seams</i>	Main target seams from the Ulan and Coggan Seams within the Permian Illawarra Coal Measures.
<i>Extraction Rate</i>	Up to 6.5 million tonnes of ROM coal a year during concurrent open cut and underground mining operations with extraction of up to 6.3 million tonnes during underground only operations.
<i>Coal Processing & Transport</i>	Coal would be processed on site in the CHPP. Product coal would be transported by rail to the Port of Newcastle for export, via the Sandy Hollow to Gulgong Railway Line. The project would require an average of 2.1 laden trains each day during peak operations.
<i>Overburden and Waste Management</i>	Up to 152 million bank cubic metres (Mbcm) of overburden material would be moved from the open cut operation and 14 million tonnes of coal reject would be generated from processing of ROM coal. Overburden would initially be placed in out-of-pit emplacements adjacent the mining areas, followed by in-pit emplacement. <p>Coarse and fine coal reject from the CHPP would be dewatered and co-disposed in the overburden emplacement areas during open cut mining operations. During underground mining, these materials are proposed to be emplaced in a final void within the Eastern Open Cut mining area. No tailings dam would be required.</p>
<i>Infrastructure</i>	Key infrastructure includes: <ul style="list-style-type: none"> • mine infrastructure areas (MIA) including the CHPP; • rail load out facility and rail loop; • water management infrastructure, including a water supply bore-field and associated pumping stations and pipelines; • on-site workforce accommodation facility (WAF) - construction phase only; and • power and communications infrastructure
<i>Roadworks</i>	Key road upgrades/ changes include: <ul style="list-style-type: none"> • upgrade to the Upper Bylong Road to access the mine and intersection with Bylong Valley Way; • realignment of Upper Bylong Road/ Lee Creek Road; • new access road from Upper Bylong Road to access properties to the east of the mine; and • upgrade to intersections in the local area.
<i>Employment</i>	Up to 470 persons at full production during concurrent operations. This would reduce to 275 persons during the underground only stage. Peak of 665 construction workers (during the initial 2 year construction period).
<i>Hours of Operation</i>	24 hours a day, seven days a week (construction and operation)
<i>Agricultural Land</i>	The project would directly disturb around 423 ha of Biophysical Strategic Agricultural Land (BSAL) and 700 ha of Equine Critical Industry Cluster (CIC) land. There is a further 288 ha of BSAL and 515 ha of CIC within proposed offset areas. Rehabilitation of the site would include reinstating 423 ha of BSAL (or equivalent).
<i>Rehabilitation and Biodiversity Offsets</i>	The project would directly disturb 1,160 ha of land through clearing associated with the open cut mining operations and surface infrastructure required for both open cut and underground mining operations. Of this area, about 753 ha comprise native vegetation communities, including 251 ha of endangered ecological communities (EEC). There is an additional area of 1,714 ha where subsidence impacts are predicted to occur, ranging from around 20mm up to 3.3m surface subsidence. <p>The biodiversity offset strategy would ultimately provide for the long term conservation of some 3,806 ha of land, including 2,212 ha of EEC. In addition, there would be rehabilitation of around 33 ha within the disturbance boundary to woodland community adjacent to remnant woodland adjoining the south-western overburden emplacement area and western open cut.</p>

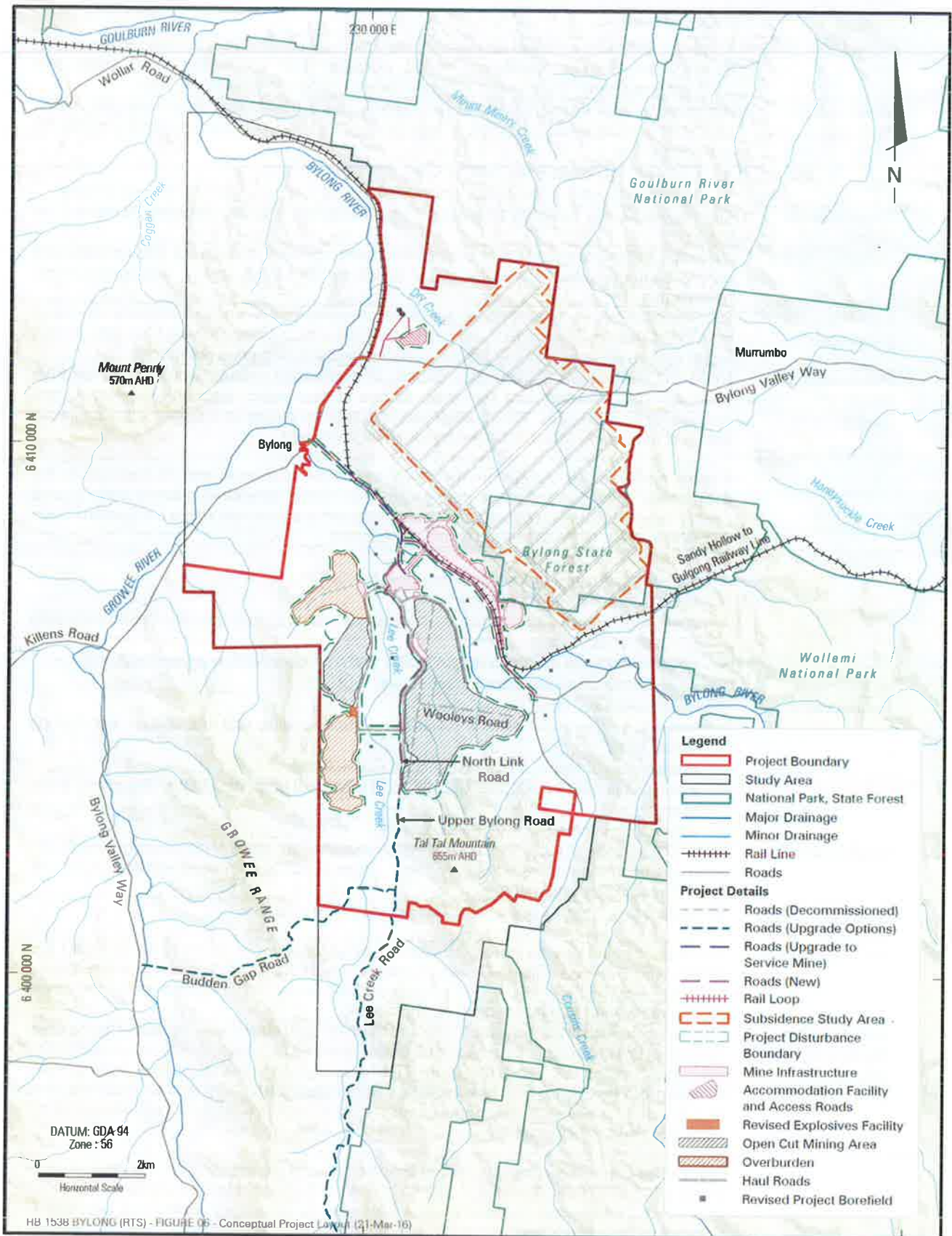


Figure 2: Bylong Coal Project Area and Key Components

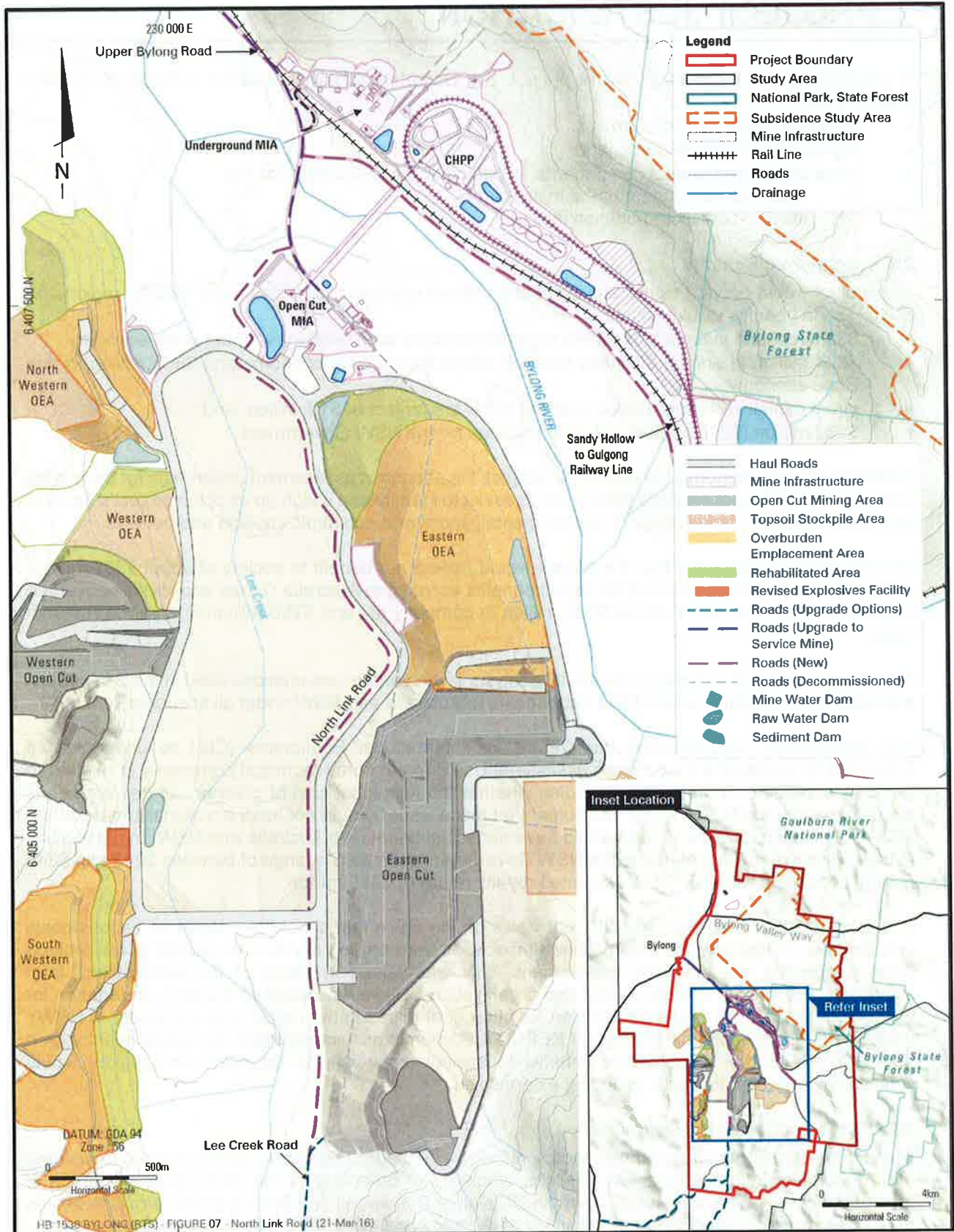


Figure 3: Mine Infrastructure Areas and North Link Road Realignment

2. PROJECT JUSTIFICATION

In considering the justification of the project, the Department has considered a range of matters including the:

- economic benefits of the project;
- significance of the resource; and
- mine design and project components, in particular the justification for the:
 - open cut component of the mine; and
 - workforce accommodation facility.

2.1 Economic Benefits

The project would provide significant direct and indirect economic benefits for the locality, region and State. These benefits would include:

- 830 direct and indirect jobs for the regional economy and 1,496 jobs for the State economy;
- \$624 million in annual business turnover within the regional economy and \$855 million for the State economy;
- direct capital investment value over the life of the project of \$1.5 billion; and
- \$763 million (\$290 present value) in royalties for the NSW Government

To assess the net economic benefits of the project, the economic assessment undertaken for the project includes a Benefit Cost Analysis (BCA), which seeks to identify and weigh up all of the project's benefits and costs based on its full range of environmental, social and economic impacts and benefits.

The assessment calculates that the project would have a net benefit to society of about \$807 million, with a minimum of \$596 million of these net benefits accruing to Australia. Taxes and royalties over the project life would amount to some \$302 million in company tax and \$290 million in royalties (present value).

The assessment also included a sensitivity analysis of the various assumptions used in the BCA, which indicates that the project would have net benefits to Australia and NSW under all scenarios tested.

The Department commissioned the Centre for International Economics (CIE) to undertake an independent review of the economic assessment. CIE made some technical comments in relation to the BCA and some assumptions (including whether the full global cost of greenhouse gas emissions should be attributed to NSW), but concluded that these issues would not have a material impact on the BCA's key finding, that the project would have net social benefits to Australia and NSW. In particular, CIE's analysis of royalty returns to the NSW Government estimated a range of between \$243 and \$345 million, consistent with KEPCO's estimated royalty return of \$290 million.

It is acknowledged that there are different views on the value that should be placed on various costs and benefits, particularly the externalities (impacts on third parties not directly related to the project) when conducting an economic assessment. This was raised in many of the submissions from individuals and special interest groups and organisations. However, based on the BCA undertaken for the project (and similar BCAs undertaken for other coal mines in the region and elsewhere in NSW), the Department accepts the findings of KEPCO's economic assessment and the independent expert advice from CIE that the project's benefits to society (especially to the State and region) would significantly outweigh its costs, including externalities.

2.2 Significance of the Resource

Under *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* a consent authority must consider the efficiency or otherwise of the development in terms of resource recovery. The submission from the Division of Resources and Energy (DRE) provided advice to the Department in relation to the efficiency of recovery and the significance of the coal resource.

DRE verified that the project would produce approximately 124 million tonnes of ROM coal and about 90 million tonnes of product coal over its 25 year life. DRE advised the Department it is satisfied that the coal resource on the site is significant, that it can be feasibly and economically recovered, and that the project would have considerable economic benefits for the region and NSW.

DRE also advised that the mine plan had reasonably excluded areas of potential coal resource due to environmental constraints including water resources and higher quality agricultural land, proximity to Bylong village and infrastructure and geological constraints. On the basis of these constraints, DRE concluded that the mine plan adequately recovered the coal resource.

Given these considerations, the Department is satisfied that the coal resource is significant, can be efficiently recovered (given the environmental and operational constraints) and that the extraction of the resource would provide substantial economic benefits to the regional and NSW economies.

2.3 Mine Design

The EIS includes a specialist mine plan justification report, undertaken by mine planning consultancy Mine Advice. The mine plan was developed following a lengthy feasibility assessment that factored in environmental, geo-technical and resource extraction constraints for both open cut and longwall mining methods to consider measures to minimise the project's environmental impacts, while considering efficiency of resource extraction and the financial viability/ return on investment of the project.

However, the justification for two key components of the project were questioned in submissions to the Department, namely the open cut mine and the workforce accommodation facility (WAF). The justification for these aspects of the project are considered further by the Department below.

Open Cut Mining

As outlined in Section 5 of this report, concerns were raised about the open cut component of the project, suggesting that the mine should be restricted to underground mining only. Submitters raised a number of concerns about the potential impacts associated with open cut mining, including impacts associated with noise, dust, vibration, water resources, biodiversity, archaeology and heritage, visual amenity, agriculture and land resources.

In addition to the justification report in the EIS, to address the concerns in these submissions, a supplementary justification report was prepared as part of KEPCO's Response to Submissions.

These reports note that the proposed open cut and underground mine plan for the project is a result of comprehensive feasibility and constraints analysis, and that this analysis has already reduced the size of the open cut. In this regard, large areas of low strip ratio (ie. economic) open cut coal resources within the authorisation areas have been excluded from the mine plan to avoid impacts on Bylong Village, infrastructure, water resources and associated alluvials, and BSAL. The proposed open cut ROM coal extraction of 33 million tonnes equates to only 8% of the total available open cut in-situ coal resource in the authorisation areas.

The mine plan justification reports indicate that, even if the open cut pits were not developed, considerable areas of surface disturbance would be required to accommodate additional surface facilities for the underground mine, including emplacement areas and tailings dams for coarse and fine coal reject material, water storages and ancillary infrastructure. Conceptual analysis indicates that these surface facilities would cover an additional area of approximately 400 hectares, compared to the open cut disturbance area of approximately 1,000 hectares (see Figure 4).

These surface facilities would have some important disadvantages, including the requirement to dispose and manage coal rejects on the surface (as opposed to the proposed co-disposal with overburden for the proposed mine plan), and environmental risks associated with the operation and rehabilitation of tailings dams structures.

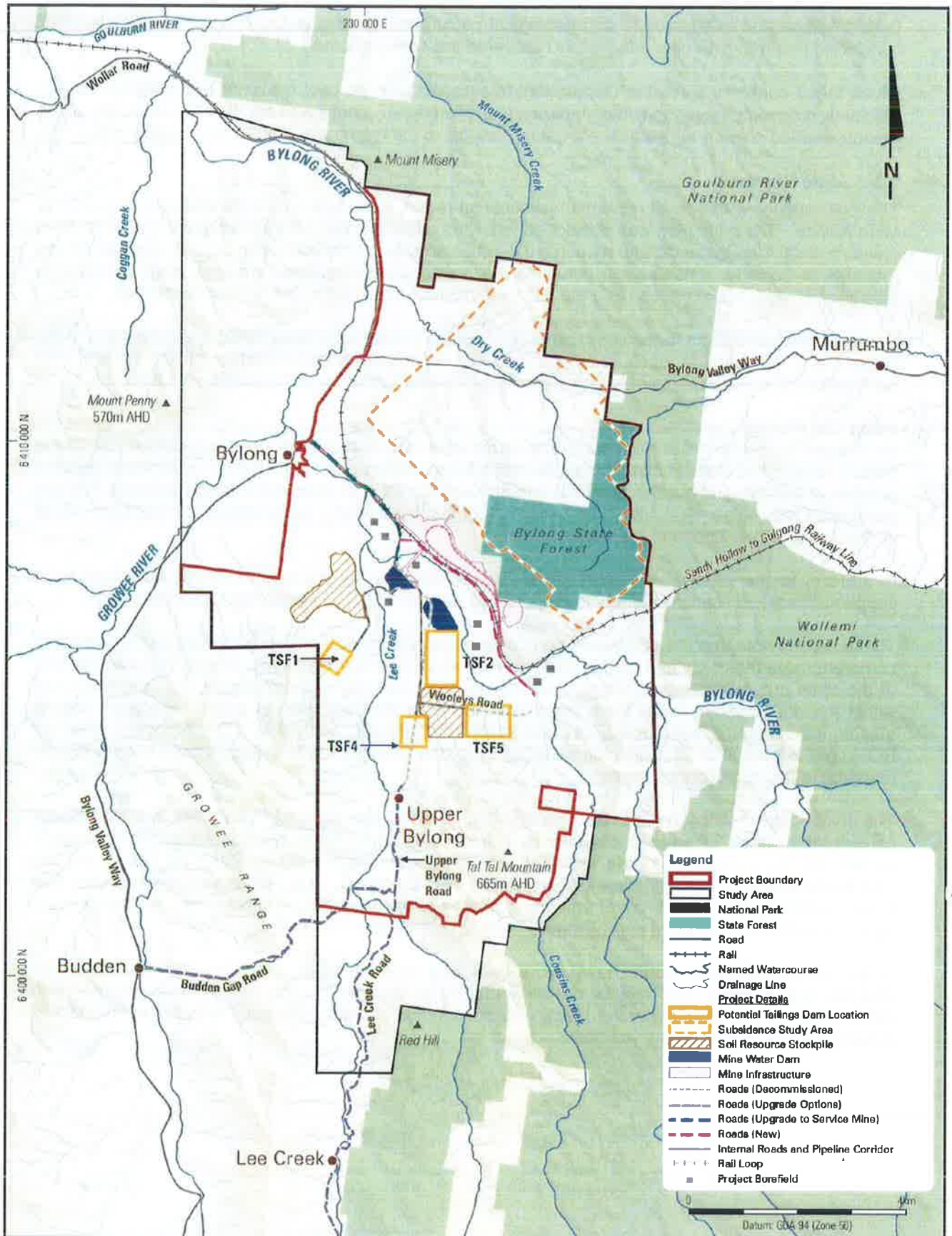


Figure 4: Conceptual Underground Only Mine Plan

The mine plan justification reports conclude that 'not only does open cut mining provide a suitable process to facilitate underground reject disposal in the long term, but that underground mining in turn provides a synergetic advantage whereby these rejects are utilised in filling the open cut voids', which ultimately assists in resulting in no final void from open cut mining.

The reports also include economic analysis which indicates that underground only mining would affect the economic viability of the project, as a result of increased operating costs and reduced cash flow. High level sensitivity analysis indicates that the underground only option could result in the project having a negative net present value (NPV) of \$89 million, based on realistic input assumptions in relation to coal price and exchange rates, compared to a positive NPV of over \$800 million.

Based on this analysis, and from a resource utilisation perspective, the proposed open cut component of the project is reasonable and warranted, as it:

- optimises resource recovery based on reasonable feasibility and constraints analysis;
- enables the co-disposal of rejects material and reduces risks associated with managing these rejects on the surface and in tailings dams; and
- bolsters the economic viability of the project including returns to NSW through royalties and economic stimulus.

As outlined in Section 6 of this report, the environmental impacts associated with the open cut component of the project can be managed to an acceptable standard based on the management measures proposed by KEPCO, advice from key agencies and independent peer review and assessment against NSW Government policy and guidelines. In this regard, the Department's assessment indicates that in relation to:

- *Noise, Air Quality and Vibration Amenity Impacts* – KEPCO has already acquired most of the land affected by amenity impacts, with one privately-owned property predicted to be significantly affected (as defined under the *NSW Voluntary Land Acquisition and Mitigation Policy*)
- *Water Resources* – the open cut mining (and bore-field extraction) is not predicted to significantly affect any other water users (as defined under the *NSW Aquifer Interference Policy*), and KEPCO has adequate water access licences to account for the alluvial water take associated with the open cut mining;
- *Archaeology, Heritage and Visual Amenity* – impacts associated with the open cut are able to be appropriately managed subject to the measures identified in consultation with the Aboriginal community and OEH;
- *Biodiversity* – while conceptual analysis indicates that underground only mining would reduce the amount of EEC clearing from 217¹ hectares to 95 hectares, KEPCO has developed a strategy that would fully offset the proposed clearing in accordance with NSW offsets policies, to the satisfaction of OEH; and
- *Agriculture and Land Resources* – whilst the reduced surface disturbance associated with underground only mining would reduce the amount of BSAL affected, it would also increase the difficulty and risks associated with BSAL rehabilitation following mining, given the surface rejects disposal and tailings dam areas. The proposed mine plan allows the full backfilling of the open cut void areas, and the reinstatement of BSAL-equivalent land resources within the rehabilitated area.

Workforce Accommodation Facility

The project would generate a variable workforce over the project life, including:

- 665² workers during the peak construction phase (Construction Phase 1), to Year 2 of the project;
- 360 workers (annual average) during Years 3 to 12, including approximately 100 workers during Construction Phase 2 (Years 4 to 6);
- 470 workers during peak operations (Year 9), when open cut and underground mining is occurring; and
- 275 workers during underground mining operations (Years 13 to 25).

KEPCO's assessment indicates that most workers hired during the construction and operational phases would be non-local hires (i.e. from areas outside one hour commute to the site), but that most (95%) operational workers would be from within (or relocate to) the Mid-Western Regional LGA, with 85% from

¹ This figure has been revised to 264 ha based on reclassification of derived native grassland requested by OEH and DoEE.

² Revised downwards from 800 in the EIS, following an additional workforce assessment undertaken as part of KEPCO's Response to Submissions, in consultation with mine operator Worley Parsons.

Mudgee. Given the temporary and specialised construction phase, most of the construction workforce would comprise (and remain) non-local hires.

To accommodate this temporary peak in short-term accommodation needs during the construction phase, KEPCO proposes to develop a workforce accommodation facility (WAF) on the KEPCO-owned Bylong Station property off Bylong Valley Way to the north of the site (see Figure 2). The location was chosen to avoid better quality agricultural land, be outside key amenity impact areas (ie. dust and noise), and be removed from Bylong village to avoid social impacts/change on the village.

The WAF, as proposed in the EIS, was to remain in place for up to 6 years to cover both of the main construction phases, with a capacity of 650 beds in Years 1 and 2, and 300 beds in Years 3 to 6.

Mid-Western Regional Council does not support the WAF. It believes there is sufficient short-term accommodation in the region to support the construction peaks, noting that the planned upgrade of the Wollar-Bylong Road (see Section 6.7) would reduce the commute to Mudgee and Rylstone to less than one hour. It also believes that the WAF would negate much of the economic benefits to the local community during the first 6 years of the project.

As part of its Response to Submissions, KEPCO undertook a further detailed workforce accommodation study using the revised employee numbers (665 workers down from 800 in the EIS). The study found that the total supply of short-term accommodation in the region is sufficient to meet the workforce demands of the project at most times. However, occupancy rates in the region fluctuate considerably during certain peak times, with occupancy sometimes up to 100%, particularly during:

- regional tourism events such as 'A Day on the Green' and the 'Mudgee Small Farm Field Days';
- peak weekends, such as public holidays; and
- potential cumulative peaks with other mining projects.

In view of these peaks, KEPCO notes that the WAF is essentially a risk management strategy in the event that an adequate supply of suitable short-term accommodation cannot be secured during peak periods of construction. It also notes that the WAF would assist in ensuring that adequate accommodation is available for tourism and other land uses.

In response to Council's concerns, KEPCO now proposes to:

- limit the WAF capacity to approximately 300 beds;
- operate the WAF for an interim period for Construction Phase 1 (Years 1 and 2);
- update the workforce accommodation study at the end of Year 2, in consultation with Council and the Department, to confirm whether the WAF is still required for Years 3 and 4, and;
 - if not required, the WAF would be decommissioned at the end of Year 2 (although services would be retained in the event that the WAF is found to be needed again for Construction Phase 2); or
 - if required, continue the WAF and update the workforce accommodation study again at the end of Year 4 to confirm the need for the WAF in Construction Phase 2 (ie. to Year 6).

Council acknowledges this further work and the commitment to reduce the number of beds and duration of the WAF, but remains opposed to the facility, noting that it has accommodated the expansion of multiple mining projects at the same time in recent years and that the market has adequately responded to the demand for additional housing and short-term accommodation. Council believes that using the local housing and accommodation market to service the project would generate positive economic benefits for the region, and support the social objective of 'one community'.

The Department has considered KEPCO's arguments for, and Council's arguments against, the WAF. While both party's arguments have merit, the Department accepts Council's position that the WAF is not required based on the experience of other mining development projects in the region, and that it would be better to have the workforce accommodated in existing centres to improve the integration of project workers within the hosting community, and reduce potential social issues associated with the WAF itself, which would be located in a quiet rural setting with relatively few residents.

KEPCO's own analysis indicates that the construction workforce can be accommodated within existing short-term accommodation in existing centres.

Consequently, the Department has recommended that the WAF not be constructed for the project, unless it is demonstrated to the satisfaction of the Secretary, and in consultation with Council, that there is insufficient accommodation capacity available to support the construction workforce. To demonstrate that the WAF is required, the Department has recommended that KEPCO submit a workforce accommodation study to the Department and has also placed strict conditions on decommissioning the WAF, if it were to be constructed.

Both Council and KEPCO support this approach and accept this is a reasonable compromise to manage the risk of potential accommodation shortfall ahead of the construction peak.

Not constructing the WAF would increase travel times for construction workers commuting between the site and urban settlements, which could increase traffic safety risks, particularly after the long (12 hour) construction shifts. The Department has carefully considered these issues in its assessment of the project (see Section 6.7) with recommendations that address road safety.

3. STRATEGIC CONTEXT

3.1 Western Coalfield

The Western Coalfield currently comprises the Ulan, Wilpinjong and Moolarben Coal Mines to the north, which are located approximately 25 km to the west of Bylong. The Western Coalfield also include mines to the south towards Lithgow.

Combined, these three mines have approval to extract up to 57 million tonnes of ROM coal a year, process it at their coal handling and preparation plants, and transport it to domestic and export markets via the Gulgong to Sandy Hollow Railway Line. This represents around 20% of NSW's coal production.

The Cobbora Coal Mine, located approximately 65 km northeast of Mudgee, was approved by the Planning Assessment Commission in May 2015. The project involved the development of a large open cut mine extracting up to 20 Mtpa of ROM coal for a period of 21 years. However, in November 2015, the NSW Government advised that it would not be proceeding with the project and that the land within the site would be sold and returned to agricultural land uses. The former Mt Penny exploration lease is also located to the west of Bylong.

While there has been no previous coal mining in the Bylong Valley, the Gulgong to Sandy Hollow Railway Line is an important coal transport corridor to the Port of Newcastle that cuts through the Bylong Valley. The line is used exclusively for freight and is dominated by coal transported from the mines in the region. The three operating mines have approval to transport up to 51 Mtpa of coal on the line which results in an average of 20 laden train movements (i.e. 40 total train movements) each day.

The cumulative impacts of coal transportation is a key consideration of the Department and is considered in detail in Section 6.7 of this report.

3.2 Local and Regional Setting

The project site is located within the Bylong Valley, near the small village of Bylong (see Figure 1). The site is accessed via the Bylong Valley Way, a well trafficked scenic route that connects the Central Tablelands to the Upper Hunter Valley.

The closest townships are Rylstone and Kandos located approximately 50 km to the south along Bylong Valley Way, with Sandy Hollow and Denman located within the Upper Hunter region about 70 km to the east.

The township of Mudgee is the largest town in the area, which is located approximately 95 km to the south-west by road.

Land use in the Bylong Valley is mainly agricultural with beef cattle grazing and cropping the predominant agricultural activities in the area. Good quality alluvial soils, including BSAL, is located through the more fertile valley floors.

Expansion of the mining industry into the Bylong Valley area has the potential to create land use conflicts with existing agricultural industries, including cattle grazing operations, cultivation and some smaller equine fodder crop enterprises.

The equine industry has a rich history in the area where a number of studs have operated. However, there has been a natural decline in horse breeding in the area over the last decade, which has been accelerated through land acquisitions for the Bylong Coal Project over the last few years. Nonetheless, the Bylong Valley area is identified as containing land mapped as part of an Equine Critical Industry Cluster (CIC).

Critical Industry Clusters are concentrations of highly productive industries within a region that are related to each other and contribute to the identity of that region and provide significant employment opportunities. The creation of these Critical Industry Clusters aims to protect this high quality agricultural land from the impacts of coal seam gas and mining activities

The Bylong Valley is also well known for the restoration works known as 'Natural Sequence Farming' (NSF) on the property Tarwyn Park, developed by Mr Peter Andrews in the 1970's. A key feature of NSF is retention of water (both surface and groundwater) in the landscape to increase agricultural productivity and restore degraded riparian ecosystems. KEPCO has acquired the Tarwyn Park property for the development of the mine.

The project area adjoins the Wollemi and Goulburn River National Parks and is also partly located within the Bylong State Forest. While the valley floors in the area of the mine have been extensively cleared for agricultural activity, the project area contains threatened ecological communities and habitat for a range of threatened flora and fauna species.

Bylong State Forest is located within the project's subsidence area (see Figure 5). The forest comprises approximately 652 ha of forest and woodland communities and is targeted for commercial forestry operations.

The Bylong Quarry is also located within the subsidence area. The quarry provides blue metal resources to the region, including for road and rail maintenance.

The project is located within the Bylong River catchment, which is a sub-catchment of the Goulburn River within the larger Upper Hunter River catchment. A number of largely ephemeral watercourses are located within or near the project area, including Bylong River, Lee Creek, Growee River and Dry Creek.

While the project area is within the Western Coalfield, there is no history of coal mining in the Bylong Valley and therefore it is a new land use in a predominantly agricultural setting, albeit surrounded by State Forests and National Parks.

3.3 Land Ownership

The Bylong Valley and surrounding area has a population of around 100 people, mainly on rural properties.

Bylong Village itself comprises three houses and a vacant lot within or near the village precinct. There is also a store (with associated residence), the Bylong Community Hall and the Anglican Church located within the village precinct.

At the time of this assessment report, KEPCO has acquired substantial landholdings around the project site, including 2 of the 3 residences in the Bylong Village precinct. KEPCO has also offered to acquire the Bylong Store and the remaining residence. In addition, KEPCO is also actively negotiating land acquisition or agreements with a further 3 properties in Upper Lee Creek Road and 2 properties to the east of the project (see Figures 5 and 6).

There are two privately-owned properties located within the subsidence area for the project, including one agricultural property (Property ID 138-141), and the Bylong Quarry (Property ID 53-55), as shown on Figure 5. KEPCO has recently acquired the Bylong Upper Public School site from the NSW Department of Education, which is located within the disturbance area for the open cut component of the project.

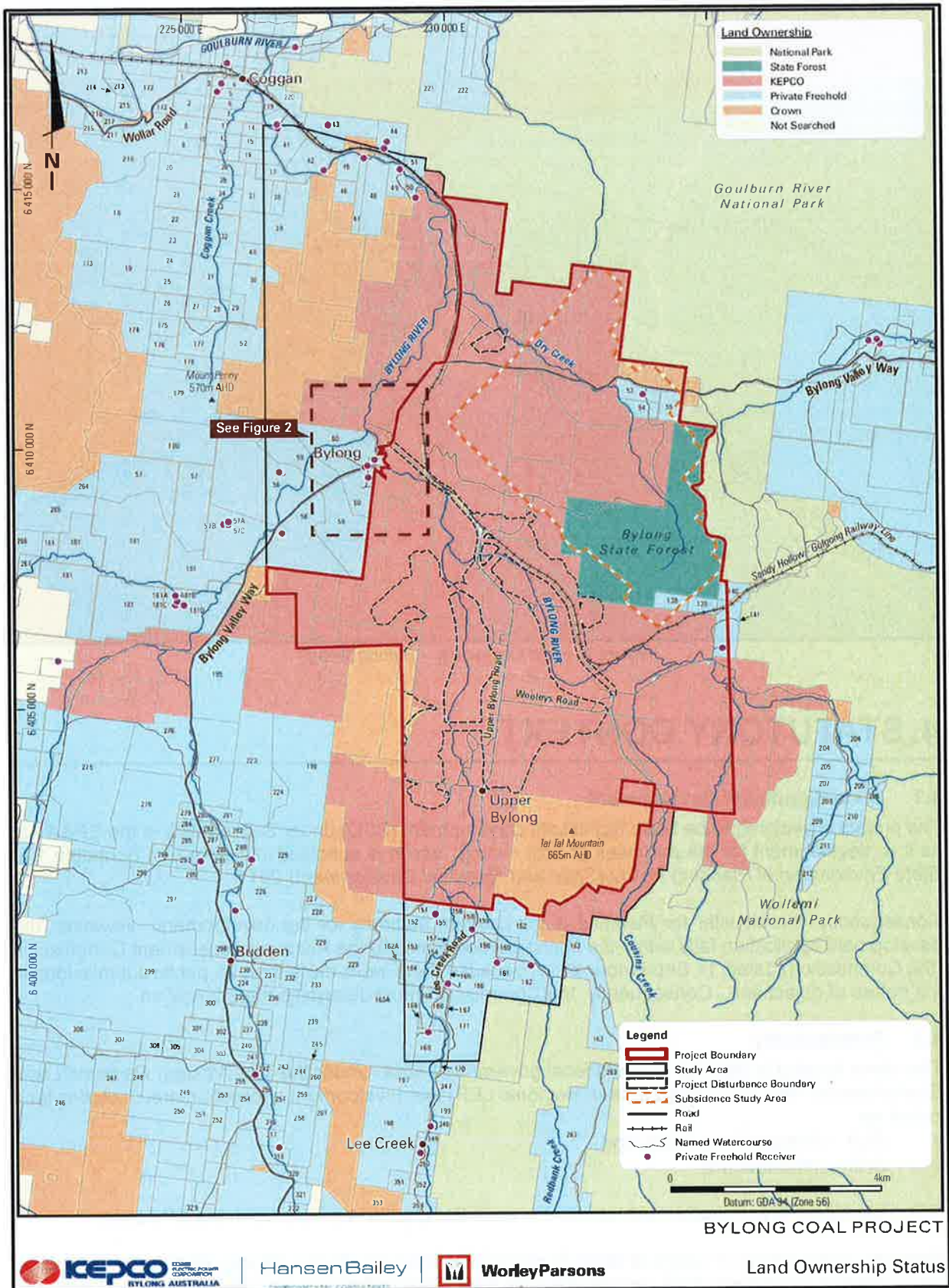


Figure 5: Land Ownership

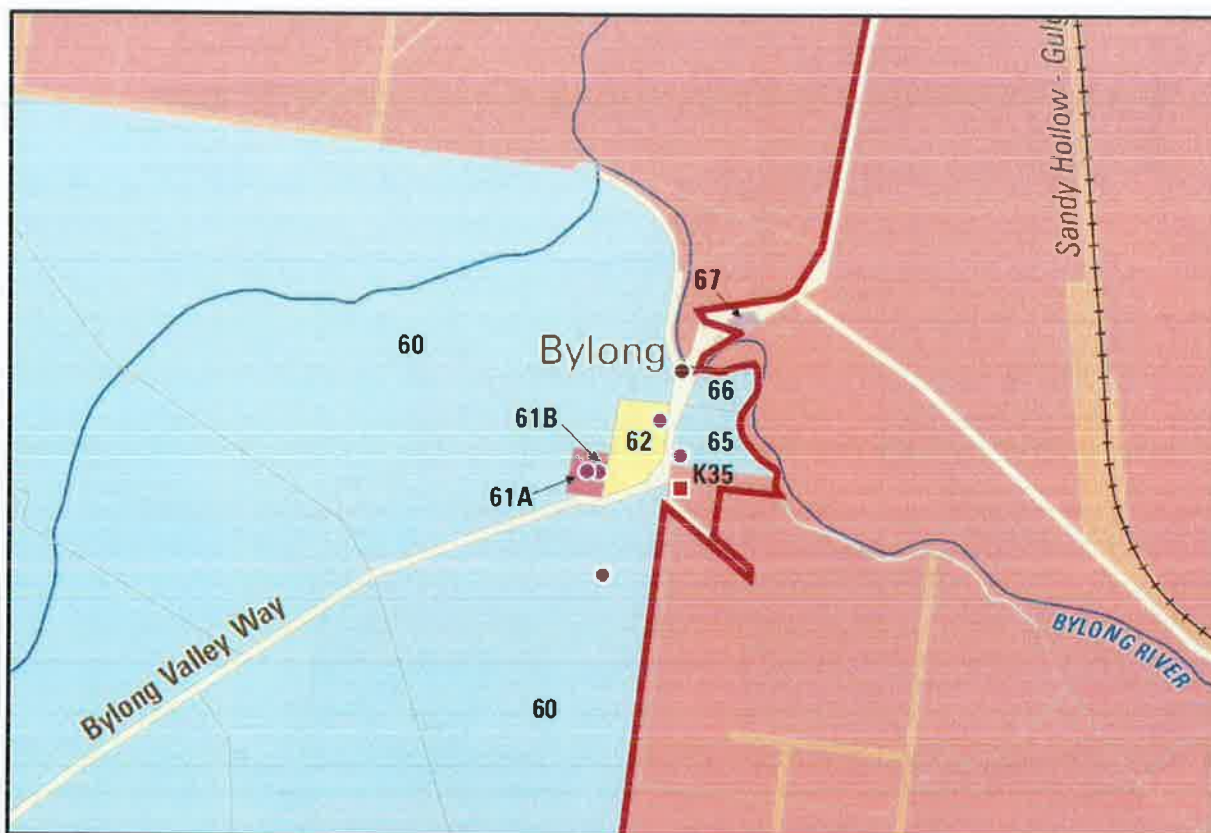


Figure 6: Land Ownership – Bylong Village

4. STATUTORY CONTEXT

4.1 State Significant Development

The project is declared to be State Significant Development (SSD) under Section 89C of the EP&A Act as it is 'development for the purposes of coal mining', which is specified in clause 5 of Schedule 1 to *State Environmental Planning Policy (State and Regional Development) 2011*.

Consequently, the Minister for Planning is the consent authority for the development. However, the development application falls within the Minister's delegation to the Planning Assessment Commission (the Commission) dated 14 September 2011, because there were more than 25 public submissions in the nature of objections. Consequently, the Commission must determine the application.

4.2 Permissibility

The site is located in the Mid-Western local government area. Under the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western Regional LEP) the development application area includes land zoned as:

- RU1 – Primary Production; and
- SP2 – Infrastructure.

Open cut mining is permissible with consent in zone RU1, but it is prohibited in the SP2 zone.

However, under clause 7(1)(b)(i) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, development for the purpose of mining may be carried out on any land where agriculture is a permissible land use. Extensive agriculture may be carried out in the SP2 zone without development consent.

Consequently, the project is permissible with development consent and the Commission may determine the application.

4.3 Integrated and Other NSW Approvals

Under Section 89J of the EP&A Act, a number of approvals are integrated into the SSD assessment process and consequently are not required to be separately obtained for the project. These include:

- various approvals relating to heritage required under the *National Parks and Wildlife Act 1974* and the *Heritage Act 1997*;
- an authorisation under the *Native Vegetation Act 2003* for the clearing of native vegetation; and
- certain water approvals under the *Water Management Act 2000*.

Under Section 89K of the EP&A Act, a number of other approvals are required, but must be substantially consistent with any development consent for the project. These include:

- a mining lease under the *Mining Act 1992*;
- an environment protection licence under the *Protection of the Environment Operations Act 1997*; and
- consent under Section 138 of the *Roads Act 1993* for the re-alignment of public roads and intersection upgrades.

The relevant agencies have been consulted through the assessment process and conditions recommended to address the matters.

KEPCO would also require other approvals for the project which are not integrated into the SSD assessment process, including:

- approval under the *Crown Lands Act 1989* for any works on Crown land;
- approvals under the *Roads Act 1993* from Mid-Western Regional Council (as the responsible roads authority) to permanently close roads within the project area;
- approval for exhumation of burials under the *Public Health Regulation 2012*;
- permit under Section 60 of the *Forestry Act 2012* to authorise the use of Bylong State Forest for non-forestry purposes;
- notification under the *Work Health and Safety (Mines) Act 2013* for high risk activities, including emplacement of reject materials;
- approval for prescribed dams under the *Dams Safety Act 1978*;
- licences to relocate threatened species under the *National Parks and Wildlife Act 1974*; and
- certain water licences under the *Water Act 1912* and the *Water Management Act 2000*.

4.4 Strategic Regional Land Use Plan and Gateway Certificate

The *Upper Hunter Strategic Regional Land Use Plan* (SRLUP, September 2012) provides a framework for balancing strong economic growth with the protection of high value agricultural land within the Upper Hunter region.

One of the first steps in achieving this outcome was the identification and mapping of three categories of strategic agricultural land in the region. These categories include Biophysical Strategic Agricultural Land (BSAL), which is essentially the best farming land in the region, and the Equine and Viticulture Critical Industry Clusters (CICs).

To ensure that potential impacts on these strategic agricultural lands are appropriately considered and minimised, any mining or coal seam gas proposals that occur on strategic agricultural land outside existing mining lease areas must be referred to the independent Mining and Petroleum Gateway Panel. This Gateway Process allows for the early identification of potential impacts on agricultural land and water resources and the determination of any additional information or assessment requirements that are necessary to inform the merit assessment of the proposed development.

The Bylong Coal Project is located within the Upper Hunter SRLUP area, and BSAL and Equine CIC is mapped within the project boundary, the mine disturbance area, subsidence area and proposed biodiversity offset areas. KEPCO was therefore required to obtain a gateway certificate prior to lodging the development application for the project.

The Gateway Panel issued a conditional gateway certificate for the project on 15 April 2014, which included a number of recommendations focusing on the provision of additional information regarding BSAL (see Table 2 and Appendix I). The panel concluded that:

- the open cut mining would have direct and significant impacts on the agricultural productivity of the verified BSAL within the project boundary area;

- indirect impacts on verified BSAL within the project boundary have not been assessed and are potentially significant;
- indirect impacts on potential BSAL adjacent to the project boundary have not been assessed and are potentially significant; and
- there would be a significant impact on Equine CIC.

The Gateway Panel's recommendations were subsequently incorporated into the environmental assessment requirements for the project.

As a result of minor changes to the project following the issue of the gateway certificate prior to lodging the development application, the Department consulted further with the Gateway Panel on its recommendations. The Gateway Panel provided further advice to the Department confirming that the minor changes to the project would not have affected its original Gateway assessment or recommendations.

KEPCO has addressed the Gateway Panel's recommendations in the EIS and in additional information. It is important to note that the Gateway Panel's recommendations were based on preliminary information early in the assessment process and the Gateway Panel has subsequently confirmed that most of its recommendations have been adequately addressed, with the exception of a small number of issues. These recommendations relate to assessment of impacts on the Equine CIC, and contingency measures for BSAL reinstatement and water supply (see Appendix I).

The Department has considered these matters and the Gateway Panel's recommendations in its assessment of the project (see Section 6.4).

Table 2: Gateway Certificate Recommendations

Relevant Criteria	Consideration	Recommendations
17H4(a) (i), (ii), (v), (vi)	The proposal to remove 194.4 ha of verified BSAL soils from within the planned open-cut mining area and the 're-creation' of this BSAL elsewhere lacks precedence and necessary detail.	With regard to the removal and recreation of verified BSAL soils: <ol style="list-style-type: none"> 1. Undertake a risk assessment that identifies the hazards and proposes controls with respect to the movement of BSAL soils. 2. Identify a final location for the verified BSAL soils within the Project Boundary area. 3. Detail the methods proposed for the handling, storage and treatment of the verified BSAL soils. 4. Propose alternate mitigation measures to be implemented in the event that the methodology selected results in the loss of verified BSAL soils post-implementation.
17H4(a) (vi)	Significant impacts are anticipated on highly productive groundwater and the consequent connection between surface and groundwater in modelling requires more detailed evaluation.	<ol style="list-style-type: none"> 1. Develop a more complex transient 3D numerical model for the EIS stage of the Development Application which includes improved time variant input data, more details on recharge, geological imperfections (dykes, sills & faults), fractures from subsidence, and a sensitivity/ uncertainty analysis. 2. Complete baseline studies for the project area to improve knowledge on water levels, and groundwater dependent ecosystems. 3. Provide an assessment of the hydrochemistry of spoil and tailings materials, and potential impact on nearby water sources. 4. Provide a strategy for complying with the rules of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources. In particular the implication of reduced available water determinations (AWDs) and the cease to pump rule. 5. Supply a plan for monitoring actual water take and how any changes from the predictions will be accounted for with water licences and remediation.
17H4(a)(i)	Mine waste emplacements have been designed with steep slopes to minimize footprint disturbance areas.	<ol style="list-style-type: none"> 1. Conduct an analysis of short and long term geotechnical stability risk of waste emplacement slope gradients. 2. Demonstrate that all final landform slope gradients are geotechnically stable in the long-term and have factors of safety of 1.5 or better. 3. Demonstrate that all final landform slope gradients are erosionally stable.
17H4(b)(i), (ii),(iii),(iv), (v)	NSW Government has verified 1,933 ha of land within the Project Boundary area as Equine CIC land. The potential impacts of the Project on the Equine CIC have not been properly assessed.	<ol style="list-style-type: none"> 1. Using the Guideline for Gateway Applicants (September 2013) by Department of Planning & Infrastructure, provide a compliant and comprehensive assessment of the Project's potential impacts on the Equine CIC.

4.5 Commonwealth Approvals

On 12 March 2014, a delegate for the then Commonwealth Minister for the Environment determined the Bylong Coal Project (EPBC 2015/7431) to be a "controlled action" in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to likely significant impacts to listed threatened species and communities (Sections 18 and 18A) and a water resource (Sections 24D and 24E).

The assessment process under the EP&A Act has been accredited under a bilateral agreement with the Commonwealth Government. This means that the NSW Government is undertaking the assessment on behalf of the Commonwealth and must assess matters of national environmental significance (MNES).

The Department's assessment of the potential impacts of the project on controlling provisions under the EPBC Act relating to biodiversity and water resources is provided in Section 6.7. Further information on the matters that the Commonwealth Minister must consider under the EPBC Act is provided in Appendices K and L.

As required under the bilateral agreement, the Department sought advice from the Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC) about the potential impacts of the project on water resources (see Appendix H). This advice has been considered by the Department in Section 6.3 and incorporated into the recommended conditions of consent (see Appendix M).

4.6 Section 79C Considerations

Section 79C(1) of the EP&A Act outlines the matters that a consent authority must take into consideration when determining development applications.

These matters can be summarised as:

- the provisions of environmental planning instruments (including draft instruments), development control plans, planning agreements, and the EP&A Regulations;
- the environmental, social and economic impacts of the development;
- the suitability of the site;
- any submissions; and
- the public interest, including the objects of the Act which include encouraging Ecologically Sustainable Development (ESD).

The Department has considered all of these matters in its assessment of the project, as summarised in Section 6 of this report. The Department has also given specific consideration to the relevant provisions of environmental planning instruments in Section 6 and Appendix J.

4.7 NSW Planning Assessment Commission

On 9 January 2017, the Minister for Planning asked the NSW Planning Assessment Commission (the Commission) to review the project. Due to the level of public interest in the project, the Minister also requested the Commission to hold public hearings during the review. The terms of reference for the Commission review are set out in the following table.

Table 3: Terms of Reference for the Commission's Review of the Bylong Coal Project

<ol style="list-style-type: none"> 1. Carry out a review of the Bylong Coal Project, and: <ol style="list-style-type: none"> a) consider the EIS for the project, all issues raised in public and agency submissions, and any other information provided on the project during the course of the review; b) assess the merits of the project as a whole having regard to all relevant NSW Government policies, paying particular attention to: <ul style="list-style-type: none"> - the impacts on the water and agricultural resources of the Bylong Valley; - the social impacts on the Bylong village and surrounds; - impacts on heritage values associated with the Tarwyn Park property, including natural sequence farming; - the justification for the open cut stage of the project, and if necessary; c) recommend appropriate measures to avoid, minimise, and/or manage significant impacts of the project. 2. Conduct public hearings during the review as soon as practicable after the Department of Planning and Environment provides its preliminary assessment report to the Commission. 3. Submit its final report on the review to the Department of Planning and Environment within 12 weeks of receiving the Department's preliminary assessment report, unless the Secretary agrees otherwise.

5. CONSULTATION

5.1 Exhibition

Under Section 89F of the EP&A Act the Secretary is required to publicly exhibit the EIS for the project for at least 30 days.

After accepting the EIS for the project, the Department:

- publicly exhibited the EIS from 23 September 2015 until 6 November 2015 at the:
 - Department's Information Centre in Sydney;
 - Mid-Western Regional Council offices in Mudgee, Rylstone and Gulgong;
 - Kandos Library;
 - Nature Conservation Council's office; and
 - Department's website;
- notified relevant State government authorities and Council by email;
- notified relevant electricity supply and transmission authorities in accordance with the infrastructure SEPP;
- notified relevant road authorities in accordance with the Mining SEPP;
- provided copies of the EIS to the two relevant Local Aboriginal Land Councils for further input from the Aboriginal community; and
- advertised the exhibition in the Sydney Morning Herald, the Daily Telegraph, the Australian, the Financial Review, the Mudgee Guardian and the Muswellbrook Chronicle.

In undertaking these processes, the Department has satisfied the requirements of Section 89F of the EP&A Act, the Mining SEPP, the Infrastructure SEPP and the Mid-Western Regional LEP.

5.2 Additional Consultation

In addition to the formal exhibition, the Department arranged a public information session in the Bylong community hall on 14 October 2015. The meeting was attended by around 40 persons, mainly from the local area.

Representatives from the Environment Protection Authority, Division of Resources and Energy, and Department of Primary Industries - Water also attended.

During the meeting, the Department explained the development assessment process, the procedures for making submissions, and invited members of community to ask questions about the process and raise any concerns about the project.

As part of a peer review of social impacts, and in response to issues raised in submissions, the Department met with Mid-Western Regional Council and members of the local community and held a further meeting on 19 April 2016, focusing on social impacts.

The Secretary of the Department and the then Minister for Planning also met with the local community at the Bylong Hall and undertook a site visit, including a visit to the Tarwyn Park property on 5 April 2016 to hear concerns first hand and to see the site for themselves.

The Department also met and/or discussed the project with key government agencies throughout the assessment of the project, including the Environment Protection Authority, the Office of Environment and Heritage, Division of Resources and Energy, Department of Primary Industries – Water, and the Commonwealth Department of Environment and Energy.

5.3 Submissions

The Department received 364 submissions³ in response to the exhibition of the EIS, including 315 from individuals, 14 from public authorities and 35 from special interest groups/ organisations. A small number of submissions were provided after the end of the exhibition and included in the submission totals. A summary of submitters and the key issues raised in submissions is provided below, and a full copy of the submissions is provided in Appendix B.

³ There were multiple submissions from some individual submitters.

Table 4: Summary of Submitters

Submitters	Number	Objection / Support
Agency	14	No objections
<ul style="list-style-type: none"> • Australian Rail Track Corporation (ARTC) • Department of Primary Industries (DPI), including: <ul style="list-style-type: none"> - DPI Water - DPI Lands - DPI Fisheries - DPI Agriculture • Division of Resources and Energy (DRE) within the NSW Department of Industry • Environment Protection Authority (EPA) • Forestry Corporation of NSW • Heritage Division of the Office of Environment and Heritage (OEH) • Mid-Western Regional Council (MWRC) • Muswellbrook Shire Council (MSC) • NSW Health • NSW Rural Fire Service • Office of Environment & Heritage (OEH) • Roads and Maritime Services (RMS) • Subsidence Advisory (formerly Mine Subsidence Board) • Transport for NSW (TNSW) 		
Special Interest Groups/ Organisations	35	31 object, 2 support, 2 comment
<ul style="list-style-type: none"> • Anglican Diocese of Bathurst Parish of Rylstone-Kandos • Barrett Industry Consulting • Bathurst Community Climate Action Network • Birdlife Australia • Blue Mountains Conservation Society Inc. • Brockman Eco-Consulting • Bylong Valley Protection Alliance (BVPA) • Capertee Valley Alliance Inc. • Carleon Mudgee Pty Ltd • Central West Environment Council • Climate Change Australia – Hastings Branch • Coombadri Ecclesia Society • Correct Planning and Consultation for Mayfield Group • Denman, Aberdeen, Muswellbrook and Scone Healthy Environment Group • Glencore Ulan Coal Mine • Hunter Communities Network • Hunter Environment Lobby Inc • Hunter Thoroughbred Breeders Association • Lock the Gate Alliance • Merriwa Healthy Environment Group • Mudgee District Environment Group • Murrumbo Station • Nature Conservation Council • Newcastle Public Health Professionals, Redhead • Nexus Law Group on behalf of Locaway Pty Ltd • NSW Farmers Association • Orange Field Naturalists and Conservation Society • Peabody Energy – Wilpinjong Coal Mine • Running Stream Water Users Association • Ryde-Hunters Hill Flora and Fauna Preservation Society • Rylstone District Environment Society • Stop Coal Seam Gas Blue Mountains, Springwood • Timnath Pty. Ltd • The Australian Institute • Wollar Progress Association 		
Community	315	
Approx. distance from the Bylong Coal Project:		
• < 5km (Bylong Valley area and surrounds)	14	12 object & 2 support
• 5 – 60 km (Nearby towns ⁴)	66	61 object & 5 support
• > 60 km	235	232 object & 3 support
TOTAL	364	336 object & 12 support

⁴ Including surrounding towns of Mudgee, Rylstone, Kandos, Wollar, Gulgong, Denman, Sandy Hollow and Merriwa.

5.4 Response to Submissions

In March 2016, KEPCO provided a detailed Response to Submissions (RTS) (see Appendix C).

The Department placed a copy of the RTS on its website, and forwarded a copy to key agencies for comment. A number of special interest groups and landowners also provided additional submissions to the Department. A copy of these responses is provided in Appendix D.

Due to residual issues raised in these submissions, KEPCO provided an additional Supplementary RTS to the Department in August 2016 (see Appendix E).

Final agency advice and additional information provided by KEPCO to address issues raised by the Department and other agencies is provided in Appendix F.

5.5 Public Authorities

None of the public authorities object to the project. However most of the authorities raised concerns about the potential impacts of the project, and made recommendations as to how these impacts should be avoided or minimised.

A summary of the residual issues raised by agencies is provided below.

Division of Resources and Energy (DRE) supports the project as a responsible use of the State's coal resources, and considers that the project would generate considerable employment opportunities and economic benefits for the region and NSW.

DRE raised some initial concerns about the level of rehabilitation of the rail loop and internal roads, however KEPCO confirmed in its RTS that it would fully decommission the rail loop and structures, and DRE subsequently advised it was satisfied with the proposed rehabilitation of the site.

Environment Protection Authority (EPA) initially raised concerns about the assessment of low frequency noise, air quality (diesel emissions) and surface water. KEPCO addressed these matters in detail in its RTS and subsequent documentation.

The EPA recommended conditions with regard to monitoring of low frequency noise, the application of noise penalties to monitored results and to validating the low frequency noise assessment of the mine's operations following commencement of open cut operations. The Department has incorporated these matters in its recommended conditions of consent.

With regard to fine particulates from diesel emissions, while the air modelling predicts that relevant ambient air quality standards would be met, the Department recognises EPA's current industry-wide initiative to minimise diesel emissions associated with mining and industrial activities. The Department has recommended conditions that KEPCO implement all reasonable and feasible measures to minimise diesel emissions, in consultation with EPA.

Office of Environment and Heritage (OEH) raised concerns relating to biodiversity and Aboriginal heritage. With regard to biodiversity, OEH recommended revisions to vegetation mapping, modification to one longwall panel to reduce subsidence impacts on a significant cliff line, an additional offset area for Fuzzy Box Woodland, and further baseline and impact monitoring of bat roost sites and cave-dwelling micro-bats. KEPCO subsequently committed to addressing these recommendations and the Department has recommended conditions that address the revisions proposed by OEH.

With regard to Aboriginal heritage, OEH recommended further assessment be undertaken on the potential ochre quarry site to confirm whether it was a quarry site, or ochre source. OEH also recommended that additional sub-surface excavation be undertaken within the open cut mining footprint and that biodiversity offset areas be surveyed for Aboriginal heritage values.

Further, OEH recommended that given cumulative impacts on Aboriginal sites from mining operations in the Western Mining Precinct, a regional rock art/ ochre study be undertaken in consultation with the Aboriginal community. The Department supports OEH's advice and has recommended conditions to address these matters.

OEH's Heritage Division (as delegate for the NSW Heritage Council) recommended that KEPCO continue to liaise with Mid-Western Regional Council regarding potential inclusion of heritage items on the Heritage Schedule of the Mid-Western Region Local Environmental Plan 2012, investigate the potential to relocate impacted heritage structures to alternative locations, prepare Conservation Management Plans for all heritage sites owned by KEPCO outside the disturbance area, and prepare an Interpretation Plan as part of the Heritage Management Plan. Heritage Division also recommended the conditions include further investigation on heritage sites be undertaken prior to disturbance of the sites.

The Heritage Council has also recently received a State Heritage Register nomination for Tarwyn Park. This is discussed in further detail in s6.5 below.

The Department has recommended conditions to address the Heritage Division's concerns.

Department of Primary Industries (DPI) provided comments from its various divisions.

DPI Water raised a number of residual issues including request for additional information on the borefield layout, alluvial pump tests to assess borefield reliability, clear commitment to specific make good provisions for affected landowners, provision of detailed bore logs and conceptual models. DPI Water also raised concerns about connectivity/hydraulic conductivity between the alluvium and sub-cropping coal seams and recharge to groundwater.

KEPCO commissioned further groundwater modelling in consultation with DPI Water and the Department to address these concerns. DPI Water has made a number of recommendations in relation to water licensing, monitoring, ongoing groundwater model validation and development. The Department has incorporated these recommendations into its recommended conditions.

DPI Agriculture also raised a number of residual issues and requested further detailed maps and tables clarifying impacts to BSAL and Equine CIC, commitment to reinstatement of impacted BSAL within the project disturbance boundary, need to develop quantitative and measureable criteria for reinstatement of BSAL, commitment to ongoing use of better quality agricultural land (such as cultivated land) within offset areas, review of soil volumes for rehabilitation, and visual screening of the project from surrounding agricultural landholdings.

Following provision of additional information, DPI Agriculture confirmed that it is satisfied that the additional information addressed its concerns and recommended that KEPCO should continue to manage its lands for irrigated agriculture (outside the disturbance footprint).

DPI Fisheries had no concerns with the project with regard to direct impacts on aquatic habitats. However, it advised that water loss from alluvial systems and impacts on downstream receiving waters should be considered. The Department has considered this issue in its assessment of the impacts on water, including on groundwater dependent ecosystems and aquatic ecology.

DPI Lands identified crown land parcels where access easements and potential land acquisition would be required. KEPCO has lodged applications for closure of unused "paper" crown roads and would continue to consult with DPI Lands on access arrangements and potential acquisition of crown land.

Forestry Corporation of NSW made comments in relation to the need to maintain access through KEPCO owned land to the Bylong State Forest, need for compensation arrangements for permanent loss of timber resource and public safety and post-mining environmental liabilities from subsidence. The Department has recommended conditions to address Forestry NSW's concerns. In addition, the Department also notes that KEPCO is required to enter a separate land access agreement with Forestry NSW.

NSW Health queried the management and performance of discharges from the water management system, notification requirements to the community as a result of air quality monitoring and need for ongoing consultation with NSW Health on exhumations from the church cemetery grounds (now owned by KEPCO). The Department has recommended conditions that address these concerns, including

requirements for Air Quality and Water Management Plans and a Burial Management Plan to be prepared in consultation with NSW Health.

Roads and Maritime Services (RMS) raised concerns relating to road safety and commitments to manage driver fatigue and mine commuter safety. In particular, RMS considered there was a lack of certainty for implementing and achieving measurable and successful management strategies. For example, commitments to car-pooling and bussing of employees and avoiding shift changes to school bus pick and drop off times are not firmly locked in.

The Department agrees that these commitments should be clarified and has recommended that KEPCO prepare a Traffic Management Plan that includes measures and commitments towards improving road safety through implementation of these measures in consultation with RMS.

Transport for NSW (TfNSW) requested additional information on traffic movements, types of heavy vehicles and dangerous goods routes and clarification of train movements. KEPCO provided additional information in its RTS. TfNSW did not provide any further comment on the project.

Rural Fire Service (RFS) made a number of recommendations to meet its policies and procedures including provision of asset protection zones (APZ), property access, ensuring adequate water supply for fire-fighting and emergency and evacuation procedures.

KEPCO subsequently committed to preparing and implementing a Bushfire Management Plan in consultation with the RFS and in accordance with relevant guidelines and standards. The Department has also recommended conditions requiring KEPCO to ensure it is suitably equipped to respond to fires and to assist RFS and other emergency services as far as practicable where there are fires in the vicinity of the project.

Australian Rail Track Corporation (ARTC) did not raise any specific concerns, however, reiterated that the rail noise impacts of the project be assessed in accordance with the *Rail Infrastructure Noise Guideline* (RING), and that any rail capacity constraints be identified. ARTC provided additional advice confirming that rail capacity assessment was undertaken using the smaller 88 wagon trains, and that future changes to the larger capacity 91 or 96 wagon trains would have less impact on the line's capacity.

ARTC did not identify any further rail capacity concerns and the Department notes that an assessment against the RING was undertaken for the assessment of the project (see Section 6.1).

Subsidence Advisory (formerly Mine Subsidence Board) referenced the *Mine Subsidence Compensation Act 1961* and requested conditions requiring KEPCO to mitigate or repair existing surface improvements damaged by subsidence. The Department has recommended conditions that meet this requirement.

Mid-Western Regional Council (MWRC) advised that it supported the project, subject to the temporary workforce accommodation facility (WAF) not being constructed. Council considers that the construction workforce peak is inflated and that there would be sufficient accommodation capacity in Mudgee and other villages, based on managing peak construction workforces previously in the region.

However, Council has advised the Department that it would support a condition requiring a further accommodation survey be undertaken prior to construction commencing and that a smaller WAF should only be allowed to proceed if the survey clearly indicated an accommodation shortfall.

Other concerns raised by Council relate to:

- **Traffic** - MWRC requested that a no-WAF option should be assessed and that road maintenance agreements need to be negotiated, including maintenance of subsidence impacts along Bylong Valley Way, road safety audit should be completed to identify and prioritise road safety treatments, and form basis for negotiations towards capital upgrades – particularly between Wollar Village and Ulan Road;
- **Heritage** - support for the nomination of Tarwyn Park for an Interim Heritage Order (IHO) and further exploration of options for relocating heritage structures;
- **Agriculture** - impacts on agricultural land and ability to rehabilitate disturbed areas back to BSAL;
- **Water** - potential impacts on groundwater and surface water resources;

- *Biodiversity* - loss of biodiversity values and productive agricultural land through biodiversity offsets; and
- *Cumulative impacts* - including further expansion of mining in the region.

Muswellbrook Shire Council (MSC) raised concerns on the traffic impact assessment and considered that more traffic than predicted could travel from the east along Bylong Valley Way to the site. MSC were also concerned on heavy vehicle traffic and safety issues, particularly around Cox's Gap and that KEPCO should providing road maintenance funding.

KEPCO undertook further traffic assessment and a road safety audit as a component of the response to submissions. To address some of the safety concerns, the Department has recommended a condition restricting larger heavy vehicles from travelling on the Bylong Valley Way from the east, with only light rigid and medium rigid vehicles up to 10 tonnes permitted to travel.

KEPCO has also offered \$40,000 payment towards safety upgrades based on its life of mine traffic contribution percentage, with costs based on estimates of MSC from a road safety audit it completed in 2015.

5.6 Community Submissions

Of the 350 submissions from special interest groups and the general public, 336 objected, 12 supported, and 2 submissions made comments that did not support or object the project.

Of the 315 submissions from individuals, 14 were from residents within the Bylong Valley area, 66 were from residents residing in the regional area and local towns (within around 60 km of the project) including the regional centre of Mudgee, and 235 were from other locations.

Of the 14 submissions from local residents, 2 supported the project and the remaining 12 objected.

The majority of submissions in support of the project were from residents living in the regional area, particularly in the surrounding towns. The key reasons for support of the project related to its employment and socio-economic benefits, particularly for the Mudgee area. A number of special interest groups or organisations also supported the project citing the benefits to business and employment in the region.

The Department received substantial submissions from the Bylong Valley Protection Alliance which was supported by five reports/peer reviews of the EIS in relation to water, subsidence, ecology, economics and noise. The issues raised in these peer reviews have been considered in KEPCO's response to submissions, by applicable independent experts commissioned by the Department, and in the Department's assessment summarised in Section 6.

A breakdown and summary of the key issues raised by special interest groups and individuals is provided below.

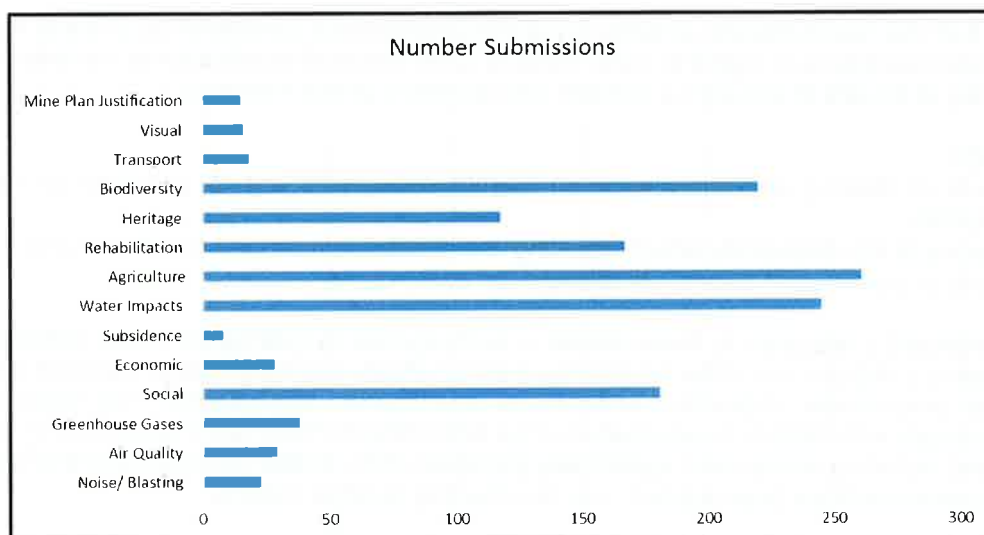


Figure 7: Key Issues Raised in Public Submissions

The key issues raised in submissions related to the impacts of the project on agriculture, water resources, biodiversity, social, rehabilitation and heritage.

Agriculture and rehabilitation:

- that there should be no impacts on BSAL and CIC;
- loss of water from agricultural production to mining;
- costings used in the Agricultural Impact Statement that were considered to be incorrect;
- not addressing the recommendations of the Gateway Certificate; and
- the ability to rehabilitate soils back to BSAL.

KEPCO has provided further consideration of these matters in its Response to Submissions and the Department has considered further advice from the Gateway Panel and DPI-Agriculture on the agricultural impacts.

The Department notes that DPI-Agriculture's advice does not object to the loss of BSAL within the project disturbance area, provided that the BSAL (or BSAL-equivalent) is reinstated within the rehabilitation area to ensure no net loss of BSAL in the locality. The Department has recommended conditions for re-instatement of BSAL against defined performance and completion criteria including a protocol for BSAL verification. Section 6.4 of this report provides a summary of the Department's consideration of these matters, particularly on avoidance and mitigation of impacts on BSAL and CIC.

Water Resources:

- over-allocation of water from the Bylong River water source and whether there is sufficient water available for mining operations;
- lack of confidence in groundwater modelling predictions;
- the need to undertake additional pump testing;
- water licensing – including effect of cease to pump rules;
- subsidence impacts on water resources; and
- ability to provide "make good provisions" to replace water if agricultural operations were to be impacted.

Many of these concerns, particularly on the confidence in groundwater modelling predictions, were also raised by DPI-Water and groundwater expert Dr Frans Kalf, who conducted an independent peer review of groundwater modelling. Substantive additional groundwater modelling, including additional pump testing was undertaken by KEPCO to address these concerns along with reconfiguration of the proposed borefield to reduce drawdown impacts around the confluence of the Bylong and Growee Rivers.

This additional modelling predicted that all private bores would be outside the zone of influence of groundwater drawdown and would therefore meet minimal impact criteria specified under the NSW Government's *Aquifer Interference Policy* (AIP).

Section 6.3 of this report provides a summary of the Department's consideration of these matters and recommended conditions in regard to water impacts, given the local significance of the water resources in the vicinity of the site to ensure the impacts are minimised and/or managed.

Biodiversity:

- impacts of clearing and subsidence on threatened species and in particular on the Regent Honeyeater;
- adequacy of the biodiversity offset, including use of subsidence areas for offsets; and
- impacts to groundwater dependent and riparian ecosystems.

KEPCO provided a response to these issues in its Response to Submissions and undertook further assessment to justify the use of the subsidence area for offsets and measures to minimise and mitigate impacts to groundwater dependent ecosystems and riparian ecosystems. The Department has consulted closely with OEH in the application of the *NSW Offsets Policy and Framework for Biodiversity Assessment*, including assessment against key principles of the offsets policy to ensure avoidance and mitigation measures have been applied, prior to offsetting residual impacts.

KEPCO provided an offset strategy in accordance with this policy, including avoidance and mitigation measures prior to offsetting the residual impacts. Section 6.6 of this report provides a summary of the Department's consideration of these matters and recommended conditions to manage and offset biodiversity impacts.

Social impacts:

- the loss of community through acquisitions in the Bylong Valley area;
- the operation of a WAF in the local area;
- impacts on Bylong village community and surrounding area;
- impacts on regional infrastructure and services, including the school closure;
- lack of consultation by KEPCO with the local community and stakeholders; and
- exhumation of remains from the Upper Bylong Catholic Church.

The Department engaged Elton Consulting to undertake an independent peer review of the social impact assessment, including undertaking further engagement with the local community. The concerns identified above were also emphasised through this engagement process with Elton making a number of recommendations to further consider these concerns and mitigate the residual social impacts on the remaining community as far as possible. As discussed above, the Department has recommended that the WAF does not proceed unless there is insufficient accommodation capacity available to support the construction workforce.

These recommendations have been carefully considered and incorporated wherever possible with recommendations for the establishment of the a Community Consultative Committee, support to direct Planning Agreement funding toward local community infrastructure and services and the maintenance of agricultural productivity on farmland. Section 6.9 of this report provides a summary of the Department's consideration of these matters, how Elton Consulting's recommendations have been addressed and recommended conditions in regard to social impacts.

The Department has also recommended the preparation and implementation of a Social Impact Management Plan. The plan would need to be prepared in consultation with the Council, the Community Consultative Committee and the local community, and include an adaptive management and mitigation program to minimise and/or mitigate negative social impacts during construction, operations and following closure of the mine.

Heritage impacts:

- impacts on Tarwyn Park particularly on natural sequence farming areas; and
- impacts on Aboriginal heritage sites.

The Department notes that natural sequence farming features on Tarwyn Park would not be affected by the project. However, a small portion of the alluvial floodplain would be disturbed for a proposed access road and mine infrastructure. KEPCO has committed to maintaining the natural sequence farming techniques or similar soil hydrology techniques on the property. The Department notes that the Minister for Planning, in its direction to the Planning Assessment Commission to undertake a review of the project has requested particular attention on the impacts of the project on Tarwyn Park.

In regard to Aboriginal heritage, the Department notes that OEH was generally satisfied with the assessment and proposed mitigation measures, but recommended that KEPCO implements a number of recommendations in relation to the ochre site and investigation of archaeological values in offset sites. The Aboriginal community was consulted in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010) and provided input into the preparation of the cultural heritage impact assessment and the adopted mitigation measures.

Section 6.5 of this report provides a summary of the Department's consideration of these matters and recommended conditions in regard to heritage impacts including the preparation and implementation of a comprehensive Heritage Management Plan covering both Aboriginal and historic heritage.

Other issues:

- *Mine Plan* - mine plan justification and the need for the open cut;
- *Economics* - accounting for externalities, coal price fluctuation, impacts on tourism and support for local stimulus, employment and royalty payments;
- *Noise/ Blasting* - amenity and health-related impacts, low frequency noise and low rural background noise levels;
- *Air quality* – dust emissions, new standards proposed by the National Environment Protection Council, diesel emissions (on-site and from rail corridor) and spontaneous combustion;
- *Greenhouse gas emissions* – need to reduce reliance on fossil fuels, contribution of burning of coal to climate change;
- *Subsidence* – impacts on Bylong Valley Way and road users, remediation of subsidence damage, far-field impacts and accuracy of predictions;
- *Transport* – closure of local roads, increased traffic through Wollar village and Munghorn Gap Nature Reserve and road safety concerns; and
- *Visual/ Light* – impacts on scenic landscape amenity along Bylong Valley Way, visual and lighting impacts at rural receptors.

Sections 2.1 (Economic Benefits), 2.3 (Mine Design), 6.1 (Air Quality, Noise and Blasting), 6.2 (Subsidence), 6.7 (Traffic and Transport) and 6.8 (Visual) of this report provide a summary of the Department's consideration of the concerns raised in submissions and recommended conditions to minimise or mitigate them.

6. ASSESSMENT

In accordance with Section 79C of the EP&A Act, the Department has considered the following in its assessment of the project:

- the environmental, social and economic impacts of the project, including KEPCO's EIS and RTS;
- all submissions received throughout the assessment process, including advice from public authorities;
- additional information provided by KEPCO to further address issues raised during the assessment process
- the gateway certificate for the project;
- advice from the Independent Expert Scientific Committee (IESC) on coal seam gas and large coal mining development which provides scientific advice on impacts on water resources;
- applicable environmental planning instruments and draft instruments;
- other relevant NSW Government policies and guidelines, including the *Upper Hunter Strategic Regional Land Use Plan* (SRLUP) and the *Voluntary Land Acquisition and Mitigation Policy*;
- the suitability of the site for the project;
- relevant provisions of the EP&A Act and Regulations, including the objects and Section 5A of the Act; and
- the public interest.

The Department also commissioned three independent experts during the assessment process to review certain key aspects of the project. These reviews included an:

- **Economic Review** – the Department commissioned Centre for International Economics (CIE) to undertake a review of the economic assessment, focusing on the Benefit Cost Analysis undertaken by Gillespie Economics for the project;
- **Groundwater Review** – the Department commissioned Dr Frans Kalf to undertake an independent peer review of the groundwater impact assessments contained in the EIS and RTS to evaluate the adequacy and accuracy of the predicted groundwater impacts of the project; and
- **Social Impact Assessment Review** – the Department commissioned Elton Consulting to undertake a review of the Social Impact Assessment completed for the project, including direct engagement with key stakeholders and the locally affected community.

Copies of these peer reviews and responses from KEPCO are provided in Appendix G.

6.1 Air Quality, Noise and Blasting

Introduction

The project would introduce noise, blasting and air quality impacts above background levels in the Bylong area. This is because the proposed mine is a greenfield project based in a rural setting, an area that is dominated by agriculture rather than industrial activities.

On this basis, objectors (including a number residents of the Wollar and Bylong communities) raised concerns that noise and dust levels would be unacceptable as a result of the project. A number of submissions from residents in the vicinity of the project and also further afield raised amenity and health issues resulting from dust emissions as key concerns. The concerns also featured at the Bylong community information event held in October 2015.

Many of the submissions also questioned the accuracy of the predictions within the environmental assessments, and raised concerns that impacts would be greater than KEPCO have predicted. Similar claims have also been raised consistently for other mines in the area. The Department notes that the air quality and noise modelling completed for the project adopt worst-case operational scenarios over the project life and that impacts have been assessed in accordance with assessment methodologies approved by the EPA.

The impacts resulting from the predicted noise, blasting and dust impacts, are discussed in the following sections. It is noted that, since the exhibition of the EIS, KEPCO has acquired a number of the properties predicted to be affected by noise and/or dust.

Air Quality

The EIS includes a specialist air quality assessment undertaken by Pacific Environment Limited (PEL), as well as a peer review of the assessment by Jacobs Group Australia. The assessment was undertaken in accordance with applicable guidelines including the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* and the NSW Government's *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments (VLAMP)*.

The air quality assessment includes consideration of:

- dust (particulate matter) associated with construction and mining operations;
- blast fume emissions (NO₂);
- diesel emissions (NO₂, CO and SO₂) associated vehicles and equipment;
- odour and other fumes associated with spontaneous combustion; and
- emissions associated with off-site rail haulage.

Cumulative contributions from the Wilpinjong mine were also considered as part of the assessment, although these contributions were found to be small given that it is located around 25 km west of the project.

The EPA noted that the air quality assessment was based on a relatively limited amount of background air quality monitoring data, which was due to a considerable amount of instrument failure during the 3 year baseline monitoring period. Nevertheless, the EPA accepts that the monitoring provides a full 12 month period of baseline data, and that the data is likely to represent prevailing conditions in the area.

Reasonable and Feasible Mitigation Measures

KEPCO proposes to implement a proactive air quality management system that uses a combination of real-time dust monitoring and weather forecasting to guide the day-to-day planning of mining operations. The system would be used to prevent air quality impacts during these adverse weather conditions as far as practicable.

The Department notes that such active management systems are now common for mining projects in places like the Hunter Valley, with results indicating that predicted impacts (particularly in relation to short-term dust impacts) are able to be significantly reduced or eliminated due to adaptive management in response to weather conditions.

KEPCO has also committed to implementing a number of other best practice mitigation measures to controlling air emissions, including:

- using water carts and/or dust suppressants on all active haul roads;
- limiting vehicle travel speed on haul roads to an average of 40 km/hr;
- maintaining 80% control efficiency on haul roads;
- using larger capacity trucks (minimum of 220t);
- installing dust control systems on drill rigs;
- orienting coal stockpiles along the prevailing wind/valley axis;
- using spray systems for coal stockpiles;
- restricting blasting during adverse meteorological conditions;
- installing dust suppression sprays or partial enclosure of ROM hopper;
- shielding on at least one side of conveyors;
- minimising drop heights to coal stockpiles;
- loading profiles for trains to minimise potential for dust emissions;
- installing dust suppression sprays on the train loader; and
- progressive rehabilitation of disturbed areas.

These measures have largely been adopted from and are consistent with the *NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining (2011)*, commissioned by the EPA.

While KEPCO has considered reasonable and feasible air quality mitigation measures associated with the project, the EPA raised some concerns about the adequacy of measures to minimise diesel particulate emissions. This is considered in more detail under a separate heading below.

Dust Impacts – Privately Owned Land

Based on the implementation of the applicable mitigation measures, the air quality assessment modelled total suspended particulates (TSP), fine particulate matter (PM₁₀ and PM_{2.5}) and deposited dust for three representative mining scenarios during open cut mining operations, namely Years 3, 5 and 9, which are considered to be representative of worst case operational scenarios for the project.

Consideration was also provided to a representative year during underground mining operations (ie. Year 18), but emissions were found to be less than 17% of the emissions estimated to occur during open cut mining, and therefore modelling was not considered necessary.

Similarly, emissions during the construction phase of the project were found to be less than 20% of the emissions estimated to occur during open cut mining, and therefore modelling of construction impacts was also not considered necessary.

The assessment found that the worst case dust emissions associated with the project are unlikely to result in any exceedances of the applicable air quality criteria at any privately-owned receivers in the locality, due to the project alone or cumulatively, noting that KEPCO has now acquired the Bylong School site from the Department of Education.

The predicted worst case dust impacts are shown on Figure 8, and outlined in Table 5.

Table 5: Worst Case Dust Predictions (cumulative unless otherwise noted)

Receiver	PM ₁₀ (µg/m ³)		PM _{2.5} (µg/m ³)		TSP (µg/m ³)	Dust Deposition (g/m ² /month)	
	24 Hour	Annual	24 Hour	Annual	Annual	Increment	Cumulative
Impact assessment criterion	50	30	25	8	90	2	4
All private receivers, all years)	40	16	25	6	49	0.2	1

As indicated on the figure and in the table, exceedances of the dust criteria would be restricted to KEPCO-owned land, along with relatively small areas of Crown land.

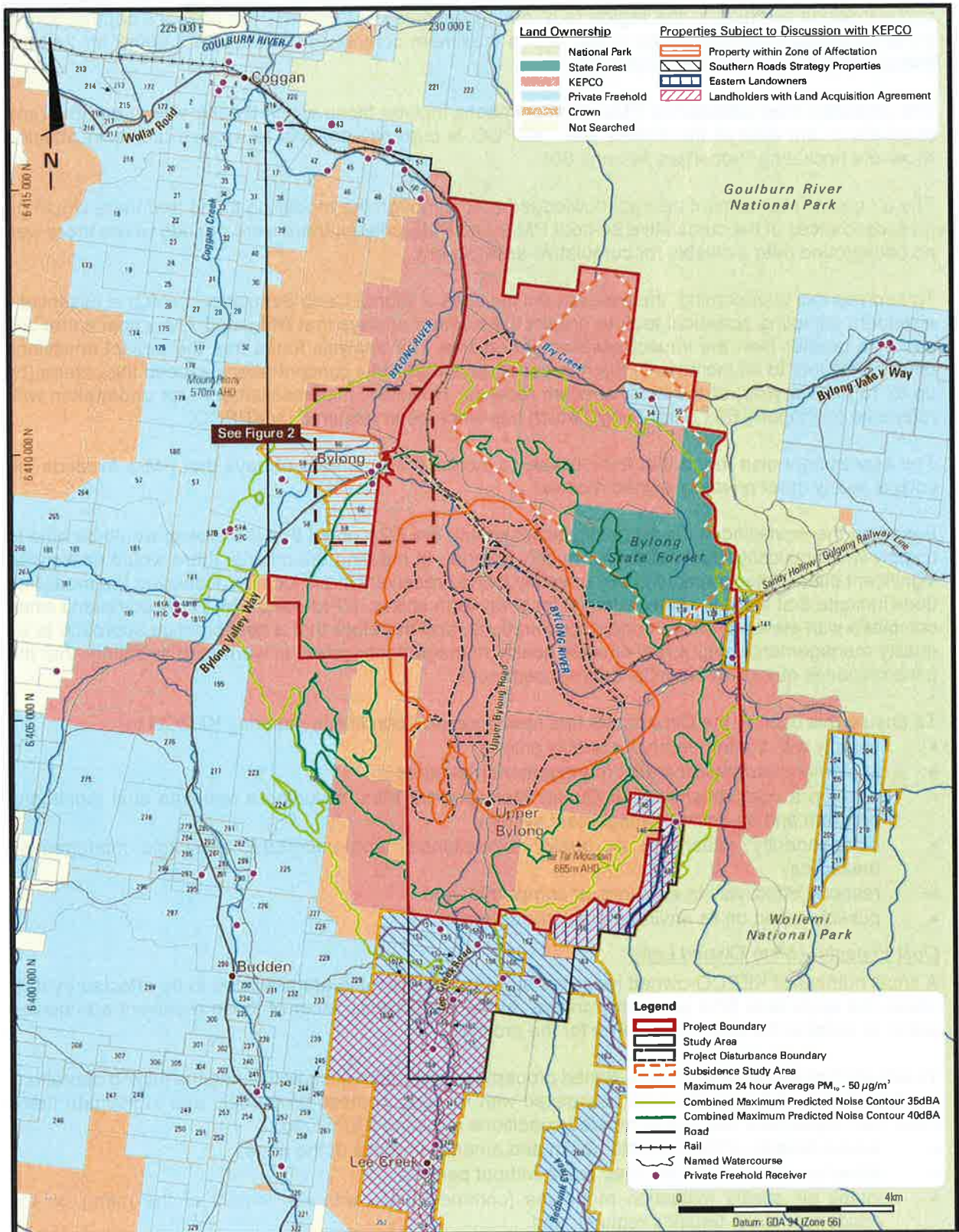


Figure 8: Worst Case Dust and Noise Contours – All Years

It is noted that cumulative short term (24-hour) PM_{2.5} levels are predicted to approach (or equal) the criterion at the closest privately-owned receivers in some modelling scenarios when background concentrations are high in the region (e.g. during bushfires). However, the project's contribution to these cumulative concentrations is low, with a maximum contribution of about 3.7 µg/m³ for 24-hour PM_{2.5}, and 0.8 µg/m³ for annual average PM_{2.5}.

The receivers most affected by PM_{2.5} concentrations include those within Bylong village and the rural receivers to the east of the project site. KEPCO is currently seeking to acquire the most affected receivers (including Properties 141 and 60).

The air quality assessment also acknowledged that, although the modelling found that there would be no exceedances of the cumulative 24-hour PM_{2.5} and PM₁₀ criteria, there were periods where there was no background data available for cumulative assessment.

To address this shortcoming, the assessment includes a 'Monte Carlo Simulation' (which is essentially a random sampling statistical tool) to predict the number of days that PM₁₀ and PM_{2.5} concentrations could be greater than the impact assessment criteria. The analysis found that the project emissions could contribute to an increase in the number of days that PM₁₀ concentrations exceed the criteria (by up to 13 days a year) at the most affected receiver. However, this assessment was undertaken with reference to Property 69 (Tinka Tong), which has since been acquired by KEPCO.

The assessment also found that it is unlikely to increase the number of days that PM_{2.5} exceeds the criteria at any other privately-owned receiver.

Based on the modelling in the air quality assessment, the EPA noted that the project would be able to comply with applicable dust-related air quality criteria. In meeting the criteria, there would unlikely be significant dust-related impacts to any privately-owned receivers in the locality. However, the modelling does indicate that there is some potential for short-term spikes in PM₁₀ and PM_{2.5} concentrations when combined with elevated background concentrations, and therefore that a best practice approach to air quality management using a real-time air quality management system is warranted to ensure that the mine responds quickly to potential dust exceedances.

To ensure this occurs, the Department has recommended conditions requiring KEPCO to:

- comply with contemporary air quality criteria;
- implement best practice dust management measures;
- develop a comprehensive Air Quality Management Plan, including a real-time dust monitoring program and an active management system;
- independently investigate air quality exceedances and undertake applicable management measures;
- respond effectively to enquiries or complaints; and
- publicly report on its environmental performance.

Dust Impacts – Mine Owned Land

A small number of KEPCO-owned receivers surrounding the mine are predicted to be affected by dust above the applicable EPA air quality criteria during the project. Most of these receivers are located within or close to the disturbance area for the project.

To ensure that any tenants of mine-owned properties that remain occupied during the mining operations are fully aware of the health risks associated with residing in these properties, and to mitigate these risks, the Department has recommended conditions requiring KEPCO to:

- advise tenants of the possible health and amenity impacts of the mine;
- allow tenants to terminate their lease without penalty;
- install air quality mitigation measures (commensurate with the impact of the mine) on the residence, at the tenant's request; and
- undertake regular air monitoring to inform tenants of the dust emissions at the residence, and provide this data to the residents.

This is the standard approach recommended by the Department to mine-owned properties across NSW.

Blast Fumes

The air quality assessment includes modelling of the potential impacts of nitrogen dioxide (NO₂) generated in blast fumes in Year 5 of mining operations, which is the year in which mining operations would be closest to Bylong village and worst case blast emissions would be expected to occur.

The modelling predicts that NO₂ concentrations would be well within the applicable 1-hour average criterion of 246 µg/m³, with maximum concentrations of approximately 62 µg/m³ (at Receiver R58).

The Department notes that the predicted concentrations are higher for blasting in the Western Open Cut, which is closer to Bylong village. The modelled concentrations are conservative in that the modelling assumes that a high-rating blast fume event would occur for every blast at the same time as adverse meteorological conditions.

In this regard, effective blast design and appropriate risk management approaches would avoid adverse meteorological conditions and thereby significantly minimise the risk of fumes being generated.

The Department notes that some submissions raised concerns regarding the potential health impacts associated with blast fumes. In this regard, KEPCO has committed to developing and implementing a detailed Blast Management Plan to ensure that management measures are implemented to minimise potential for NO₂ formation. Further details on the Blast Management Plan are provided below in the Blast and Vibration section.

The Department has also recommended that KEPCO be required to develop a blast fume management procedure as a component of the Blast Management Plan that nominates controls to address factors that are known to contribute to fume generation, which may include blast design, blast design execution, geology and adverse weather conditions.

Additionally, the Department has recommended that KEPCO be required to develop a blasting permissions protocol to ensure the appropriate controls are in place and that blasting is only undertaken when weather conditions are suitable.

Diesel Emissions

The air quality assessment also includes modelling of NO₂ emissions associated with diesel emissions from vehicles and equipment for Year 5 of the mining operations, as this year has the highest diesel consumption and, as outlined above, mining activities are closest to Bylong village. Emissions of carbon dioxide (CO) and sulphur dioxide (SO₂) would also be generated from diesel combustion, however these emissions are not as limiting as NO₂, and are not expected to be significant.

The modelling found that cumulative NO₂ concentrations associated with diesel use, blast fumes and background concentrations would be well within applicable criteria at privately-owned receivers, with a worst case 1-hour concentration of 94 µg/m³ (at Receiver 58), compared to the applicable criterion of 246 µg/m³. Annual average NO₂ emissions are also predicted to be well within the applicable criterion (ie. 62 µg/m³), with the highest predicted concentration of 23 µg/m³ at Receiver 69, which has since been acquired by KEPCO.

Notwithstanding, the EPA raised concerns about the diesel emissions assessment, particularly in relation to diesel particulates and the investigation of all reasonable and feasible measures to minimise the emission of diesel particulates and oxides of nitrogen. This concern is understood to be related to the EPA's current industry-wide initiative to minimise diesel emissions associated with mining and industrial activities.

KEPCO's modelling and assessment indicates that the project is unlikely to result in any significant diesel particulate related impacts, given the distance to receivers, the relatively minor contribution of diesel particulates to total particulate matter concentrations, and the predicted compliance with the applicable criteria.

However, the Department acknowledges the EPA's concerns and focus on minimising diesel emissions to the greatest extent practicable. In this regard, the Department has recommended conditions requiring KEPCO to:

- implement all reasonable and feasible measures to minimise diesel emissions; and
- investigate and outline these measures in the Air Quality Management Plan, in consultation with the EPA.

Spontaneous Combustion

The EPA also queried the potential for spontaneous combustion of coal and coal reject at the mine, particularly given that spontaneous combustion has been an issue at the Wilpinjong mine, and because the geochemical assessment in the EIS indicates that coal materials in the target seams have a medium to high intrinsic spontaneous combustion rating.

KEPCO notes that whilst some coal and coal reject materials were assessed as having a medium to high spontaneous combustion rating, the test samples gradually lost heat and did not reach thermal runaway in any practical timeframe. However, KEPCO does acknowledge that its studies indicate that remnant coal left in the underground goaf could present a risk of spontaneous combustion.

To minimise and manage spontaneous combustion risk, KEPCO proposes to prepare and implement a detailed Spontaneous Combustion Monitoring and Management Plan, which would include provisions and procedures for:

- further testing of sample materials during the operational phase of the project;
- sealing goaf areas;
- adopting a mine-wide inertisation (inert gas) capability;
- monitoring and sealing surface cracking to control oxygen ingress to goaf areas; and
- developing spontaneous combustion mitigation procedures.

The spontaneous combustion risks associated with the project are similar to a number of other mines in the western coalfield and other NSW coalfields. These risks can be effectively managed, subject to the planning and implementation of best practice spontaneous combustion measures. The Department has recommended conditions requiring KEPCO to prepare and implement a detailed Spontaneous Combustion Management Plan, as part of the Air Quality Management Plan.

Coal Train Emissions

A number of submissions raised concerns about dust emissions from coal trains, with some recommending that coal wagons be required to be covered and/or dust suppressants applied to minimise emissions.

The EIS includes consideration of this issue, citing an independent study completed by Katestone Environmental in 2012 on behalf of the EPA, which found that fugitive coal dust at the edge of a typical rail corridor was within the applicable emissions criteria, and that there was minimal risk of adverse impacts throughout the rail network.

The EIS reports that the total unmitigated impact of coal transport would equate to less than 0.01% of the total annual project TSP emissions for the worst case year (Year 5). The air quality assessment concluded that the ground level concentrations and any impacts to residences located along the rail corridor to the Port of Newcastle would be negligible.

Based on these studies, the Department accepts that there is no evidence that coal trains are causing any significant adverse dust-related impacts along the rail network, and that requiring the coal trains associated with the project to be covered is not warranted. Notwithstanding, the Department acknowledges that KEPCO has committed to the installation of a water spray/dust suppressant system at the rail load-out facility, which would assist in minimising any fugitive emissions during coal transport. The Department has reinforced this commitment in the recommended conditions, as part of the Air Quality Management Plan.

The Department also notes that ARTC is responsible for the management of the wider rail network, and that its EPL includes a requirement to prepare a Pollution Reduction Program that includes, amongst other things, requirements on ARTC to evaluate and reduce coal emissions on the rail network.

Greenhouse Gas Emissions

The air quality assessment includes a greenhouse gas assessment, which indicates that scope 1 and 2 greenhouse gas emissions (ie. direct emissions and electricity consumption emissions) from the project would average some 140,000 tonnes of CO₂ equivalent a year, or around 0.02% of Australia's annual average emissions.

The assessment also indicates that the total scope 3 emissions (ie. indirect emissions including those from the downstream burning of coal) associated with the project would average around 8.1 Mt of CO₂ equivalent a year. However, much of this would not be accounted for in Australia's emissions as most product coal from the project would be exported and used overseas.

KEPCO has committed to a range of greenhouse gas mitigation measures, including implementation of a detailed energy monitoring program, which would be administered via the Air Quality Management Plan.

Whilst the Department acknowledges the significant global threats posed by climate change, it has considered the greenhouse gas emissions associated with the project and believes that:

- the project's contribution to Australian and global greenhouse emissions, even when assessed on a full life cycle basis (ie. including downstream emissions), would be very small;
- refusing the project would not reduce global greenhouse emissions, as the gap in coal supply would almost certainly be filled by another coal resource locally or overseas;
- there is a demonstrable need for the development of new coal resources, for at least the foreseeable future, to meet society's basic energy needs;
- the project would result in a number of benefits to society, including job creation and socio-economic benefits for NSW; and
- KEPCO's greenhouse gas mitigation measures are reasonable.

The Department does not believe it is reasonable to apply other requirements on KEPCO through the NSW planning system to significantly reduce greenhouse gas emissions, including Scope 3 emissions associated with the downstream burning of the product coal. Any such impost – for example a CO₂ levy on product coal – would unfairly penalise KEPCO and its ability to compete in the energy industry. The Department believes that such an ad hoc approach to the issue of global warming/climate change is not in the public interest.

Further, there is also a financial incentive for KEPCO to minimise its emissions, for example through efficiency in operations to reduce fuel consumption and costs. Effective measures have been, and are continuing to be, planned and implemented at the State, national and international levels to combat global warming/climate change.

The Department has recommended conditions requiring KEPCO to prepare and implement an Annual Energy Efficiency Program, as a component of the Air Quality Management Plan to be prepared in consultation with the EPA and the CCC, which includes a process to identify, quantify and implement reasonable and feasible energy efficiency opportunities to reduce greenhouse emissions throughout the life of the project.

Noise

The EIS includes a noise assessment undertaken by PEL, along with a peer review by Bridges Acoustics. The assessment was undertaken in accordance with applicable guidelines including the *NSW Industrial Noise Policy (INP)*, the *Interim Construction Noise Guideline (ICNG)*, the *NSW Road Noise Policy (RNP)* and the *Rail Infrastructure Noise Guideline (RING)*.

The assessment includes consideration of:

- operational noise, with 4 worst case scenarios modelled (Years 3, 5, 7 and 11);
- construction noise;
- sleep disturbance impacts;
- low frequency noise impacts; and
- off-site road and rail noise.

The noise assessment also considered the cumulative noise impacts of the project together with surrounding industrial land uses. The assessment found that there is no significant industrial or mining noise source within the vicinity of the project that could contribute to cumulative noise impacts, and therefore that cumulative impacts are not expected.

The EPA raised some issues associated with the approach to low frequency noise assessment. This issue is addressed under a separate heading below.

Reasonable and Feasible Mitigation Measures

As with air quality, KEPCO proposes to implement a proactive noise management system that uses a combination of real-time noise monitoring and weather forecasting to guide the day-to-day planning of mining operations. The system would be used to prevent noise impacts during adverse weather conditions as far as practicable.

KEPCO has also committed to implementing a number of other best practice mitigation measures to controlling noise emissions, including:

- relocating some haul routes and equipment locations to minimise noise during adverse weather conditions;
- fitting noise attenuation equipment to all fixed and mobile plant;
- regular maintenance of plant and equipment;
- staff training; and
- at-property noise mitigation measures at receivers predicted to be moderately or significantly impacted (see below).

These measures would be managed as part of a detailed Noise Management Plan.

Operational Noise

The proposed mine site is located in a rural setting, with a relatively small number of residential receivers located on agricultural properties surrounding the site and in the Bylong village.

Results of background noise monitoring reflect this rural setting, with background noise generally less than 30dBA at all receiver locations during the day, evening and night time periods (where not affected by fauna noise). In accordance with the provisions of the INP, the applicable project specific noise level (PSNL) criteria for the project is therefore 35dBA for all residential receivers during all time periods.

Based on this criteria, the EIS predicted that a number of receivers surrounding the mine would experience exceedances of the criteria at some stage during the project life.

A summary of the affected privately-owned receivers at the date of this report is presented in the following table, along with the Department's management approach in accordance with the *Voluntary Land Acquisition and Mitigation Policy 2014* (VLAMP). The affected area is shown on Figure 8 above.

As outlined in the table, a total of 9 privately-owned receivers (owned by 6 landowners) would experience noise levels above the PSNL criteria at some stage during the project. The exceedances generally occur during the open cut mining stage only, although a marginal exceedance (ie. 1 dBA) is predicted for 2 of the receivers near Bylong village during underground mining operations.

Table 6: Summary of Operational Noise Exceedances

Noise Exceedance	Management Approach	No. Affected Private Receivers	Receiver ID
Marginally affected residences (1-2dB exceedance)	Noise mitigation at source	3	56 ¹ , 57A ¹ , 57C ¹
Moderately affected residences (3-5dB exceedance)	Noise mitigation, including mitigation at residence	5	58, 65, 141, 151 ² , 158 ²
Significantly affected residences (>5dB exceedance)	Acquisition	1	60
Additional significantly affected land (exceedance of amenity criteria on >25% of land)	Acquisition	-	-
Total		9 residences	
		6 landowners	

1 Receivers 56, 57A and 57C owned by the same landowner.

2 Receivers 151 and 158 owned by the same landowner.

Given the significant change in noise levels from open cut to underground mining operations, the Department has recommended separate noise limits for the two mining stages, rather than set higher noise levels for the life of the mine.

The significantly affected residence (Receiver 60 – the Eagle Hill property) is located near Bylong village, and would experience noise levels of up to 41 dBA (ie. 6 dB above the criteria) in the early years of open cut mining (Year 3). From Year 5 onwards, these noise exceedances would reduce to moderate/marginal levels.

The moderately and marginally affected receivers are located near Bylong village, or in the rural areas to the east (Receiver 141) and south (Receivers 151 & 158) of the project area.

Despite these exceedances, the noise levels at all but the most affected residence would remain below the EPA's recommended 'acceptable' night-time noise amenity criterion of 40 dBA for a rural area, as defined under the INP.

KEPCO has advised the Department that it has offered to purchase or reach agreements with three of the landowners (including Receivers 65, 141 and 151/158), although no acquisition agreements or contracts have been settled at the date of this report. KEPCO has also advised that it has sought to discuss acquisition with the owner of Receiver 60.

The Department acknowledges that the noise assessment is based on worst-case scenarios with all equipment assessed to be operating under noise enhancing weather conditions. As outlined above, KEPCO has committed to the development of a real-time noise monitoring and management system for the project, which uses a combination of real-time monitoring and weather forecasting to predict and prevent noise exceedances from occurring.

With such a system in place, the Department believes that the number of marginally affected properties could be further reduced. Accordingly, the Department has recommended conditions requiring KEPCO to develop and implement such a system, as part of a comprehensive noise management plan for the project.

That being said, the Department acknowledges the concerns of the local community about noise impacts, and the fact that there are a number of predicted exceedances of the EPA's noise criteria at nearby residences.

If the current land purchase negotiations are successful, there would be 1 residence (Receiver 60) with significant noise impacts and 1 residence (Receiver 58) with moderate noise impacts (as defined under the VLAMP) in the vicinity of the mine that would not be owned by KEPCO.

In circumstances where the acquisition and mitigation criteria are likely to be exceeded, the VLAMP encourages mining companies to either acquire the property or reach an agreement with the affected landowners. In this case, the Department considers that KEPCO should use its best endeavours to acquire or reach a negotiated agreement with the owners of Receiver 58 and 60 prior to the determination of the project. This also a matter that should be considered further by the Commission during its review of the project.

Given the marginal exceedances predicted at the remaining property (which has 3 residences - 56, 57A, 57C), the Department considers any noise impacts can be effectively managed to comply with applicable criteria through the implementation of the real-time management and monitoring system, as required under the recommended conditions.

To ensure the residual noise impacts of the project are suitably managed, and in the absence of finalised acquisitions or agreements with a number of landowners, the Department has (at this stage) recommended conditions requiring KEPCO to:

- acquire the significantly affected property (Receiver 60), if requested by the landowner;
- undertake additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at residences which are predicted to be moderately or significantly affected, if requested by the landowner;
- comply with contemporary operational noise limits;
- develop a comprehensive Noise Management Plan in consultation with the EPA and the CCC, including real-time noise monitoring and an active management system which includes an early warning alert system to identify and manage potential exceedances;

- independently investigate noise complaints and undertake applicable management measures; and
- communicate mining operations with the community, including publicly reporting all monitoring results, and effectively responding to enquiries and complaints.

Construction Noise

The project would generate short-term elevated levels of construction noise over a period of about 2 years. The noise assessment included consideration of 5 construction scenarios, including:

1. Bulk earthworks of the rail loop and mine infrastructure areas (12 months);
2. Construction of mine infrastructure, the CHPP and rail loop (10 months);
3. Upgrade of Upper Bylong Road between the mine entrance and the Bylong Valley Way (6 months);
4. Realignment of Upper Bylong Road between the mine entrance to Wooleys Road (6 months); and
5. Establishment of open cut mining areas, clearing and stockpiling (12 months).

In accordance with the INP and established practice for mining projects, the scenarios involving on-site construction activities (ie. Scenarios 1, 2 & 5) were conservatively considered and assessed against the INP using the same criteria as the operational noise assessment (which are lower than the limits in the ICNG). For the road upgrades, consideration against the construction noise criteria in the ICNG was undertaken as these works are outside the mine site and not directly related to mining activities. The EPA is satisfied with this approach.

The assessment found that the noise impacts at privately-owned receivers for Scenarios 1, 2 and 5 (the on-site activities) would be similar to the predicted impacts during the operational phase.

During the upgrade of Upper Bylong Road (ie. Scenario 3), exceedances of up to 10dBA above the applicable construction criteria (ie. 40dBA) are predicted at 2 receivers (Receivers 60 and 65), when roadworks are at their closest to Bylong village. As roadworks move away from the village, compliance with the applicable criteria would be achieved at these receivers. Construction noise levels at all times would remain below the 'highly affected' noise levels under the ICNG (ie. 75dBA or above).

Works associated with the realignment of Upper Bylong Road (ie. Scenario 4) are not predicted to result in any exceedances.

To mitigate and manage construction noise emissions, KEPCO proposes to prepare a Construction Noise and Vibration Management Plan which would adopt a range of best practice controls consistent with the ICNG, including consultation with affected receivers, source controls, temporary screens, maximising distance between noisy plant and sensitive receivers, using noise attenuated or low power equipment, and restricting use of tonal reversing alarms.

Based on the noise impact assessment, the construction noise impacts associated with the project are able to be effectively managed subject to the implementation of such best practice measures. The Department has recommended conditions requiring KEPCO to implement best practice measures, to detail them in the Noise Management Plan, and to restrict the Bylong Road upgrade works to the daytime period.

Sleep Disturbance

The noise assessment indicates that no privately-owned receivers would experience exceedances of the applicable sleep disturbance criterion (ie. 45dBA LA1 (1 minute)).

Low Frequency Noise

The EPA initially raised concerns about the assessment of low frequency noise (LFN) in the EIS, commenting that the assessment was not undertaken strictly in accordance with the INP, and recommending that the noise predictions should have adopted a modifying factor for LFN.

The current INP provides that a +5dB modifying factor (or penalty) should be applied to the noise source level if the dBC noise level minus the dBA noise level is 15dB or more – that is, where the noise has a significant low frequency component. This methodology is also known as the 'C – A method', and has been incorporated in the INP since its introduction in 2000. It was originally developed for assessing LFN impacts associated with train locomotives in close proximity to the noise source.

For some time, the EPA's noise branch and the Department have acknowledged that the C – A method in the INP has significant limitations, particularly when assessing LFN impacts at locations distant from the noise source. This is because mid and higher frequencies are naturally attenuated as distance from the noise source increases, resulting in larger differences between dBC and dBA levels due to distance alone (ie. rather than any low frequency noise source).

To illustrate, consideration of LFN for contemporary mining projects has found that a C – A difference of 7dB for a nominal noise source at 1 kilometre increases to a difference of 15dB at a distance of 3 kilometres from the noise source, due to distance alone.

Therefore, adopting the C – A method as a threshold for annoyance can result in perverse outcomes where a +5dB modifying factor is required to be applied even where the LFN levels are below or near threshold of hearing levels.

The limitations of the C – A method are also widely recognised in the scientific literature. The World Health Organisation's Community Noise Guideline (1999) states:

"However, the difference between dBC (or dBlin) and dBA will give crude information about the presence of low-frequency components in noise. If the difference is more than 10dB, it is recommended that a frequency analysis of the noise be performed."

Further, in a detailed study on LFN annoyance and health, Leventhall HG (2004) found that:

"The (dBC – dBA) difference cannot be used as an annoyance predictor, but is a simple indicator of whether further investigations may be necessary."

The NSW Ombudsman also investigated this issue in 2014 in response to complaints from the Bulga Milbrodale Progress Association (BMPA) regarding application of the LFN modifying factor. The Ombudsman noted that:

"[T]here appears to be appropriate consideration of professional advice from qualified staff and experts about LFN that casts doubt as to the practicality of strict enforcement of the [C – A methodology in the INP]".

To overcome these limitations, the Department and the EPA have recently applied two other contemporary methods for assessing LFN associated with mining projects – ie. the 'Broner method' developed by Dr Norm Broner, and the UK Department of Environment, Food and Rural Affairs' method (or 'DEFRA method'). Both of these methods do not suffer the same distance attenuation limitation as the C – A method.

The Broner method applies simplified absolute level criteria for LFN impact, with these criteria based on extensive peer reviewed scientific study. The Broner method applies night-time criteria of 60dBC (desirable) and 65dBC (maximum), based on external noise levels at the receiver. These criteria were specifically developed for noise sources with a significant LFN imbalance at larger distances.

The noise assessment in the EIS included consideration of the C – A method, with more detailed consideration using the Broner method where the C – A level was greater than 15dB. The assessment found that no privately-owned properties would exceed the 60dBC criteria using the Broner method. As outlined above, the EPA did not accept this method.

The DEFRA curve method applies a range of threshold criteria across different low frequencies, again based on extensive scientific study of LFN annoyance. The DEFRA curve applies to internal noise levels (as opposed to external noise levels under the C – A and Broner methods), but can be modified for external assessment (ie. modified DEFRA curve). The external DEFRA modified curve thresholds are reproduced in Table 7.

Table 7: Modified DEFRA External Noise Levels Leq dB

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
Third-octave	92	89	86	77	69	61	54	50	50	48	48	46	44
L _{zeq(15min)} threshold level (dB)													

KEPCO subsequently provided a revised assessment of LFN using the DEFRA method. The EPA has confirmed that it accepts this assessment as being 'consistent with current science.'

The DEFRA method assessment also found that LFN levels would comply with the applicable DEFRA criteria at all privately-owned receivers. The EPA accepts these findings, but notes that the assessment does have some limitations as it is limited in range (ie. it didn't cover the whole frequency spectrum) and resolution (ie. it was based on octave band levels rather than third-octave band levels).

The Department accepts that, based on the different approaches to LFN assessment, the noise assessments indicate that LFN is unlikely to be a significant issue for the project, and that the project is unlikely to trigger the LFN criteria and application of modifying factors.

To ensure this occurs, the Department has recommended conditions consistent with the EPA's recommendations, including requirements on KEPCO to:

- apply modifications (penalties) for LFN where C – A levels exceed 15dB and where third-octave band levels exceed applicable external modified DEFRA levels as shown in Table 8 above (or another method if adopted by the NSW Government⁵);
- undertake regular monitoring and validation of LFN levels; and
- implement all reasonable and feasible measures to minimise LFN.

Traffic Noise

The EIS includes an assessment of road traffic noise in accordance with the EPA's *Road Noise Policy*, and the RTS includes an additional assessment for the construction phase in consideration of the potential that the WAF is not constructed as part of the project.

A summary of the findings of the assessment is presented in the following table.

Table 8: Worst Case Traffic Noise Predictions

Receiver	Predicted Noise Level				Criteria		Relative Increase				Criteria	
	With WAF		Without WAF		Day	Night	With WAF		Without WAF		Day	Night
	Day	Night	Day	Night			Day	Night	Day	Night		
All receivers, all years	55	46	55	46	60	55	3.7	6.2	3.8	12.3	12	12

The assessment indicates that traffic noise at all privately-owned receivers would comply with the applicable absolute and relative increase criteria at all times, with the exception of a small exceedance of the night-time relative increase criterion at one receiver location (ie. Receiver 44) if the WAF is not constructed. Receiver 44 is located on Wollar Road to the north of the site, and to the north of the proposed WAF.

To minimise and manage traffic noise as far as practicable, the Department has recommended conditions requiring KEPCO to:

- implement all reasonable and feasible measures to minimise traffic noise; and
- implement additional noise mitigation measures on Receiver 44 (such as double glazing, insulation, and/or air conditioning) at the landowner's request, if the WAF is not developed as part of the project.

Rail Noise

The noise assessment includes an assessment of rail noise on the Sandy Hollow - Gulgong Railway, which found that the project would increase noise levels at receivers in the vicinity of the railway line by less than 2dB at all privately-owned receivers, which indicates that the increase is unlikely to be perceptible.

However, the assessment indicates that the increase would result in the total rail noise levels exceeding the absolute criteria in the EPA's *Rail Infrastructure Noise Guideline* (ie. 65 dBA during the daytime and 60 dBA during the night time) at some residences, including 3 residences in Denman and one in Muswellbrook.

The Department recognises that rail scheduling and the selection of rolling stock on the public railway network is largely beyond the control of KEPCO, with the ARTC and other bulk freight carriers being

⁵ The NSW Government is in the process of updating the INP, which is likely to include revised LFN assessment methodology.

the entities which are responsible for the haulage and timing of coal delivery on the wider public rail network.

The Department notes that ARTC's Environment Protection Licence (EPL) currently includes a Pollution Reduction Program requirement to minimise noise emissions. As part of this program, ARTC is required to monitor locomotive, noise levels, audit noise performance of locomotives, maintain an environmental hotline and implement all reasonable and feasible noise mitigation and management measures to reduce rail noise impacts.

Notwithstanding, the Department has recommended conditions requiring KEPCO to:

- ensure that the project only uses locomotives that comply with the noise limits in ARTC's EPL;
- use its best endeavours to ensure that rolling stock are selected to minimise noise; and
- implement all reasonable and feasible measures to minimise rail noise associated with the project.

Blasting and Vibration

The EIS includes a blast assessment undertaken by PEL, which models the potential ground vibration and airblast overpressure impacts of blast events at nearby receivers and sensitive structures, including cultural heritage sites and rock features.

The assessment assumed that a maximum of 6 blasts per week would be fired, and that blast designs would include a Maximum Instantaneous Charge (MIC) of up to 3,500 kg.

KEPCO notes that the assessment is based on theoretical modelling and that blasting impacts on receivers and sensitive features would depend on a number of site specific factors or 'site laws', including;

- ground conditions including rock types, groundwater and strata layers;
- distance from the blasting site;
- MIC;
- topography between the blasting site and receivers or sensitive features; and
- atmospheric conditions at the time of blasting including wind speed, wind direction and vertical temperature gradient.

KEPCO has committed to undertaking small trials blasts to develop site specific criteria for the Bylong mine, in order to minimise impacts on sensitive receiver locations.

It is noted that there is no infrastructure (including public infrastructure) in the vicinity of the project that would be impacted by blasting activities, and that consideration of potential blast fume emissions is included in the Department's assessment of air quality impacts (see above).

Residential Receivers

The blast assessment indicates that, given the distance between the mine and residential receivers, the project could be managed to achieve acceptable ground vibration and airblast overpressure levels at all receivers.

The highest predicted levels for overpressure and vibration using a conservative MIC would be 112 dB (L) and 3.27 mm/s respectively at the closest residence. These predicted levels would not exceed the applicable ANZECC amenity criteria for overpressure (ie. 120dB for all blasts, and 115dB for 95% of blasts) or vibration (ie. 10 mm/s for all blasts, and 5 mm/s for 95% of blasts). The Department also notes that all residential receivers would be located outside the 500 metre blast exclusion zone, and would be therefore highly unlikely to be affected by flyrock (rock projectiles) during blasting.

The proposed blasting activities would comply with relevant amenity guidelines for residential receivers and are therefore unlikely to result in any material impacts on built structures on privately-owned residential land.

Heritage Sites and Sensitive Features

There are a number of historic heritage buildings, Aboriginal sites and rock features located within or adjacent to the project boundary that have the potential to be impacted by blasting activities.

KEPCO has adopted impact assessment criteria of 15 mm/s for vibration and 133 dB for overpressure for most of these features, which is based on the most stringent guideline values for cosmetic or

structural damage in British Standard 7385-2 and/or Australian Standard AS2187-2. For Aboriginal rock shelters and modified (scarred) trees, a vibration criterion of 50 mm/s has been adopted, which is based on limits adopted for similar mining projects.

The assessment found that predicted vibration and overpressure levels would likely exceed the adopted criteria for a number of heritage buildings and sensitive features, even when applying the lowest modelled MIC. These heritage sites are outlined in the following table, and include the Tarwyn Park homestead.

Table 9: Blasting Predictions for Sensitive Features (exceedances in bold)

Sensitive Feature	Distance (m)	Vibration (mm/s)			Overpressure dB(L)		
		Criteria	MIC 410kg	MIC 3500kg	Criteria	MIC 410kg	MIC 3500kg
Sandstone Feature (RS003)	85	50	114.8	638.4	133	139	146
Tarwyn Park Homestead	190	15	31.7	176.3	133	131	138
Harley Hill Cottage Remains	180	15	34.6	192.0	133	131	139
Tarwyn Park Potential Archaeological Deposit	248	15	20.7	115.1	133	128	135
Swiss Cottage	133	15	56.1	311.9	133	134	142
Tarwyn Park Stables	107	15	79.5	441.7	133	137	144
Potential Archaeological Deposit 3 (Chimney remains)	340	15	12.5	69.5	133	124	132

For other rock escarpments and rock shelters in the vicinity of the mine, the predicted levels would exceed the adopted impact criteria in some cases, with predicted overpressure levels of up to 135 dB (L) and ground vibration levels of up to 104.8 mm/s using an MIC of 3,500 kg. However, the assessment indicates that predicted overpressure and vibration levels using a lower MIC would not exceed the adopted impact criteria.

KEPCO's assessment indicates that project-related blasting has the potential to impact some heritage sites and sensitive features in the vicinity of the project site, and that further measures are required to minimise and/or mitigate these impacts. Importantly, KEPCO is able to reduce the size of blasts so that Tarwyn Park and other sensitive features are protected and operational flexibility is achieved.

Management and Monitoring

In this regard, KEPCO is proposing to implement a range of blast management strategies, including:

- managing blast MIC sizes to meet the applicable amenity and structural damage criteria at sensitive features, and/or remedying blast damage following the completion of blasting;
- undertaking dilapidation/condition surveys of applicable heritage sites and sensitive features, as well as private residences (on request) prior to project blasting;
- undertaking smaller trial blasts to assist in the development of site specific criteria and appropriate MIC;
- restricting blasts during adverse weather conditions;
- implement standard best practice protocols for blast exclusion zones, complaints response, property inspections and investigations, etc.; and
- a detailed blast monitoring program for private receivers and sensitive features.

These measures would be managed in accordance with a detailed Blast Management Plan for the project that requires

The OEH, including the Heritage Branch of OEH, did not raise any particular concerns in relation to the potential blast-related impacts or the proposed mitigation measures, although the Heritage Branch does recommend that KEPCO be required to (amongst other things) prepare Conservation Management Plans for the historic heritage items outside the project disturbance area (see Section 6.5). The Department agrees, and has recommended conditions in this regard.

The Department has also recommended conditions requiring KEPCO to manage blasting operations to comply with the relevant criteria at heritage sites and sensitive features, unless measures to minimise and rectify any blast-related damage to these features have been approved as part of a specific blast management plan for the feature. This plan would be required to be prepared in consultation with OEH.

Conclusion

Blasting and blast-related operations can be readily managed to meet the applicable amenity and structural damage criteria at all surrounding private residences and infrastructure, subject to implementation of strict blast management measures.

Blasting is also unlikely to significantly affect the heritage values of the locality, but has the potential to impact some heritage items in the vicinity of the mine, including on the Tarwyn Park property.

The Department believes that these impacts should be minimised as far as practicable. To this end, the Department has recommended conditions requiring KEPCO to:

- manage blasting operations to comply with all relevant criteria at private properties and public infrastructure;
- manage blasting operations to comply with relevant criteria at heritage sites and sensitive features, unless measures to minimise and rectify any blast-related damage to these features have been approved as part of a plan for the specific site or feature;
- limit blast frequency and hours;
- keep the public notified and up-to-date regarding blasting operations, and facilitate feedback and complaint management;
- provide for structural property inspections and investigations on request;
- repair any structural damage to buildings or infrastructure caused by the project;
- manage blasting operations to avoid fly-rock related safety risks;
- develop a comprehensive Blast Management Plan including a:
 - detailed blast monitoring program; and
 - fume management protocol;
- develop Conservation Management Plans for heritage items in the vicinity of the project area (see Section 6.5).

6.2 Subsidence Impacts

Introduction

The proposed underground mining domain comprises 15 longwall mining panels (LW101-106 and LW201-206) which would have a depth of cover (ie. distance below the ground surface) of between 105 m and 310 m.

The underground longwall mining would result in 'subsidence effects' (ie. physical ground movements) and 'subsidence impacts' (ie. physical changes to the rock mass and ground surface) within a 'subsidence affectation area' (or subsidence area) above and in the vicinity of the mining area⁶. The subsidence impacts have the potential to result in a number of 'environmental consequences' on both natural and built features within the affectation area. They also have the potential to impact sensitive features outside this area as a result of 'far field' horizontal movements.

The EIS includes a detailed subsidence impact assessment undertaken by Mine Subsidence Engineering Consultants (MSEC), as well as a peer review of the assessment undertaken by SCT Operations (SCT). The BVPA submission also included a review of subsidence and water impacts from Pells Consulting.

Subsidence Area Context

Land within the subsidence affectation area comprises (see Figure 9):

- timbered and hill grazing land owned by KEPCO (majority of the area);
- heavily timbered Bylong State Forest owned by the Forestry Corporation of NSW in the south-east portion of the area;
- timbered Crown land in the north eastern area, and road corridors;
- 2 privately-owned properties including:
 - Bylong Quarry in the north-eastern area (Property ID 53-55); and
 - a partly timbered agricultural property in the south-eastern area (Property ID 138-141).

The area is surrounded by the Goulburn River National Park and Wollemi National Park to the north and east, and KEPCO owned agricultural land to the west and south. The National Parks are outside the mining and subsidence areas for the project.

⁶ Defined by the 26.5° angle of draw from the longwall mining areas and the predicted 20 mm limit of vertical subsidence.

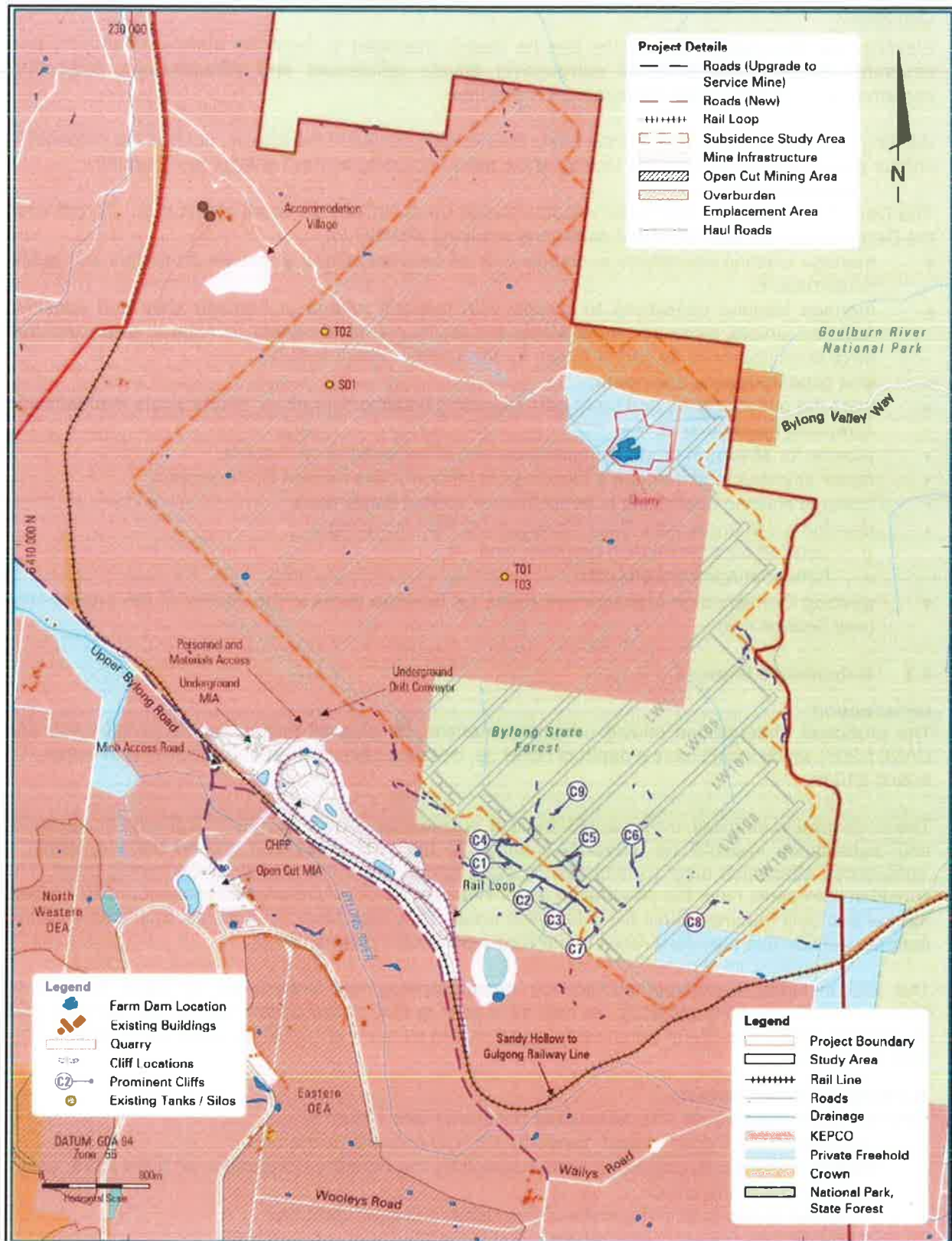


Figure 9: Subsidence Area – Key Features

There is one main drainage line in the subsidence affectation area, namely Dry Creek, which as the name suggests is a highly ephemeral creek (ie. flows only in response to rain events). Dry Creek drains northward through the area discharging to the Bylong River downstream of the site.

Much of the area is relatively hilly, containing a number of steep slopes and approximately 41 cliffs, including 30 cliffs directly above the proposed longwall panels. Most of these cliffs are located in Bylong

State Forest in the south-eastern area, and are typically 10-20 metres in height and less than 100 metres in length, although there are:

- 4 cliffs between 20-40 metres in height;
- 6 cliffs with lengths of between 100-150 metres; and
- 1 cliff with a length of up to 300 metres.

A total of 730 cliffs have been identified in the wider study area.

Infrastructure and built features within the subsidence affectation area include:

- the Sandy Hollow - Gulgong Railway is located to the west and south of the area (approximately 100 metres from the railway line at the closest point);
- Bylong Valley Way traverses the northern part of the area;
- a low voltage 22 kV electricity transmission line and some telecommunications lines are located within the area; and
- some farm structures (including fencing, farm dams, a silo, a shed and water tanks) are located in the area, most of which are owned by KEPCO.

There are no residential structures within the subsidence affectation area.

There are also a total of 146 identified Aboriginal archaeological sites within the subsidence affectation area, and a further 5 sites in close proximity. Impacts on these sites are considered separately in Section 6.5.

Avoidance and Mitigation Measures

KEPCO has designed the underground longwall panels and the resulting subsidence affectation area to avoid all subsidence-related impacts on:

- Goulburn River National Park and Wollemi National Park;
- the Bylong River and its associated alluvium; and
- the most prominent cliffs in the Bylong State Forest including Cliffs C1, C2, C3 and C4.

KEPCO also proposes to implement a number of standard best practice measures to mitigate residual impacts and environmental consequences, including:

- preparation of detailed Extraction Plan/s in accordance with DRE guidelines;
- preparation of specific Property Subsidence Management Plans for properties and infrastructure within the subsidence affectation area, in consultation with the landowners and infrastructure providers; and
- progressive remediation of subsidence impacts.

Maximum Subsidence Effects

The maximum predicted subsidence effects arising from the proposed underground mining operations are outlined in Table 10 below, and the predicted subsidence contours across the area are shown on Figure 10.

Table 10: Maximum Predicted Conventional Subsidence Effects

Longwalls	Subsidence (mm)	Tilt (mm/m)	Strain (mm/m)		Curvature (km ⁻¹)	
			Tensile	Compressive	Hogging	Sagging
All panels	3,300	75	35	25	3.5	2.5

Predicted far field horizontal movements are small, with no significant impact expected.

The subsidence effects would result in some surface cracking within the subsidence affectation area, with flatter areas predicted to experience cracks with widths of between 25-50 mm, and up to 100 mm. Steeper areas would experience cracks of between 50-100 mm width, and possibly up to 200 mm. The assessment predicts that less than 1% of the subsidence affectation area would be affected by surface cracking. The total disturbance area, with remediation of the cracking, is estimated to be well below 10% of the subsidence affectation area.

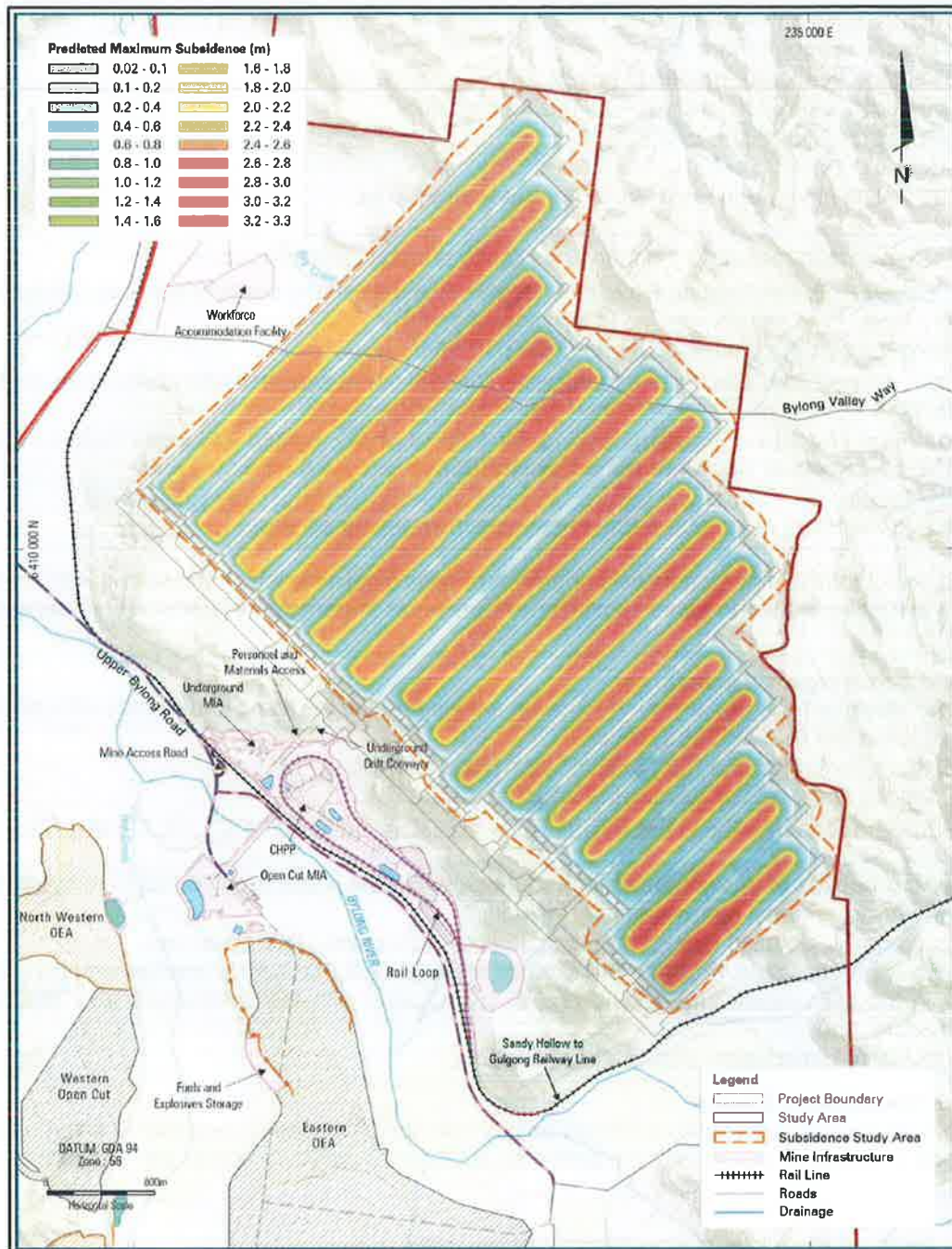


Figure 10: Predicted Subsidence Contours

Impacts on Water Resources

The subsidence would result in some localised environmental consequences on Dry Creek, including:

- ponding and flooding, predicted to occur in areas of between 50-100 metres in length and up to 1 metre in depth;
- scouring in areas where gradients have increased;
- some changes in horizontal alignment; and
- some stream bed cracking.

Given the minor and ephemeral nature of the creek, the Department, DRE and DPI-Water are satisfied that these impacts are not significant and are able to be remediated using standard best practice subsidence remediation techniques such as crack filling and re-grading. Impacts on water flows and quality are considered separately in Section 6.3.

The Department has recommended conditions requiring KEPCO to ensure that environmental consequences on Dry Creek are no greater than that predicted in the EIS, and to monitor and remediate impacts on the creek system as mining progresses.

Impacts on Cliffs and Steep Slopes

As outlined above, the longwall panels have been specifically designed (shortened) to avoid subsidence-related impacts on the most prominent cliff lines in the area, including:

- C1 – which has a height of 50 metres and length of almost 350 metres;
- C2 and C3 – which have a height of 45 metres and combined length of almost 650 metres; and
- C4 – which has a height of 30 metres and length of approximately 160 metres.

With this key avoidance measure, these cliffs are not predicted to be significantly impacted by conventional or far field subsidence effects associated with the project.

Other cliff lines within the subsidence affectation area are expected to experience some impacts. Rock falls are predicted to potentially occur along up to 20% of the length of the cliffs, and visible subsidence movements (cracks) may occur along up to 50-70% of the cliffs.

Visual assessment indicates that the largest susceptible cliffs falls (C5 and C6) would be screened from reasonably accessible public vantage points. Some smaller cliff impact locations may be visible, but these would generally be at distances of more than 1.5 kilometres.

Steep slopes also have the potential to be affected by predicted tilts, curvature and strains, which would could cause cracking. Such cracking would be remediated as mining progresses.

OEH acknowledged KEPCO's commitment to designing the project to avoid the significant Cliffs C1 to C4, but also recommended that longwall LW106 be shortened to protect the largest remaining cliff line within the subsidence affectation area, namely Cliff C5, which has a height of up to 40 metres and a length of 273 metres.

KEPCO subsequently committed to minimising subsidence impacts on C5, which would also minimise impacts on another nearby cliff (Cliff 24312), which has a height of 20 metres and a length of 145 metres. Rather than shortening the longwall panel to avoid this impact, KEPCO commits to minimising this impact through monitoring and adaptive management as mining progresses towards the cliff line. It is noted that these cliffs are located at the end of LW106 and would be subject to lower subsidence than other parts of the subsidence affectation area (see Figure 10).

By incorporating OEH's advice, the Department notes that KEPCO has designed the project to avoid and/or minimise impacts on the most prominent cliffs in the locality, and that the residual impacts to cliff lines are acceptable and commensurate with impacts associated with contemporary underground mining projects in the region. The impacted cliff lines are in relatively remote locations and are unlikely to result in significant visual impacts. The number of affected cliffs is relatively low compared to the large number of cliffs in the wider area, and the cliffs are not of particular cultural significance. The rock falls would discolour in the short to medium term such that they would blend back in to the natural environment.

The cliff impacts do have some potential to result in localised biodiversity impacts, most notably on cave dwelling bats. In accordance with OEH recommendations the Department has recommended conditions requiring KEPCO to implement a bat monitoring program as part of a wider Biodiversity Management Plan.

The Department has also recommended conditions requiring KEPCO to:

- avoid all impacts on Cliffs C1 to C4;
- manage the project to minimise impacts on Cliff C5 (and 24312); and
- ensure that the impacts on other cliffs are no greater than those predicted in the EIS.

Impacts on Protected Areas

OEH acknowledges that the subsidence affectation area avoids the Goulburn River and Wollemi National Parks, but notes that the protected areas are close to the area, and may potentially be subject to far field impacts. Consequently, OEH sought a commitment from KEPCO that it would manage the project such that subsidence impacts would have nil, or negligible, impacts on the national parks.

Further advice from KEPCO confirmed that based on the subsidence assessment (including sensitivity analysis) the project would not have any subsidence-related impacts on the National Parks, including far field impacts. The Department has recommended conditions consistent with OEH's

recommendations, including a requirement on KEPCO to manage the project to avoid impacts on the National Parks.

Impacts on Public Infrastructure

The main piece of public infrastructure that would be affected by the project is the Bylong Valley Way, which traverses the northern part of the subsidence affectation area. A low voltage 22kV power line and telecommunications lines are also expected to experience impacts, although these area expected to remain serviceable and able to be readily repairable. The Sandy Hollow - Gulgong Railway is outside the subsidence affectation area and is not predicted to be affected by the subsidence impacts of the project.

Bylong Valley Way is predicted to experience up to 3,000 millimetres of vertical subsidence and could experience cracking of up to 50-100 millimetres, stepping and heaving, as well as some localised impacts to drainage and culverts.

Some submitters raised concerns about the impacts to traffic and safety on Bylong Valley Way as a result of these subsidence impacts. KEPCO noted that it would manage subsidence impacts on the road to ensure that it remains safe and serviceable during and after the extraction of the proposed longwalls, citing a number of similar (and more heavily trafficked) public roads that have been successfully managed in this regard. In particular, the assessment included a case study on the comparable subsidence of Charlton Road near Broke in the Hunter Valley, which has similar pavement and traffic volumes, and underwent similar subsidence as a result of longwall mining for the Beltana mine.

Charlton Road was successfully undermined by 10 longwalls without incident or community complaint through the implementation of a number of mitigation measures, including:

- preparation of management plans including a:
 - Public Road Management Plan;
 - Public Road Safety and Environmental Plan; and
 - Road Monitoring Action Plan; and
- implementation of actions including:
 - pre-mining inspections;
 - review of subsidence movements prior to mining near the road to validate subsidence predictions;
 - notifications to the public and emergency services of the timing and location of mining operations beneath the road;
 - 24 hour monitoring of the road during critical periods of active subsidence, with repair crews on hand to repair and maintain the integrity of the road;
 - temporary repairs of surface cracks; and
 - post-mining inspections by Council and the Mine Subsidence Board to review the temporary repair work and determine the extent of permanent repairs required.

The Department and MWRC (the applicable roads authority) are satisfied that Bylong Valley Road can be maintained in a safe and serviceable condition, subject to implementation of standard best practice measures for undermining public roadways. The Department has recommended conditions requiring KEPCO to always maintain Bylong Valley Way in a safe and serviceable condition, ensure that any damage is fully repaired, and to implement management and monitoring measures consistent with those identified above.

Impacts to Land Uses and Private Structures

As outlined above, most of the land within the subsidence affectation area is KEPCO-owned agricultural land or State Forest, with some Crown land and 2 privately-owned properties including the Bylong Quarry.

The subsidence assessment indicates that impacts on farm structures are likely (including KEPCO-owned sheds, a silo and farm dams), however these structures are able to be kept safe, serviceable and repairable through implementation of standard subsidence management and remediation measures. The project is not predicted to have any subsidence impacts on the KEPCO-owned Tarwyn Park property or its natural sequence farming areas (see Section 6.4).

Bylong Quarry has highwalls of approximately 10 metres in height, which may experience some rock falls and surface cracking during subsidence events. KEPCO notes that it would ensure that the quarry operations are maintained in a safe and serviceable condition through implementation of a Property

Subsidence Management Plan, and access arrangements as required under the *Mining Act 1992*. The Department notes that the Mining Act provides for compensation to landholders for damage or loss (including deprivation of use) suffered as a result of the mining operations.

The Forestry Corporation of NSW acknowledges that Bylong State Forest would be subject to subsidence impacts, and expects that KEPCO would repair or replace all FCNSW infrastructure affected by subsidence (including access tracks and fences), as well as repairing any safety risks. It also raised concerns about impacts on the forest stand value and future productivity of the forest (due to damage, ponding, soil moisture decline, tree fall, malformation and root shear), and expects that these issues be addressed as part of the Property Subsidence Management Plan and access arrangements and compensation under the *Mining Act 1992*.

The subsequent impacts to land uses and privately-owned structures are commensurate with other underground longwall mining projects, noting that there are relatively few land users within the subsidence affectation area, and relatively few structures and no residential dwellings. Further, the risks to privately-owned land can be appropriately minimised, managed and/or at least compensated for in accordance with well-established regimes under the Mining Act and the recommended conditions of consent.

In this regard, the Department has recommended that KEPCO be required to:

- ensure that all built features and improvements are maintained in a safe and serviceable condition;
- ensure negligible public safety risk;
- prepare and implement detailed Property Subsidence Management Plans for each landholding in the subsidence affectation area, in consultation with the landowners; and
- prepare and implement a detailed Public Safety Management Plan.

Whilst not directly related to subsidence, the Forestry Corporation of NSW also noted that it requires unfettered access to Bylong State Forest for forest management purposes. In this regard, there are currently no known public roads that provide access to the State Forest, with existing access provided through a KEPCO-owned property (Bylong Station).

Nonetheless, KEPCO has committed to maintaining access to Bylong State Forest through the Bylong Station property, and to assisting in establishing a formal right-of-way to the forest through the property, if required. KEPCO has also advised there is potential for access through National Park estate, however, this would be subject to agreement by NPWS. The Department has recommended conditions reinforcing this commitment, as part of the Property Subsidence Management Plan with the Forestry Corporation.

Conclusion

KEPCO has assessed the subsidence impacts and potential environmental consequences associated with the proposed underground mining operations, including sensitivity analysis of potential consequences in excess of the predicted subsidence impacts.

Based on this assessment, the Department accepts that the subsidence associated with the project is able to be minimised, managed, or at least compensated for to an acceptable standard. To ensure this occurs, the Department has recommended a suite of conditions that reflect the standard framework for managing subsidence in NSW. These conditions require KEPCO to:

- meet a number of performance measures to protect or manage impacts on natural and built features within the subsidence affectation area;
- remediate or repair subsidence impacts;
- provide additional offsets in the event that impacts or consequences are greater than the performance measures; and
- prepare and implement comprehensive Extraction Plan(s), which include a (amongst other things):
 - Property Subsidence Management Plan(s), in consultation with landholders;
 - Built Features Management Plan(s) and Bylong Valley Way Management Plan, in consultation with affected public infrastructure providers;
 - Water Management Plan, in consultation with EPA and DPI-Water;
 - Biodiversity Management Plan, in consultation with OEH;
 - Heritage Management Plan, in consultation with OEH;
 - Public Safety Management Plan, in consultation with DRE;

- subsidence monitoring program; and
- contingency plan that provides for adaptive management.

6.3 Water Resources

Introduction

The potential impacts on water resources is recognised by authorities and local agricultural land users as a key risk associated with development of a coal mine in the Bylong Valley, particularly given the relatively small but valuable alluvial aquifer resource associated with local creeks and rivers.

A considerable number of specialist water resource assessments have now been undertaken for the Bylong Coal Project to understand the resource and assess the potential impacts of the project.

In this regard, the EIS includes specialist groundwater and surface water assessments, undertaken by Australasian Groundwater & Environmental Consultants (AGE) and WRM Water & Environment, respectively.

The EIS also includes a peer review of the groundwater assessment, undertaken by Dr Noel Merrick of Heritage Computing, and a number of subsidiary assessments to supplement the water resource assessments, with the key ones including:

- a geochemical assessment, by RGS Environmental, to assess the quality of leachate (and hence groundwater) produced from coal and mining waste materials associated with the mine; and
- a stygofauna assessment, by Ecological, to assess the potential for impacts on subterranean fauna (ie. stygofauna).

The Department engaged Dr Frans Kalf of Kalf & Associates to undertake an independent review of the groundwater assessments and groundwater-related issues raised in submissions (see Appendix G). The project's water resource impacts were also reviewed by specialist hydrogeologists within DPI-Water, the NSW Gateway Panel, and the Commonwealth IESC.

Dr Kalf, DPI-Water and a number of other submitters raised a number of concerns about the groundwater modelling in the EIS, with key concerns including:

- characterisation of the geology on which the model is based, including delineation of the alluvium/colluvium boundary and the weathered zone;
- historical (downward) trend in groundwater levels (particularly in the alluvium) and the affect on water supply;
- conceptualisation of the groundwater regime, including connectivity and hydraulic conductivity (permeability) in the aquifers, the need for further work (including pump tests) to confirm highly productive and less productive aquifers, long-term recovery post mining, and the nature of perched ground water systems;
- the accuracy and robustness of the groundwater model, including inputs into the model, how it models streamflow and its interaction with the alluvium, and sensitivity testing;
- impact of the project on water supplies and security, particularly in periods of sustained drought when there may not be sufficient water to allow the borefield and mine to operate efficiently;
- water licensing, particularly that KEPCO does not hold a licence to take water from the Permian hard rock aquifer, and potential restrictions in the alluvial aquifer in dry periods;
- potential water quality impacts and impacts on aquatic ecosystems and groundwater dependent ecosystems; and
- requirements for groundwater monitoring and management.

In response to these issues, KEPCO undertook additional groundwater-related assessment as part of the RTS, including:

- additional groundwater level monitoring;
- additional drilling of boreholes and pump testing;
- revision to the borefield, with bores spread more widely across the alluvial aquifer system; and
- revised groundwater modelling, incorporating information from the above additional works and modelling changes, as well as further verification, calibration and sensitivity analysis.

It also lodged a water licence application to account for the water take from the Permian hard rock aquifer, and provided additional information on groundwater monitoring and management measures,

including contingency planning if there are extended periods of drought which affect water supply to the mine and/or water users.

The revised groundwater model in the RTS was based on the MODFLOW-USG modelling code, whereas the groundwater model in the EIS was based on the MODFLOW-SURFACT code (with some sensitivity analysis using USG). While both of these models are acceptable, they do have some technical differences which can lead to differences in modelling results.

In this regard, the revised modelling found that the groundwater drawdown in the alluvium from the project would be less under the USG model than that predicted in the EIS using the SURFACT model. Consequently, KEPCO concluded that the original EIS modelling provided a conservative assessment of potential groundwater impacts⁷. This was despite the revised modelling using higher hydraulic conductivity inputs than those used in the EIS model⁸, as well as a number of other more conservative (ie. worst case) inputs.

Despite this additional assessment and the 'conservative' conclusions reached, Dr Kalf and DPI-Water continued to raise issues regarding the revised modelling, with the key concerns/issues including:

- that the considerable difference in drawdown results between the SURFACT and USG models deteriorates confidence in the model findings, and should be investigated;
- technical issues with the modelling package, including how it models streamflow/baseflow, water balance parameters (including recharge hydraulic conductivities used), and provision of 3-D conceptual model data; and
- some recommendations regarding groundwater monitoring and management.

Dr Kalf recommended that a 'groundwater audit' be undertaken to investigate the difference between the two model findings and address the related issues.

KEPCO subsequently engaged Dr Noel Merrick to undertake a detailed groundwater audit, and AGE to undertake additional groundwater modelling based on the audit findings.

The audit and modelling exercises managed to achieve much better convergence between the SURFACT and USG models than the previous modelling exercises. The audit found that, overall, it was not possible to conclude that either of the two software packages is more suitable than the other, and that groundwater modelling needs to acknowledge and consider this uncertainty as part of the modelling assessment.

Based on the audit findings, the revised groundwater modelling (using the USG code) included:

- better (higher resolution) modelling around pumping bore sites, the Goulburn River stream channel and the alluvial aquifer system;
- updated alluvial aquifer thickness data;
- incorporation of the 'streamflow' package as recommended by Dr Kalf to model recharge;
- re-calibration with higher hydraulic conductivities;
- modelling of direct connection between the alluvium and the coal seams as recommended by DPI-Water;
- updated rainfall recharge data; and
- updated modelling uncertainty and sensitivity.

Water resource impacts of the project has involved reviews by some of the State's most respected water specialists. Based on these assessments the DPI-Water and Dr Kalf are satisfied that an acceptable prediction of the project's potential water resource impacts has now been undertaken, and that the assessments include sensitivity analysis to account for the range of potential water resource impacts.

Notwithstanding, DPI-Water considers that some uncertainty in groundwater predictions persists, and has recommended measures to address this during mining operations, including additional modelling and validation (including investigation of using an integrated, or coupled, surface-water/groundwater model code), aquifer pump testing, and monitoring.

⁷ Whilst drawdown was generally less under the USG model, the model did predict increased impacts on bores on 2 privately-owned properties, due to the amended borefield layout.

⁸ These higher inputs were used following the additional pump testing carried out for the RTS, which found higher permeability than adopted previously.

Catchment Context

The site is located in the Bylong River catchment, a tributary of the Goulburn River, which in turn is a tributary of the Hunter River. The Bylong River drains generally in a northward direction, flowing from the south-east through the project site between the proposed open cut mining areas and the mine infrastructure area (see Figures 2 and 11).

A number of tributaries of the Bylong River are located within or near the site, including:

- Lee Creek, which passes through the middle of the 2 proposed open cut mining areas;
- Dry Creek, which drains through the proposed underground mining area;
- Growee River, which is located to the west of the project site and meets the Bylong River downstream of the project area;
- Wattle Creek;
- Cousins Creek; and
- Coggan Creek.

Lee Creek, Dry Creek and the Bylong River are predicted to be affected by the project (see below).

All of these waterbodies are ephemeral systems (ie. flow intermittently in response to rain events). Water quality in the Bylong River is generally fresh upstream (generally below 400 $\mu\text{S/cm}$), grading to brackish downstream of the Growee River confluence (range 1,800 to 2,200 $\mu\text{S/cm}$). Lee Creek is generally fresh (180 to 385 $\mu\text{S/cm}$), while Dry Creek is fresh to brackish (418 to 1,202 $\mu\text{S/cm}$).

Groundwater Aquifer Context

There are four main aquifer resource units in the vicinity of the project area, namely the:

- alluvium and colluvium⁹ associated with the creek systems;
- weathered Permian bedrock;
- minor perched system associated with Tertiary basalt above the underground mining area; and
- the Permian coal seams.

Figure 12 shows a conceptual cross section of these aquifer resources, and the alluvium and other geological units are shown on Figure 13.

The alluvial aquifer is the key groundwater resource in the locality, and is widely used for agricultural and domestic purposes. It is classified as a highly productive groundwater source under the *NSW Aquifer Interference Policy*.

The alluvium is typically <20 metres thick along the Bylong River floodplain, and <12 metres thick along Lee Creek (see Figure 14). The Dry Creek alluvium is mapped as forming part of the highly productive groundwater source, however drilling for the project indicates that the Dry Creek alluvium above the underground mining area does not form a thick or continuous interconnected sequence of alluvial sediments, and consequently does not meet the criteria for a highly productive groundwater source.

Hydraulic conductivity (ie. permeability) within the alluvium ranges from moderate to very high. Field testing undertaken for the additional groundwater assessments found that hydraulic conductivity typically ranges from 10 to 100 metres per day in the alluvium (and in some cases higher), meaning that permeability in the aquifer is very high in places.

Water quality is similar in the alluvium and the weathered Permian bedrock, and ranges from fresh (190 $\mu\text{S/cm}$) to brackish (3,100 $\mu\text{S/cm}$).

The weathered Permian bedrock lies between about 5 to 30 metres below the ground surface. The proposed open cut pits would be located within this aquifer unit. The weathered bedrock has typically much lower permeability than the alluvium (typically 0.1 to 0.6 m/day), although there is some potential for the weathered zone to act as a conduit for flow between the alluvium and the open cut mining areas.

The Tertiary basalt capping is a minor perched groundwater system above the underground mining area, and overlies the less permeable Permian units.

⁹ Alluvium and colluvium are transported soils and gravels and the like, and are similar in nature. Alluvium is riverine deposits that have generally been transported long distances down a river or stream (and hence the deposits are generally more rounded from erosion). Colluvium is the deposits that have only been transported short distances down a slope (and hence the deposits are generally more angular).

The Permian coal seams have a mean hydraulic conductivity of up to about 0.2 metres a day (in the Coggan Seam). Water quality varies from fresh to brackish (930 to 3,900 $\mu\text{S}/\text{cm}$), which suggests some connectivity with the alluvium given the similar salinities.

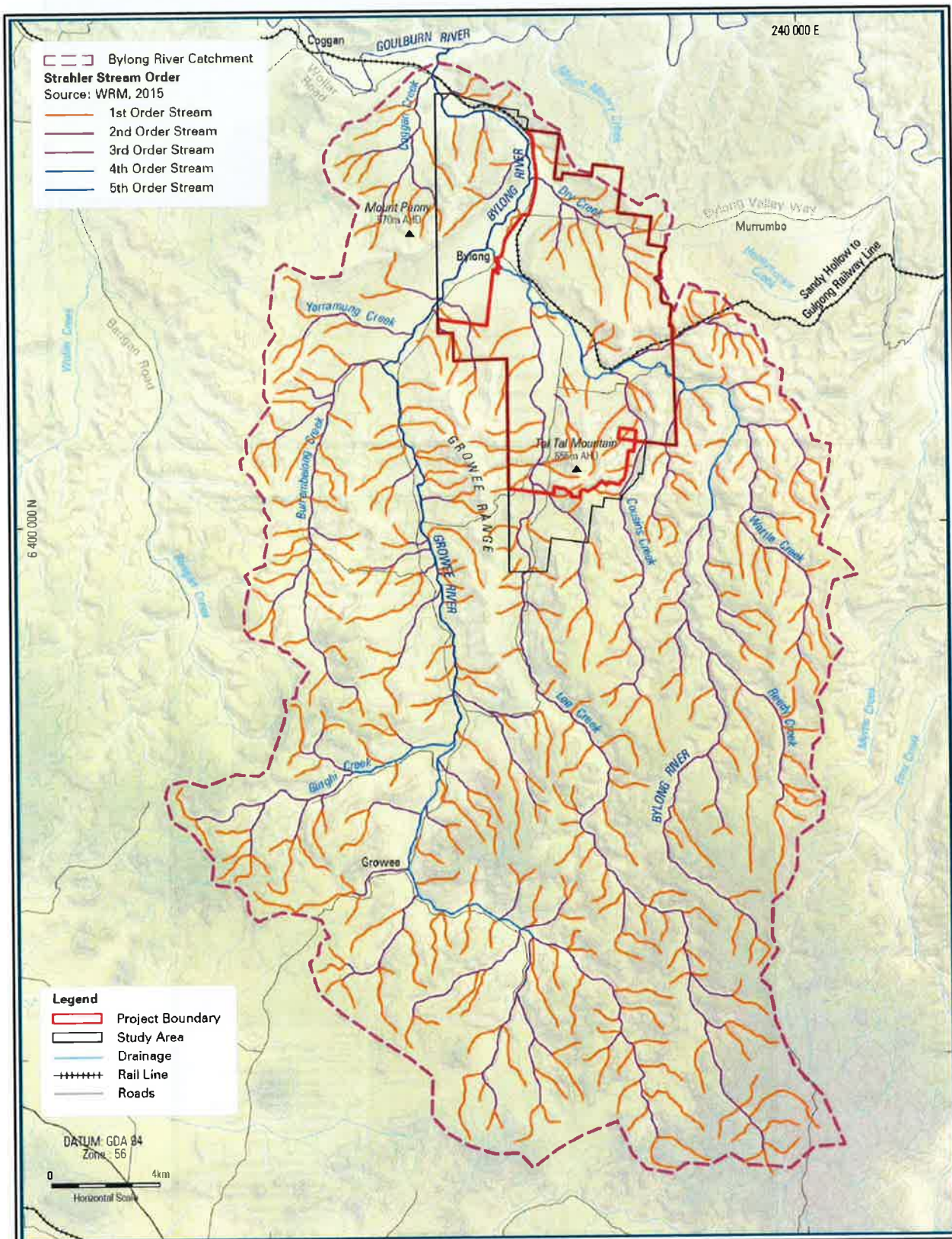


Figure 11: Bylong River Catchment

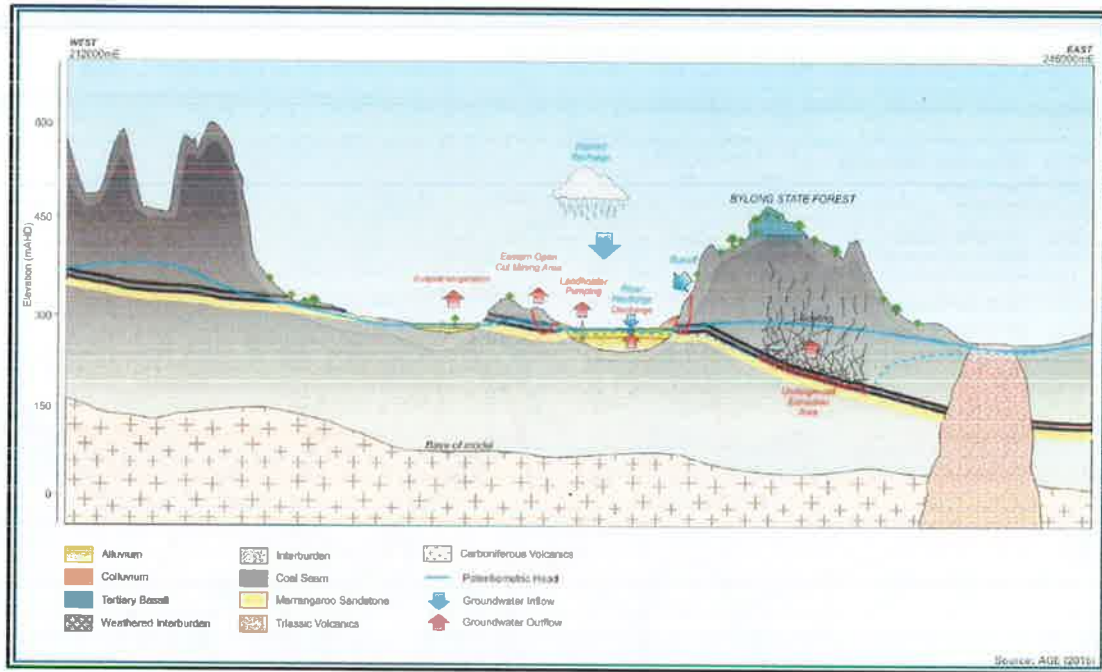


Figure 12: Conceptual Hydrogeology Cross-Section

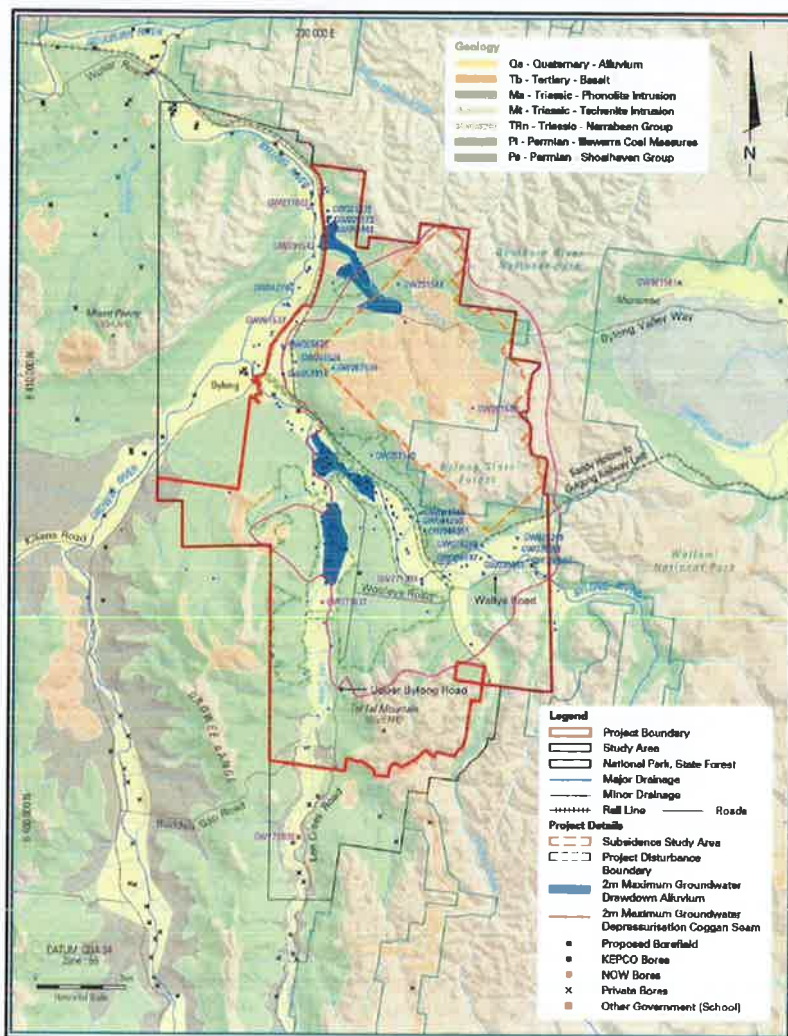


Figure 13: Main Geological Units

(Nb. Groundwater drawdown contours as predicted in the EIS. As outlined below, predicted drawdown has changed since the EIS)

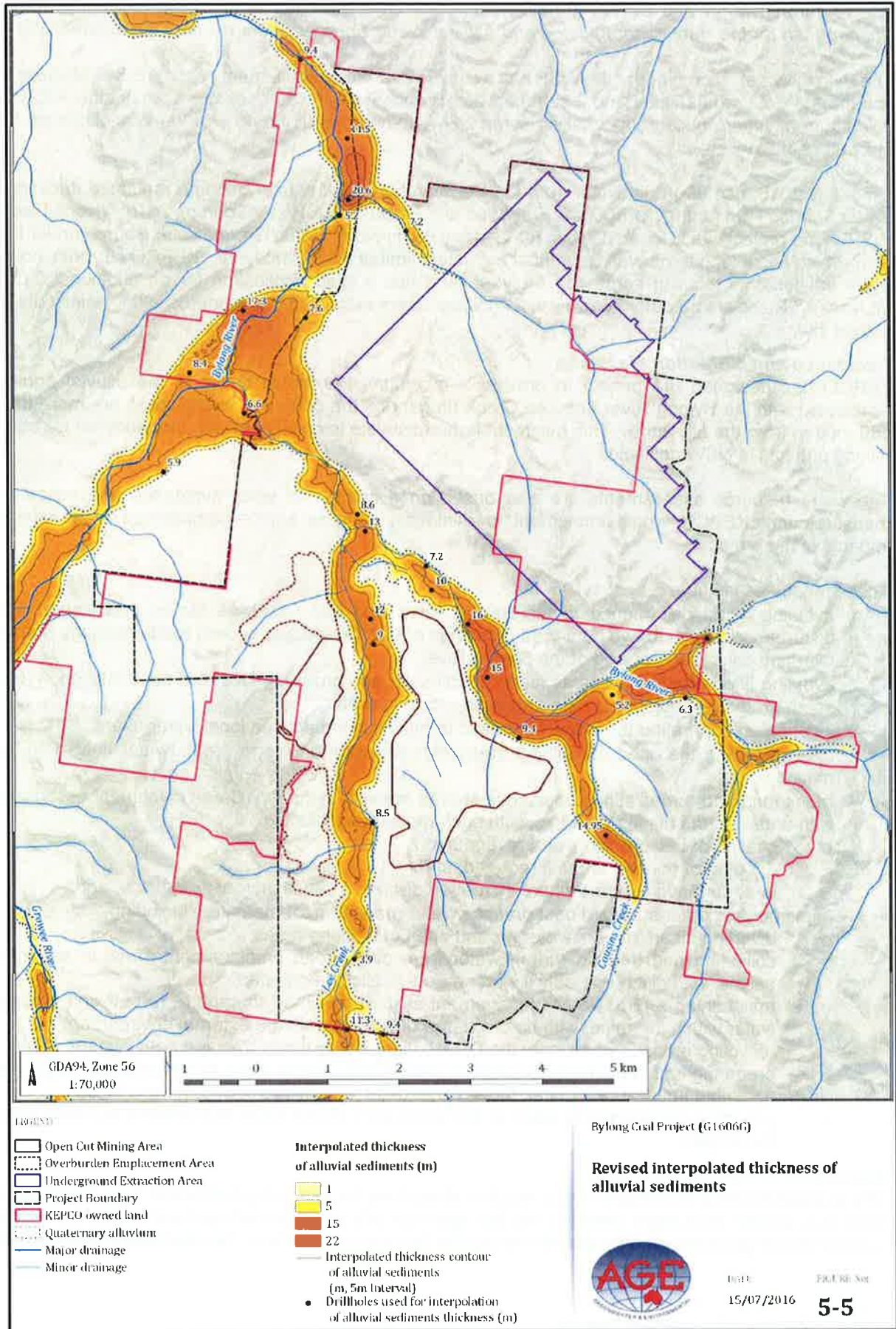


Figure 14: Alluvial Sediments Thickness

Existing Water Users

Use of surface water and alluvial groundwater in the Bylong locality is regulated under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (Hunter Unregulated WSP).

The Bylong Water Source under the WSP has a current total water entitlement of some 5,843 ML/year¹⁰, and there are 23 groundwater and 2 surface water licences in the water source. Of this total, KEPCO holds current water entitlements totalling some 2,644 ML/year, or some 45% of the total allocation for the water source.

On 1 July 2016, use of groundwater from the Permian hard rock aquifer became regulated under the *Water Sharing Plan for the North Coast Fractured and Porous Rock Water Sources 2016*¹¹ (North Coast WSP). The project site is located within the Sydney Basin-North Coast Groundwater Source under the plan, which has a long term average annual extraction limit of 90,000 ML/year. KEPCO currently holds water entitlements totalling some 411 ML/year, and has a valid application for an additional 2,093 ML/year¹². There are no other known licenced water users extracting this resource in the vicinity of the project site.

Avoidance and Mitigation Measures

KEPCO has designed the project to provide a minimum 150 metre buffer to the alluvial aquifer associated with the Bylong River and Lee Creek (in general the open cut mining areas are more than 180 metres from the alluvium). This minimum buffer distance is consistent with that adopted for other mining projects in NSW coalfields.

The water resource assessments are also based on a number of other avoidance and mitigation measures that KEPCO would implement to minimise, mitigate and/or compensate water-related impacts of the project.

These measures include:

- avoiding direct disturbance to the Bylong River and Lee Creek as far as practicable, with disturbance limited to two haul road crossings of Lee Creek, and access road crossings and an overland conveyor crossing of the Bylong River;
- avoiding flood affected areas as far as practicable, and providing localised flood mitigation (e.g. scour protection) adjacent to the proposed crossing areas;
- locating and operating the project borefield to minimise impacts on local water users;
- fully backfilling the open cut mining area voids to avoid long term groundwater flows into the mining voids;
- monitoring and remediating subsidence-related impacts in the Dry Creek catchment associated with underground mining activities, with such measures including:
 - sealing of bed cracking, and revegetation;
 - draining of ponded areas if required; and
 - in-stream bed controls where increased gradients cause increased erosion; and
- implementing other standard best practice water management measures including:
 - diverting clean 'run-on' water around open cut mining areas;
 - collecting and treating run-off water from overburden emplacement areas in sediment basins, with discharge only if water meets applicable criteria;
 - maintaining a dirty water management system designed to capture run-off and process water within the mine, with no discharge of this water to the external environment;
 - recycling process water from the CHPP, via the dirty water management system;
 - preparing and implementing detailed water management plans and monitoring programs;
 - obtaining applicable licences for all water used and discharged from the site; and
 - providing compensatory water to any land users whose water entitlements are affected by the project.

Impacts on Groundwater Flows

The proposed mining operations would result in direct take (or loss) of groundwater from the Permian hard rock aquifer (with flows seeping into the open cut pits and the underground voids), as well as indirect take of groundwater from the alluvial aquifer by inducing flow from the alluvials into the Permian

¹⁰ Plus 65ML/year surface water entitlements.

¹¹ Prior to this, Permian hard rock groundwater was regulated under the *Water Act 1912*.

¹² KEPCO had previously applied for a licence under the *Water Act 1912* to extract water from the hard rock aquifer. DPI-Water has transferred this application to the new North Coast WSP.

aquifer. The proposed borefield in the alluvial aquifer (for water supply to the mine and agricultural use) would also result in direct take of groundwater from the alluvial system.

This water take would vary throughout the life of the project as the open cut pits expand and then contract (with backfilling), and as the underground mining voids progress.

Predicted average, maximum and cumulative (total) water take in both the alluvials and the Permian hard rock aquifers are shown in the following table.

Table 11: Water Take (Loss) from Aquifers

Geological Unit	Source of Water Take	Average Take	Maximum Take		Cumulative Take over Project Life
		ML/yr	ML/yr	Year	ML
Permian hard rock	Mine inflow	1,451	4,099	Y23	36,267
Alluvial	Reduced Permian flow	19	94	Y12	483
	Borefield pumping	763	1,189	Y6	19,081
	Agricultural pumping (capped)	714	714	All	17,850
Total		2,947	-	-	73,681

The modelling indicates that direct flows from the Permian into the open cut pits would be relatively modest, but that flows into the underground mining voids would be more significant, with flows peaking at 4,099 ML/yr (11 ML/day) in Year 23. The progression of flows over the life of the project are shown in Figure 15 (Nb. this figure also shows the 1st and 99th percentile uncertainty analyses, as well as the original EIS SURFACT model and some other modelling scenarios undertaken in the revised modelling).

Indirect losses from the key alluvial aquifer due to reduced Permian flow would be relatively minor, peaking at 94 ML/yr (0.3 ML/day) in Year 12. Direct losses from the alluvial aquifer due to pumping from the proposed borefield would be more significant, peaking at up to 1,189 ML/yr (3.3 ML/day) during open cut mining as water demands for dust suppression and coal processing are not able to be met from internal water supplies (assuming a very dry year). Water take from the alluvium over the life of the project is shown on Figure 16 below.

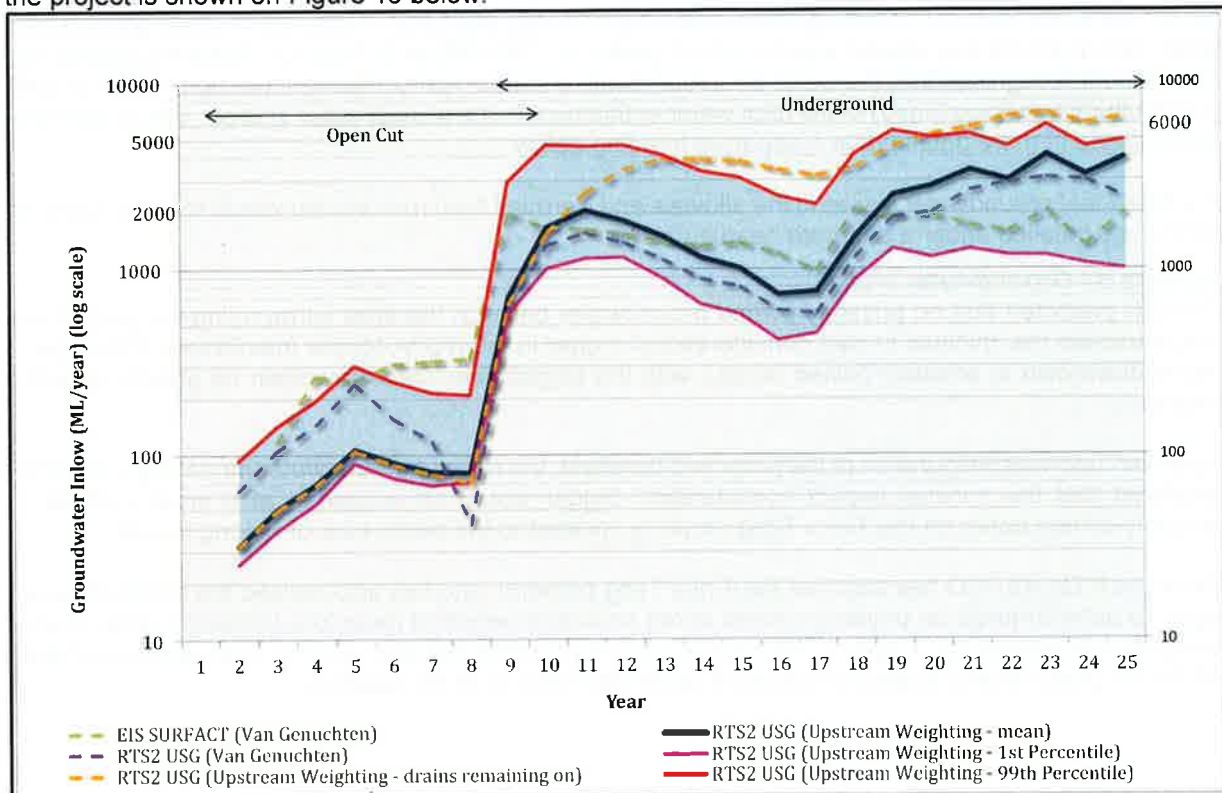


Figure 15: Permian Mine Inflows

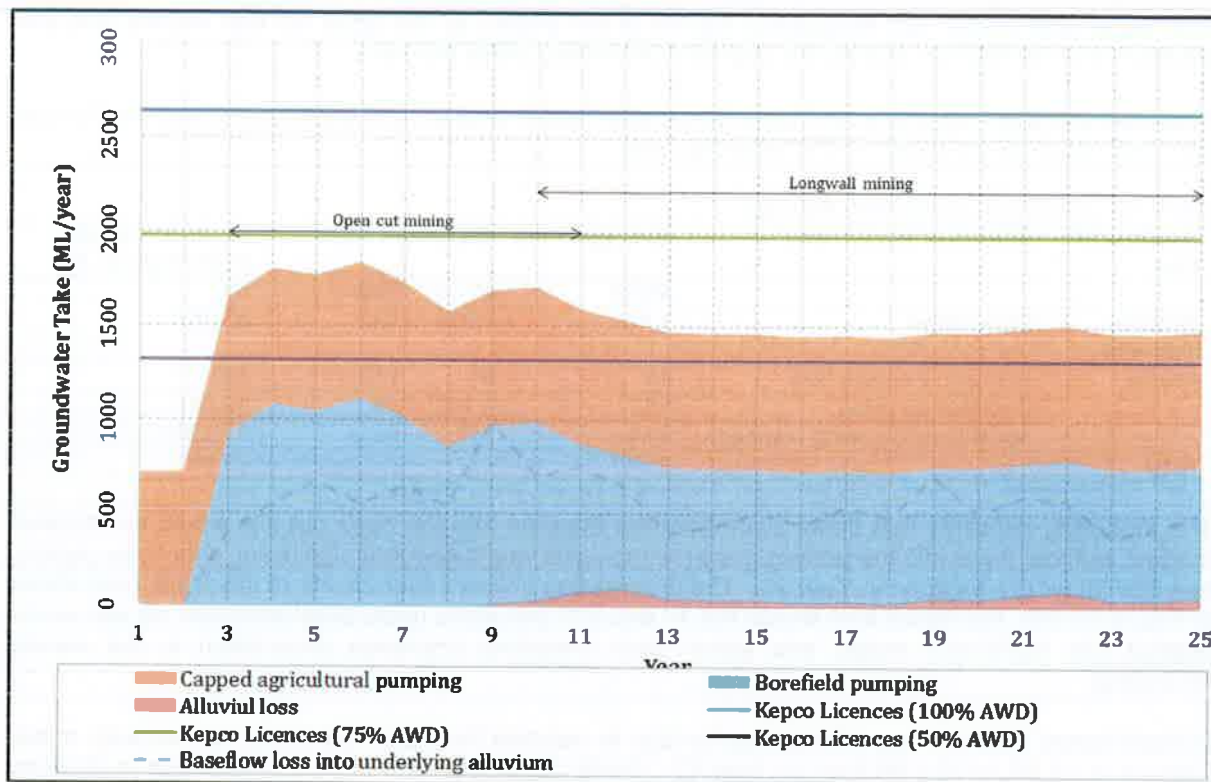


Figure 16: Alluvial Water Take

As outlined above, there is currently a total water entitlement of 5,843 ML/yr in the Bylong Water Source (alluvial groundwater) under the Hunter Unregulated WSP, of which KEPCO currently holds some 2,644 ML/yr. As such, KEPCO's existing water entitlements would adequately account for the predicted total water take from the key alluvial aquifer (which peaks at 1,835 ML/yr in Year 6). Notwithstanding, the Department recognises that the water take represents a substantial component (ie. up to 30%, or 20% if agricultural use is excluded) of the total water entitlement in the alluvial water source. Water licensing is discussed in more detail under a separate heading below.

It is noted that groundwater losses in the alluvials and Permian hard rock aquifer would recover following mining, as detailed under a separate heading below.

Impacts on Groundwater Users

The EIS predicted that no privately-owned groundwater bores in the area surrounding the project site would exceed the 'minimal impact considerations' trigger in the *NSW Aquifer Interference Policy* (ie. 2 metre drawdown at privately-owned bores), with the largest predicted drawdown no greater than 0.1 metres.

However, upon reconfiguration of the proposed borefield, the revised groundwater modelling in the RTS predicted that the minimal impact consideration trigger would be exceeded at a small number of privately-owned bores on the Tinka Tong property, located to the south-east of Bylong village.

Since the RTS, KEPCO has acquired the Tinka Tong property, and has also revised the borefield layout again to avoid impacts on privately-owned bores and other sensitive receptors (including groundwater dependent ecosystems). Figure 17 shows the optimised borefield layout. KEPCO has also undertaken additional pump testing to assess concerns about permeability in the aquifers.

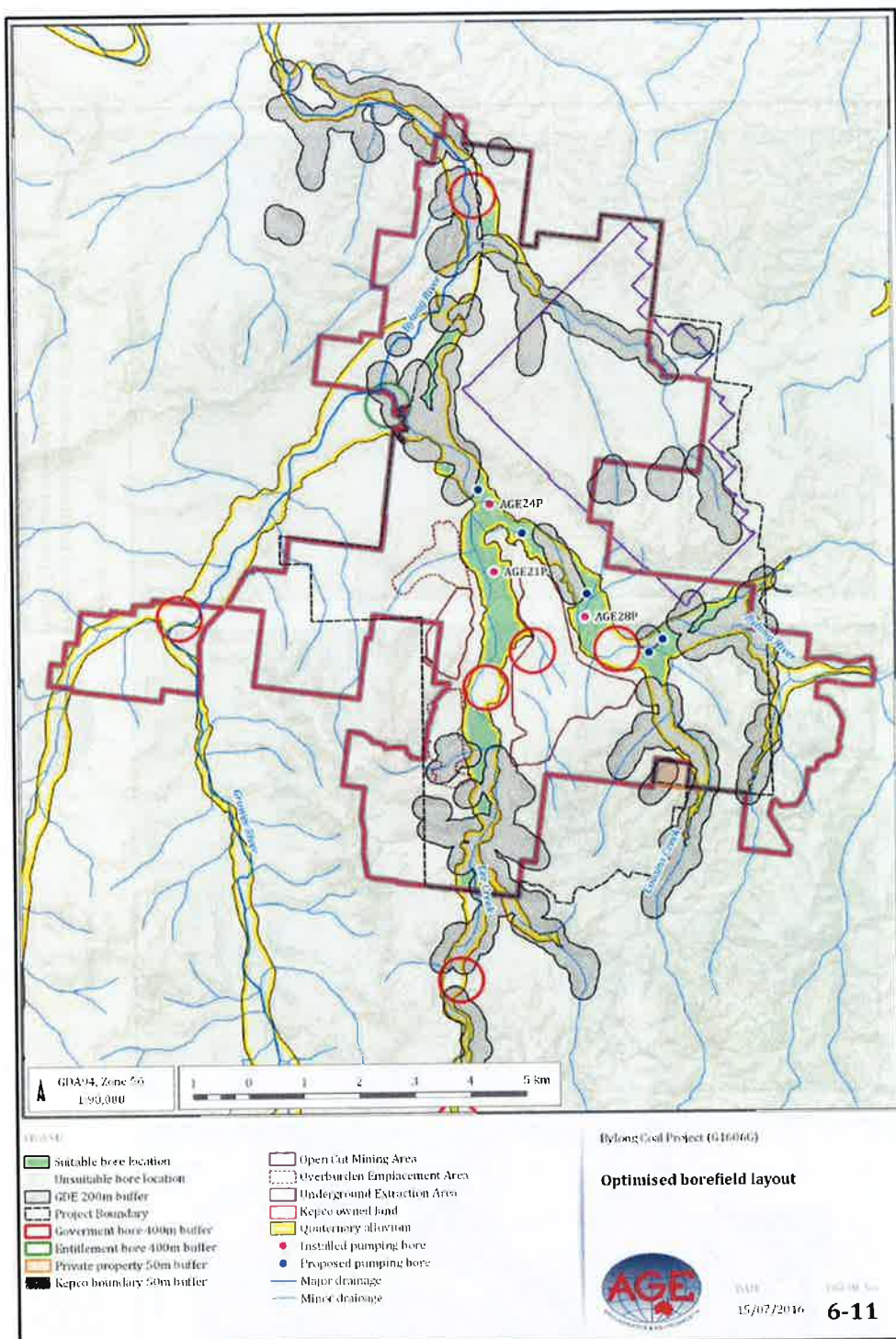


Figure 17: Revised Borefield Layout

The additional groundwater modelling based on the re-revised borefield layout indicates that no privately-owned groundwater bores would be affected by the project, with the closest privately-owned bores (on the Eagle Hill property, to the north of Bylong village) outside the zone of influence in all modelling scenarios, including the 99th percentile scenario from the uncertainty analysis (see Figure 18).

Based on the ongoing revisions to the borefield layout to reduce impacts on privately-owned bores, the additional pump testing and groundwater modelling, and the acquisition of the Tinka Tong property, the Department accepts that the project is unlikely to result in any significant impact to groundwater users in the locality.

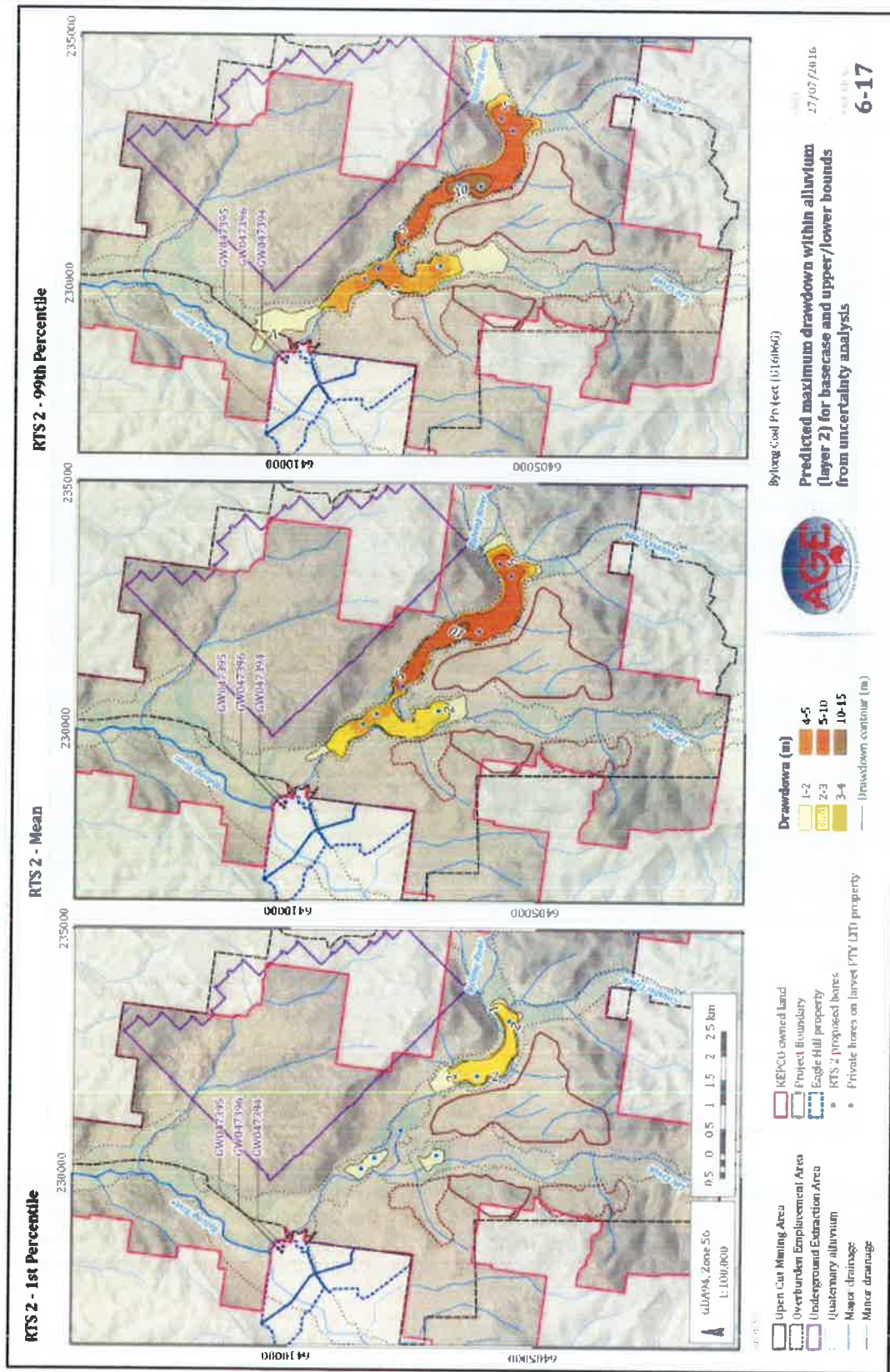


Figure 18: Predicted Drawdown in the Alluvials

Although it is KEPCO-owned, some submitters also raised concerns about the potential impacts of groundwater drawdown on the natural sequence farming areas on the Tarwyn Park property.

KEPCO acknowledges that some of the proposed pumping wells for the borefield may be located on Tarwyn Park, and that this has the potential to reduce groundwater levels on the property whilst abstraction is occurring. However, as outlined in Section 6.4, KEPCO has committed to the continued management and monitoring of the natural sequence farming areas on Tarwyn Park, and the Department has recommended conditions in this regard. Maintaining adequate water supply to the natural sequence farming areas (e.g. through irrigation) would be managed as part of the broader water management for the project.

Changes to Groundwater Quality

The main potential impact to groundwater quality associated with the project is through leaching of saline overburden and/or coal reject material from emplacements and backfilled mine voids.

The groundwater assessment and geochemical assessment indicate that the salinity of saturated overburden material would be in the range of 1,500 to 3,000 $\mu\text{S}/\text{cm}$, and that emplaced coal reject material would have a salinity of between 5,000 to 8,000 $\mu\text{S}/\text{cm}$. The long term salinity of co-disposed overburden and coal rejects would be in the range of 1,800 to 3,500 $\mu\text{S}/\text{cm}$.

These salinity levels are at the upper end of the measured salinity levels in the alluvium (ie. up to 3,100 $\mu\text{S}/\text{cm}$), and therefore long term leaching from the emplacements through the Permian hard rock into the alluvial aquifer (as is predicted) would result in some increase in salinity in the alluvium.

However, the groundwater assessment indicates that this change would be minor and within natural variation levels, given that water from the backfilled pit would comprise only a small portion of the water in the alluvium, and that flows in the alluvium would be significantly greater than in the weathered Permian. The modelling predicts that the change in salinity would not alter the beneficial use category of the alluvial groundwater (which would remain fresh) under the *NSW Aquifer Interference Policy*, and would not have any significant affect on environmental values or river condition.

The groundwater assessment also includes consideration of the impacts associated with pumping of excess water from the residual open cut void into the underground mine workings, which is proposed towards the end of the project life to allow the open cut void to be backfilled and rehabilitated. The salinity of this water is expected to be in the range of 1,800 to 3,500 $\mu\text{S}/\text{cm}$, which is within the range of salinity levels in the Permian coal measures (ie. 930 to 3,900 $\mu\text{S}/\text{cm}$). Consequently, the re-injection of excess water into the underground system is not expected to result in any significant increase in salinity levels in the coal seam aquifer.

A related issue associated with the quantum of this excess water is considered separately below.

Impacts on Surface Water Flows

The project would affect surface water flows in surrounding waterbodies including the Bylong River, Lee Creek, Dry Creek and the Growee River through three main mechanisms, namely:

- directly reducing catchment areas (and therefore catchment flows) by interception of rainfall and runoff; or
- directly to Dry Creek through subsidence-related impacts (e.g. cracking, ponding); and
- indirectly through groundwater depressurisation, resulting in reduced flow from groundwater to waterbodies and/or increased leakage from waterbodies to groundwater.

The maximum loss (or capture) of catchment areas during the project would represent:

- less than 1.3% of the Bylong River catchment (to a point downstream of the project boundary);
- approximately 5.8% of the Lee Creek catchment (to its confluence with the Bylong River); and
- less than 0.1% of the Growee River catchment (to its confluence with the Bylong River).

Given the relatively small areas of catchment loss, the captured catchment associated with the project is not expected to have any significant impacts on flows in the local creeks. The captured catchment areas would gradually reduce over the life of the project with the rehabilitation of mined areas.

With regard to subsidence-related impacts to Dry Creek, the groundwater assessment in the EIS indicated that inflow from the Dry Creek alluvium to groundwater via cracks would be up to about 0.15ML/day (55ML/year)¹³, and that the loss of surface water to groundwater via cracking would be negligible given the ephemeral nature of the creek.

Some localised areas of ponding along Dry Creek is predicted (up to about 2.3 hectares), with ponded water representing about 6% of runoff if no mitigation measures were implemented.

In practice, subsidence-related impacts on Dry Creek (including cracking, ponding, bed shear/stress) would be remediated as necessary using standard best practice techniques (such as sealing cracks, draining ponds, scour protection, etc.).

With regard to reductions in surface water flows due to groundwater depressurisation in the other catchments, the water assessments indicate that mining would reduce baseflow in Lee Creek and the Bylong River, but would not have a measurable impact on flows in the Growee River given its distance from the project area.

The depressurisation would reduce stream flows in the Bylong River and Lee Creek by up to 994 ML/year during the open cut mining period (Year 9), with the majority of this loss in the Bylong River (see Figure 19). Most of this loss would be associated with the proposed borefield and agricultural pumping. Once underground mining starts and make-up water requirements from the borefield reduce, the model indicates that stream flow loss would reduce to around 500 ML/yr.

The assessment indicates that the stream flow loss in the Bylong River would be 'detectable', depending on climate conditions at the time. Given the high connectivity between surface water and the alluvial aquifer, the loss has the potential to reduce flow durations and increase cease-to-flow periods in the river. Licensing issues associated with this loss are discussed under a separate heading below.

Given the ephemeral and naturally variable nature of the flows in the local creek systems, the changes to stream flow are not expected to result in significant impacts to aquatic and environmental values associated with the creek systems.

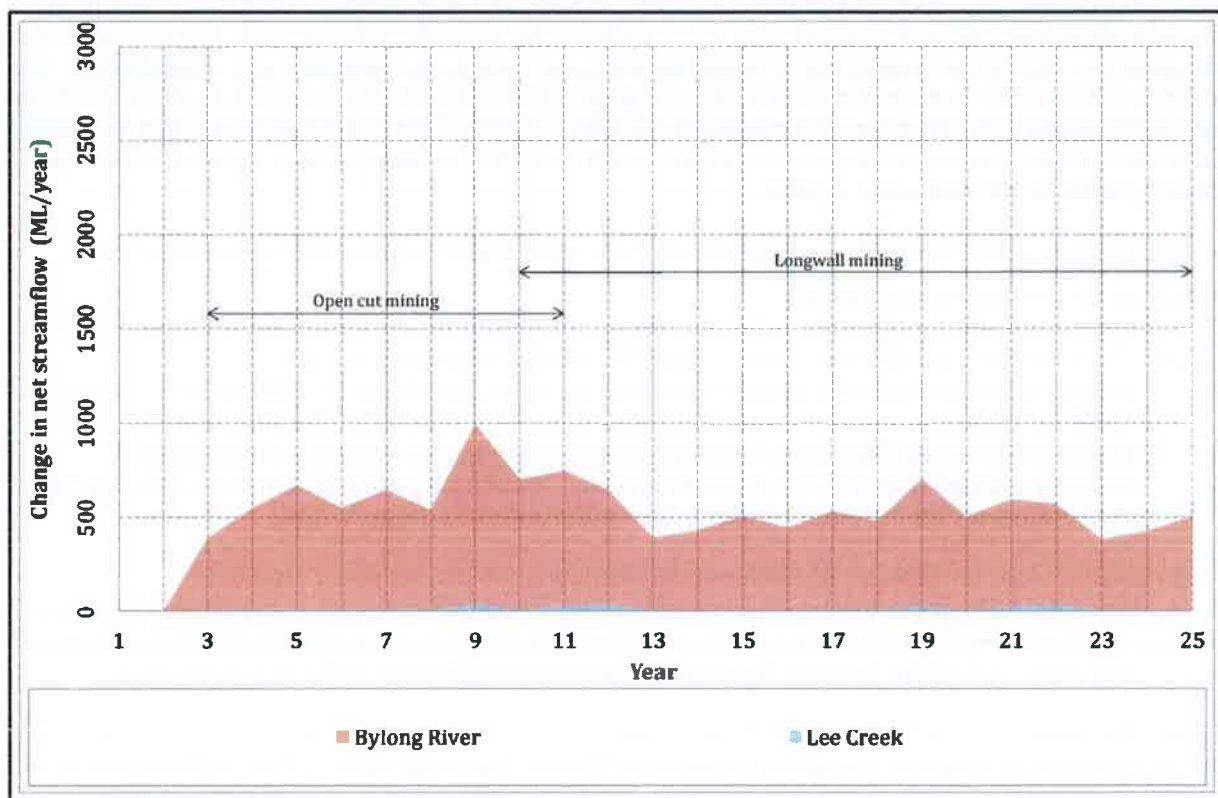


Figure 19: Predicted Stream Flow Loss

¹³ The revised groundwater modelling in the RTSs indicates that impacts on the Dry Creek alluvium would be less than this, although the specific loss via cracks is not quantified.

Surface Water Quality

The project has the potential to impact surface water quality, particularly via increases in salinity, which could occur through changes to catchment flows and uncontrolled releases (overflows) from the project's sediment basins.

The assessment indicates that there would be no uncontrolled releases from the mine water system (ie. the higher salinity water from open cut pits and disturbance areas that has come into contact with coal), which would be collected in the base of the open cut pits in the event of any overflow of the mine's storage system. The modelling indicates that the pits would have adequate storage capacity to accept any overflow of mine water during wet periods, however the storage capacity does become relatively small towards the end of the mining period. This issue is discussed in more detail in the following section.

Based on the proposed water management system (with nil discharges from the mine water system), predicted pre-development and worst case salt loads discharging to the Bylong River downstream of the project area are presented in the following table.

Table 12: Long Term Bylong River Salt Balance

Source	Salt Load (t/day)	
	Existing	Year 7*
Catchment runoff	3,947	3,546
Sediment dam overflows	-	178
Total	3,947	3,724

* Year 7 is predicted to result in the highest total salt loads during mining.

The modelling indicates that salt loads released to the Bylong River would marginally decrease during mining operations (by between 5.6% to 8.4%), as a result of:

- the reduction in catchment runoff; and
- overflows from the sediment dams having salinities consistent with receiving waterways.

Consequently, the project is not expected to result in any significant impacts on water quality in the locality. In the long term post-mining, water quality is predicted to be similar to pre-existing conditions (see separate heading below).

Water Balance

The water balance assessment (as revised following the RTS) indicates that, during open cut mining years, the mine's water demand would require supplementation via the proposed borefield to meet its water requirements. The key water demands include dust suppression and processing water for the CHPP.

The assessment indicates that between 680 to 1,100 ML/yr would be required in an average rainfall year during open cut mining, or up to 1,268 ML/yr if this period coincided with a very dry year (ie. 1st percentile). These water use requirements have been considered as part of the water licensing requirements below.

Following the commencement of underground mining, inflows from the Permian aquifer into the underground workings would increase to the point that bore water supplementation via the borefield would decrease to negligible amounts. From Year 11, the water balance indicates that bore water intake would reduce to around 1 ML/yr (see Figure 20).

However, these continued inflows to the underground workings would create the reverse issue in the mine's later years, with an excess of water that would require management¹⁴.

The mine has been designed on a nil-discharge basis, and as such the mine's water management system involves pumping excess water from the underground mine to the open cut voids, in particular to the south-eastern area of the Eastern Open Cut void following the backfilling and rehabilitation of other open cut mining areas. This void is also proposed to be used for the disposal of rejects during the underground mining phase.

¹⁴ The most recent groundwater modelling predicted that these flows would be considerably greater than the flows predicted in the original modelling in the EIS.

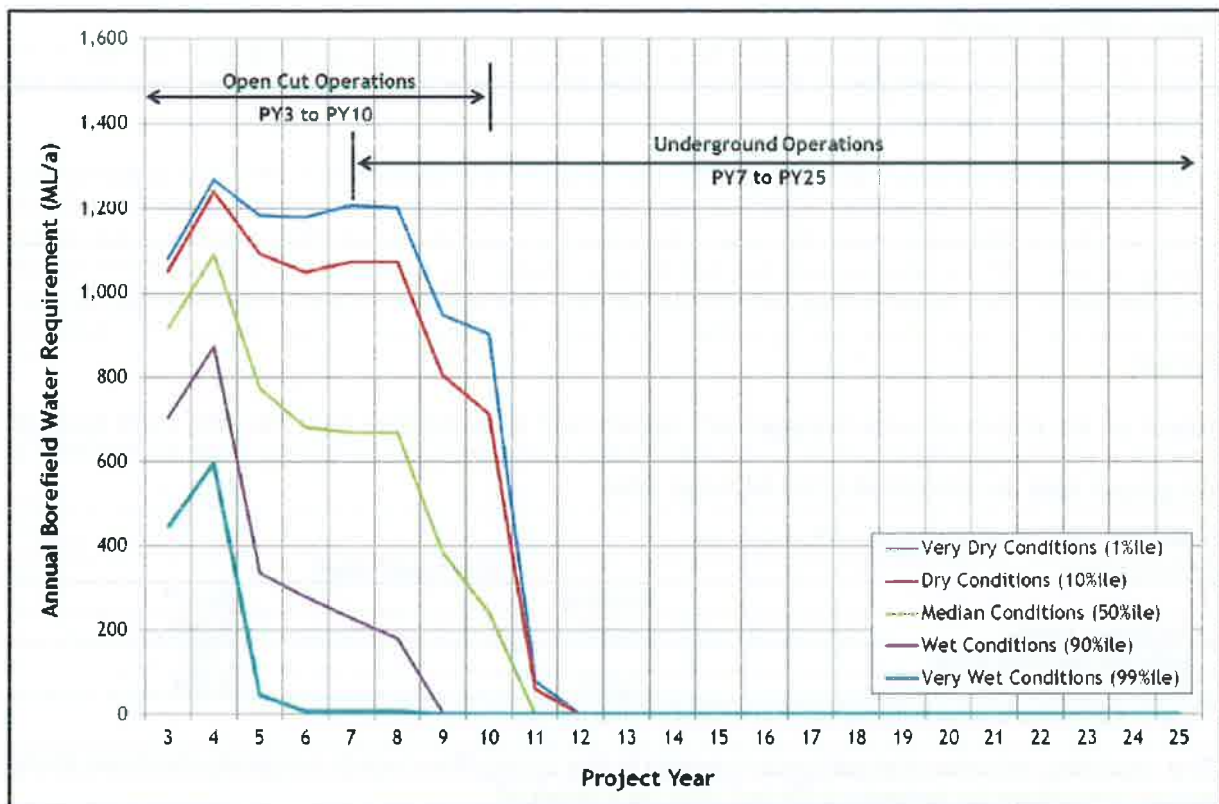


Figure 20: Annual Bore Field Water Requirements

The stored water in the void would be available for use on site during mining operations. At the end of mining, excess water would be pumped back into the underground workings to enable final rehabilitation of the void.

The water balance assessment indicates that in median (ie. 50th percentile) conditions there would be a requirement to store up to 5,540 ML in the Eastern Open Cut void at the end of mining. In very wet conditions (1st percentile), this storage requirement would increase to 6,940 ML (see Figure 21).

The assessment notes that the Eastern Open Cut void would have a total volume of around 18,800 ML at the end of open cut mining, and that the total volume of rejects generated during underground mining operations would be about 11,700 ML. This leaves approximately 7,100 ML available for water storage.

Whilst this storage capacity is theoretically sufficient to store the excess water in all scenarios, the Department notes that the water volume may be close to the available storage capacity (depending on the prevailing weather), and that this may create operational or other technical issues during the later stages of mining.

One obvious solution would be to discharge some of the excess water to the local catchment (e.g. the Bylong River and/or Lee Creek) during mining operations, following treatment to acceptable standards. Whilst this has not been proposed or assessed at this stage (and would require appropriate licensing), this option would appear feasible given the reasonably good water quality in the aquifers. It would also help supplement local creek flows and surface water users in the locality.

Notwithstanding that this option has not been assessed, reasonable and feasible options exist for the management of this excess water, and that this can be appropriately addressed as mining progresses.

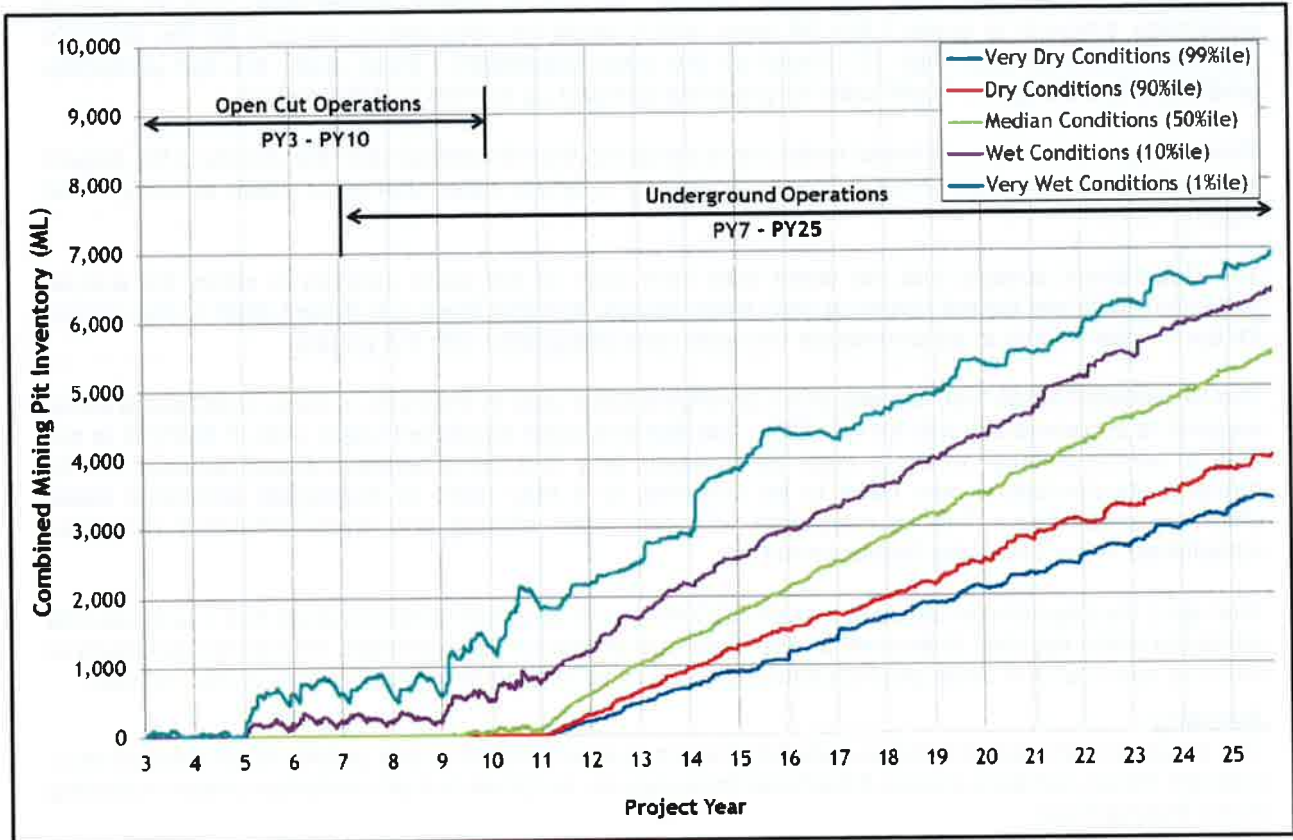


Figure 21: Open Cut Water Storage Requirements

Water Licensing

A summary of total water use (or ‘take’) associated with the project is presented in the following table.

Table 13: Predicted Water Take

Water	Water Sharing Plan (WSP)	Predicted Peak Annual Water Take		Water Access Licences held by KEPCO (units)*	Total Water Entitlements in Water Source (units)
		ML	Year		
Alluvial groundwater and surface water	Hunter Unregulated WSP (Bylong Water Source)	1,835	6	2,644	5,908
Permian hard rock aquifer groundwater	North Coast WSP	4,099	23	411 + current application for 2,093 (total 2,504)	90,000

* 1 unit equates to 1 ML in a 100% allocation year

As indicated in the table, KEPCO currently holds adequate water access licences to account for all water take from the Bylong Water Source under the Hunter Unregulated WSP, with a surplus providing a considerable buffer if the available water allocation drops below 100%.

Some submitters raised concerns that KEPCO does not currently hold enough licences to account for its water take from the Permian hard rock aquifer. However, as outlined above, the North Coast WSP only came into effect on 1 July 2016. KEPCO had previously applied for a licence under the *Water Act 1912* to extract water from the hard rock aquifer, and DPI-Water has now transferred this application to the new North Coast WSP.

A water access licence allowing extraction of up to 4,100 ML/year would be required to account for the peak annual water take from this water source. KEPCO's current entitlements plus its current application amounts to some 2,504 ML/year, which would be adequate to account for the project's predicted demands until Year 19 (based on the mean prediction). Even under the 99th percentile prediction, this allocation would cater for predicted demand up to Year 9 of the project.

There are no other known licensed water users extracting from this resource in the vicinity of the project site, and hence this water access licence is unlikely to affect water sharing or water security in the region.

The Department accepts that the water take from each of the water sources is within the annual extraction limits and issued shares in each water source, and that there is sufficient depth in the market for each water source to accommodate the water take associated with the project.

The Department notes that, like any other significant water user in the State, access to adequate water supplies is a commercial risk for KEPCO. And like any other significant water user, if KEPCO is not able to secure enough water to meet its demands (e.g. if existing allocations are reduced due to drought), its operations may need to be curtailed, or it may need to investigate additional water efficiency measures. This is consistent with the water sharing and water efficiency principles established under the Water Management Act.

That said, the Department believes that KEPCO should be required to demonstrate that it has secured adequate water supplies to account for the maximum predicted water demand for mining operations in both the open cut and underground phases, prior to commencing mining operations in each phase.

Flooding

The proposed open cut pits and surface facilities have been located largely outside flood affected land, however the project does involve 2 haul road crossings of Lee Creek and an overland conveyor crossing of the Bylong River.

KEPCO has sought to minimise flood-related impacts associated with these crossings (through culvert and embankment sizing), however the flood modelling indicates that some localised changes in flood behaviour would occur near these structures. In a 100 year ARI event, the structures would result in an increase in flood depths for up to 0.5 kilometres upstream of the structures, with the flood depth ranging from 1.0 to 2.5 metres immediately upstream of the structures (see Figure 22). Localised flood velocity increases would also occur immediately downstream of the structures.

In Dry Creek, the subsidence associated with proposed longwall mining is not expected to result in any significant flooding impacts, although a small section of the creek near the western edge of the final longwall panel may be subject to some break-out of flow from the creek channel, which may flow across the Bylong Valley Way (with a depth of less than 0.25 metres and velocity of less than 0.75 m/sec in a 100 year ARI event).

Based on KEPCO's flood assessment, the project is unlikely to result in any significant flood-related impacts the locality with predicted localised impacts to be effectively managed using standard best practice flood management techniques. These include scour protection downstream of the proposed creek crossings, and remediation (ie. localised drainage works) of subsidence-related impacts in Dry Creek. The Department has recommended conditions requiring KEPCO to manage these risks as part of a comprehensive Water Management Plan.

These flooding changes in the Bylong River system would be confined to KEPCO-owned land, and are not expected to result in any off-site impacts.

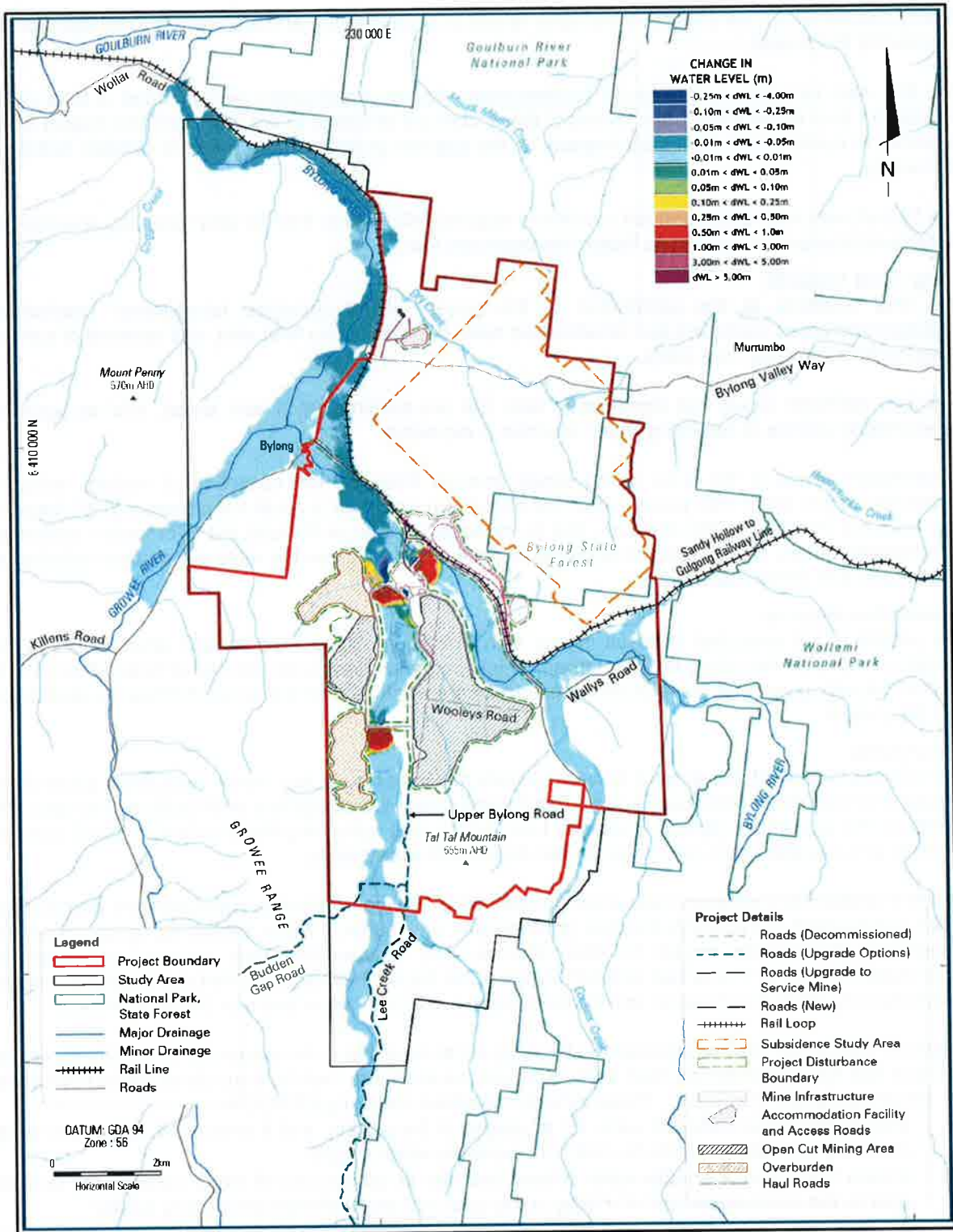


Figure 22: Flooding – Bylong River and Lee Creek

Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems which require access to groundwater (beyond soil-based groundwater from rainfall) to meet all or some of their water requirements.

There are no high priority GDEs (as listed in the Hunter Unregulated WSP) in the area surrounding the project site, however the ecological assessment identified 3 vegetation communities that are likely to have some reliance on groundwater along sections of Lee Creek, the Bylong River and Dry Creek. As indicated on Figure 17, the project’s borefield provides a minimum 200 metre buffer to these GDEs.

Groundwater modelling indicates that drawdown at these potential GDE sites would generally be less than 2 metres, and/or are located adjacent to surface water resources. The assessment indicates that

these potential GDEs are unlikely to be highly reliant on groundwater, and are unlikely to be significantly affected by the project.

The EIS also includes a stygofauna (subterranean fauna) assessment, which found a total of 10 stygofauna taxa in the study area. None of these taxa are endemic to the area, and the project is not expected to result in any significant impacts on the species given the large areas of suitable habitat in the locality.

The Department has recommended conditions requiring KEPCO to monitor and minimise any impacts to these ecosystems as part of its Water Management Plan.

Long Term Impacts

The final landform at the completion of the project would comprise rehabilitated overburden emplacement areas, backfilled and rehabilitated open cut pits with no final void, and removal of surface infrastructure including haul roads.

The final landform would not significantly alter the pre-existing catchment areas, and as such no measureable change to receiving water volumes is expected.

Groundwater levels in the area would slowly recover following the cessation of mining, reaching equilibrium within about 100 years. After this time there would be a small net increase (5 ML/year) in flow from the Permian to the alluvium, due to increased recharge through the overburden materials. Groundwater quality is not expected to be significantly affected, given the relatively modest salinities of overburden and waste materials.

Cumulative Impacts

The project is not expected to result in any significant cumulative impacts with other mines in the Western Coalfields (including the Moolarben, Wilpinjong and Ulan mines located at least 25 km to the west of Bylong), given that these other mines are located well beyond the zone of influence associated with the project.

Conclusion

KEPCO has designed the project to avoid significant impacts on key water resources, particularly through avoiding direct disturbance of the highly productive alluvial aquifers (with buffers of at least 150 metres to the alluvium in Bylong River and Lee Creek), and optimising the borefield to avoid impacts on other groundwater users and groundwater dependent ecosystems.

Based on these key mitigation measures, and following very comprehensive groundwater and surface water assessment – including detailed groundwater and surface water modelling, peer review by recognised groundwater expert Dr Noel Merrick, and independent peer review by recognised groundwater expert Dr Frans Kalf and DPI Water – the Department accepts that the project is unlikely to significantly affect groundwater and surface water resources, water users or the environment.

However, the Department recognises the local significance of the water resources in the vicinity of the site, and has recommended a broad suite of conditions to ensure that the impacts on these resources are minimised and/or managed. These include conditions requiring KEPCO to:

- ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations on site to match its available water supply;
- ensure that it has adequate water access licences to account for all water used by the project, prior to the commencement of mining in the open cut and underground mining areas;
- not discharge any mine water (ie. 'dirty' or saline water) from the site, unless otherwise approved under an environment protection licence;
- ensure that all surface water discharges of non-mine water from the site comply with the limits set in any environment protection licence;
- provide compensatory water supplies to any private landowner whose supply is found to be adversely affected by the project, in the unlikely event that this occurs;
- comply with a range of water management performance measures and rehabilitation objectives;
- implement best practice dryland salinity measures as part of the Biodiversity Management Plan;
- prepare and implement a comprehensive Water Management Plan for the project, including a:
 - water balance;
 - salt balance;
 - surface water management plan and monitoring program;
 - groundwater management plan and monitoring program;

- borefield management plan;
- program to regularly (every 3 years) validate the water balance, salt balance, surface water model and groundwater model (including consideration of using an integrated surface-water/groundwater model); and
- a protocol to minimise any cumulative water-related impacts.

6.4 Agricultural Impacts

Introduction

As outlined in Section 2, the economic assessment undertaken for the project indicates that the gross economic benefits of the project far outweigh the economic benefits associated with the continued use of the project lands (including the offset areas) for agriculture. However, the Department recognises the importance of the agricultural industry and prime agricultural land to society, and that impacts should be avoided where possible and otherwise minimised as far as practicable.

In this regard, KEPCO has designed the project to avoid impacts on BSAL and higher capability land within the project boundary and offset areas to a large extent. However, as discussed below there remains a considerable area of BSAL within these areas.

Other key mitigation measures that KEPCO has incorporated into the project include:

- maintaining the agricultural productivity of land that it acquires outside the disturbance and offset areas, including maintaining the renowned 'natural sequence farming' techniques on the Tarwyn Park property;
- employing a farm manager and preparing a Farm Management Plan to manage these lands;
- reinstating equivalent areas of BSAL (and Class 3 capability land) to that disturbed by the project, within the rehabilitation area;
- remediating BSAL and other agricultural land affected by subsidence above the underground mining area; and
- implementing a range of other measures to avoid and/or mitigate the project's direct and indirect environmental impacts on surrounding land users.

Residual environmental impacts (e.g. water, noise, dust traffic and visual impacts) on agricultural land users are addressed in other sections of this report.

With regard to residual impacts on agricultural resources themselves, the project would impact agricultural land resources through the project disturbance footprint, and remove agricultural production in some parts of the biodiversity offset areas. It also has the potential to affect key agricultural industries in the region, in particular the regionally significant equine industry.

In general terms, the project disturbance area¹⁵ comprises a total of 1,160 hectares, of which:

- 451 hectares (39%) comprises arable land (ie. suitable for cultivation and irrigated cropping);
- 694 hectares (60%) comprises grazing land; and
- 15 hectares (1%) comprises heavily timbered land.

The biodiversity offset areas comprise a total of approximately 3,800 hectares of land (excluding areas that would be retained for agriculture – see below), of which:

- 1,158 hectares (30%) is arable land;
- 1,318 hectares (35%) is grazing land; and
- 1,324 hectares (35%) is heavily timbered land.

The project disturbance area and offset areas (ie. about 4,960 hectares altogether) constitutes approximately 0.009% of the available agricultural land in NSW.

The gross value of agricultural production from land resources impacted by the project (including the disturbance area, offset areas and water that could be otherwise used for agricultural production) is approximately \$2.7 million per annum¹⁶, if the entire area was used for agricultural purposes. This represents about 4% of the total agricultural production in the Mid-Western Regional LGA, 0.02% of NSW agricultural production, and 0.005% of Australia's agricultural production.

¹⁵ Includes a buffer of 50 metres from the actual disturbance areas to address edge effects.

¹⁶ Based on the agricultural prices at the time of the EIS. The RTS indicates that this value has increased since this time (with an increase in the beef cattle market), to approximately \$4.2 million per annum.

The Department accepts that the partial/temporary (or even full) loss of this production is minor relative to total regional, State and national agricultural production. Measures to protect and rehabilitate higher value agricultural land are discussed in more detail below.

Biophysical Strategic Agricultural Land (BSAL)

Areas of BSAL¹⁷ occur both within the project boundary and disturbance area, as well as in the biodiversity offset areas. A summary of the BSAL in these areas¹⁸, including the areas that would be impacted by the project, is provided in the following table. The BSAL areas are shown on Figure 23.

Table 14: BSAL Areas and Impacts

<i>Item</i>	<i>BSAL Area (ha)</i>
BSAL in Project Boundary	1,711
BSAL in Project Disturbance Area:	
• Subsidence Area (indirect and temporary impact)	171.8
• Infrastructure Areas (direct and temporary impact)	103.6
• Mining Areas and Emplacements (direct and permanent impact)	319.5
• Total	594.9
BSAL in Biodiversity Offset Areas:	
• BSAL to be retained for agricultural use	119.6
• BSAL to be managed for conservation use	287.8
• Total	407.4
BSAL to be reinstated in Rehabilitation Area	423.1

As indicated in the table, there is a total of 1,711 hectares of verified BSAL in the project boundary. KEPCO has sought to avoid impacts on this BSAL to an extent, however there is approximately 595 hectares of BSAL within the project disturbance area that would be impacted to some degree.

Of this amount, 171.8 hectares is located within the subsidence affectation area, and is not expected to be significantly affected subject to implementation of standard subsidence remediation measures.

Approximately 319.5 hectares is located within the open cut mining areas or the emplacement areas, and as such would be directly and permanently affected. KEPCO notes that this area of BSAL is not all of the same agricultural value, with only 37% suitable for cultivation (ie. LSC Class 3). The other 63% comprises Class 4 to 6 land, and is therefore generally only suitable for grazing.

The other 103.6 hectares of affected BSAL in the project disturbance area is located in the proposed infrastructure areas.

KEPCO proposes to reinstate this 103.6 hectares of BSAL following mining (with the removal of the infrastructure), and to also reinstate at least 319.5 hectares of BSAL-equivalent¹⁹ land within the rehabilitation areas. This would provide a direct one-for-one compensation for the BSAL permanently affected by the project. In this regard, the rehabilitation (if successful) would ensure that the project does not result in any net loss of BSAL within the project boundary. The BSAL would be reinstated in similar areas as the proposed BSAL disturbance areas (see Figure 24).

The biodiversity offset areas contain a further total of 407.4 hectares of BSAL. Of this, 119.6 hectares comprises previously cultivated land. These previously cultivated areas are shown on Figure 23.

Given the limited ecological value of this cultivated land, and to reduce the loss of BSAL from active agricultural production, KEPCO proposes to retain these previously cultivated areas (including the BSAL) for agricultural production.

¹⁷ Land with high quality soil and water resources capable of sustaining high levels of agricultural productivity.

¹⁸ The BSAL areas were amended from those originally identified in the EIS, following additional soils assessment undertaken as part of the RTS.

¹⁹ DPI-Agriculture notes that man-made soils cannot technically be reinstated to BSAL, as man-made soils are not recognised in the BSAL fertility rankings. However, DPI-Agriculture accepts that BSAL-equivalent soils could satisfy its requirements, provided they meet required fertility and productivity standards.

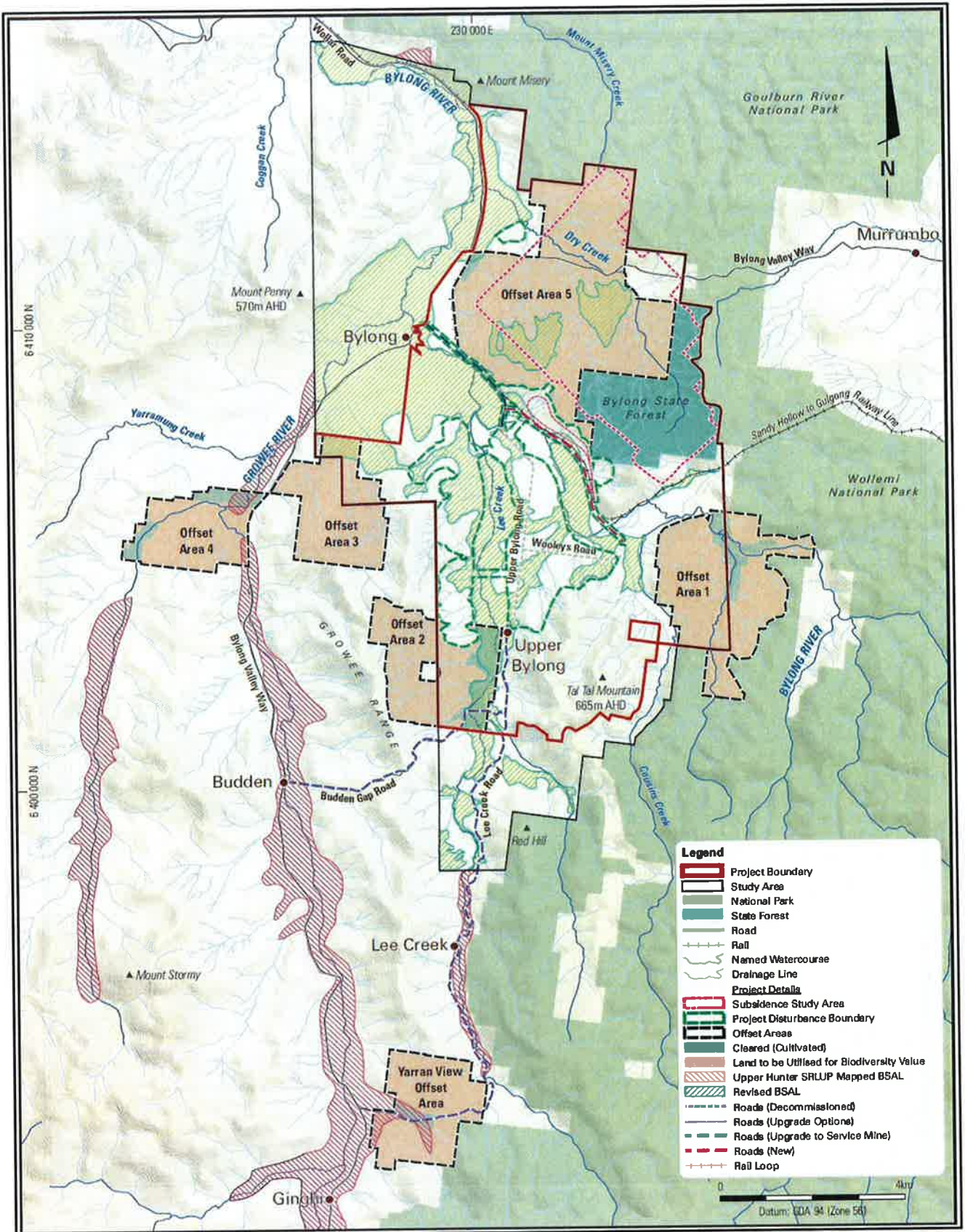


Figure 23: BSAL in the Project Disturbance and Biodiversity Offset Areas

The other 287.8 hectares of BSAL in the offset areas has not been cultivated and contains high ecological values including the critically endangered Box Gum Woodland, and is therefore proposed to be managed for conservation.

DPI-Agriculture raised a number of technical issues during the assessment process in relation to the quantum of BSAL within the project area, and the ability to reinstate BSAL-equivalent land within the rehabilitation area. KEPCO has since undertaken additional assessments and consulted with DPI-Agriculture in relation to these issues.

To this end, DPI-Agriculture is now satisfied that KEPCO has adequately assessed and mapped the BSAL within the project area.

DPI-Agriculture does not object to the loss of BSAL within the project disturbance area, provided that the BSAL (or BSAL-equivalent) is reinstated within the rehabilitation area to ensure no net loss of BSAL in the locality. The rehabilitation of BSAL is discussed in more detail under a separate heading below.

KEPCO has designed the project to avoid direct and permanent impacts to BSAL as far as practicable. The residual 319.5 hectares within the mining areas and emplacement areas is located towards the edge of mapped BSAL in the locality, and only part (ie. 118.7 hectares) is generally suitable for cultivation. The directly impacted BSAL is not expected to affect the agricultural productivity of adjoining areas of BSAL in the locality in the short or long term.

This area of directly and permanently affected BSAL represents only 0.07% of the mapped BSAL in the Upper Hunter region (ie. 470,000 hectares), and a negligible 0.01% of the mapped BSAL in NSW (ie. 2.8 million hectares).

However, the Department believes that KEPCO should be required to reinstate this BSAL, as well as the BSAL in the infrastructure areas that would be temporarily affected (ie. 423.1 hectares in total). Consideration of this rehabilitation is provided under a separate heading below.

With regard to BSAL in the biodiversity offset areas, DPI-Agriculture initially recommended that the offsets avoid BSAL altogether, so that these areas can be retained in agricultural production. It subsequently accepted KEPCO's approach to exclude cultivated and historically cultivated BSAL from the offset areas, but recommended that the residual BSAL within the offsets be kept available for high quality grazing.

The Department accepts that KEPCO's approach to exclude 119.6 hectares of cultivated and historically cultivated BSAL from the offset area is logical and appropriate, as these areas have limited ecological value and are important for ongoing agricultural production.

The Department also accepts the inclusion of some BSAL (ie. 287.8 hectares) in the offset areas to be managed for conservation (with agriculture excluded). The Department and OEHL considers that biodiversity conservation is the highest and best use of this land, particularly given that many threatened species, including the critically endangered Box Gum Woodland, are typically located on this BSAL. Indeed, widespread historical clearing of good quality BSAL for agriculture is one of the key reasons why this CEEC is threatened.

Whilst the Department acknowledges DPI-Agriculture's recommendation that residual BSAL within the offset areas be kept available for high quality grazing, the Department recognises that such a land use is likely to be incompatible with the long term conservation goals of the offsets and the Box Gum Woodland CEEC. Consequently, the Department does not believe that the residual BSAL in the offsets be made available for ongoing agricultural production. Notwithstanding, it is noted that the BSAL resource itself would remain in situ.

The Department also notes that the cultivated and historically cultivated BSAL areas to be excised from the offset areas would continue to be available for agricultural production (including access to existing roads and infrastructure), and that the biodiversity offset strategy is unlikely to have any significant impact on BSAL and agricultural production in the wider locality and region.

Equine Critical Industry Cluster

The project site and the biodiversity offset areas are located within and/or in proximity to the Equine CIC, as identified and mapped in the *Upper Hunter Strategic Regional Land Use Plan (SRLUP)*. The SRLUP defines a CIC as a localised concentration of interrelated productive industries based on an agricultural product that provides significant employment opportunities and contributes to the identity of the region.

Approximately 700 hectares of mapped Equine CIC land is located within the project disturbance area, and a further 584 hectares is located within the biodiversity offset areas. These areas represent approximately 0.5% of the mapped Equine CIC in the Upper Hunter.

The Equine CIC land within the project disturbance area would be rehabilitated/reinstated to provide similar land capability following mining, and as such would not be permanently lost to agriculture/equine use. Of the 584 hectares of mapped Equine CIC land located in the biodiversity offset areas, 69 hectares is located within the identified cultivated land areas and would remain in agricultural production. The remaining 515 hectares, however, would be permanently lost to agriculture/equine land use.

As illustrated on Figure 25, the project site is located at the south-western extremity of the Equine CIC, with the site over 1.5 hours drive from Scone. Scone is recognised as the major horse breeding centre in the CIC, and indeed one of the major thoroughbred breeding centres in the world, with over 70 operating studs.

There are currently no operating thoroughbred studs in the Bylong Valley, or within 10 km of the project site. KEPCO purchased the only operating thoroughbred stud in the valley (Bylong Park Stud) in August 2012 (ie. prior to the release of the SRLUP and the Equine CIC mapping).

The owners of Bylong Park Stud have since relocated to a new site near Denman, and thoroughbred sales information provided by KEPCO indicates that this relocation has not had any significant adverse impact on the stud's revenue.

The Gateway Panel and some submitters noted that the Bylong Valley does have a rich and important thoroughbred horse breeding history, including the KEPCO-owned Tarwyn Park property which was once a stud that accommodated some notable horses including Melbourne cup winners (including Rain Lover who won the Melbourne Cup in 1968 and 1969). However, Tarwyn Park has not operated as a thoroughbred operation since 2004/2005.

The Bylong Valley is still associated with stock horse breeding and fodder production. The site itself is used for fodder production, however the quantum of this production (or potential production) is not significant relative to the total production across the Hunter Valley or NSW, and is not critical to the CIC.

While the Bylong Valley does have a history of thoroughbred horse breeding, the Department acknowledges KEPCO's arguments that the project is unlikely to have any significant impact on the Equine CIC, given:

- the lack of stud horse breeding enterprises in the local area;
- the distance from the site to the main horse breeding enterprises within the CIC (particularly Scone);
- the lack of any significant interrelationship between the site (and surrounds) with the highly productive horse breeding industry in the CIC, consequently the site is not considered to be of critical importance to the CIC;
- the current or potential fodder production on the site is not significant or critical to the CIC;
- that the project is not expected to result in significant impacts on the identity, reputation or visual amenity of the wider CIC; and
- that the project would not significantly affect employment opportunities in the CIC.

The Department notes that, in the long term, most of the Equine CIC mapped land within the project disturbance area would be rehabilitated and returned to agricultural and potential equine use. Whilst 515 hectares of mapped Equine CIC land within the biodiversity offset areas would be permanently lost to equine or agricultural use, as outlined above the Department and OEH consider that biodiversity conservation is the highest and best use for these lands, particularly given that they comprise areas of critically endangered Box Gum Woodland.

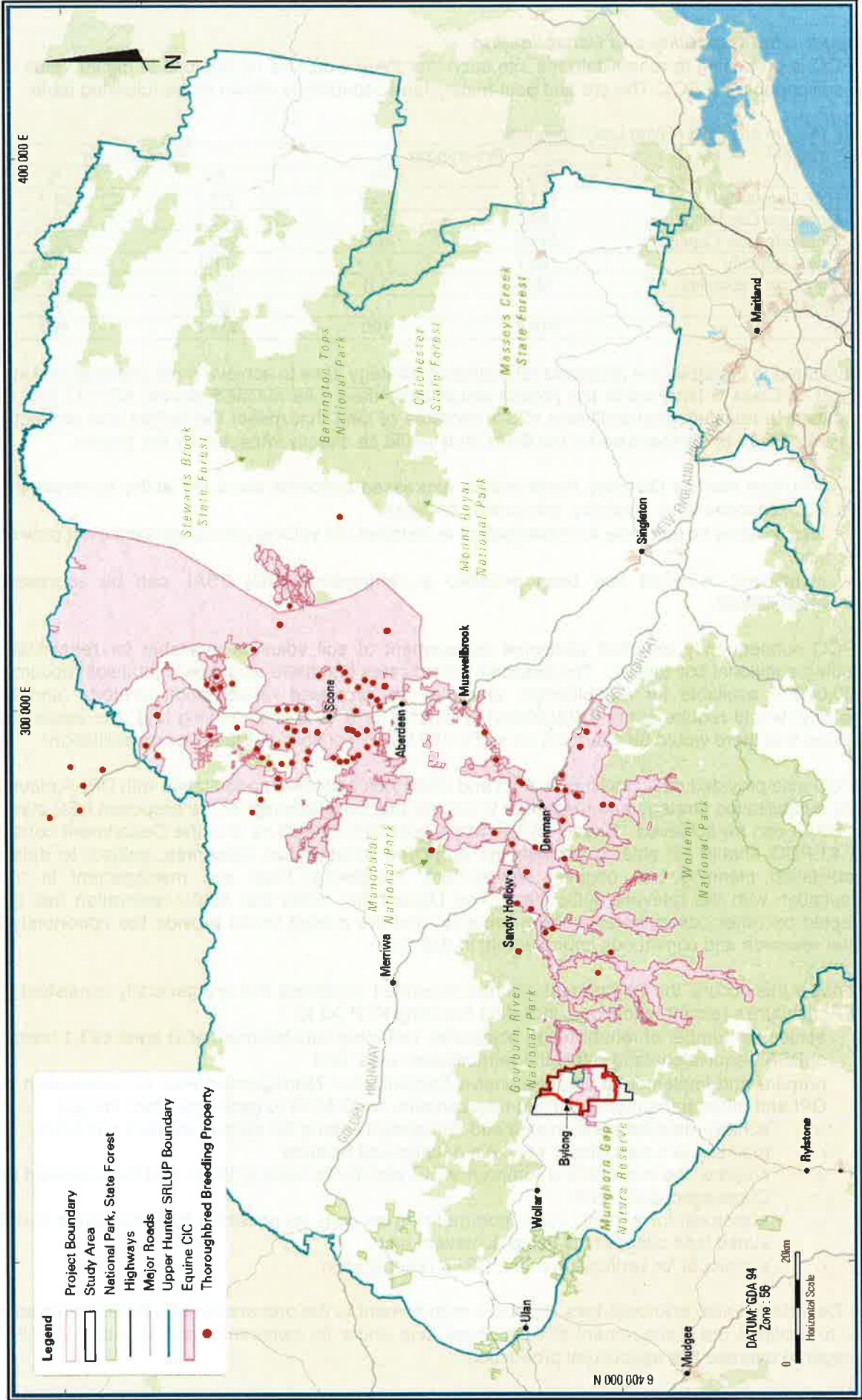


Figure 25: Upper Hunter Equine CIC

Broader Land Capability and Rehabilitation

KEPCO is proposing to rehabilitate the site such that there would be no net loss of higher value land and soil capability (LSC). The pre and post mining land capability is shown in the following table.

Table 15: Pre and Post-Mining Land Capability

LSC Class ²⁰	Pre-mining		Post-mining	
	ha	%	ha	%
3 – High Capability	141.9	15.5	319.5	34.7
4 – Moderate Capability	194.7	21.1	172.3	18.7
5 – Moderate-Low Capability	441.0	48.0	232.3	25.2
6 – Low Capability	127.7	13.9	11.0	1.2
7 – Very Low Capability	14.2	1.6	22.6	2.4
Disturbed Land	-	-	161.8	17.6
Total	919.5	100	919.5	100

As indicated in the table, the proposed rehabilitation strategy aims to achieve a net improvement in the amount of Class 3 land within the project disturbance area. As outlined above, KEPCO has also committed to reinstating/rehabilitating 423.1 hectares of land that meets the fertility and productivity criteria for BSAL to compensate for the BSAL that would be directly impacted by the project.

DPI-Agriculture and the Gateway Panel initially expressed concerns about the ability to reinstate the BSAL and proposed land capability, particularly because:

- less soil may be available for rehabilitation as detailed soil volume calculations were not provided; and
- insufficient evidence had been provided to demonstrate that BSAL can be successfully rehabilitated.

KEPCO subsequently provided additional assessment of soil volumes available for rehabilitation, including additional soil testing. The assessment indicates that there would be a total soil resource of 6,500,000m³ available for rehabilitation, and that the proposed rehabilitation strategy (and land capability) would require some 5,400,000m³. Allowing for a 10% soil handling loss, the assessment indicates that there would be a surplus (of some 450,000m³) of soils available for rehabilitation.

KEPCO also provided additional information and undertook additional consultation with DPI-Agriculture on its rehabilitation strategy and measures to ensure that reinstatement of the proposed LSC classes and BSAL can be achieved. Based on this work, both DPI-Agriculture and the Department consider that KEPCO should be able to achieve the proposed rehabilitation outcomes, subject to detailed rehabilitation planning and ongoing assessment, monitoring, trials and management in close consultation with the relevant authorities. The Department notes that BSAL restoration has been accepted on other contemporary mining projects, and the project would provide the opportunity for further research and continuous improvement in this area.

To ensure this occurs, the Department has recommended conditions that are generally consistent with DPI-Agriculture's recommendations, including requiring KEPCO to:

- achieve a number of rehabilitation objectives, including reinstatement of at least 423.1 hectares of BSAL-equivalent land within the rehabilitation area; and
- prepare and implement a comprehensive Rehabilitation Management Plan in consultation with DPI and other authorities, including requirements on KEPCO to (amongst other things):
 - achieve detailed performance and completion criteria for agricultural land and BSAL;
 - maintain and periodically review a detailed soil balance;
 - prepare and implement a comprehensive plan for reinstating BSAL and the proposed LSC Class agricultural land;
 - a protocol for periodic trials (commencing as early as possible) to demonstrate that the stated land capability is being achieved; and
 - a protocol for verification of the BSAL rehabilitation.

The Department also acknowledges KEPCO's commitment to the preparation of a Farm Management Plan to facilitate the management of agricultural land under its ownership, and to retaining a Farm Manager to oversee this agricultural production.

²⁰ There is no Class 1 land in the project disturbance area, and Class 2 land is generally located outside the proposed mining areas.

Tarwyn Park

A number of public submissions raised concerns about the impacts on the renowned 'natural sequence farming' techniques on the Tarwyn Park property.

Tarwyn Park, and the associated Iron Tank property, are both owned by KEPCO. The farm is the location where natural sequence farming was first developed and practised (from about 1975). The model was developed by Mr Peter Andrews and is based on the following key principles:

- retention and control of stream water on the alluvial floodplain to increase water availability; and
- rehabilitation and improvement of the fertility of the alluvial floodplain and adjacent areas through a managed succession of vegetation (mostly weeds).

For his work on natural sequence farming, Mr Andrews was awarded the Order of Australia Medal in 2011.

The natural sequence farming features on Tarwyn Park are located within the Bylong River floodplain and associated alluvial sediment areas (see Figure 28). As outlined in Section 6.3, KEPCO has designed the project with a minimum buffer of 150 metres to the Bylong River (and Lee Creek) alluvial aquifer.

As such, the natural sequence farming areas and alluvial sediments are largely outside the project disturbance area, and would not be directly impacted by the project. However, a small portion of the alluvial floodplain would be disturbed for a proposed access road and mine infrastructure. These works are unlikely to significantly affect the natural sequence farming areas.

Potential indirect impacts on the natural sequence farming areas by way of impacts to groundwater and surface water resources are considered in Section 6.3. As outlined in that section, the project borefield does have some potential to result in localised drawdown of the groundwater table in the vicinity of Tarwyn Park, however the water supply to the area can be appropriately managed during mining (e.g. through irrigation), and is unlikely to result in any long term impacts.

KEPCO has committed to maintaining and monitoring the natural sequence farming techniques (or similar soil hydrology techniques) on the Tarwyn Park property, as well as making the property available for external study by applicable scientific organisations such as CSIRO, universities and government authorities.

The Department has recommended conditions reinforcing these commitments, including a condition requiring KEPCO to use its best endeavours to maintain or enhance the agricultural productivity of all of its landholdings outside the project disturbance area and biodiversity offset areas (e.g. land acquired within the acquisition zone and the agricultural land within offset areas), including the natural sequence farming techniques on Tarwyn Park.

Heritage-related impacts on the Tarwyn Park property are considered in Section 6.5 below.

6.5 Heritage

The EIS includes an Aboriginal Archaeological Assessment undertaken by RPS Australia East (RPS) and Historic Heritage Assessment undertaken by AECOM Australia. To identify and assess grave sites within the study area, the EIS also includes an Archaeological Assessment for Historical Burials undertaken by Edward Higginbotham and Associates, as well as ground penetrating radar surveys undertaken by Suresearch and GBG Australia.

The assessments were undertaken in consultation with a range of stakeholders including local Aboriginal groups, historical societies, local landowners and descendants. A total of 27 registered Aboriginal parties (RAPs) have been involved in consultation and/or field surveys for the project.

The assessment and consultation has been undertaken in accordance with applicable guidelines, including the OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

Aboriginal Heritage Impacts

The project site is located within Wiradjuri country, but is also closely aligned with Wanaruah country. The site is within the administrative area of the Mudgee Local Aboriginal Land Council (MLALC) and Wanaruah Local Aboriginal Land Council (WLALC).

The archaeological assessment identified a total of 239 Aboriginal sites and cultural features within the project boundary (see Figure 26). Aboriginal sites included isolated finds, artefact scatters, rockshelters, grinding grooves, modified trees, potential archaeological deposits (PAD) and a suspected ochre quarry.

The cultural sites comprised sandstone features which resemble zoomorphic or anthropomorphic figures, as well as other sandstone features and possible occupation areas. It is noted that not all RAPs agreed with the interpretations of the cultural features, however the consensus was that these should be considered cultural features.

The assessment indicated that a total of 144 sites would be at risk of being impacted by the project, including:

- 42 sites that may be indirectly impacted by subsidence or blasting; and
- 102 sites that are within the project disturbance area and would be directly impacted.

A summary of the archaeological significance of these sites is presented in the following table.

Table 16: Aboriginal Sites and Archaeological Significance Summary

No. Sites	Site Type	Site ID	Regional Significance	Potential Impact
1	Ochre quarry	OQ001	High	Cracking/rockfall
2	Rockshelter	RS007, RS013	High	Cracking
1	Rockshelter	RS003	High	Blasting
2	Cultural feature	CUL004, CUL007	High	Cracking/rockfall
1	Grinding grooves	GG004	Moderate	Cracking
3	Rockshelter	RS008, RS010, RS012	Moderate	Cracking
28	Cultural feature	Numerous	Moderate	Cracking
2	PAD	PAD 1, AS077	Moderate	Direct impact - In disturbance area
3	Modified trees	MT005, MT007, MT008	Moderate	Direct impact - In disturbance area
2	Cultural feature	CUL010, CUL011	Moderate	Direct impact - In disturbance area
95	Surface artefacts	Numerous	Low	Direct impact - In disturbance area
4	Rockshelter	RS001, RS006, RS009, RS011	Low	Cracking

A number of other sites are located outside the subsidence area or the project disturbance area and are not expected to be affected by the project. These include 3 grinding groove sites of high significance (GG001, GG002 and GG003), which are located in proximity to, but outside the subsidence area at the north-western edge of the site.

Following the EIS and based on a recommendation from OEH, KEPCO engaged RPS and rock art specialist Mr Ben Gunn to undertake an additional assessment of the ochre quarry site. The assessment concluded that the site contained no evidence of Aboriginal quarrying or other signs of use, and that therefore the site cannot be regarded as an archaeological site. The site has since been referred to as an ochre site (or source) rather than an ochre quarry. The assessment re-assessed the archaeological significance of the site to low, although it remains of high cultural significance.

Most of the other affected Aboriginal sites of high or moderate archaeological significance, including the rock shelters and the cultural features, are located in the elevated wooded terrain in the southern portion area of the subsidence area (within Bylong State Forest), or in the elevated terrain within or in proximity to the southern portion of the open cut mining area.

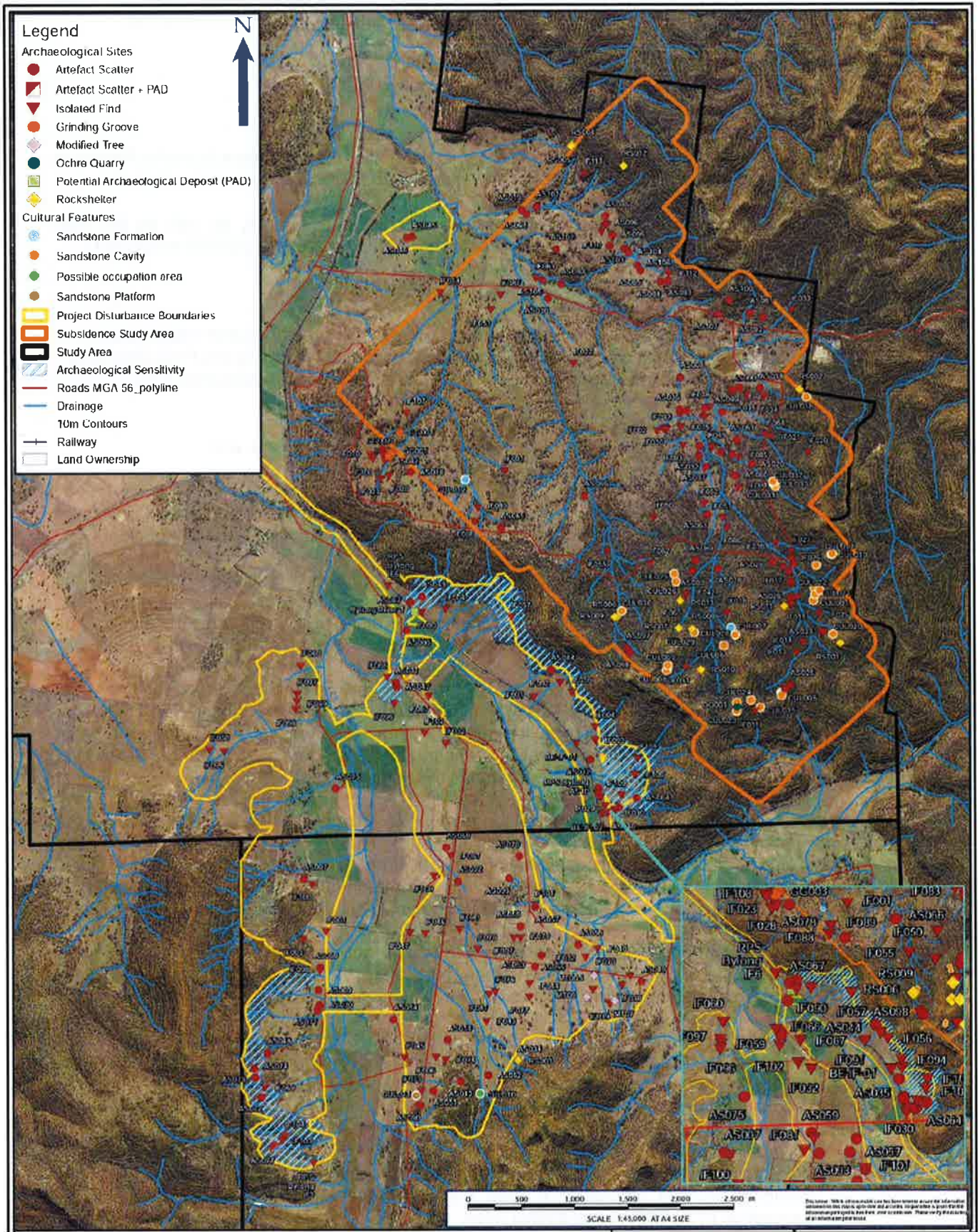


Figure 26: Aboriginal Sites

In terms of cultural significance, the RAPs generally considered that the sites and features in the study area have a moderate to high significance, with the highest significance features including the:

- ochre site;
- modified trees;
- grinding grooves; and
- 2 sandstone cultural features (CUL004 and CUL007).

The EIS includes a number of proposed measures to mitigate and/or manage impacts on the Aboriginal heritage values of the site, which were generally accepted by the RAPs. The measures include:

- sites subject to indirect impacts:
 - pre-mining archival recordings of all sites and cultural features, as well as the high significance grinding grooves that are not predicted to be affected (GG001 to GG003);
 - monitoring and inspection during and after mining;
 - test excavation of rockshelter sites;
- sites subject to direct impacts:
 - surface collection of sites, including artefact scatters, isolated fines and modified trees;
 - test excavation and salvage excavation of significant sites, including the PAD sites; and
 - pre-mining archival recording of the cultural features within the disturbance area (CUL010 and CUL011);
- involving RAPs in the salvage, excavation and conservation works;
- protection of sites outside the disturbance area with fencing and signage; and
- facilitation of continued access to identified Aboriginal sites.

These and other measures would be managed in accordance with a detailed Aboriginal Cultural Heritage Management Plan for the project, developed in consultation with Aboriginal stakeholders.

OEH was generally satisfied with the assessment and proposed mitigation measures, but recommended that KEPCO implements all of the recommendations in the Gunn assessment report on the ochre site, including that KEPCO obtains a chemical signature of the red ochre in the site and compares this to other known quarries and art to better understand rock art patterns in the region.

KEPCO subsequently committed to undertaking a specialist rock art study as part of the wider Aboriginal Cultural Heritage Management Plan. The study would include chemical analysis of the ochre source, identifying its availability in the region, examination of rock art sites, and additional research on key cultural rock art questions (including examining reasons for the predominant use of red ochre over other colours, and the prevalence of hand stencil motifs over other motifs).

OEH also raised some broader concerns about the cumulative loss of Aboriginal heritage sites in the region, and recommended that KEPCO be required to undertake additional archaeological investigations of some of the proposed biodiversity offset areas to better understand the regional archaeological resource. KEPCO has also agreed to this recommendation, which would be undertaken in consultation with OEH and the RAPs as part of the Aboriginal Cultural Heritage Management Plan.

The Department acknowledges that, whilst the EIS does not include detailed archaeological assessment of the proposed biodiversity offset areas (particularly the off-site offset areas), the offset areas would conserve a range of Aboriginal sites and cultural heritage values.

The Department has recommended conditions requiring KEPCO to prepare and implement a comprehensive Heritage Management Plan covering both Aboriginal and historic heritage. For Aboriginal heritage, the plan would require:

- ongoing consultation with the local Aboriginal community and OEH;
- a description of measures to be implemented for:
 - salvage, excavation and archival recording of sites within the project disturbance area;
 - protection, monitoring and management of sites outside the project disturbance area, including archival recording of sites subject to potential indirect impacts, and test excavation of significant rockshelter sites;
 - further investigation and research into the ochre site and rock art in the region;
 - further assessment of the Aboriginal cultural heritage values of the biodiversity offset areas;
 - ensuring continued access to cultural heritage sites for Aboriginal stakeholders;
 - managing the discovery of human remains or previously unidentified Aboriginal artefacts;

- adequate training and induction of personnel; and
- storage and management of salvaged items.

Historic Heritage

The Bylong area was explored and settled by Europeans in the 1820s, and has had a continuous pastoral land use history since this time, with a focus on cattle and thoroughbred horses. The Bylong Valley also has links to a number of bushrangers (including Captain Thunderbolt), who are suspected to have used the sandstone caves and cliffs above the valley as hideouts.

Today, there are no heritage items within the project site that are listed on any statutory heritage register, however the heritage assessment in the EIS identified 18 items within the study area that have been assessed as having local heritage significance. Three of these are listed on the non-government National Trust (NSW) Register.

Six of the heritage items are located within the project disturbance area and would be directly impacted by the project. No sites are located in the subsidence area for the underground mine.

The sites are shown on Figure 27, and outlined in the following table.

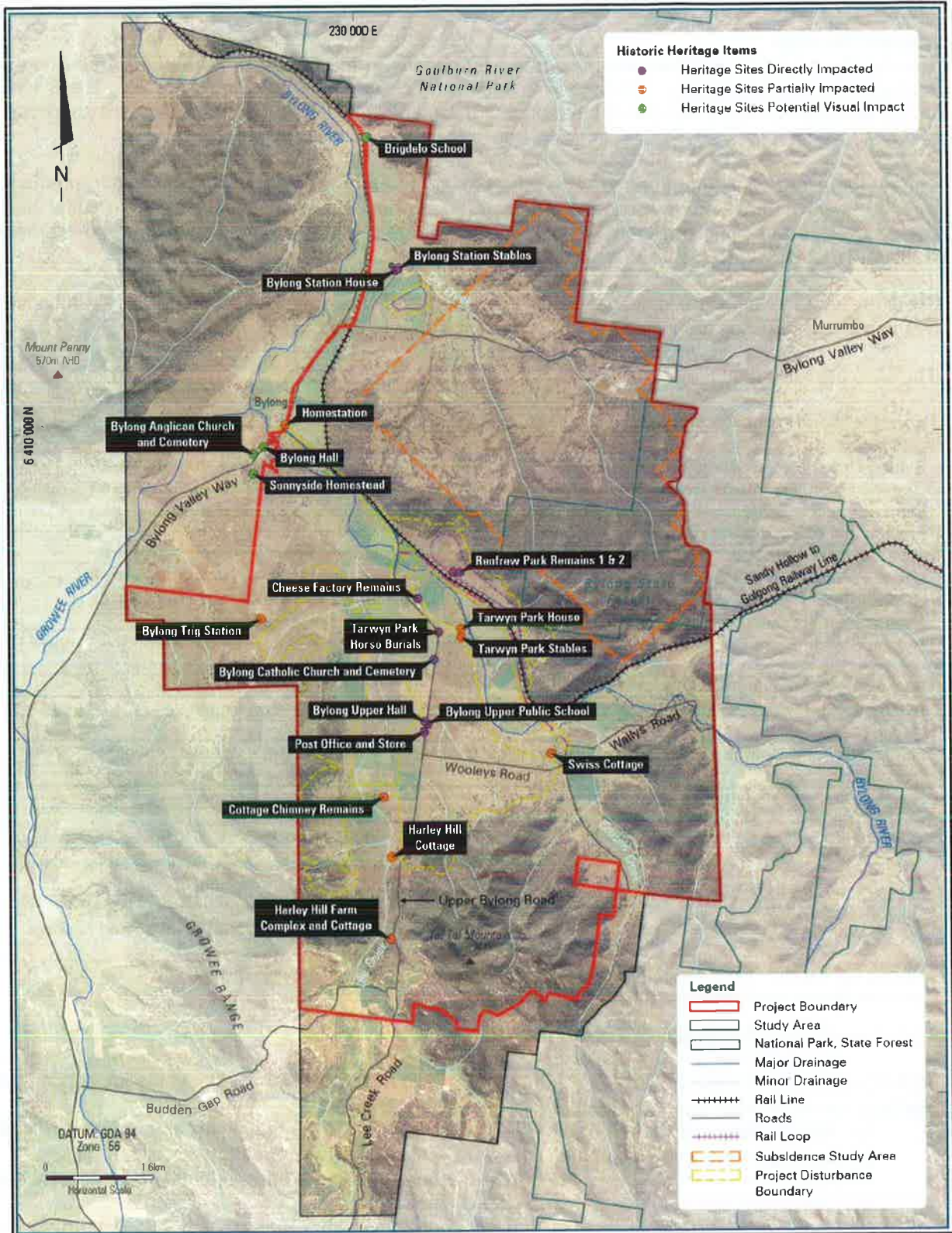
Table 17: Historic Heritage Sites

Site Name	Potential Impact
Bylong Upper Public School (2 buildings)	Direct impact – in disturbance area
Cheese Factory Remains	Direct impact – in disturbance area
Our Lady of the Sacred Heart Catholic Church and Cemetery* (including 4 marked graves)	Direct impact – in disturbance area
Renfrew Park Remains 1 & 2 (homestead)	Direct impact – in disturbance area
Upper Bylong Post Office and Store	Direct impact – in disturbance area
Bylong Upper Hall	Direct impact – in disturbance area
Homestation (homestead)	Partial impact – visual
Bylong Station Farm Complex	Partial impact – visual, some direct impact to farmland
Sunnyside (homestead)	Partial impact – visual
Bylong St Stephens Anglican Church and Cemetery* (including 44 graves)	Partial impact – visual
Harley Hill Farm Complex and Cottage	Partial impact – visual, vibration
Bylong Trig Station	Partial impact – visual
Swiss Cottage (homestead)	Partial impact – visual, vibration
Bylong Hall	Partial impact – visual
Tarwyn Park Farm Complex	Partial impact – visual, vibration, some direct impact to farmland and horse burial location
Cottage Chimney Ruins	Partial impact – visual
Bylong Valley Cultural Landscape (reflecting the aesthetic and cultural values of the Bylong Valley)	Partial impact – visual, direct impact to farmland, landscape features and heritage items
Bylong Landscape Conservation Area* (including the Bylong and neighbouring valleys covering approximately 486km ²)	Partial impact – visual, direct impact to farmland, landscape features and heritage items

* Listed on the National Trust Register

KEPCO proposes to implement the following measures to minimise and/or mitigate the impacts on the heritage values of these sites and the broader area:

- for the 6 sites within the project disturbance area – undertaking archival recordings, archaeological test excavation and, where warranted by testing, archaeological salvage;
- for grave sites – exhumation of the graves in consultation with descendants and in accordance with applicable statutory requirements (see discussion below);
- for sites potentially affected by blasting vibration – undertaking dilapidation surveys, managing blast sizes to minimise damage, installing structural supports (where necessary) and rectifying any identified damage; and
- for sites affected by visual impacts – undertaking landscaping treatments to screen views and minimise impacts, and progressively rehabilitating the site.



These and other measures would be managed in accordance with a Historic Heritage Management Plan, which would also include Conservation Management Plans for the conservation of the Tarwyn Park Farm Complex, Bylong Station Farm Complex and Homestation homestead.

With regard to the former Catholic Church and Cemetery (now owned by KEPCO) within the project disturbance area, the assessments (including ground penetrating radar surveys) have identified up to 4 marked and 8 unmarked burial sites in the cemetery. To date, the 4 marked burials have been positively identified, and one of the 8 potential burials have been identified.

A further potential burial has also been identified on the Renfrew Park property (also now owned by KEPCO), although the burial has not yet been able to be positively identified.

KEPCO is continuing to attempt to identify the potential burials on the site.

The Catholic Church burials are within the proposed Eastern open cut mining area, and would be required to be exhumed and reinterred for the project. The Renfrew Park potential burial is outside the project disturbance area and would not be impacted, however the Department notes that this potential burial is relatively close to the proposed underground mining infrastructure area and the rail loop, and as such should also be exhumed and reinterred if the descendants are identified and wish for this to occur.

To facilitate the exhumation and reburial process, KEPCO proposes to:

- continue to identify and make contact with all descendants;
- consult with other stakeholders including the Catholic Church and community members;
- obtain statutory approvals for the exhumation and reinterment in accordance with the *Public Health Regulation 2012*; and
- undertake the process in accordance with a detailed Burials Management Plan, including details of:
 - statutory applications for exhumation;
 - community liaison;
 - procedures for exhumation, relocation and reburial;
 - forensic analysis and storage of skeletal material; and
 - procedures for discovery of further human remains.

The Heritage Branch of OEH did not raise any particular concerns about project-related impacts, but did recommend some additional mitigation measures including, amongst other things, that KEPCO be required to:

- apply to list the remaining built heritage sites on the Mid-Western Local Environmental Plan (LEP);
- prepare conservation management plans (CMPs) for all of the remaining sites;
- prepare an Interpretation Plan for the broader Bylong precinct;
- undertake a more detailed archaeological investigation of Renfrew Park 1 and 2 prior to disturbance; and
- investigate the relocation of the former Catholic Church.

KEPCO does not object to these additional measures, but did note that there is no statutory requirement to apply to Mid-Western Regional Council (Council) to have the sites listed on the LEP. Notwithstanding, KEPCO notes that it would assist Council if it wishes to list these sites.

Council recommended that further consultation with key stakeholders is required to explore opportunities for relocating some of the heritage sites in the project disturbance area, including the Bylong Upper Public School buildings, the Catholic Church, Upper Bylong Post Office and Store, and Bylong Upper Hall. It also requested that if the reburials from the Catholic Church cemetery are relocated outside the locality, then KEPCO should erect a memorial in the local area including information on the headstones and the new burial site.

KEPCO subsequently confirmed that it is open to relocation and/or adaptive reuse of the heritage items (if feasible), and agreed to the erection of the memorial if reburials occurred outside the locality.

A number of public submissions also raised concerns about the impacts on the 'natural sequence farming' techniques on the Tarwyn Park property, and have called on Council and the Heritage Branch to support an Interim Heritage Order on the property.

As outlined in Section 6.4, the KEPCO-owned Tarwyn Park property and associated Iron Tank property is the location where natural sequence farming was first developed and practised (from about 1975). The model was developed by Mr Peter Andrews, who was awarded the Order of Australia Medal in 2011 for his work.

The Tarwyn Park property was also associated with early 20th century thoroughbred horse breeding in the Bylong Valley. Approximately 5 racehorses are known to be buried on Tarwyn Park, including 1968 and 1969 Melbourne Cup winner Rain Lover.

The natural sequence farming features on Tarwyn Park within the floodplain are largely outside the project disturbance area, and would not be impacted by the project (see Figure 28). However, a small portion of the alluvial floodplain would be disturbed for a proposed access road and mine infrastructure. These works are unlikely to significantly affect the natural sequence farming areas.

KEPCO has committed to maintaining the natural sequence farming techniques or similar soil hydrology techniques on the property, as well as making the property available for external study by applicable scientific organisations such as CSIRO, universities and government authorities.

With regard to the horse burials, KEPCO has committed to excavation and relocation of the remains in consultation with key stakeholders (including equine and racing industry representatives and organisations), and in accordance with a detailed Horse Burial Management Plan.

The Heritage Branch does not object to the proposed mitigation measures for Tarwyn Park, and no Interim Heritage Order has been placed on the site to date. The Department also accepts that KEPCO's proposed mitigation measures would adequately minimise and/or mitigate potential impacts on Tarwyn Park.

However, Heritage Branch has recently received a State Heritage Register nomination for Tarwyn Park and Iron Tank, and the Heritage Council supports the further investigation of the heritage significance of the properties. To this end, the Heritage Council has resolved to request the Planning Assessment Commission to obtain an independent assessment of the heritage significance of the properties, and the impacts of the project on these values, to inform its consideration of the state heritage register nomination.

Notwithstanding the state heritage status, the Department notes that KEPCO proposes to avoid and/or minimise the potential impacts on the heritage values of the properties, particularly through:

- avoiding direct disturbance of the natural sequence farming areas;
- maintaining the natural sequence farming during mining operations, including managing adequate water supply to the areas;
- managing the horse burials in accordance with a detailed management plan;
- minimising blast-related impacts on Tarwyn Park infrastructure (see Section 6.1); and
- preparing a detailed Conservation Management Plan for the farm complex.

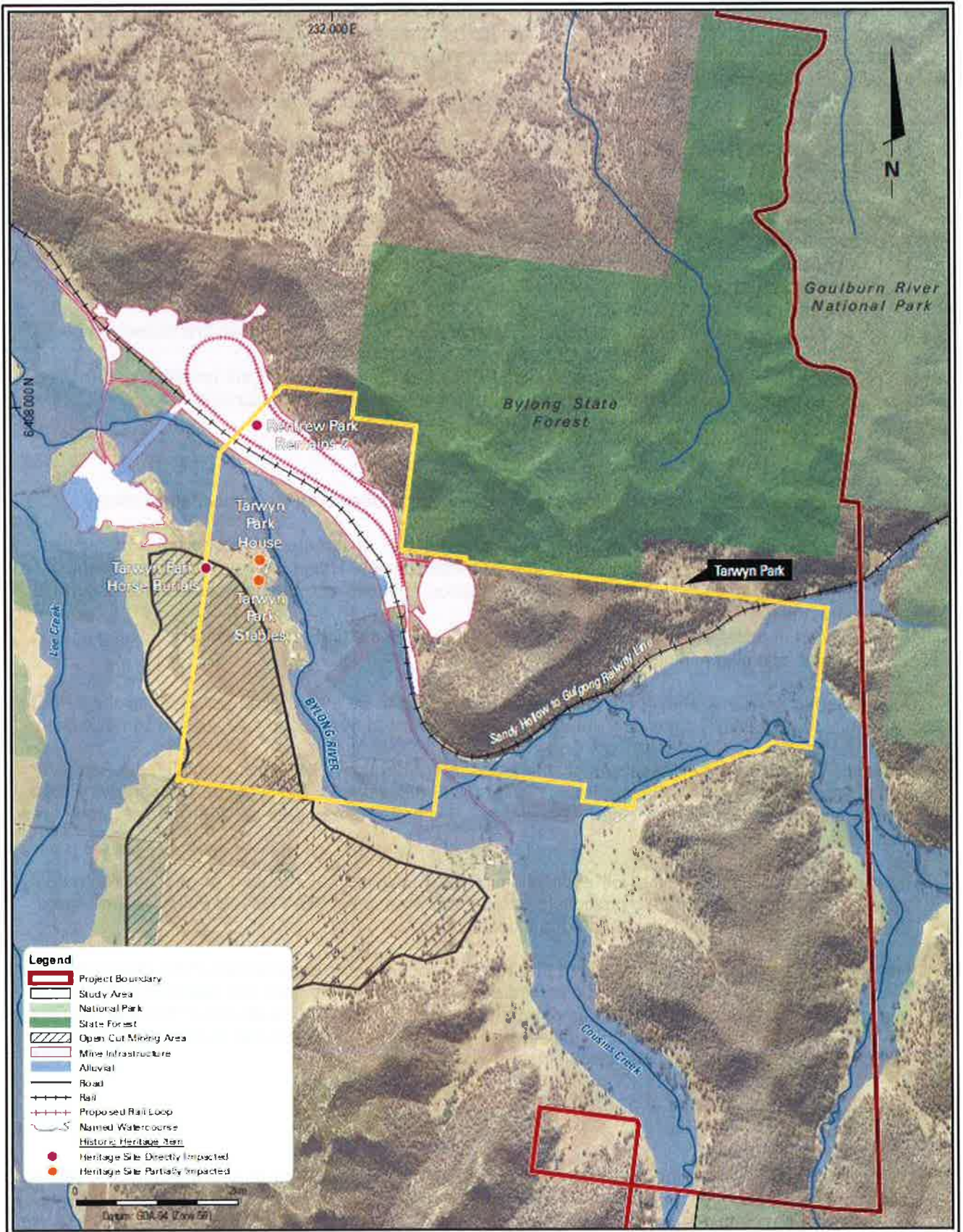


Figure 28: Tarwyn Park

That said, the Department also recognises that the project would have a direct or partial impact on a number of heritage items of local significance in the locality, including a relatively small number of human burials. To minimise and/or mitigate these impacts the Department has recommended conditions requiring KEPCO to prepare and implement a comprehensive Heritage Management Plan, including requirements for:

- archival recording, test excavation, archaeological salvage and, where possible relocation, of the 6 sites that would be directly affected;
- blast mitigation and monitoring for sites potentially affected by project-related blasting;
- landscape treatments to mitigate visual impacts;
- exhumation and reinterment of human burials in accordance with a detailed Burials Management Plan and applicable statutory approvals under the *Public Health Regulation 2012*;
- installation of a memorial in the local area in the event that reburials occur outside the locality;
- Conservation Management Plans for all identified built heritage items outside the project disturbance area, including assisting Council with any proposal to list the sites on applicable heritage registers;
- an Interpretation Plan for the broader Bylong precinct, including a detailed oral history prepared in consultation with existing and former residents of the Valley; and
- continuation of natural sequence farming techniques on the Tarwyn Park property, and making the property available for external study by applicable scientific organisations.

6.6 Biodiversity

Introduction

The EIS includes a specialist ecological impact assessment undertaken by Cumberland Ecology.

The project would directly and indirectly impact a number of threatened ecological communities, threatened flora and fauna species and habitat for these species. These impacts would be a result of:

- direct impacts from clearing of native vegetation for open cut mining operations and surface infrastructure; and
- indirect impacts associated with mine subsidence from the underground longwall mining and on habitat adjoining mining operations.

As outlined in Section 4 above, the project was determined to be a controlled action under the EPBC Act due to the potentially significant impacts on MNES for listed threatened species and communities.

In addition, the biodiversity assessment was assessed under the *NSW Biodiversity Offsets Policy for Major Projects 2014* (NSW Offsets Policy) using the *Framework for Biodiversity Assessment* (FBA), which are accredited under the Assessment Bilateral Agreement between NSW and the Commonwealth.

It is important to note that the full application of the FBA was not required as the environmental assessment requirements for the project pre-dated the finalisation of NSW Offsets Policy. In this regard, the Bylong Coal Project is considered a transitional project.

Nevertheless, the Department requested that KEPCO undertake an assessment of the direct impacts of the disturbance area of the project in accordance with the FBA to ensure the application of the best available biometric tools in the assessment of the project. Further, the Assessment Bilateral requires the FBA to be applied for the MNES threatened species to avoid additional assessment using the Commonwealth offsets policy and calculator.

Biodiversity Impacts

Vegetation Communities

The project would involve the direct disturbance of approximately 753 ha of native vegetation, with a further 1,698 ha of native vegetation located within the predicted subsidence area. Table 18 provides details of the vegetation proposed to be cleared and the vegetation communities are shown in Figure 29.

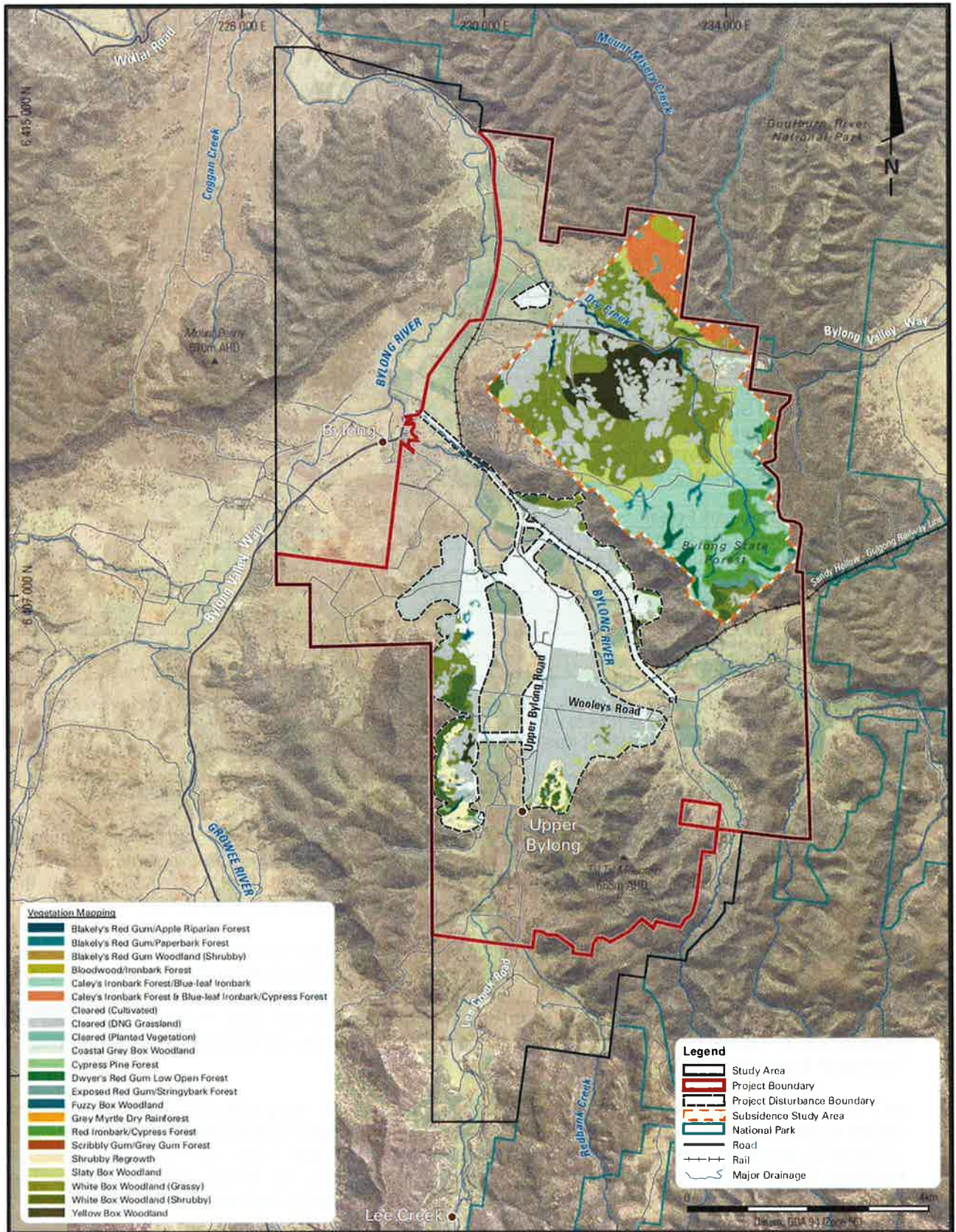


Figure 29: Vegetation Communities – Bylong Coal Project

Table 18: Native Vegetation Communities

Vegetation Community (Code in mapping)	Disturbance Area hectares	Subsidence Area (ha)
Endangered Ecological Communities (EECs)		
Box Gum Woodland ¹	(251 in total)	
- 6. Yellow Box Woodland	8	101
- 7a. White Box Woodland Grassy	57	397
- Derived Native Grassland	186 ³	339 ³
9. Hunter Valley Foothills Slaty Gum Woodland ²	13	124
Total Listed EECs	264	961
Non-listed Native Forest/ Woodland		
2. Grey Myrtle Dry Rainforest	0	<1
4a. Blakely's Red Gum Apple Riparian Forest	6	14
5. Blakely's Red Gum / Paperbark Forest	0	15
7b. Whitebox Woodland (Shrubby)	70	34
8b. Blakely's Red Gum Woodland (Shrubby)	0	15
10. Coastal Grey Box Woodland	29	5
11. Fuzzy Box Woodland	5	0
13. Shrubby Regrowth	40	2
14. Dwyer's Red Gum Low Open Forest	0	31
15. Caley's Ironbark Forest	0	348
16. Blue-leaf Ironbark/ Cypress Forest	0	86
17. Red Ironbark Cypress Forest	0	105
18. Cypress Pine Forest	4	0
19. Bloodwood Ironbark Forest	0	17
20. Scribbly Gum / Grey Gum Forest	0	1
21, 22. Exposed Grey Gum Stringybark Forest	0	33
Total Other Forest and Woodland	154	705
Derived Native Grasslands (non-listed)	335	32
Total Remnant Woodland	232	1,327
Total Derived Native Grassland	521	371
Total Native Vegetation	753	1,698

Notes:

- 1: Listed as EEC under TSC Act as 'White Box – Yellow Box – Blakely's Red Gum (Box Gum) Woodland' and listed as Critically Endangered Ecological Community (CEEC) under the EPBC Act as 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland', together termed in this report as 'Box Gum Woodland'
- 2: Listed as EEC under the TSC Act
- 3: Increased area of listed Box Gum Woodland compared to information presented in the RTS to include additional areas of lower condition derived native grassland to conform with mapping requirements of DoEE - as discussed further below.

As outlined in the table, around 264 ha of vegetation in the disturbance area and 961 ha within the subsidence area conforms to the definition of one or more listed endangered ecological communities (EECs) under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Apart from the direct impacts of clearing vegetation, a key consideration in the assessment of the project is the impact of subsidence on the vegetation communities and associated habitat values, particularly for threatened flora and fauna species. Subsidence impacts can potentially affect ecosystem functions particularly through surface cracking, hydrological changes and cliff falls. Further, there can be disturbance to vegetation from rehabilitating some of these impacts, for example to access areas to remediate subsidence impacts.

KEPCO conservatively assessed the subsidence impacts as potentially affecting 10% of ecosystem values in the subsidence area, including impacts as a result of activities undertaken to repair significant subsidence impacted areas. At the request of the Department and OEH, KEPCO also applied a modified FBA impact credit assessment on subsidence impacts for further consideration. The Department notes that the FBA excludes indirect impacts associated with subsidence. The modified FBA assessment is discussed further below.

In addition, KEPCO proposes to use a portion of the predicted subsidence area as part of its biodiversity offsets (Offset Area 5), arguing that overall the proposed biodiversity offset management actions would provide a long term increase in biodiversity values in the area. In particular, the proposed offset area provides landscape connectivity to the Goulburn River National Park. This is also discussed further below.

Classification of Derived Native Grassland

Following advice from OEH, the vegetation mapping of the disturbance area completed for the EIS was modified in the RTS. These changes were related to boundary delineation of remnant woodland and derived native grassland areas.

Further, DoEE raised concerns that the classification of the derived native grassland mapping did not follow the DoEE listing and policy advice, such that more DNG should have been identified as EPBC listed Box Gum Woodland. This issue centres on the definition of a 'patch', which under EPBC policy and guidance includes areas of a combination of continuous woodland and derived native grassland with a predominantly (>50%) native cover. Specifically, DNG identified as being in condition "2" and "3" in the EIS and RTS for Whitebox (community 6) and Yellowbox (community 7a) were excluded as EPBC listed Box Gum Woodland.

The Department accepts the advice of DoEE and OEH in this regard, with Table 19 above reflecting the increased area of listed Box Gum Woodland in DNG form compared to that identified in the RTS (by 111 ha within the disturbance area and 148 ha within the subsidence area).

However, the Department notes that under the FBA, the grassland in question would be of a condition class that would not require offsetting. That is, the additional area would not affect the offset liability or the outcome of the FBA assessment. Similarly, for proposed offset areas, DNG of this condition class has also been identified as Box Gum Woodland.

Threatened Flora

The ecological assessment recorded 7 listed threatened plant species within the study area, with a further 8 species potentially occurring due to suitable habitat, as summarised in Table 19 below. Of these, only one species "*Acacia pendula*" was recorded in the project disturbance boundary with an additional two species located within the subsidence area. The individual within the project disturbance boundary is a planted garden specimen.

Table 19: Threatened Plant Species

Plant species	TSC Act Status¹	EPBC Act Status¹	Location
<i>Tylophora linearis</i>	V	E	Recorded Outside
<i>Ozothamnus tessellatus</i>	V	V	Recorded Subsidence
<i>Acacia pendula</i> (Weeping Myall) ²	EP	-	Recorded Disturbance
<i>Cymbidium canaliculatum</i> (Tiger Orchid)	EP	-	Recorded Subsidence
<i>Eucalyptus camaldulensis</i>	EP	-	Recorded Outside
<i>Diuris Tricolor</i> (Pine Donkey Orchid)	V	-	Recorded Outside
<i>Pomaderris queenslandica</i> (Scant Pomaderris)	E	-	Recorded Outside
<i>Prostanthera cryptandroides</i> (Wollemi Mint Bush)	V	V	Potential
<i>Prostanthera discolour</i>	V	V	Potential
<i>Commersonia rosea</i>	E	E	Potential
<i>Eucalyptus cannonii</i> (Capertee Stringybark)	V	-	Potential
<i>Homoranthus darwinioides</i>	V	V	Potential
<i>Pomaderris sericea</i> (Silky Pomaderris)	E	V	Potential
<i>Philothea ericifolia</i>	-	V	Potential
<i>Thesium australe</i> (Austral Toadflax)	V	V	Potential

Notes: 1. EP- endangered population; V – Vulnerable; E – Endangered

2. The Weeping Myall does not conform to the listing as an EEC under the EPBC Act.

Fauna Impacts

The project has the potential to impact fauna species through the removal of habitat trees and resources associated with the grassland, woodland and forest communities identified in Table 18 above. Further, there would be impacts from subsidence to cliff lines and associated habitat features and shelters, such as caves.

A total of 24 threatened fauna species were recorded within the project area as summarised in Table 20 below. The EIS also noted that a further 23 species are likely to occur within the project area based on available habitat and regional site records.

Table 20: Summary of Threatened Fauna Species recorded or potential to occur within the Project Area

Group	Species (Common Name) ¹	TSC Act ²	EPBC Act ²	Recorded
Birds 17 recorded, 13 likely to occur	Barking Owl, Blacked Chinned Honeyeater, Brown Treecreeper, Diamond Firetail, Gang-gang Cockatoo, Glossy Black Cockatoo, Grey Crowned Babbler, Hooded Robin, Little Eagle, Little Lorikeet, Powerful Owl, Speckled Warbler, Spotted Harrier, Turquoise Parrot	V	-	Yes
	Regent Honeyeater	CE	E	Yes
	Rainbow Bee-eater, White Throated Needle-tail	-	M	Yes
	Flame Robin, Painted Honeyeater, Masked Owl, Varied Sitella, Scarlet Robin, Square Tailed Kite	V	-	No
	Cattle Egret, Eastern Great Egret, Fork-tailed Swift, Rufous Fantail, Satin Flycatcher, White-bellied Sea Eagle.	-	M	No
	Swift Parrot	E	E	No
	Mammals	Eastern Bent-wing Bat, Yellow-bellied Sheath-tail Bat	V	-
7 recorded 7 likely to occur	Corben's Long-eared Bat, Large-eared Pied Bat	V	V	Yes
	Brush-tailed Rock-wallaby	E	V	Yes
	New Holland Mouse	-	V	Yes
	Spotted Tail Quoll	E	E	Yes
	Eastern Cave Bat, Eastern False Pipistrelle, Greater Broad-Nosed Bat, Little Bent-wing Bat, Squirrel Glider,	V	-	No
Reptiles 3 likely to occur	Koala, Grey-headed Flying-Fox	V	V	No
	Broad-headed Snake	E	V	No
	Pink-tailed Legless Lizard	V	V	No
	Rosenberg's Goanna	V	-	No

Notes: V = vulnerable; E = endangered; M = migratory; CE- critically endangered.

The majority of these species are identified as ecosystem credit species under the FBA. This means that the impacts on these species are accounted for in the impact ecosystem credits. That is because the vegetation communities provide suitable habitat for these species. However, 5 fauna species are identified as species credit species under the FBA including the Regent Honeyeater, Brush-tailed Rock-wallaby, Large-eared Pied Bat, Eastern Bent-wing Bat and Eastern Cave Bat.

OEH and other submitters raised concerns about the potential impact of cliff falls from subsidence on threatened cave-dependent bats, including the Large-eared Pied Bat and Eastern Bent-wing Bat recorded in the study area.

As discussed in Section 6.2 above, KEPCO has designed the project to avoid the larger, more significant cliffs and also has committed to ensuring that material impacts on Cliff C5 (and consequently the nearby Cliff 24312) are minimised.

OEH recommended ongoing baseline monitoring of potential roost sites at the prominent cliffs within and adjacent to the subsidence area and monitoring of cave dwelling micro-bats prior to and during underground mining operations. KEPCO has accepted these recommendations and the Department has included this monitoring requirement as a component of the Biodiversity Management Plan.

Impacts on Aquatic Species and GDE

Predicted impacts as a result of groundwater drawdown on GDEs are discussed in Section 6.3. No aquatic ecological communities or aquatic fauna species listed under the EPBC Act, TSC Act or *Fisheries Management Act 1994* were recorded during targeted surveys or considered likely to occur within the study area.

Overall, the assessment considered that the project has a low potential to impact on aquatic biodiversity, with baseline monitoring data showing poor condition within pools along the drainage system within the study area. The Department has recommended ongoing management and monitoring of potential impacts on aquatic ecosystems and GDEs as a component of the Extraction Plan (for subsidence impacts) and Water Management Plan.

Significance of Impacts on Threatened Species

Sections 5A to 5D of the EP&A Act relate to threatened species assessment and management. These matters include the:

- factors in Section 5A(2), known as the '7 part test of significance';
- threatened species assessment guidelines²¹ identified in Section 5A(1); and
- register of critical habitat as identified in Section 5B.

The Department confirms that its assessment of the project has taken into account the matters listed in these sections in assessing whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats

The Department notes that the Commonwealth referral decision in determining that the action is a controlled action was based on there being likely significant impacts on 4 threatened species, including Box Gum Woodland CEEC, Large-eared Pied Bat, New Holland Mouse and the Regent Honeyeater, with further assessment of potential impacts required on a further 11 threatened flora and fauna species including:

- *Flora species:* *Ozothamnus tessellatus*, *Tylophora linearis*, *Prostanthera cryptandroides* (Wollemi Mint Bush), *Homoranthus darwinioides* and Ingram's Ziera; and
- *Fauna species:* Brush-tailed Rock-wallaby, Spotted Tail Quoll, Corben's Long-eared Bat (South-eastern Long-eared Bat), Swift Parrot, Pink-tailed Worm-lizard and the Broad-headed Snake.

Cumberland Ecology assessed the significance of impacts on State listed threatened species using the 7 part test and Commonwealth listed species using the methodology outlined in *Matters of National Environmental Significance Significant Impact Guidelines 1.1 (2013)*. In addition to the species identified by DoEE in its referral, Cumberland Ecology also considered other EPBC listed threatened flora species potentially occurring in the study area, as identified in Table 20 above and the threatened fauna species Koala and Grey-headed Flying-fox.

OEH has also provided a detailed assessment of impacts on MNES (see Appendix K).

Cumberland Ecology concluded that, without the implementation of a range of mitigation and offsetting measures, there would be a significant impact on Box Gum Woodland and the Regent Honeyeater. In relation to the Large-eared Pied Bat and New Holland Mouse, Cumberland Ecology concluded that the long-term viability of these species were unlikely to be affected.

The Department's consideration has had regard to Cumberland Ecology's and OEH's assessment, along with the threatened species assessment guidelines which assist in the interpretation and application of the 7 factors (or tests) of significance. This assessment has considered the direct and indirect impacts of the project on threatened species, populations or ecological communities, or their habitats – both on the site and the broader study area, as defined under the threatened species assessment guidelines.

For the 4 species considered likely to be significantly impacted by DoEE, the Department has undertaken a detailed consideration of Cumberland Ecology's assessment of significance, OEH's advice, relevant approved conservation advice, recovery plans and threat abatement plans (TAPs). A summary of this assessment is provided in Appendix L.

The Department has carefully considered the significance assessments for the remaining threatened species and accepts that there is unlikely to be a significant impact on these species. Further review of these EPBC listed threatened species is provided in Appendix L.

Avoidance and Mitigation

KEPCO argues in its justification for the project that it has applied reasonable avoidance measures in the design of the mine plan. In particular, KEPCO has adopted the following avoidance strategies to reduce impacts on biodiversity:

- reducing the extent of open cut mining within the Bylong Valley compared to available resource;
- modifying the layout of the north west emplacement area to avoid impacts on the threatened flora species *Tylophora linearis*;

²¹ Assessment guidelines means assessment guidelines issued and in force under Section 94A of the Threatened Species Conservation Act 1995 or, subject to Section 5C, Section 220ZZA of the Fisheries Management Act 1994, including the Threatened Species Assessment Guidelines – The Assessment of Significance, prepared by the then Department of Environment and Climate Change, dated August 2007.

- set-backs to longwall panels to minimise subsidence impacts on significant cliff lines; and
- additional set-back to longwall panel LW106 to further avoid impacts on cliff line habitat.

KEPCO argues that it has avoided impacts on biodiversity as far as practicable, particularly given the location of the coal resource relative to the remnant native vegetation and known populations of threatened flora. Further, a range of best practice mitigation measures have been adopted. These avoidance and mitigation measures are consistent with Principle 1 of the NSW Biodiversity Offsets Policy:

"Principle 1: Before offsets are considered, impacts must first be avoided and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for the remaining impacts."

The residual impacts proposed to be offset are discussed below.

Biodiversity Offsets

KEPCO proposes to offset the residual biodiversity impacts of the project by providing 7 substantial land-based offset areas, most of which adjoin nearby National Parks. The offsets comprise a total area of approximately 4,100 ha, including 3,800 ha of native vegetation and 1,765 ha of Box Gum Woodland EEC, to compensate for the 754 ha of native vegetation that would be directly disturbed by the project.

The offset areas are summarised in Table 21 and shown in Figure 30.

Table 21: Summary of Biodiversity Offsets

Offset Component	Description
Offset Area 1 (OA1)	<ul style="list-style-type: none"> • 762 ha landholding with 687 ha of native vegetation including 85 ha of Box Gum Woodland and 144 ha of Slaty Gum Woodland. • Adjoins Wollemi National Park
Offset Area 2 (OA2)	<ul style="list-style-type: none"> • 526 ha landholding with 420 ha of native vegetation including 89 ha of Box Gum Woodland and 17 ha of Slaty Gum Woodland. • Adjoins Wollemi National Park
Offset Area 3 (OA3)	<ul style="list-style-type: none"> • 458 ha landholding with 455 ha of native vegetation including 228 ha of Box Gum Woodland and 2 ha of Slaty Gum Woodland.
Offset Area 4 (OA4)	<ul style="list-style-type: none"> • 380 ha landholding 311 ha of native vegetation including 269 ha of Box Gum Woodland
Offset Area 5 (OA5)	<ul style="list-style-type: none"> • Mainly located within the subsidence area • 1,512 ha landholding with 1,497 ha of native vegetation including 942 ha of Box Gum Woodland and 230 ha of Slaty Gum Woodland • 435 ha native vegetation located outside the subsidence area • 1,062 ha native vegetation located within the subsidence area • Adjoins Bylong State Forest and Goulburn River National Park
Yarran View Offset Area	<ul style="list-style-type: none"> • 443 ha landholding 418 ha of native vegetation including 151 ha of Box Gum Woodland and 53 ha of Slaty Gum Woodland. • Adjoins Wollemi National Park
Fuzzy Box Offset Area	<ul style="list-style-type: none"> • 17 ha of Fuzzy Box Woodland • Potential habitat for Regent Honeyeater other species credit species
TOTAL:	<ul style="list-style-type: none"> • Total landholding of around 4,100 ha with 3,806 ha of native vegetation including 1,765 ha of Box Gum Woodland and 447 ha Slaty Gum Woodland. • Regent Honeyeater habitat of approximately 2,184 ha • Brush-tailed Rock-wallaby habitat of approximately 705 ha • Threatened bat habitat of approximately 1,031 ha

Offset Areas 1-5 are located in the immediate vicinity of the project, with Offset Area 5 (OA5) mainly located within the subsidence area. The Yarran View Offset Area is located approximately 9 km south of the project.

The Fuzzy Box Offset Area was included following further consultation with OEH to ensure that there were adequate offset credits for this vegetation community, in accordance with the rules of the FBA.

The offset areas contain generally good quality native vegetation, and most of the offsets are well placed adjoining National Park estate, and would provide additional buffer and connectivity to these reserves.

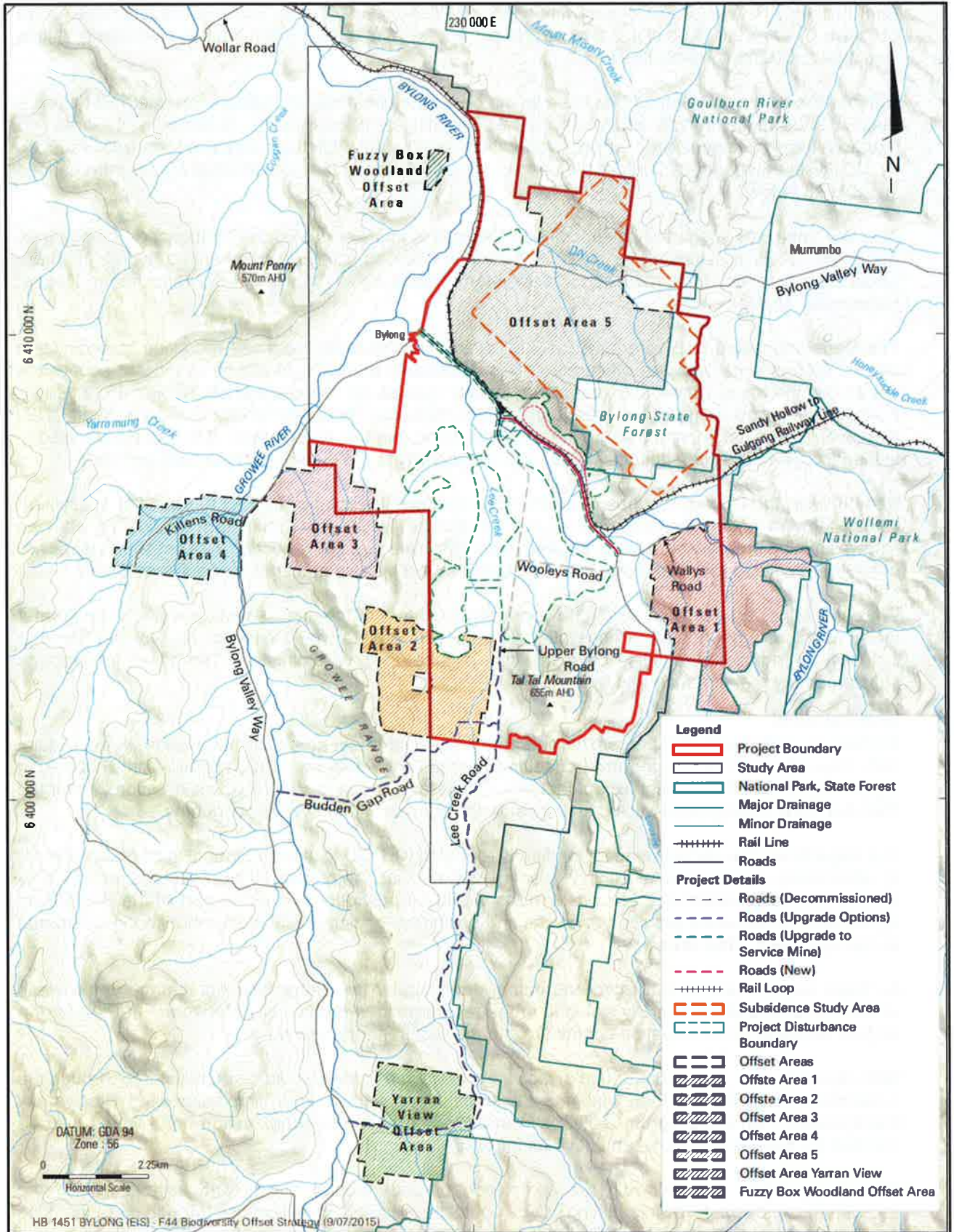


Figure 30: Biodiversity Offset Areas

Offset Area 5

Approximately 70% of OA5 is located within the subsidence impact area. Some submitters have raised concerns over the inclusion of this area as part of the offset package, arguing that the biodiversity values would be substantially diminished.

Cumberland Ecology assumed that there would be a 10% diminution in overall ecosystem values as a result of subsidence impacts and measures taken to mitigate these impacts. Accordingly, the area and therefore the credits generated for each vegetation community within the subsidence area was reduced by 10%, with these reduced credits included in the calculation of the overall offset credits summarised in Table 23 below.

This approach was supported by a modified FBA assessment completed by Cumberland Ecology (see Appendix C) which estimated as a result of surface cracking, cliff fall and changed hydrology, there would be a potential 1.2% reduction in ecosystem credits within OA5 and 1.5% reduction in Regent Honeyeater species credits.

The Department and OEH are satisfied that, even with the predicted small reduction in ecosystem values, OA5 is suitable as an offset area. This is because there would still be significant ecosystem values for threatened flora and fauna, particularly habitat for the threatened Regent Honeyeater. Further, with proposed mitigation measures in OA5, including restoration of Box Gum Woodland DNG, there would be a net improvement in these values in the medium to long term. It is also well located in the landscape to provide additional buffer and connectivity to the Goulburn River National Park.

Nonetheless, the Department has recommended conditions requiring KEPCO to track the ecosystem values through ongoing assessment of the condition of vegetation within the subsidence area as longwall mining progresses. This is required to demonstrate that any reduction in ecosystem values are within the predicted range and that there are sufficient ecosystem and species credits available.

While it is considered unlikely given the conservative nature of the assessment, if impacts are greater than predicted, any shortfall in ecosystem and species credits would need to be provided through inclusion of additional offsets, payment into a fund to be administered by OEH, or through supplementary measures agreed by OEH.

Offset Security

KEPCO consulted with OEH regarding potential transfer of offset areas into the National Park estate. OEH has advised that the preferred offsetting mechanism would be through an up-front Biobanking Agreement for all offset areas, except for OA5. This is largely due to statutory considerations under the TSC Act while underground mining and subsidence impacts within OA5 are occurring.

The Department has recommended conditions requiring KEPCO to secure Biobanking Agreements for all offset areas except for OA5 within 2 years of commencing the project. In this case, the in-perpetuity funding for management of these offset areas would be provided up-front as part of the Biobanking Agreement, which would provide the capital and operating funding (including for monitoring programs) to manage these offset areas.

As these areas would be managed and administered under the Biobanking Agreement, these areas would not require to be formally included in the recommended Biodiversity Management Plan for the project. Similarly, a conservation bond would not be required for these areas.

With regard to OA5, the management of biodiversity within this area would be administered through the recommended Extraction Plan covering the subsidence impact area and associated Biodiversity Management Plan covering the project site and OA5. A separate conservation bond would also be required for biodiversity management costs for OA5.

OEH has advised that following the completion of underground mining and assessment of the ecosystem condition following mining, OA5 could be secured in perpetuity through a Biobanking Agreement (or similar statutory instrument at that time). In the interim, the Department recommends that OA5 be secured on title through positive and restrictive covenants under the *Conveyancing Act 1919*, which is a security mechanism applied to a number of biodiversity offsets at other mines in NSW.

Ecosystem Credits

Table 22 below compares the impact 'ecosystem' credits²² and offset ecosystem credits calculated by Cumberland Ecology using the FBA for direct impacts within the project disturbance boundary. The ecosystem credit calculations are based on plant community types (PCTs) with the local vegetation communities mapped (refer Table 19) assigned to specific PCTs.

As shown in Table 22, the proposed offset areas provide sufficient ecosystem credits for all impacted vegetation communities, with substantive excess credits available for the communities. There is also a further 7,475 ecosystem credits generated from other PCTs within offset areas that are not directly impacted by the project. However, these areas provide additional species credits as discussed below.

Overall, the offset areas generated 49,198 ecosystem credits compared to the 20,094 credits required, with all impacted PCT's credit liability substantially met.

Table 22: Ecosystem Credit Calculations

Impacted Plant Community Type (PCT)	PCT Code	Assigned Vegetation Code	Impact Area Credits		Offset Area Credits		
			Area (ha) ¹	Credits Required	Area ² (ha)	Total Credits Generated	OA5 Credits
Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion	HU732	6a					
- Box Gum Woodland			23	590	335	4,548	2,645
- Non-listed			<1	3	8	128	0
- Total			23	593	343	4,676	2,645
Grey Box – White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	HU690	7a					
- Box Gum Woodland			228	4,669	1,353	15,685	7,291
- Non-listed			272	6,474	125	1,533	223
- Total			500	11,143	1,478	17,218	7,514
Rough-barked Apple-Red Gum-Yellow Box woodland on alluvial clay to loam soils on valley flats in northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	HU714	4	16	295	160	2,206	260
Fuzzy Box Woodland on alluvial brown loam soils mainly in NSW South Western Slopes Bioregion	HU547	11	58	152	17	233	-
White Box-Black Cypress Pine shrubby woodland of the Western Slopes	HU824	7b, 13, 18	114	6,431	786	10,600	1,097
Grey Box-Slaty Box shrub-grass woodland on sandstone slopes of the upper Hunter and Sydney Basin	HU869	9	42	1,480	436	6,918	219
TOTAL Box Gum Woodland			251	5,259	1,204	20,233	9,936
TOTAL FOR IMPACTED PCTS³			754	20,094	3,220	41,723	14,904
Additional area/ ecosystem credits					479	7,475	2,838
TOTAL ALL PCTS within offset areas					3,699	49,198	17,742

Notes:

1. Area includes derived native grassland assigned to each PCT. However, where the site condition score was <17, no offset credits are required under the FBA. Approximately 175 ha of derived native grassland generate a site score <17.
2. Includes reduction in OA5 area by 10% within subsidence area when compared to total offset area figure of 3,806 ha in Table 13 above.
3. Slight differences in totals due to rounding.

²² Ecosystem credits for Plant Community Types (PCT) under the FBA assume the presence of a range of threatened flora and fauna species. Individual species credits are not required where the PCT is a surrogate for these species.

Sufficient credits are available on land-based offsets outside of OA5 to meet the ecosystem credit requirements for all vegetation communities, and associated ecosystem credit species, except for non-listed Grey Box – White Box grassy open woodland on basalt hills in the Merriwa region, Upper Hunter Valley.

As outlined above, these ecosystem credits would need to be retired through a Biobanking Agreement within 2 years of commencement of the development. OA5 would then need to provide 1,439 of the remaining ecosystem credits.

Species Credits

As described above, the project would directly impact 5 'species credit' threatened species. Table 23 below summarises the impact credits required against credits available in the land-based offsets.

Table 23: Species Credit Calculations

Species	Impact Area Credits		Offset Area Credits		
	Habitat Area (ha)	Credits Required	Habitat Area (ha)	Credits All offset areas	Credits (OA5)
Regent Honeyeater ¹	180	13,892	2,184	15,507	6,721
Brush-tailed Rock-wallaby	26	688	705	5,005	-
Large-eared Pied Bat	56	728	1,031	7,323	2,187
Eastern Bentwing-bat	56	728	1,031	7,323	2,187
Eastern Cave Bat	56	728	1,031	7,323	2,187

Note:

- The species impact and offset credits for Regent Honeyeater were revised from the RTS report as a result of updates to the OEH Threatened Species Database, with revised list of Plant Community Types (PCTs) considered to comprise habitat for this species. Refer to Appendix E - Supplementary RTS Report (Appendix B – Response to OEH). OEH in its advice on EPBC listed species (see Appendix K) further modified the area and credits based on areas lacking key feed species and isolation from other suitable habitat.

The Department also notes that in addition to meeting the required credits for the impacted species, there are additional recorded threatened flora species in the offset areas which generate species credits. These species include *Cymbidium canaliculatum*, *Tylophora linearis*, *Pomaderris queenslandica* and *Ozomanthus tessetatus*.

Sufficient credits are available on land-based offsets outside of OA5 to meet the species credit requirements for all "species credit" threatened species, except for the Regent Honeyeater.

As outlined above, these species credits would need to be retired through a Biobanking Agreement within 2 years of commencement of the development. OA5 would then need to provide 5,106 of the remaining species credits for the Regent Honeyeater.

Matters for Further Consideration

The NSW Offsets Policy requires that the consent authority considers matters requiring further consideration. The assessment identified encroachment on the riparian buffer along the Bylong River, Box Gum Woodland, and impacts on the Regent Honeyeater and Brush-tailed Rock Wallaby for further consideration.

OEH are satisfied that the small area of encroachment on the riparian buffer of the Bylong River is adequately dealt with in the offset package and that the project would not cause Box Gum Woodland, the Regent Honeyeater or the Brush-tailed Rock Wallaby to become extinct or have its viability significantly reduced in the region.

Further, there are substantive excess ecosystem and species credits for these species, particularly for Box Gum Woodland and the Brush-tailed Rock Wallaby, as shown in Tables 22 and 23 above.

Therefore, no additional supplementary measures are required for these matters.

Conclusion

KEPCO has sought to avoid, mitigate, manage and/or offset the residual impacts of the project in accordance with the NSW Offsets Policy, so that biodiversity values would be enhanced or maintained over the medium to long term.

The Department has recommended a broad suite of conditions to manage and offset biodiversity values. These include conditions requiring KEPCO to:

- prepare and implement a Biodiversity Management Plan to ensure the commitments of the EIS to avoid, mitigate, offset and monitor impacts on biodiversity are undertaken;
- provide a substantial land based offset package comprising around 3,800 ha of native vegetation, to compensate for the direct clearing of 754 ha of native vegetation;
- secure the majority of these offset areas through Biobanking Agreements, which would provide upfront funding in perpetuity for management of the offset areas; and
- monitor and manage subsidence impacts and offset management measures for OA5 with long term security provided through a Biobanking Agreement, once underground mining is completed.

6.7 Traffic and Transport

Introduction

The EIS includes a traffic and transport impact assessment (TTIA), which was undertaken by Parsons Brinkerhoff in 2015 and expanded in 2016 to incorporate a wider study area. The assessment examines the potential impacts of the project associated with road and rail transport.

As outlined in Section 2.3, the Department has recommended that KEPCO's proposed WAF is not constructed as part of the project, unless there is a clear accommodation shortfall identified. The following assessment of traffic and transport impacts is based on the assumption that the WAF would not be constructed as this would mean (conservatively) there would be more project related traffic during construction.

Transport Routes

The key regional access routes to the Bylong Valley and the project site are shown on Figure 31, and include:

- Bylong Valley Way – which links the site to the:
 - Castlereagh Highway (B55) to the south at Ilford via Rylstone; and
 - Golden Highway (B84) to the east at Sandy Hollow; and
- Wollar Road – which links the site to the:
 - Castlereagh Highway and Mudgee via the Munghorn Gap, to the south-west of the site; and
 - Ulan Road via the unsealed Ulan-Wollar Road, to the north-west of the site.

Bylong Valley Way is a sealed two lane road, while Wollar Road is partially unsealed (for a 17 km length between Bylong Valley Way and the Village of Wollar) two lane road. The roads are generally under the care and maintenance of Mid-Western Regional Council, although the eastern end of Bylong Valley Way (to the east of Cox Gap) is managed by Muswellbrook Shire Council.

Mid-Western Regional Council has received around \$14 million funding from the NSW Government Resources for Regions program to upgrade and seal the 17 km unsealed length of Wollar to Bylong Road. The Department notes that if this funding was not provided through this program, KEPCO would have been required to provide significant capital funds towards the sealing of this road, prior to the commencement of the project. This work is currently scheduled to be completed during 2017-2018, with sealing of the road to be completed by the end of 2017, and would minimise any road safety risks and amenity impacts (dust from unsealed roads) associated with project related traffic.

KEPCO has emphasised through the assessment the importance of the WAF during construction, in particular, to mitigate potential delays to the project if the road is not upgraded by Council prior to the commencement of construction. However, the Department considers the sealing of the Wollar to Bylong Road is a fundamental requirement to reduce safety risks and should be completed prior to the commencement of any substantive construction activity, apart from minor ancillary works and activities. The Department has recommended a condition in this regard.

Within the Bylong Valley, the road network incorporates Wollar Road, Upper Bylong Road, Budden Gap Road, Woolley's Road and Lee Creek Road (see Figure 32) although Budden Gap Road is a poorly formed road with limited public access.

Access to the open cut mine infrastructure Area (MIA) would be mainly via the existing Upper Bylong Road from Bylong Valley Way. Access to the underground MIA would be via a new access road to be constructed from Upper Bylong Road over the Sandy Hollow to Gulgong Railway Line, with an existing level crossing upgraded to facilitate safe access over the railway line.

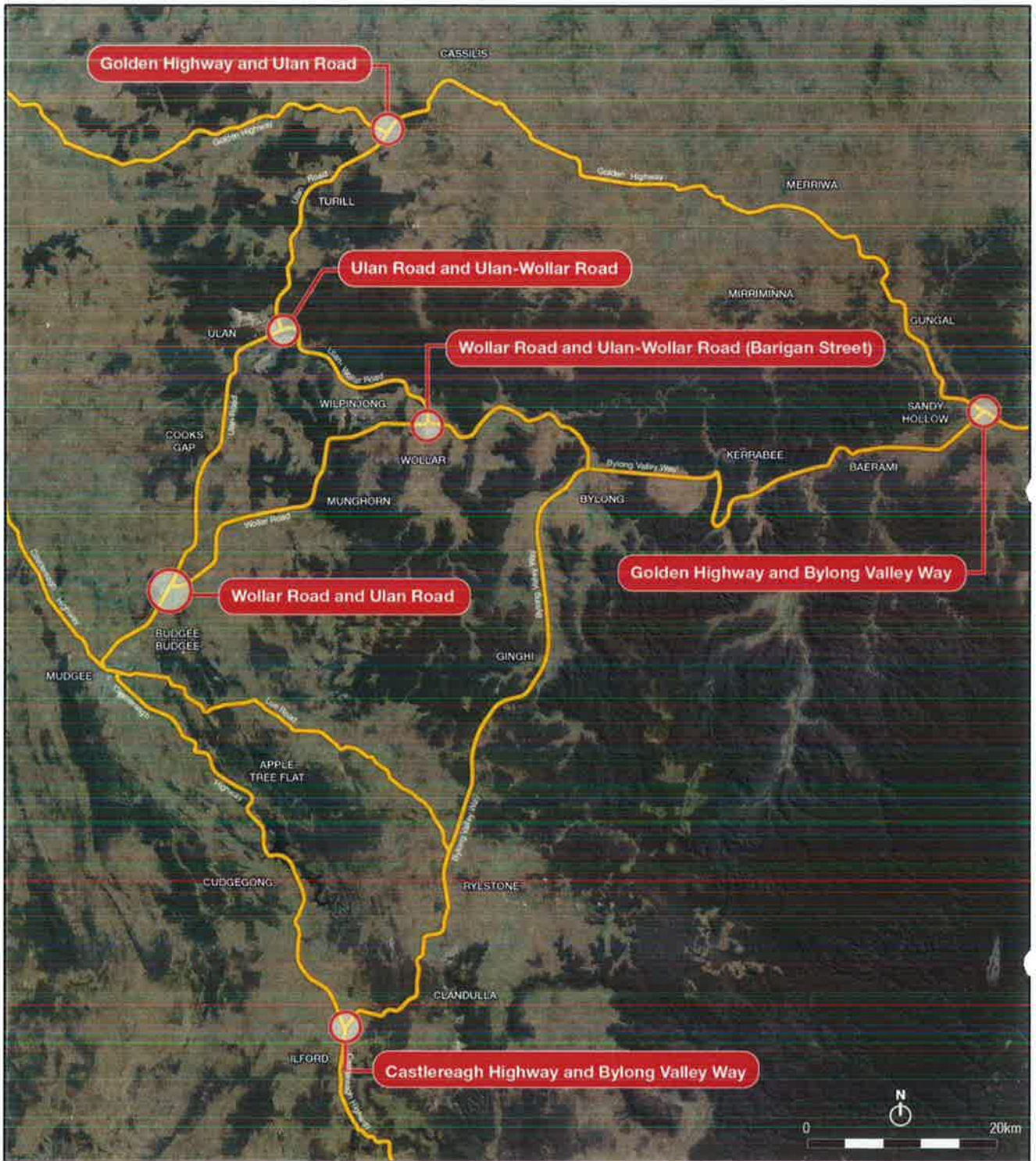


Figure 31: Regional Traffic Network

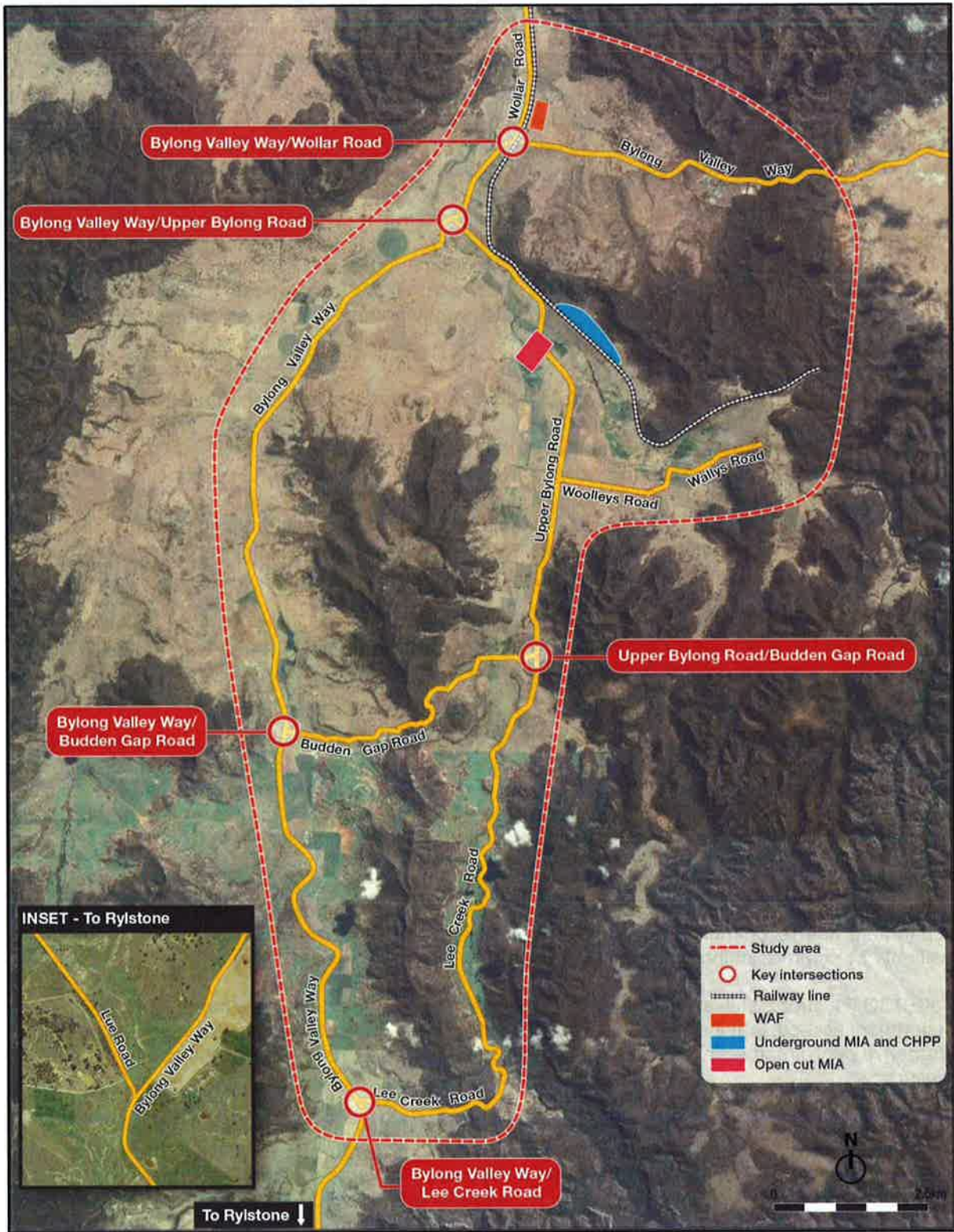


Figure 32: Local Traffic Network

Heavy and Oversize-Mass Vehicles

Oversize vehicles would be used to transport large plant and equipment to the mine, primarily during the construction phase. Oversize vehicle access is proposed to be along the Golden Highway (B84) and Wollar Road. These roads are approved B-Double routes with travel conditions issued by the RMS.

The traffic assessment assumed that there would be some heavy vehicle²³ traffic movements to the site along Bylong Valley Way from the east and south. However, access along these routes is constrained in some areas due to tight corners and grades. These constraints are identified as a road safety risk due to the potential for larger trucks to straddle across lanes (see below).

To address this issue, the Department has recommended that project-related heavy vehicle access along these routes be restricted to "light rigid" vehicles which are two axle smaller trucks with a gross vehicle mass (GVM) of up to 8 tonnes and buses that seat more than 12 adults including the driver and a GVM up to 8 tonnes and "medium rigid" vehicles, with a GVM up to 10 tonnes. This would ensure, with appropriate monitoring, that the larger vehicles would not use the constrained sections of Bylong Valley Way.

Road Upgrades and Closures

KEPCO proposes to undertake a number of road upgrades and closures to facilitate the project. These include:

- constructing the new access road to the underground MIA;
- constructing internal roads and parking areas for the underground MIA and open cut MIA;
- closing Woolleys road and the southern portion of Upper Bylong Road;
- constructing the North Link Road to maintain access to three southern landholdings; and
- re-aligning Upper Bylong Road via an Eastern Link Road, to maintain access to two eastern landholdings and an entry point into Wollemi National Park.

KEPCO proposes to close portions of the Upper Bylong Road/ Lee Creek Road and Woolleys Road that are within the open cut mining area. These road closures would mean that 3 landholders to the south of the mine (see Figure 5 above) would need to travel an additional 30 minutes each way (approximately) when leaving and arriving at their property.

KEPCO initially proposed options to upgrade the southern end of Lee Creek Road or Budden Gap Road to mitigate these impacts. Some of the landholders in submissions identified the importance of a northern access, particularly for larger agricultural vehicles, due to flooding and poor road access along Lee Creek Road to the south. To address these concerns, KEPCO's preferred option is now the construction of the North Link Road to maintain access to these properties.

The Department notes that KEPCO's engagement with all three affected landholders is as yet unresolved, with an acquisition agreement signed with one landowner only. In this regard, the Department has recommended conditions that require KEPCO to maintain access for the affected residents by commissioning the North Link Road.

If KEPCO is successful in reaching an agreement with or acquiring all three landholdings, the Department accepts that the North Link Road would not be required to be constructed during mining as alternative public road access would still be maintained via Lee Creek Road to the south at the end of mining.

With regards to access to the three eastern landholdings, the Department notes that KEPCO is in the process of acquiring two of these properties (Oakdale ID 145-150 and property ID138-140) and the remaining property (ID 204-212) operates as a 4WD recreation park. KEPCO is currently negotiating an agreement with the landowner in relation to maintaining access.

KEPCO propose to realign the Upper Bylong Road to connect into Walleys Road crossing the Bylong River flood plain to maintain access to these landholdings and an entry point into Wollemi National Park. This would be retained as a private road with a right of way easement to maintain access, otherwise there would be no alternative access to these properties. The road would be maintained by KEPCO.

²³ A heavy vehicle is a vehicle that has a gross vehicle mass (GVM) or aggregate trailer mass (ATM) of more than 4.5 tonnes and a combination that includes a vehicle with a GVM or ATM of more than 4.5 tonnes (as defined under the Heavy Vehicle National Law (NSW)).

At the cessation of mining, there would also be the option to transfer ownership of the road to be managed as a public road by Council.

The road is proposed to be constructed to a similar standard to Walleys Road (unsealed) with the crossing of the Bylong River to provide equivalent flood access as is currently the case via the Upper Bylong Road crossing.

The Department has recommended construction of the Eastern Link Road and North Link Road be undertaken to the satisfaction of Mid-Western Regional Council, prior to the closure of the existing public roads and subject to successful acquisition of the three landholdings to the south.

Council also advised the Department and KEPCO that the road pavement on the Bylong Valley Way between Wollar Road and Upper Bylong Road was not constructed for the carriage of heavy vehicles and it is likely that this section of road would deteriorate quickly during the construction period.

The Department considers it is reasonable that KEPCO fund the rehabilitation of this section of road and has recommended that this road upgrade, and associated intersections, be completed prior to the commencement of construction. Council and KEPCO are currently negotiating an acceptable contribution toward these upgrades. Based on the outcome of these negotiations, the Department will recommend a funding contribution prior to determination of the project.

Traffic Impacts

The project would operate for 25 years, with peak traffic generation occurring during the peak construction stage in Year 2, and the peak operational stage in Year 9 (which includes simultaneous period of underground and open cut mining operations).

Under the no-WAF scenario, it is predicted that during construction, the project would generate up to 512 light vehicle movements, 50 light vehicle deliveries, and 78 heavy vehicle movements each day. The majority (80%) of this traffic is predicted to be to and from Mudgee and surrounds via Wollar Road. The traffic assessment for the no-WAF scenario is based on the assumption that the majority of the construction workers would be residing in Mudgee during their construction shifts.

The Department notes that the high number of light vehicle movements during construction is conservatively based on all construction employees travelling to the site by car with some car-pooling, that is no busing of workers to the site.

The remaining 20% of traffic would use the Bylong Valley Way travelling to and from Rylstone or Sandy Hollow. Much of this traffic would occur during morning and afternoon peaks associated with shift changeover times.

The Department notes that this assumption is disputed by Muswellbrook Shire Council which considers a higher percentage of the construction (and operational) workforce may travel to the site from Upper Hunter area. The workforce travel locations are reasonable in this instance, with a strong commitment by both KEPCO and Mid-Western Regional Council to encourage the construction and operational workforce to reside in the Mid-Western Regional Council area.

The largest relative increase in overall traffic volumes would be observed on roads linking towns, such as Wollar Road from Wollar linking to the Bylong Valley Way which would see a peak increase of 461% during construction and 266% during Year 9 operations, or Wollar Road from Wollar linking to the Ulan Road, which would see a peak increase of 302% during construction and 174% during operations. These sections of Wollar Road traverse the south end of Wollar village, at the intersection to Ulan (Ulan-Wollar Road).

Overall, the traffic assessment concludes that the increase in traffic, although significant in terms of relative traffic volumes, is not expected to materially affect the capacity, performance or safety of the local and regional road network, subject to a number of upgrades and works (see below). This includes performance of the various intersections along the transport routes, with the project not expected to materially change the existing levels of service (which are currently good at either 'A' or 'B').

The only exception to this is the evening peak at the Ulan Road/Ulan-Wollar Road intersection, which is predicted to experience a service level of C, which is still considered satisfactory. The Department notes that the additional delay at this intersection would be experienced, for the majority, by mine

workers travelling home from the mine. Further, this is largely a result of existing mining traffic, (principally Wilpinjong and Moolarben mines) rather than traffic travelling to and from the project, which is mainly along the Wollar Road.

The RMS and Council both accept that the regional and local road network can accommodate the project, however this would be subject to addressing the findings of the road safety audit, a number of road upgrades and works and contributions towards road maintenance. These aspects are addressed below.

Road Safety

Although the level of service along key traffic routes meets accepted standards, road safety was a key issue raised in submissions from RMS, Council, community and special interest groups. In particular, concerns were raised on road safety along the Wollar Road, particularly within the Munghorn Gap Nature Reserve.

Road Safety Audit

KEPCO commissioned Parsons Brinkerhoff to undertake a road safety audit along the key traffic routes including the entire length of Bylong Valley Way (Golden Highway to the Castlereagh Highway) and Wollar Road between Bylong Valley Way and Ulan Road (see Appendix E). The audit was undertaken in accordance with the RMS 2011 *Guidelines for Road Safety Audit Practices* and Austroads *Guide to Road Safety: Part 6 Road Safety Audit*.

Table 24 provides a summary of the risk ranking of identified risks along these key road networks.

Table 24: Summary of Risks from Road Safety Audit

Road Corridor	Intolerable	High	Medium	Low / Note Only
Bylong Valley Way South – Wollar Road to Kandos ¹ (assumed 10% of total project traffic), 60.6 km length	0	2	13	12
Bylong Valley Way East - Wollar Road to Golden Highway (assumed 10% of total project traffic), 59.7 km length	1	6 ²	14	14
Wollar Road – Bylong Valley Way to Ulan Road (assumed 80% of total project traffic), 64.1 km length	4	8	17	13
TOTAL	5	16	44	39

Notes:

1. Council advised that the relevant road section along Bylong Valley Way south would be to Kandos as the likely end destination for workforce along this route, rather than entire 79km length to the Castlereagh Highway.
2. Three high risks within MSC local government area, one within MWRC local government area and two around the Council boundary, mainly associated with steeper grades and tight curves through Cox Gap and limitations for heavy vehicles.

Two of the intolerable risks are associated with risk of collision with wildlife along the more vegetated sections of roads and one is associated with the 17km unsealed length of Wollar Road, which would be addressed as part of the Wollar Road sealing and upgrade by Council. This upgrade would also address the remaining 2 intolerable risks which were identified in the unsealed section of road.

The 8 high risk locations along Wollar Road were also identified within the proposed Wollar road upgrade, which also includes widening and upgrading Fitzgerald Bridge just outside Wollar, at the Barigan Road intersection.

The remaining 8 high risks along Bylong Valley Way are associated with narrow road widths, narrow bridge (at Reedy Creek), rail bridge overpass and restrictions associated with steep grades, narrow road verges and tight curves with potential for heavy vehicles to straddle lanes.

KEPCO has identified treatments to reduce risks for the high and medium risk sections including providing signage, line-marking and commitment to restricting project related oversize vehicles. Council has advised that these treatments would be implemented as part of road maintenance contributions to be provided by KEPCO (see below).

In addition to the road safety audit, accident data from 2010 to 2014 showed a higher rate of accidents along Bylong Valley Way (South) from Bylong towards Kandos/ Rylestone and along the Wollar Road.

In particular, given that most of the project related traffic would be along the Wollar Road, there are two crash clusters identified, one a 3km stretch within the Munghorn Gap Nature Reserve and the initial 5 km section from Ulan Road towards Wollar. Council has undertaken significant upgrade works for the 5km stretch of road, including bridge upgrades.

Mid-Western Regional Council sought funding from Resources for Regions to upgrade Wollar Road through the nature reserve. These proposed works are road safety upgrades safety barriers, road widening where required, pavement rehabilitation, clearing of trees and culvert widening. However, Council was unsuccessful in its bid in the latest (2015/ 2016) round of funding.

The Department has recommended that KEPCO provide funding towards the upgrade of Wollar Road through Munghorn Gap, noting that the NSW Government has contributed some \$14 million for the Wollar-Bylong Road upgrade, which would provide provided substantial benefit to the project. These road upgrades focus on safety aspects including road and culvert widening, installation of safety rails and rehabilitating road deformation.

Council and KEPCO are currently negotiating an acceptable contribution toward these upgrades. Based on the outcome of these negotiations, the Department will recommend a funding contribution prior to determination of the project.

KEPCO has also committed to provide \$40,000 for road safety upgrades to MSC for road safety upgrades along Bylong Valley Way that were identified in a road safety audit completed by MSC in 2015. KEPCO based its contribution of the total cost estimated of road safety upgrades (some \$920,000) using the percentage of predicted life of project-related traffic (4.3%) over this section of road, compared to non-project related traffic.

School bus route

Based on a proposed shift changeover time of 7am and 7pm, the assessment concludes that the project-related traffic peaks are unlikely to coincide with school bus travel between Mudgee and Wollar. KEPCO also states it would "encourage" travel outside of school drop off and pick up periods.

However, the Department considers that shift change traffic associated with the project may interact with school buses travelling to schools in Mudgee along Wollar Road and Ulan Road between 7.30am and 8.35am (southbound). RMS also recommended that KEPCO's commitment be strengthened to ensure that shift changeover traffic generating activities would not coincide with school bus travel.

The Department supports the RMS recommendation, which is consistent with conditions for the Ulan, Wilpinjong and Moolarben mines, and has recommended conditions for production shift traffic to avoid school bus periods and co-ordinate shift changes with the other mines to minimise potential cumulative impacts.

Mine commuter safety

Given the relative isolation of the mine, longer travel distances along with 12 hour working shifts, managing worker fatigue is a key issue for the project during construction and operations. With the sealing of Wollar Road, the commute to Mudgee would be around 1 hour, with Rylestone and Kandos closer at about 35 to 45 minutes respectively. Denman to the east is also an approximate 1 hour drive.

KEPCO has identified a range of initiatives to manage this risk including:

- construction of the WAF to reduce travel times;
- commitment to investigate bussing of operational employees;
- requiring Journey Management Plans to be prepared for each worker;
- implementation of a project Fatigue Management Policy, including education program;
- provision of information to employees and families regarding management of fatigue; and
- encouraging car-pooling during operations.

While RMS was generally supportive, it requested that the commitments made by KEPCO are measurable, enforceable and reportable, particularly in relation to car-pooling and bussing of employees.

As discussed above, depending upon available accommodation in the region prior to construction commencing, the WAF may not be constructed or would be substantially reduced in size. The Department considers that KEPCO should undertake all reasonable endeavours to use buses and car

pooling to transport its peak shift-work employees to the project site during both construction and operations.

The Department has recommended that a Traffic Management Plan be prepared in consultation with RMS and Council and to the satisfaction of the Secretary prior to the commencement of the project. The Traffic Management Plan would require KEPCO to demonstrate that it has implemented a program for busing and car-pooling its workforce to the site as far as reasonably practicable and include its other commitments to manage driver fatigue.

Based on experience at other mines sites, the Department would expect that a minimum target of 60% of the construction and operational shift workforce to be transported to the site from the surrounding towns by bus would be reasonable. Council has also advised the Department that there are existing drop off and pick up locations in Mudgee that have been used previously for other developments during construction and continue to be used for operational workforces.

KEPCO would be required to implement the approved Traffic Management Plan which would provide the compliance and reporting mechanism requested by RMS.

Road Maintenance Contributions

KEPCO has committed to providing road maintenance contributions to Mid-Western Regional Council. Following consultation between the Department, KEPCO and Council, an annual contribution of \$177,000 is considered appropriate based on average life of mine project vehicle use compared to non-project related vehicles. This would commence within 3 months of the date of commencement of the project and annual payments would increase based on CPI index from 2017-18 year.

The Department does not consider that road maintenance contributions to Muswellbrook Shire Council are warranted given the recommended condition to restrict project-related heavy vehicles along this section of Bylong Valley Way, the predicted low number and percentage of the workforce along this route, and KEPCO's commitment for accommodating its workforce in the MWRC local government area. However, as discussed above, the Department considers that KEPCO should provide funding for identified road safety upgrades.

Rail Transport

Product coal would be transported by rail via the proposed rail loop and the Sandy Hollow to Gulgong Railway Line, which connects to the Main Northern Railway Line at Muswellbrook and continues down to the Port of Newcastle. The project would generate an average of around 2 return train trips per day, with a peak of up to 10 return train trips per day. These transport rates have been determined in consideration of production rates, coal sales and the availability within the transport chain.

This would mean the product coal transport from the project represents an increase in the order of 9% in the current average rail movements approved for the existing western coal mines.

The existing mine operators who utilise the Sandy Hollow to Gulgong Railway Line raised concerns about the capacity to accommodate additional coal haulage, particularly due to constraints associated with ventilation of the Bylong Tunnel.

The Department notes that production forecasts from the project have already been accounted for within ARTC's 2015-2024 Corridor Capacity Strategy (the Corridor Strategy). Importantly, the Corridor Strategy shows that the existing line has sufficient capacity to include anticipated rail movements from the project over this period. The recently completed 2016-2025 Corridor Strategy (September 2016) includes Bylong in its prospective volumes over this period. The Department also notes that the Cobbora Coal Project is not proceeding, which was approved to transport 6 return train trips a day along the same rail corridor.

The 2016-2025 Strategy concludes that no increase in rail capacity is required for contracted volumes and there has been a downward revision for prospective volumes with one passing loop required near Mt Pleasant by 2022. That is, the Sandy Hollow to Gulgong Railway Line can accommodate the additional trains required for the project and ARTC have measures in place to manage existing and prospective users.

Conclusion

The Department has recommended a number of traffic-related conditions requiring KEPCO to:

- maintain access through road upgrades/ realignments to properties to the south and east of the project site;
- contribute funding towards road safety upgrade works and road maintenance along the main transport routes to the applicable local roads authorities;
- not commence construction until the Wollar Road is sealed;
- restrict larger heavy vehicles from accessing the site along Bylong Valley Way from the Castlereagh Highway to the south, Golden Highway to the east and Ulan-Wollar road;
- prepare and implement a Traffic Management Plan, including requirements for managing worker fatigue and utilising bussing and car-pooling of workers to the site; and
- ensure shift changeover traffic does not interact with school bus schedules.

Based on KEPCO's traffic assessment, commitments proposed by KEPCO in response to RMS recommendations and the Department's recommended conditions, the increase in traffic as a result of the project could be safely accommodated on the local and regional road network.

6.8 Visual Amenity

Visual Context

The project site is located within a recognised scenic rural area, characterised by rugged vegetated ridgelines and enclosed pastoral valleys. Whilst these landforms result in a visually striking and sensitive setting, the visual impacts of mining developments in the valley areas are mitigated to a degree by the valley's enclosed nature, which assists in limiting views from neighbouring areas.

In this regard, the visual catchment of the project site is generally limited to areas east of the main Growee River valley. The Growee River valley accommodates a number of agricultural properties, as well as the principle thoroughfares in the locality including the Bylong Valley Way.

Notwithstanding, there are a number of visual receivers in the area that have the potential to be impacted by the visual and lighting impacts of the project. The EIS includes a specialist visual impact assessment, prepared by JVP Visual Planning and Design that assesses the residual visual and lighting impacts of the project on these receivers.

The receiver locations, and their assessed visual sensitivity to project-related impacts, are outlined in the following table.

Table 25: Visual Receivers and Sensitivity

Receiver	Visual Sensitivity
Bylong village	High
Rural residences	High
Mapped Equine CIC land	High
Bylong Valley Way and Wollar Road	High
Local roads (inc. Upper Bylong Road, Wooleys Road, Wallys Road, Lee Creek Road, Budden Gap Road)	Moderate-Low
Rural land	Low
Sandy Hollow to Gulgong Railway	Low

Avoidance and Mitigation Measures

The visual assessment is based on a number of measures that KEPCO would implement to avoid or mitigate the visual and lighting impacts of the project. These include:

- reducing the size of the open cut pits, limiting the duration of open cut mining, and backfilling the open cut pits;
- avoiding open cut mining and emplacement on key topographic high points;
- prompt construction and rehabilitation of overburden emplacement areas;
- limiting the primary view zone of pre-rehabilitated overburden emplacements as far as possible (to less than 2.5%);
- locating the mine infrastructure area (MIA) between existing topographical features to screen it from external receiver locations;
- installing and managing lighting to minimise light spill, in accordance with applicable Australian Standards;

- shaping and landscaping overburden emplacements and rehabilitation areas to provide mimic natural landforms and vegetation communities as far as possible;
- painting infrastructure in 'forest tones' to blend in with the surrounding environment as far as practicable; and
- avoiding subsidence impacts on significant cliff lines, including cliffs C1 to C4 (see Section 6.2).

KEPCO has also committed to undertaking offsite mitigation measures, including:

- providing landscape treatments for privately-owned residences predicted to be visually impacted by the project; and
- providing screening vegetation along public roads, particularly along the realigned Upper Bylong Road adjacent to the Sandy Hollow to Gulgong Railway.

Residual Visual Impact

The areas of primary visual concern and impact are shown on Figure 33.

With regard to Bylong village, the visual assessment indicates that there would be no perceptible views of project elements from the village as a result of intervening vegetation, and therefore the project would have a low visual impact on the village.

With regard to rural residences, one privately-owned residence located to the east of the mine (Receiver 141) would have direct views to the mining operations at a distance of about 3 kilometres, and is predicted to experience high visual impacts during the first 4 years of the project. These impacts are predicted to reduce to moderate and low as rehabilitation progresses. This residence may also experience moderate to high impacts associated with potential cliff falls, particularly in relation to Cliff C8 which is located about 1.5 kilometres from the receiver. KEPCO has offered to purchase this property.

While views would be available from other rural lands, impacts on these land areas are predicted to be moderate to low, given the low sensitivity of these areas.

Views to project elements would also be available from some rural properties containing mapped Equine Critical Industry Cluster (CIC) land²⁴, including Tarwyn Park, Tinka Tong and the Walling Pastoral land. All of these properties are now owned by KEPCO, and as such the visual impacts from these properties are assessed as low.

Bylong Valley Way and Wollar Road are key local roads in the Bylong Valley used by commuters, residents and tourists, and as such have a high visual sensitivity. The visual assessment indicates that the project elements would not be visible from these roads due to intervening topography and vegetation, apart from some short sections where the overburden emplacements would be visible. The resulting visual impact is considered to be moderate to high prior to rehabilitation, given the high visual sensitivity of these roads.

Some potential cliff falls within the subsidence area (particularly cliffs C5, C6 and C9) may also be visible from Bylong Valley Way, however any residual impact is assessed as low to moderate given the distance to the cliffs (approximately 3.2 kilometres), the interrupted views through vegetation, and the viewing angle to the cliffs from the road.

Other local roads would have some direct views to overburden emplacements and project elements, as well as views to some potential cliff falls, although impacts are considered to be low to moderate given the lower sensitivity of these roads.

The Sandy Hollow to Gulgong Railway Line is considered to be of low visual sensitivity, as it is not used for passenger services. Users of the railway would have direct views of project elements, however the resulting impacts are considered to be low to moderate given the low sensitivity.

The assessed high and moderate impacts would gradually reduce to moderate and low respectively, following completion and rehabilitation of overburden emplacements, and would ultimately reduce to low as rehabilitation vegetation matures.

²⁴ Section 6.5 provides further consideration of Equine CIC land.

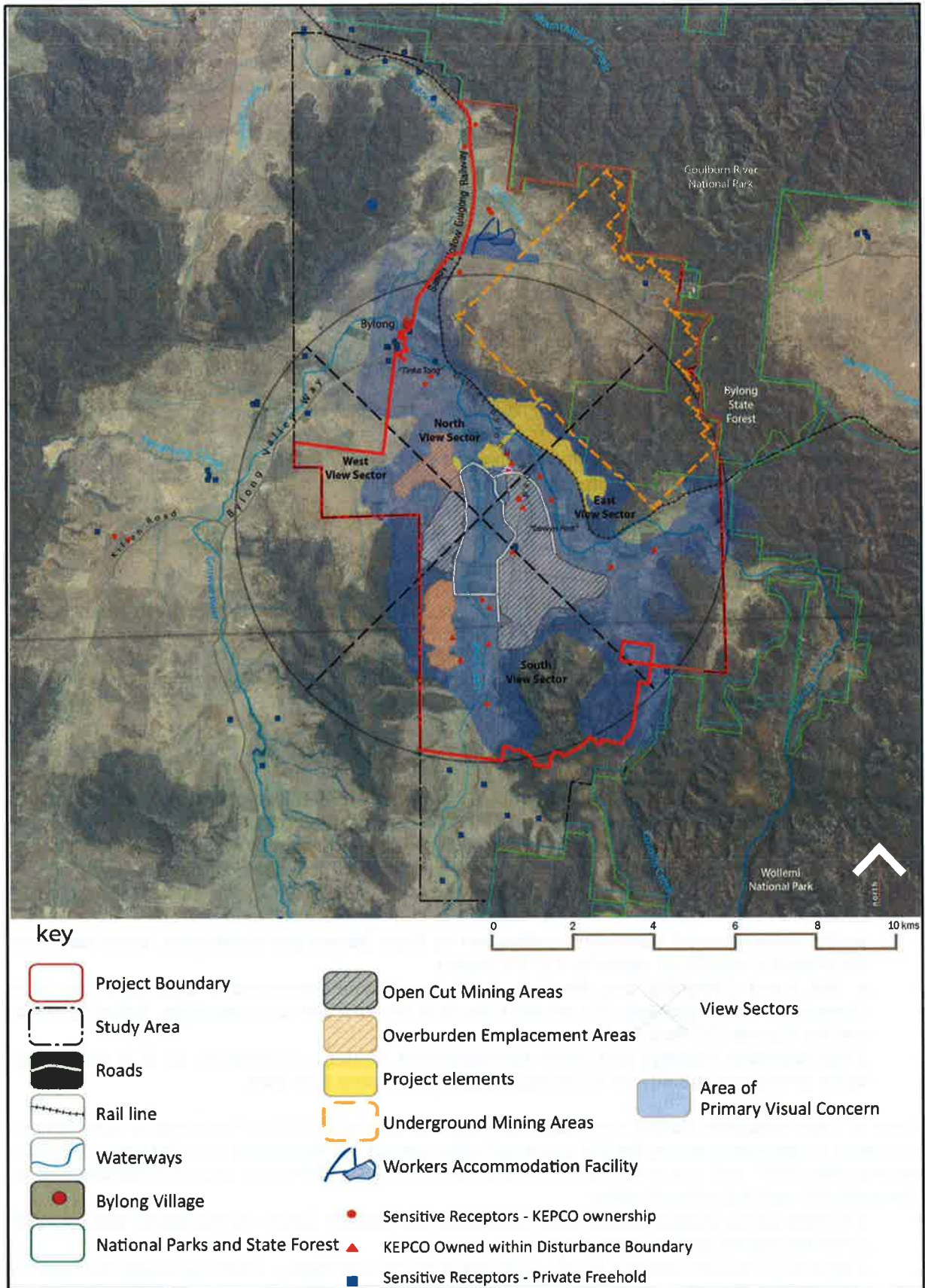


Figure 33: Areas of Primary Visual Concern

Lighting impacts at sensitive receiver locations are considered to be low, due to the influence of intervening topography.

The Department recognises that the project would result in some changes to the visual landscape of the Bylong Valley. However, the Department notes that these impacts would be relatively localised, with the project elements generally hidden from view of the receivers with the highest visual sensitivity (including Bylong village, most rural residences and Bylong Valley Way). The Department also acknowledges KEPCO's commitment to minimise visual impacts, particularly through the backfilling of the open cut voids, promptly rehabilitating the emplacements, and avoiding subsidence of key cliff lines.

In this regard, while the project would transform the local landscape from a rural setting to a mining/industrial setting, in the longer term the project rehabilitation would return the site to a landscape generally similar to the existing setting.

To minimise the residual visual and lighting impacts of the project on receivers as far as practicable, the Department has also recommended conditions requiring KEPCO to:

- implement additional visual mitigation measures to reduce the visibility of the mine operations on privately-owned receivers that have direct views of the mining operations, at the request of the landowner;
- notify relevant land owners of their entitlement to additional site-specific visual assessment and landscaping treatments;
- undertake screening along affected roadsides as soon as possible; and
- implement all reasonable and feasible measures to reduce visual impacts.

6.9 Social Impacts

Introduction

As with any large mineral resources project, particularly for greenfield projects such as the Bylong Coal Project, the benefits would accrue to both the local community (e.g. jobs, economic opportunities) and the wider community (e.g. affordable energy, economic value add), while many of the costs (particularly amenity impacts such as noise and dust, and changes to social dynamics) would be felt within the local community surrounding the mine site.

The EIS includes a number of specialist studies to assess the project's impact on these socio-economic and biophysical matters, including:

- a Social Impact Assessment²⁵, undertaken by Hansen Bailey, which assesses the project's impacts on local and regional social infrastructure, services and dynamics;
- an Economic Impact Assessment, undertaken by Gillespie Economics, which attempts to identify, assess and weigh up potential economic costs and benefits, including externalities;
- a peer review of the Economic Impact Assessment, undertaken by Mr Drew Collins of BDA Group;
- an Agricultural Impact Statement, undertaken by Scott Barnett and Associates, which assesses the project's impacts on agriculture in the region;
- a Soil, Land Capability and Strategic Agricultural Land Assessment, undertaken by SLR Consulting, which assesses the project's impacts on soils and land capability, including BSAL and the Equine CIC land; and
- a Rehabilitation Strategy and BSAL Reinstatement Strategy, undertaken by SLR Consulting, which provides a strategy for achieving agreed post-mining land uses.

Some of these specialist studies were expanded upon as part of KEPCO's Response to Submissions to address issues raised during the EIS public exhibition period. These issues included concerns about the proposed WAF, and concerns about the assessment of BSAL within the project disturbance area. The additional assessments included:

- a revised Social Impact Assessment, undertaken by Hansen Bailey, for the option that the WAF is not developed as part of the project;
- a Workforce Accommodation Study, undertaken by Hansen Bailey, which assesses the need for the WAF in relation to workforce requirements and accommodation supply in the region; and

²⁵ The EIS was prepared prior to the preparation of the *Social Impact Assessment – Draft Guidelines for State Significant Mining, Petroleum Production and Extractive Industry Development* and therefore these guidelines did not apply to this project.

- additional soil testing and BSAL analysis, undertaken by SLR Consulting, which identified an increase in BSAL within the project disturbance area compared to that originally identified in the EIS.

The Department engaged specialist consultants to undertake independent reviews of some of the assessments including:

- the Centre for International Economics (CIE), which undertook an independent review of the Economic Impact Assessment; and
- Elton Consulting, which undertook an independent review of the Social Impact Assessments, including additional consultation with the community.

Based on these assessments, and the consultation process undertaken for the EIS and social assessments, the Department considers that the assessment of the project's impacts on socio-economic matters has been substantial, and have provided adequate information to enable the consideration of these impacts.

Consideration of the economic costs and benefits of the project is provided in Section 2 of this report. As outlined, the Department accepts the conclusion of CIE that the project's benefits to society (especially to the State and region) would significantly outweigh its costs, including externalities, from an economic perspective.

Consideration of the need for the WAF is provided in Section 2.3. As outlined, the Department has recommended that the WAF not be constructed for the project unless KEPCO demonstrates, in consultation with Council, that there is insufficient accommodation capacity available to support the construction workforce.

Consideration of agricultural impacts is provided in Section 6.4. As outlined, the Department accepts that the project would not significantly impact the agricultural resources or productivity of the region, subject to the implementation of a number of measures to minimise and/or rehabilitate impacts on these resources.

A summary of the Department's consideration of other social impacts associated with the project is provided below.

Social Context

The Bylong Valley is a rural community of approximately 100 residents. Bylong village is the focus of community activity and has a small general store, a community hall, sporting grounds, a church (St Stephens Anglican Church) and the Bylong Rural Fire Service (RFS). The Bylong Upper Primary Public School is located on Upper Bylong Road about 1 kilometre from the village, however the Department of Education and Training has closed the school due to lack of enrolments and has recently sold the land to KEPCO. The school is located within the project disturbance area for the open cut mine.

There are 3 houses in or near Bylong village, 2 of which have been acquired by KEPCO. The privately-owned house is located to the south-west of the village (Receiver 60). The general store also includes a residence which is currently privately-owned (Receiver 65). KEPCO has offered to purchase these 2 privately-owned properties.

The wider Mid-Western Regional LGA has a population of around 24,000 and comprises the regional centre of Mudgee, small settlements of Gulgong, Kandos and Rylstone, and 14 villages and localities including Bylong. The closest urban settlement to the project site is Rylstone, located approximately 50 km to the site by road. Mudgee is located approximately 95 km to the south-west by road. The village of Denman, located in the Muswellbrook LGA, is located to the east about 72 km by road.

The Mid-Western Regional LGA has a population growth of around 10% (between 2006 and 2013), and an unemployment rate slightly above the NSW average at about 6.6% (in 2014). Key industries in the LGA include agriculture, viticulture, tourism and mining. There are currently 3 operating mines in the LGA, including Wilpinjong, Moolarben and Ulan. A fourth, the Charbon mine, ceased mining operations in late 2015.

Local Infrastructure and Services

The EIS projects that, to Year 3, the project would generate up to 460 new residents in the LGA (equivalent to a population increase of 3.6%), 415 of which would reside in Mudgee. During Years 3 to 9, the project would result in further 540 new residents in the LGA (an increase of 4.3%), 490 of which would reside in Mudgee.

Based on these increases, the social assessment found that:

- *Housing* – the project would generate demand for an additional 380 dwellings to the peak year (Year 9). This increase has been considered in Council's urban release strategy, and it is predicted that the demands can be met without significant additional pressure;
- *Labour* – the labour market has been softening in recent years with the mining downturn, and the project would help to arrest this decline;
- *Community Infrastructure* – the project would not adversely affect Bylong village facilities including the Bylong general store, sports grounds and the Anglican Church. The project would impact the former Bylong Upper Public School, which is within the project disturbance area, but the school has been closed by the Department of Education and Training in response to declining enrolments; and
- *Health, Children's Services and Education* – the project would result in some incremental demand on services in Rylstone and Mudgee, but the capacity of these services is adequate.

The assessment indicates that the project is able to be accommodated in the region without placing significant additional pressure on local infrastructure and services.

Nonetheless, to assist in contributing towards the increased demand on local community infrastructure and services, KEPCO and Council have entered into a Voluntary Planning Agreement (VPA) for the project. Under the VPA, KEPCO has agreed to make contributions to Council towards community infrastructure comprising some \$7.25 million, including:

- \$1.5 million upon granting of development consent and other approvals;
- \$1.25 million upon mine commencement; and
- \$0.05 per tonne of product coal, payable annually, which would be directed towards a Community Investment Fund.

The distribution of the funds would be identified and managed subject to a community needs assessment or other such mechanism as agreed by Council and KEPCO.

The Department acknowledges that KEPCO and Council have already entered into a VPA for the project. However, the Department notes that the terms of the VPA are fairly broad and would be directed, at Council's discretion, towards priorities identified in its Community Plan, with some scope for suggestions by KEPCO as to how the funds should be disbursed.

While the Bylong Valley itself would not support a significant portion of the project workforce, nor does it contain a significant amount of local community infrastructure and services, the community would bear the majority of amenity impacts associated with the mine, and changes to social dynamics. Consequently, the Department has recommended that KEPCO makes every effort to encourage VPA funding in the area surrounding the mine, including Bylong village.

With regard to the former Bylong Upper Public School, as outlined in Section 6.5 KEPCO has committed to the relocation and/or adaptive reuse of the school buildings (and other heritage items), if an opportunity for relocation is identified. The Department has recommended conditions requiring KEPCO to relocate the structures, if an adaptive reuse is identified following consultation with Council.

Social Dynamics

The project has already had a considerable effect on social structure and social dynamics in the Bylong Valley, given the relatively small population of the Valley and that KEPCO has already purchased considerable landholdings within the project area and the area predicted to be affected by project-related impacts (such as dust, noise and blasting).

In this regard, KEPCO has now purchased all of the privately-owned land within the project area and the noise and dust significant affectation area, with the exception of 1 receiver (Receiver 60) predicted to be affected by noise. Whilst these land purchases have occurred on the open market, they have inevitably led to some social division and considerable concern within the remaining community.

The Department's independent social expert, Elton Consulting, considers that KEPCO's social assessment presents, in general, as a thorough and well researched assessment conforming to standard methodology. However, the independent review was critical of a number of aspects of the assessment, noting amongst other things that it:

- provides relatively superficial treatment of social concerns;
- conveys little of the depth of these concerns;
- overlooked the effects of the historic property acquisitions on community structure;
- fell short of accepted community engagement standards; and
- showed a poor understanding of the significance of cumulative change and the social significance of biophysical impacts, the effects of the acquisition process on stress and change, and the potential for future community revitalisation through attraction of mining employees to the area.

KEPCO disagreed with many of these criticisms, noting that Elton's review was limited by its focus on only the social assessment (and lack of consideration of the broader EIS), and that Elton's own consultation process was limited to the local Bylong area, focusing on the immediately affected community, rather than balancing this with the views of the broader community.

Notwithstanding these criticisms, the Department is acutely aware that the project has had, and is continuing to have, a considerable effect on social structure, dynamics and cohesion in the local area, particularly in the Bylong Valley. This effect is similar to those of other large resource projects, particularly greenfields projects, which inevitably brings a large amount of change to the area in which the resource is located.

The Department recognises that KEPCO's land acquisition program has already had an effect on the Bylong community, but also recognises that this program has led to all but one of the privately-owned properties within the noise and dust significant affectation area already been voluntarily purchased on the open market. This outcome is an improvement on many contemporary mining projects, which often proceed through the development application and assessment stage with a considerable number of privately-owned properties within the area affected by the project.

Elton Consulting made a number of recommendations to mitigate the residual social impacts on the remaining community as far as possible. A number of these recommendations would be addressed through conditions that the Department requires for most mining projects. These recommendations, and the Department's consideration of each, are outlined below:

- *that Council provides support for residents when engaging and negotiating with KEPCO* – the Department is confident that Council would provide appropriate levels of support for the community through the VPA, its representation on the Community Consultative Committee (CCC) and other Council community engagement functions;
- *develop a 'mini Bylong VPA', or allocate a portion of the VPA funds to the local area* – as outlined above, the Department has recommended that KEPCO makes every effort to focus VPA funding on local community infrastructure and services;
- *that the local community be represented on the CCC* – the Department has recommended that a CCC be established for the project in accordance with the Department's recently updated CCC guidelines, and notes that community representation is a standard requirement for any CCC;
- *that if the WAF is approved, that it is open to the community and provides recreational facilities* – as outlined in Section 2.3 the Department has recommended that the WAF not be approved, subject to further review of available accommodation in the region. If approved, this would mean a scaled down and short term facility such that general communal use would not be appropriate;
- *that KEPCO maintains farmland and residences acquired in productive use* – KEPCO has committed to continuing agricultural production on these lands, and the Department has recommended conditions reinforcing this (see Section 6.4);
- *that KEPCO documents the process of change that has occurred* – the Department has recommended a condition requiring KEPCO to prepare a detailed an oral history of the Bylong Valley (see Section 6.5);
- *that KEPCO provides funding and in-kind support for RFS volunteers* – KEPCO has committed to such funding through the VPA, as agreed by Council, and encouraging its workers to volunteer;
- *that the Bylong Upper Public School be relocated for community use* – as outlined in Section 6.5, the Department has recommended conditions in this regard;
- *that ongoing community engagement be undertaken by suitably qualified staff* – KEPCO has hired a community engagement officer, and the Department has recommended conditions requiring KEPCO to:

- keep the local community informed about the operation and environmental performance of the mine;
- establish and maintain a CCC, which is required to include local community representatives;
- effectively respond to enquiries and complaints;
- independently investigate complaints;
- notify residents of any exceedances of environmental criteria; and
- publicly report all relevant project-related information, including approvals, environmental reports and monitoring results.

Conclusion

The Department recognises that the project would have a significant social impact on the local Bylong Valley community. This is clear from meetings the Department and the then Minister for Planning held with local community members and groups and submissions received on the EIS.

In particular, the social dynamics and community cohesion has already substantially changed due to the land acquisitions required for the project and ongoing concerns over further social impacts, if the project were to proceed.

The Department has heard how this leads to a sense of loss of rural landscape, connectivity and relationships between landowners and with other nearby communities, such as Wollar. The project would also lead to a loss of connection for people living away from the area, but with long term family and historic connections. This is particularly the case for impacts of the project on the Upper Bylong Catholic Church cemetery and proposed exhumation of graves.

However, the Department acknowledges that, similarly to other small rural areas and communities, there has been a reduction in population and services occurring prior to the land acquisition program commenced for the Bylong Coal Project.

KEPCO has also continued to negotiate with landowners significantly affected by the project, particularly those within the significant affectation zone for noise and where the project has impacted on road access and has completed further land acquisition since the project application was lodged.

The social impacts of the project are directly linked to the Department's consideration of the range of issues in Sections 6.1 to 6.8 of this report, including amenity and health impacts, water and agriculture, heritage and biodiversity, traffic and visual impacts. While the project would largely meet relevant criteria and acceptable impact levels set under NSW Government policy, particularly given the acquisition of land within and around the project area, the Department acknowledges that there would be residual social impacts borne by the local community.

The Department has recommended conditions for mitigating and managing these residual social impacts including:

- affording acquisition and/or mitigation rights to the remaining noise affected residents in the vicinity of the proposed mining operations (although the Department considers KEPCO should seek to acquire or reach agreement with these landowners prior to any determination);
- requiring a CCC to ensure that the views and concerns of the community through its representatives are considered during the life of the project, including input into management plans;
- retaining agricultural productivity where possible on KEPCO acquired landholdings during mining and to return disturbed areas to an agricultural land use following mining;
- undertaking an oral history of the area, preparing archival documentation, relocating where possible important local historical items of importance to the local community and managing impacts on heritage items, including on Tarwyn Park;
- preparing a Burial Management Plan for exhumations from the old Upper Bylong Catholic Church grounds;
- providing assistance for the RFS and ensuring the site is equipped for fire-fighting;
- support for allocation of VPA funding to be directed to local community projects;
- requiring monitoring, management and reporting of impacts under management plans and the environmental management system for the project; and
- requiring KEPCO to implement measures, in consultation with Council and the CCC, for post mining land use and managing socio-economic impacts associated with mine closure.

The Department has also recommended that KEPCO be required to prepare and implement a comprehensive and adaptive Social Impact Management Plan (SIMP) for the project, in consultation with Council, the CCC and the local community. The SIMP would:

- identify negative social impacts resulting from the project during construction, operations and following closure in both a local and regional context;
- include an adaptive management and mitigation program to minimise and/or mitigate negative social impacts during construction, operations and following closure;
- include a detailed description of the measures that would be implemented to:
 - maintain and manage land and assets owned by the KEPCO in Bylong Village;
 - assist in maintaining services for the local community; and
 - minimise the adverse social impacts associated with mine closure;
- include a program to monitor, review and report on the effectiveness of these measures.

The Department considers that the implementation of the SIMP would assist in minimising social impacts and would provide a framework for maintaining the built and social fabric of Bylong village and surrounds to the greatest extent practicable following the cessation of mining. It is also generally consistent with the Department's draft Social Impact Assessment policy which emphasises the need to involve affected communities in identifying and developing measures to address any negative social impacts associated with mining.

7. RECOMMENDED CONDITIONS

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

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

The conditions incorporate the recommendations of relevant government authorities where applicable, and the Department considers they reflect best practice and provide a sound basis for managing the various potential impacts of the project.

8. CONCLUSION

The Department has assessed the development application, EIS, submissions on the project, the Response to Submissions, Supplementary RTS and a range of additional information in accordance with the requirements of the EP&A Act. The Department has also considered the independent expert reviews of the project's economic, groundwater and social impact assessments.

Based on this assessment, the Department considers that KEPCO has designed the project in a manner that achieves a reasonable balance between maximising the recovery of a recognised coal resource of State significance and minimising the potential impacts on surrounding land users and the environment as far as is practicable, particularly through:

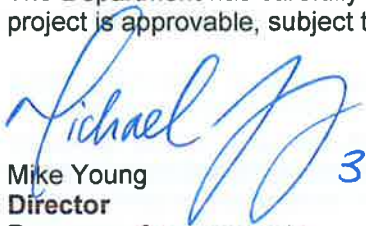
- avoiding disturbance of the Bylong River and Lee Creek alluvial aquifers;
- reducing the open cut pits to a reasonable size and layout;
- fully backfilling and rehabilitating the open cut voids;
- avoiding subsidence impacts on the Goulburn River and Wollemi National Parks;
- avoiding and/or minimising subsidence impacts on significant cliff lines;
- minimising noise and dust impacts on Bylong village and surrounds; and
- reducing impacts on biodiversity, agricultural land, Aboriginal sites and historical heritage sites.


The Department has recommended a comprehensive and precautionary suite of conditions to ensure that the project complies with the relevant criteria and standards, and to ensure that the predicted residual impacts are effectively minimised, mitigated and/or compensated for. The Department believes that the conditions reflect current best practice for the regulation of mining projects in NSW.

The Department also recognises that the project would provide major economic and social benefits for Mudgee and the Mid-Western region, including:

- a direct capital investment in the mine over \$1.5 billion;
- direct employment for up to 470 workers during operations, and generation of around 830 jobs in the region;
- generating around \$624 million in annual business turnover in the region;
- funding for local infrastructure and community service projects; and
- direct revenue for the State Government, including \$763 million (\$290 million present value) in coal resource royalties.

The Department has carefully weighed the impacts of the project against its benefits. On balance, the project is approvable, subject to stringent conditions.


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