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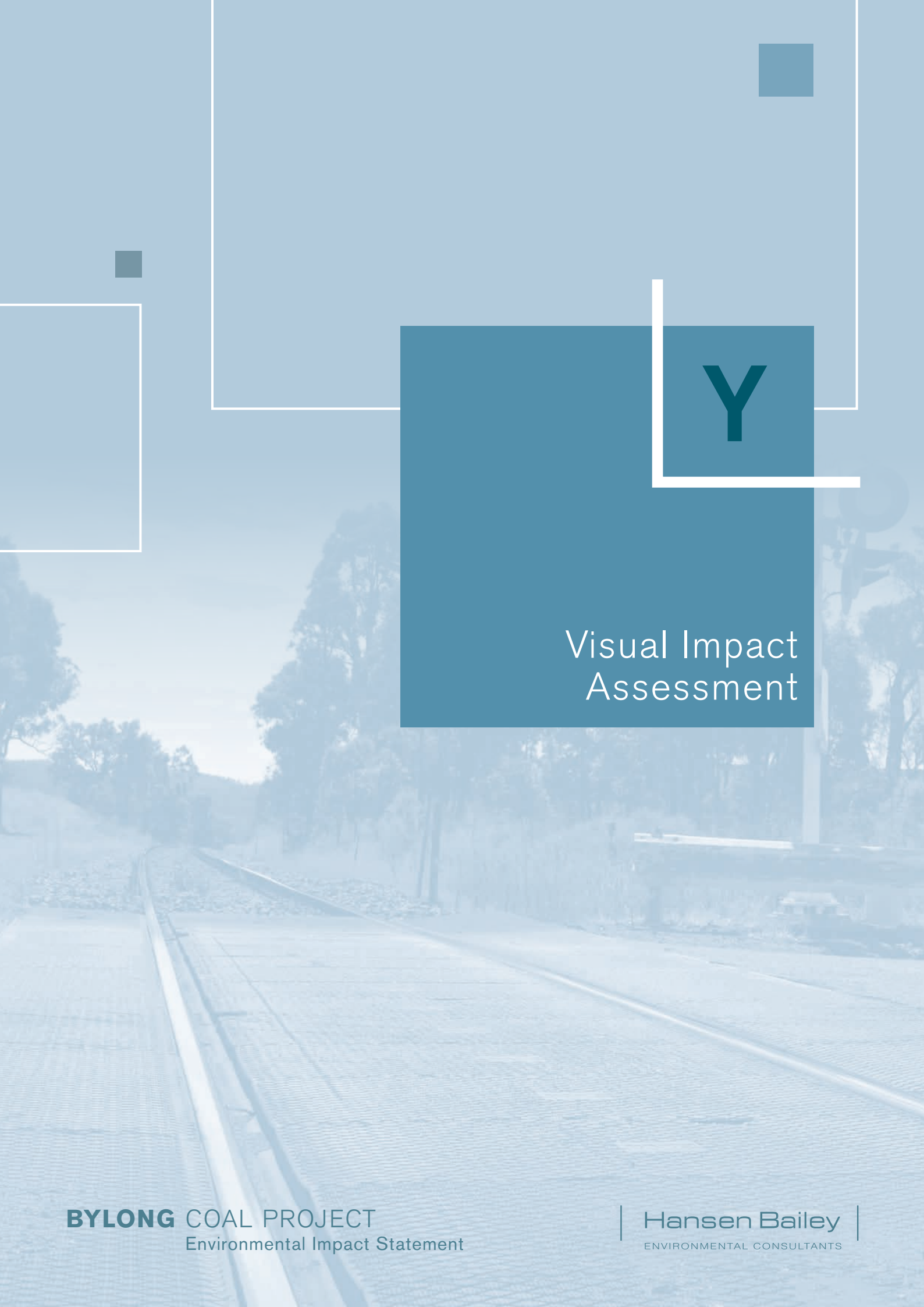
Visual Impact Assessment



BYLONG COAL PROJECT
Environmental Impact Statement

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

Bylong Coal Project

Visual Impact Assessment

July 2015

Report prepared by

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Glossary and Abbreviations

Areas of Primary Visual Concern	Areas that have potential views to the Project based on a consideration of topography alone as a screening element.
Contrast	The degree to which a development element differs visually from its landscape setting.
Critical Industry Clusters	Critical industry clusters (CICs) are concentrations of highly productive industries within a region that are related to each other, contribute to the identity of that region, and provide significant employment opportunities. Includes equine and viticulture industries.
Field of View	This area includes the total view, consisting of the primary view zones above and the secondary or peripheral view zones around the primary view zone, out to about 700 either side of the central view line in both vertical and horizontal plain.
Integration	The degree to which a development element can be blended into the existing landscape without necessarily being screened from view.
Interburden	Material of any nature that lies between two or more bedded ore zones or coal seams.
Landscape Character Unit (LCU)	The landscape features of the locality (topography, vegetation and land use features) combine in various ways to create areas of relative visual uniformity that can be defined as LCUs.
Overburden Emplacement Area (OEA)	Refers to the placement of waste material (mostly dirt and rock) excavated as part of the coal mining process into a predefined area.
Photomontage	Photomontage is the process and result of making a composite photograph by cutting and joining a number of other photographs or graphic images for illustrative effect. The composite picture or image aims to give a visualisation of a projected visual effect.
Primary View Zone (PVZ)	This zone is the central most critical part of a view that is seen with the greatest clarity. It is that part of a view that is within a horizontal arc of 300 either side of the centre line of a view and a vertical arc of 300 above the horizontal.
Scenic amenity	This term encapsulates people's aesthetic experience of the environment; their appreciation and value of a physical environment whether it be an urban, coastal, bushland, rural or industrial setting. Aesthetic appeal is often associated with the reinforcement of cultural or social values and identity.
Screen	The degree to which a development element is unseen due to intervening landscape elements such as topography or vegetation.
The Project	Bylong Coal Project
Visual Absorption Capacity (VAC)	The Visual Absorption Capacity is defined as the ability of that VCU to screen and or visually integrate the project elements or activities of the coal mine and transmission, exploration and production infrastructure project elements.
Visual Character Unit (VCU)	Visual Character Unit. Areas of landscape that have similar topographic, vegetation and land use features that create areas of similar visual character
Visual Effect	A measure of the visual interaction between the Project and the landscape setting within which it is located.

Visual Impact	A measure of a joint consideration of both visual sensitivity and visual effect that considered together determine the visual impact of a development
Visual Sensitivity	The degree to which a change to the landscape will be perceived in an adverse way.
View Shed	A view shed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point.
Primary Visual Catchment	The primary visual catchment includes the most significant parts of the total visual catchment from which the Project Boundary potentially could be seen. This is the area containing the most critical locations with potential views to the Project, which will be the focus of visual impact assessment.

EXECUTIVE SUMMARY

KEPCO Bylong Australia Pty Ltd (KEPCO) is seeking State Significant Development Consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the development and operation of the Bylong Coal Project (the Project). The State Significant Development Application will be supported by an Environmental Impact Statement (EIS), which is being prepared by Hansen Bailey.

The Project is located wholly within Authorisation (A)287 and A342, which are located within the Mid-Western Regional Council (MWRC) Local Government Area (LGA). The closest regional centre is Mudgee, located approximately 55 km south-west of the Project Boundary. The Project is approximately 230 km by rail from the Port of Newcastle.

The Project includes both open cut and underground mine areas. Project components comprise of overburden emplacement areas (OEAs) and topsoil stockpiling, coal handling and preparation plant (CHPP), mine site facilities and mine infrastructure, haul roads, construction of a rail loop and associated rail load out facility, water management infrastructure, upgrade to Upper Bylong Road, development of a mine access road and an Eastern Link Road, and decommissioning and progressive rehabilitation of disturbed lands. There will also be a Workforce Accommodation Facility.

The topography of the Bylong Valley generally comprises steep rugged ranges, ridge lines, escarpments and hills which dominate a series of small river valleys and associated floodplains. These ridges and escarpments encircle the Project Boundary and extend into the north-east and east. All these landscape elements, create a rural landscape that has retained high visual integrity as experienced from numerous viewing locations within the valley and moving between them. For the greater part the various components of the rural landscapes are considered to have common scenic amenity with some distinctive landscapes created by features.

The Project life is anticipated to be approximately 25 years, comprising a two year construction period and a 23 year operational period, with underground mining operations commencing in approximately Year 7. Various rehabilitation and decommissioning activities will be undertaken during both the course of, and following the 25 years of the Project.

The main components of the open cut Project are the Western, South-Western and Eastern Open Cut mining areas and their associated OEAs.

The analysis of the interaction between the existing visual environment and the Project provides the basis for determining impacts and developing mitigation strategies. The impact levels of the Project are determined by the defined visual effects of the Project in the landscape and visual sensitivity at specific viewing locations.

The visual impact of the Project is generally **low** from key viewing locations. Impacts are confined to the local setting of Lee's Creek and the Upper Bylong Valley within the area of primary visual concern. The major landscape experience of the Bylong Valley is west of the major operational areas of the Project in this location. It is separated visually from it by existing topography and vegetation.

Visual impacts are generally restricted, because visual effects of Project elements are quickly restored by progressive rehabilitation. High visual effect levels have very short duration times of up to 2-5 years, after which time landscape restoration and rehabilitation reduces visual effects to **low**.

Further, visibility to high sensitivity use areas such as the main Bylong Valley and Bylong Valley Way is limited. Topography and vegetation screening protect high sensitivity use areas such as those along Bylong Valley Way and some residences. Sensitive receptors are described below in relation to their location in view sectors.

Northern View Sector

- Bylong Village is a high sensitivity receptor, but actual views are very limited resulting in low visual impact.
- Properties and areas mapped as Equine Critical Industry Cluster (CIC) that are generally exposed to the Project would have a high sensitivity. This includes outer perimeter areas of Tinka Tong and the residence and property areas that are part of the Wallings Pastoral Company.
- Impacts on particular Equine CIC lands would be high if they were not acquired by KEPCO. The broad open paddocks are visually exposed experiencing high visual effects and impacts of various levels depending on viewing distance and sensitivity levels ascribed.
- All residences with views that are within 2.5 km of the mine areas will have high visual sensitivity. Those residences that have views in that range will have visual impacts prior to rehabilitation of OEAs.
- Short sections of Bylong Valley Way and Wollar Road will have a high sensitivity within 2.5 km of visible Project elements and moderate sensitivity at a distance of up to 7.5 km. Wollar Road will have a high sensitivity to views of the WAF, with moderate sensitivity to the more distant North-Western OEA.
- The impact on Bylong Valley Way will predominantly be low due to screening and lower visual effect levels. For the section of this road with views to susceptible cliff lines to the south, the visual impact will be high to moderate. The sections of this road and Wollar Road that afford views to the WAF will experience high visual impact until visual mitigation tree planting has become established.
- The Sandy Hollow to Gulgong Rail Line has low sensitivity due to coal and freight haulage function of this rail line. This receptor will experience moderate to low visual impacts.
- Local roads have a moderate to low sensitivity.
- For all local rural roads including Upper Bylong Road, high to moderate visual impacts will be experienced for short periods of time when the visual effect of a pre-rehabilitated OEA is seen from roadway. Following rehabilitation, visual effects will be lowered and impact will be reduced to moderate to low.
- The view sector is predominantly rural land, which has a low visual sensitivity. There will be moderate to low visual impacts.

Eastern View Sector

- Two private freehold residences to the east of the Project have high visual sensitivity. There will be high visual impacts for the one residential property impacted for up to 4 years from the commencement of open cut mining operations due to the visual effect of pre-rehabilitated OEAs and mine operations. High to moderate impacts will also be due to views to potentially susceptible cliff lines over the underground mining area. The second property has no views to the Project due to intervening topography.
- All Equine CIC in this sector has been acquired by KEPCO, reducing its potential high

sensitivity and therefore impact.

- The Sandy Hollow to Gulgong Rail Line has low sensitivity due to the coal and freight haulage function of this rail line. This receptor will experience moderate to low visual impacts.
- Local roads have a moderate to low sensitivity.
- For all local rural roads high to moderate visual impacts will be experienced for short periods of time when the visual effect of a pre-rehabilitated OEA is seen from roadway. Following rehabilitation visual effects will be lowered and impact will be reduced to moderate to low.
- The view sector is predominantly rural land with no private residents, which has a low visual sensitivity. There will be moderate to low visual impacts.

Southern View Sector

- The residences to the south will have a moderate to high visual sensitivity based on distance from Project elements; however screening topography and woodland vegetation would eliminate some views. Those within 2.5 kms of mine operations with most potential for views to mine areas have been acquired by KEPCO thereby reducing their sensitivity. The privately owned residences will be screened by the topography within the valley and therefore have low impact.
- Moderate to high visual impacts to limited number of KEPCO owned residences for up to Year 25 due to the Eastern Open Cut. Impacts will be reduced to moderate to low following planned staged rehabilitation. Impact to private residences further south will be low.
- This sector contains some Equine CIC lands however there are no Equine facilities in the sector. All Equine CIC land in this sector has been acquired by KEPCO, reducing its potential sensitivity and impact.
- Local roads have a moderate to low sensitivitydue to low number of traffic movements.
- Upper Bylong Road and other local roads will experience moderate visual impacts for up to 5 years while the visual effect of pre-rehabilitated OEA is seen from the roadway. When rehabilitation is achieved, visual effects and impacts will be reduced to low.
- The view sector is predominantly rural land, which has a low visual sensitivity. There will be moderate to low visual impacts. Rehabilitation will reduce such impacts to very low.

Western View Sector

- Residences located on Bylong Valley Way and Killens Road have high visual sensitivity; however are generally screened from the Project by ridge line east of Bylong Valley Way.
- There is a short stretch of Bylong Valley Way where it is less than 2.5 km from the nearest Project element. Limited stretches of the high sensitivity road and residences may experience a high to moderate impact for short periods of time until OEA faces are rehabilitated. After rehabilitation, visual effect further reduces visual impact to low.
- Equine CIC lands in this sector are generally screened from operational areas with the exception of a small portion of the North-Western OEA that extends over an existing ridge line. There are no equine facilities or residences in this part of the Equine CIC. The land is owned by KEPCO.
- All CIC land within this view sector has been acquired by KEPCO, further reducing its potential sensitivity and impacts.

An analysis of site visit view data, topographic mapping, aerial photography and 3D modelling of mine levels in combination with level of visual effect, determined that potentially high visual impact is limited to one remaining private freehold rural homestead to the east of the Project Disturbance Boundary. The other area of potential impact is a section of Upper Bylong Road with potential views to the south-east on approach to the mine prior to the establishment of screening vegetation that would be part of the rehabilitation works.

Other rural homesteads to the east would have compromised visual amenity for the life of the mine, however they are under KEPCO ownership and would most likely be occupied by employees of the mines who acknowledge and accept the mining activities and compromised visual landscape values of those locations for the duration of the Project.

All other sensitive receptors are screened from the Project elements by the intervening topography and vegetation. Significantly, the Project is located within a near self contained view shed created by the existing local topography of surrounding ridgelines. This containment will be supplemented by the development of the OEAs on the mines north-western perimeter. This element in itself will have limited visual impacts however contributes to that visual containment of the Lee Creek Valley and mine components.

The impacts on Equine CIC lands vary in space and time. Spatially, the lands to the east of Bylong Village and Bylong Valley Way within the Lees Creek and upper reaches of Bylong River catchments are the most affected by the Project. Within these areas, the open rural landscapes will allow for open views to many operational areas. However open cut mining will be limited to a period of 10 years during which progressive rehabilitation of ground shaping, grassing and the re-establishment of woodland patterns, road side planting as well as other landscape treatments around homesteads will reinstate and in some cases improve on landscape patterns in this locality. Beyond this 10 year period, CIC lands could to varying degrees, experience moderate to low impacts from infrastructure elements that depend on the various levels of visual integration of these elements as seen from various view points in the CIC. Again these impacts will only be experienced during the life cycle of the mine.

Additionally, CIC lands within the Lee's Creek and upper reaches of Bylong River catchments is not currently utilised for equine purposes and due to the proximity to the Project Disturbance Boundary, will not be utilised for equine purposes for (at least) the open cut operational period. As such, the anticipated visual impacts to Equine CIC mapped land will be low. CIC lands outside of the Lees Creek and upper reaches of Bylong River catchment areas will not be impacted.

The visual significance of local cliff lines is recognised and detail mine planning in terms of extent and mining detail design will ensure that these geological formations are protected from rock cracking and falls.

Mitigation and Management Measures

There are numerous mitigation measures incorporated in the design and operating plans for the Project that will reduce the visual effect and mitigate the visual impact of the Project on sensitive viewing locations. The key measure being the mine planning and design that ensures that the mine and OEAs are contained behind and below the western ridgeline.

Proposed mitigation and management measures include:

- Design elements
  - The siting of the MIA between existing topographic features to achieve screening from many sensitive external view locations, especially the main valley along the Growee River;
  - Timely construction and implementation of progressive OEA rehabilitation during mining operations to reduce visual effect levels;
  - Seeking to limit pre-rehabilitated OEA areas to less than 2.5% of potential primary view zones of sensitive receptors for as short a time as possible, limiting times that high visual effects are experienced;
  - Limit maximum height of North-Western OEA to maximum height of 348m to ensure it remains below height of adjacent ridgeline;
  - Design the form of OEAs to achieve a more natural fit with surrounding hills and avoid extensive 'flat top' development within the landscape;
  - Designing drainage structures to fit in with more natural landforms; and
  - Retention of iconic high points, including cliff lines in local landscape setting.
- Onsite mitigation
  - Inclusion of the visual landscape objectives in the Rehabilitation Strategy (SLR, 2015) prepared for the Project; the objective will be to emulate existing forest, woodland and grassland landscape patterns in the existing landscape for mine area rehabilitation, infrastructure areas and roadways;
  - Supplement the existing driveway and other plantings for the WAF;
  - Use existing vegetation to screen/integrate the WAF structures; and
  - Infrastructure constructed in forest tones (i.e. green, grey, cream) to blend with the surrounding natural environment as far as practical.
  - Further landscape integration is to be achieved through the implementation of tree planting around infrastructure areas and adjacent to roadways.
- Offsite mitigation
  - Development and implementation of a Rehabilitation Management Plan outlining specific screening strategies to be employed for the Bylong Valley Way in areas that are visually exposed to views of the Project including the WAF;
  - Development and implementation of location specific screening strategies to be employed for the high sensitivity viewer locations within Equine CIC being impacted by pre-rehabilitation open cut mine works, infrastructure or other Project elements including Private freehold residences and 'Tinka Tong' residence and any part of the property carrying out activities associated with the Equine industry.

- Establishing tree screens along Upper Bylong and Lee Creek Roads as required to integrate infrastructure areas and further reduce diffuse light spillage potential; and

- Development and implementation of a Rehabilitation Management Plan for any other area identified as being significantly impacted by pre-rehabilitation open cut mine works, infrastructure or other Project elements.

Ongoing stakeholder consultation will identify any issues that arise in relation to visual impacts on surrounding sensitive viewing locations. These would be addressed through consultation with the relevant parties. If deemed necessary, additional measures may also be established to achieve greater mitigation at specific sensitive viewing locations. Such measures would include offsite visual treatments, such as establishing tree screens and / or plantings at the viewer's location to reduce visibility.

1. INTRODUCTION

1.1 Background

In December 2010, KEPCO Bylong Australia Pty Ltd (KEPCO) acquired Authorisations A287 and A342. Since this time, extensive exploration and mine planning work has been undertaken to determine the most socially responsible and economically viable mine plan to recover the known coal resources within the two Authorisations.

In August 2014 KEPCO commissioned WorleyParsons Services Pty Ltd (WorleyParsons) to manage the Project exploration activities, mine feasibility study planning, environmental approvals and ongoing environmental monitoring for the Bylong Coal Project (the Project).

The Project is located wholly within A287 and A342, which are located within the Mid-Western Regional Council (MWRC) Local Government Area (LGA). The closest regional centre is Mudgee, located approximately 55 km south-west of the Project Boundary. The Project is approximately 230 km by rail from the Port of Newcastle. **Figure 1.1** illustrates the locality of the Project within New South Wales (NSW). **Figure 1.2** shows the regional locality of the Project in relation to the neighbouring town centres, mining authorities, major transport routes and reserves.

KEPCO is seeking State Significant Development Consent under Division 4.1 of Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the development and operation of the Project. The State Significant Development Application will be supported by an Environmental Impact Statement (EIS), which is being prepared by Hansen Bailey.

JVP Visual Planning and Design was commissioned by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of WorleyParsons to prepare a visual impact assessment for the Project.

1.2 Project Description

The Project life is anticipated to be approximately 25 years, comprising a two year construction period and a 23 year operational period, with underground mining operations commencing in Year 7. Various rehabilitation and decommissioning activities will be undertaken during both the course of, and following the 25 years of the Project. It is noted that further mineable coal resources exist within both A287 and A342.

The Project is to be developed on land within the Study Area as illustrated on **Figure 1.2.** The Project Boundary is located within the eastern and southern parts of the Study Area. Key features of the Project are conceptually shown and described in Section 4, on Figure 4.1 and include:

- The initial development of two open cut mining areas with associated haul roads and Overburden Emplacement Areas (OEAs), utilising a mining fleet of excavators and trucks and supporting ancillary equipment;
- The two open cut mining areas will be developed and operated 24 hours a day, 7 days a week over an approximate 10 year period and will ultimately provide for the storage of coal processing reject materials from the longer term underground mining activities;
- Construction and operation of administration, workshop, bathhouse, explosives magazine and other open cut mining related facilities;

Figure 1.1 | *Location Plan*

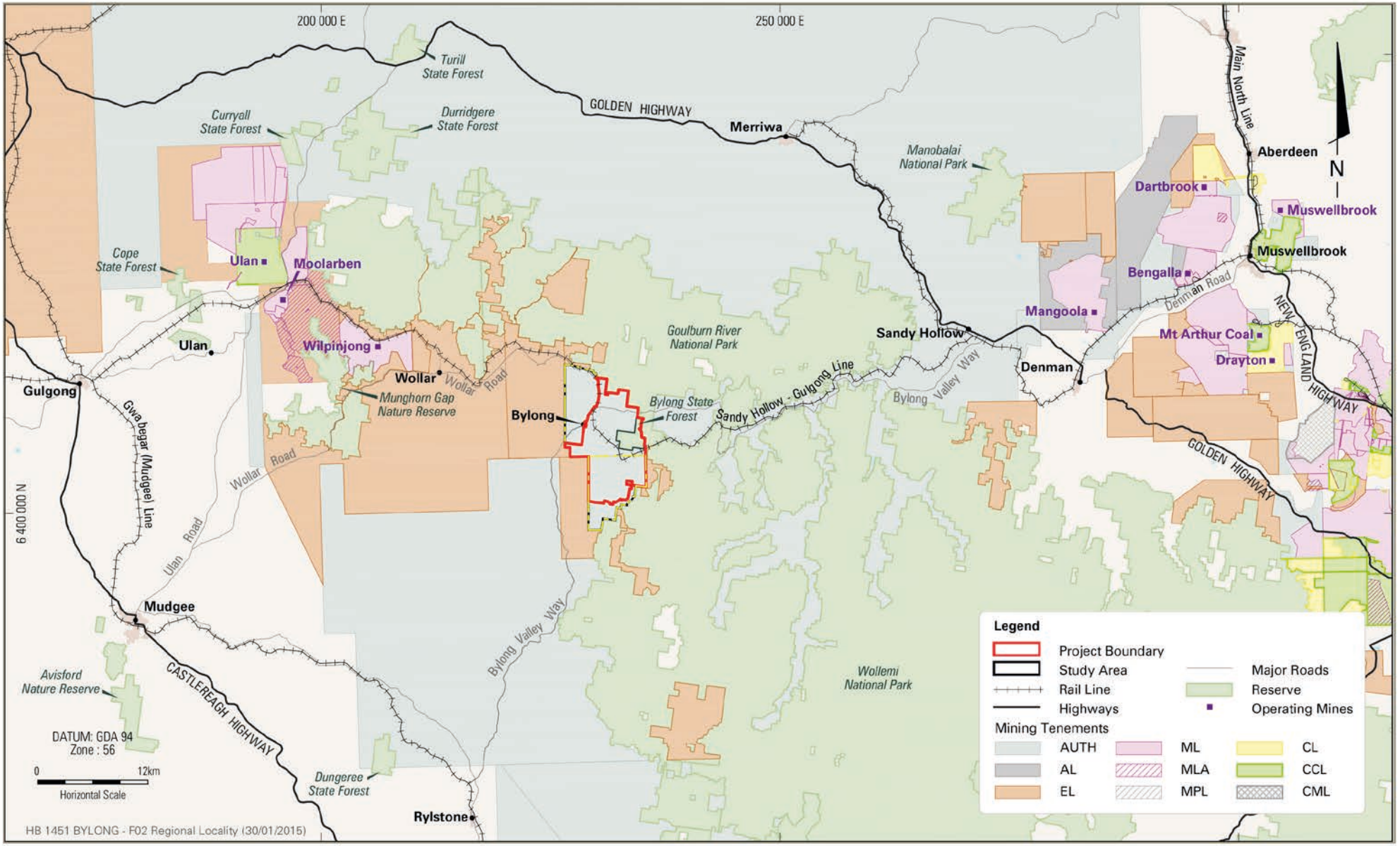


Figure 1.2 | *Regional Context*

- Construction and operation of an underground coal mine operating 24 hours a day, 7 days a week for a 20 year period, commencing mining in around year 7 of the Project;
- A combined maximum extraction rate of up to 6.5 Million tonnes per annum (Mtpa) Run of Mine (ROM) coal;
- A workforce of up to approximately 800 during the initial construction phase and a peak of 470 full-time equivalent operations employees at full production;
- Underground mining operations utilising longwall mining techniques with primary access provided via drifts constructed adjacent to the rail loop and Coal Handling and Preparation Plant (CHPP);
- The construction and operation of facilities to support underground mining operations including personnel and materials access to the underground mining area, ventilation shafts, workshop, offices and employee amenities, fuel and gas management facilities;
- Construction and operation of a CHPP with a designed throughput of approximately 6 Mtpa of ROM coal, with capacity for peak fluctuations beyond this;
- The dewatering of fine reject materials through belt press filters within the CHPP and the co-disposal of dewatered fine and coarse reject materials within OEAs and final open cut voids (avoiding the need for a fine rejects dam);
- Construction and operation of a rail loop and associated rail load out facility and connection to the Sandy Hollow to Gulgong Railway Line to facilitate the transport of product coal;
- The construction and operation of surface and groundwater management and water reticulation infrastructure including diversion drains, dams (clean, dirty and raw water), pipelines and pumping stations;
- The installation of communications and electricity reticulation infrastructure;
- Construction and operation of a Accommodation Facility and associated access road from the Bylong Valley Way;
- The upgrade of Upper Bylong Road and the construction and operation of a Mine Access Road to provide access to the site facilities;
- Relocation of sections of some existing public roads to enable alternate access routes for private landholders surrounding the Project; and
- Infilling of mining voids, progressive rehabilitation of disturbed areas, decommissioning of Project infrastructure and rehabilitation of the land progressively following mining operations.

Figure 4.1 illustrates the Conceptual Project Layout. The Project description as it relates to the visual impact assessment is discussed in further detail in **Section 4**.

1.3 Relevant Legislation

1.3.1 Strategic Regional Land Use Policy

The Department of Planning & Environment (DP&E) released the Strategic Regional Land Use Plan (SRLUP) for the Upper Hunter Valley region in September 2012. The SRLUP represents a component of the NSW Government's broader policy developed to address land use conflicts in areas such as the Upper Hunter Valley region, with a particular focus on managing coal and coal seam gas issues.

The SRLUP defines areas of Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CIC). In accordance with the Policy, coal mining and coal seam gas projects that are located in areas of defined BSAL or CIC must consider the potential for impacts in accordance with the prescribed '*Gateway Criteria*' listed within the SRLUP. The Gateway process (effective from 4 October 2013) adds an additional level of scrutiny to new State significant mining and CSG proposals on BSAL and the Upper Hunter equine and viticulture CICs.

Under the SRLUP released in September 2012, areas of CIC (Equine) were identified within areas of the Project Boundary (SRLUP CIC (Equine) mapping). The SRLUP CIC (Equine) mapping within the Project Boundary was based on high level criteria of 5 km from Bylong Valley Way in areas where land slope was less than 18°.

In light of the high level mapping completed for the SRLUP, the NSW Government completed further validation for areas of CIC and released revised mapping within the Upper Hunter Region on 3 October 2013 for stakeholder review and comment (Revised draft CIC (Equine) mapping). The Revised Draft CIC (Equine) mapping refined areas within the Project Boundary to three horse enterprises to the south of Bylong Valley Way.

Since the Project Boundary contains areas of CIC (Equine) as mapped under the SRLUP CIC (Equine) and the most recent Revised Draft CIC (Equine) mapping, the Project was subject to the Gateway Process.

A Gateway Application was made to assess the suitability of the Project for Development Consent. This included the consideration of potential loss of scenic and landscape values from the area. The Mining and Petroleum Gateway Panel granted a Conditional Gateway Certificate for the Project in April 2014.

The conditional Gateway requires the following: '*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*.'

In accordance with the *Guideline for Gateway Applicants (September 2013), for* State significant mining and coal seam gas proposals on CIC land, the supporting document must address the criteria listed in the Mining SEPP as detailed in **Table 1.1**.

Table 1.1
Mining SEPP Critical Industry Cluster Criteria

Specific Issues/ Requirement	Where addressed
Clause 17H (4) The relevant criteria are as follows: (b) in relation to critical industry cluster land – that the proposed development will not have a significant impact on the relevant critical industry based on a consideration of the following:	
• any impacts on the land through surface area disturbance and subsidence	Agricultural Impact Statement
• reduced access to, or impacts on, water resources and agricultural resources	EIS Agricultural Impact Statement and EIS Surface Water and Groundwater Impact Assessments
• reduced access to support services and infrastructure	EIS Social Impact Assessment
• reduced access to transport routes	EIS Traffic and Transport Impact Assessment
• the loss of scenic and landscape values	Section 7.5

The potential for visual impacts to the Equine CIC land within and surrounding the Project Boundary is provided in **Section 7** of this report.

1.4 Visual Impact Assessment Objectives and Purpose

This report provides an assessment of the potential visual impacts of the Project on the existing landscape and visual values of the surrounding areas, specifically in relation to impacts on the scenic and landscape values within the areas of CIC (equine) as mapped within the Project Boundary. This report identifies the visual character of the existing landscape of the CIC (Equine), and the broader visual landscape as well as that proposed for the Project.

The visual impacts of the Project, including both short-term and long-term impacts, have been assessed with methodologies developed in accordance with best practice as guided by *Guideline for Landscape and Visual Impact Assessment (1999)*. Such methodologies are not provided in any formal regulatory guideline but for the purposes of this Report, include:

- An assessment of the existing visual settings created by various landscapes in and around the Project;
- Establishing the visual character and visual effect created by the Project;
- A consideration of the visibility of the Project from sensitive receptors;
- The likely visual impacts created by the Project giving regard to visual effect and sensitivity;
- The development of available preliminary mitigation strategies to ameliorate adverse visual impacts; and
- Consideration of cumulative visual impacts in the locality and includes a consideration of night light effects.

1.5 Secretary's Environmental Assessment Requirements

This Visual Impact Assessment has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs – 11 November 2014) for the Project. **Table 1.2** provides a summary of the requirements under the SEARs that are relevant to this assessment and indicates where specific issues have been addressed in this document.

Table 1.2

Summary of Secretary's Environmental Assessment Requirements

Specific Issues/ Requirement	Where addressed in this document
Secretary's Requirements - Department of Planning and Environment	
Existing Environment	
An assessment of the likely impacts of the development on the environment, focussing on the specific issues identified below, including a description of the existing environment likely to be affected by the development, using sufficient baseline data.	Section 3
Visual	
Changing landforms on the site (overburden dumps, bunds etc.) during the various stages of the Project.	Section 4
Assessment of the likely visual impacts of the development on private landowners in the vicinity of the development and key vantage points in the public domain, paying particular attention to the creation of new landforms (overburden dumps, bunds, etc.), and minimising the lighting impacts of the development;	Section 5, 6 & 7
Impact Assessment	
Description of the measures that would be implemented to mitigate and/or offset the likely impacts of the development, and an assessment of: • whether these measures are consistent with industry best practice, and represent the full range of reasonable and feasible mitigation measures that could be implemented; • the likely effectiveness of these measures; and • whether contingency plans would be necessary to manage any residual risks.	Section 8

2. ASSESSMENT METHODOLOGY

2.1 Introduction

The methodology to determine the level of visual impact of the Project on the scenic and landscape values of locality and region involves four stages as follows:

1. The identification and evaluation of the existing visual environment. This stage includes a review of existing landscape settings and how they are seen from various viewing locations. In this way, the visual character of the landscape (as well as visual sensitivity of the various viewing locations) can be determined.

2. The identification and evaluation of the visual effect and visual sensitivity of the Project on the existing visual environment. Visual effect and visual sensitivity is assessed by considering the visual characteristics of the Project in the context of the landscape within which it is seen.

3. A combined consideration and analysis of both the visual sensitivity of the visual environment and visual effect of the Project on that visual environment. The overall method of visual assessment of the existing landscape and the Project in the context of the landscape is outlined in **Figure 2.1**.

4. A consideration of the impact on landscape values based on the total perception of landscape, including sight, smell, sound, touch, as well as knowledge and personal perceptions based on a wide range of input factors. In this step, evaluation of these components includes a consideration of the landscape of the locality and its context in the region and how the relationship of the landscapes and the Project may be perceived in the broader context of perceptions of the Bylong region.

5. An overview of mitigation strategies and the objectives of reduced visual effects, sensitivity and visual impacts.

6. A description of how the study method is implemented which includes evaluation of plans and reports, field assessment, photomontage and cross section analysis. The assessment is then completed using a joint consideration of all the analysis techniques summarised to outline view sheds, sensitive receptors, visual sensitivity and visual effect.

2.1.1 Evaluation of the Existing Visual Environment

The evaluation of the existing visual environment consists of the assessment of both the existing landscape setting and viewing locations within it that may be impacted by the Project.

2.1.2 Landscape Setting

The landscape setting of the Project is defined in terms of topography, vegetation, hydrology and land use features. These elements define the existing visual character of the landscape that the Project is located within and that it visually interacts with. Within any landscape there are areas of similar visual features that are defined as a Landscape Character Unit (LCU). Characterising the landscape in terms of these units assists in understanding the visual character of the landscape as a whole. The LCUs are defined within the Primary Visual Catchment (PVC), which is the area from which there may be potential views of Project elements.

The scenic amenity of the various LCUs is defined as '*distinctive*', '*common*', '*minimal*', or '*disturbed*'.

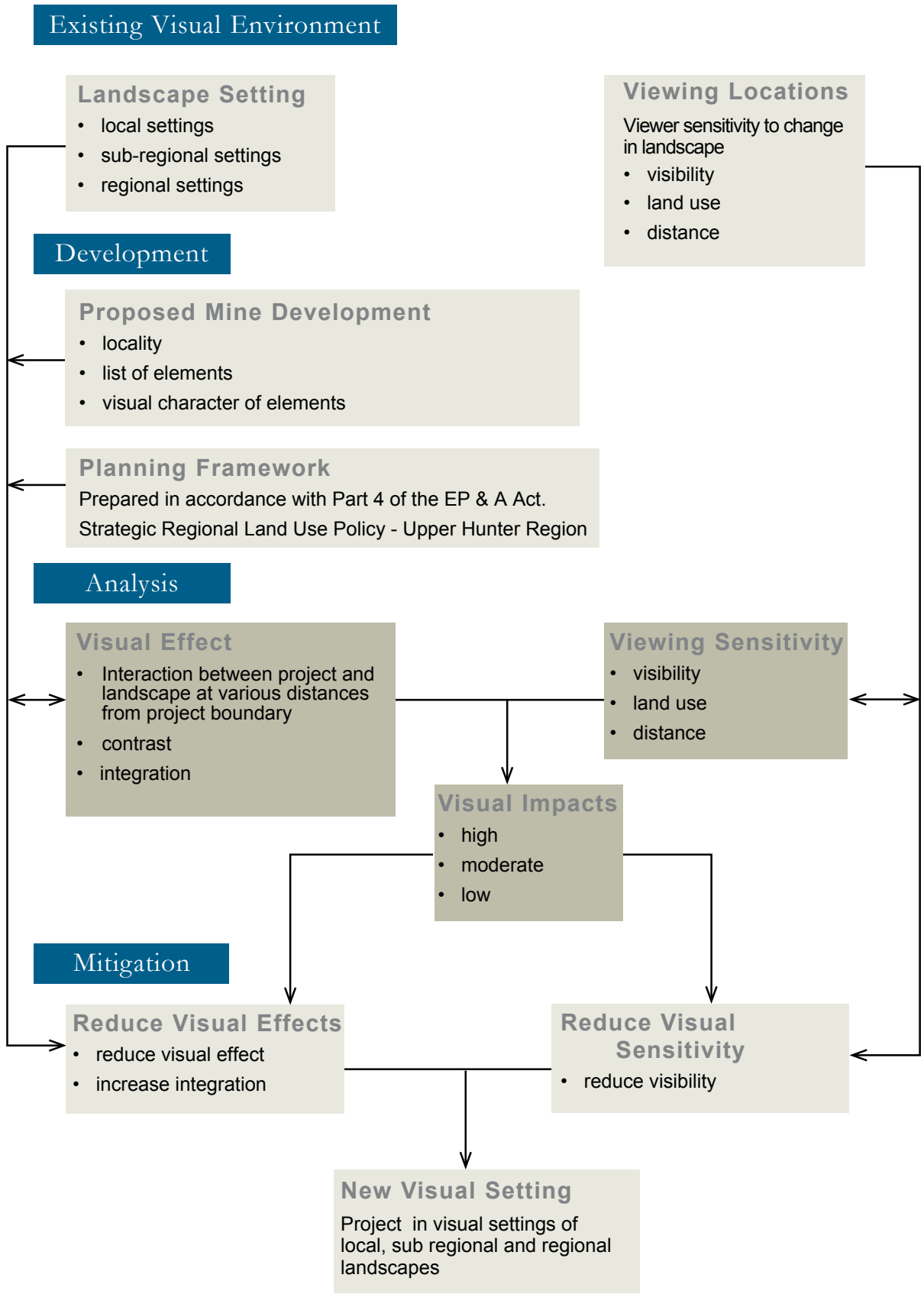


Figure 2.1 | *Visual Assessment Methodology*

Distinctive LCUs are of regional significance and have unique scenic amenity values in terms of topography, vegetation, geology, hydrology and /or various cultural or heritage features. In addition, these areas would have a high visual integrity with no detracting features. These landscapes will also have unique form, shape, line and / or colour, geological, vegetation or hydrological features.

Common LCUs are areas that have visual integrity but are not uncommon or unique. These landscapes will have visually pleasing patterns, shapes, lines and / or colours (e.g. rural areas).

Minimal LCUs can have a high integrity but often lack visual interest. These landscapes will be common but will also lack visual variety of form, shape, line or colour (e.g. open grassland with scattered trees).

Disturbed landscapes lack visual integrity with intrinsic values of form, shape, line colour and texture significantly compromised (e.g. active (un-rehabilitated) OEAs, industrial infrastructure and open cut mining areas). Disturbed landscapes are those that have been modified and would require some form of management to reinstate scenic amenity and restore integrity to surrounding landscapes (e.g. OEAs).

The scenic amenity of each LCU relevant to the Project is outlined in **Section 3.0**.

2.1.3 Viewing Locations

The viewing locations are those areas where people are likely to obtain a view of the Project. These viewing locations have different significance based on numerous factors, collectively evaluated through land use, landscape characteristics and viewing distance to the Project. Viewing locations could include residences, roads, commercial and recreational areas as well as urban and rural areas.

2.2 Consideration of Visual Effect and Sensitivity

The analysis of the interaction between the existing visual environment and the Project provides the basis for determining impacts and developing mitigation strategies. The impact levels of the Project are determined by the defined visual effects of the Project in the landscape and visual sensitivity at specific viewing locations.

The Project is evaluated to define the visual elements that are most significant from a visual perspective in the context of the existing environment. The key Project elements from a visual context are defined as being '*major*' or '*minor*' and are considered in terms of how they contrast with the main elements of the existing visual environment.

2.2.1 Visual Effect

Visual effect is a measure of the level of visual contrast and integration of the Project with the existing landscape. The degree of this contrast with the existing landscape will determine the level of visual effect. A new mining development will have a higher visual effect due to strong contrast with the existing visual environment. Extensions to the operations of an existing mine will have a lesser visual effect due to elements of the development being present in the landscape. The successful completion of rehabilitation would be likely to have a low visual effect due to limited contrast with the existing landscape.

In a similar way, a development is considered to be integrated with the existing landscape based on issues of scale, position in the landscape and contrast with the surrounding environment. High visual integration is achieved if a development is dominated by the existing landscape, is of small scale and or of limited contrast.

The magnitude of the visual effect for a development, outlined in **Table 2.1** is determined by a balanced analysis of the following factors.

Contrast and Integration

The level of contrast and integration of the Project with its surrounding landscape determines visual effect. Project elements as expressed through the visual expression elements (i.e. form, shape, pattern, line and colour with minor consideration in relation to texture) contrast to varying degrees with the surrounding landscape and will also create some level of integration with it.

The Proportion of a View that includes Project Areas

For any given level of contrast and integration, a lower proportion of the view that is occupied by the Project elements will result in a lower level of visual effect. This is determined by defining the proportion of the total field of view that is occupied by the Project. This is most appropriately determined by defining what percentage of the Primary View Zone (PVZ) it occupies (refer **Figure 2.2**). The PVZ is the area that is occupied by an arc created by sight lines from the eye radiating out vertically and horizontally at angles of 30 degrees around a centre view line from a nominated viewing location.

The PVZ is the most critical and central part of a view. It is not representative of the total view, but is the most important part.

Measuring the percentage of the PVZ occupied by a development will provide a more conservative measure than the consideration of the development in the context of the whole view zone, which would include both primary and secondary view areas (representing a total view arc of 1200 instead of the PVZ view arc of 600).

Generally, a high visual effect will result if a visible element of the Project in the PVZ has a high visual contrast and low integration to the surrounding landscape.

A low or very low visual effect will occur if there is minimal contrast between the visible area of the Project in the PVZ and the existing landscape setting and or the area occupied by the Project represent only small parts of a total view.

2.2.2 Visual Sensitivity

Visual sensitivity is a measure of how critically a change to the existing landscape is viewed by people from different land use areas in the vicinity of a development.

In this regard, residential, tourist and / or recreation areas generally have a higher visual sensitivity than other land use areas including industrial, agricultural or transport corridors. This is because land uses with a higher visual sensitivity, such as residential, use the scenic amenity values of the surrounding landscape and may be used as part of a leisure experience and often over extended viewing periods (such as the Bylong Valley Way which is part of a regional tourist drive). **Table 2.2** indicates the levels of visual sensitivity associated with land uses relevant to the Project.

Table 2.1
Visual Effect Levels

Visual Properties			Visual Effect		
Contrast Levels with elements in primary view zone	Visual Integration with elements in primary view zone		High Visual Effect	Moderate Visual Effect	Low Visual Effect
High Project elements do not borrow, form, shape, line, color or texture or scale from existing features of the visual setting and contrast levels are high with existing landscape	Low The Project lacks integration with visual setting because of scale totally dominating the ability of site or surrounding features, vegetation and or topographic features to integrate the development	CATEGORY 1	Visible element occupies more than 2.5% of the primary view shed	Visible element occupies between 1 - 2.5% of the primary view shed	Visible element occupies less than 1% of the primary view shed
Moderate Project elements borrow from some features of the visual setting in terms of form, shape, line pattern and or color and scale, reducing visual contrast with existing setting	Moderate The Project has some degree of visual integration with setting from other features, vegetation and / or topography achieving some level of integration	CATEGORY 2	Visible element occupies more than 20% of the primary view shed, generally when in a foreground location	Visible element occupies between 20-10% of the primary view shed	Visible element occupies less than 10% of the primary view shed
Low Project elements borrow extensively from features in visual setting in terms of form, shape, line, pattern color and scale minimizing contrast with the existing setting	High Visual integration is high due to other features, vegetation and or topography achieving dominance and screening or filtering	CATEGORY 3	Visible element occupies more than 40% of the primary view shed	Visible element occupies 40-30% of the primary view shed	Visible element occupies less than 30% of the primary view shed

Table 2.2
Visual Sensitivity

Land Use	Visual Sensitivity Levels			
	Nearest visible mine area less than 2.5km away	Nearest visible mine area between 2.5km - 7.5km away	Nearest visible mine area between 7.5 km-12.5km away	Nearest visible area more than 12.5km away
Urban and rural houses	High Sensitivity	High/Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
Thouroughbred horse studs	High sensitivity	High/Moderate Sensitivity	Moderate Sensitivity	Low Sensitivity
Designated picnic areas, lookouts and walking trails in recreation reserves, e.g. Gouldburn River National Park, Wollemi National Park, Lee Pinch Lookout, Bylong State Forest	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Designated tourist roads e.g. Bylong Valley Way	High Sensitivity	Moderate Sensitivity	Low Sensitivity	Low Sensitivity
Railway- Sandy Hollow to Gulgong Railway	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Other main roads e.g. Quirindi Premer Carroll Breeza Road, Wollar Road	Moderate Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Minor local roads in rural zone e.g. Upper Bylong Road, Lee Creek Road	Moderate/Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity
Broad acre rural lands	Low Sensitivity	Low Sensitivity	Low Sensitivity	Low Sensitivity

Table 2.3
Visual Impact

Visual Effect	Visual Sensitivity		
	High	Moderate	Low
High	High visual Impact	High/Moderate Visual Impact	Moderate/Low Visual Impact
Moderate	High /Moderate Visual Impact	Moderate Visual Impact	Moderate/Low Visual Impact
Low	Moderate/Low visual Impact	Moderate/Low Visual Impact	Low Visual Impact

Visual Impact is dependant on the interaction between visual effect and sensitivity.

Distance from Project Site	Area of Primary View Zone
1 km	0.60 km²
2 km	2.4 km²
3 km	5.43 km²
4 km	9.66 km²
5 km	15.09 km²
6 km	21.73 km²
7 km	29.57 km²
8 km	38.62 km²
9 km	48.88 km²
10 km	60.35 km²
11 km	73.02 km²
12 km	86.9 km²
13 km	101.99 km²
14 km	118.29 km²

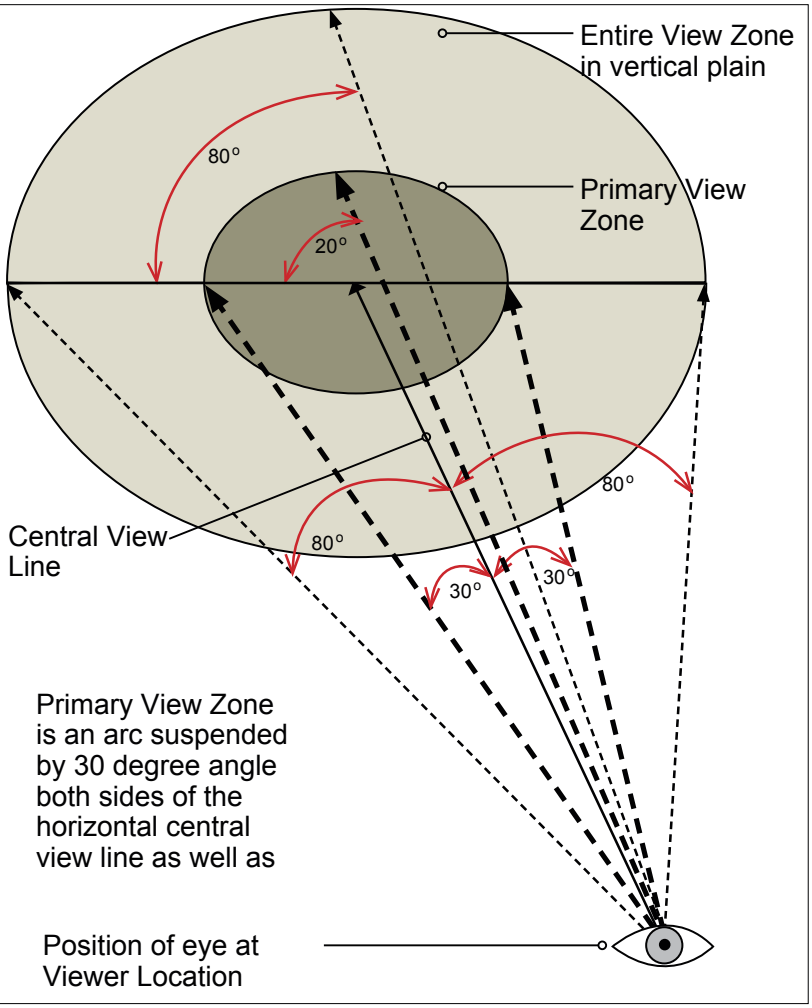


Figure 2.2 | ***Area of Primary View Zone at various distances from a Project***

However, the visual sensitivity of individual viewing locations may range from high to low, depending on the following additional factors:

- Screening effects of any intervening topography, buildings or vegetation. Viewing locations with well screened views of the Project will have a lower visual sensitivity than those with more open views;
- Viewing distance from the viewing location to visible areas of the Project. The longer the viewing distances, the lower the visual sensitivity; and
- General orientation of residences to landscape areas affected by the Project. Viewing locations with strong visual orientation towards the Project (i.e. those residences with areas such as living rooms and/or verandas orientated towards it) will have a higher visual sensitivity than those not orientated towards the Project, and which do not make use of the views toward the Project (e.g. some residences in Bylong Village).

For any area to be given a sensitivity rank, it must have views to the Project. This visibility was determined based on field assessment, evaluation and computer analysis of topographic and vegetation data.

2.3 Visual Impact

The visual impact of the Project has been determined by considering both visual effect and visual sensitivity. The way in which the parameters of visual sensitivity and visual effect are utilised to determine visual impacts is illustrated in **Table 2.3**.

2.4 Mitigation

Visual and landscape impact mitigation strategies are typically recommended for both within the Project Boundary (on site) and outside of the Project Boundary (off site) as required. This ensures that either visual effects and or visibility/visual sensitivity factors are decreased in appropriate time frames to achieve mitigation of impacts. General strategies to reduce visual impacts that may be recommended are outlined below.

2.4.1 Reduce Visual Effects

Rehabilitation of disturbed areas associated with the Project will decrease the visual contrast created by mining operations to the existing landscape. Rehabilitation strategies that emulate patterns, shapes, line and colour of the existing landscape can reduce the contrast between the Project and the existing landscape, reducing visual effect.

2.4.2 Reduce Visual Sensitivity

Reducing visual sensitivity is achieved by carrying out treatments to minimise the visibility to the Project. Due to the scale of open cut coal mine components (such as the OEAs) screening, if required, would best be completed at or close to the point of viewing. Such screening treatments can also be used to redirect views to areas not affected by mining activities as well as generally enhancing the landscape at the viewing point.

2.4.3 Reduce Visual Impacts

Reducing visual impacts is also achieved by the mine plan design and siting that maximises screening of Project elements by utilising existing topographic features. Maintaining significant high points and topographic and vegetation features also contributes to a reduction of visual impact.

2.4.4 Post-mining Visual Setting

On completion of mining operations and following rehabilitation, a post-mining local landscape will be created. This landscape would reflect post-mining landforms and land use.

2.5 Implementation of Study Method

The methodology set out above was implemented through a combination of different evaluation processes and analyses. These are outlined below and included:

- Evaluation of Project mine plans, maps, aerial photography and reports;
- Field assessment;
- Photomontage development; and
- Computer analysis.

2.5.1 Evaluation of Plans and Reports

Evaluation of the various components of the Project was based on the Project Description and associated mine planning figures provided by Hansen Bailey (refer **Section 1.2**). The Project has been refined and optimised in consideration of a number of environmental, economic and initial stakeholder constraints, with the preferred mine plan assessed as part of this report.

Topographic mapping and aerial photography provided the basis for the establishment of landscape and visual character. A field assessment undertaken in areas within and surrounding the Project Boundary assisted in establishing LCUs for the Project and considering the visual impacts on areas of Equine CIC within the PVZ.

Aerial photography, along with computer analysis also assisted in evaluating the visibility, sensitive receptor locations and extent of views to the Project.

Project plans, (such as the conceptual mine plans), rehabilitation and final landform maps were also used to assist in defining visual effects and where they will occur through the life of the Project.

2.5.2 Field Assessment

The field assessment involved visitation to locations within the PVC including Bylong Valley Way, Upper Bylong Road, Wooleys Road, Lee Creek Road and Wollar Road.

Views toward the Project Boundary were also evaluated from other selected viewing locations in the PVC.

Such an assessment was made to give an indication of likely visibility conditions of the Project from each area (e.g. foreground screening, vegetation, open views, etc.), the experience of different LCUs, and how these are seen together, to consider cumulative effects.

2.5.3 Photomontage Analysis

Photomontages are images that bring a computer model of the terrain and the Project together with a photograph of the existing landscape to illustrate what the Project may look like from a given location at various points in time. Photomontages for five locations were developed to illustrate likely visual effects as seen from various locations around the Project Boundary (refer **Section 6**).

Photographs of the Project were taken at standing eye level from the two viewing locations. The precise location of each of these photograph positions was recorded by a registered surveyor using a GPS. The photography provides a realistic representation of the site landscape and how it is seen from each viewing location in response to light and atmospheric conditions.

Three dimensional computer models of the Project at representative stages of the mine's progression were created from digital surface topography and project mine plans. The models enabled accurate views of the Project to be generated from any specified viewing location and account for screening of views by natural topography. The photographs of the Project and its landscape setting were overlain on the model view from the same viewing location. The locations of future visible components of the Project were determined taking into account any foreground screening from topography or vegetation in the photograph.

Realistic colours and textures were applied to the visible project components taking into account viewing distances to the visible components. The end result is realistic photomontage of the likely future view of the Project from the selected representative viewing locations.

The photomontages were used to assist in determining the level of visual effect of the Project from each of the representative viewing locations (refer **Section 6**).

2.5.4 Cross-Section Analysis

In addition to photomontage development and analysis as discussed above, cross sectional analysis was also completed to determine the potential visual impacts of underground mining on significant cliff lines. This complemented field assessment and map/aerial photography analysis.

Cross-section analysis enabled the landscape to be considered across relevant elevated features to determine whether or not topographic features were able to screen Project components. Also it gave a relative scale to Project components in relation to the landscape.

2.5.5 Combined Analysis

In completing this assessment, a joint consideration of all the analysis techniques summarised above were used to outline view sheds, sensitive receptors, visual sensitivity and visual effect.

3. EXISTING ENVIRONMENT

3.1 Introduction

This section of this report establishes the LCUs of the landscapes relevant to the Project that make up the PVC. The existing visual settings of the Project and its surrounds are created by a range of different landscapes. These vary as a result of topography, vegetation cover and land use types. Based on visual differences created by these landscape elements, six LCUs were identified.

The LCUs were analysed in terms of their visual character within the PVC of the Project. The PVC follows the escarpments that surround the Project Boundary to the south, west and north and falls within the Project Boundary along the eastern and north-eastern edges.

3.2 Regional Context

The Project is located within the MWRC LGA within the western portion of the Hunter River catchment. The village of Bylong is located adjacent to the Project Boundary to the north-west. Denman is approximately 53 km to the east of the Project Boundary, accessible via the Bylong Valley Way. The regional centre of Mudgee is located approximately 55 km to the south-west of the Project Boundary.

3.2.1 Topography

The topography of the Project Boundary generally comprises steep rugged ranges, ridge lines, cliff line escarpments and hills which dominate a series of small river valleys and associated floodplains. These ridges and escarpments encircle the Project Boundary and extend into the north-east and east. Tal Tal Mountain forms the maximum elevation point within the Project Boundary, being approximately 655 m Australian Height Datum (AHD). Mount Penny (570 m AHD) is further west of the northern part of the Project Boundary. The western extent of the Project Boundary is bounded by the Growee Ranges.

3.2.2 Rivers

Generally, the valleys within the Project Boundary are interlaced by small meandering creek lines draining north towards the Goulburn River, which is located north of the Project Boundary.

Within the Project Boundary, there are a number of small tributaries that flow into the Bylong River that flows from east to west before flowing north in the vicinity of the village of Bylong (refer **Figure 3.1**). The Growee River drains to the north-east from south-west entering the Bylong River near Bylong Village. Lee Creek flows north south into the Bylong River. Lee Creek, is also a major creek catchment within the Project Boundary. Other minor creeks also flow into the river systems. The creek valleys are narrow, broadening somewhat into wider flood plains along the rivers.

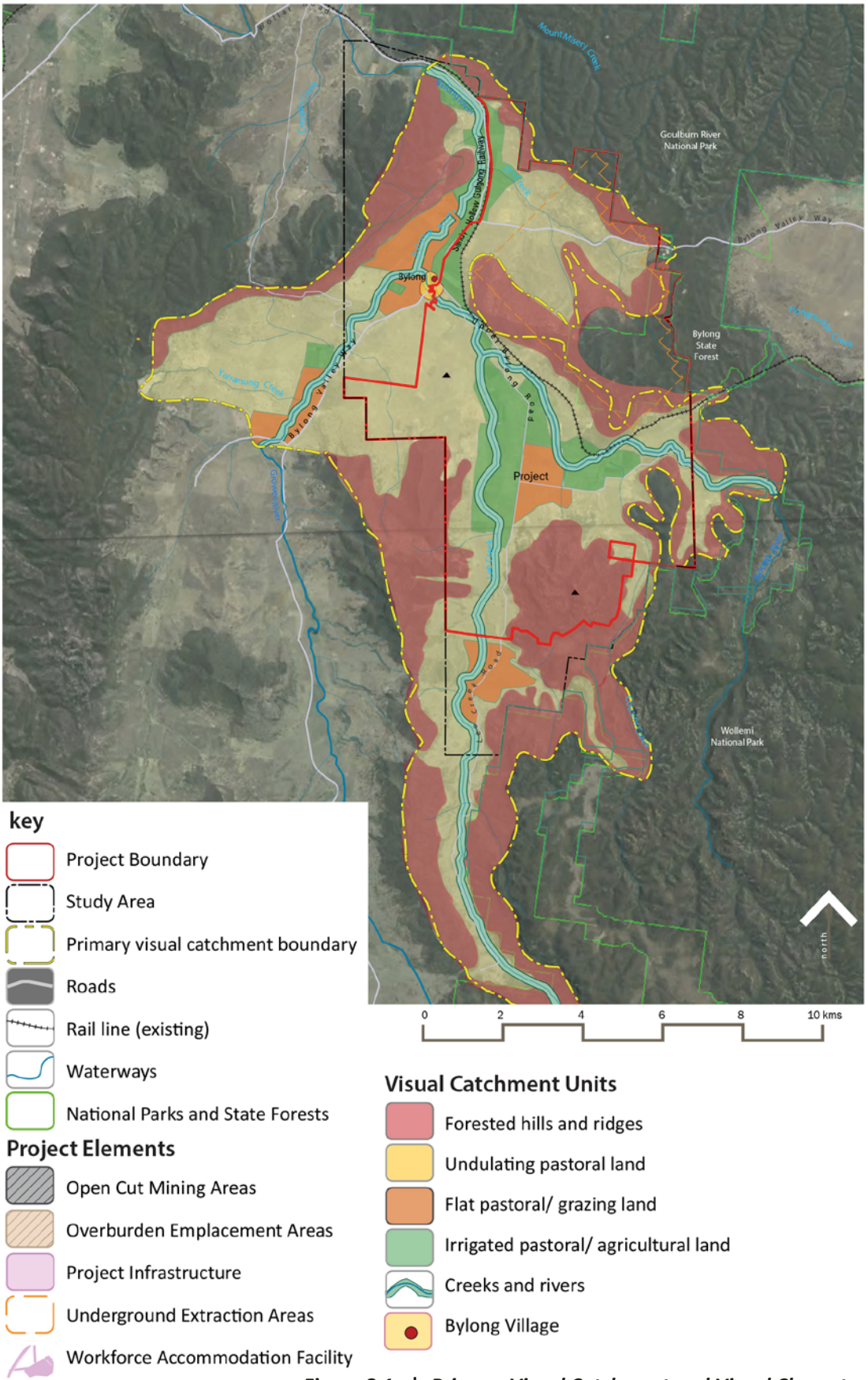


Figure 3.1 | *Primary Visual Catchment and Visual Character Units*

3.2.3 Land Uses

Land use within the Project Boundary ranges from broad acre grazing of cattle, stock horse breeding, training properties, and Natural Sequence Farm (Tarwyn Park) to irrigated cropping lands. Breeding of thoroughbred racehorses has formerly been conducted within the Project Boundary and equine facilities still remain. The visual character of these land uses is representative of a moderately common rural landscape with attractive scenic amenity due to the combination of visually significant topographic features and linear pastoral valleys with minimal settlement or views to other land use activities.

Dense undisturbed vegetation is limited to the steeper slopes, escarpments and ridges within and surrounding the Project Boundary that are generally unsuitable for agriculture and reflect conservation land uses. The balance of forest and woodland vegetation within the valleys has been largely disturbed, with total or partial tree clearing for agricultural and pastoral land uses. Some small pockets of open woodland remain on the more elevated and isolated knolls that rise above the valley floor.

The eastern and northern sections of the Project Boundary are bounded by National Park or State Forest, including Wollemi National Park, Goulburn River National Park and Bylong State Forest.

3.2.4 Towns

Bylong Village is located north-west of the Project Boundary on Bylong Valley Way, near the junction of the Bylong and Growee Rivers.

Other townships in the locality (including Kandos and Rylstone) are greater than 40 km distance and are screened from views of the Project by elevated intervening topography.

3.2.5 Rural Residences

Rural residences are generally well spread out, reflecting the larger land holdings in this region. The residences are generally located low in the valleys and are not often orientated to long distance views. Rather, most residences are surrounded by homestead gardens that to various extents limit some long distant views.

These residences are spread along all major and minor roads in the locality.

3.2.6 Roads, Rail & Industry

Major roads within and surrounding the Project Boundary comprises of Bylong Valley Way, and Wollar Road. Minor roads within the Project Boundary include: Upper Bylong Road; Growee Road; Lee Creek Road; Wooleys Road; Killens Road and Budden Gap Roads.

The Bylong Quarry (located within the north-eastern part of the Project Boundary) is the only mining / industrial site currently located within the Project Boundary.

The Sandy Hollow to Gulgong Railway Line forms a cross country link between the Main North Line and the Gwabegar Line and runs generally east to north through the centre of the Project Boundary and connects with the Main Northern Railway Line at Muswellbrook, where it continues to the Port of Newcastle. Coal trains dominate this rail line; there are no passenger trains that use this line.

3.3 Primary Visual Catchment

The Primary Visual Catchment (PVC) includes the most significant parts of the total visual catchment from which the various elements of the Project could potentially be seen. The PVC does not enclose all potential view points, but a consideration of those located within the PVC will achieve a robust visual assessment of the relevant viewpoints for the Project. The PVC is illustrated in **Figure 3.1**. The rugged and undulating nature of the land around the Project Boundary limits the extent of the PVC.

At a regional scale, the forested hills, ridges and escarpments that surround the PVC also define it. Within the PVC, linear north-south ridge lines and mountains limit most broad east-west views.

Vegetation on flat terrain is limited, with few trees associated with rural settlement and road corridors. More scattered trees occupy the lower slopes of the valleys; open woodland and forest occupy the remaining hillsides, ridges and escarpments within the PVC.

As noted above, the extent of the PVC is dominated by the ridge lines and escarpments. The limited areas of broad flat rectilinear patterned cropping lands that occur near Bylong and within Project Boundary provide visual contrast to this rugged setting.

The PVC also contains the small village of Bylong and a number of rural residential properties.

3.4 The Project Boundary

The land within the Project Boundary is a mix of elevated ridges and alluvial valleys. The valleys have been affected by impacts commonly associated with livestock grazing or cropping operations. This existing disturbance includes tree clearing, pasture improvement, weed invasion, altered natural drainage lines and edge effects. The current vegetation pattern in these valleys is irrigated grazing and agricultural lands within patchy open woodland and grassed slopes. The elevated ridges and hills remain largely undisturbed and retain forest cover.

The Project shares its boundary with the Wollemi National Park to the south-east, and the Goulburn River National Park in the north-east. The western boundary is located along two ridge lines on both sides of the Growee River, crossing the river valley south of Bylong.

3.5 Landscape Character Units (LCU)

The landscape features of the locality (topography, vegetation and land use features) combine in various ways to create areas of relative visual uniformity that can be defined as LCUs. The LCUs combine in various vistas that are obtained from viewing locations such as residences and roadways. A range of the LCUs occur within the PVC.

Figure 3.1 illustrates the extent of the LCUs within the PVC and includes:

- Forested Hills and Ridges LCU;
- Undulating Pastoral Lands LCU;
- Flat Pastoral Lands LCU;
- Irrigated Grazing/Agricultural Lands LCU;
- Creeks and Rivers LCU; and
- Bylong Village LCU.

3.5.1 Forested Hills and Ridges LCU

The extensive areas of forested hills and ridges within the PVC comprise the escarpments and elevated ranges that surround the Project Boundary (refer **Plate 3.1**). These hills and ridges reach elevations above 550 m AHD in several locations and generally form natural topographic boundaries for the PVC. Some contain rocky cliff outcrops that create visual features of some distinction where they occur. They also add significantly to the visual character of the LCU of which they are a part.

Vegetation cover on all these ridges is open woodland and forest. These hills and ridge lines typically surround areas of undulating grasslands at lower elevations on the valley floors that are characterised by scattered trees and open flat lands that are utilised for grazing. There is visual contrast between the undulating grazing grassland and the steeper forested hills as shown on **Plate 3.1**.

Along with the continuation of ridge lines within the Undulating Pastoral Lands LCU, the dominant ridges within this LCU divide it into separate view sheds. This assists in visually separating the Project from the main valley area adjacent to Growee River.

The Forested Hills and Ridges LCU dominates the PVC and creates the major visual features in the rural landscape. It is a distinctive LCU in that it often provides a backdrop to visual elements in the foreground and significant screening of elements in the adjacent valleys, middle distance and distance.

3.5.2 Undulating Pastoral Land LCU

Where the steep terrain of the surrounding forested hills and ridge lines gives way to more undulating topography, the land has been cleared of most trees to develop grassland for cattle and horse grazing. These undulating slopes lie between flat valley floors and the steeper wooded slopes of the ridge lines and hills and cover the majority of areas not occupied by forest and woodland (as illustrated in **Plate 3.2**). The hills that occur around these pastoral lands provide a sense of enclosure to this LCU.

Lands within the Undulating Pastoral Lands LCU are characterised by dry grassland and areas of scattered trees. There is significant contrast with the Forested Hills and Ridges LCU and moderate contrast with surrounding agricultural LCUs, which include flat grazing and irrigated pastoral/ agricultural lands.

The views in this LCU are constrained to the local valleys by the elevated hills and ridge lines. Views to distant vistas across the grazing lands are also limited by undulating topography and intervening tree cover.

The Undulating Pastoral Lands LCU is a common landscape in the area and provides visual variety in the context of other landscape units.

3.5.3 Flat Pastoral Land LCU

The Flat Pastoral Land LCU is characterised by flat land within the creek and river valleys that has been cleared of trees and used for broad paddock grazing (refer to **Plate 3.3**). There is no irrigation or tilling of soils evident within this LCU and land use is generally restricted to cattle and horse grazing.

The flat pastoral lands also support a number of rural residences on various sized holdings. These

residences and other farm buildings, along with surrounding landscapes, create minor visual features in this LCU.

There are longer views available within this LCU created by the ridge and valley topography, with very few trees within paddocks to screen extended views.

Roads and roadside viewing locations are also contained within this LCU. Many of the roads in this LCU contain adjacent tree corridors, which effectively screen foreground views in some locations, as illustrated in **Plate 3.3**. The Bylong Valley Way, which provides the main vehicle access to the Bylong Valley, is promoted as a tourist route by the Muswellbrook Chamber of Commerce & Industry Inc. The east-west section of this road between Wollar Road and Sandy Hollow is also part of the Greater Blue Mountains Drive.

The Flat Pastoral Land LCU is common to rural landscapes. Its significance lies with the many roadways that follow the valley floors. Vistas can be long and uninterrupted along lengths of valleys. Ridges and hills and some roadside vegetation provide screening of lateral views between valleys.

3.5.4 Irrigated Pastoral and Agricultural Land LCU

The Irrigated Pastoral and Agricultural Land LCU closely follows the creek and river alluvial valley floors in a patterned landscape of textured rectilinear fields. Photography illustrates the contrast in colours, patterns and textures on the land depending on the level of irrigation, the crop and the harvesting season as illustrated in **Plate 3.4**.

Vistas in this LCU are linear along the valleys, interrupted only by the more elevated ridges, hills and knolls at varying distances. There are few trees within this LCU as this land is reserved for cropping or irrigated pastoral land uses. The Bylong Valley Way, promoted as a regional tourist road, also passes through this LCU.

The Irrigated Pastoral and Agricultural Lands LCU support a number of rural residences on varied size holdings. These residences and other farm buildings, along with surrounding landscapes, create minor visual features in this rural locality.

The irrigated pastoral and agricultural lands together with the flat grazing lands and undulating pastoral lands create the rural component of the landscape within the PVC. The areas collectively have a pleasing visual character; however it is not an uncommon landscape setting in the regional or local setting.

This LCU adds to the visual diversity of the landscape settings as a whole but does not of itself contain distinctive features.

3.5.5 Creeks and Rivers LCU

The Creeks and Rivers LCU has a narrow linear visual character spreading across the entire PVC along with the numerous minor watercourses, **Plate 3.5**. The presence of creeks and rivers in this topographically varied landscape is usually evident by a thin linear band of trees and shrubs marking the margins of the watercourse.

Within the Project Boundary, there are a number of small tributaries that flow into the Bylong River, Growee River and Lee Creek (refer **Figure 3.1**). Creeks and rivers often create boundaries to visual spaces and can also create visual screening due to vegetated areas on the edges of the LCU. It is a common landscape setting that contributes to the pleasant rural character of the area.

3.5.6 Bylong Village LCU

Bylong is the only village within this PVC and is located adjacent to the Project Boundary near the junction of Bylong Valley Way and Upper Bylong Road. The Sandy Hollow to Gulgong Railway Line lies to the east of the village.

Bylong Village is on level land adjacent to the Bylong River, which passes beneath the Bylong Valley Way to the south-east of the village and flows to the north.

There are several buildings within Bylong Village (refer **Plate 3.6**), including:

- Bylong General Store and fuel pumps;
- Lee Homestead;
- Rest area shelter; and
- Residential properties.

A number of historic heritage items are located within the village including:

- St. Stephen's Anglican Church and cemetery on the western edge of the village;
- Bylong Community Sports Ground Community Hall;
- 'Sunnyside' Homestead;
- The sandstone Lee Family c1848 'Homestation' building; and
- Bylong Station and stables located on the north-eastern outskirts of Bylong Village.

There are low key tourist information facilities located on western side of Bylong Valley Way on the edge of the village.

The LCU contains a small concentration of potentially sensitive residential, commercial and recreational receptors (refer **Section 5**).

3.5.7 Overall Landscape Character of the PVC

The PVC contains a number of LCU that combine to create the overall visual and landscape character of the locality. Overall, the character is created by a range of rural landscapes contained by visually prominent forested ridge lines. Within this broad context there is a great deal of variety created by variations in scale, and varied combinations of LCUs in different views. In some situations, focal points in the landscape are created by special features including rock outcrops high on ridges, patches of forest and woodland vegetation, land use elements such as Bylong Village, rural homesteads and other rural land improvements.

All these interacting landscape elements and changes to them over time create a rural landscape that has retained high visual integrity as experienced from the large majority of viewing locations within the valley and moving between them. For the greater part the various components of the rural landscapes are considered to have common scenic amenity, with some distinctive landscapes created by features such as rocky outcrops or cultural elements such as the St. Stephen's Anglican Church.

The significance of the landscapes also lies in its visual integrity and the part it plays in the regional experience of the landscapes of Bylong Valley as part of the trip from Denman in the north to Rylstone in the south.

Plate 3.1 | *Forested hills and ridges LCU*

This LCU includes moderate to rugged slopes, ridge lines and escarpments that form a boundary of the PVC in some places. Such ridge lines also limit views from east to west across the PVC.

Plate 3.2 | *Undulating pastoral land LCU*

Plate 3.3 | *Flat pastoral land LCU*

Low flat open grasslands with a few isolated trees generally characterise this LCU. Distant views are possible but the road side trees may screen lower features within the landscape beyond.

Plate 3.4 | *Irrigated pastoral / agricultural land LCU*

This LCU creates open long distant views and small scale rectilinear patterns of visual contrast due to the deep greens of irrigated paddocks. The extent of this LCU is generally defined by the Forested Hills and Ridge lines LCU.

Plate 3.5 | *Creeks and rivers LCU*

This LCU includes the watercourses that interlace the PVC in meandering tree lined drainage channels. Visually, the lines of trees mark the presence of creeks and rivers throughout the PVC.

Plate 3.6 | *Bylong village LCU*

Towns and villages create focal points in the broader landscape as well as creating localised visual environments. This LCU contains built elements contributing to the foreground of a view.

4. THE PROJECT

This section evaluates the various elements of the Project and considers the potential visual effects in terms of how these elements contrast with the existing landscapes. Each of the Project elements will have varied visual effects on the surrounding landscapes (**Table 2.1**) based on their location, visual character, scale and their interaction with the adjoining landscape units and their visibility, especially to sensitive viewing areas.

4.1 Project Elements

From a visual perspective, the Project elements outlined in **Section 1.2** of this report can be divided into major and minor elements. Major elements have the potential for significant visual effect in relation to external views. Minor elements, although not necessarily insignificant in horizontal scale, have a less significant visual effect due to lack of vertical scale and potential for visual projection beyond their immediate boundaries.

Major Project development elements, refer **Figure 4.1**, include:

- Two open cut mining areas (Eastern and Western Open Cut Mining Areas);
- Two in-pit and two out-of-pit OEAs (Western and Eastern OEAs and North-Western and South-Western OEAs respectively);
- CHPP and associated infrastructure; and
- The Workforce Accommodation Facility (WAF) facility and associated access road from the Bylong Valley Way.

Minor Project development elements include:

- Surface and groundwater management and reticulation infrastructure;
- Surface mine site facilities within the Mine Infrastructure Areas (MIA);
- Mine Access Road;
- Realignment of existing public access roads;
- Decommissioning of existing roads;
- Communications and electricity reticulation infrastructure; and
- Rail loop, associated rail loading facility and connection to the Sandy Hollow-Gulgong Railway Line.

The location of these Project elements is illustrated in **Figure 4.1**, with the physical and visual character of each and their construction and / or operational requirements discussed below. **Figures 4.2** to **4.6** illustrates the progression of open cut mining within the Eastern Open Cut Mining Area (Eastern Open Cut) and Western Open Cut Mining Area (Western Open Cut). **Figure 4.7** illustrates the progression of underground mining operations within the Underground Extraction Area. **Figure 4.8** illustrates the Rail loop and associated load out facilities in the local context and **Figure 4.9** illustrates the WAF in its landscape context.

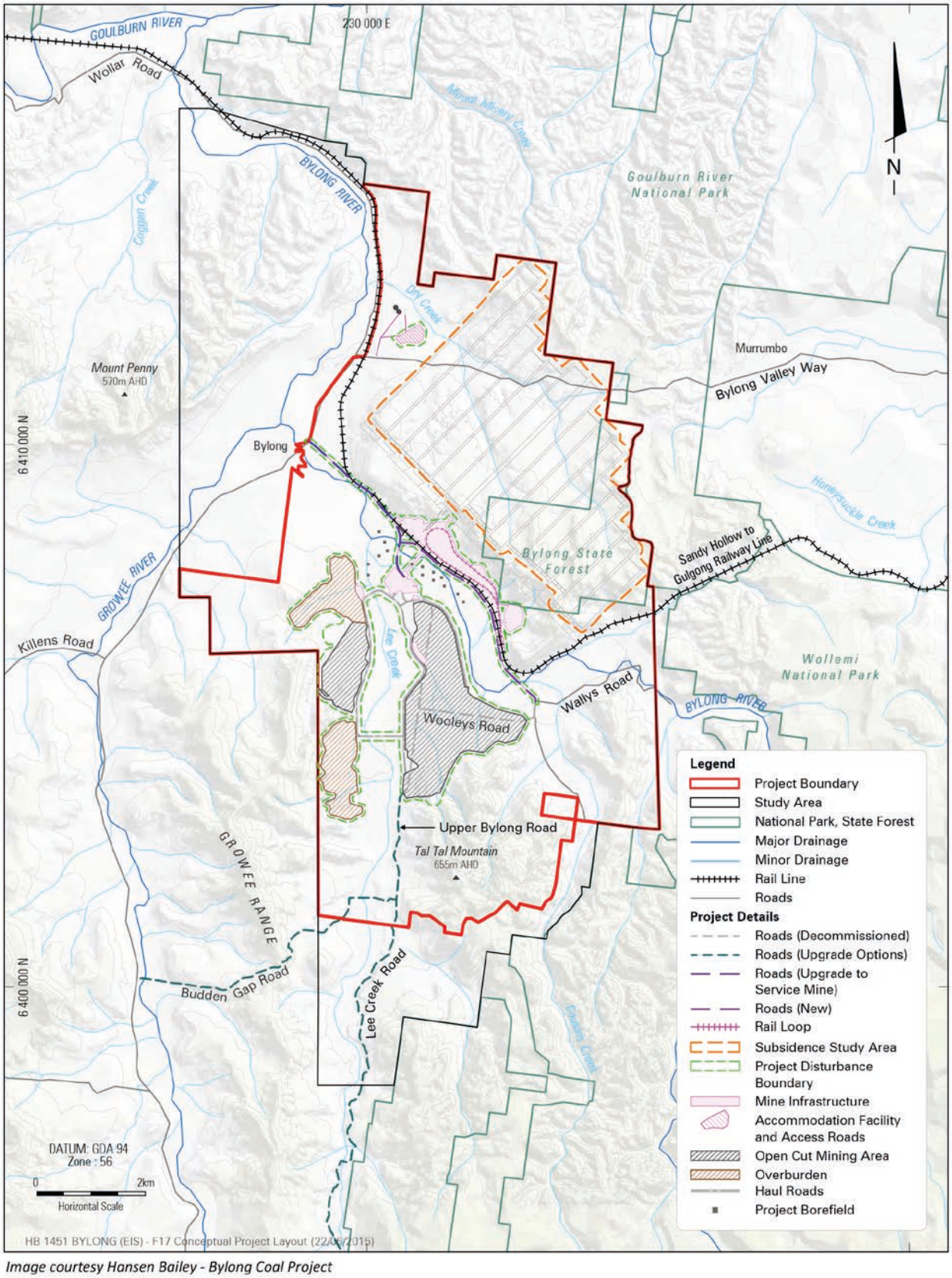
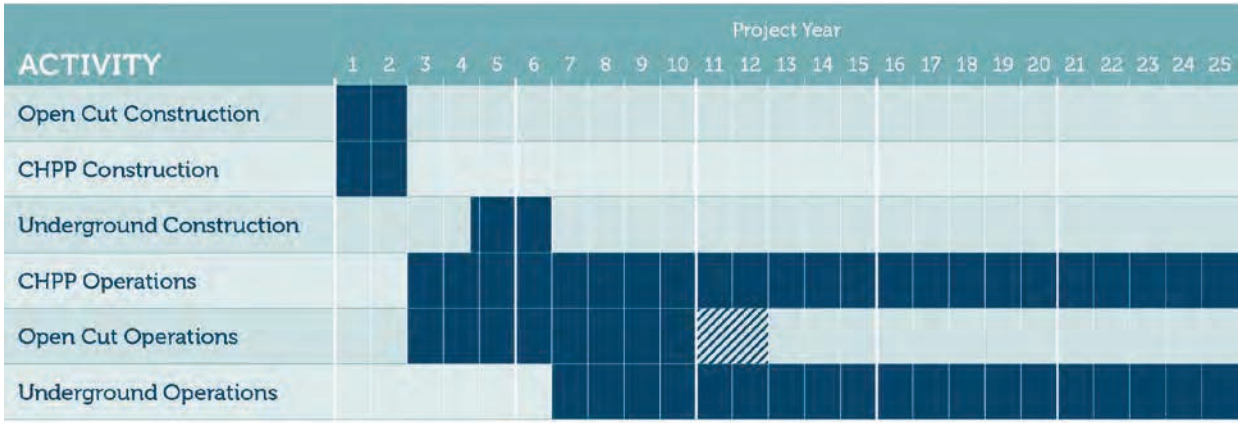


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.1 | *Conceptual Project Layout*

Table 4.1 below provides an overview of the Project construction and operational phases.

Table 4.1
Project Operational Timeline



4.2 Major Project Elements

4.2.1 Open Cut Mining Areas

Physical Character

Coal extraction by open cut mining methods is a major visual element of the Project. The coal resource within the western portion of the Project Boundary occurs at relatively shallow depths, which makes this resource most suitable technically for recovery using open cut mining methods.

Prior to surface disturbance commencing, suitable soil materials will be recovered and stockpiled for use in parallel rehabilitation that will facilitate reinstatement/reactivation of agricultural land use activities. The proposed open cut activities will be consistent with conventional open cut mining operations, utilising diesel powered hydraulic excavators matched with suitably sized haul trucks to facilitate the removal of overburden to uncover the coal.

Underground mining methods are proposed within the more elevated topographic areas north of Upper Bylong Road where this method is achievable. However underground mining would not result in significant additional visual effects to those created by the proposed open cut mining areas and surface infrastructure required for the Project (refer **Section 4.4**).

Project Year 3 (Figure 4.2)

After initial land clearance and topsoil stockpiling, mining and progressive rehabilitation will commence at the end of Project Year 2 in the northern extent of the Eastern Open Cut within adjacent topsoil stockpile along western perimeter. Overburden from the Eastern Open Cut will initially be placed within the North-Western and South-Western OEAs until the mining areas are suitably developed to enable progressive backfilling. There will also be topsoil stockpiling in an area to the south-east of the pit.

The southern portion of the Eastern Open Cut Mining Area will remain as an open void for the storage of rejects material for the duration of the underground mining operations.

Concurrently, mining will also be developed in the northern extent of the Western Open Cut with a box cut in the northern end. Overburden extracted from this area will initially be placed within the North-Western OEA until mining has been sufficiently developed to enable the overburden to be used to backfill the mining area.

Within this construction phase, approximately 268 ha of land will be cleared for the development of the mine.

Project Year 5 (Figure 4.3)

In Project Year 5 the Eastern Open Cut has progressed to the south with haul roads enclosing the operations to the east and west. The overburden will be deposited to further develop the Eastern OEA and develop the South-Western OEA. A small secondary open cut mine area has been developed further to the south at the end of eastern haul road.

The Western Open Cut has progressed south with a secondary pit on its south-western front excavating into an adjacent ridge line; the previous void being filled and rehabilitated. Fill is also used to develop the South-Western OEA.

Project Year 7 (Figure 4.4)

In Project Year 7 the Eastern Open Cut will have advanced to the south-east and south joining with the previously separate pit. The areas of open cut are now divided by the southern extension of the Eastern OEA.

The active Western Open Cut has contracted to its south-eastern extent with no further expansion of disturbance. The voids being filled and rehabilitated with the Western OEA further extended to the south.

Project Year 9 (Figure 4.5)

In Project Year 9 the advancing eastern OEA divides the Eastern Open Cut into a southern and eastern zone with an active margin along the southern face connecting the operational areas and following the landform on the northern slopes of Tal Tal Mountain. The overburden continues to be used to develop the Eastern OEA.

The Western Open Cut Mining Area has completed operations and rehabilitation has commenced on both the Western and South-Western OEAs.

Open cut mining period is completed by Year 10; Western and South-Western OEAs have established rehabilitation coverage for all areas of disturbance. The North-Western OEA continues to receive topsoil stockpiling and overburden emplacement from ongoing underground mine development and final decommissioning of Eastern Open Cut.

The southern void of the Eastern Open Cut will continue to receive reject materials from the Underground Extraction Area to the completion of the Project.

Project Year 25 - Final Landform (Figure 4.6)

By Project Year 25 underground reject materials have filled the southern void in the Eastern Open Cut and the entire open cut mining and overburden areas are developing towards the long term final landform and rehabilitation targets.

4.2.2 Visual Effect

The highwalls of the open cut mining areas are located below natural ground level and therefore only the higher elevations of this element will be visible from certain view locations in the PVC. Such potential views are to where active open cut mining fronts are on existing slopes that are elevated above the valley floor and the advancing face of the mining areas. This activity may therefore be visible above the previously mined areas.

From some viewing locations, in particular elevated locations, views to open cut mining areas create a high visual effect due to contrast against the surrounding landscape features. Operations in the Eastern and Western Open Cuts in the initial years of the Project will result in a high visual effect to some more elevated viewing locations.

The Eastern Open Cut will be viewed from the north-west including northern parts of Upper Bylong Road. Topography and vegetation screen potential views from Bylong Village on its narrow northern and western fronts. Users of Lee Creek Road as it approaches the Eastern Open Cut will also have limited distant views of operations along the broad south-west flank. There may also be distant views to the Western Open Cut Mining Area from here.

This high level of visual effect created by views to very limited areas of open cut mining areas will continue until the associated OEAs are established and rehabilitated to meet the conceptual final landform design. The visual effect will progressively be reduced to moderate or low in the long term as OEAs are shaped, rehabilitation is established and the landform is integrated with the surrounding rural LCU settings. A faster lowering of visual effects will occur to the west of Lee Creek with view areas adjacent to Growee River and Bylong Valley Road experiencing lower visual effects once the leading faces of the OEAs are rehabilitated.

By Year 7, the active faces of both open cut mining areas will have advanced to the south and viewpoints are screened by the OEAs being developed within the mining areas as well as the existing topographic features (ridge lines).

The visual effect of the Western Open Cut is high, but most viewing locations are generally screened by some of the intervening topography, limiting the visibility of open cut operations for receptors in adjacent areas. Once the North-Western OEA has been developed and rehabilitation commenced, it will provide a good level of screening of operations from the north-west, particularly for those receptors in Bylong Village.

The final void in the Eastern Open Cut Mining Area will create a high visual effect for those areas that have views towards this feature in the landscape. However the development and rehabilitation of the OEAs and existing ridge and valley topography will limit views to these areas, reducing this high level of visual effect.

4.3 Overburden Emplacement Areas

4.3.1 Physical Character

Project Year 3

In the initial 3 years of open cut mining, overburden from the two open cut mining areas will initially be placed within a North-Western OEA and a South-Western OEA until the mining areas are suitably developed to enable progressive backfilling.

The Project will commence with the development of two OEAs, including the:

- North-Western OEA located to the north-west of the Western Open Cut; and
- South-Western OEA located at the base of ridgeline, further to the south on the western side of Lee Creek.

Both OEA areas are accessed by new haul roads.As these two OEAs are developed in conjunction with open cut mining, there will be initial removal of overburden and topsoils. Mine overburden will be trucked to the OEAs to develop landforms that are higher than the existing topography. The conceptual design of these OEAs has been developed to minimise surface disturbance and mitigate visual impact to sensitive receptors where possible. OEAs will initially appear as bare earth mounds until progressive rehabilitation is implemented.

Topsoil stockpiling will also be part of the initial mine development, with large stockpile to the south-east of Eastern Open Cut and two smaller piles to the west of the Western Open Cut. Topsoil stockpiles will be limited in vertical height by soil quality management constraints.

Project Year 5

By Year 5, the Project will be developed sufficiently to enable the progressive infilling of the mining areas and construction of an additional South-Western OEA (refer **Figure 4.3**). Overburden from the developing Western Open Cut and Eastern Open Cut will be placed at the base of ridge line on western side of Lee Creek valley above the flood plain. Early rehabilitation will be implemented on the eastern face of the OEA.

The North-Western OEA will be developed further to the south and west and will be used for topsoil stockpiling. Rehabilitation works to establish ground cover and revegetation will have commenced on the northern face that presents to Bylong village and Upper Bylong Road. The active accumulation area for both overburden and topsoil has increased.

The Eastern OEA will be extended to the south filling the area between the haul roads to the north of active Eastern Open Cut. Rehabilitation works to establish ground cover and revegetation will commence on the northern face that presents to Bylong village and Upper Bylong Road.

The North-Western OEA will provide screening of views towards the open cut mining areas from the north-west, particularly Bylong village and road users on Bylong Valley Way. It will also assist in limiting views from most locations to the Western Open Cut Mining Area from Upper Bylong Road to the north.

The Eastern OEA will limit views into the Eastern Open Cut Mining Areas from viewing locations off the northern sections of Upper Bylong Road after the initial construction period in Years 1 to 3.

Project Year 7

By Year 7, the Project will have finalised landforms on North-Western and South-Western OEAs. The entire South-Western OEA will now be under rehabilitation. The Western OEA will have expanded south with progressive rehabilitation established across approximately two thirds of its northern extent.

The Eastern OEA will have progressed further south filling the mining void as it advances south and east. The rehabilitation work now extends along the lower margins on all faces of the Eastern OEA. There will be a small active unshaped overburden on the central upper ridge and southern margin consistent with the progression of mining operations.

Project Year 9

By Year 9, the North-Western OEA will continue to receive overburden from the underground mine operations which commenced in Year 7. The northern face will have established rehabilitation cover and south-western area will continue to be a topsoil stockpile area.

Both the Western and South-Western OEAs will have reached their final landform and have established rehabilitation cover across all disturbed surfaces.

The Eastern OEA has continued to extend south and east filling the voids of the Eastern Open Cut pits (now separated into two). The northern third of OEA has reached its final landform and has established rehabilitation cover on all side and upper slopes. A central zone remains active, receiving overburden from the last stages of this Eastern Open Cut operations.

Year 10 is the final year of open cut mining operations for the Project. The only active open cut mining areas in Year 10 occur on the southern and south-eastern margins of the Eastern Open Cut, with rehabilitation established over the remainder of the OEA.

Project Year 25 - Final Landform

By Project Year 25 underground reject materials will have filled the southern void in the Eastern Open Cut and the entire open cut mining and overburden areas are developing towards the long term final landform and rehabilitation targets (refer **Figure 4.6**).

4.3.2 Visual Effect

The OEAs for the Project will create strong contrasting form and colour in the landscape. This high level of contrast can have high visual effect when visible depending on proximity to the viewer (refer **Table 2.1**). This will be reduced over time during rehabilitation as initial grass cover establishes, lowering visual effects to moderate. Following the development of appropriate tree cover on the rehabilitated OEAs, the visual effect will be reduced to low.

During the initial years of operations within the Western Open Cut, the North-Western OEA creates moderate to high effects. By Year 3 the visual effect of the face of the OEA presenting to Upper Bylong Road is reduced to moderate due to early rehabilitation work on that face. Year 5 sees the OEA grassed and the colour contrast is reduced along the western face, thereby lowering visual effect. Most of this OEA is positioned behind a local ridge line and spur to its west, thereby limiting the extent of views to disturbed surface areas from the west.

Some high visual effect levels may be experienced for up to 5 years due to visual exposure to the pre-rehabilitated OEAs, topsoil dumps and backfilled open cut mining areas. These effects can be minimised by the continued use of progressive rehabilitation and by optimising rehabilitation timetables for each exposed area.

Bylong Village and Bylong Valley Way (Figure 4.2 to Figure 4.6)

After Year 3 of mining construction, the nearest active mining area is approximately 3.2 km to the east to the village of Bylong and 2.2 km to the east of Bylong Valley Way. However, intervening vegetation around the village (and to varying degrees along Bylong Valley Way) will minimise the available glimpses to the mine operations until the rehabilitation of the North-Western OEA is completed.

Upper Bylong Road (Figure 4.2 to Figure 4.6)

Until the northern and western faces of the OEAs are rehabilitated, there will be views to areas of un-rehabilitated faces of the North-Western and Eastern OEAs that, initially, could have a high visual effect due to a strong contrast in form, shape, line, colour and texture that will be a major deviation from the existing environment.

After 3 years and the establishment of grassland rehabilitation, the North-Western OEA will lower the visual effects to moderate and will also further limit views to active operations in both Western and Eastern Open Cuts for the remaining years of the Project.

The visual effect will progressively be further reduced to moderate or low as all OEAs are shaped, rehabilitation advances and the landforms are integrated with the surrounding rural settings. The establishment and development of mature tree plantings during development of the rehabilitation of the OEAs will further reduce the visual effects.

As a result of views of the Eastern OEA after Year 3, high visual effects will be experienced for several years. Local receptors such as rural residences will experience views to cleared excavations and un-rehabilitated overburden.

This visual effect for receptors to the north will reduce when initial rehabilitation on the northern front of the North-Western and Eastern OEAs is established by Year 5. A further reduction in visual effect from viewing locations at higher elevations can only be achieved when mature tree cover is established, approximately five years after tree planting or seeding on rehabilitated areas has occurred.

Like the other OEAS, the southern and eastern faces of the South-Western OEA development will also have a high visual effect until rehabilitated. However proximity and number of receptors are limited as access along Upper Bylong Road south of the Project Disturbance Boundary will be restricted. For discussion of visual effect on receptors refer to **Section 6**.

There are three rural residences (KEPCO owned) that will experience direct high visual effects but those rural residences approximately 2 kms to the south will have moderate visual effects due to the reduced area of primary view occupied by the disturbance.

4.4 Underground Mining Operation

4.4.1 Physical Character

The underground mining element of the Project is proposed under the more elevated topographic areas, as demonstrated in **Figure 4.1**.

The primary elements for the underground mining operations that will be visible from locations outside of the Project Disturbance Boundary will be the initial box cuts and ventilation infrastructure. This infrastructure will be constructed prior to the commencement of underground mining operations.

Box Cut

The initial development for the underground mining operations will involve the development of two box cuts in the vicinity of the Rail Loop. The box cuts will facilitate the construction of decline drifts to provide access to the Underground Extraction Area for employees, materials, power, ventilation and coal transport.

The two box cuts are proposed to be developed generally below the existing ground level and will also be screened from external view behind other elements of Project infrastructure, including the MIA, Rail Loop, CHPP and associated support infrastructure.

Ventilation Shaft

A ventilation shaft will also be constructed on the north eastern side of the Rail Loop to facilitate ventilation of the Underground Extraction Area according to the relevant safety standards. The ventilation shaft is proposed on the north-eastern side of the Rail Loop and due to its size, is unlikely to be visible to external views behind this infrastructure.

4.4.2 Visual Effect

The visual effect of underground mining will be limited to the initial box cuts that will create localised landform and colour contrasts. These elements will not have a high visual effect because of the locations and limited scale of this infrastructure.

Underground mining will be done with the permanent main headings proposed to be developed in a south-east to north-westerly direction to generally align with the elevated topography leading up from the valley areas. This will maximise subsidence protection of surface cliffs and steep topography.

The visual character of the active underground mining (**Figure 4.7**) operations will not be visible from ground level viewing locations. The exception to this will be the portals and associated supporting infrastructure elements. These elements are proposed to be located within the MIA itself and are considered in terms of the visual effects of that area.

Other visual effects of underground mining could possibly be created by ground subsidence.

Generally, any visual effects on the surface would be localised and not perceivable to other local and more distant views. Subsidence reports indicate that rock falls may occur within the Bylong State Forest, however the escarpment rocky outcrops that are visible will be protected due to underground mine design.

Such rocky outcrops occur in some locations along ridge lines running north-north-west to east-south-east in Bylong State Forest, adjoining the MIA to the north, and two spur lines running from this ridge in a general north south direction. They also occur to a lesser extent on the ridge line that forms the boundary between the adjacent state forest and national park, however this ridge is not undermined.

The visual effect of any outcrop collapse would likely have a high local effect due to colour contrast between fresh exposed rock and adjoining weathered rock and forest. However these effects on more distant middle ground and background views would be minimal due to scale and would generally be well integrated into existing larger scale landscape patterns. Mine plans have been designed to protect cliffs and minimise instances of subsidence and rock falls and larger scale landscape patterns.

The visual significance of these cliff lines is recognised and detailed mine planning has been completed to protect key ridgelines and minimise potential impact to these geological formations from rock cracking and falls.

4.5 Mine Infrastructure

The major infrastructure elements proposed for the Project are located in following locations (refer **Figure 4.2**):

- At the foothills of the natural escarpment to the north-east of the Sandy Hollow to Gulgong Railway Line;
- North-Western side of the Rail Loop; and
- On flat land between the junction of Bylong River and Lee Creek adjacent northern extent of Eastern Open Cut Mining Area.

4.5.1 CHPP

Physical Character

The major infrastructure elements of the CHPP include:

- CHPP facility;
- Raw coal stockpile area;
- ROM Bins and rejects area;
- Overland conveyor; and
- Product stockpile area.

All the major infrastructure elements of the CHPP have a distinct industrial character. They are large in scale and coupled with the minor additional infrastructure elements, create an industrial setting. During the construction period, there will be the additional activity associated with the development of the Project, generally associated with vehicle and construction machinery movement.

Visual Effect

The CHPP would create a high visual effect where they are visible to receptors due to strong contrasts with the surrounding rural landscapes. The rectilinear form, shape and line of the CHPP, product bins, coal stockpiles, conveyors, etc. will contrast strongly with the natural form, colour, shape and line of the topography and vegetation of the locality.

The ROM and product coal stockpiles will generally be linear and will contrast strongly with the existing environment, creating a high visual effect where localised views are available from adjacent Upper Bylong Road and a section of Bylong Valley Way, approximately 4 km to the west.

The OEAs that will be developed during the initial years of open cut mining operations, together with existing topography and vegetation, will screen views to the CHPP from Bylong Valley Way.

Local topography and vegetation will screen views to the CHPP from Bylong Village.

The visual effect of the construction process will add a visually dynamic element in terms of machinery and vehicle movement. These visual effects will be in addition to the creation of visual effect created by the ongoing establishment of the MIAs and major infrastructure elements within it.

4.5.2 Mine Site Facilities

Physical Character

The mine site facilities located in the Open Cut MIA are proposed to include:

- Internal mine access roads and light vehicle parking;
- Associated power reticulation and communication infrastructure;
- Mine office, administration and bathhouse facilities;
- Sewerage treatment systems;
- Lighting facilities (assessed further in Section 7.6);
- Mine workshop, store and laydown facilities;
- Hardstand areas;
- Fuel and lubrication station and refuel facility;
- Compressor facility;
- Associated water management infrastructure;
- Feeders and sizers; and
- ROM and rejects bins and associated conveyors.
- The Underground MIA infrastructure elements are proposed to include:
- Internal mine access roads and light vehicle parking;
- A high voltage transmission line and associated power reticulation infrastructure;
- Mine Office, administration and bathhouse facilities;
- Sewerage treatment systems;
- Communications lines, towers and other facilities;
- Mine workshop, store and laydown facilities;
- Hardstand areas;
- Fuel and lube station and refuel facility;
- Compressor facility;
- Associated Water Management Infrastructure;
- In pit area and portals;
- Ventilation plant;
- Stockpiles;
- Feeders and sizers;
- Conveyors; and
- Underground Inertisation plant.

These elements relate to the operation of the mine facility and service the workforce.

Visual Effect

Much of the mine site facilities will be of light industrial character including - sheds, workshops, and service equipment. The facilities contrast in character to the rural landscape but have similar scale and form of many agricultural sheds and out-buildings that currently occur in the valley. They are generally clustered in one location, thereby consolidating the extent of effect on the wider rural landscape. However, the infrastructure will only be visible from limited locations to the south. Most of these areas are within KEPCO land holdings with the exception of Upper Bylong Road and its realigned location.

4.6 Rail Loop and Associated Load Out Facilities

Physical Character

The Project will transport the coal product after processing to the Port of Newcastle by rail, utilising the existing Sandy Hollow to Gulgong Rail Line. A Rail Loop with train loading facilities will be constructed to facilitate the loading of coal (refer **Figure 4.8**).The Rail Loop will be constructed on the north-east of the existing Sandy Hollow to Gulgong Rail Line. There will be associated facilities constructed to support the Rail Loop operations.

Visual Effect

Development of the Rail Loop will require substantial fill and cut into the existing landscape. However, the Rail Loop will have little vertical projection, particularly when compared to the existing Sandy Hollow to Gulgong Rail Line, which will lie in front of this infrastructure. While the earth embankments required for the Rail Loop are being developed, a 'moderate' visual effect will be created by the contrast in line and colour created by exposed parts of this landform. However, this effect will be reduced to 'low' once the exposed areas of the embankment are rehabilitated.

There will also be significant activity associated with the construction of the Rail Loop. However, the visual effects from this activity will be temporary in nature and the existing screening effects of the Sandy Hollow to Gulgong Rail line will minimise views of this activity.

4.7 Mobile Equipment - Mining Fleet

Physical Character

All open cut mining operations are proposed to be completed utilising a large fleet of industrial scale mining equipment including excavators, haul trucks, dozers, graders, drill rigs and water carts. The equipment will be constantly moving throughout the Project Boundary on designated routes between open cut mining areas and the MIAs and may be visible from time to time from particular view locations. Activity levels will be highest during the two year Construction Phase, then again in the overlap years (Years 7 to 10) of the end of Open Cut Mines and commencement of Underground Mining.

Visual Effect

The mining fleet forms, colours and lines contrast strongly with the surrounding landscape. However each element of the fleet is mobile, therefore its visual effect is ephemeral, evident only when the equipment is visible to a viewing location, which may be for short periods of time. On that basis, the mining fleet elements have a high but temporary visual effect. Lighting effects are discussed below in **Section 7.6**.

4.8 Water Infrastructure

Physical Character

Water infrastructure includes the construction and operation of surface and groundwater management and reticulation infrastructure including dams, pipelines, diversion drains, sedimentation dams and culverts, pumping stations and associated infrastructure. This infrastructure will be sized and located as required to capture runoff from mining and overburden emplacement areas.

Visual Effect

Elements of the site water management system may include long horizontal pipelines that will follow the ground contours. The development of water management dams will require vegetation clearance. These dams will initially have high visual effect during construction due to the colour contrast caused by exposed soils and loss of vegetation against the forested backdrop of the foot slopes to the Bylong State Forest. This visual effect will reduce after ground cover is re-established over disturbed areas.

Any water transfer pipelines generally will have a plain linear form and line. These and the other industrial infrastructure elements will contrast in form, colour and texture to the surrounding landscape but will generally have a low height profile, modifying the level of visual effect (moderate to low visual effect) and would have very little visual effect outside of the Project Boundary.

4.9 Site Access

Physical Character

Access to the Project would generally be via the existing Upper Bylong Road from the Bylong Valley Way. Access to the Open Cut MIA will be via Upper Bylong Road. An upgrade to the Upper Bylong Road and its intersection with Bylong Valley Way will be necessary to support the additional construction and operational traffic.

The Underground MIA will be accessed from Upper Bylong Road via an access road to be constructed over the Sandy Hollow-Gulgong Railway Line.

Access to the WAF will be from Bylong Valley Way into an existing residential access located on the former Bylong Station property to the north-west of the underground and open cut mining areas as illustrated in **Figure 4.9**.

The southern reaches of Upper Bylong Road after the Open Cut MIA would need to be decommissioned to facilitate mining operations within the Eastern Open Cut mining area. It is proposed that a realignment of the Upper Bylong Road or ‘East Link Road’ will occur along the southern side of the Sandy Hollow-Gulgong Railway Line to the east, providing access for private landholders to the east of the Project.

Internal mine haul roads will be constructed to access open cut mine sites and allow the movement of overburden to the OEAs and coal to the MIA for processing. As shown on **Figure 4.1**, the Project will require the development of three main haul roads. The Western Open Cut Mining Area, North-Western OEA and South-Western OEA are accessed by the western arm of the haul road network. The Eastern Open Cut Mining Area and Eastern OEA are accessed via a central haul road and an eastern arm haul road, which contain the mine areas and OEA. There will also be a connecting haul road across to the South Western OEA by Year 5.

Operational requirements will result in relocation of parts of the exiting Upper Bylong Road. Road realignments along the southern side of the Sandy Hollow to Gulgong Railway Line are also proposed. There are two options to maintain access to the southern portion of Upper Bylong Road to be assessed as separate applications:

- Upper Bylong Road via Bylong Valley Way and Lee Creek Road; and
- Upper Bylong Road via Bylong Valley Way, Budden Gap Road and Lee Creek Road (more direct but elevated).

Visual Effect

The visual effect of the site access roads and realigned public road will create a high visual effect during construction. However, once constructed, the visual effect of most of these roads, including the new access roads to residential properties, will be reduced to 'low' as they are generally set low in the landscape and would represent the continuation of an existing visual element in the local and regional landscape settings.

Any new bridge crossings that are required will create 'high' visual impact locally during construction, however like the site access roads, are an existing visual element in the local and regional landscape. Once established, the visual impact of any bridges will be reduced to 'low'.

There will be increases in traffic volumes introduced by the Project to the area as described by the Traffic Impact Assessment report. The increased traffic volumes may result in a high visual effect, however it is transient and would be restricted to receptors adjacent the key intersections and roads involved in the site access route and for travellers using the Bylong Valley Way and Wollar Road. The majority of traffic will be coming from north Mudgee via the Ulan – Wollar Road connection.

The visual effect of the internal mine haul roads within the context of the existing environment is 'low' as they are relatively flat and follow the topography within the Project Boundary. Many will be screened by local topography, intervening vegetation or, at higher elevations, by OEAs after the mines are more established. Locations with views to internal haul roads will be limited by the development of the OEAs, reducing visual effect.

4.10 Power Reticulation

Physical Character

The Project will involve the construction of a 66 kV transmission line from the Bylong Zone Substation (or directly from connection to the 66 kV transmission line supplying the substation) to the Underground MIA and will provide the principal power supply for mining operations. The indicative alignment of the 66 kV transmission line will cross the Bylong Valley Way and travel generally adjacent to the upgraded Upper Bylong Road to the Underground MIA (refe**r Figure 4.1**). Subject to review, the alignment of the transmission line will cross the Sandy Hollow to Gulgong Railway Line as conceptually shown in **Figure 4.1 and Figure 4.8**.

In addition, various realignments of existing power reticulation infrastructure will be constructed to accommodate the Project. The key power reticulation infrastructure that will require realignment, as part of the Project will be those currently located within the open cut mining areas. These realignments will be undertaken in accordance with complying development approvals that will be sought from the relevant consent authority under the EP&A Act.

Visual Effect

These power reticulation infrastructure lines represent similar physical elements that are presently experienced within the landscape. Visual effects of the proposed power reticulation infrastructure will be 'low'.

4.11 Workforce Accommodation Facility

Physical Character

The Workforce Accommodation Facility (WAF) will likely be a series of pre-fabricated structures clustered about centralised service facilities and amenities. The proposed location is on a flat, slightly elevated area to the east of Bylong Valley Way, as illustrated in **Figure 4.9**. The design includes specifications for external finishes to be of a forest tones (i.e. green, grey, cream) to blend with the surrounding existing environment as far as practical and consistent with mitigation commitments.

The proposed WAF site is to be located in a rural setting with very few existing structures and no residential building clusters that are similar to the proposed configuration or character of this facility.

The WAF will operate from PY1 to the end of underground construction at approximately end of PY6.

Visual Effect

The visual effect of this facility will be high due to the contrast in forms, colour and character of the development, its location adjacent to Bylong Valley Way and Wollar Road. The visual effect at this location has been reduced by implementation of onsite visual mitigation measures to screen views to this facility from these roads. These mitigation measures include tree planting along Bylong Valley Way and Wollar Road consistent with road safety requirements. Existing vegetation will also assist in screening this area.

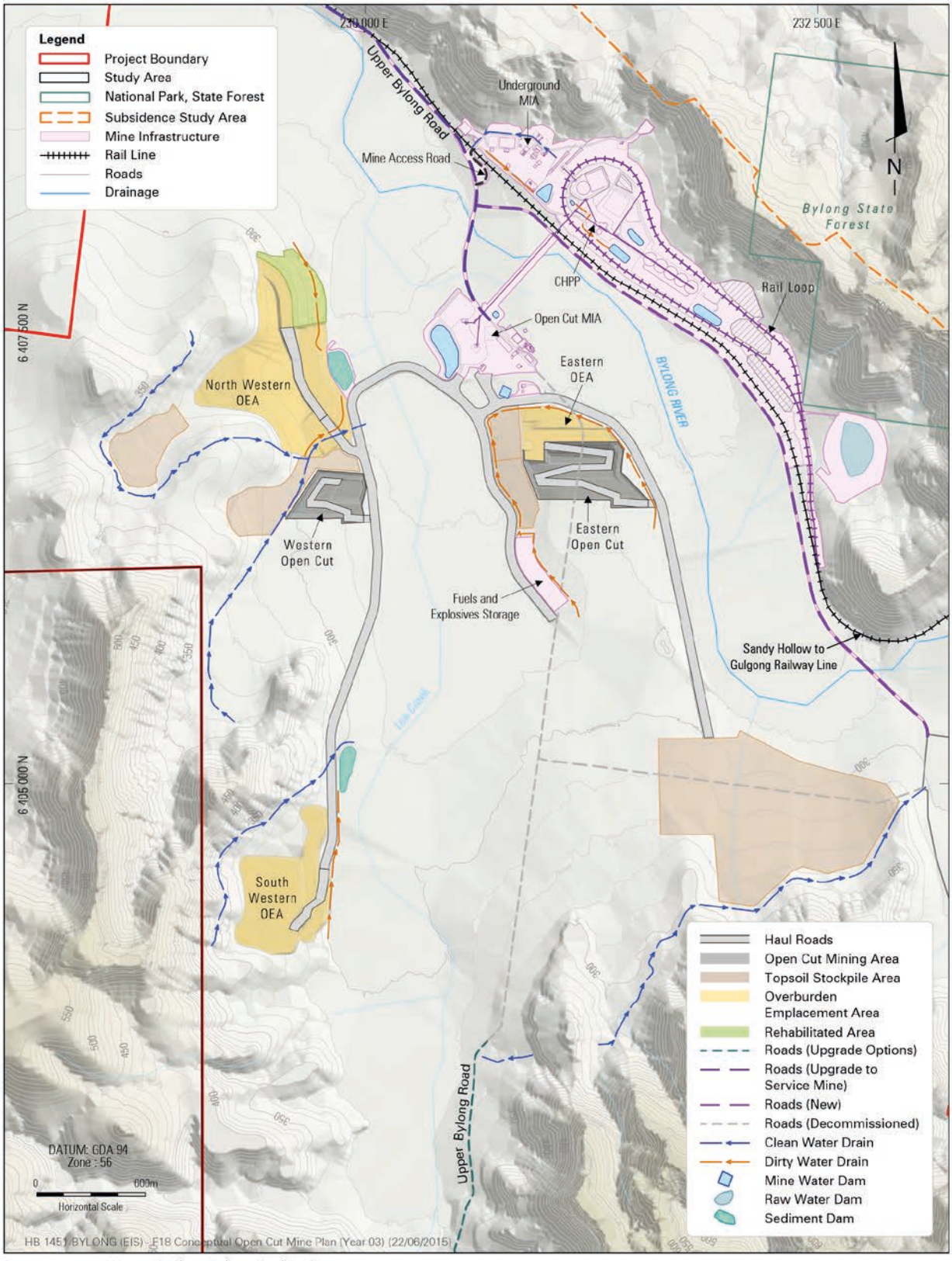


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.2 | *Conceptual Open Cut Mine Plan - Year 3*

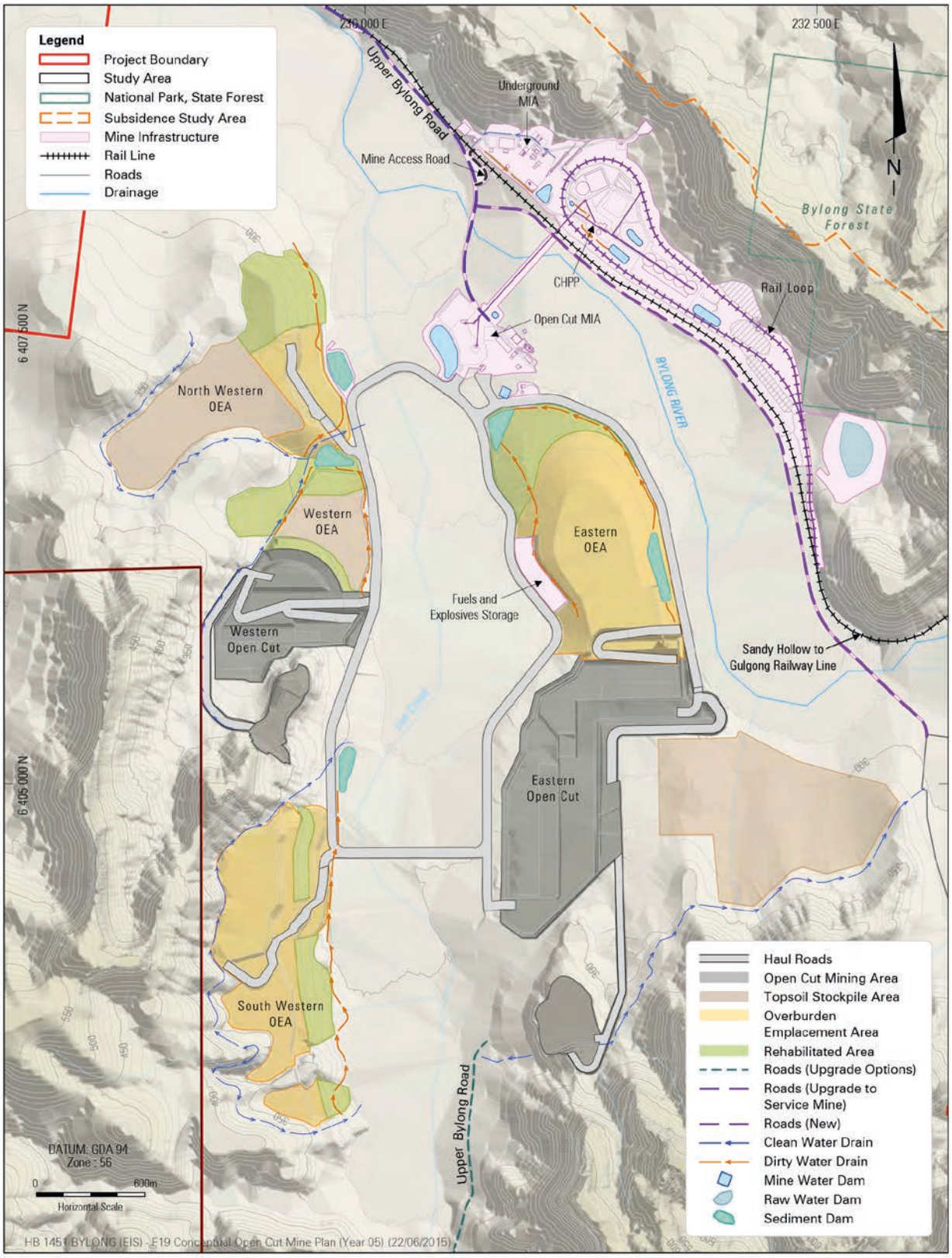


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.3 | *Conceptual Open Cut Mine Plan - Year 5*

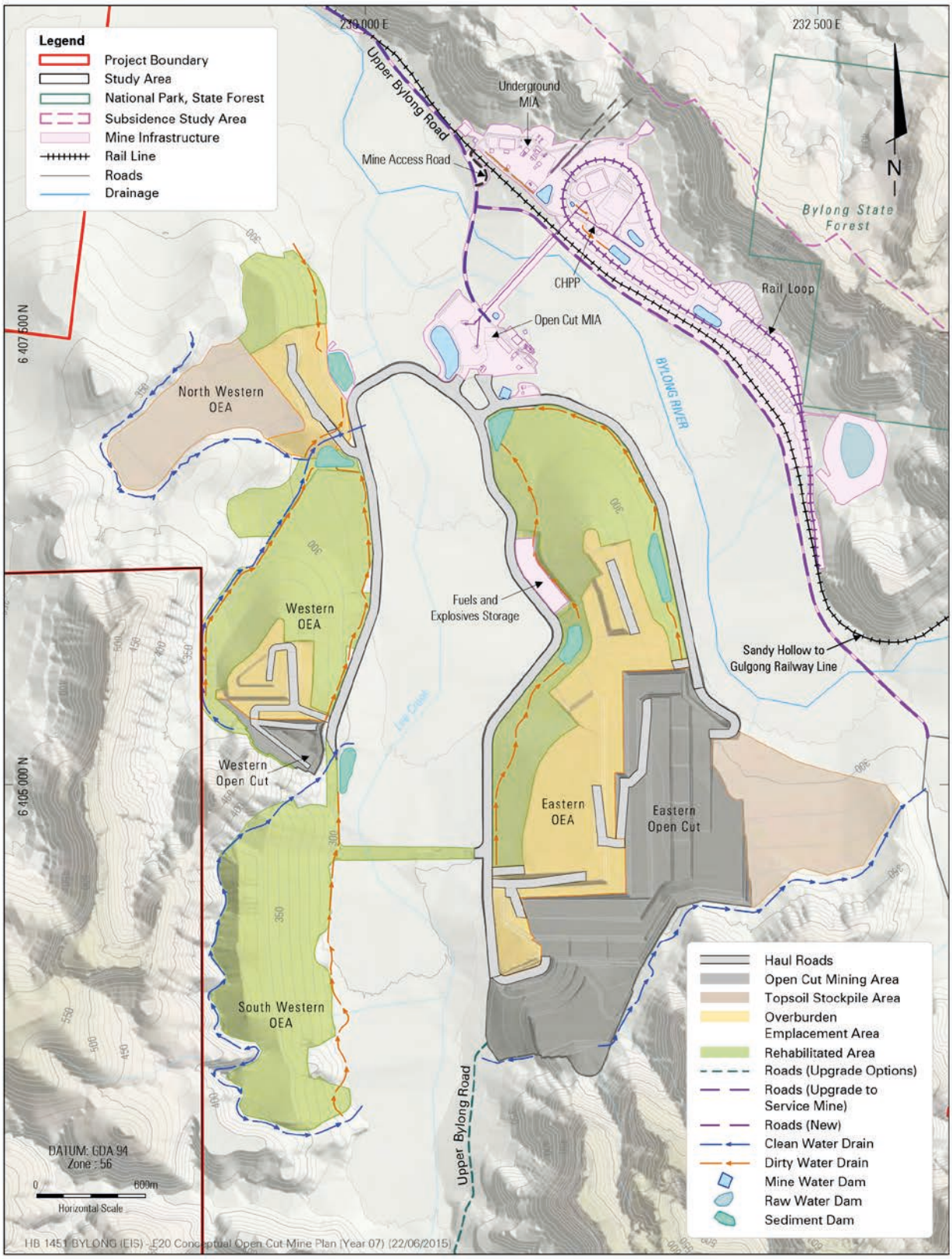


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.4 | *Conceptual Open Cut Mine Plan - Year 7*

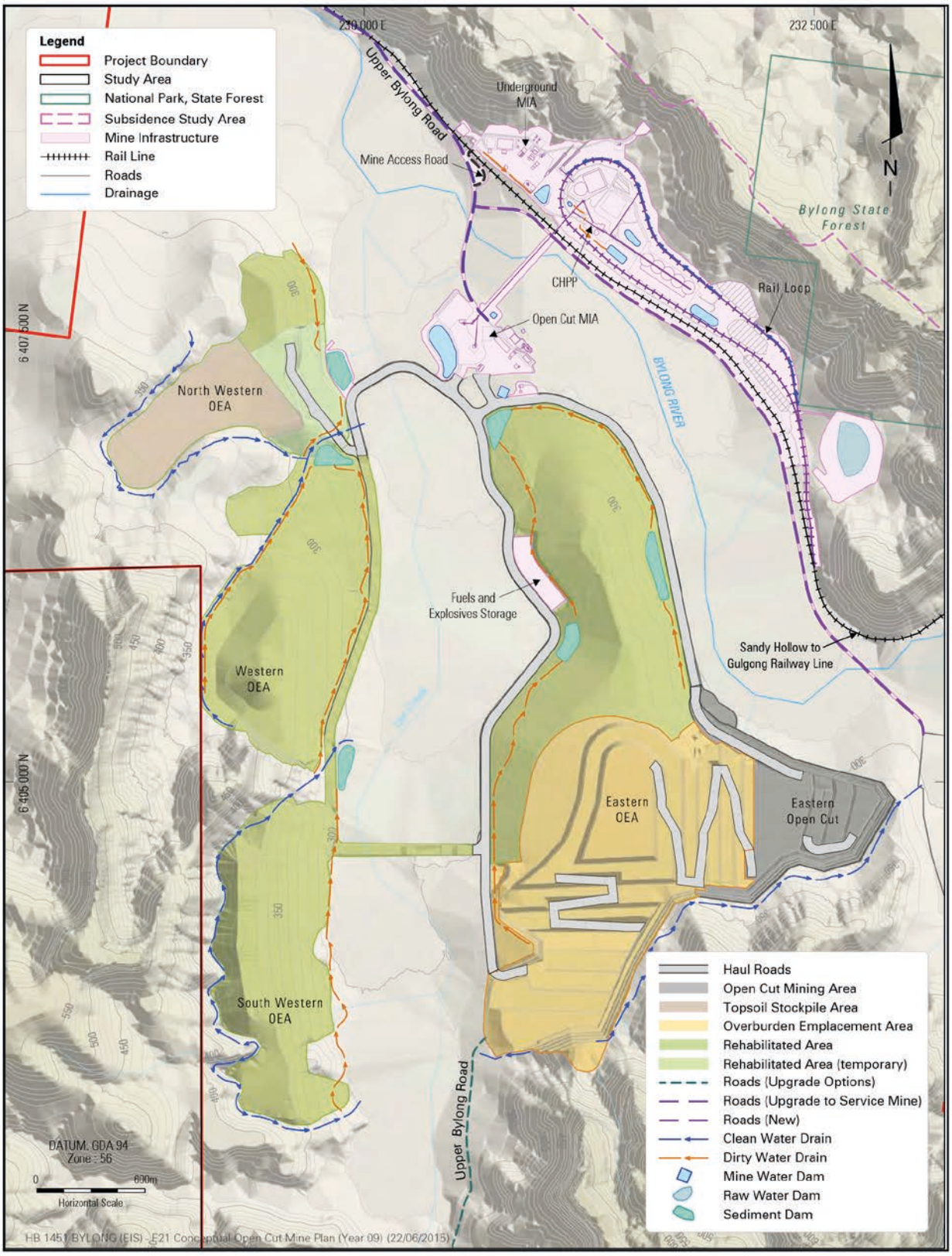


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.5 | *Conceptual Open Cut Mine Plan - Year 9*

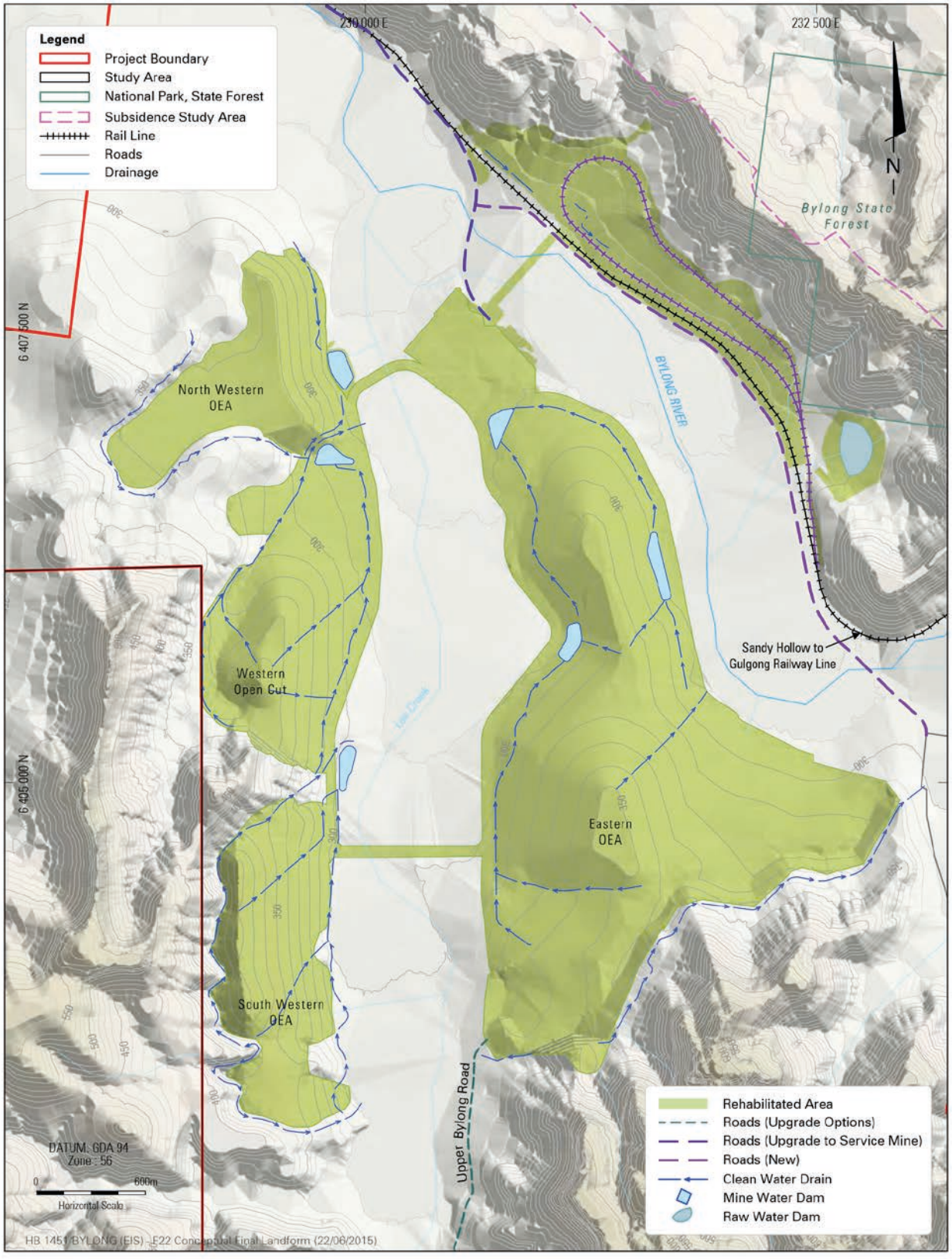


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.6 | *Conceptual Open Cut Mine Plan - Final Landform*

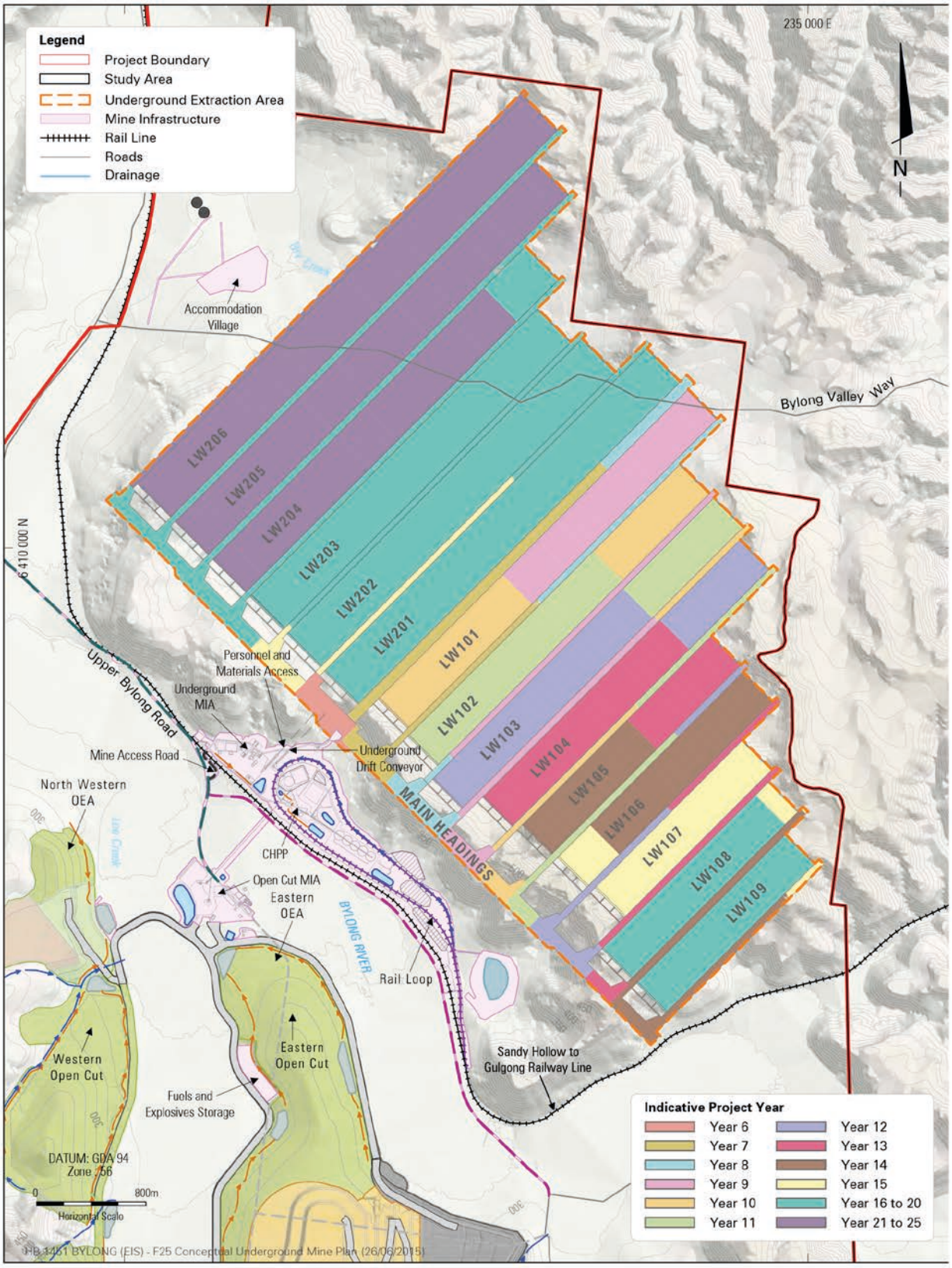


Image courtesy Hansen Bailey - Bylong Coal Project

Figure 4.7 | *Conceptual Underground Mine Plan*

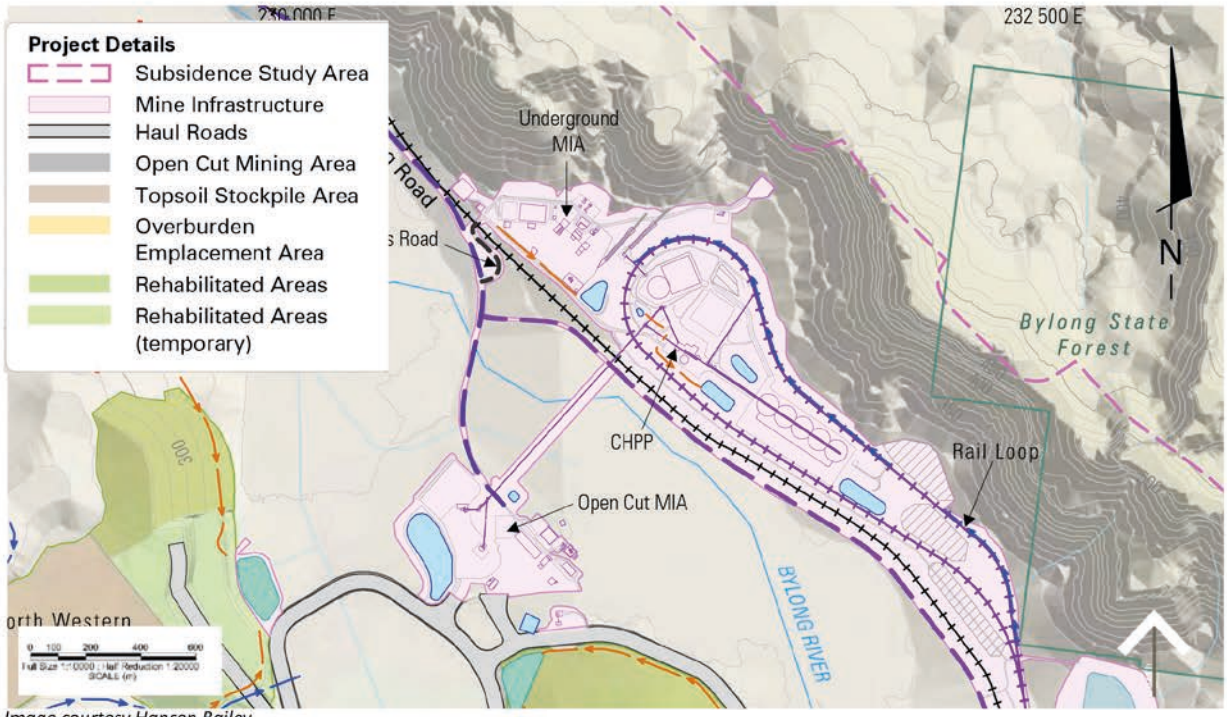


Image courtesy Hansen Bailey

Figure 4.8 | *Rail Loop and associated load out facilities*

Image courtesy Hansen Bailey

Figure 4.9 | *Workforce Accommodation Facility Layout*

5. VISIBILITY AND VISUAL SENSITIVITY

This section evaluates and analyses the visibility of the Project to external viewing locations within the PVC. Within the PVC there must be visibility to the various mine elements for a viewpoint to have visual sensitivity and potentially experience an impact as a result of the Project. Such visual sensitivity is determined, where visibility exists, according to land use, LCU and distance from viewer to the Project Boundary (refer **Table 2.1**).

5.1 Area of Primary Visual Concern within PVC

Field assessment, evaluation of mapping and aerial photography, as well as computer analysis assisted in defining the area defined as the area of primary visual concern or seen areas within the broader PVC (refer **Figure 5.1**). **Figure 5.1** illustrates how adjacent ridgelines and topography of the Lee Creek water catchment immediately adjacent the Project contains the majority of views into the catchment and Project area. Within this area of primary visual concern are several private residences to the south, east and west of the Project (including those within Bylong Village), as well as one significant regional tourist road.

As noted above, visibility to any of the various Project elements is required for a visual sensitivity and a visual impact to be incurred. Areas that do not have views of the Project will not be visually impacted.

5.1.1 Seen Area

Seen areas are those with the potential views of the Project. These potential seen areas within the PVC have been determined on the basis of field assessment, evaluation of mapping and aerial photography and computer modelling. These areas have then been evaluated in terms of visually sensitive land uses.

The main seen areas are defined by the valleys created by the water catchments of Lee Creek in the vicinity of the Project (refer **Figure 5.1**). To a lesser extent, seen areas also include parts of the Bylong River water catchment area north of Bylong Village. However this area only has the potential for views to small portions of the North-Western OEA that extends beyond the Lee Creek catchment boundary into the eastern edge of the Bylong River catchment and the WAF facility.

The seen area of the Project also includes a number of rural residences as well as Bylong Village, parts of Bylong Valley Way as well as minor roads such as Lee Creek and Upper Bylong Road. Many of these areas have the potential for views of the Project based solely on a topographic analysis. However, foreground vegetation such as existing forest and woodland areas, roadside vegetation and garden plantings around residences can affect the potential for, and extent of views, from these locations. Any location afforded views to the Project would have high to moderate visual sensitivity.

5.1.2 Significant Topographic Features

Within the PVC, the topography of the regional setting consists of a series of small creek and river catchment valleys surrounded by elevated rocky ridge lines, hills and escarpment that define the limits of the seen areas, refer **Plate 5.1**. Longer distance views along the valley floors are available but views between valleys are limited by the intervening forested ridge lines and hills. There are very few viewing opportunities from these significant elevated areas due to lack of access.

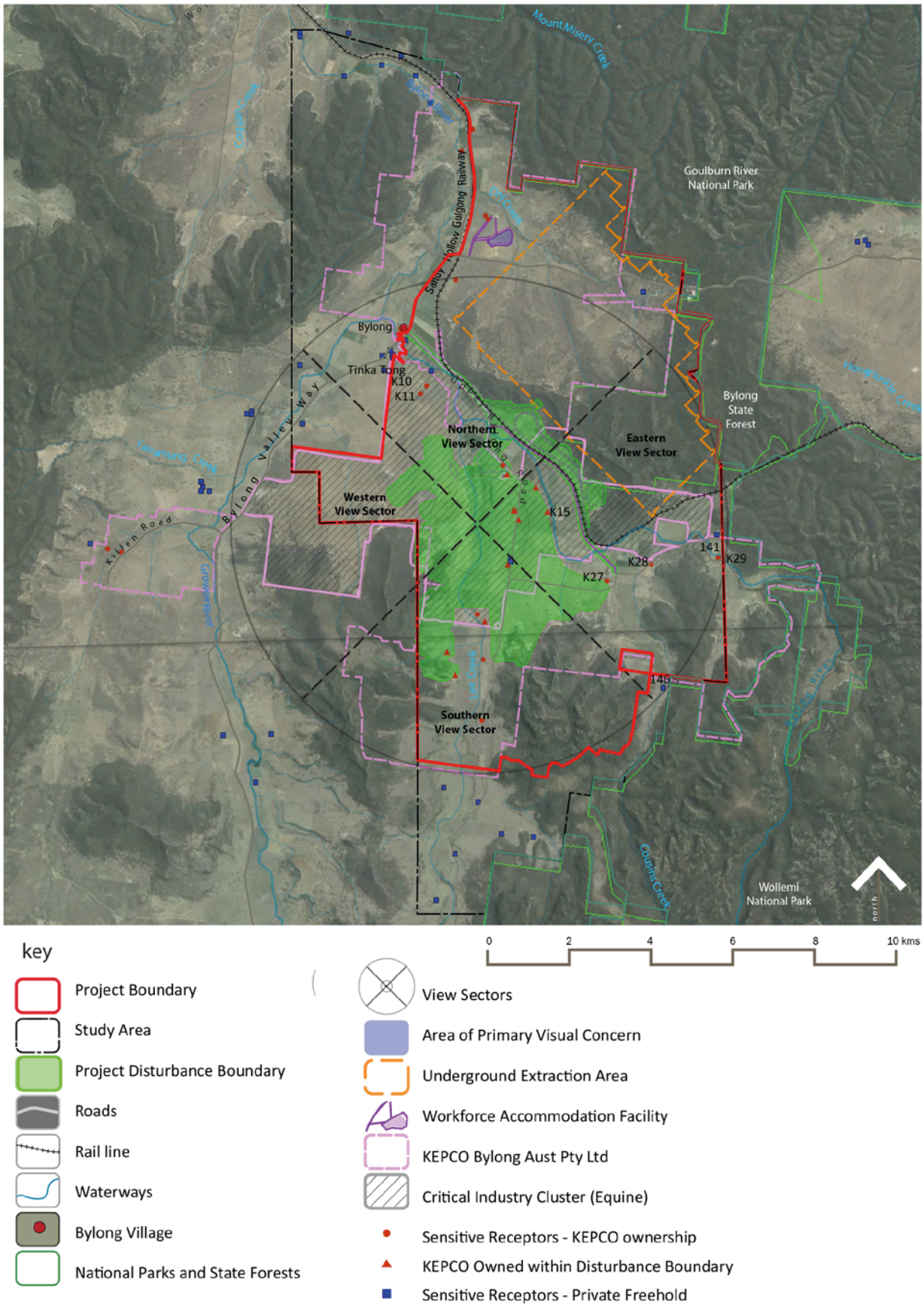


Figure 5.1 | *Sensitive Receptors*

The escarpment (cliffs) in some locations around the visual catchment perimeter, are prominent in the general horizon (MSEC 2015). There is a range of cliff profiles within the escarpment, as defined by DoPe (2012) by height and features including sections of large cliff lines of special significance.[1]

Topographically, the eastern part of the Project Boundary follows the escarpment and western edge of the Wollemi National Park. Tal Tal Mountain is the highest topographic feature within the Project Boundary at 655 m AHD but has no access or lookout points. To the west, the Growee Range encloses the PVC. To the south, the Bylong River and Lee Creek are situated in north-south valleys separated by ridge lines. Views extend along these valleys but are limited by internal topography, hills and smaller side ridges and some cliff lines.

5.1.3 Significant Vegetation Areas

Tree cover is important in providing potential screening to the Project elements (as shown on **Plate 5.2**). It is especially significant in providing screening effects when it is close to the viewing locations. Native woodland (especially that associated with the eucalypts along the creeks and drainage lines), plantings around rural residences, roads and villages also create screening effects. Plantings and residual vegetation areas in the foreground or near middle ground can be significant in reducing views to Project elements. In the same way, vegetation around residences or village streets can greatly assist in screening views to the Project Boundary or elements of the Project, reducing visual effect.

5.2 Sensitive Receptors

There is a range of potentially sensitive viewing locations within the PVC (refer **Figure 5.1**). These include the Bylong Village, rural residences and rural churches, roads and rail line, Critical Industry Cluster – Equine (Equine CIC) properties, limited tourist facilities/recreation areas and agricultural areas.

5.2.1 Bylong Village

Bylong Village is located in the north-west quadrant of the PVC (refer **Plate 5.3**). It has potential for visibility to various elements of the Project, in particular the North-Western OEA. However, the visual impact modelling indicates that there is no visibility to Project activities due to the existing vegetation and topography that exists between the receptors in the village and the elements of the Project.

The village would have high sensitivity to any views of the Project; however tree cover and topography screen views to Project elements.

5.2.2 Equine Critical Industry Cluster

Within the PVC are areas that have been defined as Equine CIC under the SRLUP. This area was studied in detail as part of the Gateway Assessment for the Project.

The extent of the Equine CIC in this locality is illustrated in **Figure 5.1**. The land within this area has been purchased by KEPCO, with the exception of the Tinka Tong property (Blocks 69, 70, 71). Much of the land mapped as Equine CIC is located within or immediately adjacent to the Project Disturbance Boundary. This land would therefore be highly impacted in various locations due to open cut mining activities or in the development of OEAs and site infrastructure for at least in the first 10 years of the Project until rehabilitation of the open cut mine areas is complete.

1 MSEC (2015) *Subsidence Impact Assessment for the Bylong Coal Project.*

Within this context, it would still be possible to screen sensitive receptors such as homesteads and critical work areas; however the broad paddock areas that make up the visual setting of the Equine CIC have the potential for exposure to high visual effects from open cut mining operations until progressive rehabilitation occurs from 3-15 years into the Project life.

'Tinka Tong' (Block 69-71), especially the homestead and stockhorse equine facilities are protected to a significant degree from visual impact by the adjacent woodland on the property (refer **Plate 5.4**) that effectively screens operational areas from view. Some weakening of this situation would be expected towards the outer edges of the property. These areas could be highly impacted (although there are no sensitive receptors in these locations), until rehabilitation of the North-Western OEA areas is completed at various times up to Project Year 7.

The Wallings Pastoral Company properties (Helvetia, Sunnyside, Valley View, Almerta, Torrie Lodge, Home Leigh, Innisfail, Crows Nest and part of Harley Hill), purchased by KEPCO in 2013, (Blocks K10 and K11) both have the potential for open views to Project elements. This is especially true of the properties as a whole and to varying degrees also related to the homesteads. These homesteads and equine facilities on them would have high sensitivity if they had not been purchased by KEPCO. The Tarwyn Park (K15), purchased by KEPCO in 2013, is in close proximity to the Disturbance Boundary therefore sensitivity is not assessable.

After rehabilitation from Year 5 onwards, visual impacts to Equine CIC properties would reduce from low to imperceptible as the patterns of grasslands with scattered tree and woodland cover re-establish.

The Equine CIC would have high sensitivity to the Project disturbance areas in this sector, especially the residences and equine facilities on the Walling and Andrews Properties.

5.2.3 Local rural churches

There is one church located within the Project Boundary, being the former Our Lady of the Sacred Heart Catholic Church and the adjoining Cemetery, which is located within the Project Disturbance Boundary. The church will be relocated or removed as part of the Project. The remains of those buried in the Cemetery will be exhumed and reinterred at a site or sites yet to be determined.

St Stephen's Anglican Church and Cemetery are located outside the Project Boundary, on the south-western outskirts of Bylong Village (refer **Plate 5.5**). This church is in and would have a high visual sensitivity, as it is an important community and cultural facility. The rural character of the church, contributing to tourist values of the area, and its function as an important community hub, means the church would have a 'high' sensitivity to views within 2.5km.

Visitors to the church would have potential views toward the North-Western OEA. These would have a high sensitivity.

5.2.4 Recreation Areas

Bylong Village has a rest area and tourist interpretation shelter. Both are located on the western side of Bylong Valley Way adjacent the Bylong Community Sports Grounds.

The rest area and adjoining information shelter would have a high sensitivity to changes in landscape based on existing views to surrounding rural lands. While there are good views to the adjacent forested hills and ridge lines from both facilities, Project elements are screened from view at these locations by foreground trees on the eastern side of Bylong Valley Way.

The recreation area would have a high sensitivity but views are generally screened by topography and vegetation.

5.2.5 National Parks and State Forests

Goulburn River National Park lies to the north of the Project area outside the PVC. Views from the Lee Pinch Lookout approximately 14 kms to the NW are unlikely due to intervening topography and distance. There are no other NSW National Parks and Wildlife Service (NPWS) promoted bushwalks or camping areas closer to the Project site.

Wollemi National Park lies to the east of the Project area and to the south of Bylong Valley Way. As a wildlife corridor it is continuous with Goulburn River National Park to the north. There are no promoted NPWS walking trails or camping areas on the north-western extent of the national park.

Bylong State Forest lies directly north of the Project area with the south-western extent of park within the visual catchment. There are no public walking trails or camping facilities within this part of the forest. The majority of the state forest lies to the north of the ridge line which contains the northern edge of the area of primary visual concern and the PVC.

The national parks and state forests would have high visual sensitivity however there are no recreational trails, lookouts or campsites within the visual catchment.

5.2.6 Major Roads

The major road in the locality is the Bylong Valley Way as illustrated in **Plate 5.6**.

Bylong Valley Way

The Bylong Valley Way is a picturesque, two lane sealed road. It is deemed to be a major road in the context of this assessment due to it being the regional connector road unlike other local roads that do not have this broader transport use. It links Wollar Road in the north to Upper Bylong Road, Budden Gap Road and Lee Creek Road and eventually linking to the Castlereagh Highway to the south. Bylong Valley Way also extends east from Wollar Road to the Golden Highway at Sandy Hollow. The Bylong Valley Way provides the main vehicle access to the Bylong Valley and is promoted as a tourist route by the Muswellbrook Chamber of Commerce & Industry Inc. The east – west section between Wollar Road and Sandy Hollow is part of the Greater Blue Mountains Drive.

Much of Bylong Valley Way is nestled between the Wollemi and Goulburn River National Parks. A number of regional activities and attractions are promoted as being accessed via this tourist route. It also provides access to a number of local and regional agricultural settlements and villages.

There are potential views heading south near the junction with Wollar Road looking toward a small section of Open Cut Project elements. While the existing topography and vegetation would screen most Project elements there is potential for partial views from this section of road. However, such views are restricted to the northern face of the north-Western OEA. This will quickly be established and rehabilitated in a period of up to two years and then will provide a visual screen to open cut mining activities behind it. The open pastures to the southern edge of the road limit foreground screening. There are also potential limited views from this road to the WAF.

As a tourist route, Bylong Valley Way has high sensitivity to views of the WAF, being less than 2.5 km from the road.

It has moderate sensitivity to any visible elements of the Project (namely the North-Western OEA) being between 2.5 km and 7.5 km away.

Wollar Road

Wollar Road – This subregional road heads west from Bylong Valley Way approximately 2 km north of Bylong Village. While there will be no views from this road to Project mining or infrastructure areas, there are potential views to the WAF. The WAF will be within 2.5 km of the road and will be a high sensitivity view from this location.

Bylong Valley Way and Wollar Road will have high sensitivity to any potential views to WAF open cut mining areas being less than 2.5 km distance. Beyond this, it roads will have reducing lower sensitivity due to increasing viewing distances.

5.2.7 Local Roads

There are a small number of local roads within the PVC and Project Boundary. These pass through agricultural and pastoral landscapes within the valleys as illustrated in **Plate 5.7**. These include:

- Upper Bylong Road – local route south and east from Bylong village following Bylong River and Lee Creek through agricultural pastoral areas;
- Lee Creek Road is continuous with Upper Bylong Road to the south of the Project Boundary; and
- Wooleys Road intersects Upper Bylong Road and travels in a west to east direction.

Upper Bylong Road and Lee Creek Road will have moderate to low sensitivity to open cut mining areas being less than 2.5 km distance. Beyond this, these roads will have lower sensitivity due to increased viewing distances.

5.2.8 Rural Residences

There are a limited number of rural residences spread throughout the PVC (refer **Figure 5.1**). Residences are associated with the various grazing and cropping farms on the flat areas, or with grazing lands on the surrounding undulating hills. There are a number of residences in Lee Creek and Upper Bylong Road that would have views and high sensitivity; however the majority of these have been purchased by KEPCO.

There are a limited number of residences outside of KEPCO owned lands within the PVC.

To the north-west there is the Tinka Tong residence and Bylong Village, which are generally unsighted due to intervening topographic and vegetation features. Any views of the Project from these locations would have a high visual sensitivity.

Residences to the west along Bylong Valley Way and Killens Road are screened from views of operational areas by intervening topography and vegetation to the east of Bylong Valley Way.

To the south, on Lee Creek and Budden Gap Roads there are a number of residences but these are also unsighted due to intervening topography.

To the east of the Project there are six residences - two remaining in private freehold ownership (refer **Figure 5.1**). Of these two, the residence furthest to the east (block ID 141) there is high potential for views between 2.5 kms and 7.5 kms away onto the eastern portion of the Eastern Open Cut mining area and OEA resulting in a moderate to high visual sensitivity where views of the Project are available. Aerial photographs identify some limited intervening vegetation which may partially filter views from this location (refer **Figure 5.2**).

The second freehold property (block ID 146) lies within a small valley to the south-east; it is screened from the Project by local topographic features (refer **Figure 5.2**). KEPCO owned property K29 would not have views of the Project due to topographic screening. KEPCO properties 15, 27 and 28 will have direct views onto eastern front of Eastern Open Cut, however as they are not private freehold, have low sensitivity to the mine development.

There are no private freehold rural residences to the north of the Project that would have visibility to the open cut mine areas.

Residences would have a moderate to high sensitivity where views of pre-rehabilitated open cut mining areas and OEAs are available.

5.2.9 Rural Lands

The predominant land use within the PVC is agriculture. There are minor areas of cropping and improved pastures on the flood plains (Flat Pastoral Lands LCU), with the more elevated slopes and cleared foothills used for grazing purposes (Undulating Pastoral Lands LCU) (refer **Plate 5.8**).

Pastoral land on the valley floor is generally flat or gently undulating with open views across large expanses of ground. Despite possibility for views onto Project elements, pastoral lands as a viewing location have a low visual sensitivity due to the rural primary production character of this land.

All of these pastoral/ agricultural areas in the PVC have a low visual sensitivity.

5.3 Summary

There are a number of residences that will have a high sensitivity to views of various Project elements due to proximity and the openness of the landscape in this locality. However the majority of these have been acquired by KEPCO therefore significantly reducing the sensitivity of the impacted views from these receptor locations as illustrated in **Figure 5.1**.

The remaining private freehold rural residences including Tinka Tong to the north-west and one property (141) in the Eastern view sector have high to moderate sensitivity to views of the Project elements. The second private freehold property (147) to the east will be screened by topographic features as illustrated in **Figure 5.2**.

Generally localised vegetation and topography also provides screening to views of Project elements from other sensitive receptors around the Project.

Bylong Valley Way is a promoted tourist route but also serves as the local and regional connector road. There is potential for glimpses of the various elements of the Project from the north-west; these views will be limited in extent and duration due to the nature of observation when moving in a vehicle. These potential views will be greater than 2.5 km from the open cut mine areas and are likely to be partially screened by intervening topography and vegetation thereby reducing sensitivity to moderate.

Local rural roads, pastoral/ agricultural land and the Sandy Hollow to Gulgong Rail Line all are ascribed low visual sensitivity even though they may be located within close proximity to the mine areas.

In the context of this rural setting, existing vegetation between view locations and Project elements is a changing part of this landscape. It will increase visual screening as trees and shrubs mature and canopies fill out, thereby reducing sensitivity of view locations. However views windows can also open in events such as fire and die back where defoliation results in loss of view filtering.

Any proposed revegetation and tree planting which forms part of the rehabilitation and biodiversity offsets aspects of the Project will, over time, contribute to the filtering of views and reduction of viewpoint sensitivity. This is further discussed in **Section 8** – Mitigation.

Plate 5.1 | *Topographic Features*

Includes escarpment, hills, mountains and small and large knolls. These elements create visual screens to the Project as well as features within the landscape.

Plate 5.2 | *Vegetation*

Vegetation is an effective visual screen when it occurs in the foreground of views in locations such as roadsides or around rural residences.

Plate 5.3 | *Bylong Village*

Plate 5.4 | *Equine CIC properties*

These are visual receptors that will have a high sensitivity within the PVC. Often tree plantings, garden landscapes and/ or view orientation screens the Project from view of private residences.

Plate 5.5 | *St. Stephen's Anglican Church and cemetery*

This active community facility on outskirts of Bylong Village would have a high sensitivity to changes in the landscape and visual amenity.

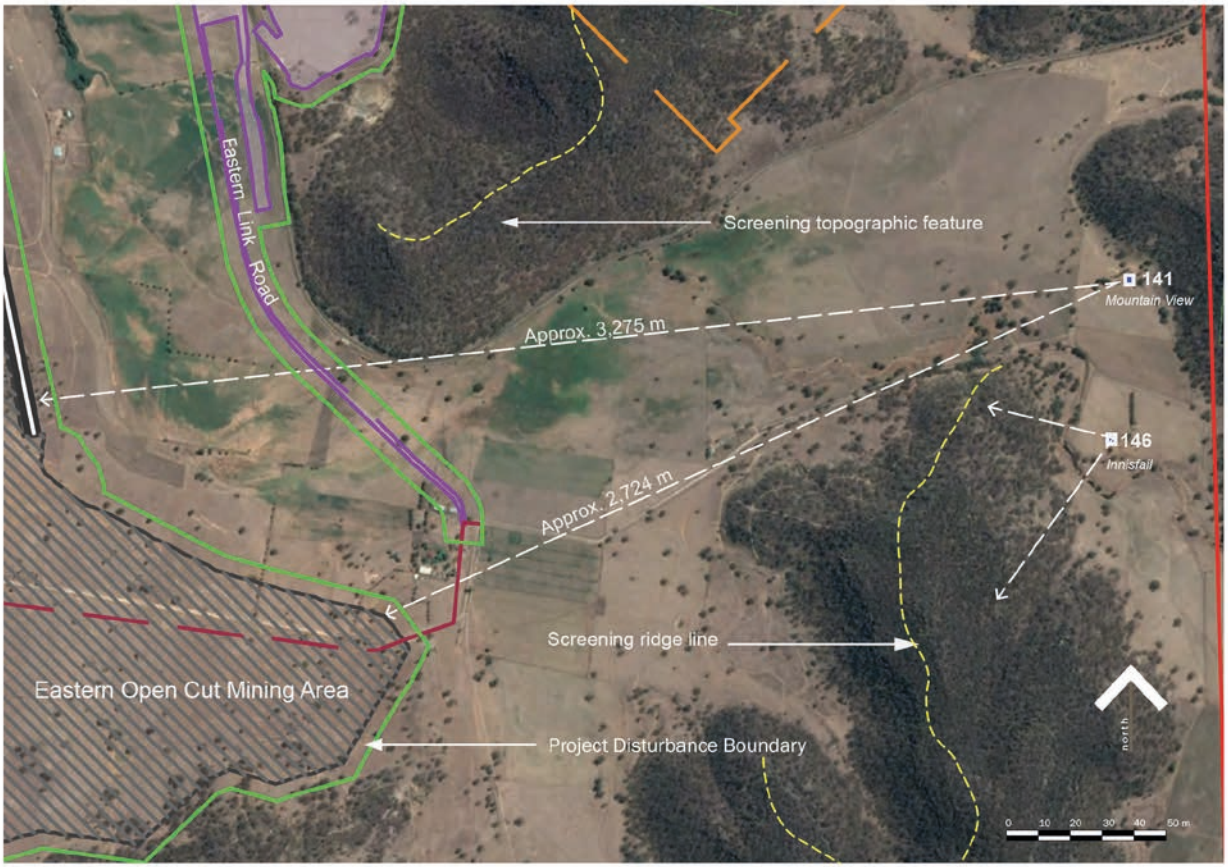


Figure 5.2 | *Private freehold residence to east of Project Disturbance Boundary*

One residence is completely screened by ridge and vegetation. The other may have a narrow field of view through a filter of open woodland.

Plate 5.6 | *Bylong Valley Way*

This designated tourist road would have a high sensitivity where views are available within 2.5 kms of the Project area.

Plate 5.7 | *Rural roads - Upper Bylong Road*

Local roads like this would have moderate to low sensitivity close to the Project Boundary reducing to very low as viewing distance increases.

Plate 5.8 | *Rural production areas*

These areas which include cropping and grazing lands have low visual sensitivity.

6. VISUAL EFFECT

The potential sensitive viewing locations (receptors) in the vicinity of the Project have been defined in detail in **Section 5** of this report.

This section further defines the visual effect of various Project elements on view locations within the PVC as discussed in **Section 4** above. To assess the visual effects of Project elements, views were considered from the north, south, east and west view sectors.

The visual effects were considered from a number of representative viewing locations within the PVC and have also been assessed through photomontage development and cross sectional representation of changes to landform as a result of the Project. The representative viewing locations used in this photomontage assessment are shown in **Figure 6.1**.

The photomontage locations were selected to illustrate a range of typical views as seen from the various sectors and to represent sensitive viewing locations within the PVC. The photomontage locations were selected from numerous sites where photography and GPS coordinates was taken during the field survey component of this assessment.

The cross section locations were selected to illustrate the line of sight views to potential alteration to the existing landform, specifically cliff lines, due to Project operations from adjacent Upper Bylong Road.

The level of visual impact on receptors is discussed in **Section 7** based on the consideration of the key elements of the Project (**Section 4**) and receptor sensitivity (**Section 5**).

6.1 Photomontage Illustration of Visual Effect

The visual effect of the Project is illustrated in part by photomontage illustration. These photomontages show what can be seen in the existing landscape setting and the proposed visual character of Project elements from six representative locations selected within the PVC. The locations of the photomontage views are illustrated on **Figure 6.1**.

The photomontage locations were selected to illustrate a range of visual effects of the Eastern OEAs and Eastern Open Cut from Wooleys Road (refer **Figure 6.2**) and the North-Western OEA from Upper Bylong Road (**Figure 6.3**) and three locations on Bylong Valley Way (refer **Figures 6.4**, **6.5** and **6.6**) .

6.1.1 Wooleys Road – Eastern View Sector - Viewpoint 1 – Figure 6.2.

Existing View: Refer **Figure 6.2(a)**: Views westward across flat pastoral LCU and Lee Creek Valley flood plain towards ridges, actively stocked with cattle with farm residence and outbuildings (KEPCO purchased). Lower foothills of the northern ridgeline can be seen to right of view. Sandy Hollow to Gulgong Railway line is located at the base of this ridgeline.

Though this road will be closed, the assessment of these photomontage views is relevant for sensitive receptors near this location in the Eastern view sector. This is discussed further in **Section 7**.

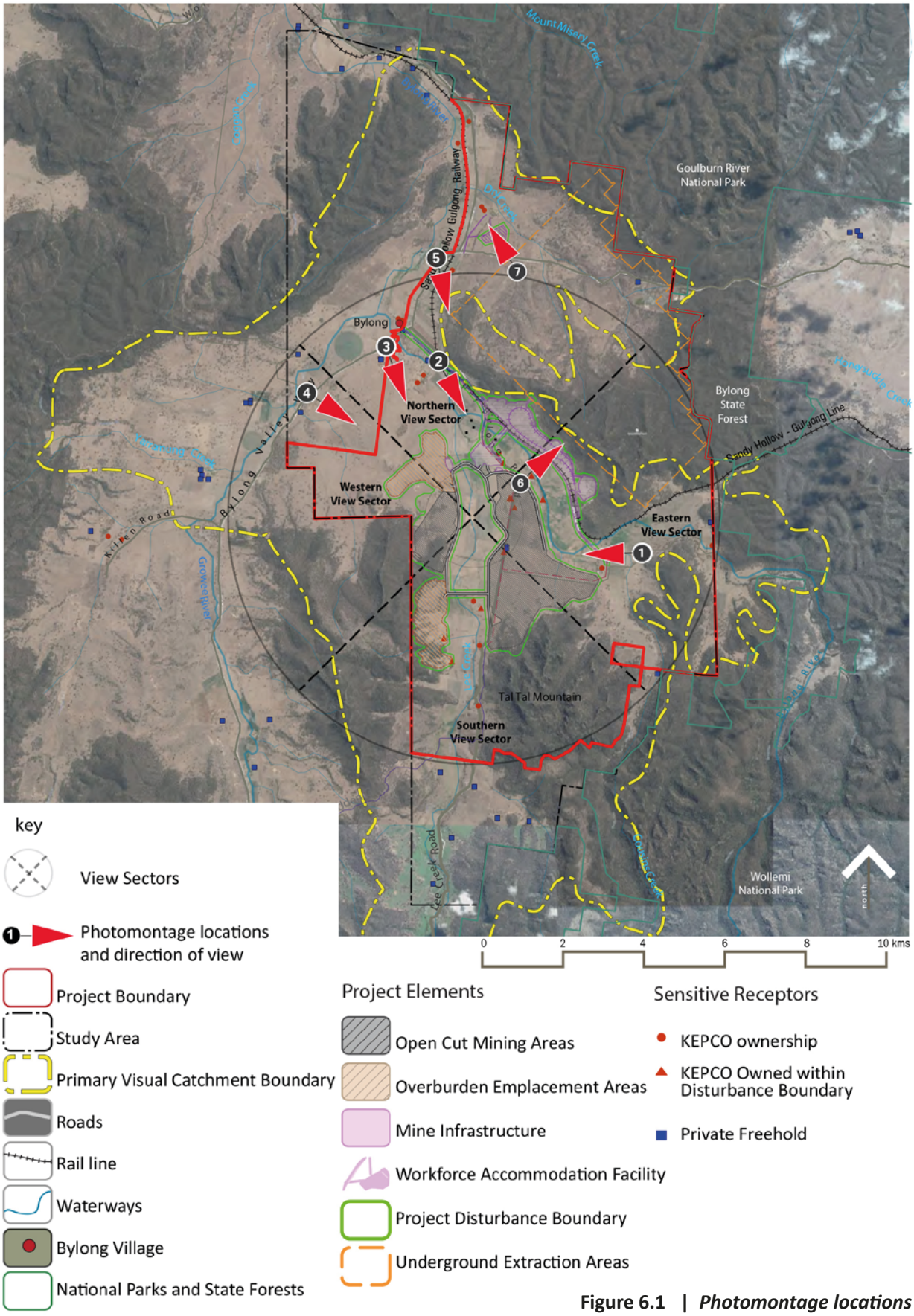


Figure 6.1 | *Photomontage locations*

Year 3: At year 3, initial disturbance of the Western Open Cut has commenced, visible due to tree removal and some ground disturbance on the gently sloping valley floor. Topsoil stockpile areas would be visible as low linear light coloured contrasting bands in the ground plain prior to grass cover establishment as illustrated in this view. Outside the photomontage setting, visible from receptors near this location in the Eastern view sector, are parts of the North-Western OEA and the Eastern Open Cut disturbance areas.

To the left of this view, is the South-Western OEA visible above and behind the nearer Eastern toposoil stockpile, as the light coloured contrasting zone at base of the ridgeline. Access haul road to this dump zone is also visibly along base of ridgeline.

Generally the views to all disturbance zones are partially filtered by intervening vegetation.

Year 5: This photomontage view of mine development at Year 5 illustrates rehabilitated North-Western OEA and stockpile, now demonstrating a degree of visual integration with surrounding slopes. Disturbance areas and haul roads associated with Western Open Cut is now visible at the base of ridgeline middle of panorama. The colour contrast levels at this stage are high. Disturbance areas and OEAs associated with the Eastern Open Cut are visible in the middle ground. Pre-rehabilitated OEAs and exposed open cut are visible.

Year 7: Photomontage views from this location at Year 7 illustrate well-integrated lower faces North-Western OEA. Upper slopes and areas of topsoil stockpile can be detected due to the colour contrast with surrounding rural areas.

The northern extent of Eastern OEA demonstrates initial rehabilitation, which reduces its visual contrast and visual effect The Western Open Cut and haul roads are now highly on ridge eastern face due to contrast in colour and texture of mine face against the woodland setting of this ridgeline.

Active Eastern Open Cut mine disturbance areas are visible below the visible Western Open Cut disturbance area. This Eastern Open Cut extends across approximately half the view. Behind this can be seen the South-Western OEA with initial rehabilitation which lowers visual contrast and therefore visual effect.

Year 10: By Year 10 the Eastern OEA restoration is well advanced with grassland and tree growth starting to become evident. The elevation of the Eastern OEA to the left of photomontage has increased and screens views of the South-Western OEA. A contrast level of the disturbance areas is high, however for all rehabilitated areas, the visual effect is being reduced to low levels.

6.1.2 Upper Bylong Road – Northern View Sector - Viewpoint 2 – Figure 6.3

Views are to the south and south-east from Upper Bylong Road in the north view sector. Photomontage views are across open pastoral land onto northern faces of the two North-Western and Eastern OEAs over the development of the mine.

Existing View: Refer **Figure 6.3(a)**. Existing view is open flat terrain backgrounded by the small series of ridges running north south. Views to location of North-Western OEA are open, where views to the Eastern OEA and topsoil stockpile area are screened by foreground vegetation.

Year 3: Refer **Figure 6.3(b)**. This view illustrates the initial raised ridge line profile of the North-Western OEA in the east of this view. Landform and texture appears similar to existing. Grass rehabilitation has been implemented and has lowered visual effect to moderate by reducing colour contrast.

Year 5-7: Refer **Figure 6.3(c)** and **(d)**. The rehabilitated North-Western OEA profile remains constant. Texture and colour contrast have been further reduced by established rehabilitation of OEA face, minimising visual effect.

Year 10: Refer **Figure 6.3(e)**. Rehabilitated to the North-Western OEA is well established, with grass cover helping to visually integrate the OEA faces with surrounding landscapes.Visual effect has been reduced.

6.1.3 Bylong Village/ Sunnyside – Western View Sector - Viewpoint 3 – Figure 6.4

Views are to the south-south-east from the edge of Bylong Village towards the North-Western OEA. As with much of Bylong Village, the views in this direction are partially screened by open woodland vegetation between the viewing location and visible elements of the Project. There are no perceptible views of the Project elements (including the northern face of the North-Western OEA) through intervening vegetation and topography. This is typical of many western viewing locations within the Growee Valley.

Existing View: Refer **Figure 6.4(a)**: is across a gentle slope to a series of hills in the middle ground. Both the slopes and hills are covered by grassland with scattered trees, with more heavily forested hills in the background. The Project Disturbance Boundary is located at the foot of the hills in the middle ground.

Year 3 - 9: Refer **Figure 6.4(b)**. There is no visible alteration to the existing vegetation, topography or landscape character as viewed from this location from the existing view through to Project Year 9. There are no views to Project elements.

6.1.4 Bylong Valley Way (South) – Western View Sector - Viewpoint 4 – Figure 6.5

This location was chosen to represent views to the south from Bylong Valley Way towards the North-Western OEA.

Existing View: Refer **Figure 6.5(b)**: is across a gentle slopes and plains landform to a series of hills in the middle ground. Both slopes and hills are predominantly covered by grassland, with scattered trees with forested ridge lines and hills in the background.

Year 3 to 9: Refer **Figure 6.5(b)**. White line indicates upper limit of OEA over life of open cut mine. There is no visible alteration to the existing vegetation, topography or landscape character as viewed from this location. There are no views to Project elements.

6.1.5 Bylong Valley Way (North) – Northern View Sector - Viewpoint 5 – Figure 6.6

Views are to the south and south-east from Bylong Valley Way near Bylong Village (a promoted tourist route and sensitive viewing location). Views are towards the Project Disturbance Boundary and the North-Western OEA.

Existing View is across open fields with scattered trees and grassland, towards the gentle slopes in the background where the western extent of the North-Western OEA will be located (refer **Figure 6.6(a)**).

Years 3 to 9: Refer **Figure 6.6(b)**. White line indicates upper limit of OEA over life of open cut mine. There is no visible alteration to the existing vegetation, topography or landscape character as viewed from this location. There are no views to the Project elements from this location.

6.1.6 Upper Bylong Road – Mine Infrastructure Area – Northern View Sector - Viewpoint 6 – Figure 6.7

Existing: The existing view illustrates the open agricultural landscapes on the valley floor and foot slopes to the south of the adjoining steep forested mountain range. This range will provide visual enclosure and dominance over infrastructure elements.

Constructed and operational site:

At Project inception, the largest visual effect will be created by the cuttings into the southern foot slopes of the adjoining range. The raw earth and rock cut will contrast strongly in colour to the adjoining forested hills from which they were formed. Buildings, structures and the coal stockpiles will also contrast in form, shape and line. Most of the contrast will be created by the coal stockpiles viewed against the light coloured soil and rock as opposed to the darker more textured forest. Restoration of cut slopes and landscape treatments of the southern boundary of the Mine Infrastructure Area will greatly increase the screening/integration of the built forms and changes to topography.

6.1.7 Workforce Accommodation Facility – Bylong Valley Way – Northern View Sector Viewpoint 7 – Figure 6.8

This viewpoint has been chosen to represent the view as a viewer passes by at rural road speeds. There is approximately 1,450 m of road frontage where there would be potential views to the WAF.

Existing: This view from Bylong Valley Way (west of Wollar Road intersection) looking north-west towards site of proposed WAF. The general character of landscape in view is rural Flat Pastoral LCU in foreground with Forested Hills and Ridges LCU providing the backdrop. Large trees in the middle ground grow along a drainage line. The line of vegetation visible in background is an established avenue of trees growing along the existing driveway to Bylong Station Homestead. The homestead can be seen in the distance (refer **Figure 6.8 (a)**).

Power lines, rural fences and a water tank are part of this common rural landscape.

As constructed (refer **Figure 6.8 (b)**): This view illustrates the vertical and horizontal scale of the proposed WAF as well as the extent of the view occupied by the facility at a distance of approximately 700m without any foreground trees and poles. It also illustrates the proposed forest tone colours and reflectivity of the new facilities within this rural landscape.

A more accurate illustration of the view following establishment of the planned tree screening in 1 to 2 years is shown in **Figure 6.8 (c).** This view also demonstrates the effect intervening foreground trees and poles which filter the views and break up the horizontal mass of the buildings. Glimpses of the building can be seen through the vegetation. The view towards the WAF from this location will show a consistent mass of vegetation with little to no visual effect created by the buildings.

This view location was selected as a conservative view towards the proposed WAF site as seen by drivers along Bylong Valley Way heading west towards the Bylong Valley. It is taken at the point from where views of the facility will become available and fall within the moderate to high impact zone (<750m from visible Project element). The WAF will occupy more of the primary view area as distance from proposed site decreases thereby resulting in higher visual effect and visual impact.

However this will be up until the end of Project Year 6 at which time the buildings will be dismantled and site rehabilitated following decommissioning af the facility.

6.2 Cross Sectional Illustration of Visual Effect – Subsidence Impacts to Cliff Formations

Cross sections have been developed to illustrate the relationship of significant cliff lines and potential subsidence (rock falls) in a line of sight as a result of underground mine operations. The EIS Subsidence Impact Assessment (MSEC, 2015) has identified and assessed nine significant cliff lines relevant to the underground mine operations.

Figure 6.9 identifies cross section locations demonstrating the visibility, or otherwise, of the sensitive cliffs.

The EIS Subsidence Impact Assessment has identified the following:

- Cliffs C1, C2 and C3, nearest Upper Bylong Valley Road and in lines of sight have been assessed as 'likely to be substantially protected' from mine induced subsidence because of the mine design.
- Cliff C4 is also protected from subsidence but not as much as C1 to C3;
- Cliffs C5, C6 and C9 have highest potential for subsidence; and
- Cliffs C7 and C8 have potential for disturbances and perceptible impacts.

6.2.1 Visual Cross Section Location Lines

Potential for visual effects of underground mine operations on sensitive cliff lines will be assessed using following cross sections as illustrated in **Figure 6.10 and Figure 6.11** as well as review of aerial photography of local vegetation patterns.

Section A-A: Cliffs C3 and C6

Viewpoint on Upper Bylong Road - direction of view to the north-east. Line of sight to the more subsidence susceptible C6 is screened by intervening ridgeline and C3 cliff line. This cliff line is considered to be secure from mine operations induced subsidence.

Visual effect from Upper Bylong Road will be low.

Section B-B: Cliffs C2 and C5

Viewpoint on Upper Bylong Road - direction of view to the north-east. Line of site to the more subsidence susceptible C5 is screened by intervening ridgeline and C2 cliff line. This cliff line is considered to be secure from mine operations induced subsidence.

Visual effect from Upper Bylong Road will be low.

Section C-C: Cliff C5

Viewpoint on Upper Bylong Road - direction of view to the east. Line of site to the more subsidence susceptible C5 is screened by intervening ridgeline. This ridgeline contains Cliffs C1 and C4 either side of the line of sight. This cliff line is considered to be secure from mine operations induced subsidence.

Visual effect from Upper Bylong Road will be low.

Section D-D: Cliff C9

Viewpoint on Bylong Valley Way - direction of view is to south-south-west from Bylong Valley Way to Cliff C9. Line of site is over 2.5kms distance. The C9 cliff line faces north and has limited exposure to Bylong Valley Way due to a spur to the west of C9 cliff line. It also has limited lateral scale but exhibits cliff heights within the 15 metre range).

Adjacent to the cross section line D-D is private freehold property (non-residential), located on the south side of Bylong Valley Way. From desktop study it appears to be an extraction and stockpiling operation (quarry). It is located at a topographic low point and is visible from Bylong Valley Way.

Within this view there is potential to also see the C5 and C6 cliff lines from the viewpoint on Bylong Valley Way as they both lie within an enclosed valley formed by adjacent ridgelines. The section line D-D illustrates unimpeded line of site over gently rising topography towards these cliffs. Review of aerial photographs of view location on Bylong Vally Way illustrates available glimpses of cliff lines C9, C5 and C6 available along a stretch of road adjacent the quarry. Either side of this stretch, local topography or roadside vegetation limit views towards these cliffs.

According to the MSEC report (May 2015) cliff lines C9, C5 and C6 are considered at risk of experiencing rock falls along some aparts of their length as a result of the proposed mining.

Visual effect from Bylong Valley Way will be low based on a Category 2 Visual integration, occupying less than 10% of the primary view shed (refer **Table 2.1***).*

Photo courtesy of Google Earth

Plate 6.1 | *Cross Section D-D viewpoint - Bylong Valley Way*

Existing views at viewpoint towards cliff lines C9 and C5

Section E-E: Cliff C7

Viewpoint is from private freehold residence (#146). Direction of view is 4.2kms to the north-north-west towards Cliff C7. This cliff line is considered to be potentially susceptible to subsidence impacts from mine operations. Line of sight to Cliff C7 is screened by intervening topography.

As there are restricted views to potential visual impacts, visual effect from Residence #146 will be low.

Section F-F: Cliff C8

Viewpoint is from private freehold residence (#141). Direction of view is 1.5kms to the north-west towards Cliff C8. This cliff line is considered to be potentially susceptible to subsidence impacts from mine operations. Line of sight to Cliff C8 is open with limited intervening vegetation to provide screening, though there may be on-site conditions such as residential gardens which provide some visual screening.

As there are unrestricted views to potential visual impacts at distance of 1.5kms, visual effect from Residence #141 will be moderate.

Section G-G: Cliff C8

Viewpoint is from Wallys Road. Direction of view is 1.5kms to the north-north-west towards Cliff C8. This cliff line is considered to be potentially susceptible to subsidence impacts from mine operations. Line of sight to Cliff C8 is open with limited intervening vegetation to provide screening.

As there are unrestricted views to potential visual impacts at distance of 1.5kms, visual effect from Wallys Road will be moderate.

Figure 6.2(a) | *Photomontage Location 1- Wooleys Road - Existing view*

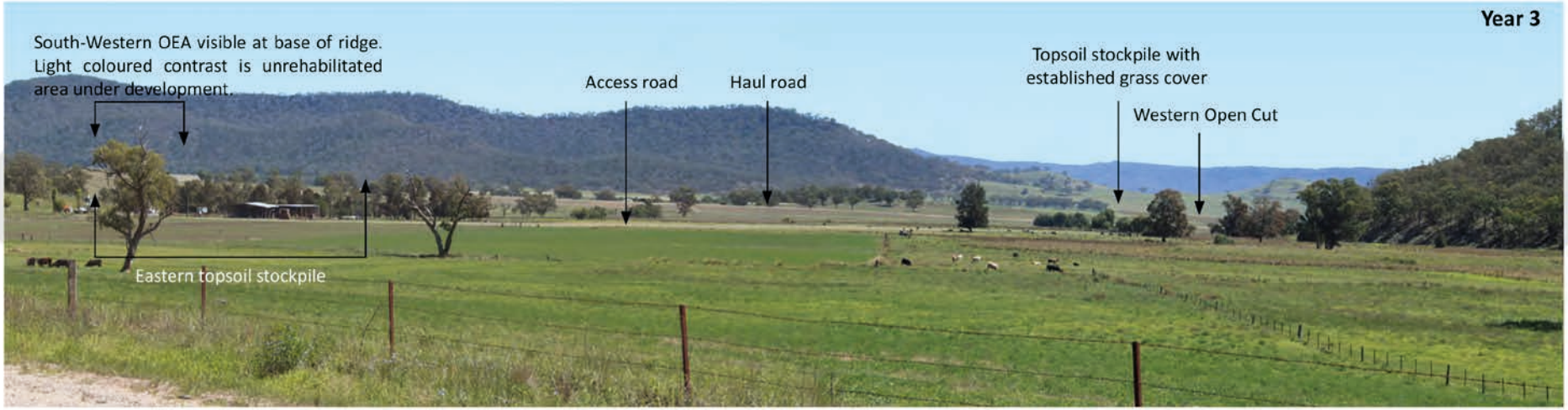


Figure 6.2(b) | *Photomontage Location 1 - Wooleys Road - Year 3*

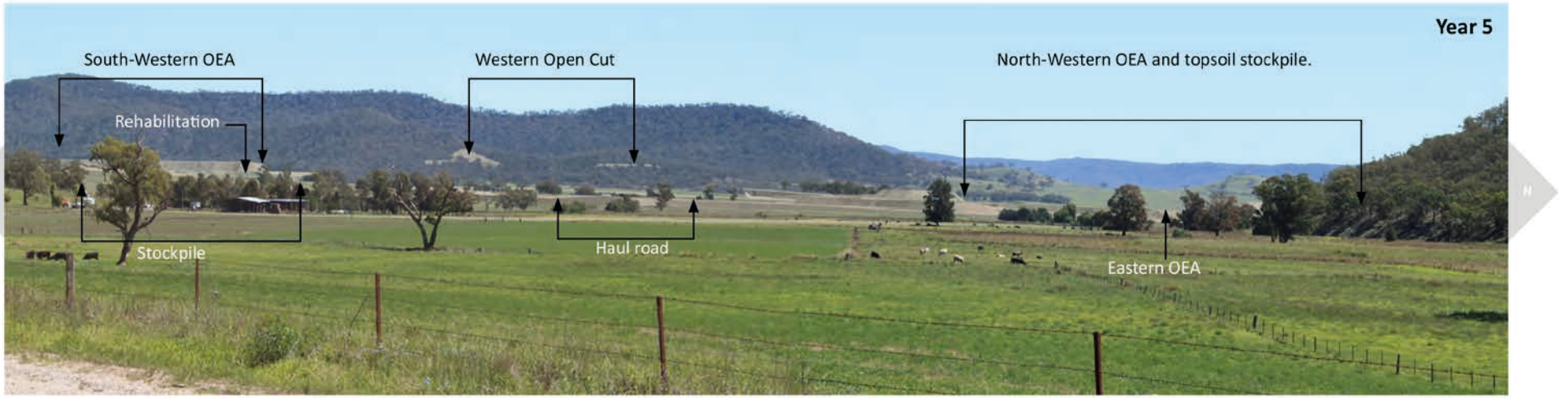


Figure 6.2(c) | *Photomontage Location 1 - Wooleys Road - Year 5*

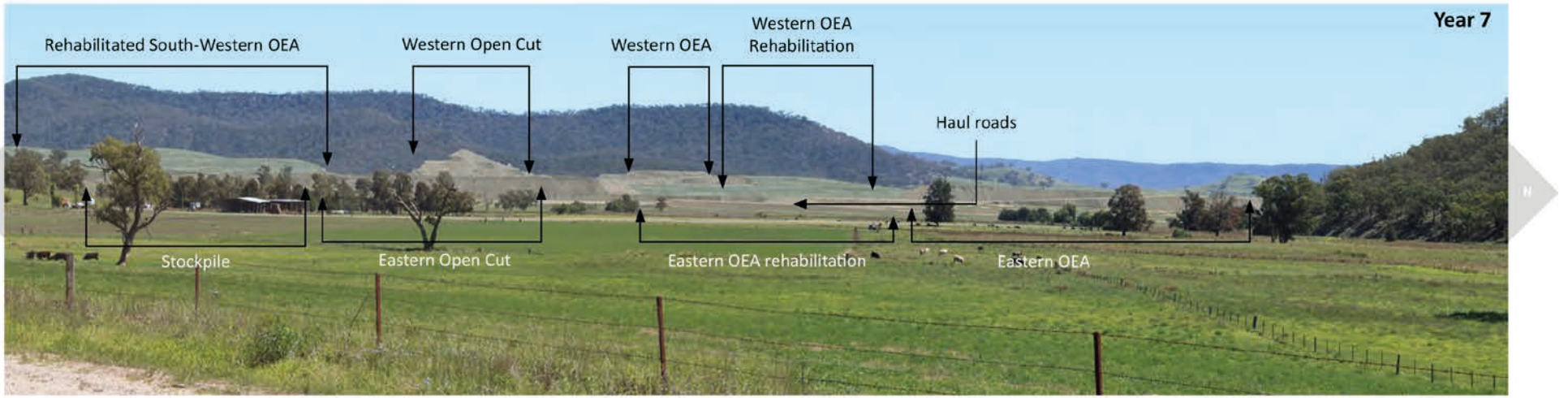


Figure 6.2(d) | *Photomontage Location 1 - Wooleys Road _ Year 7*

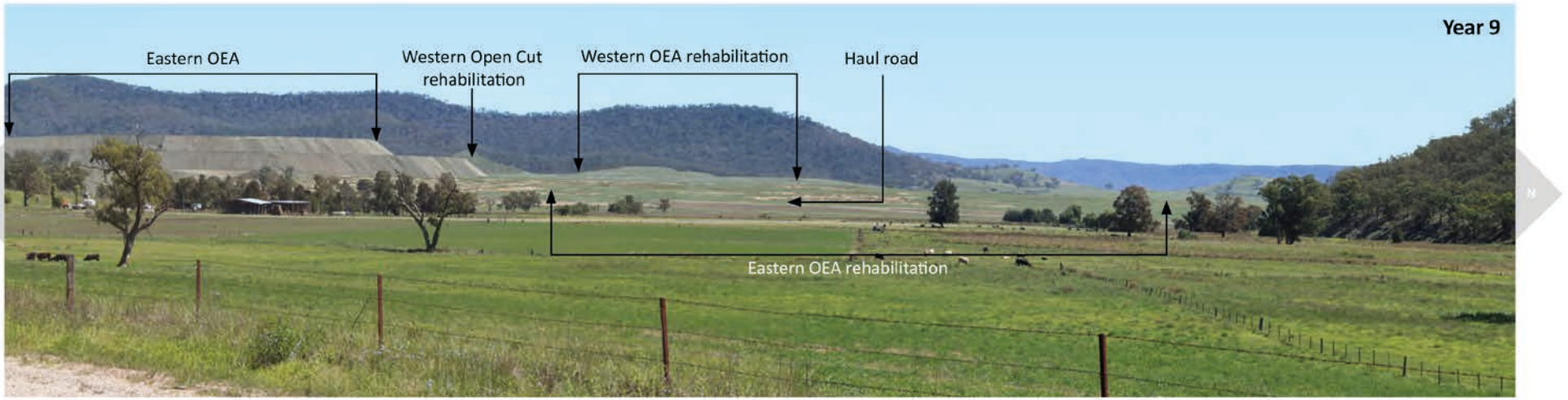


Figure 6.2(e) | *Photomontage Location 1 - Wooleys Road - Year 9*

Figure 6.3(a) | *Photomontage Location 2 - Upper Bylong Road - Existing view*

Figure 6.3(b) | *Photomontage Location 2 - Upper Bylong Road - Year 3*

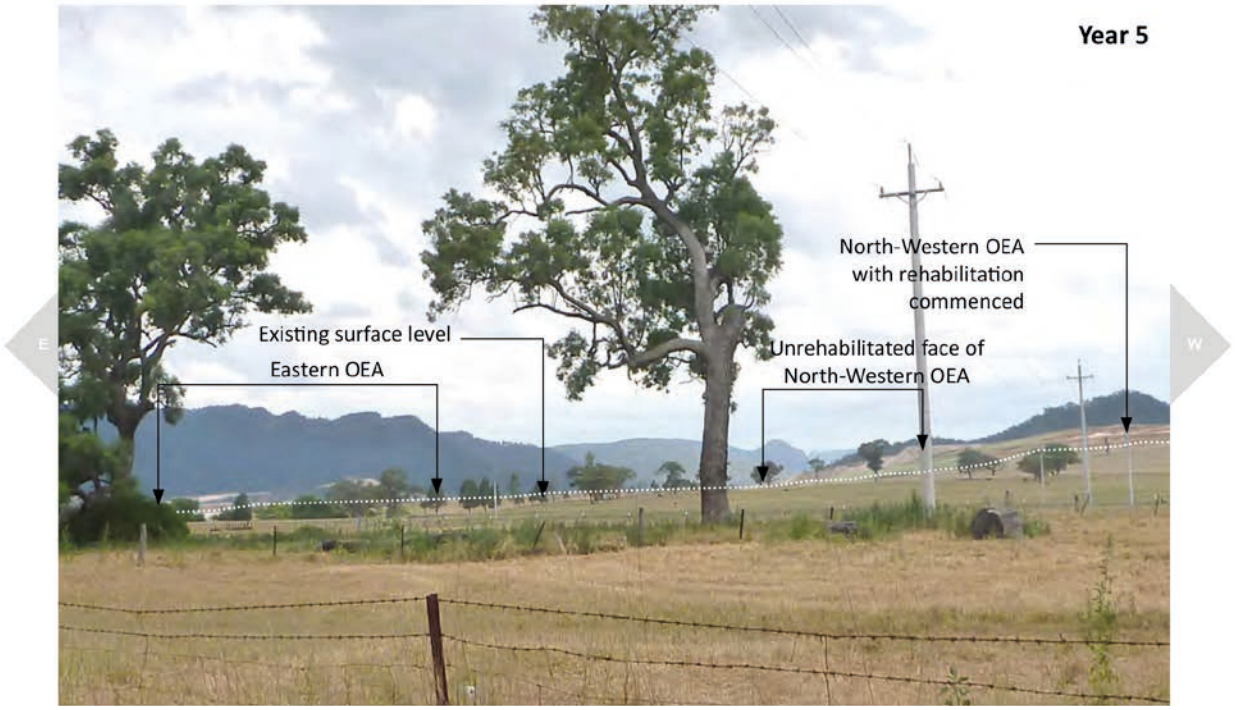


Figure 6.3(c) | *Photomontage Location 2 - Upper Bylong Road - Year 5*

Figure 6.3(d) | *Photomontage Location 2 - Upper Bylong Road - Year 7*

Figure 6.3(e) | *Photomontage Location 2 - Upper Bylong Road - Year 10*

Figure 6.4(a) | *Photomontage Location 3 - Bylong Village/ Sunnyside - Existing view*

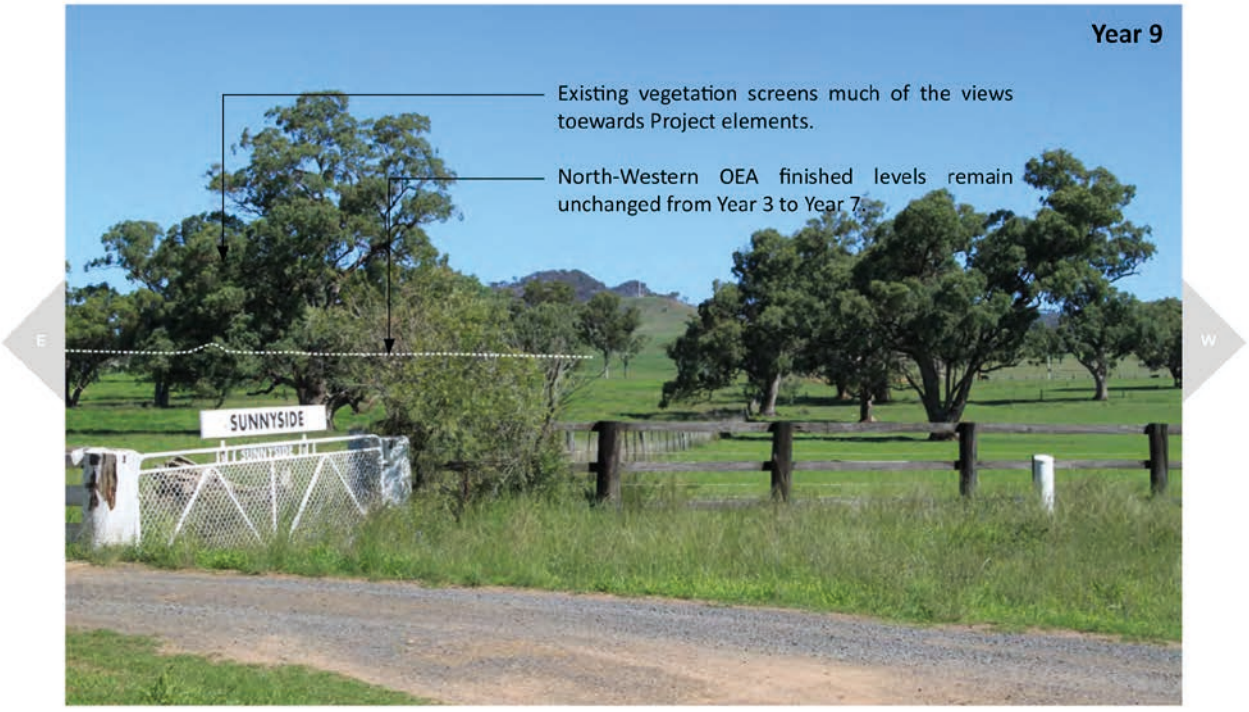


Figure 6.4(b) | *Photomontage Location 3 - Bylong Village/ Sunnyside - Upper mine limit - Year 9 and all mine years*

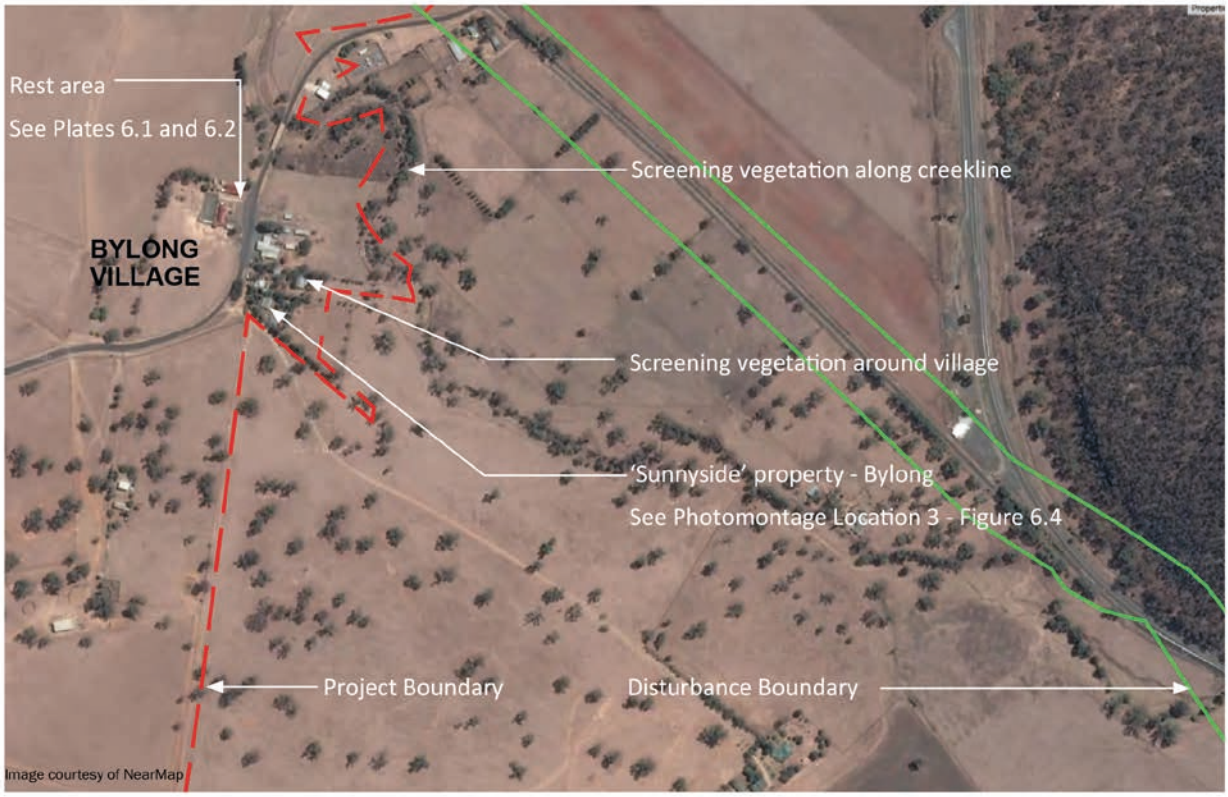


Figure 6.4(c) | *Aerial View of Photomontage Location 3 - Bylong Village/ Sunnyside*

Plate 6.1 and 6.2 | *Views east and south-east towards Project area*

Photo location:Tourist Information sign / Rest Area on Bylong Valley Way - Bylong Village

Figure 6.5(a) | *Photomontage Location 4 - Bylong Valley Way (South) - Existing*

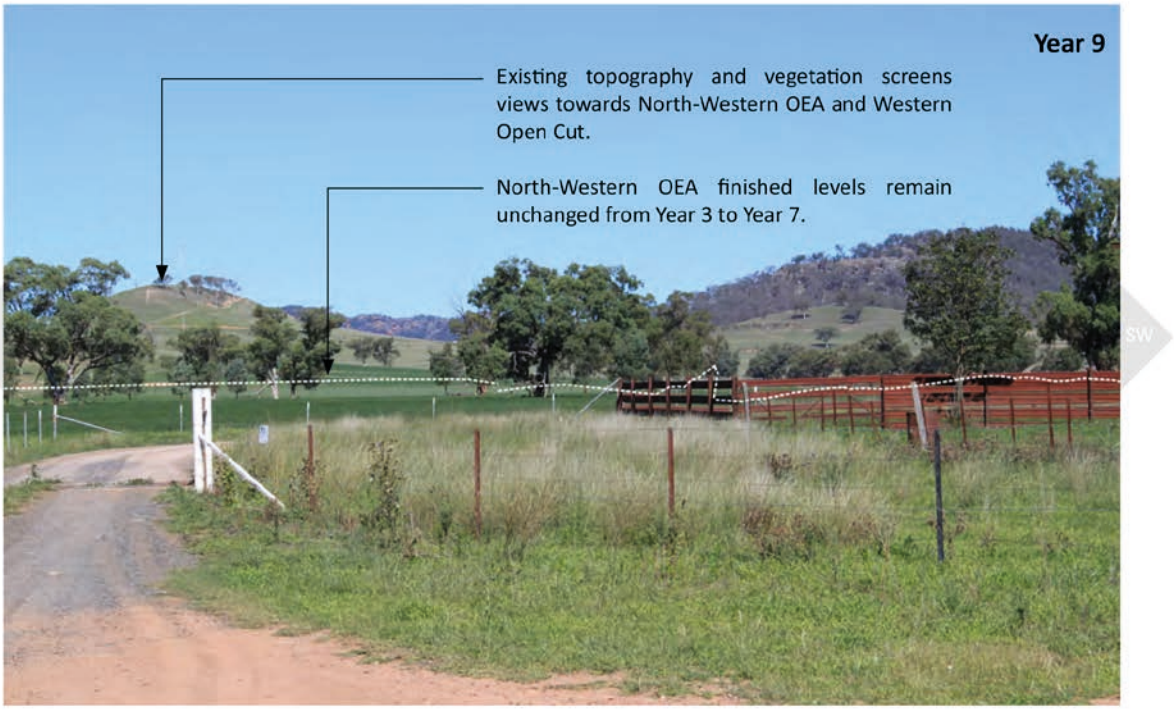


Figure 6.5(b) | *Photomontage Location 4 - Bylong Valley Way (South) - Upper mine limit - Year 9 and all mine years*

Figure 6.6(a) | *Photomontage Location 5 - Bylong Valley Way (North) near intersection with Wollar Road- Existing*

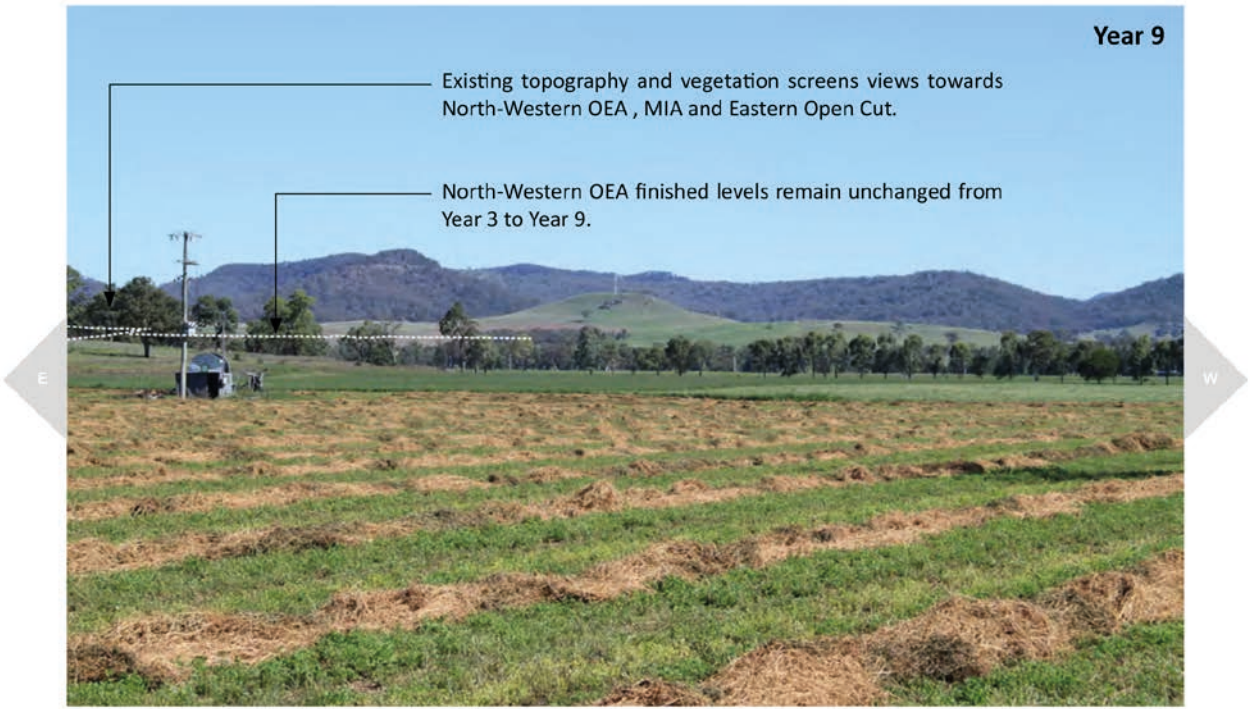


Figure 6.6(b) | *Photomontage Location 5 - Bylong Valley Way (North) near intersection with Wollar Road - Upper mine limit - Year 9 and all mine years*

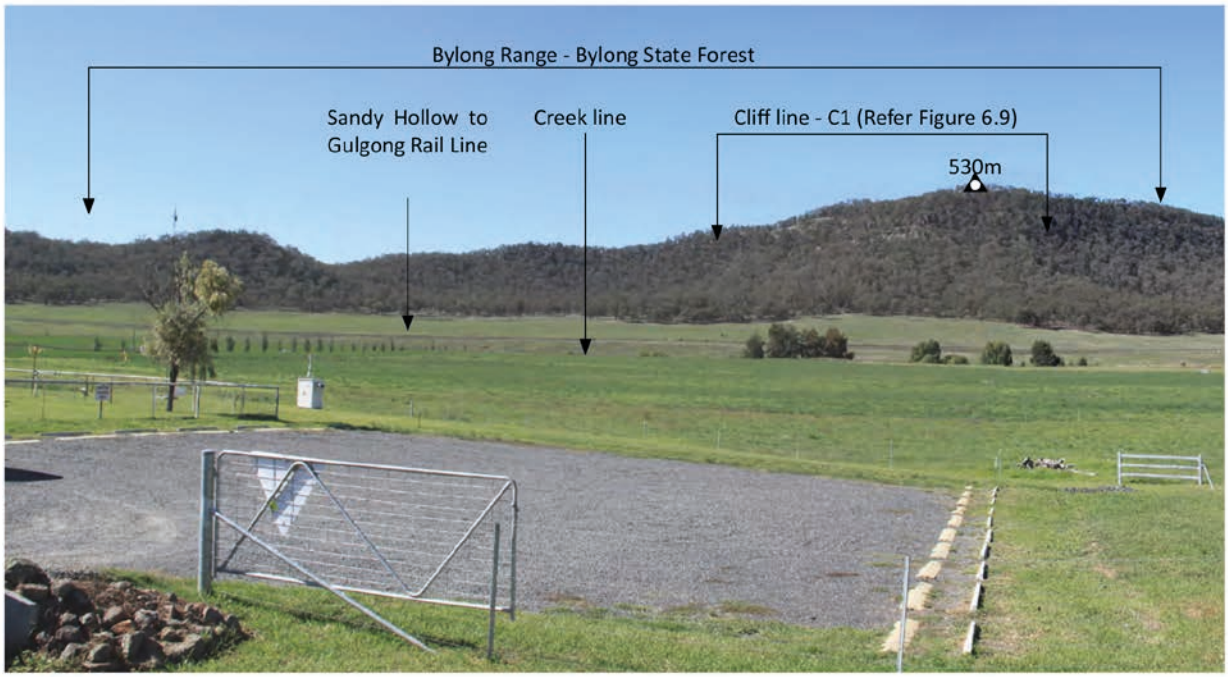


Figure 6.7(a) | *Photomontage Location 6 - Mine Infrastructure Area - Existing*

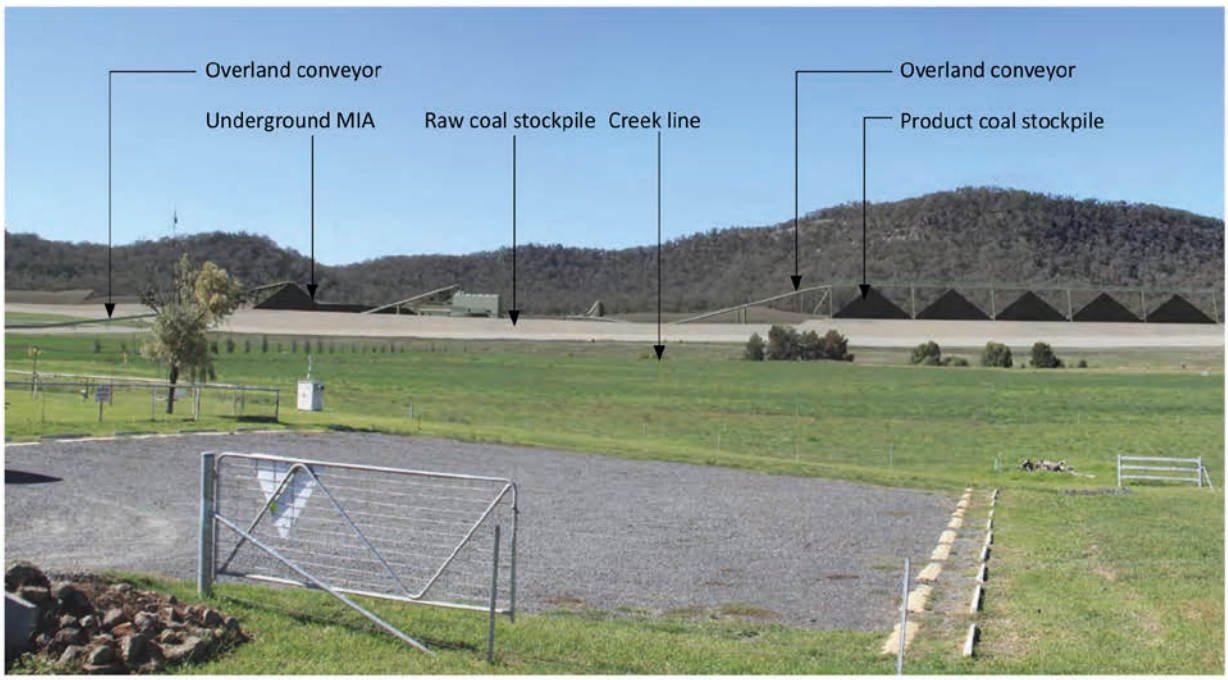


Figure 6.7(b) | *Photomontage Location 6 - Mine Infrastructure Area - View from Site Office*

Figure 6.8 (a) | *Photomontage Location 7 - Workforce Accommodation Facility - Bylong Valley Way*

Existing - 70mm lens view towards WAF site.

Figure 6.8 (b) | *Photomontage Location 7 - Workforce Accommodation Facility - Bylong Valley Way - without foreground elements*

Figure 6.8 (c) | ***Photomontage Location 7 - Workforce Accommodation Facility - Bylong Valley Way - with roadside tree screening at 1 year growth***

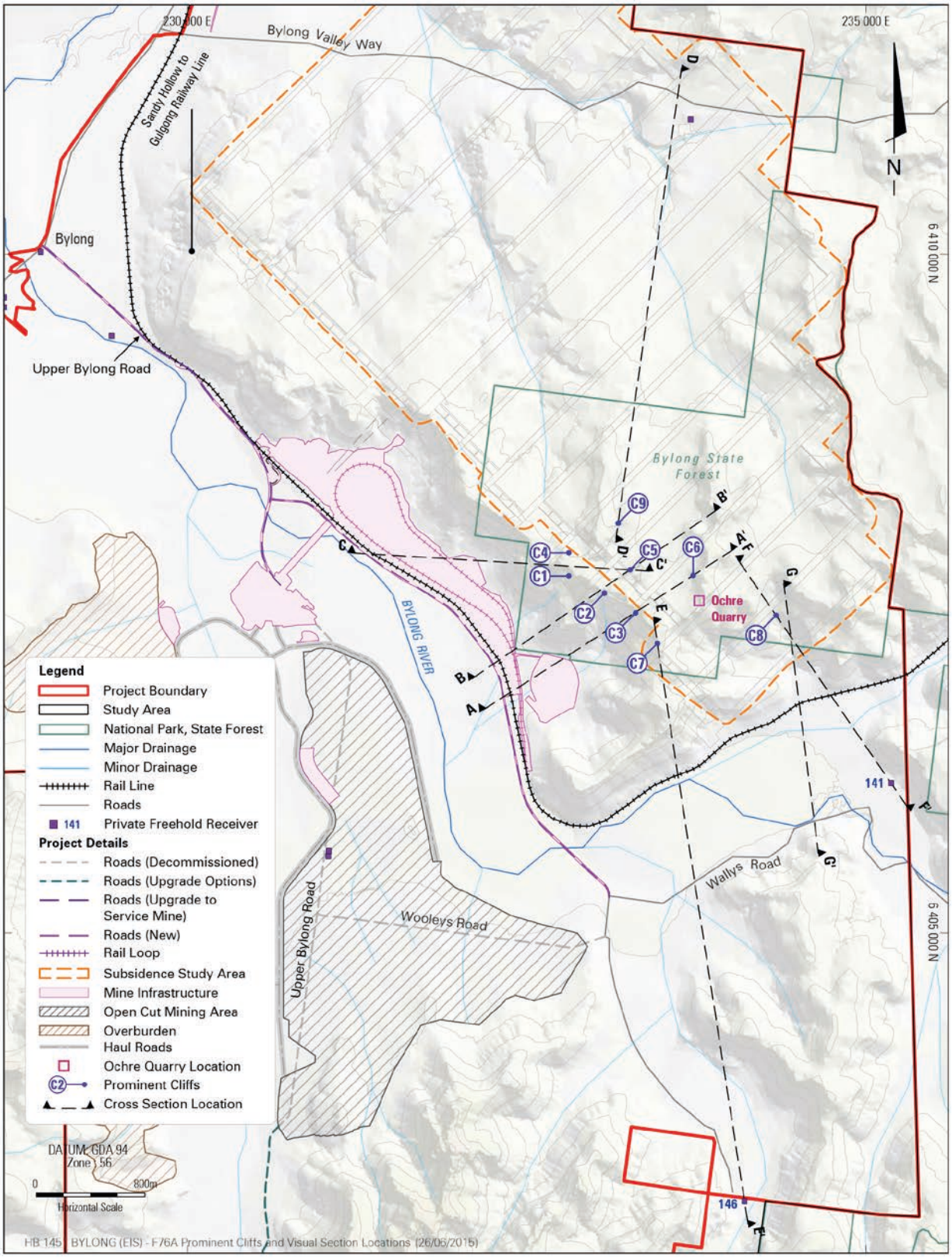


Figure 6.9 | *Sensitive Clifflines and Visual Cross Section Locations*

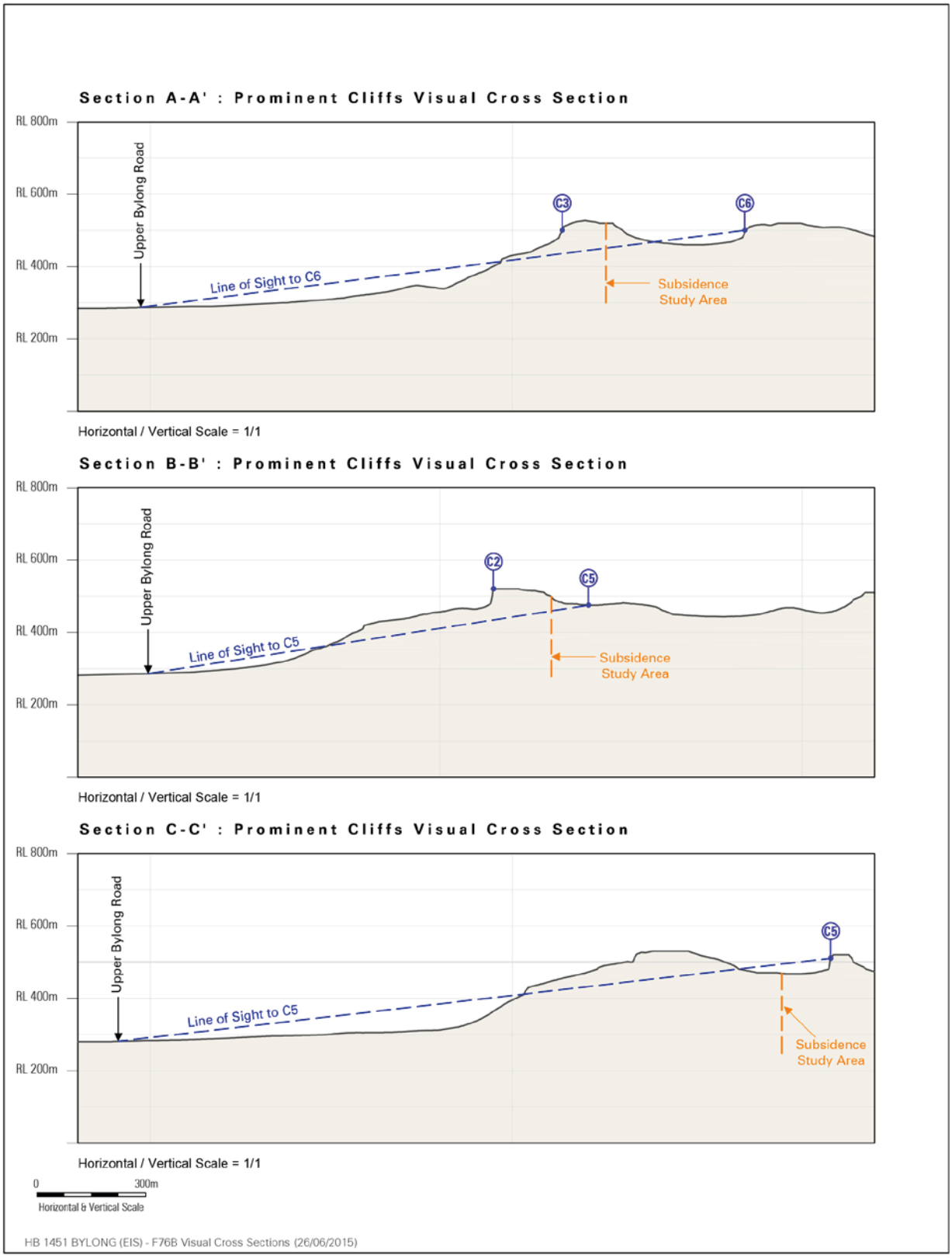


Figure 6.10 | *Visual Cross Sections to sensitive cliffs from Upper Bylong Road*

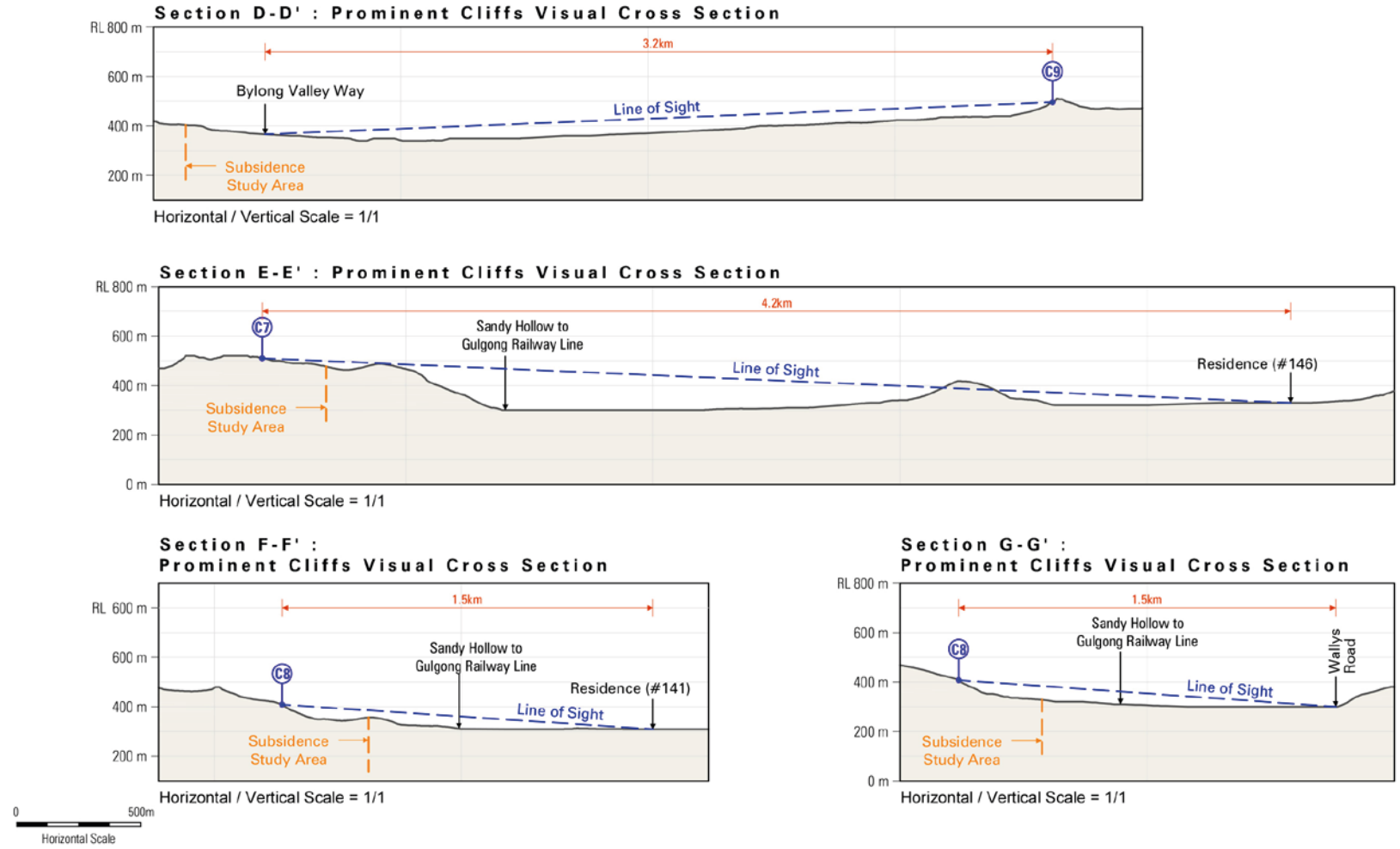


Figure 6.11 | *Visual Cross Sections to sensitive cliffs from other key viewpoi*

7. VISUAL & LANDSCAPE IMPACT

This section considers the visual and landscape impact of the Project based on visual sensitivity values of receptors and visual effects of Project elements as well as a consideration of the Project in the broader regional landscape. The visual sensitivity levels of the Project were discussed in Section 5 of this report. The visual effects of the various elements of the Project were discussed in Section 6 of this report.

The impact will vary according to the visual effect of the Project, its visibility, and the visual sensitivity of areas from which it is seen. These factors are considered together as indicated in **Table 2.3** to determine impact levels.

The primary visual catchment was divided into four view sectors: north, east, south, and west. These sectors have a different orientation to the Project and support different land uses with varying sensitivities. They potentially experience different visual effects.

The visual impacts are considered in relation to the various sectors, which are shown on **Figure 7.1**. The impacts from the Project on each sector are described below.

7.1 Northern View Sector

The majority of the northern view sector contains flat to gently undulating pastoral lands with a northern backdrop forested ridge lines. The Bylong River flows through a portion of this sector.

Generally, the Project Boundary and Project elements are screened by the forested ridges to the north (refer **Figure 7.1**); however from Bylong Valley Way north of Bylong village (moderate to high sensitivity dependent upon distance from visible mine elements), there is potential for glimpses of elements of the North-Western OEA, Eastern OEA and Mine Infrastructure Areas from within this sector.

The other exception is the WAF that is located in open grassland at the intersection of the Bylong Valley Way and Wollar Road. The WAF will not be visible from residences within the sector but will be visible from small sections of the Bylong Valley Way (high sensitivity) and Wollar Road (high sensitivity).

Parts of Upper Bylong Road will have high visual effect views to the elements of the North-Western OEA, Eastern OEA and Mine Infrastructure Areas but will have low sensitivity as it will be used by KEPCO for access to all open cut and underground mine areas. Residents living to the east, using Upper Bylong Road and proposed Eastern Link Road to access their properties will have high sensitivity.

7.1.1 Visual Effects - Northern View Sector

From within this sector, views will be across broad flat landscape towards northern aspects of the North-Western OEA, the northern extent of the Eastern Open Cut and associated OEA, haul roads, the MIAs (open cut and underground), overland conveyor, ROM coal stockpile and the newly constructed access roads. There will be limited views into the North-Western Open Cut Mining Area and these will be limited to KEPCO personnel accessing the mine site and any residents using the realigned Upper Bylong Road (East Link Road) to the east.

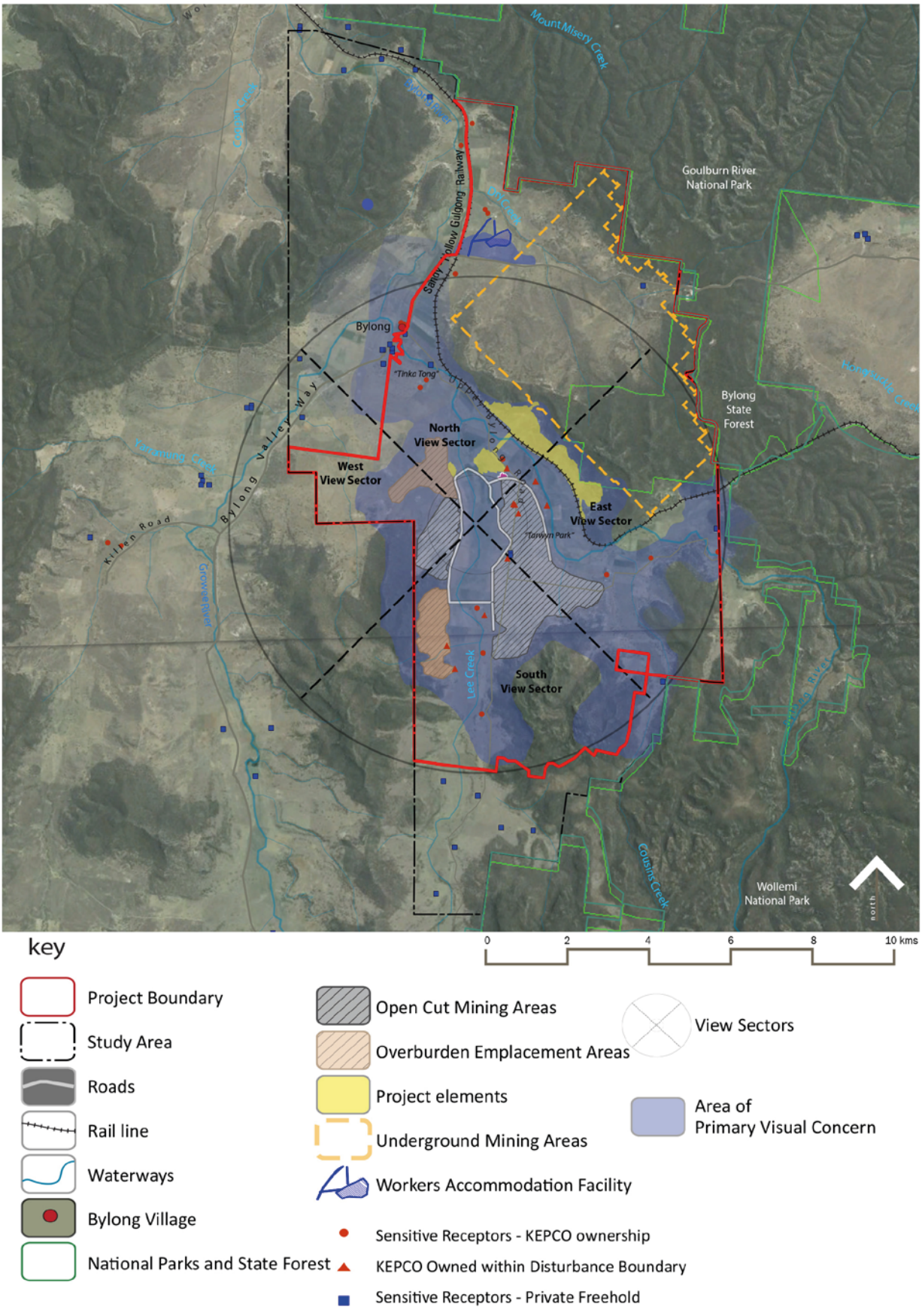


Figure 7.1 | Visual Impact and View Sectors

During the initial years of operations, the North-Western OEA will create high visual contrast and high visual effects from some viewing locations where it will be seen between the tree vegetation from the west and north-west, and through the tree canopies from the east and south. This effect will reduce to moderate / low as in the north when the initial rehabilitation of ground shaping and grassing is complete. The development of haul roads for both open cut mining areas will create high visual contrast but this will generally have limited visual effects due to their limited scale as a proportion of any view from this sector. Further it is generally screened by the intervening rehabilitated OEA to the north.

Bylong Valley Way will be approximately 2.3 km away from the nearest element of the Project in this sector. Intervening vegetation in the middle distance will limit views to OEAs from the Northern Sector, especially from lower elevations on the Bylong Valley Way.

By Year 5, the visual effect will progressively be reduced to moderate or low as OEAs are shaped, rehabilitation advances and the landforms are integrated with the surrounding rural settings. The establishment of trees during rehabilitation development will further reduce the visual effects.

Within first 3 years, there will be construction of surface infrastructure to support the mining elements of the Project and these facilities can be viewed from some locations within this sector. This will create high visual contrast and potentially high visual effect, especially during the construction period.

The WAF is located in this sector. This facility will create a high visual effect during the construction phase of the Project. The WAF will operate from PY1 to the end of underground construction at approximately end of PY6.

Movement of mining fleet will be a constant visual element during construction and development of OEAs. However the visual effect of these activities is likely to be low due to the intermittent nature of any views to mobile equipment.

7.1.2 Sensitivity - Northern View Sector

Bylong Village

The village of Bylong is within this sector. It would have high sensitivity to mining activity and based on topography alone would have views to the North-Western OEA. However views to the North-Western OEA are largely screened by foreground vegetation in residential gardens, streetscapes and by woodland areas in adjoining paddocks and along creek line to east of village. There is potential for viewed glimpses to the North-Western OEA from limited locations.

Bylong Village is a high sensitivity receptor, but actual views are very limited.

Rural Residences

'Tinka Tong' is a stock horse enterprise located between Upper Bylong Road and the Bylong River adjacent to the intersection with Bylong Valley Way. As shown on **Figure 7.1**, it is located on the property, approximately 100 m from the Upper Bylong Road. Woodland trees in the paddocks and along the Bylong River would generally screen views to the road and to the south-east in the direction of the underground mining infrastructure area. This screening of views of the Project would reduce visibility and visual sensitivity.

All residences, with views, that are within 2.5 km of the mine areas will have high visual sensitivity.

Equine CIC Land

This sector contains some Equine CIC lands. It includes all of 'Tinka Tong' (described above) and some of Tarwyn Park and Wallings Pastoral Company properties (now KEPCO owned). Equine facilities at 'Tinka Tong' as well as the residence on the property are within this sector.

The residence and equine facility at 'Tinka Tong' are generally protected visually by woodland vegetation.While this vegetation screening of views of the Project is intact, visibility and visual sensitivity are reduced. Without vegetation screening, as in a bushfire event or drought induced vegetation loss, this property would have high visual sensitivity to the Project.

This is not the case for land in other parts of the property on the outside edges of the woodland or where woodland is absent. The residence and property areas that are part of the Wallings Pastoral Company in this sector are generally exposed and would have a high sensitivity and would potentially experience high impact for up to 7 years until OEAs associated with the open cut mining are rehabilitated with grassland and tree plantings develop. Tarwyn Park is within this sector in part but the residence and equine facilities are in the eastern sector.

All this land with the exception of 'Tinka Tong' has been acquired by KEPCO, reducing potential sensitivity and impact on these CIC (Equine) lands for the duration of the Project, on the basis that such lands, including residences, will be leased to people that accept the land ownership status and mining activity. This could include the leasing and or use of the residences by mining staff. During mining operations, land scenic amenity values are compromised but rehabilitation and landscape treatments will ensure restoration of visual and landscape values in the medium to long term.

Bylong Valley Way

A short section of Bylong Valley Way runs through the north view sector just outside of Bylong Village. This road will have a high sensitivity within 2.5 km of visible Project elements and moderate sensitivity at a distance of up to 7.5 km.

Wollar Road is in this sector and will also have a high sensitivity to potential views of the WAF, with moderate sensitivity to the more distant North-Western OEA.

Railway line

The Sandy Hollow to Gulgong Rail Line skirts the northern edge of this view sector.

Railway line has low sensitivity due to coal and freight haulage function of this rail line.

Local Roads

The roads in the location have been ascribed a moderate to low sensitivity due to distance from the Project areas and ascribed visual sensitivity levels (refer **Table 2.2**). These roads will be used by mine workers accessing the Project site and local residents living in the north and east of the Project Boundary.

These roads have a moderate to low sensitivity.

Rural land

The view sector is predominantly rural land.

The lands have a low visual sensitivity.

7.1.3 Visual Impacts - Northern View Sector

In this view sector, only residences with views within 2.5 km or less will experience high visual impacts, if open views are available. Distances between 2.5 km – 7.5 km from nearest visible element of the Project, a moderate to high impact will be experienced, depending on visual screening effects of garden and roadside landscapes and view orientation.

High visual effects (Level 1 as per **Table 2.2**) will be reduced as rehabilitation of OEAs occurs.

Impacts on Equine CIC lands not aquired by KEPCO, such as 'Tinka Tong" would be high if there were views to the Project. Existing vegetation screening limits visual impacts on both residence and landuse.

Impacts on other Equine CIC lands would be high if they were not aquired by KEPCO, especially on the residence and equine facilities on the Wallings Pastoral Company Properties (blocks 91/90). The broad open paddocks are visually exposed experiencing high visual effects and impacts of various levels depending on viewing distance and sensitivity levels ascribed.

The impact on Bylong Valley Way will predominantly be low due to screening and lower visual effect levels. The sections of this road and Wollar Road that afford views to the WAF will experience high visual impact until any visual mitigation tree planting has become established.

For all local rural roads including Upper Bylong Road, such impacts will be experienced for short periods of time when the visual effect of a pre-rehabilitated OEA is seen from roadway. When rehabilitation is achieved, visual effects will be lowered; following this, impact will be reduced to moderate to low.

All rural production lands will experience moderate to low impacts, and rehabilitation will reduce such impacts.

The visual impact on the northern view sector is generally low due to limited views from high sensitivity receptors such as Bylong Village and rural residences. Moderate to high impacts may be experienced from limited locations including Bylong Valley Way, Wollar Road and Upper Bylong Road for short periods of time until rehabilitation of the North-Western OEA occurs and tree screen planting has become established where required for the WAF.

Visual impact of subsidence effects to Cliff Formations

There are intermittent views from Bylong Valley Way towards susceptible cliff lines as discussed in **Section 6.2.1.** The visual impact will range from high to moderate dependant upon the distance from the views to these cliff lines due to the high visual sensitivity of this road.

7.2 Eastern View Sector

The eastern view sector is divided between flat to gently undulating pastoral lands in the west and elevated ridge lines and hill country to the north and east.

The upper section of the Bylong River also flows through this sector.

Both open cut and underground mining operations will be present within this sector.

7.2.1 Visual Effects - Eastern View Sector

From within this sector, views will be limited to the broader flat pastoral areas in the centre, east and south-east. Hills and ridge lines limit more distant views and external views across the sector from the north and east.

There will be views of the northern and eastern aspects of the Eastern Open Cut, OEA, haul roads and newly constructed access roads within the sector. There will be some views to MIAs, overland conveyor and ROM coal pad in the adjacent northern view sector. There will be limited views to the North-Western OEA, but these will be limited to people accessing the mine site, rail operators and the local residents using the new access road to the north.

High visual effects (Category 1 as per **Table 2.2**) will be experienced until Year 9 of the Project due to operations of the Eastern Open Cut. Before then, there will be views of active mining operations, OEAs , haul roads and rail loop construction. After Year 5, this effect will reduce to moderate / low when OEAs are shaped, rehabilitation advances and the landform is integrated with the surrounding rural settings. The establishment and development of tree plantings during rehabilitation will further reduce the visual effects.

The development of haul roads along the eastern face of Eastern Open Cut will create high visual effects. Upper Bylong Road will be realigned to provide access to rural residences in the eastern part of the view sector.

Development of the Rail Loop will have high visual effects during the construction phase due to earth works disturbance and movement of the construction equipment fleet.

The movement of the mine fleet will be a constant visual element during construction and development of OEAs visible from this sector.

7.2.2 Sensitivity - Eastern View Sector

Rural Residences

All but two residences (#141 and #146) within this sector are KEPCO owned. This limits the sensitivity to those two properties identified in **Figure 7.1** and discussed in **Section 5**. The two private residences have high visual sensitivity.

Equine CIC Land

This sector contains some Equine CIC lands including most of Tarwyn Park and part of Wallings Pastoral Company. Equine facilities at Tarwyn Park and the Wallings Pastoral Company as well as the residences on both properties are located within this sector.

The residences and equine facilities on Tarwyn Park are generally exposed and would have a high sensitivity to views of Project elements. Both properties would potentially experience a high impact for up to 10 years before open cut mining OEAs are rehabilitated.

All this land has been acquired by KEPCO, reducing its potential high sensitivity and impact.

Railway Line

The Sandy Hollow to Gulgong Railway Line traverses this view sector centrally from east to west. This is a low sensitivity line as it is solely a freight and coal haulage line.

Local Roads

The local roads in the view sector have been ascribed a moderate to low sensitivity due to distance from the elements of the Project that may be visible (refer **Table 2.2**). These roads will be used by employees accessing the Project site and residents accessing properties near the east of the Project Boundary.

Rural Land

The view sector is predominantly rural land which ascribed low visual sensitivity where the nearest visible mine area is less than 2.5 km away.

7.2.3 Visual Impacts - Eastern View Sector

During the initial years of the Project, some rural residential properties, Upper Bylong Road and other local roads will experience moderate to high visual impacts based on distance and visibility of the nearest visible elements of the Project.

For private rural residence (#141) near the eastern boundary with views to the mine operations, visual impact will be high from Year 3 when topsoil stockpiling and haul roads development are innitiated within the viewrange of that property. This will continue up to up to Year 9 due to the visual effect of open cut mine operations, pre-rehabilitated OEAs as they develop in the viewshed of this residence (Level 1 as per **Table 2.2**) as well as haul roads and traffic movement.

In relation to views to susceptible cliff lines from this residence, there will be high to moderate visual impact.

For private rural residence (#146) the will be low visual impact as views to cliffs and mine operations are restricted by surrounding topography.

For all local roads such impacts will be experienced for up to 4 years from the commencement of open cut mining operations due to the visual effect of pre-rehabilitated OEA (Level 1 as per **Table 2.2**) visible from roadways in this sector.

After Year 4, progressive rehabilitation reduces the extent of high level visual effect areas. Visual integration and a further reduction in visual effect advances southward behind the advancing open cut mine face. When rehabilitation and final landform is achieved, visual effects will be lowered; following from this, impact will be reduced to moderate and low.

Railway operators will receive direct unimpeded views onto the east face of the Eastern Open Cut Mining Area at a distance less than 2.5km. Visual impact from these views would be moderate to low due to the low sensitivity of the receptor.

All rural production lands will experience moderate to low visual impacts. The rehabilitation of OEAs will reduce such impacts to very low.

The visual impact on the eastern view sector is low to moderate due to the limited number of high sensitivity receptors. The progression of rehabilitation of OEAs visible in this sector will reduce impacts to low.

The visual impact on Equine CIC lands would be high had land acquisition by KEPCO not taken place.

Visual impact of subsidence effects to Cliff Formations

Based on an assessment of overall low to moderate visual effects from the assessed viewpoints on Upper Bylong Road (refer **Section 6.2)**, the visual impact of subsidence effects from underground mine activities will be low.

For views to susceptible cliff lines from residence #141, there is potential for high to moderate visual impact.

For private rural residence (#146) the will be low visual impact as views to cliffs are restricted by surrounding topography.

7.3 Southern View Sector

The southern view sector is defined by elevated ridge lines and hill country to the east and west divided by flat to gently undulating pastoral lands and river valley. Lee Creek flows from south to north through this sector.

Lee Creek Road approaches the proposed open cut mining areas from the south along the central valley within the sector. However there is also connection to the Bylong Valley Way in the south. The Bylong Valley Way route is more likely to be used to give access to residences located in the south of this valley thereby the number of viewers experiencing views to mine from within this view sector.

Open cut mining operations will be undertaken within this sector.

7.3.1 Visual Effects - Southern View Sector

From within this sector, views toward the Project will be limited to the longer flat pastoral areas of the valley floor on the Lee Creek Road and southern approach. Hills and forested ridge lines limit more distant views beyond the valley in this sector, as well as the potential for external views from the east and west.

High visual effects will be experienced until Year 9 due to operations of the Western and Eastern Open Cuts. Before then, there will be views of active open cut mining operations, un-rehabilitated overburden, internal haul roads and potentially the construction of the surface infrastructure required to support the underground mining activities in the middle distance. The un-rehabilitated overburden in the South Western OEA will significantly contribute to visual effect before Year 5.

After Year 7, this effect will reduce to moderate or low when OEAs are shaped, rehabilitation advances and the landform is integrated with the surrounding rural settings. The establishment and development of tree plantings during rehabilitation will further reduce the visual effects.

The development of haul roads along the western face of Eastern Open Cut and eastern face of South Western OEA will create high visual effects. Movement of mine fleet will be a constant visual element during construction and development of OEAs.

From the south, beyond the junction with Budden Gap Road where people may use Upper Bylong Road to access properties, intervening topography will screen most northern views of mine operations. There is one small stretch of road where there is potential for a small glimpse of Eastern OEA at distance over 2.5 kms.

Lee Creek Road will have restricted access, limited to mining operations only, resulting in a low visual effect in all years.

7.3.2 Sensitivity - Southern View Sector

Rural Residences

Within this sector there are a number of residences in the southern part of the valley. All residences will have a moderate to high visual sensitivity; however some views would be eliminated by screening provided by topography and woodland vegetation. Those with most potential for views to mine

areas and within 2.5 kms of mine operations have been acquired by KEPCO thereby reducing their sensitivity. The privately owned residences will be screened by the topography within the valley.

Equine CIC Land

This sector contains some Equine CIC lands, being part of Wallings Pastoral Company. There are no Equine facilities in the sector.

Residences on Equine CIC land in this sector are generally exposed to longer distance views, would have a high visual sensitivity and would potentially experience high impacts up to Year 10. These impacts would be reduced following this time as these areas are rehabilitated. All Equine CIC land in this sector has been acquired by KEPCO, reducing its potential sensitivity and impact

Local Roads

The local roads in this view sector have been ascribed a moderate to low sensitivity due to distance from the Project elements (refer **Table 2.2**). These roads will be used by mine workers to access the site and by residents living to the south of the Project.

Rural Land

The view sector is predominantly rural land, which is ascribed low visual sensitivity where nearest visible mine area is less than 2.5 km away.

7.3.3 Visual Impacts - Southern View Sector

All residences within the view sector may experience moderate to high visual impact from views to active mining areas and un-rehabilitated OEAs. However, the visual screening effects of topography, residential garden planting, roadside landscapes and view orientation is likely to reduce or eliminate such impacts. In addition, all residences within 2.5kms have been acquired by KEPCO thereby reducing sensitivity and impacts.

All high visual impacts experienced by KEPCO owned residences will be for up to Year 25 due to the Eastern Open Cut where the pit will remain open to receive coarse and fine rejects materials from the underground mine operations to Year 25. Impacts will be reduced to moderate to low when landscape patterns are restored by planned staged rehabilitation.

All residences in this view sector under private ownership are between 2.5kms from the Project and have high to moderate visual sensitivity to nearest viisible mine activity (refer **Table 2.2**). The visual effects of the activities on the south facing mine fronts will be high until rehabilitation reduces visual effect of the OEA faces.

Visual impacts on residences with potential views will initially be high to moderate, reducing to moderate/ low in the longer term following establishment of rehabilitation.

During the initial years, Upper Bylong Road and other local roads will experience moderate visual impacts. For all local roads such impacts will be experienced to Year 5 when the visual effect of pre-rehabilitated OEA is seen from the roadway. When rehabilitation is achieved, visual effects and impacts will be reduced to low.

Rural production lands will experience moderate to low impacts. Rehabilitation will reduce such impacts to very low.

The visual impact on the southern view sector is generally low due to limited number of high sensitivity receptors and relatively short periods of high visual effect.

7.4 Western View Sector

The majority of the Western View Sector is comprised of broad flat pastoral lands that straddle the Bylong Valley Way which passes through this sector. The PVC boundary forms part of its south-western margin. A second low north-south ridge line lies more centrally and lies immediately west of the proposed South-Western, and North-Western OEAs and the Western Open Cut. This ridge and the OEAs limit views into the central area of the Project and the open cut mining areas.

There are few local roads in this view sector; however the Bylong Valley Way passes through this area.

Open cut mining operations will be undertaken within this sector.

7.4.1 Visual Effects - Western View Sector

The visual effects of the open cut mining operations are screened except for a small portion of the northern and western faces of the North-Western OEA. These areas project over the screening ridge line and will have high levels of visual effect (Category 1 as illustrated in **Table 2.1** for short periods of time) where they are visible. However these areas are small in size as a proportion of available views and are likely to generate a moderate visual effect only (less than 2.5% of the primary view area). This effect will occur for a few years until primary rehabilitation restores grassland values on the visible OEA face, creating Category 2 visual effects. Tree pattern establishment in the rehabilitation will further reduce visual effects to very low.

During the initial years of open cut mining operations, high visual effects may be experienced from parts of Bylong Valley Way when some views of active OEAs are possible. Intervening topography and vegetation may limit these views to the east and south-east. This high visual effect will reduce to moderate/ low after 2-3 years when OEAs are shaped, grassland rehabilitation advances and the landform is integrated with the surrounding rural settings. The establishment of trees during rehabilitation development will further reduce the visual effects.

7.4.2 Sensitivity - Western View Sector

Visibility in the sector is limited by the north-south ridge line and hills within this views sector to the west of the Western Open Cut Mining Area and South Western OEA.

Rural Residences

Within the sector, there are residences located on Bylong Valley Way and Killens Road.

These residences are screened from views of the active open cut mining operations and infrastructure area by the ridge line to the east of Bylong Valley Way as well as foreground vegetation around the homesteads, along the roadways, within and adjacent to the village and within adjoining paddocks. However small parts of the North-Western OEA will potentially be visible above the existing ridge line topography and viewed with a high sensitivity.

Equine CIC Land

This sector contains some Equine CIC lands (part of Wallings Pastoral Company property). This land is generally screened from operational areas with the exception of a small portion of the North-Western OEA that extends over an existing ridge line.

There are no equine facilities or residences in this part of the Equine CIC.

All this land has been acquired by KEPCO, further reducing its potential sensitivity and impacts.

Bylong Valley Way

A section of Bylong Valley Way runs through the south-west of this view sector. There is a short stretch of this route where it is less than 2.5 km from the nearest Project element. This road will have a high sensitivity for this section.

7.4.3 Visual Impact - Western View Sector

The visual impact on the western sector will generally be low due to the screening of the major mining operation areas being topography and vegetation. Limited stretches of the high sensitivity road areas and residences may experience a high to moderate impact for short periods of time until OEA faces are rehabilitated. After rehabilitation, visual effect further reduces visual impact to low.

7.5 Landscape and Cumulative Impacts.

The landscape of the Bylong region is dominated by the rugged forested sandstone ridges/ cliffs and narrow valleys to the east gradually giving way to the broader valleys and more gentle grass dominated landscapes to the west. The eastern landscapes of Wollemi National Park are dissected by the cleared narrow valleys of Baerami and Kerrabee Creeks that flow into the west/east flowing Goulburn River. To the west these valleys broaden adjoining Coggan Barigan, Wollar, Cumbo and Wilpinjong Creeks.

Bylong is situated in the transitional area between the two with valley width varying from narrow in the Lees Creek and Upper Bylong and Growee River to being broader in the vicinity of Bylong itself adjacent to the lower Growee and Bylong Rivers. The cleared lower croplands, grasslands and open woodlands are dominated by steep forested hills and cliffs that provide strong enclosure even to the broader valley landscapes of the Bylong Village area.

The landscapes have high to moderate landscape quality natural landscapes of cliffs and steep forested hills and plateaus as well as cleared agricultural valleys. The separate and combined sequential experience of these landscapes dominate the views, generally experienced from the roadways, in the region. Of these the Bylong Valley Way is the main road with Wollar Road being secondary. Other roads such as Upper Bylong Road, Killens Road and Lee Creek Road are, to varying degrees of significance, local roads.

There are existing open cut coal mines at Wollar (Wilpinjong Coal Mine) and Ulan (Moolarben and Ulan coal mines) these mines are currently operational creating high visual effect and impact levels on the adjoining Wollar and Ulan Roads, both being regional through roads.

Unlike the open cut mines on Wollar and Ulan Roads, the proposed Bylong Coal Project is located in an enclosed and visually isolated section of Upper Bylong River and Lees Creek, on often dead end local roads. Further, open cut mining is limited to 10 years with the more significant visual effects of the north western Project areas being mined and rehabilitated within a two year period between Year 3 and Year 7.

The combination of this isolation, the location on minor local roads and the short-term operational life of the open cut mine limit the Project's landscape and cumulative visual impact.

The Project operations will have a **low** impact on the landscape of the Bylong Valley as experienced by the majority of residents and visitors to the valley. While the impact on the locality of the upper catchment of Bylong River and Lees Creek may be periodically high for up to ten years, the impact on the larger adjacent main valley will be low as it is generally out of the visual experience (both static and sequential) of most view sheds of both local and of regional significance. Beyond this

time, with the Project infrastructure well screened and or integrated by rehabilitation, the impact on the landscape values of the region will be minimal.

Due to the location of the proposed mining operations, the limited time of above ground operations, the location of infrastructure below the dominating forest ridge to the north and the screening of all these areas from the main valley, the impact on the landscape of the Bylong Valley is at most moderate but overall will be low to minimal, localised and of relatively short periods of time until visual effects are mitigated.

7.6 Impact of Night Lighting

General

The visual effect of lighting surrounding the Project Boundary will vary. In the context of KEPCO land holdings and the location of areas where light sources will be needed to support Project operations, the location of sensitive receptors is generally located to the west, with one residence to the east and others in the far south.

The effect of night light will be influenced by the location and relative height of operations on-site, the relative level at which the viewing location is situated and the presence of any barriers to lighting effects such as OEAs, off site topographic features and / or vegetation.

There are **two** types of lighting effects that could be experienced from the Project. The first effect is where the light source is directly visible, and will be experienced if there is a direct line of sight between a viewing location and the light source.

The **second** effect relates to the general night-glow (diffuse light) that results from light of sufficient strength being reflected into the atmosphere. This type of lighting effect will create a strong local focal point and the effect will vary with distance and atmospheric conditions such as fog, low cloud and / or dust particles which all reflect light.

Direct Light Effects

Direct light effects are generally restricted to mobile equipment and the MIAs. Outside of the open cut mining areas and vehicles, other operational light vehicle lighting would generally be hooded or positioned to avoid direct lighting effects.

During the open cut mining operations occurring up to Year 10, night lighting from dump trucks and other machinery working on the outer faces of the OEA could project direct lighting effects outside the Project Boundary to the east. Although this is likely to be limited as most haul roads are orientated north south. However there are no sensitive receptors in these locations. Areas to the north, south and west will be screened by existing topography.

Lighting in the two MIAs will be located on a range of infrastructure as well as on tall structures such as the CHPP, as well as loading ramps, conveyors, roadways, Rail Loop facilities and tunnel portals. With the exception of tall buildings and gantries, most of this lighting will be lower than 5m from ground level for building and site illumination of the ground plain.

Diffuse Light Effects

Diffuse lighting effects can occur when there is no direct view to lights or as a complement to direct views to lights. Diffuse light is essentially light reflecting off atmospheric particles and is likely to increase in response to dust or moisture in the air around light sources. Diffuse light often causes a glow of light in the otherwise dark night and is more likely to occur where there is a concentration of light such as at the key facilities within the MIAs.

Night Light Impacts

The potential for visual impact from light sources is minimised by the location of the key elements of Project infrastructure, including the CHPP, rail loading and underground mine portals immediately adjacent to a major ridge line to the north of the site. This meandering ridge line gives light impact screening to the north and north west as well as the north east. This feature, coupled with a ridge line to the east of Bylong Valley Way, screens areas to the east and south east of the Project. The Tinka Tong residence to the east is similarly protected by the topography of this northern ridge line, as well as vegetation on it and from vegetation surrounding the property itself.

To the south of the Project, there are no residences that are not on KEPCO owned lands and the remainder consists of open rural lands.

To the far south, along Lees Creek, privately owned residences are some 15 km south of the MIA and are protected from direct lighting effects by the alignment of the valley and adjoining forested hills and spurs. In a similar way, southern residences are screened from the less intensive pit lights by similar topographic features.

Visual impacts emanating from light sources are low to negligible of sensitive receptors primarily due to the influence of intervening topography. Mitigation treatments in the form of landscape treatments and normal light management through directional lighting and hooding will further reduce light spillage from active work areas.

7.7 Summary

The visual impact of the Project is generally **low** from key viewing locations with impact limited to the local setting of Lees Creek and the Upper Bylong Valley as delineated on Figure 5.1 within the area of primary visual concern. The major landscape experience of the Bylong Valley is west of the major operational areas of the Project in this location and is separated visually from it by existing topography and vegetation.

Visual impacts are generally restricted, as visual effects of Project elements are quickly restored by progressive rehabilitation. High visual effect levels have very short duration times of up to 2-5 years, after which time landscape restoration and rehabilitation reduces visual effects to low.

Further, visibility to high sensitivity use areas such as the main Bylong Valley and Bylong Valley Way is limited. Topography and vegetation screening protect high sensitivity use areas such as those along Bylong Valley Way and some residences.

Additionally, mapped Equine CIC lands within the Lee's Creek and upper reaches of Bylong River catchments is not currently utilised for equine purposes and due to the proximity to the Project Disturbance Boundary, will not be utilised for equine purposes for (at least) the open cut operational period. As such, the anticipated visual impacts to Equine CIC mapped land will be low. Equine CIC lands outside of the Lees Creek and upper reaches of Bylong River catchment areas will not be impacted.

8. MITIGATION

The numerous mitigation measures incorporated in the design and operating plans for the Project will reduce the visual effect and mitigate the visual impact of the Project on sensitive viewing locations.

Mine design elements and planning is responsive to the potential visual effects and visual impacts. Considered mine design limits the extent of mine footprint and areas of disturbance where possible.

On-site treatments include rehabilitation of disturbed landforms, while viewer location (off-site) treatments include a range of treatments to screen views, filter views and or reorientate primary views as required. It is to be noted that on-site treatments are already being carried out as part of the Project and relate to OEA establishment and rehabilitation. Details regarding these measures are to be found in **Section 8.3** below.

8.1 Design elements

Design elements incorporated into the Project include:

- The siting of the MIA between existing topographic features to achieve screening from many sensitive external view locations, especially the main valley along the Growee River;
- Timely construction and implementation of progressive OEA rehabilitation during mining operations to reduce visual effect levels;
- Seeking to limit pre-rehabilitated OEA areas to less than 2.5% of potential primary view zones of sensitive receptors for as short a time as possible, limiting times that high visual effects are experienced;
- Limit maximum height of North-Western OEA to maximum height of 348m to ensure it remains below height of adjacent ridgeline;
- Design the form of OEAs consistent with storage and noise abatement requirements to achieve a more natural fit with surrounding hills and avoid extensive ‘flat top’ development within the landscape;
- Designing drainage structures to fit in with more natural landforms; and
- Retention of iconic high points, including cliff lines in local landscape setting.

8.2 On site mitigation treatments

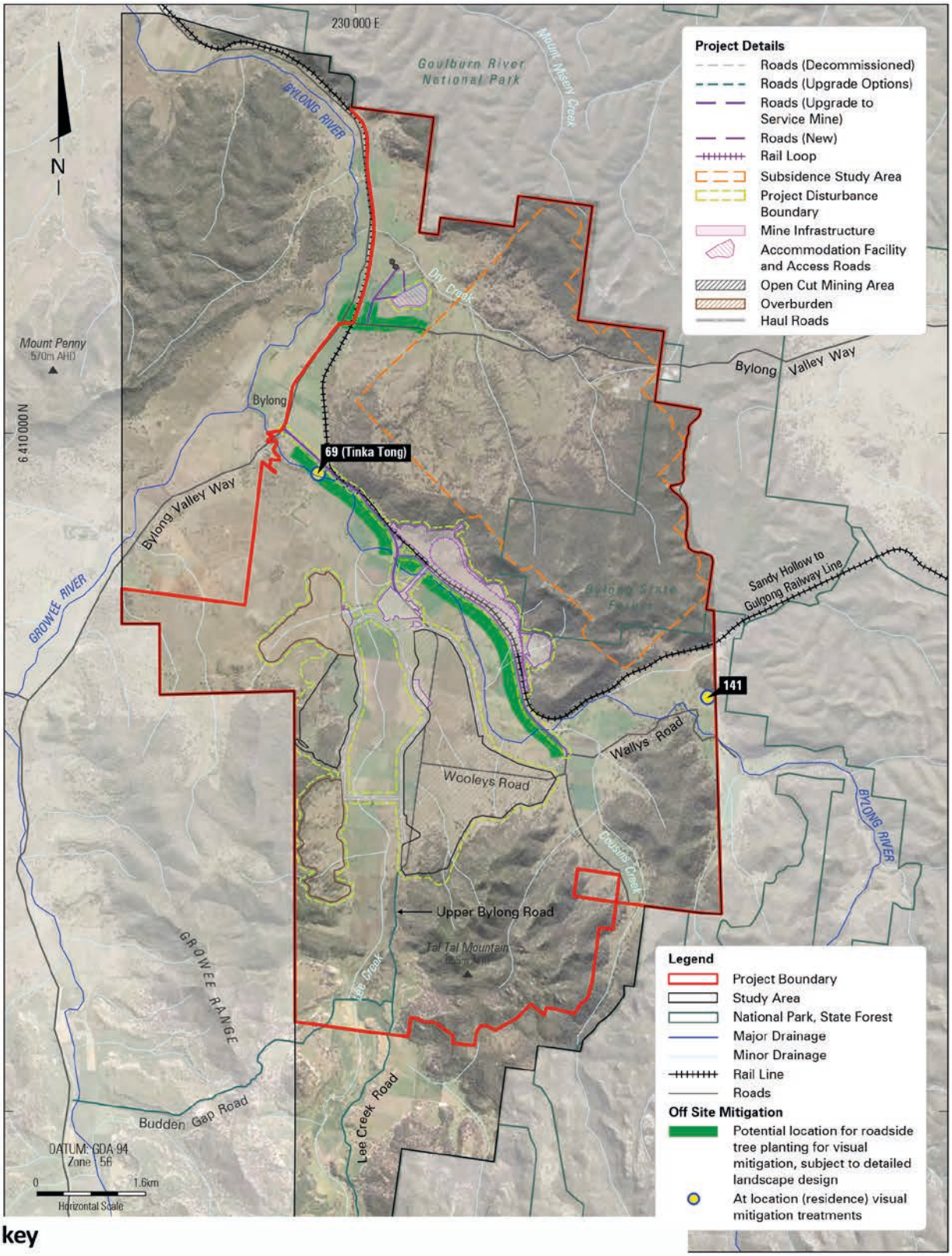
- On-site treatments recommended for implementation for the Project include:
- Implementation of both short and long term Project specific objectives as described in the Rehabilitation Strategy (SLR, 2015) prepared for the Project, including:
- Reducing the extent of clearing and disturbance (consistent with operational requirements), scheduling operations, including overburden/ interburden emplacement shaping and revegetation;
- Timely rehabilitation of the disturbed areas no longer required for mining-related operations (including WAF facilities);
- Undertake progressive rehabilitation as soon as areas become available for practical rehabilitation;

- Inclusion of the visual landscape objectives in the Rehabilitation Strategy (SLR, 2015) prepared for the Project, including measures to establish an ecological forest, woodland and scattered tree planting patterns. The objective of these plantings will be to emulate existing forest, woodland and grassland landscape patterns that provide colour and texture continuums in the existing landscape for mine area rehabilitation, infrastructure areas and roadways;
- Supplement the existing driveway and other plantings for the WAF site as illustrated in **Figure 8.1**;
- Use existing vegetation to screen/integrate the WAF structures; and
- Infrastructure constructed in forest tones (i.e. green, grey, cream) to blend with the surrounding existing environment as far as practical. Such strategies should be considered in terms of actual backgrounds and need not necessarily be olive green. Further landscape integration is to be achieved through the implementation of tree planting around infrastructure areas and adjacent to roadways.

8.3 Off-site mitigation treatments

Off-site treatments recommended for implementation for the Project, where deemed necessary through consultation within relevant stakeholders, include:

- Development and implementation of a Rehabilitation Management Plan outlining specific screening strategies to be employed for the Bylong Valley Way in areas that are visually exposed to views of the Project including the WAF as illustrated in **Figure 8.2**;
- Development and implementation of location specific screening strategies to be employed for the high sensitivity viewer locations within Equine CIC being impacted by pre-rehabilitation open cut mine works, infrastructure or other Project elements including:
- Private freehold residences;
- ‘Tinka Tong’ residence and any part of the property carrying out activities associated with the Equine industry;
- Establishing tree screens along Upper Bylong and Lee Creek Roads as required to integrate infrastructure areas and further reduce diffuse light spillage potential; and
- Development and implementation of a Rehabilitation Management Plan for any other area identified as being significantly impacted by pre-rehabilitation open cut mine works, infrastructure or other Project elements.



key

Off site mitigation
Potential locations for roadside planting subject to Rehabilitation Management Plan details.

Residential visual mitigation treatments.

Figure 8.1 | *Offsite visual mitigation recommendations*

Figure 8.2 | *Offsite visual mitigation recommendations - Workforce Accommodation Facility*

9. CONCLUSION

The development and operation of the Project will have **minimal** visual and landscape impacts outside of the immediate operational areas of upper Bylong River and Lees Creek catchments. While the visual effects of the Project will be similar to those of all open cut / underground mining projects, there are numerous factors that mitigate against significant visual and landscape impacts arising from the development of the Project. They are:

Firstly, the location of the activities of the proposed open cut mining areas in upper valley areas visually separates active mining operations from the main valley and the more sensitive view locations situated there. Its location is isolated due to topography and to some extent vegetation screening also ensures that effects on regionally significant landscapes are minimised.

Secondly, the visual exposure times of high visual effect level of operations such as the OEAs are very limited. In most mines of this nature, OEA exposure can be as high as 30 years. In this Project such exposure and associated high levels of visual impact is limited to a period of 2-5 years.

Consistent with this is the WAF, located on the north side of Bylong Valley Way near the junction with Wollar Road within the Project Boundary. The visual impact on Bylong Valley Way in this instance will be potentially high particularly during the construction phase, however forward planning and implementation of roadside tree screening along Bylong Valley Way adjacent the WAF site will mitigate future visual effects. There is a 1-2 year period for the establishment of effective roadside tree screening. The visual mitigation measures described will reduce the visual effects of this Project element over the life of this facility while contributing to ecological diversity and habitat.

Finally the recommended rehabilitation/reinstatement patterns and other visual mitigation strategies will ensure that a landscape of high visual diversity is retained in the long term due to the planting pattern that will be reinstated following the completion of mining operations associated with the Project.

10. REFERENCES

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