Centennial Coal
Mandalong

STATEMENT OF ENVIRONMENTAL EFFECTS

Mandalong Mine

Transmission Line TL24 Relocation Project

Section 96(2) Modification to State Significant Development Approval SSD-5144

March 2016

Mandalong Mine

Transmission Line TL24 Relocation Project

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Statement of Environmental Effects

Prepared on behalf of:

Centennial Mandalong Pty Limited

By:

Centennial Coal Company Limited

Level 18, BT Tower, 1 Market Street
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Centennial Coal
Mandalong

March 2016

Submission of Statement of Environmental Effects (SEE)

Prepared under Section 96(2) of the *NSW Environmental Planning and Assessment Act 1979*

SEE Prepared By:

Name:	Iain Hornshaw Approvals Coordinator
Qualifications:	BSc (Hons); MSc
Company:	Centennial Coal Company Limited
Address:	Level 18, BT Tower, 1 Market Street, Sydney, NSW, 2000

Development Application:

Proponent Name:	Centennial Mandalong Pty Limited
Proponent Address:	Level 18, BT Tower, 1 Market Street, Sydney NSW, 2000
Land to be Developed:	Mandalong Mine Kerry Anderson Drive, Mandalong, NSW, 2264 Lake Macquarie City Council Local Government Area Refer to attached Schedule of Land
Development Description:	Modification to State Significant Development SSD-5144 to permit the construction of a relocated section of Transmission Line TL24 in addition to the decommissioning of the redundant section of TL24.

Declaration:

I hereby certify that I have prepared the contents of this document and to the best of my knowledge:

- It contains all available information that is relevant to the environmental assessment of the proposed development to which the document relates; and
- It is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

Name: Iain Hornshaw (Centennial Coal Company Limited)

Signature: 

Date: March 2016

EXECUTIVE SUMMARY

Background

Mandalong Mine is an existing underground longwall coal mine operation producing thermal coal that is supplied to domestic and export markets. It is located approximately 35 kilometres south-west of Newcastle near Morisset in New South Wales (NSW). Mandalong Mine is 100 percent owned and operated by Centennial Mandalong Pty. Limited (Centennial Mandalong), a subsidiary of Centennial Coal Company Limited. Centennial Coal Company Limited is a wholly owned subsidiary of Banpu Public Company Limited.

Mandalong Mine operates under Development Consent SSD-5144 which was granted on 12 October 2015 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), and provided for extension of the mining area with a production limit of 6 million tonnes per annum of thermal coal from the West Wallarah and Wallarah-Great Northern Seams.

The currently approved Mandalong Mine comprises the underground workings and surface infrastructure of the following:

- The Mandalong Mine Access site, encompassing underground workings and associated surface infrastructure near Morisset.
- Delivery of run-of-mine coal from the underground workings to the Cooranbong Entry Site and Delta Entry Site near Dora Creek. These coal handling and processing facilities are approved under the Northern Coal Logistic Project (SSD-5145).
- Mandalong South Surface Site (MSSS) (yet to be constructed), encompassing ventilation shafts, ventilation fans and underground delivery boreholes located approximately 6 kilometres south-west of the Mandalong Mine Access Site.

This Statement of Environmental Effects (SEE) has been prepared to support an application by Centennial Mandalong seeking to modify its existing development consent under Part 4 of the EP&A Act for the Mandalong Transmission Line TL24 Relocation Project.

Proposed Modification

Centennial Mandalong proposes to modify its Development Consent SSD-5144 pursuant to Section 96(2) of the EP&A Act for the Mandalong Transmission Line TL24 Relocation Project. To achieve optimum coal extraction and limit subsidence effects on surface infrastructure, Mandalong Mine proposes to seek approval for the relocation of a 2.4 kilometre section of TransGrid's 330kV Transmission Line (TL) 24. As part of the Project, it is proposed to remove 12 existing steel lattice towers and establish eight new towers (**Figure A**).

The new section of TL24 includes a 60 metre wide easement entirely on freehold land owned by Centennial Fassifern Pty. Limited, a subsidiary of Centennial Coal Company Limited. Following the establishment of the eight new towers and relocation of the transmission line, the redundant 12 towers will be decommissioned, dismantled and removed. Upon completion of the line, the easement for the redundant section of TL24 will be relinquished and a new easement will be created over the new section of TL24 by TransGrid. The construction of the new towers and demolition of the redundant towers combined form the extent of this Project.

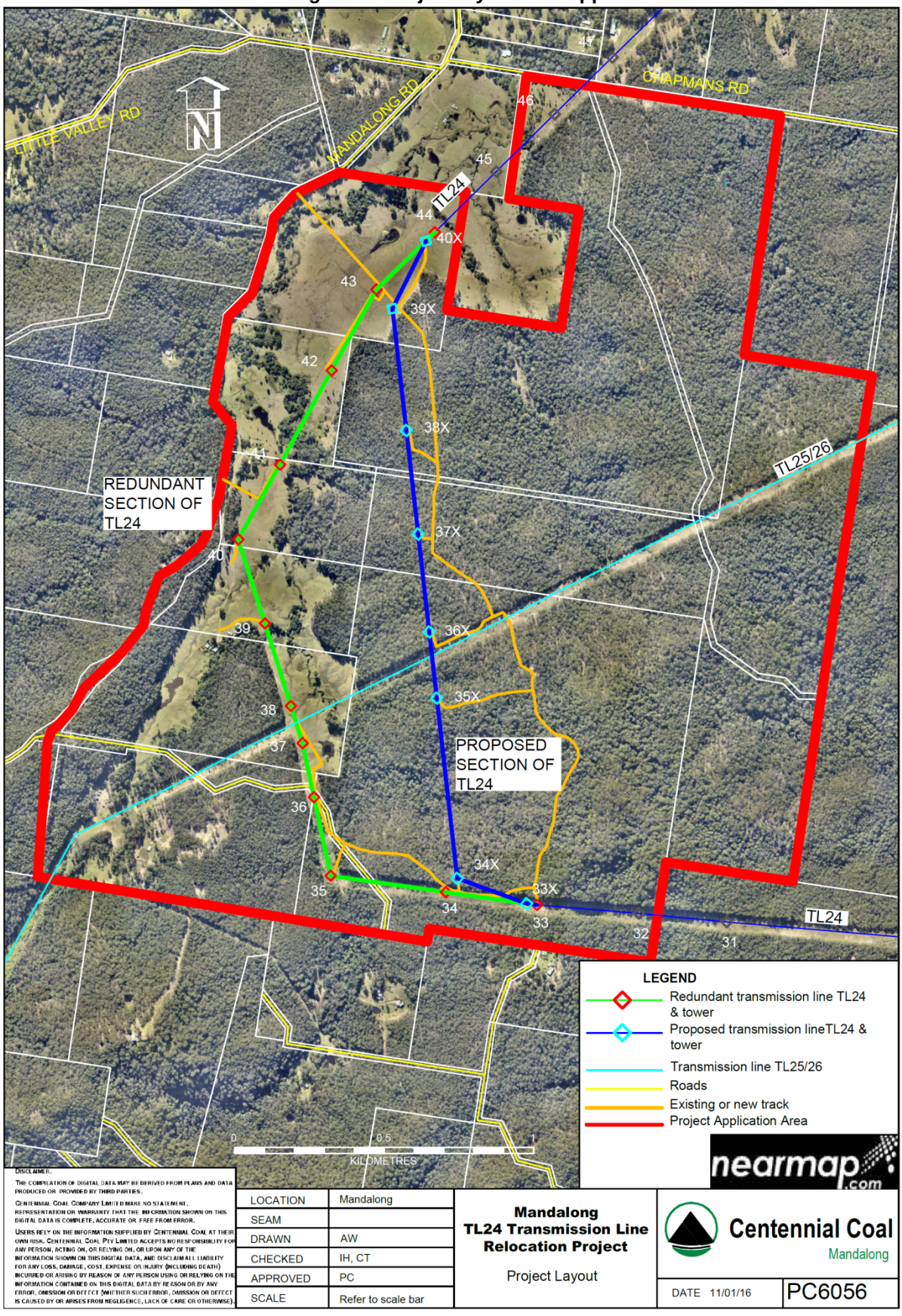
Once the construction of the relocated transmission line and removal of the redundant transmission line has been completed, TransGrid will be responsible for the ongoing maintenance and operation of the

transmission line and its easement. The ongoing maintenance and operation of the transmission line and its easement does not form part of this application.

The following operational and maintenance activities would be undertaken in accordance with TransGrid's policies and procedures:

- Inspections (ground and aerial) and maintenance of existing electrical equipment on the transmission line;
- Vegetation maintenance along the easement to ensure safe clearances remain between the conductors and vegetation (and reduce bushfire risk); and
- Access track maintenance (repairing access tracks as required and removal of vegetation along access tracks) to allow ongoing vehicular access to each transmission structure.

Figure A: Project layout and Application Area



Potential Impacts

This SEE, which includes technical specialist assessments, documents the various studies that have been undertaken to examine potential impacts that may occur as a result of the Project.

The assessment of environmental issues has been multi-disciplinary and involved consultation with the NSW Department of Planning and Environment (DP&E). Where a knowledge gap was identified, a technical specialist study was commissioned and appropriate management responses identified.

The Project is anticipated to pose minimal environmental impacts beyond those previously assessed and approved under SSD-5144. While the information presented within the body of this SEE and within the appended technical specialist assessments should be read in their entirety, the following table provides a broad overview of the key outcomes.

Broad Overview of Assessed Environmental Issues

Assessment Issue	Overview of Key Findings
Water Resources	• Negligible impacts to water resources or water users are predicted as a result of the Project. • Whilst there is the potential for sediment and erosion impacts to occur during the construction phase, mitigation and management measures will be implemented prior to undertaking disturbance activities to manage this risk. • Erosion mitigation and management measures to be implemented will be included in the Project's Erosion and Sediment Control Plan. This will form an appendix to the Construction Environmental Management Plan (CEMP). • No additional water licences are required for the proposed work.
Ecology	• The Project involves the direct removal of 8.5 ha of native vegetation consisting of: 0.3 ha of MU 6 - Coastal Narrabeen Moist Forest and 8.2 ha of MU 15 - Coastal Foothills Spotted Gum - Ironbark Forest; and 33 hollow-bearing trees. Neither of these vegetation communities are commensurate with any threatened ecological community listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). • The 7-part tests (TSC Act) and the Assessments of Significance (EPBC Act) have assessed the threatened species and threatened ecological communities which are likely to occur within the impact area and the potential impacts of the Project. These assessments have concluded that the Project is unlikely to have a significant impact on non-cryptic threatened species or ecological communities. • Avoidance, mitigation and offset measures are proposed to minimise the potential flora and fauna impacts of the clearing and construction activities associated with the Project.
Visual	• Proposed Project activities will have a negligible visual impact on the majority of people living in or travelling through the landscape within and surrounding the Project Application Area (PAA). • The towers and lines associated with the redundant section of TL24 will be removed from several private properties many of which are in close proximity to residential dwellings. • Views toward the relocated TL24 line from the majority of receptors will be predominantly contained by existing tree planting within and surrounding the PAA.

Assessment Issue	Overview of Key Findings
Traffic and Transport	• The Project will not adversely impact the local road network with traffic movements not proposed to exceed the peak number of vehicle trips approved as part of the Mandalong Southern Extension Project SSD-5144. • A Construction Traffic Management Plan will be developed as an Appendix to the CEMP for the Project. The traffic management strategies adopted will aim to minimise the impacts of the construction works on the local road network.
Aboriginal Heritage	• The field survey conducted on 4 March 2015 over the TL24 easement identified an open forest vegetation landscape with dense pockets of vegetation in the vicinity of drainage lines, with some portions having being cleared as a result of establishing electricity easements. • A number of tributaries of Morans Creek were identified in the TL24 easement draining to the west. None of these drainage lines contained flowing water but grinding groove sites were observed, being AHIMS#45-3-1227, AHIMS#45-3-3534 and AHIMS#45-3-3539. During the visual inspection, the location of AHIMS#45-3-1227 was revisited but the features of the site were not observed due to heavy sedimentation, rocks and vegetation. This site remains valid on the AHIMS database. • No new Aboriginal cultural heritage sites or objects were identified in the TL24 easement. Barrier fencing will be in place when clearing and construction activities are in progress on the new line to protect registered Aboriginal sites AHIMS#45-3-1227, AHIMS#45-3-3534, AHIMS#45-3-3539, AHIMS#45-3-3541 and AHIMS#45-3-3540. This requirement will be implemented through the CEMP.
European Heritage	• As physical remnants of the forestry history of the Olney State Forest, landing skids are considered to be of low local significance. • Whilst forestry practices are of high local interest in the Olney State Forest, and an integral part of the area's European industrial and social heritage, the physical remains are fragmentary and in the absence of further evidence, of limited scientific value. • L3 is close to a worksite but will be barricaded when construction is occurring at existing tower #33 and new tower #33X to avoid any damage. • L1 is adjacent to an access track which will need to be widened. If the track can be widened without impacting the skid it will be but that might not be possible. If L1 is to be impacted it will be archivally recorded prior to dismantling.
Soil and Land Resources	• The PAA contains no areas of potential Biophysical Strategic Agricultural Land (BSAL) and the Project will not result in any changes to the land and soil capability classes. • The Project will have a negligible impact on surface water and groundwater resources relied on by agriculture. • Measures will be implemented to avoid the introduction of weeds at construction and demolition sites.

Assessment Issue	Overview of Key Findings
Air Quality	• In order to assess the background air quality of the region a number of industrial facilities with the potential to have a cumulative impact on the local airshed were identified. This also included the impacts of the proposed Mandalong Southern Extension Project. A dispersion modelling exercise was performed to determine suitable background concentrations of pollutants in order to appropriately assess the cumulative impacts. • Dispersion modelling was conducted for the identified emission sources for all scenarios. The two worst case scenarios representing the 'Foundation' and 'Demolition' phases of the construction works related to the Project. Maximum 24-hour concentrations of PM10 and PM2.5, along with annual average levels of dust and TSP, PM10 and PM2.5 concentrations are unlikely to exceed the relevant air quality criterion at any of the identified sensitive receptors. • Overall, it is concluded that in regards to the air quality impacts, there are no limiting factors for the construction of the Project.
Noise	• Noise results indicate there are eleven receptors predicted to receive construction noise levels greater than the affected criteria during the day period. All receptors are predicted to receive construction noise levels less than the highly affected criteria. • Cumulative construction noise (which includes noise emissions associated with construction of the MSSS) results indicate there are 16 receptors predicted to receive construction noise levels greater than the affected criteria during the day-time period. Only five receptors are predicted to receive a noticeable increase in received noise levels (i.e. above the Mandalong Southern Extension Project levels) due to the addition of the construction activities. All receptors are predicted to receive cumulative construction noise levels less than the highly affected criteria, with three receptors predicted to receive less than the affected criteria.
Electromagnetic field	• The overall electromagnetic field impact will be reduced as a result of the transmission line being relocated further away from residential dwellings. • Even under peak or emergency load conditions, the magnetic fields are still predicted to remain within the relevant guideline reference level. • Even if the line were to be operated at a voltage 10% greater than the nominal voltage, the electric field contribution of the proposed line deviation is still predicted to remain within the relevant guideline reference level.
Dangerous Goods	• Dangerous goods will be effectively managed so as not to pose any significant risk in relation to human health, life or property or the biophysical environment. The risk of dangerous goods will be managed through the CEMP.
Decommissioning and Rehabilitation	• Following the construction of the relocated TL24 transmission line and demolition of the redundant section, disturbance around the new and redundant tower sites will be rehabilitated. Any temporary access tracks established to the redundant tower sites will be rehabilitated in consultation with relevant stakeholders. The new towers, easement and access tracks will remain in place to allow TransGrid to operate and maintain the transmission line.

Prior to construction a CEMP will be developed outlining how the construction and demolition impacts listed above will be managed.

Project Benefits

The social and economic assessments prepared in relation to the Project have considered the findings from the relevant technical specialist assessments which have assumed a worst case scenario, meaning that potential impacts may be less than predicted.

Overall the Project results in no long term social impacts with the Project being undertaken to reduce the risk of interruption to the existing TL24 power supply. Centennial Mandalong has negotiated a favourable outcome with TransGrid, which will see that business's infrastructure and service obligations safeguarded against potential impacts in the absence of the relocation of the relevant section of TL24.

A positive impact arising from the Project is the removal of towers from private land holdings and therefore a reduction in immediate visual impact and risk of Electromagnetic Radiation.

Approval of the Project will result in greater royalty and tax yields for state and federal governments. This will also have a positive social impact over the life of the mine.

Conclusion

To date, significant effort by Centennial Mandalong has been invested to avoid or minimise potential impacts that could be associated with continued operations. The Project involves the direct clearing of 8.5 hectares of native vegetation which will be offset in addition to temporary construction impacts to sensitive receptors. The Project does not require any other changes to existing operations to achieve this relocation.

The Project will allow for continued operations at Mandalong Mine in accordance with the mine plan approved under SSD-5144. This will sustain current employment levels for the life of the Project. As a coal mine, Mandalong Mine's challenge is to maximise returns through the mineral wealth within existing lease areas whilst ensuring a minimal environmental impact. Mandalong Mine acknowledges the need to co-exist with its regional community as well as underpin the economic opportunity the mine represents.

Based on the assessment of environmental and socio-economic considerations undertaken as part of this SEE, the Project is anticipated to pose minimal environmental, social and economic impacts, and as such poses minimal impacts beyond those already approved under SSD-5144.

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1.0 INTRODUCTION

1.1 Background

Mandalong Mine is an existing underground coal mine operation located in the Lake Macquarie and Wyong Local Government Areas (LGAs). Mandalong Mine is situated approximately 130 kilometres north of Sydney and 35 kilometres south-west of Newcastle near Morisset in New South Wales (NSW). Mandalong Mine operates under Development Consent SSD-5144 which was granted on 12 October 2015 by the NSW Planning Assessment Commission under Part 4, Division 4.1 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) which relates to State Significant Developments (SSD).

This Statement of Environmental Effects (SEE) has been prepared to support an application to modify SSD-5144 pursuant to Section 96(2) of the EP&A Act for the Project.

1.2 The Proponent

Mandalong Mine is owned and operated by Centennial Mandalong (the Proponent), a wholly owned subsidiary of Centennial Coal Company Limited (Centennial Coal). Centennial Coal is a wholly owned subsidiary of Banpu Public Company Limited (Banpu). Centennial has over 1,400 employees, with approximately 370 of these making up the workforce for Mandalong Mine; one of the largest underground coal producers in NSW.

Centennial Mandalong is the applicant for the Project. The relevant address is:

Centennial Mandalong Pty Limited
Level 18, BT Tower
1 Market Street
Sydney NSW 2000

1.3 Document Purpose and Structure

This SEE has been prepared by Centennial Coal to support the application to modify SSD-5144 pursuant to Section 96(2) of the EP&A Act. It has further been prepared in accordance with the relevant provisions of the *NSW Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

In addition to describing the Project, this SEE contains an assessment which addresses the key issues identified following a project risk assessment and stakeholder consultation.

In summary, this SEE is structured as follows:

Section 1: outlines the Project background, introduces the Proponent and Project and briefly outlines the approval pathway.

Section 2: provides an overview of the Project Application Area (PAA), including land ownership, existing land uses and surrounding residences.

Section 3: describes the existing approved Mandalong Mine operations.

Section 4: describes the proposed Mandalong Transmission Line TL24 Relocation Project.

Section 5: describes the approval pathway and environmental legislative framework for the Project.

Section 6: contains an analysis of socio-economic factors.

Section 7: outlines the stakeholder consultation activities undertaken to identify and prioritise the issues to be addressed within the SEE.

Section 8: outlines the Project environmental risk assessment undertaken to identify and prioritise the issues to be addressed within the SEE.

Section 9: contains an assessment of the potential environmental and socio-economic implications of the Project, including cumulative impacts.

Section 10: lists the Statement of Commitments proposed to be adopted for the Project in order to mitigate potential adverse impacts and ensure appropriate management and monitoring.

Section 11: provides a justification for the Project and discusses the Projects in terms of the objects of ecologically sustainable development.

Section 12: lists the reference documents referred to within the SEE.

Section 13: lists the abbreviations used within the SEE.

1.4 Overview of the Modification

Centennial Mandalong is seeking to modify its existing development consent for the Mandalong Transmission Line TL24 Relocation Project (the Project). To achieve optimum coal extraction and limit subsidence effects on surface infrastructure, Mandalong Mine proposes to relocate a 2.4 kilometre section of TransGrid's 330kV Transmission Line (TL) 24. As part of this project, it is proposed to remove 12 existing steel lattice towers and establish eight new steel lattice towers.

Clearing of 8.5 hectares of native vegetation is required for the new section of TL24 which includes a 60 metre wide easement entirely on freehold land owned by Centennial Fassifern Pty. Limited. Following the establishment of the eight new towers and relocation of the transmission line, the redundant 12 towers will be decommissioned, dismantled and removed in consultation with key stakeholders. Upon completion of the line, TransGrid will be responsible for extinguishing the redundant easement for the decommissioned section of TL24 and establishing a new easement over the new section of TL24. The construction of the new towers and demolition of the redundant towers combined form the extent of this Project. Once all construction and demolition activities are completed, TransGrid will continue to operate and maintain the transmission line and easement in accordance with their operating procedures.

The Project is summarised into the following key stages:

- Establishment of access tracks and clearing of required 60m wide easement;
- Construction of proposed tower foundations and establishment of towers for new section of TL24;
- Stringing and cutting in of lines on new section of TL24; and
- Removal of redundant TL24 structures.

1.5 Modification Need

As part of the assessment for the Mandalong Southern Extension Project, Centennial Mandalong initiated a strategic constraints analysis across the Mandalong Southern Extension Area. The current TL24 corridor posed a significant limitation to the mine layout now approved under SSD-5144. Suspension towers, which are those where the line passes through without changing direction, can withstand a certain amount of tilt and strain and can be protected from subsidence to a certain extent. Tension towers, where the line is fixed to the towers, are installed where there is a change of direction or a clearance issue and these towers have very low tolerance to tilt and strain due to the line being tightened or slackened and

instability of the structure due to the change in line angle. Impact to TransGrid's infrastructure has been minimised by the mine layout, however it was not possible to avoid the line altogether.

A number of mine layouts were drawn up in an attempt to avoid the tension towers within the Southern Extension Area by relocating longwalls around them or developing main headings under them. However due to the location of the tension towers in the thick seam area (LWs 25 to 37) in an area where the proposed longwalls are already short, the impact on the Project's financial viability made these options unfeasible (see **Figure 1**).

Several adjustments were made to the proposed mine plan, where possible, to avoid or limit impacts on TransGrid infrastructure. This included limiting the length of LWs 30 and 31 to avoid undermining a tension tower on line TL25/26, and providing a narrow corridor between the gateroads of LWs 38 and 61 to avoid undermining a section of the transmission line TL24 to the east of the Project.

Given the remaining unavoidable subsidence impacts to the five TL24 towers, a TransGrid feasibility study concluded that the best option is to relocate the section of TL24 to avoid undermining of the tension towers. The Subsidence Predictions and Impact Assessment Report (DGS, 2013) for the Mandalong Southern Extension Project highlighted that five TL24 tension towers are within the proposed limits of the longwall extraction with two towers inside a 26.5° angle of draw from the panel limits. These towers are likely to be subjected to cumulative tensile or compressive strains in excess of 1mm/m. The relocation of the TL24 line to allow the approved Mandalong Southern Extension Project will enable the proposed longwall panels to be extracted without compromising the viability of the tower structures on the surface by way of predicted subsidence.

The requirement to relocate a section of TL24 was highlighted in the Mandalong Southern Extension Project Environmental Impact Statement (EIS) and Response to Submissions report which supported SSD-5144. In particular it was emphasised that a separate application (to SSD-5144) would need to be lodged to assess the impact of the relocation following a Network Modification Scoping Study to be undertaken by TransGrid. The relocation will take place entirely within the SSD-5144 PAA and will be established on land owned by Centennial Fassifern Pty. Limited. The modification is proposed to be made under Section 96(2).

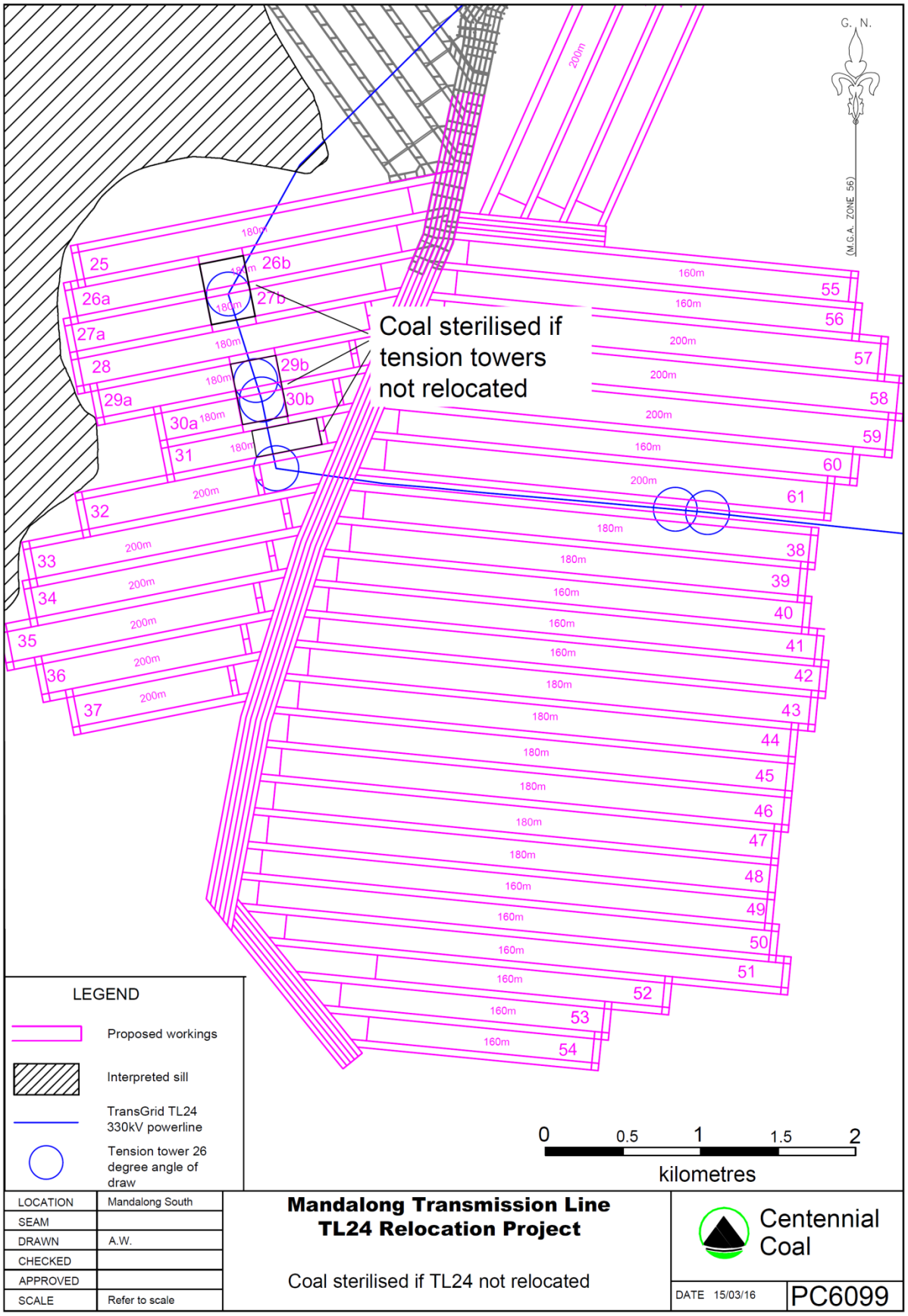

Figure 1: Coal Sterilised if TL24 Not Relocated

2.0 SITE DESCRIPTION

2.1 Site Location

Mandalong Mine is an existing underground longwall coal mine located in the Lake Macquarie and Wyong Local Government Areas (LGAs). Mandalong Mine is situated approximately 130 kilometres north of Sydney and 35 kilometres south-west of Newcastle near Morisset (see **Figure 2**).

The nearest major population settlements to the Mandalong Mine Access Site are Morisset 2.5 kilometres to the east, Wyee 6.5 kilometres to the south-east and Cooranbong 4.5 kilometres to the north. The Sydney-Newcastle M1 Motorway and the Main Northern Railway Line both traverse through the Mandalong Mine Development Consent boundaries on a north-south alignment.

Electricity transmission lines and suspension towers are situated across the Mandalong Mine Development Consent boundaries. Such lines were constructed to transmit electricity from the region's power stations to the Sydney metropolitan area.

In addition to many private land owners, the Development Consent boundary covers parts of the Olney State Forest and exists within the Lake Macquarie and Wyong River catchment areas.

2.2 Project Application Area

Wholly situated within the Lake Macquarie LGA, the PAA for this Project comprises an area of approximately 540 hectares and is illustrated on **Figure 3**.

The PAA is located approximately 5.4 kilometres south-west of the Mandalong Mine Access Site and includes the proposed new TL24 route encompassing a 60 metre wide easement in addition to the existing TL24 infrastructure to be decommissioned. The PAA has been designed to encompass any required laydown areas and access tracks to be utilised or upgraded during the construction period.

The PAA is bordered by Mandalong Road to the west, land owned by Centennial Coal to the south and east and Chapman's Road to the north (refer **Figure 3**).

The PAA exists over Private land and crown roads and is illustrated on **Figure 4**. The PAA does not include areas of the Olney State Forest.

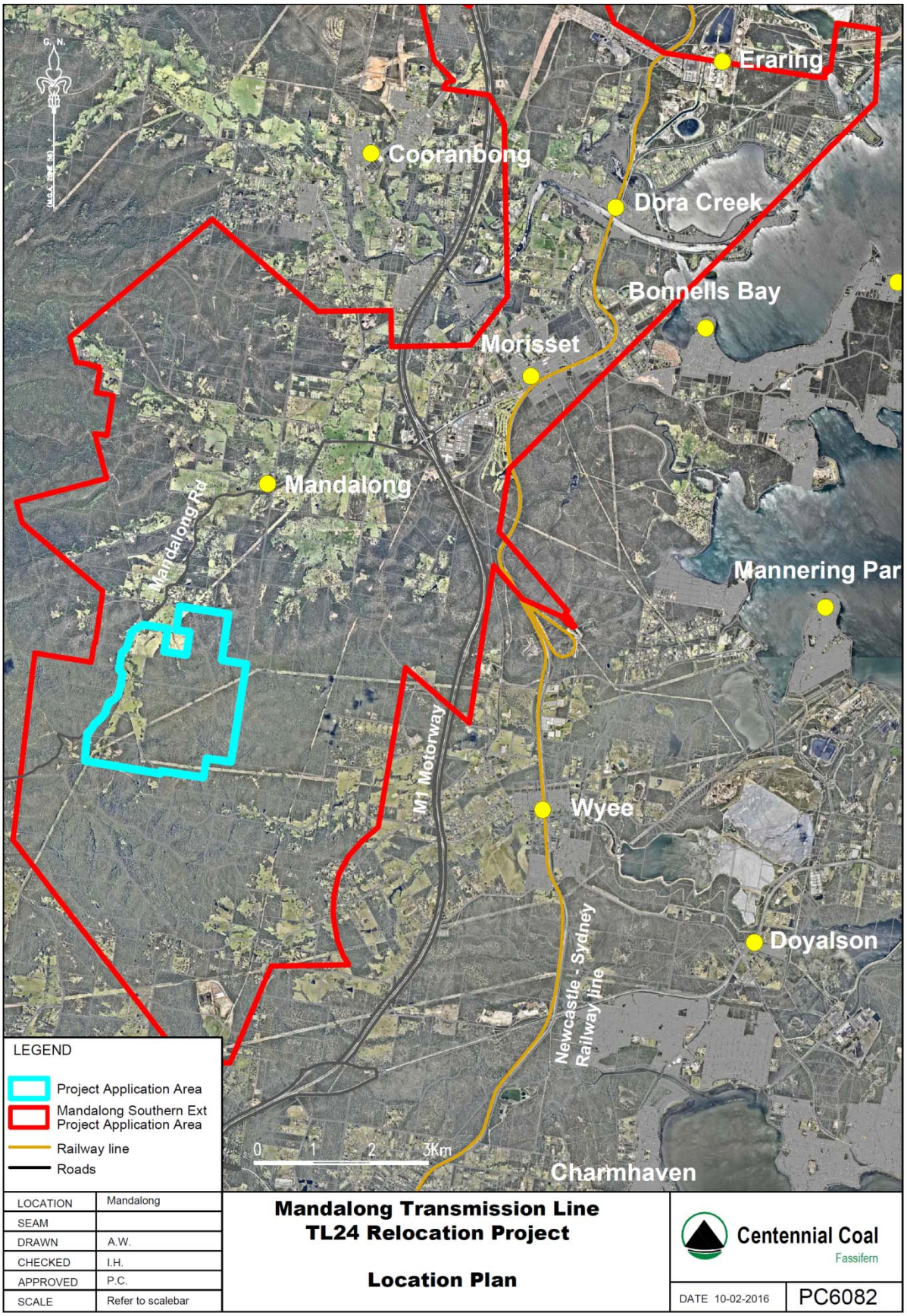

Figure 2: Location Plan

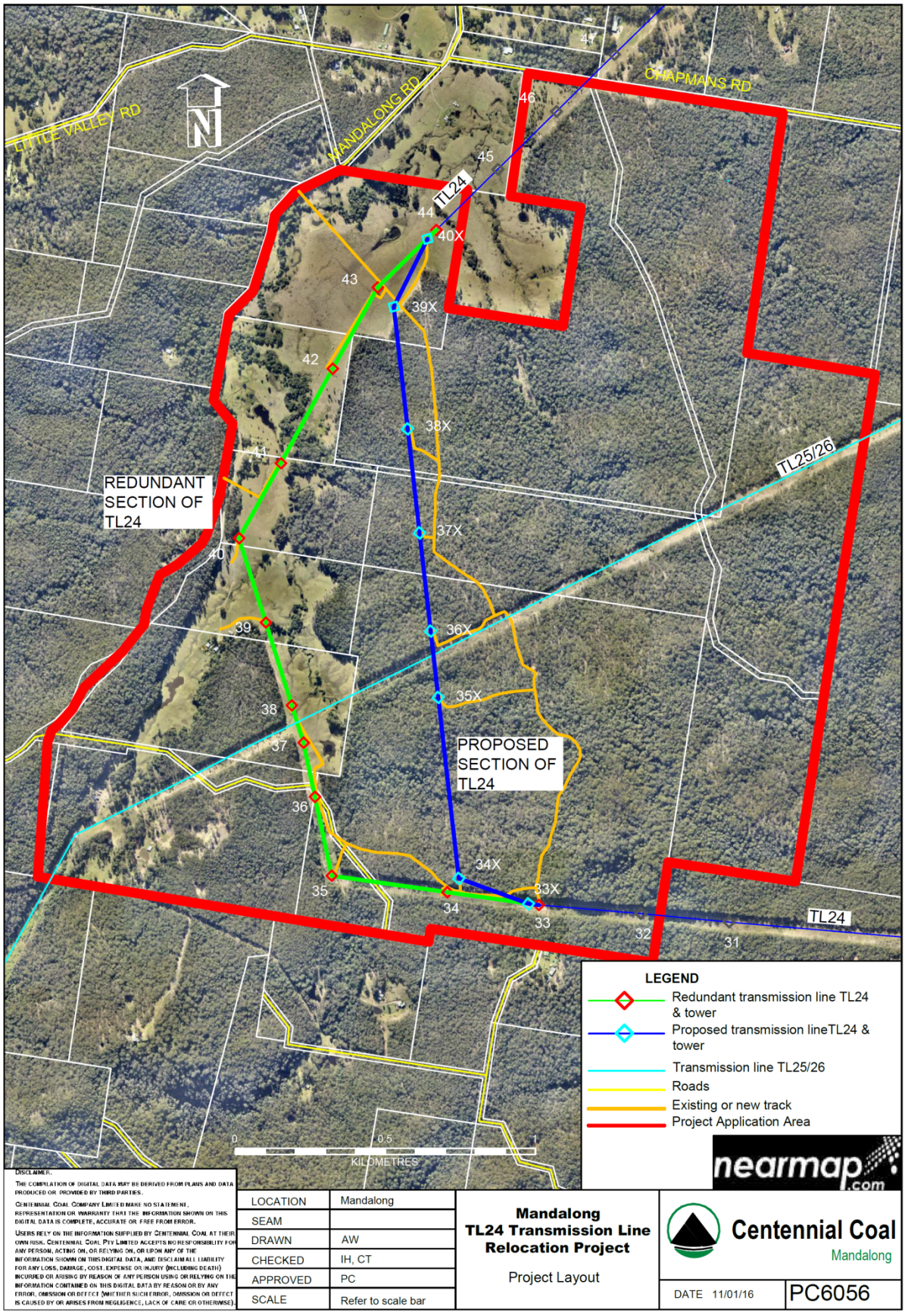

Figure 3: Project Application Area

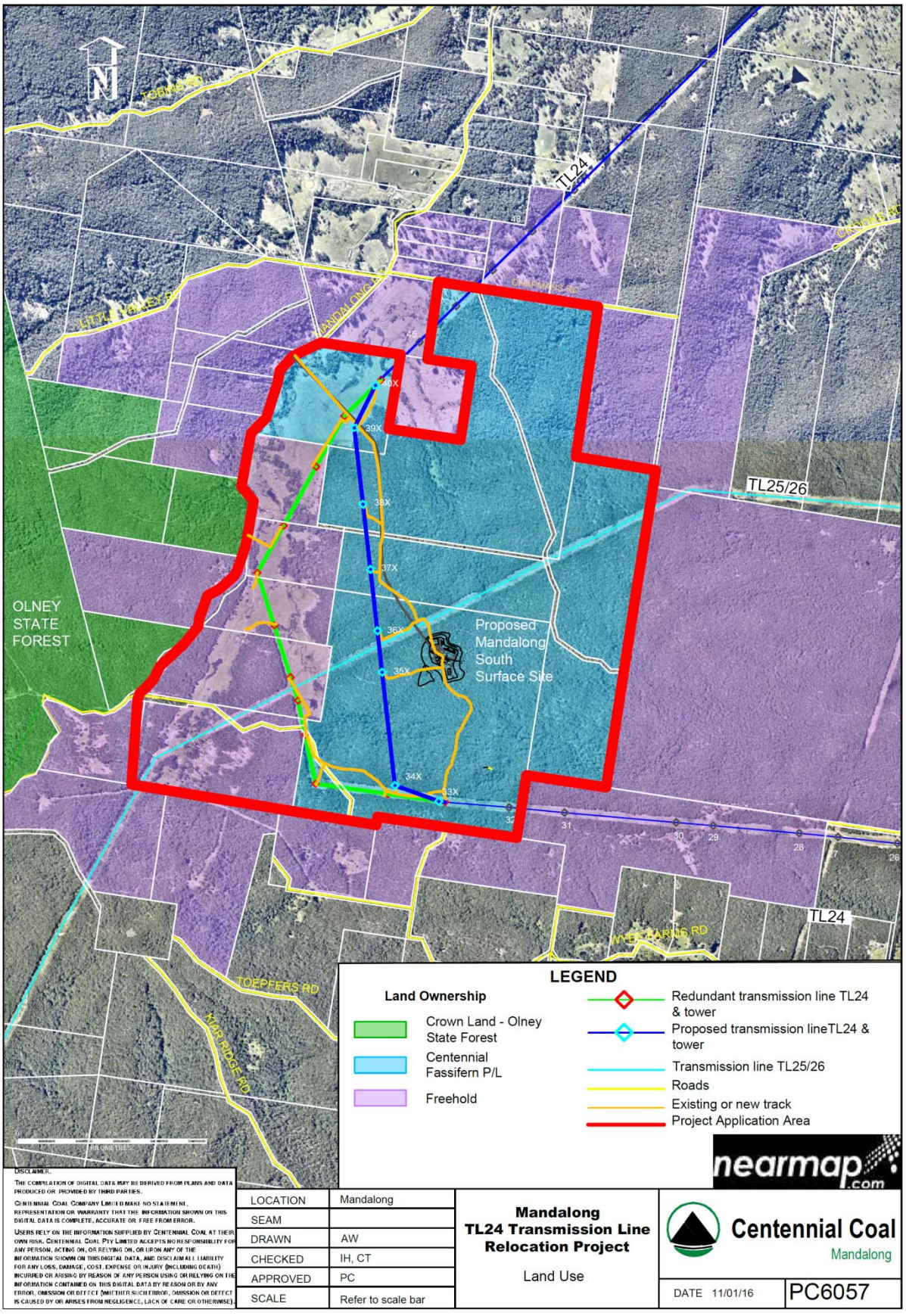

Figure 4: Land Ownership

2.3 Land Use and Ownership

The predominant land uses within the PAA include rural-residential, utility easements, underground mining and proposed surface operations associated with the Mandalong Mine, cattle grazing and production and transport corridors.

The land within the PAA exists over private land and crown roads. A Schedule of Land indicating land ownership within and surrounding the PAA appears in **Appendix 1**.

2.3.1 Sensitive Receivers

As evident in **Figure 4**, the nearest privately-owned residences to the PAA typically exist along Mandalong Road. The nearest privately-owned residences to the proposed Mandalong South Surface Site (MSSS) located over 950 metres to the south and west along Mandalong Road and Wyee Farms Road. The MSSS is the surface infrastructure site approved under SSD-5144 and located on **Figure 4**.

From **Figure 5**, Sensitive Receivers R11 to R29 are the nearest privately-owned residences to the PAA.

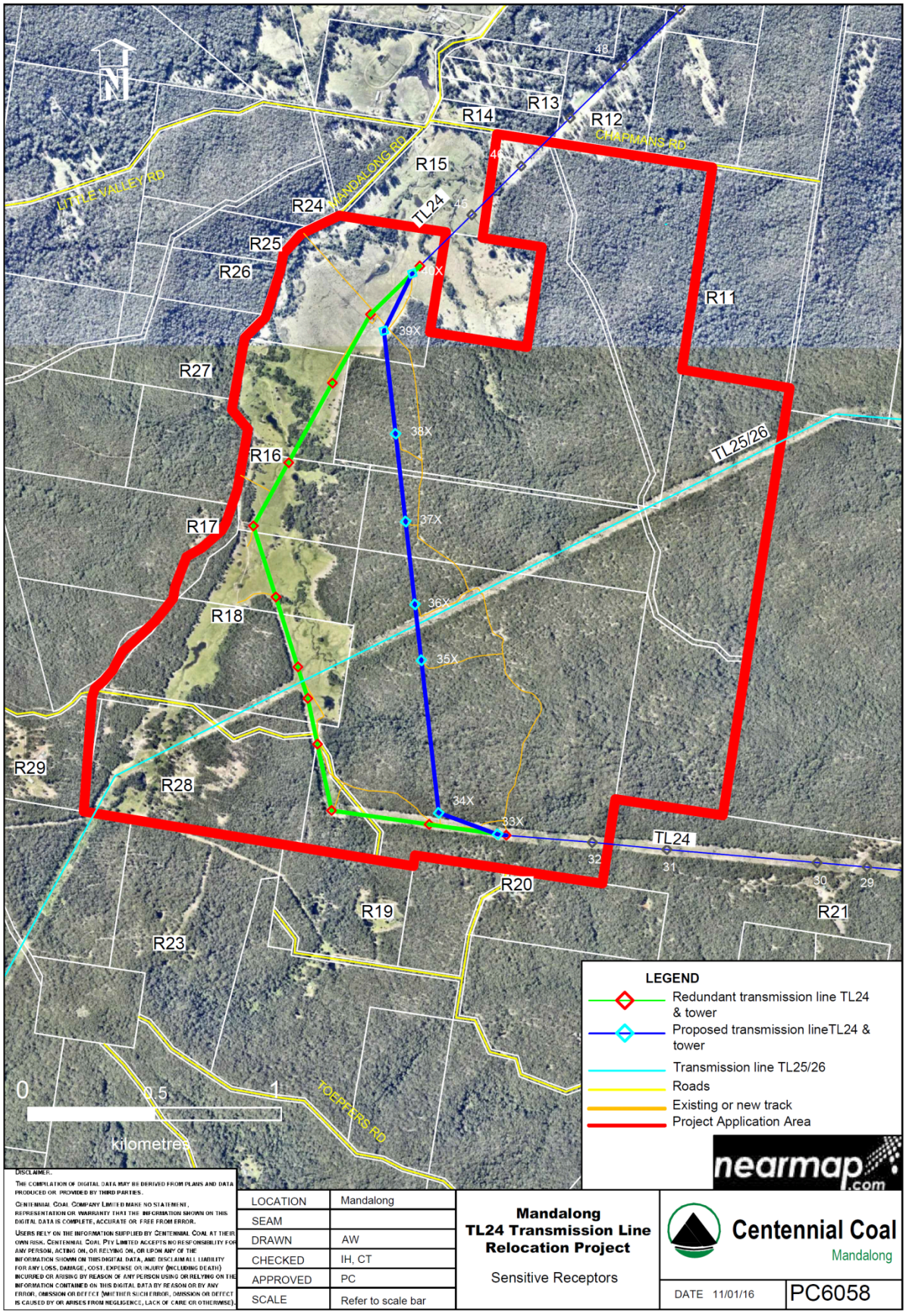

Figure 5: Sensitive Receptors

2.4 Soils, Geology, Topography and Hydrology

The PAA is located in the south-western part of the Newcastle Coalfield, which occupies the north-eastern portion of the Sydney Basin. The target coal seams are the West Wallarah seam and the Wallarah-Great Northern seam, which together form the upper part of the Permian Newcastle Coal Measures. Above the West Wallarah and Wallarah-Great Northern seams lies the Narrabeen Group, which are comprised of variable sequences of interbedded claystones, siltstones and fine to coarse-grained sandstones. The Munmorah Conglomerate is a sandstone-dominated formation within the Narrabeen Group, which typically occurs between 60–140 m above the Newcastle Coal Measures.

Land within and surrounding the PAA is dominated by two ridgelines which trend generally north-west to south-east and from the south to the north-east corner; both are densely timbered. Elevations on these ridgelines is up to 200 m Australian Height Datum (AHD). The small areas of relatively flat land to the west of these ridgelines have been cleared and used for rural production. The valleys are relatively low lying with surface elevations generally less than 50 m AHD. The Jilliby State Conservation Area is located north-west of the PAA and the Olney State Forest is located to the west and south of the PAA.

The PAA exists wholly within the Lake Macquarie Catchment Area. Morans Creek, a 3rd order waterway, is the key sub-catchment within the PAA. Morans Creek flows in an approximately north-easterly direction before flowing into Stockton Creek which subsequently flows into Dora Creek west of Morisset. Dora Creek ultimately flows into Lake Macquarie (**Figure 6)**. The Morans Creek catchment area is predominantly well forested, with sandy soils and some rocks. The soil landscapes within the Morans Creek catchment include Watagan and Mandalong soil landscapes within upper slope areas, Gorokan soil landscape within the footslope areas and Yarramalong and Wyong soil landscapes within the floodplain area.

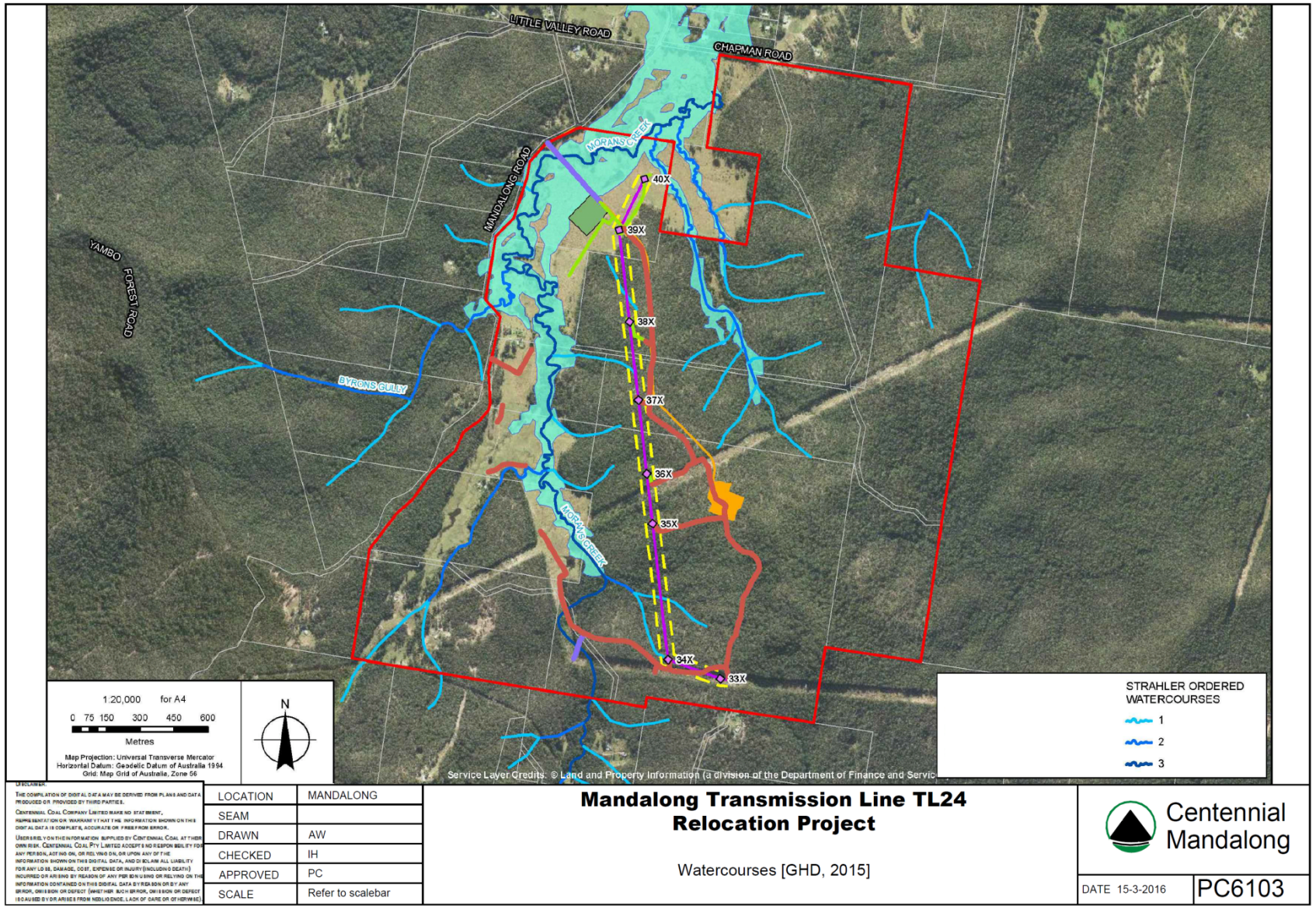

Figure 6: Watercourses in the Project Application Area

2.5 Climate

The meteorology data presented in this section has been sourced from long-term data collected at the Bureau of Meteorology's (BoM) nearest operational weather stations, along with information provided in GHD (2015) and SLR (2015a).

2.5.1 Temperature

The PAA is located in a temperate climate zone with no designated wet season, although the area can be susceptible to occasional heavy showers and thunderstorms due to easterly troughs during warmer months. The local climate is characterised by warm to hot summers and cool to mild winters. Based on the long-term climate statistics sourced from the Bureau of Meteorology between 1994 and 2012, mean monthly maximum temperatures in the area range between 15.1 degrees Celsius (^{0}C) in July to 26.9 ^{0}C in January. Mean monthly minimum temperatures range between 6 ^{0}C in July to 17 ^{0}C in February. Autumn and spring are generally mild with sporadic temperature fluctuations.

2.5.2 Rainfall and Evaporation

GHD (2015) obtained a continuous daily rainfall dataset as SILO Patched Point Data, using SILO data from the BoM Cooranbong (Avondale) weather station (station number 061012) with missing data "patched" in from interpolations from nearby stations. The available rainfall data extended from January 1889 through to December 2014, with the representative statistics reported as:

- Minimum annual rainfall – 531 millimetres (in 1944).
- Average annual rainfall – 1,106 millimetres.
- Median annual rainfall – 1,041 millimetres.
- Maximum annual rainfall – 2,040 millimetres (in 1990).

The average annual evaporation total was approximately 1,187 millimetres, compared to the annual average rainfall of 1,106 millimetres. This gives an annual deficit (difference between annual rainfall and annual evaporation) of approximately 81 millimetres.

2.5.3 Wind

SLR (2015a) has developed a three-dimensional prognostic meteorological dataset for the region surrounding the PAA using the CALMET meteorological model. A summary of the annual wind behaviour predicted by CALMET for the year 2010 is presented as wind roses in SLR (2015a). These wind roses indicate that the area predominantly experiences light to moderate winds (between 1.5 and 8 metres per second), with high-speed winds (greater than 8 metres per seconds) prevailing for a low fraction of time. Wind direction is seasonally dependent.

While winds occur reasonably evenly from all quadrants, based on the modelled wind roses for 2006 to 2010, summer winds appear to be generally from the east-northeast and winter winds appear to be predominately from the west-northwest. Calm wind conditions (less than 0.5 metres per second) were predicted to occur just over 1 percent of the time during each year.

2.5.4 Atmospheric Stability

Using the CALMET model, SLR (2015a) predicted the frequency of each stability class within the area over the five years between 2006 and 2010, with the results indicating a high frequency of conditions

typical to Stability Class F. Stability Class F is indicative of very stable night time conditions, conducive to a low level of pollutant dispersion due to mechanical mixing (SLR 2015a). In 2009 and 2010 a higher percentage of Stability Class D was predicted, which is indicative of neutral conditions, conducive to a moderate level of pollutant dispersion due to mechanical mixing (SLR 2015a).

3.0 EXISTING MINE OPERATIONS

3.1 Overview of Operations

Underground longwall mining operations commenced at Mandalong Mine in January 2005. Since this time, Centennial Mandalong has extracted up to 6 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal from the West Wallarah Seam utilising a combination of longwall and continuous mining methods.

3.2 Existing Approvals and Licences

3.2.1 Development Consents

On 12 October 2015 State Significant Development (SSD) 5144 was approved by the NSW Planning Assessment Commission (PAC) for the Mandalong Southern Extension Project. This approval exists as a single new development consent for the Mandalong Southern Extension Project to regulate its approved existing mining operations, extend existing underground mining operations into the Southern Extension Area and utilise existing and proposed new surface infrastructure integral to the mining operation. The primary activities authorised under SSD-5144 are as follows:

- Continue to operate the Mandalong Mine, with the exception of the infrastructure and operations at the surface of the Cooranbong Entry Site (however the mine ventilation shaft, ventilation fan and Borehole Dam at the surface of the Cooranbong Entry Site are part of the Project).
- Extend the Mandalong Mine's underground mining operations into the area covered by ML1722 (Southern Extension Area) using a combination of continuous miner and longwall mining methods.
- Extract up to 6 Mtpa of ROM coal from the West Wallarah and Wallarah-Great Northern Seams within the current mining lease areas.
- Deliver ROM coal from the underground workings to the Cooranbong Entry Site at a rate of up to 6 Mtpa and to the Delta Entry Site at a rate of up to 6 Mtpa.
- Continue to utilise the existing surface infrastructure of the Mandalong Mine Access Site.
- Install and operate surface infrastructure at the proposed MSSS to service the extended underground mining operation.
- Increase manning to 420 full-time employees and up to 50 contractors during longwall relocations.
- Undertake on-going exploration drilling activities within the bounds of Centennial Mandalong's mining leases and exploration licences.
- Continue to operate 24 hours per day, seven days per week.

In addition to SSD 5144, Development Consent DA 35/2/2004 was granted in July 2004 by the Minister for Planning, approving the construction and operation of the coal handling and clearance system at the Delta Entry Site. This SEE only relates to a proposed modification of SSD-5144.

3.2.2 Approval Under the Environment Protection and Biodiversity Conservation Act 1999

An assessment of whether Mandalong Mine may have a significant impact on any Matters of National Environmental Significance (MNES) or on the environment of Commonwealth land was completed as part of the Mandalong Southern Extension Project. This assessment determined that no aspect of the Project posed a significant impact on any MNES. Mandalong Mine's operations have not been referred under the EPBC Act. As such, Mandalong Mine has no existing approval under the EPBC Act.

3.2.3 Subsidence Management Plan Approvals

Centennial Mandalong has approved Subsidence Management Plans to mine up to and including Longwall panel 21. An Extraction Plan is being prepared regarding Longwall panels 22 to 24A.

3.2.4 Environmental Protection Licence

Mandalong Mine is a premises-based activity under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act). On this basis, the occupier of the premises must hold an Environmental Protection Licence (EPL) administered by the Environment Protection Authority (EPA) under Section 43(b) of the POEO Act. Mandalong Mine operates under EPL 365, which covers coal mining to a scale of greater than 5 million tonnes produced per annum and coal works to a scale of greater than 5 million tonnes handled per annum. A copy of EPL 365 is contained within **Appendix 2**.

3.2.5 Water Licencing

Centennial Mandalong currently holds several groundwater monitoring licences under the provisions of the *Water Act 1912* for the purposes of monitoring groundwater levels in the Mandalong Mine Development Consent Boundary.

A groundwater dewatering licence (licence number 20BL169424) is also held by Centennial Mandalong under the Water Act 1912 permitting the extraction of up to 1,825 megalitres per year of groundwater from the coal seam as part of the process of mining (dewatering).

3.2.6 Mineral Authorities

As shown on **Figure 7** and listed in **Table 1**, exploration, mining and mining-related operations at Mandalong Mine occur under the provisions of various mineral authorities.

Table 1: Mandalong Mine's Mineral Authorities

Reference	Title	Description	Expiry Date
CCL 762	Consolidated Coal Lease 762	Title of Cooranbong workings, includes some surface land.	13 Oct 2022
CCL 746	Consolidated Coal Lease 746 (sublease)	Title of Cooranbong workings, includes some surface land.	31 Dec 2028
ML 1722	Mining Lease 1722	Title for Mandalong Mine workings, includes surface mining lease for MSSS.	17 Dec 2035
ML 1443	Mining Lease 1443	Title for Mandalong Mine workings, includes Mandalong Mine Access Site.	1 Mar 2020
ML 1431	Mining Lease 1431	Title to surface land for proposed shaft at the back of Morisset.	27 May 2019
ML 1543	Mining Lease 1543	Title for Mandalong Mine workings.	25 Nov 2024
ML 1553	Mining Lease 1553	Title for Delta Link Project.	7 Sept 2025
MPL 191	Mining Purposes Lease	Title to surface land for water	24 Feb 2023

	191	tanks at Cooranbong.	
MLA 457	Mining Lease Application 457		N/A
MPL 329	Mining Purposes Lease 329	Title to surface land for old water supply line from Eraring Power Station.	5 Aug 2015
EL 6317	Exploration Licence 6317	Title for exploration activities in the Southern Extension Area.	8 Aug 2019
EL 4443	Exploration Licence 4443	Title for exploration activities over the former Cooranbong Colliery.	23 Oct 2017
EL 4968	Exploration Licence 4968	Title for exploration activities over part of Mandalong Mine.	31 July 2017
EL 4969	Exploration Licence 4969	Title for exploration activities over part of Mandalong Mine.	31 July 2017
EL 5892	Exploration Licence 5892	Title for exploration activities over part of Mandalong Mine.	31 July 2017
A 404	Authorisation 404	Title for exploration activities over part of Mandalong Mine.	31 July 2017

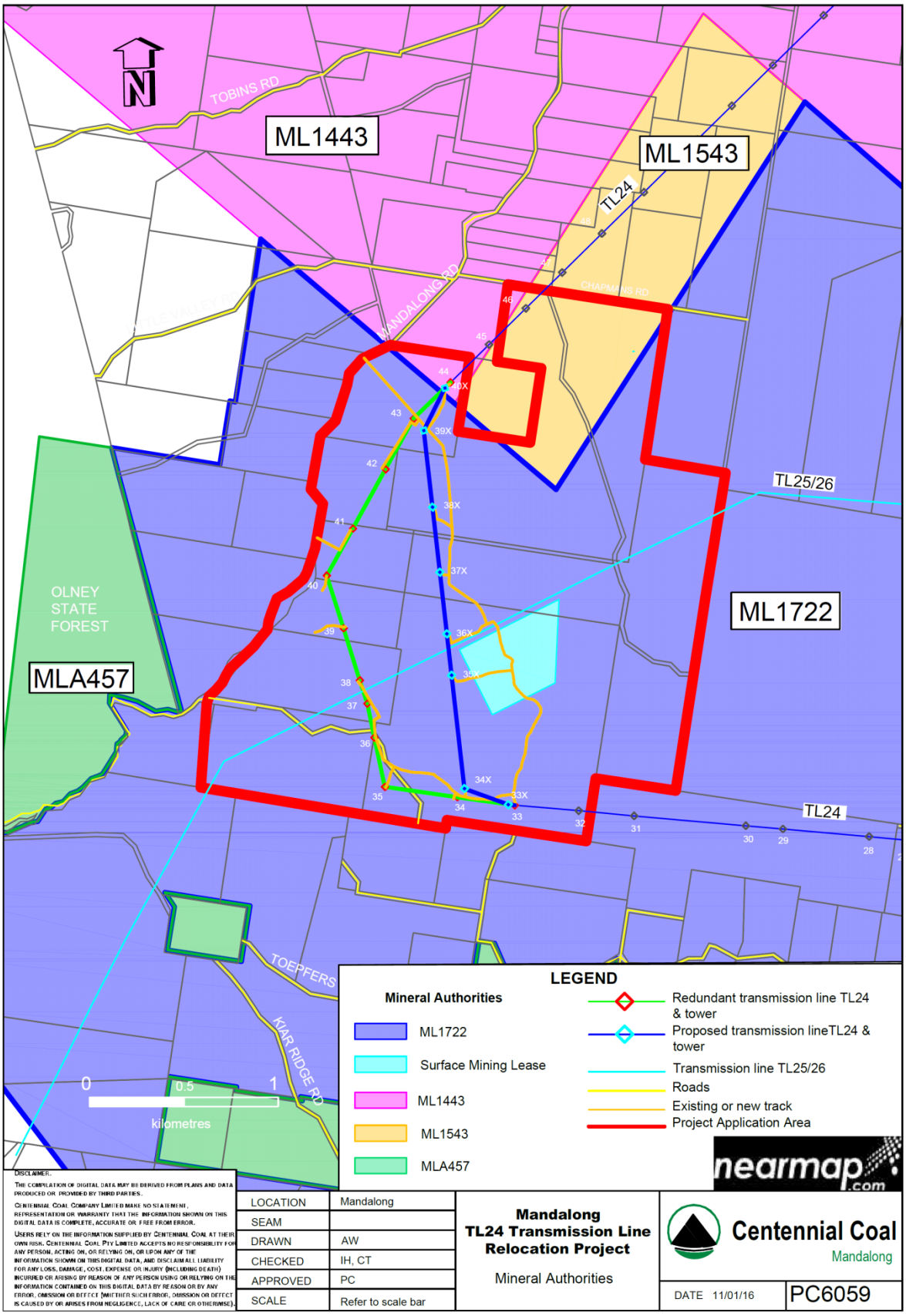

Figure 7: Mineral Authorities

3.3 Life of Mine

Mandalong Mine's current Development Consent will expire in 2040.

3.4 Hours of Operation

Mandalong Mine is approved to operate up to 24 hours per day, seven days per week.

3.5 Employment

Mandalong Mine is approved to employ up to 420 full-time equivalent employees. Up to an additional 50 contractors will be employed during longwall relocations.

3.6 Mining Operations and Subsidence

The approved Mandalong Mine comprises the underground workings and surface infrastructure of the Mandalong Mine, including the Mandalong Mine Access Site and MSSS, encompassing access to underground workings and associated surface infrastructure. The other operations directly related to the currently approved Mandalong Mine are the two components which comprise the Delta Entry Site and the Cooranbong Entry Site.

Underground longwall mining operations commenced at Mandalong Mine in January 2005. Centennial Mandalong is approved to extract up to 6 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal from the West Wallarah Seam utilising a combination of longwall and continuous mining methods. The primary components of Mandalong Mine are:

- Existing surface infrastructure at the Mandalong Mine Access Site (ventilation infrastructure, gas drainage, demonstration VAM RAB, administration, workshops and material storage);
- The mine ventilation shaft, ventilation fan and Borehole Dam at the surface of the Cooranbong Entry Site;
- Mandalong Mine's underground mining operations in existing and future approved mining areas as outlined in SSD-5144;
- Extraction of up to 6 Mtpa of ROM coal from the West Wallarah and Wallarah-Great Northern Seams within the current mining lease areas;
- Delivery of ROM coal from the underground workings to the Cooranbong Entry Site at a rate of up to 6 Mtpa and to the Delta Entry Site at a rate of up to 6 Mtpa; and
- Surface infrastructure at the MSSS (yet to be constructed) to service the extended underground mining operation.

TL24 is located in the northern part of the Southern Extension Area and has a number of suspension and tension towers located within the area. Suspension towers, which are those where the line passes through without changing direction, can withstand a certain amount of tilt and strain. Conversely, tension towers, which are those where the line is fixed to the towers and there is usually a change in direction of the line or the line is crossing over another line, have very low tolerance to tilt and strain due to the lines being tightened or slackened and the instability of the structure due to the change in line angle.

A number of mine layouts were drawn up in an attempt to avoid the tension towers within the Southern Extension Area by relocating longwalls around them or developing main headings under them. However due to the location of the tension towers (LWs 25 to 37) and in an area where the proposed longwalls are already short, the impact on the Project's financial viability made these options unfeasible.

Adjustments have been made to the mine plan, where possible, to avoid or limit impact to TransGrid infrastructure. This includes limiting the length of LWs 30 and 31 to avoid undermining a tension tower on Transmission Line TL25/26, and providing a narrow corridor between the gateroads of LWs 38 and 61 to avoid undermining a section of the transmission line TL24.

3.7 Mine Support Facilities

All existing surface and underground infrastructure at Mandalong Mine, including previous surrounding workings (for ongoing ventilation and access), will continue to be relied upon. The existing Mandalong Mine Access Site is located off Mandalong Road (via Kerry Anderson Drive) west of Morisset. Existing surface and underground infrastructure includes the following:

- Decline Tunnel;
- Administration Buildings and Bathhouse;
- Car Parking Areas;
- Mechanical Workshop and Store;
- Mine Ventilation and Gas Drainage Infrastructure;
- Water management infrastructure; and
- Pollution control infrastructure.

The MSSS when constructed will comprise of infrastructure to service the extended underground mining operation with key items including:

- Floxal unit and Borehole;
- Ventilation Fans;
- Hydrocarbon Storage;
- Storage and delivery to underground of Bulk Materials;
- A small administrative office (no personnel will be permanently located at the site);
- Compressor shed;
- Tube Bundle Gas Monitoring Equipment;
- Electrical sub-station; and
- Water tanks.

3.8 Coal Handling Transport and Dispatch

Mined coal is transported from the Mandalong Mine underground workings via underground drift conveyor systems to either the Cooranbong Entry Site at a rate of up to 6 Mtpa or the Delta Entry Site at a rate of up to 6 Mtpa. These conveyors operate 24 hours a day, seven days per week. Centennial's Northern Coal Services is responsible for processing, stockpiling and dispatching product coal at the Cooranbong Entry Site. Coal delivered via the Delta Entry Site is transported to Vales Point Power Station via the Delta Electricity owned overland conveyor belt.

3.9 Water Management

The water demands of the Mandalong Mine are for underground operations, surface facilities (including machinery operation and wash-down), dust suppression, fire-fighting storage and staff amenities. Potable water is obtained via the existing connections to Hunter Water's reticulated water supply infrastructure at the Mandalong Mine Access Site and Cooranbong Entry Site. Additional water sources comprise mine water and rainfall runoff.

The key functions of the Mandalong Mine water management systems are to:

- Separate clean and dirty water sources, and allow for diversion, collection and treatment as appropriate;
- Minimise discharges by maximising, where practicable, available water storages; and
- Manage water discharge, in terms of volume and quality, to a level that is acceptable for environmental management.

Surface runoff from areas where there is no coal storage, handling, processing or transportation and no equipment servicing is considered to be clean water. It is typically from undisturbed catchment areas and impervious areas such as sealed roads and car parks. This runoff is directed around dirty water catchments to avoid potential contamination and minimise the volume of dirty water required to be managed.

Dirty water is runoff from disturbed areas and areas likely to contain coal, oils, greases and hydrocarbons, including workshop and fuel storage areas. Dirty water is managed and treated to remove sediment and residual hydrocarbons prior to discharge in accordance with the relevant EPL.

Surface water at the MSSS is directed underground into the mine's dewatering system. An emergency discharge facility is in place for rain events greater than 1:20 average recurrence interval.

3.10 Environmental Management System

Mandalong Mine has an established Environmental Management System (EMS) that has been developed in accordance with the *Centennial Coal Environmental Management System Framework* (2011) and is generally consistent with the elements of ISO 14001. This EMS provides a framework to ensure the effective management of environmental issues and compliance with regulatory requirements for all activities and areas managed by Centennial Mandalong. It also provides a means for continued improvement in environmental performance.

As part of this EMS, a comprehensive set of environmental management plans has been developed and implemented at Mandalong Mine. The implementation of these plans and the integration of the *Centennial Coal Environmental Management System Framework* (2011) is a strong focus at the Mandalong Mine and demonstrates environmental due diligence. These plans are reviewed and updated, as necessary, to reflect operational changes and incorporate additional/amended requirements.

The existing environmental management plans include:

- Underground Mining Environmental Management Plan;
- Environmental Management Plan Surface Facilities Operations Stage;
- Water Management Plan;
- Erosion and Sediment Control Plan;

- Land Management Plan;
- Air Quality Management Plan;
- Noise Monitoring Program;
- Waste Management Plan;
- Wetland Monitoring and Management Plan;
- Energy Savings Action Plan;
- Landowner Communication and Consultation Plan;
- Cooranbong Haul Road Air Quality Management Plan;
- Cooranbong Haul Road Landscape and Rehabilitation Management Plan;
- Cooranbong Haul Road Flora and Fauna Management Plan; and
- Cooranbong Haul Road Waste Management Plan.

The environmental management plans are backed by an environmental monitoring network. Monitoring results are reported monthly on Centennial Coal's website and in the Annual Review.

Mandalong Mine has also developed and implemented an Approvals Database which is used as the primary tool for tracking compliance with conditions of consent, licences and leases.

3.11 Rehabilitation and Final Landform

The underground nature of Mandalong Mine's operations means that surface disturbance and the need for progressive rehabilitation and revegetation is relatively minor compared to open cut mining operations. Regardless, Mandalong Mine does adopt a progressive approach to rehabilitation in accordance with a series of approved management plans; including on-going maintenance of previously rehabilitated areas.

The Mining Operations Plan (MOP) was approved by the Division of Resources and Energy (DRE) on 23 December 2013 for the two year period from 1 January 2014 to 30 November 2015. MOP Amendment A was sought and approved by DRE on 13 October 2015 for an additional 12 month period to 30 November 2016. MOP Amendment B was approved on 19 January 2016 to allow the development of main headings into ML1722.

A new MOP is currently being developed (to also address the Rehabilitation Management Plan requirements specified by SSD-5144) for the Mandalong Mine and will include underground mining from Longwall 22 to 37 under the Development Consent SSD-5144, granted on 12 October 2015 for the Mandalong Southern Extension Project.

4.0 PROJECT DESCRIPTION

4.1 Overview of Project

Centennial Mandalong is seeking to modify its existing development consent for the Mandalong Transmission Line TL24 Relocation Project. To achieve optimum coal extraction and limit subsidence effects on surface infrastructure, Mandalong Mine proposes to relocate a 2.4 kilometre section of TransGrid's 330kV Transmission Line TL24. As part of this project, it is proposed to remove 12 existing steel lattice towers and establish eight new steel lattice towers.

TransGrid's 330kV electricity transmission line in EL6317 represents a significant constraint to the mine layout, approved under the Mandalong Southern Extension Project (SSD-5144). Suspension towers, which are those where the line passes through without changing direction, can withstand a certain amount of tilt and strain and can be protected from subsidence to a certain extent. Tension towers, where the line is fixed to the towers, are installed where there is a change of direction or a clearance issue and these towers have very low tolerance to tilt and strain due to the line being tightened or slackened and instability of the structure due to the change in line angle. Impact to TransGrid's infrastructure has been minimised by the mine layout, however it was not possible to avoid the lines altogether.

The Subsidence Predictions and Impact Assessment Report (DGS, 2013) for the Mandalong Southern Extension Project highlighted that five TL24 tension towers are within the proposed limits of the longwall extraction with two towers inside a 26.5° angle of draw from the panel limits. These towers are likely to be subjected to cumulative tensile or compressive strains in excess of 1mm/m. The relocation of the TL24 line to allow the approved Mandalong Southern Extension Project will enable the proposed longwall panels to be extracted without compromising the viability of the tower structures on the surface by way of predicted subsidence. This was confirmed by a feasibility study undertaken by TransGrid which determined that the best option is to relocate a section of TL24 to avoid undermining of the tension towers.

Further benefits to be gained from the relocation of TL24 are:

- Removal of the existing line and easement on private property.
- The towers are located in areas of reduced subsidence to maintain the integrity of the line
- The route as proposed is the shortest of the designs considered which minimizes clearing and construction impacts.
- The new section of TL24 has been designed to go above TL25/26 instead of under which means that less clearing is required. It also avoids extensive earthworks where material would have to be removed to achieve the required clearing which would increase noise, dust and traffic impacts.

Clearing of 8.5 hectares of native vegetation is required for the new section of TL24 which includes a 60 metre wide easement entirely on freehold land owned by Centennial Fassifern. Following the establishment of the eight new towers and relocation of the transmission line, the redundant 12 towers will be decommissioned, dismantled and removed in consultation with key stakeholders. The location of the existing and proposed TL24 is illustrated on **Figure 8**. Upon completion of construction and demolition the line, the easement for the redundant section of TL24 will be relinquished and a new easement will be created over the new section of TL24.

The Project is summarised into the following key stages:

- Establishment of access tracks and clearing of required 60m wide easement;

- Construction of proposed tower foundations and establishment of towers for new section of TL24;
- Stringing and cutting in of lines on new section of TL24; and
- Removal of redundant TL24 structures.

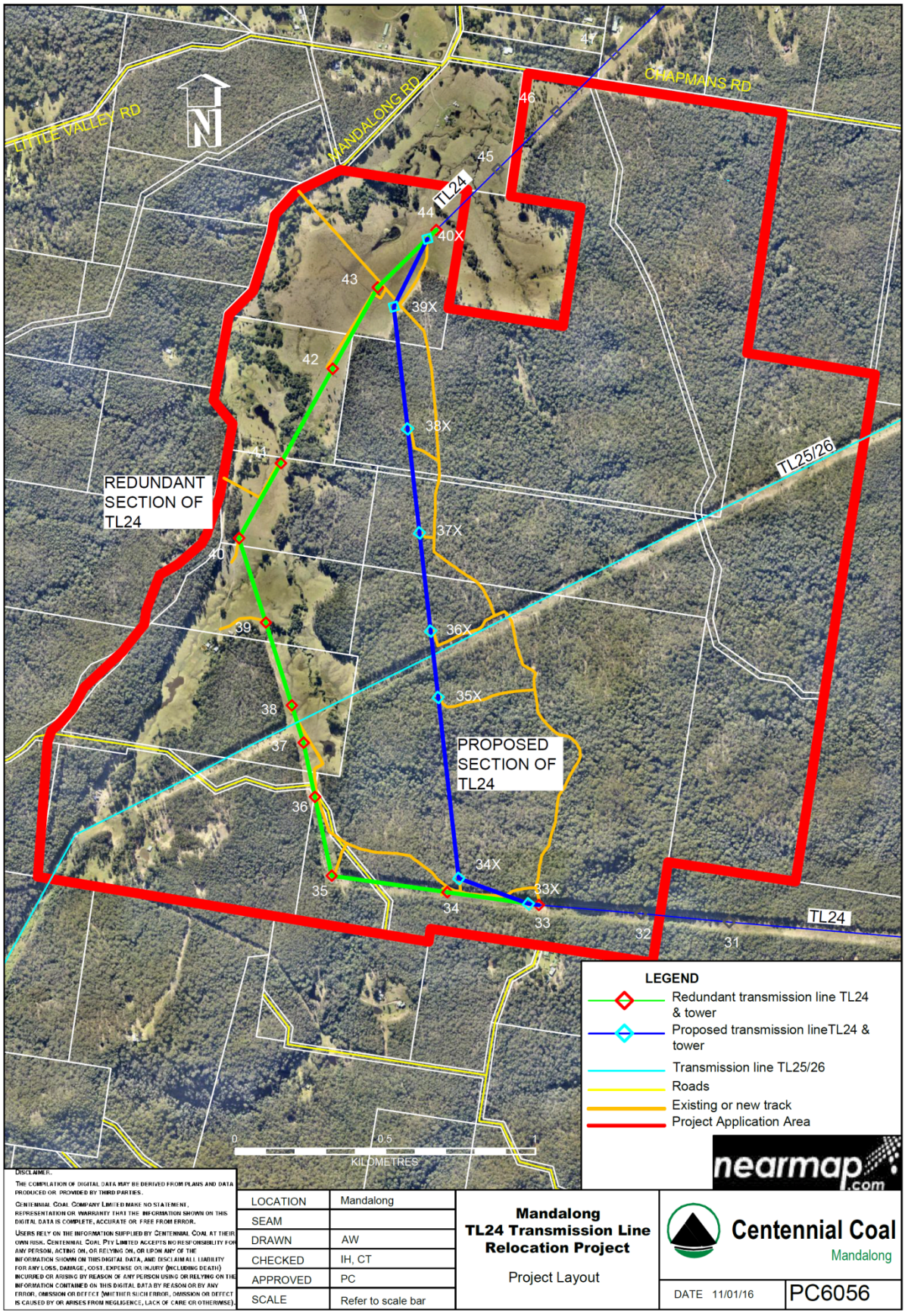

Figure 8: Location of the Existing and Proposed TL24

Table 2 provides an overview of the proposed modification, summarising and comparing the major components of the existing operations at Mandalong Mine and the proposed modification.

Table 2: Comparison of Existing Operation and Proposed Modification

Aspect	Existing Operation	Proposed Modification
Site Access	Access to the Mandalong Mine Access Site is via Kerry Anderson Drive off Mandalong Road adjacent to the M1 Pacific Motorway. Access to the PAA is via Mandalong Road.	Access to the Project construction area will be via the approved MSSS Access Road.
Underground Mine Access	Access to the underground mine is via mine portals situated at the pit top and via existing headings and roadways.	No change.
Development	Mandalong Mine has an approved underground mining area under SSD-5144.	No change.
Longwall Mining and Production	Mandalong Mine is approved to produce up to 6 Mtpa of ROM coal. Mandalong Mine has an approved underground mining area under SSD-5144.	No change
Mine Life	Under Development Consent SSD-5144 mining operations are permitted to 31 December 2040.	No change
Hours of Operation	The mine currently operates 24 hours per day, 7 days per week.	No change
Employment	Mandalong Mine currently has provision to employ up to 420 full-time equivalent employees as well as an additional 50 contractors during longwall relocations.	Up to 25 additional contract personnel will be required for the Project's construction.
Supporting Surface Infrastructure	Mine supporting surface infrastructure designed to control and manage water, ventilation, materials delivery, equipment maintenance etc. is situated at the Mandalong Mine Access Site and when constructed at the MSSS.	No change
Coal Preparation and Handling	No coal preparation or handling is undertaken by Mandalong Mine. All ROM coal is delivered to Northern Coal Services for handling and dispatch.	No change
Waste Coal Management	As product coal is not washed at Mandalong Mine, coarse and fine reject material is not generated at the site.	No change
Surface Water Management	Current water management occurs in accordance with the Mandalong Mine Site Water Management Plan.	No change
Land Preparation	Land preparation required to establish the access road and construction area for the Mandalong Mine Surface Site.	Additional land preparation of 8.5 hectares required to establish the site office, access tracks and proposed easement.

Aspect	Existing Operation	Proposed Modification
Rehabilitation	Given that Mandalong Mine is an underground coal operation, rehabilitation is currently limited to small areas following exploration or construction or when surface infrastructure is decommissioned.	Following the construction of the relocated TL24 transmission line and demolition of the redundant section, disturbance around the new and redundant tower sites will be rehabilitated. Any temporary access tracks established to the redundant tower sites will be rehabilitated in consultation with relevant stakeholders. The new towers, easement and access tracks will remain in place to allow TransGrid to operate and maintain the transmission line.

4.2 Project Application Area

The PAA is illustrated on **Figure 3** and includes the proposed new TL24 route encompassing a 60 metre wide easement in addition to the existing TL24 infrastructure that would be required to be decommissioned. The general boundaries are Mandalong Road to the west, land owned by Centennial Coal to the south and east and Chapman's Road to the north. The PAA has been designed to encompass all required laydown areas and access tracks to be utilised or upgraded during the construction period. The PAA encloses a total area of approximately 540 hectares.

4.3 Hours of Operation and Project Life

Mandalong Mine will continue to operate up to 24 hours per day, seven days a week.

Construction and demolition will be limited to the recommended standard hours of work as per the NSW Interim Construction Noise Guidelines (ICNG) being Monday to Friday 7am to 6pm, Saturday 8am to 1pm and no work on Sundays or Public Holidays. There may be a requirement for TransGrid to undertake some stringing or cutting in activities outside of the daytime hours stipulated in the ICNG if any of the required outages on the lines are not possible during normal construction times.

4.4 Employment

The Project will not generate any change to the full time employment numbers approved under SSD-5144.

It is envisaged that the Mandalong Transmission Line TL24 Relocation Project will require up to 25 temporary construction personnel.

4.5 Mining Operations and Subsidence

Mine planning and design at Mandalong Mine aims to create a safe underground working environment to optimise the extraction of coal. Centennial Mandalong will continue to undertake existing mining operations in accordance with SSD-5144 using longwall mining and bord and pillar extraction methods within the West Wallarah and Wallarah-Great Northern seams. The currently approved extraction rate of 6 million tonnes per annum will remain unchanged. All existing activities at Mandalong Mine approved under SSD-5144 will continue unchanged.

As part of the Mandalong Southern Extension Project (SSD-5144), Centennial Mandalong commissioned a Subsidence Predictions and Impact Assessment Report (DGS, 2013) which modelled predicted and

maximum vertical subsidence, tilt, strain and curvature as a result of the proposed mine layout. The report findings were used by TransGrid to determine a suitable route for TL24 and to design each of the towers to ensure the infrastructure would not be adversely impacted by subsidence.

4.6 Proposed Transmission Line and Easement

A 2.4 kilometre section of TL24 is to be relocated to allow the approved Mandalong Southern Extension Project to safely proceed without compromising the viability of the tower structures on the surface by way of predicted subsidence.

The new section of line will be constructed with a combination of tension and suspension steel lattice towers. The relocated TL24 will have the following general characteristics:

- Land preparation required to create the 60 metre wide easement and necessary access tracks;
- Eight new steel lattice tower structures of heights ranging from approximately 21m to 64m. Four of the towers will be suspension towers and four will be tension towers;
- Stringing of the conductors between new towers in addition to installation of insulators;
- Dismantling and decommissioning of the redundant section of Line 24 (12 towers in total); and
- Rehabilitation on completion of construction and demolition works.

4.6.1 Clearing and Site Establishment

Requirements to clear native vegetation have been reduced from approximately 14 ha (whole of 2.4km long 60m wide easement) to 8.5 ha. This includes all clearing associated with the easement and access tracks. The reduction has been achieved by not clearing areas within the proposed easement where vegetation height does not pose a risk to the operation of the proposed transmission line in accordance with TransGrid's vegetation management procedures.

Once the relocated section of the TL24 transmission line becomes operational, TransGrid may undertake additional clearing for bushfire management and ongoing maintenance using their discretionary processes and guidelines. This loss is temporary and indirectly attributable to the Project as Centennial Mandalong is not seeking approval for this clearing rather it may be undertaken by TransGrid subject to their clearing rights.

Clearing and site establishment forms the first phase of the project and consists of the following three major stages:

- Clearing and/or widening required for the necessary access tracks;
- Clearing within the 60 metre wide easement; and
- Establishment of an approximately 100 x 100 m site office and laydown area.

Initial surveys will be completed regarding the proposed easement, access tracks and site locations with pegs and flagging tape installed to define the various boundaries.

All clearing activities will be completed in accordance with TransGrid’s policies and procedures. These clearing procedures outline the preferred method for vegetation control, which is to remove rather than lop vegetation that will eventually infringe the ‘absolute limit’ clearances required for the relocated TL24.

Proposed access tracks have generally been aligned with existing tracks to minimise the extent of clearing. The tracks are required to enable construction access within the new easement in addition to the proposed decommissioning of the existing line. The tracks will remain unsealed to enable long term 4WD vehicle access for TransGrid. Existing tracks will be widened where required to four metres in width, with a vertical clearance of six metres from the base of the track. The proposed tracks are illustrated on **Figure 9** which delineates between new and upgraded tracks.

An easement suitable for the construction and operation of the relocated TL24 will be cleared on land owned by Centennial Fassifern Pty. Limited. The easement width required is 60 metres. Each tower location requires a 50 m^2 area on which to situate a construction pad.

An area of approximately 100 x 100 metres is required for a site office and laydown area for the duration of the construction period. Minimal vegetation clearing is required for this office area due to the open location away from densely vegetated areas (see **Figure 10**).

Ground stability works using imported ballast may be required in certain areas where the ground conditions are deemed inadequate or additional stability is required to assist with construction activities.

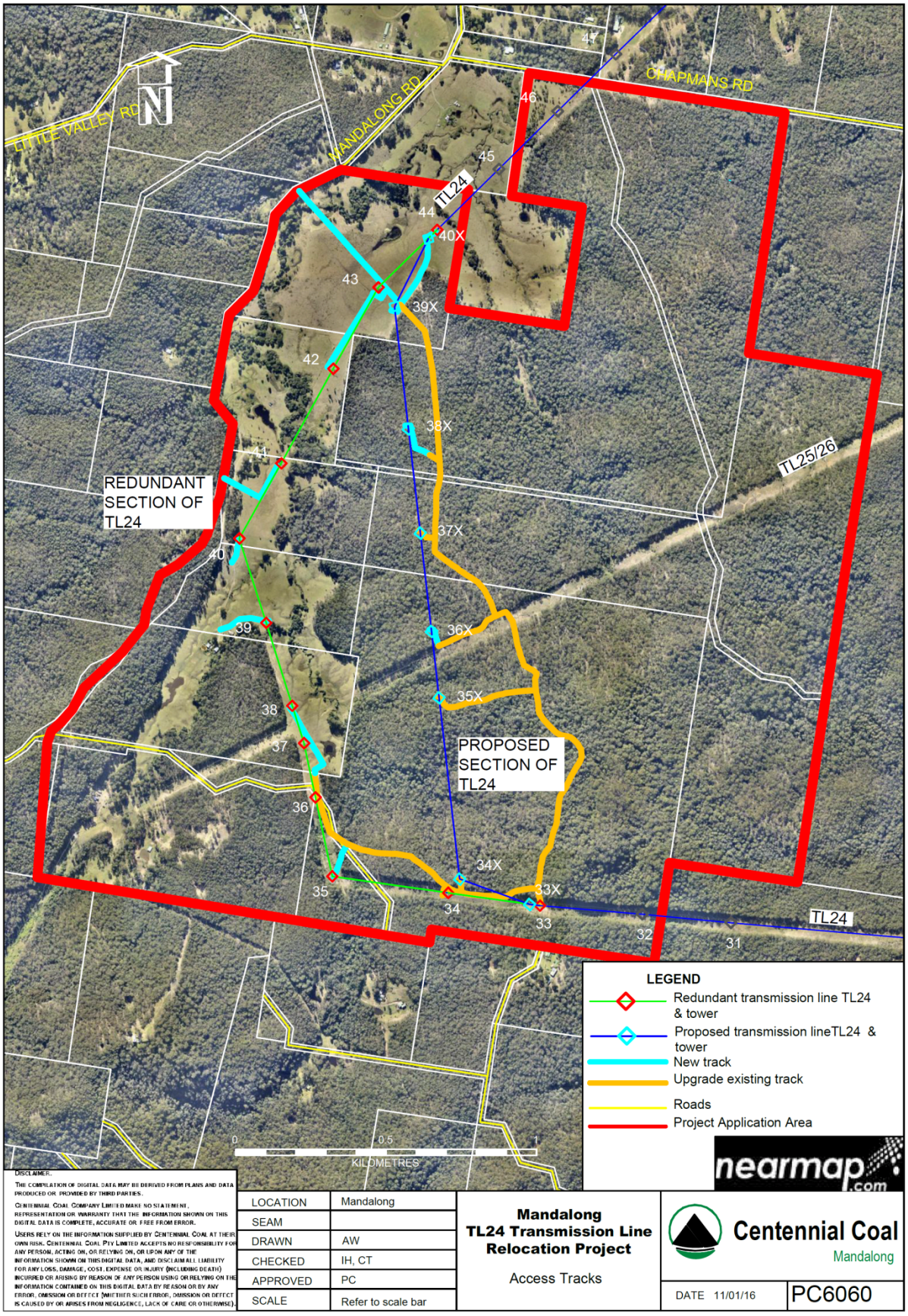

Figure 9: Access Tracks

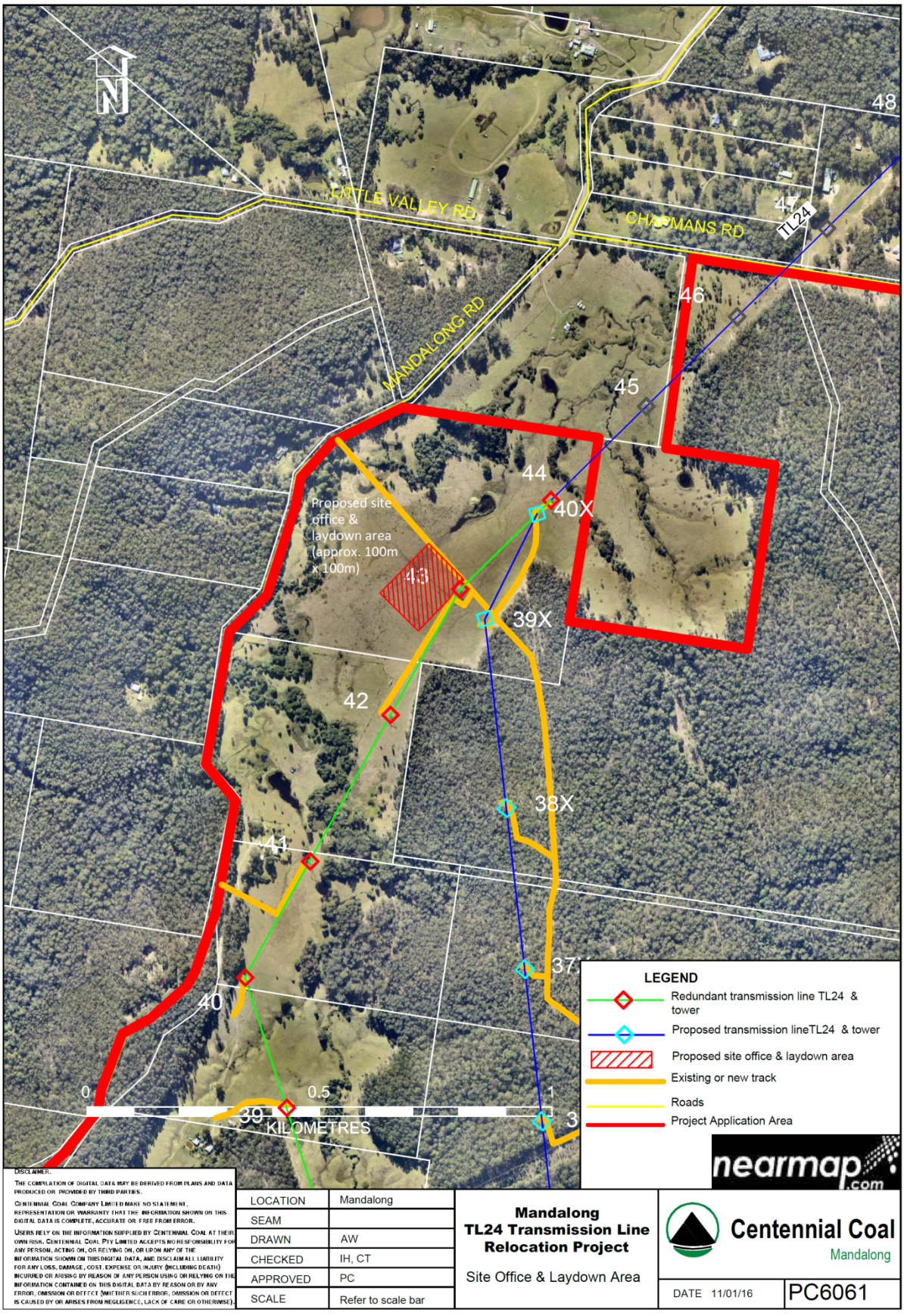

Figure 10: Site Office and Laydown Area

4.6.2 Construction

All on-site construction activities will occur within the PAA. Light and heavy vehicle access will be via Mandalong Road at the proposed MSSS Access Road intersection.

The site office will comprise a number of demountable offices including a project contractor site office, TransGrid site office, amenities, lunch room and a meeting room. A laydown area and a car park is also required. The expected overall footprint for the site office and laydown area is approximately 100 x 100 metres.

The construction phase consists of the following key stages:

- Foundations;
- Tower Erection/Assembly;
- Stringing and cutting in; and
- Demolition.

4.6.2.1. Foundations

The maximum amount of cleared ground at each tower location is 50 m^2. The size of each construction pad located centrally to each new tower site is approximately 20 m^2. Where there is a requirement to install crane and/or Elevated Work Platform (EWP) pads they are approximately 10m x 8m. Each of the construction pads (whether for tower foundation work or for crane/EWP) are established by cutting into the existing ground level and/or installation of road base material, which is compacted to create a flat hardstand area. All clearing for the foundation work is included in the easement boundary.

4.6.2.2. Tower Erection/Assembly

Materials required for tower erection are transported unassembled to site on the back of semi-trailers and/or flatbed trucks. The steel is then partially assembled at each tower location and erected in assembled sections. Typically each steel tower may require up to 4-5 lifts to assemble the full tower.

The steel sections will be assembled, i.e. bolted together at each of the actual tower sites. This work will only be undertaken during the day time construction hours.

A crane will erect the tower sections. A crane for the movement of materials and equipment will be used for the duration of the construction of the new section of TL24.

4.6.2.3. Stringing

Stringing refers to the process where wires that carry electricity, known as conductors, are connected to the tower structures. During this phase, earth wires are also connected to the towers. Stringing of the conductors between each tower will either be undertaken by helicopter or harnessed personnel. At the completion of the conductor/earth wire draw outs, the conductors are sagged and clipped into their suspension and tension units.

Following the correct sagging and clipping in work of all of the conductors/earthwires, the twin spacers will need to be installed utilising EWPs or a helicopter along the new route.

There are minimal ground impacts associated with the stringing process.

4.6.2.4. Demolition

The 12 steel lattice towers that need to be removed consist of five tension (approximately 20 metres tall) and seven suspension (approximately 25 to 36 metres tall) structures. As part of the demolition work, it is proposed to excavate around each leg to at least 1.0 metres below ground and remove the remaining steel to that depth and back filling with the same soil and additional fill material to achieve flat ground.

The redundant material will be removed from site and recycled where possible or disposed of to landfill by a licenced waste contractor.

The decommissioned tower sites will be rehabilitated in accordance with TransGrid's rehabilitation objectives and in consultation with landholders. TransGrid will be responsible for extinguishing the redundant easement in consultation with relevant stakeholders.

4.6.2.5. Construction Equipment

Typical plant expected to be used for the Project is listed below:

Possession of site

- Backhoes;
- Bobcats;
- Bulldozers;
- Scrapers;
- Forklifts;
- Cranes (80 – 100 tonnes);
- Generators; and
- Light vehicles (4WDs).

Access track and clearing;

- Backhoes;
- Bobcats;
- Dump trucks;
- Bulldozers;
- Scrapers;
- Chainsaws;
- Brush cutters; and
- Light vehicles (4WDs).

Foundations

- Bulldozers/30 tonne excavator;
- Drilling rigs / Soilmecs;
- Compaction plates / whacker packers;
- Cranes (80 – 100 tonnes);
- Transport / delivery trucks (including semi-trailers, 6x6 rigid flatbeds, in-transit concrete mixers etc.); and
- Light vehicles (4WDs).

Tower erection / assembly

- Transport / delivery trucks (including semi-trailers, water tankers, flatbeds, in-transit concrete mixers etc.);
- Generators;
- Air compressors / hand tools, rattle guns etc.;
- Cranes (80-100 tonnes)

- Elevated work platforms (up to 75m reach); and
- Light vehicles (4WDs).

Stringing works

- Elevated work platforms (up to 75m reach);
- Brake and winch machinery for stringing purposes;
- Helicopter use for the laying out of the draw wire; and
- Light vehicles (4WDs).

Cut in works

- Elevated work platforms (up to 75m reach);
- Brake and winch machinery for stringing purposes;
- Helicopter;
- Cranes (80 – 100 tonnes); and
- Light vehicles (4WDs).

Demolition

- Excavators;
- Cranes (80 – 100 tonnes);
- Generators;
- Air compressors / hand tools, grinders, rattle guns etc.;
- Brake and winch machinery for de-stringing purposes;
- Transport trucks (including semi-trailers and/or flatbeds to remove steel and line equipment from site); and
- Light vehicles (4WDs).

4.6.3 Operation and Maintenance

Once the construction of the relocated transmission line and removal of the redundant transmission line has been completed, TransGrid will be responsible for the ongoing maintenance and operation of the transmission line and its easement. The ongoing maintenance and operation of the transmission line and its easement does not form part of this application.

The following operational and maintenance activities would be undertaken in accordance with TransGrid's policies and procedures and are in line with existing practices currently undertaken on TL24:

- Inspections (ground and aerial) and maintenance of existing electrical equipment on the transmission line;

- Vegetation maintenance along the easement to ensure safe clearances remain between the conductors and vegetation (and reduce bushfire risk); and

- Access track maintenance (repairing access tracks as required and removal of vegetation along access tracks) to allow ongoing vehicular access to each transmission structure.

4.7 Water Management

Based on the Project design and proposed management controls, it is considered that the Project will have minimal impacts on surface water and groundwater. Management controls will be implemented through the Construction Environmental Management Plan (CEMP).

4.8 Environmental Management System

Once the construction of the relocated transmission line and removal of the redundant transmission line has been completed, TransGrid will be responsible for the ongoing maintenance and operation of the transmission line and its easement. The ongoing maintenance and operation of the transmission line and its easement does not form part of this application.

The following operational and maintenance activities would be undertaken in accordance with TransGrid's policies and procedures:

- Inspections (ground and aerial) and maintenance of existing electrical equipment on the transmission line;
- Vegetation maintenance along the easement to ensure safe clearances remain between the conductors and vegetation (and reduce bushfire risk); and
- Access track maintenance (repairing access tracks as required and removal of vegetation along access tracks) to allow ongoing vehicular access to each transmission structure.

4.9 Rehabilitation and Final Landform

Following the construction of the relocated TL24 transmission line and demolition of the redundant section, disturbance around the new and redundant tower sites and any temporary access tracks established to the redundant tower sites will be rehabilitated in accordance with TransGrid's rehabilitation objectives outlined and in consultation with landholders. The new towers, easement and access tracks will remain in place to allow TransGrid to operate and maintain the transmission line.

5.0 REGULATORY FRAMEWORK

The Mandalong Transmission Line TL24 Relocation Project has been assessed with full consideration of the applicable legislative requirements of the Commonwealth and State, along with the local planning and environmental frameworks of the Lake Macquarie LGA, where applicable. This section describes the relevant regulatory framework and the application to the Project.

5.1 Approval Pathway and Permissibility

Development consent SSD-5144 was granted to Centennial Mandalong by the Planning Assessment Commission on 12 October 2015 pursuant to Section 89E of the EP&A Act. Centennial Mandalong now seeks a modification to SSD-5144 pursuant to the provisions of Section 96 of the EP&A Act to allow for the relocation of approximately 2.4 kilometres of the 24 Vales Point to Eraring 330kV Transmission Line (TL24).

Section 96 of the EP&A Act provides the mechanism for modification of the SSD-5144. Specifically, section 96(2) provides that:

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and

(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 5) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and

(c) it has notified the application in accordance with:

> *(i) the regulations, if the regulations so require, or*
>
> *(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*

(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

Further, section 96(3) requires the consent authority to take into consideration the matters referred to in Section 79C(1) of the EP&A Act, in so far as they are relevant to the modification.

Clause 115(1) of the *Environmental Planning and Assessment Regulation 2000* (**EP&A Regulation**) sets out the information which must be contained in an application for modification to a development consent under Section 96. **Table 3** details where in this Statement of Environmental Effects this information has been provided.

Table 3: Section 115(1) Information to be Included in the Statement of Environmental Effects

Section 115(1) Matters	Section of SEE
a. the name and address of the applicant	See Section 1.2 of this SEE
b. a description of the development to be carried out under the consent (as previously modified),	See Section 3.0 of this SEE
c. the address, and formal particulars of title, of the land on which the development is to be carried out,	See Section 2.3 and Appendix 1 of this SEE
d. a description of the proposed modification to the development consent,	See Section 4.0 of this SEE
(i) a statement that indicates either: *(i) that the modification is merely intended to correct a minor error, misdescription or miscalculation, or* *(ii) that the modification is intended to have some other effect, as specified in the statement,*	The Project is substantially the same development as the original SSD 5144 application. The relocation of the TL24 was contemplated in that application, and mining beneath TL24 was authorised under that approval. At the time the SSD application was made, the route for the relocation was unknown. Subsequent approval for the relocation was required.
(ii) a description of the expected impacts of the modification	See Section 9.0 of this SEE
(iii) an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved	The Project is substantially the same development as the original SSD 5144 application. The relocation of the TL24 was contemplated in that application, and mining beneath TL24 was authorised under that approval. At the time the SSD application was made, the route for the relocation was unknown. Subsequent approval for the relocation was required.
(iv) if the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner)	Landholder consent is not required. The SSD 5144 was made without landholder consent by way clause 49(2)(b) of the EP&A Regulation.
(v) a statement as to whether the application is being made to the Court (under section 96) or to the consent authority (under section 96AA)	Not applicable to the proposal.
(vi) and, if the consent authority so requires, must be in the form approved by that authority	Not applicable to the proposal.

The Minister for Planning (or his delegate) determines development applications for under section 96(2) of the EP&A Act.

The modification application is focused on the impacts associated with the relocation of part of the TL24, dismantling and disposal of bypassed towers, access and construction pad works for

the partial relocation of TL24 and the design and installation of cruciform footings on six of the eight new towers on the relocated TL24.

The modification application is not seeking ongoing operation or management of the TL24 once relocated. These activities are authorised under Clause 41 (1) of the State Environmental Planning Policy (Infrastructure) 2007, the *State Owned Corporations Act (1989),* the *Electricity Network Assets (authorised Transactions) Act 2015* and the EP&A Regulation to be undertaken by the infrastructure owner, TransGrid.

5.2 Commonwealth Legislation

5.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of the Environment and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as matters of 'national environmental significance' (NES). An action that "*has, will have or is likely to have a significant impact on a matter of National Environmental Significance*" may not be undertaken without prior approval from the Commonwealth Minister, as provided under Part 9 of the EPBC Act. Approval under the EPBC Act is also required where actions are proposed on, or will affect, Commonwealth land and its environment.

An assessment of whether the Mandalong Transmission Line TL24 Relocation Project may have a significant impact on any matters of NES or on the environment of Commonwealth land was undertaken during the SEE investigations and preparation. Specifically, RPS Australia East Pty Ltd, conducted an on-line search of the EPBC Act Protected Matters Search Database (accessed on 1 July 2015) to generate a list of those matters of NES within a 10 kilometre radius of the PAA. RPS Australia East Pty Ltd used this data, together with other local knowledge and records, to assess whether the Project will have, or is likely to have, a significant impact upon a matter of NES or on the environment of Commonwealth land.

RPS concluded that the Mandalong Transmission Line TL24 Relocation Project is not likely to have a significant impact on matters of NES listed under the EPBC Act. Consequently a referral to the Department of the Environment will not be made.

5.2.2 Native Title Act 1993

The *Native Title Act 1993* recognises that Aboriginal people have rights and interests to land and waters which derive from their traditional laws and customs. Native title may be recognised in places where Indigenous people continue to follow their traditional laws and customs and have maintained a link with their traditional country. It can be negotiated through a Native Title Claim, an Indigenous Land Use Agreement (ILUA) or future act agreements.

An ILUA is an agreement between a native title group and other parties who use or manage the land and waters. The ILUA process allows for negotiation between indigenous groups and other parties over the use and management of land and water resources, and the ability to establish a formal agreement. An ILUA is binding once it has been registered on the Native Title Tribunal's Register of Indigenous Land Use Agreements.

Native Title matters were addressed as part of the larger Mandalong Southern Extension Project (SSD 5144). Additional surveys over the proposed TL24 route were undertaken on 4 March 2015 and 16 July 2015. Aboriginal Groups who registered interest in the Mandalong Southern Extension Project were invited to attend. Centennial Mandalong believes there to be no outstanding Native Title matters in relation to the Mandalong Transmission Line TL24 Relocation PAA.

5.3 New South Wales State Legislation

5.3.1 Environmental Planning and Assessment Act 1979

Objects of the EP&A Act

The EP&A Act is the principal piece of legislation overseeing the assessment and determination of development proposals in NSW. It aims to encourage the proper management, development and conservation of resources, environmental protection and ecologically sustainable development.

The objects of the EP&A Act generally seek to promote management and conservation of natural and artificial resources, while also permitting appropriate development to occur. The principles of ecologically sustainable development and public participation are also objects of the EP&A Act. The consistency of the Project with these objects is summarised in **Table 4**.

Table 4: Objects of the EP&A Act

Objects of the EP&A Act	Consistency of the Project
(b) to encourage:	
(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,	Specialist consultants have been engaged to assess and report on the potential for the Project to impact upon the natural and artificial resources within the vicinity of the PAA. Notably: • The impacts on the natural environment have been addressed within Section 9.0. • The impacts on agricultural land have been addressed within Section 9.7.3. • The social and economic implications have been addressed within Section 6.0.
(ii) the promotion and co-ordination of the orderly and economic use and development of land,	The orderly and economic use of land is best served by development which is permissible under the relevant planning regime and predominantly in accordance with the prevailing planning controls. The Project comprises a permissible development which is consistent with the statutory and strategic planning controls. As detailed in this SEE, the proposal will result in positive economic impacts, with appropriate mitigation measures and management strategy being proposed to reduce adverse environmental impacts.
(iii) the protection, provision and co-ordination of communication and utility services,	Refer to Section 5.3.3.
(iv) the provision of land for public purposes,	Not applicable to the proposal.
(v) the provision and co-ordination of community services and facilities, and	Not applicable to the proposal.
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological	Specialist consultants have been engaged to assess and report on the potential for the Project to impact upon the local environment. Notably, the impacts on flora and fauna have been addressed within Section 9.2.

Objects of the EP&A Act	Consistency of the Project
communities, and their habitats, and	
(vii) ecologically sustainable development, and	The proposal is consistent with the principles of ecological sustainable development as outlined in Section 11.3, addressing both this object of the EP&A Act and clause 7(1)(f) in Schedule 2 of the EP&A Regulation.
(viii) the provision and maintenance of affordable housing, and	Not applicable to the proposal.
(c) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and	The SSD proposal is subject to the provisions of Part 4 of the EP&A Act, where the Minister for Planning and Environment is the consent authority.
(d) to provide increased opportunity for public involvement and participation in environmental planning and assessment.	As outlined in Section 7.0, Centennial Mandalong has undertaken consultation in relation to the Project with government agencies, the local community and other stakeholders. This consultation process is continuing with respect to the progression towards obtaining development consent. Any relevant public representations will need to be considered by the Department of Planning and Environment (DP&E) during the assessment of the development application.

Section 79C Evaluation

Section 79C of the EP&A Act applies to the determination of development applications for SSD. In determining the Project, the consent authority is required to consider the matters listed in Section 79C(1) of the EP&A Act as are of relevance to the development. Each of the relevant matters has been addressed in the SEE and will need to be considered by the consent authority during the assessment of the Project.

Other Approvals

Pursuant to Section 89J of the EP&A Act, the following authorisations are not required for approved SSD proposals:

- The concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of the Act;
- A permit under section 201, 205 or 219 of the *Fisheries Management Act 1994*;
- An approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*;
- An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*;
- An authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation or State protected land;
- A bush fire safety authority under section 100B of the *Rural Fires Act 1997*;

- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*; and

- An order under Division 8 of Part 6 of the *Heritage Act 1977* restricting harm to buildings, works or relics that are not protected by a heritage listing.

Pursuant to Clause 89K of the EP&A Act, an authorisation of the following kind cannot be refused if it is necessary for carrying out an approved SSD proposal, and must be granted "substantially consistent" with the SSD consent:

- An aquaculture permit under section 144 of the *Fisheries Management Act 1994;*

- An approval under section 15 of the *Mine Subsidence Compensation Act 1961*;

- A mining lease under the *Mining Act 1992*;

- A production lease under the *Petroleum (Onshore) Act 1991*;

- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act);

- A consent under section 138 of the *Roads Act 1993;* and

- A licence under the *Pipelines Act 1967.*

The need to obtain any of the above approvals for the Project is outlined in the section below.

5.3.2 Other Key NSW State Legislation

The existing approvals relevant to the Project are described in Section 3.2.

In addition to the requirement for development consent under Part 4 of the EP&A Act, the Mandalong Transmission Line TL24 Relocation Project will require approvals, licences and/or authorities under various other pieces of NSW State legislation. **Table 5** lists the key relevant pieces of NSW State legislation and indicates the implications, if any, for the Project.

Table 5: Relevant NSW State Legislation

NSW State Legislative Act	Project Implications (approvals, licences and/or authorities)
Protection of the Environment Operations Act 1997 (POEO Act)	Mandalong Mine is a premises-based "scheduled activity" under Schedule 1 of the POEO Act and currently operates under the provisions of EPL 365. Schedule 1 of the POEO Act lists activities that are scheduled activities for the purposes of the Act. There will be no requirement for Centennial Mandalong to seek a variation to the existing EPL 365 for the addition of this activity.
Mining Act 1992	Centennial Mandalong currently holds a number of mining leases, namely ML 1443, CCL 762, CCL 746, MPL 191, MPL 329, ML 456, ML 1431, ML 1543, and ML 1553. The site for the installation and operation of the relocated transmission line TL24 is within ML456.

NSW State Legislative Act	Project Implications (approvals, licences and/or authorities)
Water Act 1912	The *Water Act 1912* governs access, trading and allocation of licences associated with surface water and groundwater sources where a Water Sharing Plan is not in place. The *Water Act 1912* applies to groundwater interference, bore installation and extraction of groundwater. The proposed construction of the relocated transmission line TL24 does not require the extraction of groundwater or surface water and therefore no further licenses are required.
Water Management Act 2000 (WM Act)	The WM Act is intended to ensure that water resources are conserved and properly managed for sustainable use benefitting both present and future generations. Water sharing plans prepared in accordance with the WM Act include rules for protecting the environment and administrating water licencing and trading. No water sharing plans are in operation with regard to the PAA. By the operation of Section 89J of the EP&A Act, the Project will not require water use approvals under Section 89 of the WM Act, water management approvals under Section 90 or a controlled activity approval under Section 91.
Work Health and Safety (Mines) Act 2013	Centennial Mandalong currently holds all necessary approvals under the WHS (Mines) Act, which aims to assist in securing and promoting the health, safety and welfare of people at work at coal operations. Gas drainage and management at Mandalong Mine will continue to be regulated under the provisions of the Act.
Mine Subsidence Compensation Act 1961	The PAA is located within the Mandalong Mine Subsidence Districts. All surface improvements will require approval by the MSB prior to construction.
Dams Safety Act 1978	The Project does not propose any underground mining or surface disturbance on or in the vicinity of any dams prescribed under the *Dam Safety Act 1978*.
Crown Lands Act 1989	The PAA exists over Private land and Crown roads. The Project will not require a licence to use Crown Land under the provisions of the *Crown Lands Act 1989*.
Roads Act 1993	Section 138 of the *Roads Act 1993* requires consent be obtained prior to disturbing or undertaking work in, on or over a public road. Use of the local road network for site access will be required for the duration of the Project. By operation of Clause 89K of the EP&A Act, consent under Section 138 of the *Roads Act 1993* cannot be refused if it is necessary for carrying out an approved SSD proposal, and must be granted substantially consistent with the SSD consent.
Threatened Species Conservation Act 1995 (TSC Act)	The TSC Act provides protection for threatened plants and animals native to NSW (excluding fish and marine vegetation) and integrates the conservation of threatened species into development control processes under the EP&A Act. RPS Australia East Pty Ltd concluded that the Project will not have a significant impact on threatened species or ecological communities within the PAA.

NSW State Legislative Act	Project Implications (approvals, licences and/or authorities)
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act contains provisions for the protection and management of national parks, historic sites, nature reserves and Aboriginal heritage. By operation of Section 89J of the EP&A Act, the Project does not require any additional approvals under the NPW Act. The area for the relocated transmission line TL24 unit was surveyed by Archaeologists from RPS and representatives from the Registered Aboriginal Parties as part of the Mandalong Southern Extension Project and again as part of this Project.
Aboriginal Land Rights Act 1983	The *Aboriginal Land Rights Act 1983* provides for the constitution of local, regional and State Aboriginal Land Councils and a mechanism for Land Councils to claim Crown land. There are no known granted claims over Crown Land in the PAA.
Heritage Act 1977	Historical archaeological relics, buildings, structures, archaeological deposits and features are protected under the *Heritage Act 1977*. There are no references to heritage items in the PAA within the World Heritage List, NSW Heritage Register, Australian Heritage Database or the relevant Local Environmental Plans (RPS 2015a). As no heritage items are situated within the PAA, approval is not required under Part 4 of the *Heritage Act 1977.* In any event, approval is not required due to the operation of Section 89J of the EP&A Act.
Contaminated Land Management Act 1997	The relevance of this legislation to the Project is outlined below.
Forestry Act 1916	No permits are required for the Forestry Corporation of NSW regarding the Project.

5.3.3 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are Environmental Planning Instruments (EPIs) prepared by the Minister to address issues significant to NSW. The SEPPs outlined in the below sub-sections contain provisions that are relevant to the Mandalong Transmission Line TL24 Relocation Project and therefore are matters to be taken into consideration by the consent authority.

SEPP (State and Regional Development) 2011

SEPP (State and Regional Development) 2011 (SRD SEPP) came into effect upon the repeal of Part 3A of the EP&A Act and identifies development to which the SSD assessment and determination process under Division 4.1 in Part 4 of the EP&A Act applies.

SEPP (Mining, Petroleum Production and Extractive Industries) 2007

SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP) aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of NSW.

Part 3 of the Mining SEPP stipulates matters for consideration by the consent authority before determining an application for consent in respect of development for the purposes of mining. Specifically, Clauses 12 to 17 (inclusive), requires consideration to be given to the compatibility of projects with other

surrounding land uses, including the existing and potential extraction of minerals, natural resource management and environmental management, resource recovery, transportation and rehabilitation.

The information presented in this SEE addresses each of the matters for consideration prescribed in the abovementioned clauses, and the assessment undertaken has been multi-disciplinary and involved consultation with various government agencies and stakeholders. Emphasis has been placed on anticipation and prevention of potential environmental and social impacts, with various mitigation measures, management strategies, and monitoring activities proposed to minimise adverse impacts.

SEPP (Infrastructure) 2007

SEPP (Infrastructure) 2007 (Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across NSW by improving regulatory certainty and efficiency through a consistent planning regime and greater flexibility in the location of infrastructure and service facilities.

Clause 8 of the Infrastructure SEPP outlines its relationship to other environmental planning instruments:

Except as provided by subclause (2), if there is an inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this Policy, this Policy prevails to the extent of the inconsistency.

Clause 45 of the Infrastructure SEPP provides that for a development application in respect of development carried out:

- within or immediately adjacent to an easement for electricity purposes (whether or not the electricity infrastructure exists), or
- immediately adjacent to an electricity substation, or
- within 5m of an exposed overhead electricity power line,

the consent authority must give written notice to the electricity supply authority for the area and invite comments about potential safety risks, and take into consideration any response to that notice received within 21 days after the notice is given.

SEPP No. 55 – Remediation of Land

SEPP No. 55 – Remediation of Land (SEPP 55) provides for a state-wide planning approach to the remediation of contaminated land in order to reduce the risk to human health or any other aspect of the environment.

Clause 7(1) of SEPP 55 provides that a consent authority must not consent to the carrying out of any development on land unless:

- it has considered whether the land is contaminated, and
- if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
- if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

Further, clause 7(2) of SEPP 55 provides that before determining an application for consent to carry out development that would involve a "change of use" in respect of certain land specified in clause 7(4) of

SEPP 55, the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines (being the 1998 publication *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land*).

For the disturbance areas of the existing Mandalong Mine in respect of which the Project does not involve any "change of use", Centennial Mandalong submitted Contamination Notifications to the EPA in February 2012 in accordance with section 60 of the *Contaminated Land Management Act 1997*. In accordance with commitments made to the EPA in the Notifications, Centennial Mandalong has commenced undertaking Phase 2 assessments at both the Mandalong Mine Access Site and Cooranbong Entry Site. Following the completion of the Phase 2 assessments, remediation plans will be developed and implemented in consultation with the EPA and an accredited contaminated land auditor to address any contamination issues identified. In a letter dated the 6 July 2012 the EPA confirmed acceptance of the approach proposed by Centennial Mandalong.

Finally, Centennial Mandalong will implement best management practices for hydrocarbons, along with the approved EMS and occupation health and safety management systems, at the Mandalong Mine to ensure the potential for contamination and associated issues remains low.

SEPP No. 44 – Koala Habitat Protection

SEPP No. 44 – Koala Habitat Protection provides for the protection of koala habitat by ensuring that areas subject to development proposals are considered for their value as habitat or potential habitat for koalas. The Lake Macquarie LGA is listed under Schedule 1 of SEPP No. 44 as an area to which the SEPP applies.

Refer to **Appendix 6** regarding SEPP No. 44 assessment.

SEPP No. 33 – Hazardous and Offensive Development

SEPP No. 33 - Hazardous and Offensive Development (SEPP 33) regulates, amongst other things, the determination of development applications to carry out what is defined in SEPP 33 as development for the purposes of a "potentially hazardous industry" or "potentially offensive industry". With the continued implementation of best management practices for hydrocarbons and explosives used within the PAA and the other measures outlined in this SEE to reduce or minimise the impact of the Project, as well as effective implementation of the approved EMS and occupation health and safety management systems, the Project would not pose any significant risk, in relation to its locality, to human health, life or property or to the biophysical environment.

Further, by employing the management and mitigation measures outlined in this SEE during, the Project it would not result in the emission of a polluting discharge in a manner which would have a significant adverse impact in its locality or on the existing or likely future development on other land.

On the above bases, the Project is not considered to comprise a "potentially hazardous industry" or a "potentially offensive industry" within the meaning of these expressions in SEPP 33, and therefore a preliminary hazard analysis was not prepared as required by clause 12 of SEPP 33 and nor does clause 13 of SEPP 33 apply to the consent authority's determination of the Project's development application.

SEPP No. 14 – Coastal Wetlands

SEPP No. 14 - Coastal Wetlands aims to ensure that the coastal wetlands are preserved and protected in the environmental and economic interests of the State. The provisions of SEPP 14, insofar as they require the consent authority to obtain the concurrence of the Director-General of DP&E, do not apply to the Project by reason of the exclusion for SSD provided for in section 79B(2A) of the EP&A Act.

5.3.4 Local Environmental Plans

Local Environmental Plans (LEPs) are instruments that guide planning decisions for LGAs and allow Councils to manage the ways in which land is used through zoning and development consents.

Lake Macquarie Local Environmental Plan 2014

The objective of the *Lake Macquarie Local Environmental Plan 2014* (Lake Macquarie LEP) is

> (a) to recognise the importance of Lake Macquarie City and its waterways and the coast as an environmental, social, recreational and economic asset to Lake Macquarie City and the Hunter and Central Coast regions,
>
> (b) to implement a planning framework that protects areas of significant conservation importance, while facilitating development and public facilities in appropriate areas, that are accessible to a range of population groups, to accommodate Lake Macquarie City's social and economic needs,
>
> (c) to promote the efficient and equitable provision of public services, infrastructure and amenities,
>
> (d) to facilitate a range of accommodation types throughout Lake Macquarie City so that housing stock meets the diversity of community needs and is affordable to as large a proportion of the population as possible,
>
> (e) to apply the principles of ecologically sustainable development,
>
> (f) to encourage development that enhances the sustainability of Lake Macquarie City, including the ability to adapt to and mitigate against climate change.

From the *Lake Macquarie Local Environmental Plan (LEP) 2014*, the PAA is located within areas zoned *E2 Environmental Conservation* and *E3 Environmental Management*.

The objectives of zone E2 are:

- To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.
- To prevent development that could destroy, damage or otherwise have an adverse effect on those values.
- To conserve, enhance and manage corridors to facilitate species movement, dispersal and interchange of genetic material.
- To encourage activities that meet conservation objectives.
- To enhance and manage areas affected by coastal processes.

The objectives of zone E3 are:

- To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.
- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.
- To provide for a limited range of development that does not have an adverse effect on those values.

- To protect, manage and enhance corridors to facilitate species movement, dispersal and interchange of genetic material.

- To protect water quality, land surface conditions and important ecosystems.

As the Lake Macquarie LEP refers only to types of developments that are not regulated by an applicable State Environmental Planning Policy, the Infrastructure SEPP is applicable to the proposed development. Electricity Transmission or distribution networks are defined under Clause 40 of the Infrastructure SEPP.

Clause 8 of the Infrastructure SEPP outlines its relationship to other environmental planning instruments:

Except as provided by subclause (2), if there is an inconsistency between this Policy and any other environmental planning instrument, whether made before or after the commencement of this Policy, this Policy prevails to the extent of the inconsistency.

On this basis, any provision in the Lake Macquarie LEP that would otherwise operate to prohibit the Project has no effect, and accordingly, the Project is permissible with development consent on the land in which the Project will be carried out that is within the Lake Macquarie LGA.

The Lake Macquarie LEP also contains the following provisions:

- The consent authority must not grant consent unless the consent authority has had regard to the vision, values and aims of the Lifestyle 2030 Strategy, and is satisfied that such of the development as is proposed to be carried out within a zone is consistent with the relevant objectives for the zone (clause 16);

- Certain relevant provisions in Parts 4, 5 and 6 of the Lake Macquarie LEP that operate as controls in respect of the decision-making function of the consent authority, including certain development standards.

The operation of the above provisions in respect of the Project are subject to the application of clause 8 of the Infrastructure SEPP. Notwithstanding the application of clause 8 of the Infrastructure SEPP, the assessment of the Project in this SEE:

- Enables the consent authority to form the opinion that the development is consistent with the objectives for the zones in which the Project is to be carried out;

- Demonstrates that the Project is consistent with any relevant controls set out in Parts 4, 5, 6 and 7 of the Lake Macquarie LEP.

5.3.5 Other Considerations

Lake Macquarie City Council's Lifestyle 2030 Strategy

Lake Macquarie City Council's *Lifestyle 2030 Strategy* (LS2030) was adopted by the Council on 11 March 2013. The LS2030 provides the long-term direction for the overall development of the City and describes the Council's high level policies for managing private and public development in Lake Macquarie. LS2030 is the primary guiding document for the development of local plans, regulations and guidelines that control development of land. It is anticipated that major reviews of LS2030 will occur every five years.

5.3.6 Water Sharing Plans

Water Sharing Plans (WSP) prepared in accordance with the *Water Management Act 2000* include rules for protecting the environment, extractions, managing licence holders' water accounts, and water trading

within defined areas and specified water sources. The PAA is not within an area covered by a water sharing plan.

5.3.7 Strategic Regional Land Use Policy

The NSW Government's *Strategic Regional Land Use Policy* was introduced in September 2012 and sets out a range of initiatives to better balance growth in the mining industry with the need to protect agricultural land and water resources. The Policy includes a package of measures including the following key elements:

- The preparation of *Strategic Regional Land Use Plans* (SRLUPs) for both the Upper Hunter and the New England North West regions of NSW which identify and map Strategic Agricultural Land (SAL) and Critical Industry Clusters (equine and viticulture land uses) within these areas;
- The introduction of the *NSW Aquifer Interference Policy*; and
- The requirement for Agricultural Impact Statements to accompany SSD applications for mining projects that have the potential to affect agricultural resources.

The proposed key policy response for resolving land use conflict between mining and coal seam gas proposals and agricultural land is a 'gateway process'. Under this process, a panel of independent experts would assess proposals involving mining or coal seam gas development on mapped SAL at an early stage before the lodgement of a development application. The outcome of the 'gateway process' would be that the proposal either meets the gateway criteria relating to agricultural and water impacts, or the proposal does not meet the criteria and therefore stringent requirements will be imposed that must be addressed at the development application stage. The 'gateway process' will commence when the relevant amendments to the Mining SEPP and EP&A Regulation are made.

The existing SRLUPs do not apply to the PAA. Notwithstanding, matters relating to soil landscapes, land use impacts, land capability and agricultural suitability have been addressed within this SEE.

Following the outcomes from the soil and land capability assessment and the agricultural impact assessment undertaken for the Project, the PAA contains no areas of potential BSAL and the Project will not result in any changes to the land and soil capability classes.

5.3.8 NSW Aquifer Interference Policy

The *NSW Aquifer Interference Policy* (AIP) is a key component of the NSW Government's *Strategic Regional Land Use Policy*. The AIP clarifies the water licensing and approval requirements for aquifer interference activities, including the taking of water from an aquifer in the course of carrying out mining, and defines the considerations for assessing potential impacts to key water-dependent assets.

The AIP indicates that where mining results in the loss of water from an overlying source that is covered by a WSP, a water access licence is required under the WM Act to account for this take of water.

In water sources where WSPs do not yet apply, an aquifer interference activity that is taking groundwater is required to hold a water licence under Part 5 of the *Water Act 1912*. The requirements for proponents detailed in the AIP also apply to applicants for a *Water Act 1912* licence. An application for a licence made under the *Water Act 1912* will be assessed on the same considerations as an application for an access licence made under the *Water Management Act 2000.*

Potential impacts to water resources are assessed by GHD in **Appendix 5** and summarised in Section 9.1 of this SEE.

5.3.9 Lower Hunter Regional Strategy 2006-31

The Department of Planning and Environment's *Lower Hunter Regional Strategy 2006-31* (Lower Hunter Regional Strategy) identifies how the expected growth in the Lower Hunter Region (encompassing the five local government areas of Newcastle, Lake Macquarie, Port Stephens, Maitland and Cessnock) will be managed to provide for both economic development and the protection of environmental assets, cultural values and natural resources. The Lower Hunter Regional Strategy is implemented primarily through local environmental plans, development control plans, through the State Infrastructure Strategy and through funds collected as developer contributions. The Lower Hunter Regional Strategy is to be comprehensively reviewed every five years, so that it can adjust to any demographic and economic changes. This will assist local councils will their five-yearly review of local environmental plans, required under recent reforms to the planning system. In February 2010, the NSW Government announced it had re-endorsed the Lower Hunter Regional Strategy as a sound platform to guide the region's future growth.

6.0 SOCIO-ECONOMIC ANALYSIS

6.1 Project Economic Analysis

The Project's economic assessment was prepared by AIGIS GROUP and appears as **Appendix 3** to this SEE.

The economic assessment is presented in two parts. Initially, the impact of the Project at the broader State level is assessed using a Cost-Benefit Analysis (CBA) approach. The CBA principally describes differences in outcomes from mining relating to the two scenarios for managing impacts on TL24. The CBA is supplemented by a second section of analysis, which considers regional and local impacts of the Project.

The proposed Project involves a twelve month construction period assumed on current planning to commence in mid-2017 completing in mid-2018.The Project will employ approximately 25 full-time equivalent employees over the construction period. Approval of the Project will result in greater royalty and tax yields for state and federal governments. This will also have a positive social impact over the duration of the Mandalong Mine.

Given the relatively small scale of the Project, there is a proportionally limited range of external costs and benefits associated with the Project. Quantitative assessment of these impacts indicates that the positive aspects of the Project are greater than are the potential negative externalities. The net economic benefit associated with the increased resource to be mined is a net present value of approximately $7.1 million, which essentially equates to the royalties that would be foregone if the line was not relocated. The benefit-cost ratio of 14.6 for the Project is also positive. There are also unquantified benefits relating to the avoidance of risk to critical power transmission infrastructure and associated service to consumers.

Under alternative sensitivity testing scenarios based on changes to assumptions on discount rates and Project benefits and costs, the economics of the Project remain robust.

With respect to the external impacts, Centennial Mandalong and its advisers are engaged in a continuous process of stakeholder consultation and development of mitigation programs that will ameliorate impacts to the greatest practical extent. Importantly, Centennial Mandalong has negotiated a favourable outcome with TransGrid, which will see that business's infrastructure and service obligations safeguarded against potential impacts in the absence of the relocation of the relevant section of TL24.

6.2 Project Social Analysis

The Project's Social Impact Assessment (SIA) appears as **Appendix 4** to this SEE.

The SIA has considered findings from all relevant specialist reports and identified that the following have the potential to have an adverse impact on residential amenity:

- Noise;
- Air Quality;
- Traffic; and
- Visual Impact.

The construction period is over a short timeframe and construction activities are limited to day time operations only. It is noted that within the construction period (i.e. the weeks the construction activity will be undertaken) the potential impact will be intermittent during that period.

Each report has been prepared using a worst case scenario and has identified management strategies that will reduce the likelihood of impact. There are no activities where non-compliance will be experienced with any specific criteria.

The positive impact of the Project is the relocation of the redundant towers from private property and onto Centennial Fassifern owned land.

Mitigation of potential impacts should include:

- The undertaking of measures outlined in the CEMP;
- Consultation with land holders with regards to specific impacts that may be experienced including the requirement to access land; and
- Consultation about the Project aimed at the general community.

6.3 Conclusion

The social and economic assessments prepared in relation to the Project have considered the findings from the relevant technical specialist assessments which have assumed a worst case scenario, meaning that potential impacts may be less than predicted.

Overall the Project results in no long term social impacts with the Project being undertaken to reduce the risk of interruption to the existing TL24 power supply. Centennial Mandalong has negotiated a favourable outcome with TransGrid, which will see that business's infrastructure and service obligations safeguarded against potential impacts in the absence of the relocation of the relevant section of TL24.

A positive impact arising from the Project is the removal of towers from private land holdings and therefore a reduction in immediate visual impact and risk of Electromagnetic Radiation.

Approval of the Project will result in greater royalty and tax yields for state and federal governments. This will also have a positive social impact over the duration of the Mandalong Mine.

The mitigation strategies identified in each of the specialist assessments are considered adequate.

7.0 STAKEHOLDER ENGAGEMENT

7.1 Introduction

Centennial Mandalong places the utmost importance on maintaining effective communication with the local community and other key stakeholders. Prior to the commencement of the Project, a Stakeholder Engagement Plan (SEP) was developed to provide a consistent management framework for the identification and consultation with stakeholders that may have an interest in the Project. The objectives of the SEP are to:

- Set a process for engagement with stakeholders of interest, with clear desired outcomes for the Company and stakeholders;
- Openly communicate with stakeholders about the Project;
- Serve as a tool for understanding the reasonable expectations and interests of stakeholders; and
- Provide a means of community access to the Project team.

In addition to the specific consultation undertaken for this Project, Mandalong Mine has undertaken consultation with state and local government agencies, the community, Aboriginal groups and other stakeholders regarding the Mandalong South Extension Project (SSD-5144). This consultation incorporated the issue of TL24 representing a significant constraint to mining as well as the likelihood of it being relocated. Consultation has also been undertaken with stakeholders specifically in relation to this Project. The sections below provide detail on the consultation undertaken.

7.2 Engagement Strategy and Stakeholder Identification

A range of stakeholders have been identified for inclusion in the engagement strategies outlined in the Project's SEP. These stakeholders were determined by taking into consideration those individuals who will be affected by the construction activities and long term visual impact of the Project in addition to those that can influence, affect or have an interest in the Project. These stakeholders include:

- Landholders in areas where TL24 is currently located who will be affected by its relocation;
- Neighbouring landholders;
- The broader Mandalong community;
- Indigenous groups (including Registered Aboriginal Groups);
- Local and state government agencies; and
- TransGrid.

Stakeholder consultation has been ongoing since 2009 regarding the Mandalong Southern Extension Project (SSD-5144). More recently, consultation specifically relating to the TL24 Relocation Project has been undertaken in accordance with the Project's SEP. The SEP provides a framework to identify and appropriately consult with stakeholders that may be influenced by or have an interest in the Project.

Targeted consultation has been undertaken with landholders where TL24 towers are currently located and access to their property is required. Targeted consultation will continue to be undertaken with landholders who will be impacted upon by the TL24 relocation.

Public consultation has been undertaken through:

- Formal face to face meetings with stakeholders;
- Community information sessions;
- The Mandalong Community Consultative Committee; and
- Letter/newsletter/information flyer drop-offs in the local community.

7.2.1 Local Community

Community consultation undertaken to date for the Project has occurred as outlined below:

- Letters were posted to affected landowners in June 2015 to inform residents of the Project by providing an overall outline of the key stages and community contact information.
- A Project update was included in the December 2014, July 2015 and March 2016 Mandalong Mailbox publications which were distributed to local residents.
- A number of face to face meetings were held with affected landowners during the environmental assessment process to discuss specific matters of relevance to their property.
- The Mandalong Mine Community Consultative Committee (CCC), which is independently chaired and comprises representatives from the local community and Lake Macquarie City Council (LMCC) meets on a quarterly basis. In accordance with the DP&E guidelines, the CCC is a forum for open discussion between Centennial Mandalong, the community, LMCC and other stakeholders on issues directly relating to Mandalong Mine's operations, projects, environmental performance and community relations. The Project has been discussed at meetings since June 2013. Minutes from these meetings and the presentations made are available on the Centennial Coal website.
- A dedicated community information telephone number was established for the Mandalong Southern Extension Project which has continued to be in use for this Project. The number exists as a freecall 1800 731 966 number to provide interested community members with access to the Project Team regarding any queries or concerns in relation to the Project. The telephone number continues to be advertised through ongoing correspondence including the Mandalong Mailbox newsletter.
- Letters were posted to all affected landowners in the Mandalong area notifying them of the Community Information Sessions to be held on the 12 and 14 November 2015. A Project update flyer was included with each letter.
- An advertisement was placed in *Lakes Mail* on Thursday 5 November 2015 to inform the broader Lake Macquarie area of the scheduled Community Information Sessions.

Regional community consultation was undertaken for the Project during November 2015. Community Information Sessions were held at the Mandalong Project Office off Mandalong Road on:

- Thursday 12 November 2015 from 9am to 7pm; and
- Saturday 14 November 2015 from 9am to 12pm.

Information boards with project plans and illustrations were on display during the above information sessions with Project staff on hand to discuss specific issues. Outcomes from the various technical specialist assessments completed to date for the Project were presented in the form of posters to demonstrate the outcomes to attendees. These included noise, air quality, electric and magnetic field,

visual and heritage. Other environmental assessment items undergoing completion were discussed verbally.

Whilst all residents who attended the sessions were generally comfortable with the Project, issues raised focused on end use of the cleared vegetation in addition to surface disturbance management. An additional concern was the condition of Mandalong Road and the proposed MSSS Access Road intersection. Such matters are assessed within the impact assessment sections.

7.2.2 Indigenous Stakeholders

Consultation with relevant indigenous stakeholders is ongoing for Mandalong Mine. The objective of the consultation process is to ensure that an opportunity is given to a broad range of Aboriginal stakeholders to express their cultural heritage values, including spiritual connections, archaeological sites, and the natural environment and landscape values.

The consultation methodology to date involved the identification of Aboriginal Land Councils, Aboriginal elders and other interested parties in accordance with the *NSW Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCR) (DECCW 2010a), followed by consultation with Aboriginal communities and other stakeholders in the area.

According to the ACHCR process, a site survey should be undertaken with reference to the nature, scale, and complexity of the project. With these factors considered, it was deemed appropriate that the Registered Aboriginal Parties (RAPs) be offered the opportunity to participate in a field visit of the PAA. As such, two field visits occurred across the PAA on 4 March 2015 and 16 July 2015. Aboriginal stakeholders were present at both site visits (RPS, 2015a).

A register of consultation with the RAPs has been maintained and specific comments regarding the cultural significance of the survey results and report recommendations has been incorporated into the Cultural Heritage Impact Assessment (RPS, 2015a). Full details of the indigenous stakeholder consultation process undertaken for the Project is provided in the Cultural Heritage Impact Assessment report (RPS, 2015a) which forms **Appendix 10** to this SEE.

7.2.3 Service Groups (TransGrid)

Centennial Mandalong has consulted with TransGrid since July 2011 when TransGrid's transmission lines were identified as major constraints to the proposed mine layout. Initially TransGrid completed a Feasibility Study for Centennial Mandalong which advised that a number of tension towers over proposed workings could not be undermined due to the risk of subsidence damaging the infrastructure. The study also suggested that there was an option to relocate the section of TL24 that was constraining the mine layout. TransGrid has prepared a Network Modification Scoping Study to determine the final route as shown in **Figure 6**.

More recently TransGrid has been assisting with information required for the environmental assessments and consultation has continued regarding the project schedule, design work and contractual arrangements. There have also been a number of site visits by TransGrid personnel involved in the Project.

Meetings with TransGrid were held on:

- 5 July 2011
- 5 March 2012
- 24 May 2012
- 17 August 2012
- 25 March 2013
- 15 May 2013

- 29 August 2014
- 13 June 2014
- 14 August 2014
- 22 August 2014
- 9 April 2015
- 21 July 2015
- 6 August 2015
- 31 August 2015
- 22 October 2015
- 24 November 2015
- 26 February 2016

There has also been ongoing telephone and email correspondence between Centennial Mandalong and TransGrid during this time.

7.2.4 Local and State Government

Local Government

Delegates of LMCC attended the Community Information Sessions on 12 November 2015 and were provided with an overview of the Project and preliminary outcomes from the environmental assessment completed to date. Specific feedback provided by the LMCC delegates regarding the noise and air quality models in particular demonstrating any constraints to each model as well as control inputs and factors.

On 3 December 2015 the Project Team met with LMCC officers to provide an overview of the Project in addition to primarily outcomes from the technical specialist assessments. Issues of interest to LMCC in addition to community issues were presented being air quality, noise, traffic, electromagnetic field, ecology and biodiversity offsets. A number of matters were raised by LMCC in relation to clearing protocols, rehabilitation, community contact, waste material and site security. The future management of the relocated TL24 easement was also discussed with regard to ensuring future access via the proposed access tracks only.

State Government Agencies

Table 6 below outlines the state government consultation undertaken to date for the Project.

Table 6: Summary of Consultation Undertaken with State Government Agencies

Agency	Comment
• Department of Planning and Environment (DP&E)	• Phone and email correspondence regarding approval pathway in January 2016. • Letter sent 7 March 2016 with an overview of the project, a list of technical assessments that have been completed and a request for application fee.
• Department of Primary Industries (DPI) (Agriculture, DPI Water, Fishing and Aquaculture and Lands)	• Letters sent to all DPI agencies on 4 December 2015 to provide an overview of the project in addition to relevant preliminary assessment outcomes and Project Team contact information.
• Division of Resources and Energy within the Department of Industry	• On 2 February 2016, the Project Team met with representatives from the Division of Resources and Energy to provide a summary of the project and discuss how TransGrid infrastructure was to be protected from the impacts of subsidence.
• Environment Protection Authority	• On 26 November 2015, the Project Team met with the EPA's Regional Operations Officer to provide a summary of the project in

Agency	Comment
(EPA)	addition to the preliminary results obtained from the water, air quality and noise assessments. Whilst the results appeared to be satisfactory, it was stressed during the meeting that the EPA was very interested in the methodology undertaken and that transparency should be ensured in the report.
• Mine Subsidence Board (MSB)	• On 13 November 2015, the Project Team met with representatives from the MSB to provide a summary of the project and why it was necessary to relocate the powerline so that the resource can be mined efficiently without risk of damage to TransGrid infrastructure.
• NSW Health	• Letter sent to Hunter New England Population Health on 4 December 2015 to provide an overview of the project in addition to relevant preliminary air quality assessment outcomes as well as Project Team contact information.
• Office of Environment and Heritage (OEH) including the Heritage Branch	• On 8 March 2016, the Project Team met with representatives from OEH to provide an overview of the project and to discuss the Aboriginal Heritage assessment and proposed biodiversity offset strategy.
• Transport for NSW (including Roads and Maritime Services)	• Letters sent to Transport for NSW in addition to Roads and Maritime Services on 4 December 2015. Letters provided an overview of the project in addition to relevant preliminary traffic assessment outcomes. Project Team contact information was also provided.

8.0 IDENTIFICATION OF KEY ENVIRONMENTAL ISSUES

8.1 Introduction and Objectives

Centennial Mandalong utilises a risk-based approach to manage safety, environment and social issues as a result of its operations at Mandalong Mine. This process involves personnel identifying issues or recognising areas where further information is required in addition to recommending any necessary controls to address identified risks. This practice is guided by the overarching Centennial Environmental Policy which requires continual improvement of environmental performance through risk management strategies based on clear science and valid data.

The compilation of this SEE has been undertaken through a risk based and consultative approach. The key project related issues warranting detailed investigation and discussion were identified through a range of measures including:

- The existing environmental context of the Project and surrounding locality (see **Sections 2 and 3**);
- The regulatory framework applicable to the Project (see **Section 5**);
- The outcomes of consultation undertaken with government agencies and other relevant stakeholders (see **Section 7**);
- The risk assessment undertaken regarding the Project (this section).; and
- Specialist studies completed as part of the preparation of the SEE (see **Section 9**).

A preliminary Broad Brush Risk Assessment (BBRA) was completed on 28 August 2015 by Centennial Mandalong, providing an initial risk assessment and directing the scope of technical specialist assessments to enable adequate assessment and management of key issues. The objective of the BBRA was to identify the triple bottom line (environment, social and economic) risks associated with the Project and to identify knowledge gaps or recommend improvements to existing mitigation and management measures already in place to ensure the residual consequences are acceptable. Where there was a knowledge gap in the information available, or where risks were considered unacceptable, a technical specialist assessment has been undertaken to support the SEE.

8.2 Proposed Activities with the Potential to Cause Environmental Impacts

The activities of the Project with the potential to cause environment, social or economic impacts were ranked as ‘high’, ‘significant’, ‘moderate’ and ‘low’ based upon Centennial Coal’s Risk Management Standard Risk Matrix.

The potential impacts of the Project and their associated environmental, social and economic consequences have been identified through the BBRA and consultation with government agencies and the community. The BBRA was based on existing knowledge i.e. prior to the preparation of technical specialist assessments and identified a number of issues for which further assessment or due diligence was required to determine the applicable level of risk.

The activities identified for the Project with the potential to cause environmental, social and economic impacts are as follows:

- Taking possession of the site and undertaking vegetation clearing within the proposed easement and access tracks;
- Construction of the concrete pads, erection of the new towers and cable stringing;

- Demolition and removal of redundant towers including use of access tracks; and
- Rehabilitation of construction disturbance.

8.3 Risk Assessment

The ranking of environmental consequences is based upon the principles of the Australian and New Zealand standard AS/NZS 4360:2004 (SASNZ 2004) – Risk Management and Centennial Coal's Risk Management Standard Risk Matrix. In accordance which these standards, a qualitative risk assessment methodology (using the Dyadem Stature Risk Management Software) was adopted.

The primary objectives of the BBRA were to:

- Identify risks/hazards to the environment and community associated with the construction of the proposed new section of TL24;
- Identify risks/hazards to the environment and community associated with the demolition of the redundant section of TL24;
- Identify risks/hazards to the environment and community associated with the long term operation of the relocated section of TL24;
- Identify the existing controls that are in place to manage the risks/hazards;
- Evaluate the consequence and likelihood of the risks/hazards; and
- Develop additional controls/actions to reduce all risk/hazard to an acceptable level.

The key issues that were specifically addressed in the risk assessment were:

- Water pollution;
- Landform stability issues causing sediment/erosion impacts;
- Impacts to biodiversity;
- Impacts to Aboriginal and European heritage;
- Air quality and noise impacts to surrounding receptors;
- Public safety;
- Visual impacts;
- Electric magnetic field impacts; and
- Traffic impacts.

Potential environmental, social and economic risks were assessed in the BBRA. Each risk was assessed by determining the probability and consequence in light of the mitigation measures and management strategies already in place at Mandalong Mine. When an individual risk was considered unacceptable, or where a knowledge gap was identified, a technical specialist assessment was commissioned.

8.4 Risk Register

Based upon the risk assessment methodology, the potential consequence of key project-related environmental issues has been ranked. While this risk register and prioritisation of key environmental issues does consider existing mitigation and management measures, it does not consider the application of new mitigation and management measures arising from technical assessments of key environmental issues.

A total of 43 risks were assessed and are summarised below:

Extreme Risk

No extreme risks were identified associated with the Project.

High Risk

Three high ranking risks were identified:

1. Sediment and erosion occurrence caused by clearing activities or taking possession of the site resulting in an impact to surface hydrology or tunnel erosion.

2. Interaction with soils caused by clearing activities or taking possession of the site resulting in impact to soils or tunnel erosion.

3. Sediment and erosion occurrence caused by access track clearing/stability or tower removal resulting in an impact to surface hydrology or tunnel erosion.

Significant Risk

Seventeen significant ranking risks were identified:

1. Loss of native flora caused by clearing activities or taking possession of the site resulting in impact to biodiversity (species and communities) or loss of habitat.

2. Change in visual amenity caused by clearing activities or taking possession of the site resulting in community complaints or visual impacts at the receptors.

3. Increased traffic along local roads caused by clearing activities or taking possession of the site resulting in community complaints, air/noise exceedances or public safety issues.

4. Change in visual amenity caused by construction activities resulting in community complaints or visual impacts at receptors.

5. Increased traffic along local roads caused by construction activities resulting in community complaints, air/noise exceedance or public safety issues.

6. Increased traffic along local and private roads caused by access clearing/stability or tower removal resulting in community complaints, air/noise exceedances or public safety issues.

7. Increased traffic along local and private roads caused by rehabilitation activities resulting in community complaints, air/noise exceedances or public safety issues.

8. Change in visual amenity resulting in community complaints or visual impact at receptors.

9. Potential interaction with cultural heritage sites caused by clearing activities or taking possession of the site.

10. Interaction with soils caused by construction activities resulting in impact to soils or tunnel erosion.

11. Sediment and erosion occurrence caused by construction activities resulting in impact to surface hydrology or tunnel erosion.

12. Interaction with soils caused by access clearing/stability or tower removal resulting in impact to soils or tunnel erosion.

13. Generation of airborne dust caused by access clearing/stability or tower removal resulting in community complaints, air quality exceedances or public safety issues.

14. Operation of noise generating equipment caused by access clearing/stability or tower removal resulting in community complaints, noise exceedances or public safety issues.

15. Generation of airborne dust caused by rehabilitation activities resulting in community complaints, air quality exceedances or public safety issues.

16. Change in visual amenity caused by access clearing/stability or tower removal resulting in community complaints or visual impact at receptors.

17. Change in visual amenity caused by rehabilitation activities resulting in community complaints or visual impact at receptors.

Medium Risk

Twelve medium significant ranking risks were identified:

1. Potential interaction with European heritage sites caused by clearing activities or taking possession of the site resulting in disturbance and/or loss of European heritage sites or place.

2. Potential interaction with Cultural Heritage sites caused by construction activities resulting in disturbance and/or loss of Aboriginal heritage sites or places.

3. Power supply disruption caused by stringing and cutting in phase resulting in community complaints.

4. Ignition of surrounding vegetation caused by construction activities resulting in bushfire.

5. Ignition of surrounding vegetation caused by tower removal resulting in bushfire.

6. Interaction with soils caused by rehabilitation activities resulting in impact to soils or tunnel erosion.

7. Sediment and erosion occurrence caused by rehabilitation activities resulting in impact to surface hydrology or tunnel erosion.

8. Operation of noise generating equipment caused by clearing activities or taking possession of the site resulting in community complaints or exceedance of noise criteria/guidelines or noise emissions at receptors.

9. Generation of airborne dust caused by clearing activities or taking possession of the site resulting in community complaints or exceedance of air quality criteria/guidelines or dust emissions at receptors.

10. Operation of noise generating equipment caused by construction activities resulting in community complaints or exceedance of noise criteria/guidelines or noise emissions at receptors.

11. Generation of airborne dust caused by construction activities resulting in community complaints or exceedance of air quality criteria/guidelines or dust emissions at receptors.

12. Operation of noise generating equipment caused by rehabilitation activities resulting in community complaints or exceedance of noise criteria/guidelines or noise emissions at receptors.

Low Risk

Ten low risks were identified which were deemed to have acceptable controls in place.

8.5 Conclusion

In response to the risks identified the following technical specialist assessments were carried out to inform this SEE:

- Water Impact Assessment;
- Flora and Fauna Impact Assessment;
- Biodiversity Assessment Report;
- Visual Impact Assessment;
- Traffic Impact Assessment;
- Aboriginal Heritage Impact Assessment;
- European Heritage Due Diligence Letter Report;
- Soil and Land Resource Assessment;
- Biophysical Strategic Agricultural Land Assessment;
- Agricultural Impact Statement;
- Air Quality Impact Assessment;
- Noise Impact Assessment;
- Electric Magnetic Field Impact Assessment;
- Social Impact Assessment; and
- Economic Impact Assessment.

The following sections of this report contain an assessment of all environmental, social and economic issues to a level commensurate with their risk rating.

9.0 ASSESSMENT AND MANAGEMENT OF KEY ENVIRONMENTAL ISSUES

From the technical specialist assessment, this section provides a summary of the potential environmental, social and economic impacts of the Project and the measures that will be implemented to mitigate and manage such impacts. The issues are presented in accordance with the risk ranking determined by the Project risk assessment.

9.1 Water Resources

9.1.1 Introduction

Potential impacts to water resources associated with the Project were assessed by the technical study *Centennial Mandalong Pty Ltd Mandalong Transmission Line TL24 Relocation Project Water Impact Assessment* (GHD 2015) (**Appendix 5**).

The primary objectives of the assessment were:

- To identify water quality objectives and triggers for the receiving environment, in order to minimise the potential impacts to local water quality as a result of the Project;
- Consider sediment and erosion controls to mitigate the impact of construction activities; in particular tunnel erosion as raised by the community; and
- Identification of flood risk areas based on existing flooding information.

The assessment has been undertaken in consideration of the relevant legislation and guidelines and considers the outcomes of both the risk assessment and stakeholder consultation.

9.1.2 Existing Environment

The existing surface water environment within the PAA is located within the upper reaches of Morans Creek and includes several unnamed tributaries. Morans Creek is a tributary of Dora Creek which flows into Lake Macquarie approximately 13 kilometres north east of the PAA (**Figure 11**). The proposed easement for TL24 is located outside of the modelled 100 year average recurrence interval flood extent and crosses four first order tributaries of Morans Creek.

The groundwater sources in the PAA are generally low yielding and predominantly within the Quaternary alluvium, weathered and/or fractured sandstone and coal seams. They would be classified as 'less productive' in accordance with the NSW Aquifer Interference Policy since the yields are generally less than 5 litres per second with the total dissolved solids concentration being typically greater than 1,500 mg/L.

The terrain within the vicinity of the PAA is characterised by the floodplain of Morans Creek. The proposed new TL24 easement rises from approximately 40 metres at the northern end to 140 metres at the southern extent. Soil types within the vicinity of the PAA are typically sandy loams of moderate erodibility. Selected areas within the PAA are subject to higher erodibility, in particular within the Gorokan landscape. The Gorokan landscape is typically located within the foot slope areas of the PAA and is generally cleared of taller vegetation. The clearing establishment of pasture within these areas typically result in an increase in the interaction between the groundwater and subsoil and topsoil layers. This increased groundwater interaction has the potential to increase the occurrence of tunnel erosion within the sodic soils of the Gorokan landscape.

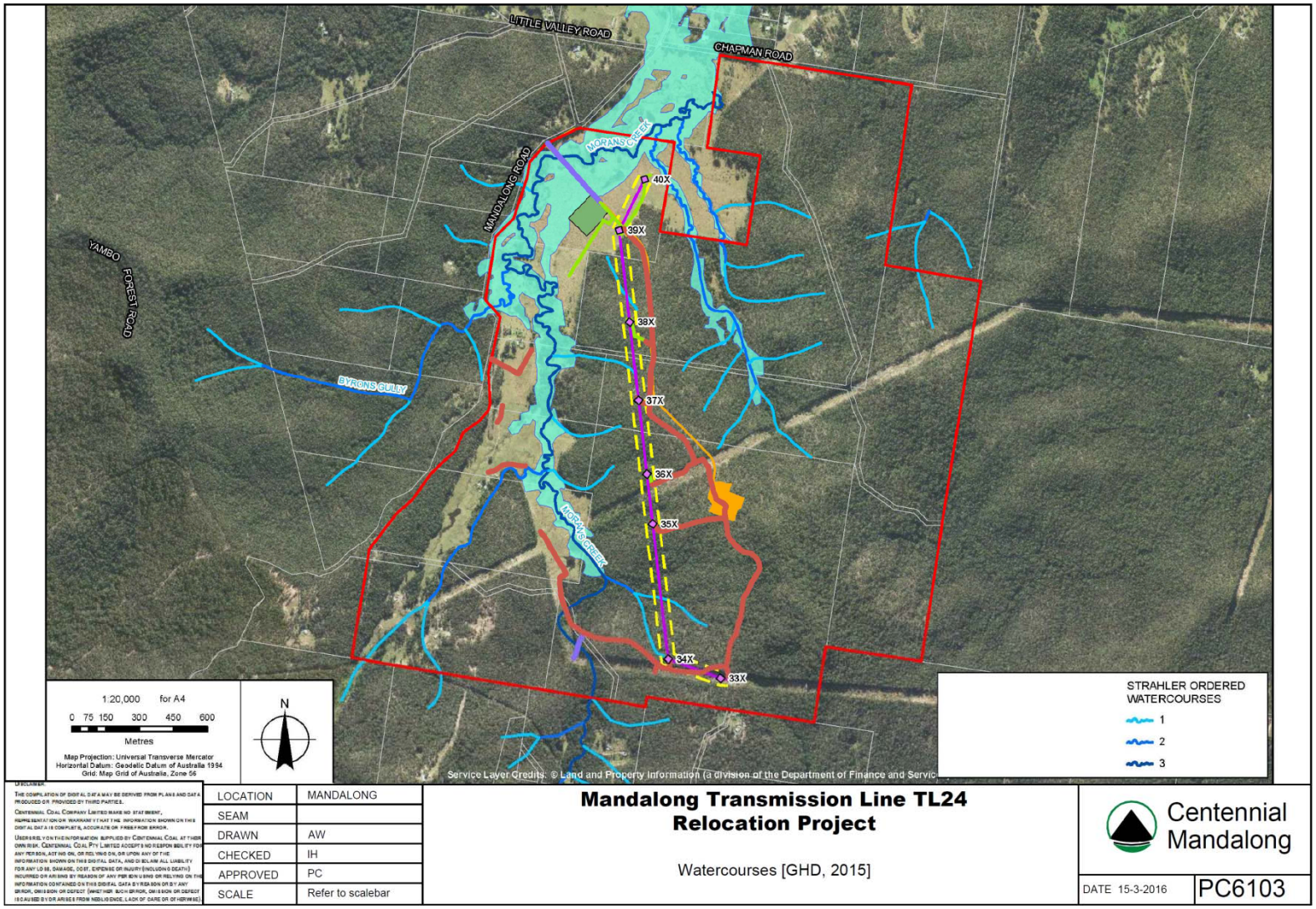

Figure 11: Surface Water Environment Within PAA (GHD, 2015)

9.1.3 Impact Assessment

Flooding

The Project includes access tracks that are located within the Morans Creek floodplain and an approved crossing structure over Morans Creek. Access over Morans Creek will be via the approved watercourse crossing structure associated with the permanent access road for the MSSS.

Water Quality and Quantity

The proposed water management system and erosion and sediment controls are intended to minimise the potential water quality impacts associated with the Project. Assuming that the recommended controls are constructed and suitably maintained, no appreciable impacts to the water quality within the surrounding area are expected.

The Project does not include any proposed detention, inter-catchment transfer, or other interception and re-use of local catchment runoff. As a result, it is considered unlikely that the Project will result in appreciable differences in creek flows during either construction or demolition.

As the impacts to downstream water quality and quantity are expected to be negligible no appreciable impacts to downstream water users are expected.

Groundwater

The Project includes surface works only and includes shallow excavations necessary to construct footings for the towers and the access track. As a result it is considered unlikely that the Project will impact on local groundwater resources.

Soils

The existing sodic soils located within the Gorokan soil landscape along the foot slopes below the existing areas of vegetation present an erosion risk for any disturbance activities. Currently there are a number of instances of tunnel erosion caused either by natural processes or by human or livestock impact.

The Project includes access tracks that traverse these high erosion risk areas. Construction of these access tracks has the potential to result in increased instances of tunnel erosion. These risks have been identified as key management requirements within the consent conditions for the Mandalong Southern Extension Project and are therefore of equal importance for this Project.

The Project proposes, in these risk areas, to only undertake disturbance activities for the purpose of constructing access roads and hence boxing out of existing soil materials will be required.

Cumulative Impacts

It is considered that the Project will not result in appreciable cumulative impacts to the local water environment. The likely extent of impacts to water will be isolated to the proposed areas of clearing and the watercourse crossing during the construction phase of the Project. In addition, it is expected that part of the access tracks will be reused and upgraded during the construction of the MSSS Access Road during future works associated with the Mandalong Southern Extension Project.

9.1.4 Mitigation and Management

Whilst there is the potential for sediment and erosion impacts to occur during the construction phase, mitigation and management measures will be implemented as required in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004)* also known as *The Blue Book*.

Erosion mitigation and management measures to be implemented will be included in the Project's Sediment and Erosion Control Plan which will form an appendix to the CEMP.

9.1.5 Conclusion

Negligible impacts to water resources or water users are predicted as a result of the Project. Whilst there is the potential for sediment and erosion impacts to occur during the construction phase, mitigation and management measures will be implemented prior to undertaking disturbance activities to manage this risk. Erosion mitigation and management measures to be implemented will be included in the Project's Sediment and Erosion Control Plan which will form an Appendix to the CEMP. No additional water licences are required for the proposed work.

9.2 Ecology

9.2.1 Introduction

RPS Australia East Pty. Ltd. (RPS) was engaged by Centennial Mandalong to undertake the assessment of the flora and fauna issues associated with the Project. The field based study area adopted by RPS for this assessment comprised of all proposed disturbance areas in addition to adjoining areas. The remainder of the PAA was assessed at a desktop level given that there are no additional activities or disturbance proposed for these areas.

The scope of this flora and fauna assessment included:

- Identification and mapping of the vegetation communities;
- Assessment of the status of plant species and vegetation communities under relevant legislation;
- Identification of existing habitat types and assessment of the habitat potential for threatened species, populations and ecological communities known from the proximate area;
- Identification of threatened terrestrial and aquatic fauna and flora;
- Assessment of the potential for the Project to have a significant impact on any threatened species, populations or ecological communities identified during field surveys or as having potential habitat in the area; and
- Recommendations for measures to avoid, reduce or mitigate impacts on biodiversity.

The RPS assessment has been completed in accordance with the applicable legislative framework and guidelines specifically the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A copy of the *Flora and Fauna Assessment* (RPS 2015b) is contained within **Appendix 6**, with significant findings and recommendations summarised in the below sub-sections.

9.2.2 Methodology

Literature Review

A literature review was undertaken by RPS (2015b) to assist in identifying distributions, suitable habitat and known records of threatened specials to help guide the field survey program. This included a review of available aerial imagery to assist in mapping the vegetation within the study area, along with a review of previously prepared ecological assessments for nearby areas.

Field Survey and Vegetation Mapping

Floristic plots and ground-truthing were undertaken by RPS in 2011, 2013, 2014 and 2015 to inventory the flora and validate and/or refine previous vegetation mapping of the study area. Vegetation communities were identified using nomenclature from LHCCREMS (NPWS 2003). Four vegetation types were identified as occurring on the study area, being:

- MU 5: Alluvial Tall Moist Forest;
- MU 6: Coastal Narrabeen Moist Forest;
- MU 15: Coastal Foothills Spotted Gum - Ironbark Forest; and
- Cleared / Disturbed Land.

Targeted flora surveys were undertaken within areas that contained suitable habitat for the targeted species. Additionally, opportunistic threatened flora surveys were undertaken throughout the study area during vegetation surveys and fauna surveys.

An assessment of the relative flora and fauna habitat value present within the study area was undertaken. This assessment focused primarily on the identification of specific habitat types and resources within the study area favoured by known threatened flora and fauna species in the region. The assessment also considered the potential value of the study area (and surrounds) for all major guilds of native flora and fauna.

Habitat assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.

9.2.3 Results

Flora

A total of 103 flora species were identified within the study area. No threatened flora species or ecological communities, listed under the TSC Act 1995 and/or EPBC Act 1999 were detected within the study area during RPS targeted surveys.

Habitat

Habitats within the study area were found to be in relatively good condition, with a mixture of mature hollow-bearing trees and a variable understorey which was associated with different levels of disturbance. Fallen timber and a dense groundcover provides suitable shelter for a wide range of terrestrial species, with hollow-bearing trees providing suitable breeding and roosting/denning habitat for threatened hollow obligates such as microchiropteran bats (microbats), arboreal mammals, forest owls and Black-Cockatoos.

Fauna

A total of 61 fauna species were detected within the study area during field surveys, including nine terrestrial mammals, two arboreal mammals, six confidently identified species of microbat, 39 birds, two reptiles and three frog species. The results for each group are discussed further below. Three threatened fauna species listed under the TSC Act 1995 were detected during RPS surveys being:

- Brown Treecreeper (V) *Climacteris picumnus victoriae*

- Little Bentwing-bat (V) *Miniopterus australis*; and
- Eastern Freetail-bat (V) *Mormopterus norfolkensis*.

9.2.4 Impact Assessment

Once the relocated section of the TL24 transmission line becomes operational, TransGrid may undertake additional clearing for bushfire management and ongoing maintenance using their discretionary processes and guidelines. This loss is temporary and indirectly attributable to the Project as Centennial Mandalong is not seeking approval for this clearing rather it may be undertaken by TransGrid subject to their clearing rights.

The Project involves the removal of 8.5 ha of native vegetation consisting of: 0.3 ha of MU 6 - Coastal Narrabeen Moist Forest; and 8.2 ha of MU 15 - Coastal Foothills Spotted Gum - Ironbark Forest and 33 hollow-bearing trees. Neither of these vegetation communities are commensurate with any threatened ecological community listed under the TSC Act or EPBC Act.

The areas of vegetation which are proposed to be cleared are very common and widespread in the region, occupying large areas between Ourimbah and Beresfield (21,110 ha of MU 15 and 31,186 ha of MU 6 (NPWS 2003)). The proposed areas of clearing are relatively insignificant when converted to percentages of the vegetation which has been mapped within the region (0.05% of MU 15 and 0.001% of MU 6 (NPWS 2003)).

The 7-part tests (TSC Act) and the Assessments of Significance (EPBC Act) have assessed the threatened species and threatened ecological communities which are likely to occur within the impact area and the potential impacts of the Project. These assessments have concluded that the Project is unlikely to have a significant impact on threatened species or ecological communities.

9.2.5 Mitigation and Management

Avoidance

The Project aims to minimise impact on threatened species and ecological communities. Requirements to clear native vegetation have been reduced from approximately 14 ha to 8.5 ha. This includes all clearing associated with the easement and access tracks. The reduction has been achieved by not clearing areas within the proposed easement where transmission line height provides sufficient clearance in accordance with TransGrid's vegetation management procedures. The proposed clearing is further minimised by utilising existing access tracks wherever possible. This reduction in clearing has also decreased the number of hollow bearing trees to be removed from 46 down to 33 and leaves a vegetation corridor. The area of the easement required to be cleared is shown in **Figure 12.** The total 8.5ha proposed to be cleared includes the easement clearing and the widening of existing access tracks to allow access to the tower sites.

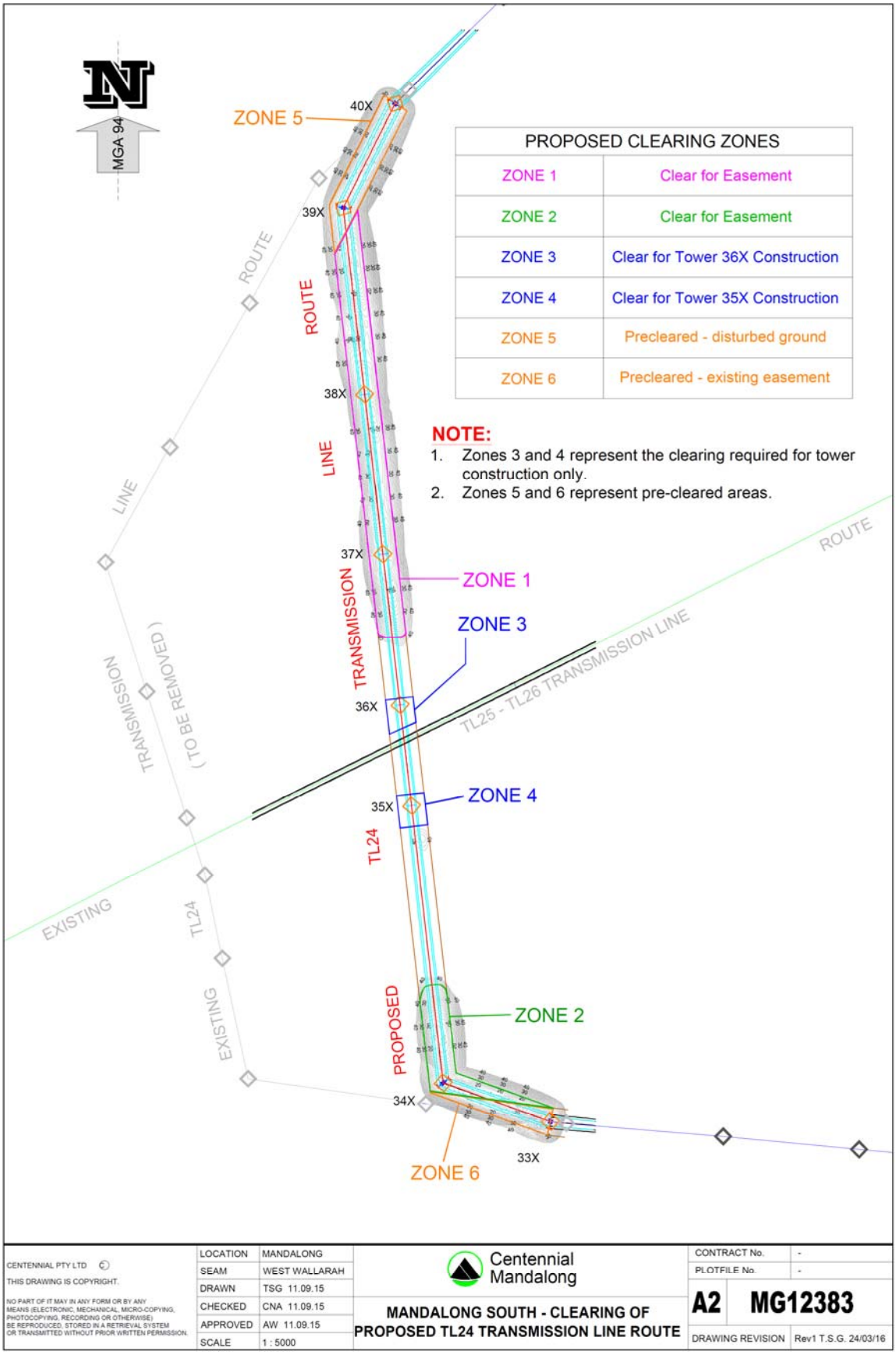

Figure 12: TL24 Easement Clearing Plan

Mitigation

The following mitigation measures have been recommended to minimise the potential flora and fauna impacts of the clearing and construction activities associated with the Project and will be implemented as part of the CEMP:

- The clearing of native vegetation has been minimised as far as is practicable. Unnecessary vegetation clearing should be avoided by marking the clearing limit with flagging tape;
- All contractors will be advised of the designated work area through a site induction process;
- Vehicles/machinery will use designated access tracks. Speeds will be limited to 40 kilometres per hour to reduce the potential of fauna strike and to reduce dust generation;
- Measures will be implemented as required to prevent the spread of weeds and potential importation of Phytophthora. Such measures will be detailed in the CEMP;
- Appropriate erosion and sediment control measures will be managed via the implementation of an Erosion and Sediment control plan as an appendix to the CEMP;
- Where possible, clearing activities should be timed to avoid removal of hollow-bearing trees during breeding season of threatened species (avoiding winter and spring); and
- A suitably qualified person is to be present to supervise hollow-bearing tree clearing within the impact area and that vegetation clearing is undertaken in accordance with TransGrid's policies and procedures.

9.2.6 Offset

RPS Australia East Pty. Ltd. (RPS) was engaged by Centennial Mandalong to undertake an assessment of the offsetting requirements associated with the Project. The Biodiversity Assessment Report was completed in accordance with the *Framework for Biodiversity Assessment* (FBA) (OEH, 2014). A copy of the *Biodiversity Assessment Report* (RPS 2016a) is contained within **Appendix 7**, with significant findings summarised below.

The Project will result in the permanent clearing of 8.5 ha of vegetation to enable the proposed easement and access track construction. This clearing is directly attributable to the Project.

Once the relocated section of the TL24 transmission line becomes operational, TransGrid may undertake additional clearing for bushfire management and ongoing maintenance using their discretionary processes and guidelines. This loss is temporary and indirectly attributable to the Project as Centennial Mandalong is not seeking approval for this clearing rather it may be undertaken by TransGrid subject to their clearing rights.

The clearing of 8.5 hectares of vegetation directly attributed to the Project would require a total of 518 ecosystem credits to be secured in order to compensate for the impacts associated with the loss of vegetation using the Major Project Assessment calculator tool under the FBA. Centennial Mandalong has identified a parcel of land within close proximity to the impact site and with 'like for like' vegetation communities to those proposed to be cleared by the Project. This parcel of land is proposed to be secured in order to compensate for the loss of vegetation communities as a result of the Project. The parcel of land, identified as Lot 152; DP 755238, is owned by Centennial Fassifern Pty. Limited (**Figure 13**) and encompasses a total area of 73.6 hectares. Using the Major Project Assessment calculator tool under the FBA, the identified parcel of land generates a total of 584 ecosystem credits, an ecosystem credit surplus of 66 credits.

The credit surplus of 66 credits within the proposed parcel of land identified to be secured in order to compensate for the loss of vegetation as part of the Project will be used to accommodate for any future discretionary clearing undertaken by TransGrid within the easement under their clearing rights during the future operational and maintenance phase of TL24.

The NSW Biodiversity Offsets Policy for Major Projects identifies the required elements of an offset site to ensure that actual gains to biodiversity will be achieved. These include:

I. The principal objective of ongoing site management is biodiversity conservation;

II. Management actions are undertaken in accordance with a plan of management;

III. There is reasonable likelihood that sufficient resources will be available to implement the plan of management over time;

IV. There are appropriate accountability mechanisms in place to secure the outcomes, and these mechanisms cannot be altered without alternative and comparable offsetting arrangements being put in place; and

V. The arrangements are in perpetuity and conservation obligations are transparently transferred and disclosed to any new owners of the land through appropriate administrative procedures.

In October 2015, Centennial Mandalong received State Significant Development approval for the Mandalong Southern Extension Project (SSD-5144). The Mandalong Southern Extension Project committed to the development of a Land Management Strategy to conserve and enhance the vegetation communities on three parcels of land to compensate for the loss of 15.6 hectares of vegetation as part of the Mandalong Southern Extension Project. The conditions of consent for the Mandalong Southern Extension Project required the Land Management Strategy to:

I. Be finalised in consultation with OEH;

II. Define conservation areas, habitat restoration areas and riparian protection areas within the parcels of land;

III. Make arrangements to manage, protect and provide long-term security for the Land Management Strategy areas;

IV. To the satisfaction of the secretary.

Centennial Mandalong propose to secure the parcel of land for this Project using the same mechanisms recently approved by the Mandalong Southern Extension Project with the additional parcel of land included into the Land Management Strategy to be developed. This strategy will ensure the parcel of land proposed to be used to compensate for the loss of vegetation communities will meet the required elements of an offset site detailed within the NSW Biodiversity Offsets Policy for Major Projects.

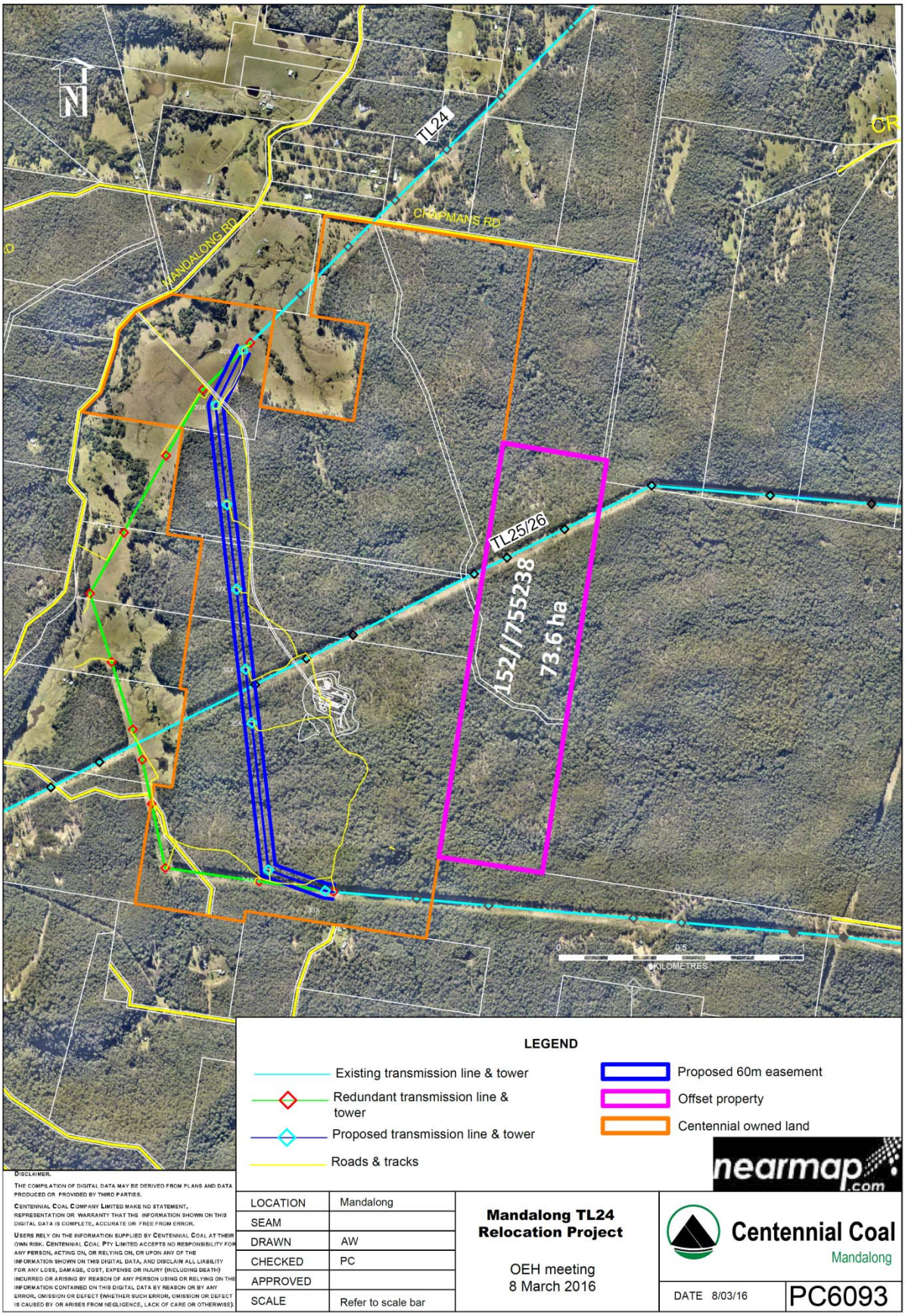

Figure 13: Biodiversity Offset Land

9.2.7 Conclusion

The Project involves the removal of 8.5 ha of native vegetation consisting of: 0.3 ha of MU 6 - Coastal Narrabeen Moist Forest and 8.2 ha of MU 15 - Coastal Foothills Spotted Gum - Ironbark Forest; and 33 hollow-bearing trees. As aforementioned, neither of these vegetation communities are commensurate with any threatened ecological community listed under the TSC Act or EPBC Act.

The 7-part tests (TSC Act) and the Assessments of Significance (EPBC Act) have assessed the threatened species and threatened ecological communities which are likely to occur within the impact area and the potential impacts of the Project. These assessments have concluded that the Project is unlikely to have a significant impact on non-cryptic threatened species or ecological communities.

Avoidance and mitigation measures are proposed to minimise the potential flora and fauna impacts of the clearing and construction activities associated with the Project.

9.3 Visual

9.3.1 Introduction

The Visual Impact Assessment (VIA) involved an evaluation of the visual character of the landscape in which the Project will be located, and an assessment of the potential visual impact that could result from the construction of various components and infrastructure associated with the Project.

The primary objective of the VIA was to determine the potential visual significance of the relocated TL24 line on people living and working in, or travelling through the landscape within and surrounding the PAA. The VIA has also been undertaken to:

- Assess the existing visual character within the PAA as well as the surrounding landscape;
- Determine the extent and nature of the potential visual significance of the relocated TL24 line on surrounding areas; and
- Identify measures to mitigate and minimise any potential visual impacts.

The methodology included the following activities:

- Desktop study addressing visual character and identification of view locations within the surrounding area;
- Fieldwork and photography; and
- Assessment and determination of visual significance.

The VIA was completed by Green Bean Design Pty Ltd and appears as **Appendix 8** to this report.

9.3.2 Existing Environment

The proposed Project is located on the north facing slope of a ridgeline spur above the Morans Creek drainage line which meanders along a north to south alignment to the east of Mandalong Road. The landscape surrounding the proposed Project contains a number of discontinuous ridgelines with spurs descending toward drainage lines within a broad valley. The proposed new easement is surrounded by mature tree cover which largely contains views toward the proposed Project.

9.3.3 Impact Assessment

The impacts to the majority of sensitive receiver locations within and surrounding the PAA have been determined as negligible with regard to the Project and its associated infrastructure. The negligible significance results from:

- extensive visual screening by existing tree cover and/or with the combination of rising and undulating landform;
- restricted views to the upper and top sections of the proposed TL24 towers; and
- restricted opportunities to gain direct views along the proposed 60 metre wide easement.

Sensitive receiver locations are shown in **Figure 14** (note these are different to the receiver numbers used in the air quality and noise impact assessments). R9 and R12 have been determined as a low visual significance with regard to the relocated TL24 transmission line. Restricted views toward upper sections of some transmission towers may be visible from R9; however, the majority of the Project will be screened by existing trees located on sloping landform rising to the east of the dwelling. An indirect view may also occur toward the mid and upper section of the two tallest transmission towers (35X and 36X) from the R9 property, but these structures are not considered to dominate views of the surrounding landscape from the dwelling.

Elevated and distant views will extend toward a short section (around 200 metres) of the proposed relocated TL24 transmission line from the R12 property. This may include views toward the tallest proposed towers (35X and 36X) at around 65 metres. Views toward the Project from the R12 dwelling are largely restricted by surrounding tree cover as well as the orientation of the dwelling toward the Project; however, views will extend toward the Project from an area within the property to the north-east of the dwelling, where distant views are available above and along a domestic power line easement to the R12 property. The Project is not considered to form a dominant element within the overall and available view from R12. The proposed visible portions of the towers are unlikely to form significant skyline features from this elevated receiver location. Photomontages provide an illustration of these views (see **Plates 1 and 2)**.

Associated small scale works, including the construction of access tracks, are not considered likely to result in any significant level of change to the existing landscape and will not form prominent visual elements within the context of existing and available views from surrounding receiver locations.

The construction of the 60 metre wide easement along the TL24 relocated alignment will create a potential visual corridor (north to south) along lower slope sections of the relocated transmission line route. A partial view toward the 60 metre wide easement will also be visible from a limited number of elevated receiver locations (principally R12).

The construction activities would be temporary and transient in nature. Views toward construction activities would be largely restricted by vegetation surrounding the PAA.

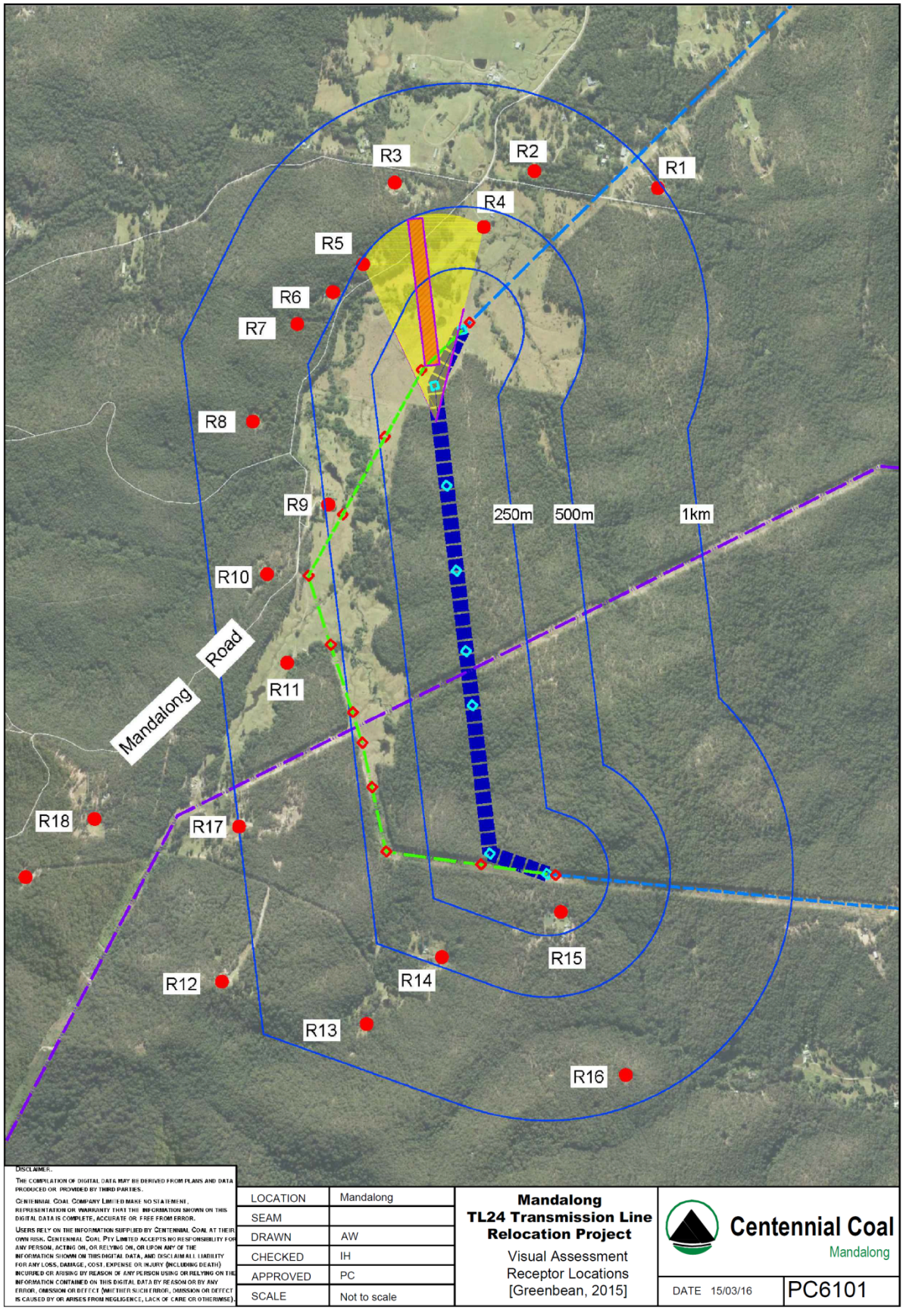

Figure 14: Visual Assessment Receptor Locations (Green Bean Design, 2015)

Photo location P6 - view looking west from Dwelling R9 garden

Photomontage 5 from photo location P6 - view looking west from Dwelling R9 garden

Plate 1: Photomontage from R9

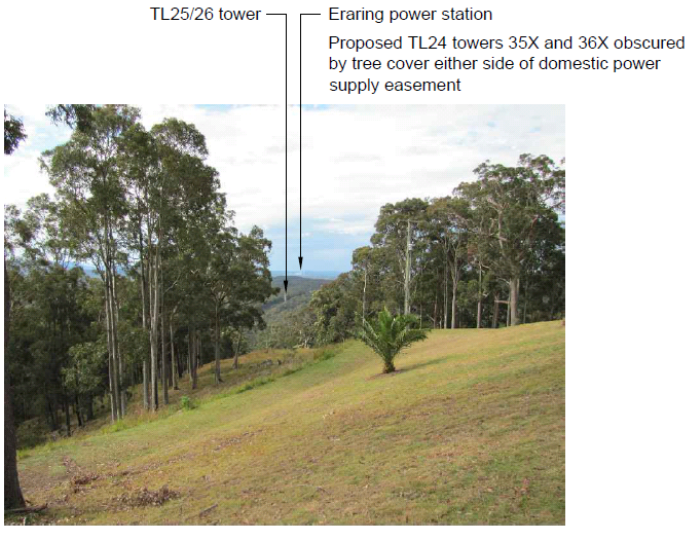

Photo location P8 - view looking north-east from Dwelling R12 (garden area north of dwelling)

Plate 2: Photomontage from R12

Cumulative Visual Impact

A cumulative visual impact could result from elements of the Project being constructed in conjunction with other existing infrastructure within the PAA which could be either associated or separate to it.

The relocated TL24 line and towers will be visible together with other existing transmission line structures which include adjoining sections of the TL24 line and the existing TL25/26 line which extends north-east to south west through the PAA, and directly beneath the proposed section of TL24.

Whilst the relocated TL24 line will be visible in combination with existing transmission line structures, the VIA notes that within the PAA:

- The proposed relocated TL24 line will extend for approximately 2.4 kilometres, the redundant and dismantled section of TL24 extends for approximately 3 kilometres;
- The proposed relocated TL24 will incorporate 8 new towers, the redundant and dismantled section of TL24 includes 12 towers; and
- The proposed relocated TL24 line will be approximately 600 metres shorter in length than the existing TL24 line and will also result in four fewer tower structures within the PAA.

The Project will be constructed at the same time as the proposed Mandalong South Surface Site. The Mandalong Southern Extension Project VIA (Green Bean Design, 2013) concluded that there would be a negligible to low visual impact associated with this development. Whilst some elements of the TL24 transmission line relocation will be visible from surrounding receiver locations, it is considered unlikely that constructed elements within the MSSS will be visible together with the TL24 transmission line relocation from the majority of receiver locations within the PAA.

The residential dwelling R12 view location will have partial views toward the MSSS as well as potential views toward a short section of the TL24 line. These views will be limited to some portions of the property and are unlikely to occur from the dwelling.

Green Bean Design considers that the proposed relocated TL24 line will have no significant cumulative impact on views from sensitive receiver locations within and surrounding the PAA.

9.3.4 Mitigation and Management

Overall visual significance has been determined as negligible for the majority of surrounding receiver locations, largely due to extensive visual screening by existing tree cover and/or with the combination of rising and undulating landform. Having part of the easement not cleared and moving the powerline further away from private properties has reduced the visual impact.

9.3.5 Conclusion

Key Project activities will have a minimal visual impact on the majority of people living in or travelling through the landscape within and surrounding the PAA. Views toward the relocated TL24 line from most receiver locations will be predominantly contained by existing tree planting within and surrounding the PAA.

The overall negligible visual impact will be due to a combination of the following factors:

- Constructed elements associated with the Project will be similar in form and function to existing infrastructure visible within the PAA;
- The scale of proposed constructed elements within the PAA will be similar to existing constructed elements and unlikely to impact on views from rural residential areas surrounding the PAA;
- There will be a negligible impact from the development on views from rural residential areas; and
- There will be a negligible impact from the development on views from local road corridors.

9.4 Traffic and Transport

9.4.1 Introduction

Potential traffic and transport impacts associated with the Project were assessed by the technical study *Traffic Impact Assessment – Mandalong Transmission Line TL24 Relocation Project* (Intersect Traffic 2015) (**Appendix 9**).

Potential impacts to the existing road network from the project are directly attributable to construction traffic associated with the relocation of TL24 given access to the easement is from Mandalong Road.

The assessment has been undertaken with reference to the *Guide to Traffic Generating Developments* (RTA 2002)*, Guide to Road Design* (Austroads 2010) and Lake Macquarie City Council's *Development Control Plan No. 1 - General Principles of Development (Part 2.6 Transport, Parking, Access and Servicing)*.

9.4.2 Existing Road Traffic Environment

Existing Road Network

Mandalong Road is a two way two lane local rural road that connects the Mandalong area to Morisset and the M1 Pacific Motorway. The section of Mandalong Road within the PAA is under the care and control of Lake Macquarie City Council. The majority of the road is bitumen sealed however a short section of unsealed road (3.5 kilometres) exists to the south and is not expected to be used by any traffic generated by this development. Under a functional road hierarchy this road performs the function of a minor collector road in that it collects traffic from a number of tributary local access roads and distributes traffic to the main arterial road network (M1 Pacific Motorway and MR 217 at Morisset). The speed limit along Mandalong Road is 80 kilometres per hour and, at the time of inspection, Intersect (2015) considered the road to be in good to fair condition.

Chapman Road is a two way two lane local unsealed rural road that provides access to a small number of properties and exists as a crown road. It has a narrow carriageway and a small timber bridge currently in a poor state of repair over Morans Creek. At the time of inspection the road was considered to be in poor condition.

Existing Traffic Volumes and Network Capacity

As part of a previous traffic assessment undertaken by Intersect in 2009 for the exploration drilling program in the Southern Extension Area, base traffic count data was obtained via automatic tube counters and manual intersection counts. To complement this data Intersect Traffic also undertook an additional automatic tube count on Mandalong Road near Chapman Road from Wednesday 29 July 2015 to Wednesday 12 August 2015.

A summary of the traffic data collected and considered relevant to the assessment of the Project is provided in **Table 7**.

Table 7: Traffic Data (Intersect, 2015)

Road	Location	Source	Count Year	AADT (ctpd)	Peak Hour (vtph)
Mandalong Road	East of Deaves Road	Intersect	2009 (manual)		185
Mandalong Road	East of Deaves Road	Intersect	2012 (manual)		275
Mandalong Road	East of Mine entrance	Intersect	2012 (manual)		423

Mandalong Road	West of Mine entrance	Intersect	2012 (manual		281
Mandalong Road	South of Deaves Road	Intersect	2009 (tube)	660	60
Mandalong Road	South of Deaves Road	Intersect	2009 (manual)		48
Mandalong Road	South of Deaves Road	Intersect	2012 (manual)		99
Mandalong Road	North of Chapman's Road	Intersect	2015 (tube)	318	45

The data extracted from the 2015 tube count near Chapman's Road indicates the peak road network period in the vicinity of the PAA is the PM peak between 3.30 pm and 4.30 pm. AM peak periods have lower traffic volumes with the peak period being recorded as 6 am and 7 am.

The data indicates traffic growth of approximately 20 percent per annum over the last three years which is considered unusually high and generally not sustainable over a long period of time. This growth rate may be artificially high due to the low background traffic volumes and traffic associated with recent growth in the Morisset Industrial area. Therefore for assessment purposes a more appropriate background traffic growth rate, given existing and likely future development along the road network (except the subject mine extension), would be three percent per annum which is considered typical for a developing area.

From a review of the aerial map it is noted that Chapmans Road currently provides access to approximately three dwellings therefore is only likely to have traffic volumes of the order of 3 vehicles per hour during peak periods and 30 vehicles per day.

The capacity of roads is generally governed by the capacity of intersections on the road, however the *Guide to Traffic Generating Developments* (RMS 2002) provides some guidance on the mid-block capacity and expected levels of service (LOS) on rural roads. LOS is a basic parameter used to describe the operation of an intersection and ranges from A (good intersection operation) to F (saturated conditions with long delays and queues). Based on current traffic volumes, the LOS determined by Intersect (2015) for the subject roads are summarized in **Table 8**.

Table 8: LOS for Subject Roads (Intersect, 2015)

Road	Level of Service
Mandalong Road – east of Mandalong Mine entrance	B
Mandalong Road – west of Mandalong Mine entrance	A
Mandalong Road south of Deaves Road	A
Mandalong Road north of Chapman's Road	A
Chapman's Road	A

If it is assumed that a desirable level of service C or better on the local rural road network during the weekday peak is considered satisfactory, as recommended in the *Guide to Traffic Generating Developments* (RMS 2002), then this data indicates that the local road network has spare capacity to cater for additional traffic generated by this project. It is noted that a desirable LOS C or better is achieved if traffic volumes remain less than 870 vehicles per hour.

9.4.3 Traffic Generation and Distribution

This Project will not generate any change to the full time employment numbers to be approved under SSD-5144 therefore the traffic impacts generated by the Project will only relate to construction traffic. It is envisaged that the Mandalong Transmission Line TL24 Relocation Project will require up to 25 temporary construction personnel throughout the construction period.

If it is assumed each construction employee drives their own car to the work site each day and an allowance is made for material delivery and a plant floating within the AM and PM peak hour periods associated with construction employees commencing and finishing work it is reasonable to conclude that the peak hour traffic generation for the proposed construction works would be in the order of 30 vehicles per hour of which up to 15% to 20% would be heavy vehicle traffic. It is also reasonable to conclude that all construction traffic would access the site via Mandalong Road from the M1 Pacific Motorway.

As this Project is likely to run concurrently with the construction of the MSSS, which forms part of the Mandalong Southern Extension Project, the construction traffic associated with the MSSS (MSSS) construction also needs to be considered. Within Intersect Traffic's Traffic Impact Assessment (2013) for the Mandalong Southern Extension Project, it was identified that the likely construction traffic associated with the MSSS construction would be in the order of up to 79 vehicle trips per hour during the AM and PM peak hours. Again the majority of this traffic would access the site via Mandalong Road from the M1 Pacific Motorway.

Therefore the cumulative traffic generation from this Project and the MSSS construction was calculated to be of the order of up to a maximum of 109 vehicle trips per hour of which it would be expected that 15 percent to 20 percent would be heavy vehicle traffic. However, more detailed planning of the MSSS construction has shown that the high vehicle activities can be scheduled so as not to coincide with high vehicle TL24 activities (for example delivery of road ballast and concrete delivery). Therefore the projects can be managed so that peak construction traffic will not exceed 79 vehicle trips per hour approved under SSD-5144.

9.4.4 Road Traffic Impact Assessment

Road Network

Intersect Traffic (2013) identified that construction associated with the MSSS, being part of SSD-5144, would generate a maximum of 79 vehicles trips per hour. This Project does not propose to exceed this peak number of vehicle trips.

There are no other major developments proposed that would result in higher than normal background traffic growth on this section of Mandalong Road. Therefore the resultant traffic volumes on Mandalong Road near the Mandalong Mine Access Site entrance, during this Project will be in the order of 500 vtph and in the order of 570 vtph in 2017 if a background traffic growth rate of three percent per annum is adopted. Therefore based on the data a LOS C is still likely to be experienced by motorists. This is considered satisfactory for operational efficiency of a rural collector road.

Peak traffic volumes on Mandalong Road near the construction site near Chapman's Road have been determined as 45 vtph (Intersect Traffic 2015). With the addition of 79 vtph associated with this Project and the construction of the MSSS and assuming a background traffic growth of three percent per annum the likely peak hour traffic volumes would be in the order of 127 vtph in 2017. Based on the data a LOS A is still likely to be experienced by motorists. This is considered satisfactory for operational efficiency of a rural collector road.

Overall it is concluded that Mandalong Road has sufficient spare mid-block capacity to cater for the additional construction traffic generated by this Project.

Whilst the actual traffic volumes generated by the construction activities are unlikely to impact on the road network efficiency, the large number of heavy vehicle movements may impact on the condition of the road pavement. The increased heavy vehicle traffic will result in accelerated pavement deterioration with particular impact on the lower standard roads such as Mandalong Road south of the Mandalong Mine Access Site. As part of SSD-5144 Centennial Mandalong has committed to undertake a pavement condition assessment report prior to and on completion of construction activities to identify areas of road

pavement deterioration requiring maintenance treatment that could be directly attributed to the construction activities. This will be completed in consultation with Lake Macquarie City Council.

Road Safety

The road network impacted on by the Project is from observation considered to be suitable to carry the increase in traffic volumes resulting from the Project.

Construction and maintenance traffic will utilise Mandalong Road south-west of the Mandalong Mine Access Site entrance to the south of Chapman Road. Again by observation this section of Mandalong Road, being at least six metres wide and sealed, is considered suitable for future traffic volumes on the road i.e. less than 500 vtph.

The recently approved new MSSS Access Road will be located directly off Mandalong Road approximately 700 metres south of Chapman Road. An existing access gate is currently located at this location. Centennial Mandalong will construct this as an at-grade BAR/CHL intersection providing a left turn turning lane into the site. A right turn lane is not considered necessary at this location as nearly all traffic generated by the new surface site facility will have its origin/destination from the existing Mandalong Mine Access Site to the north. Whilst such traffic volumes do not warrant such a high standard of access, the likely use of the access by heavy vehicles during construction of infrastructure would justify the construction of this standard of access. This access would be suitable for use by construction traffic associated with this Project as well as the construction of the MSSS. It will be identified as the only site access for the Project within the Construction Traffic Management Plan.

On-site Car Parking

Suitable on-site car parking areas will be provided for construction traffic within the PAA and this will be identified within the Construction Traffic Management Plan.

However for this assessment given the large area covered by the PAA it is reasonable to conclude that there is sufficient area within the construction zone to provide adequate and suitable on-site parking for construction traffic. The Project will not result in any on-road parking on Mandalong Road therefore will not impact on the safety and efficiency of the public road network.

9.4.5 Management and Mitigation

As recommended by Intersect Traffic (2015), a Construction Traffic Management Plan will be developed as an appendix to the CEMP to address the impacts of the construction works on the local road network. The management measures will be similar to those adopted for the construction relating to the Mandalong Southern Extension Project SSD-5144.

9.4.6 Conclusion

In conclusion, Intersect Traffic (2015) advises that the proposed TL24 Relocation Project will not adversely impact the local road network with traffic movements not proposed to exceed the peak number of vehicle trips approved as part of the Mandalong South Extension Project SSD-5144.

9.5 Aboriginal Heritage

9.5.1 Introduction

Potential impacts to Aboriginal heritage associated with the Project were assessed by the technical study *Mandalong Transmission Line TL24 Relocation Project Aboriginal Heritage Impact Assessment* (RPS 2015a) (**Appendix 10**). The assessment considered the entire PAA with pedestrian surveys focusing on proposed disturbance areas.

The RPS assessment has been completed in accordance with the applicable legislative framework, including the NPW Act and best practice guidelines for survey reporting. It has also been completed in consultation with the Aboriginal parties who registered their interest in the Mandalong Southern Extension Project (SSD-5144) to meet the requirements of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a) (ACHCR).

9.5.2 Consultation

Stage 1 – Notification of Project Proposal and Registration of Interest

In July 2010, formal consultation processes were initiated for the Mandalong Southern Extension Project in accordance with the ACHCRs. On 7 July 2010, letters requesting the identification of Aboriginal groups to be contacted by Centennial Mandalong were mailed to DECCW, Hunter Central Rivers Catchment Authority, NSW Aboriginal Land Council (on behalf of the West Lakes Aboriginal Community – now represented by Biraban LALC), Lake Macquarie City Council, National Native Title Tribunal, Native Title Services Corporation Limited, Registrar of Aboriginal Owners, Wyong Shire Council, Darkinjung LALC and Bahtabah LALC. Each Aboriginal party identified through this process was contacted by letter (13 August 2010), inviting a registration of interest for the Project consultation process. In addition, an advertisement was placed in the Lakes Mail (29 July 2010) seeking expressions of interest from Aboriginal parties for the Mandalong Southern Extension Project.

A meeting with the Registered Aboriginal Parties (RAPs) in November 2010 identified Guringai Tribal Link as a potential additional Aboriginal party that should be contacted and invited to participate in the consultation process. Guringai Tribal Link had not been identified through the implementation of the ACHCRs. Guringai Tribal Link was contacted by letter (17 December 2010) and the invitation was accepted (email 21 December 2012). The inclusion of Guringai Tribal Link resulted in nine RAPs in total registered for the project.

Stage 2 – Presentation of information about the Project

In December 2010, a draft Aboriginal Community Consultation Strategy for the Mandalong Southern Extension Project was developed and distributed to all RAPs for comment. Comments were received from the Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC), Awabakal Traditional Owners Aboriginal Corporation (ATOAC) and the Darkinjung LALC. Following feedback received from the RAPs on the draft Aboriginal Community Consultation Strategy, the Strategy was finalised, incorporating where appropriate any feedback or comments received. The document was distributed to all RAPs (April 2011).

Land pertaining to the TL24 PAA was previously surveyed as part of the archaeological investigation conducted within the Mandalong Southern Extension Project PAA that commenced on 28 February 2011 and continued until 9 May 2011. The Aboriginal groups that participated in the field surveys for the Project included representatives from the West Lakes Aboriginal Community, Bahtabah LALC, Darkinjung LALC, ADTOAC and ATOAC. At the completion of the surveys, a field visit was scheduled (8 November 2011) with all RAPs invited to attend. This field visit provided an opportunity for RAPs who did not participate in the field surveys, or those who were involved in a different survey team, to inspect some of the Aboriginal heritage sites that were identified.

Stage 3 – Gathering of information about cultural significance

Centennial Mandalong conducted a three-day workshop with the RAPs to collectively discuss and rank the cultural significance of Aboriginal sites identified during the field surveys. In addition, regular update meetings were held throughout the Project with the RAPs. Copies of all Project Newsletters have been provided to the RAPs throughout the Project to date with invitations provided to attend information sessions or open days.

Stage 4 – Review of draft Aboriginal Heritage Impact Assessment

The *Mandalong Transmission Line TL24 Relocation Project Aboriginal Heritage Impact Assessment* report that pertains to portions of land within the MLS PAA was supplied to the RAPs for review and comment. The RAPs were provided a 28 day review period as per the ACHCRs. The draft report was sent to the stakeholders listed in **Table 9**. Feedback was requested from the RAPs within the 28 day review period and can be found in **Appendix 10**. Centennial Mandalong provided responses to feedback received from the RAPs regarding their draft report review. Centennial Mandalong's reply letters to the RAPs can be found in **Appendix 10**.

Table 9: Registered Aboriginal Parties Sent Copy of Draft Report (RPS, 2015)

Organisation	Name of Representative	Date Report was Sent
Biraban LALC (formerly represented by Awabakal LALC on behalf of West Lakes Aboriginal Community)	Craig Foreshew	23/09/2015
Awabakal Descendants Traditional Owners Aboriginal Corporation	Peter Leven (formerly Shane Frost)	23/09/2015
Awabakal Traditional Owners Aboriginal Corporation	Kerrie Brauer	23/09/2015
Guringai Tribal Link Aboriginal Corporation	Tracey Howie	23/09/2015
Cacatua Cultural Consultants	Donna and George Samson	23/09/2015
Kauwul / TA. Wonn1	Arthur Fletcher	23/09/2015
Bahtabah LALC	Michael Green	23/09/2015
Darkinjung LALC	Sean Gordon	23/09/2015
Yula-Panaal Education and Healing Aboriginal Corporation	Victor Wright	23/09/2015

9.5.3 Existing Environment

The PAA is considered to include the lands and boundaries of the Awabakal people, the Guringai/Kuringai people and the Darkinjang/Darkinjung peoples. In terms of previous Aboriginal occupation, the area has a good supply of fresh water. This would have resulted in a diversity of flora and fauna that would have provided food resources for local inhabitants. The presence of sandstone outcrops may have also provided rockshelters and suitable surfaces for grinding axes, ochre or seeds. Until recently Aboriginal occupation of the region was viewed in terms of the frequent utilisation of the large saltwater Lake Macquarie and Lake Munmorah to the east and south-east, which provided a number of resources. Further survey work indicates that there is also evidence for frequent Aboriginal occupation of the inland areas west of these lakes (RPS 2015a).

In 2011, LMCC released the *Sustainable Management of Aboriginal Cultural Heritage in the Lake Macquarie Local Government Area* (Umwelt Environmental Consultants 2011). This report addresses each landform type within the LGA and identifies potentially sensitive Aboriginal cultural landscapes within each landform type. The sensitive landscapes of relevance to the Project are Mountain Landscapes, which have important links to ceremonial activities, traditional Awabakal stories and historical events, and Freshwater (Creek Corridor) Landscapes, which are significant as sources of freshwater and in providing important resources (RPS 2015a).

Aboriginal Heritage Information Management System

A search of all the AHIMS sites recorded and registered for the TL24 PAA was undertaken. The search revealed that there are 33 recorded Aboriginal sites within the search parameters (**Figure 15** and **Appendix 10**). Although the AHIMS extensive search results identified 34 sites, AHIMS#45-3-3537 is a duplicate of AHIMS#45-3-3446 which brought the total number of sites within the TL24 PAA to 33.

Description of Existing Sites

Of the 33 Aboriginal sites within the TL24 PAA, the most common were grinding groove sites. Scarred trees and artefact scatters also occurred commonly. Only one stone arrangement site and one rockshelter containing art and PAD had been previously recorded. It is also worth noting that seven rock cavities had been previously recorded within the TL24 PAA.

The underlying geology of the TL24 PAA is sandstone, with many sandstone outcrops identified as features. Habitation structures and shelters of a reasonable size were identified through the search, suggesting suitable sandstone formations for the purpose of human occupation exist in the TL24 PAA. Sandstone platforms in close proximity to water sources deemed suitable for grinding stone tools are also available in the region and are the most common site type within the TL24 PAA.

While there are 33 sites within the PAA, only five are located close to areas of proposed disturbance. The following AHIMS sites were identified within the proposed TL24 easement (**Figure 16**):

- AHIMS# 45-3-3541 (Scarred Tree);
- AHIMS# 45-3-3539 (Grinding Groove);
- AHIMS# 45-3-3534 (Grinding Groove); and
- AHIMS# 45-3-1227 (Grinding Groove).

One stone arrangement site (AHIMS# 45-3-3540) is located in close proximity to the eastern boundary of the proposed TL24 Easement but outside the impact footprint (**Figure 16**). All Aboriginal sites located within and/or in close proximity to the proposed TL24 Easement were located and groundtruthed during the visual inspection, with mitigation measures planned to avoid inadvertent harm during proposed future works.

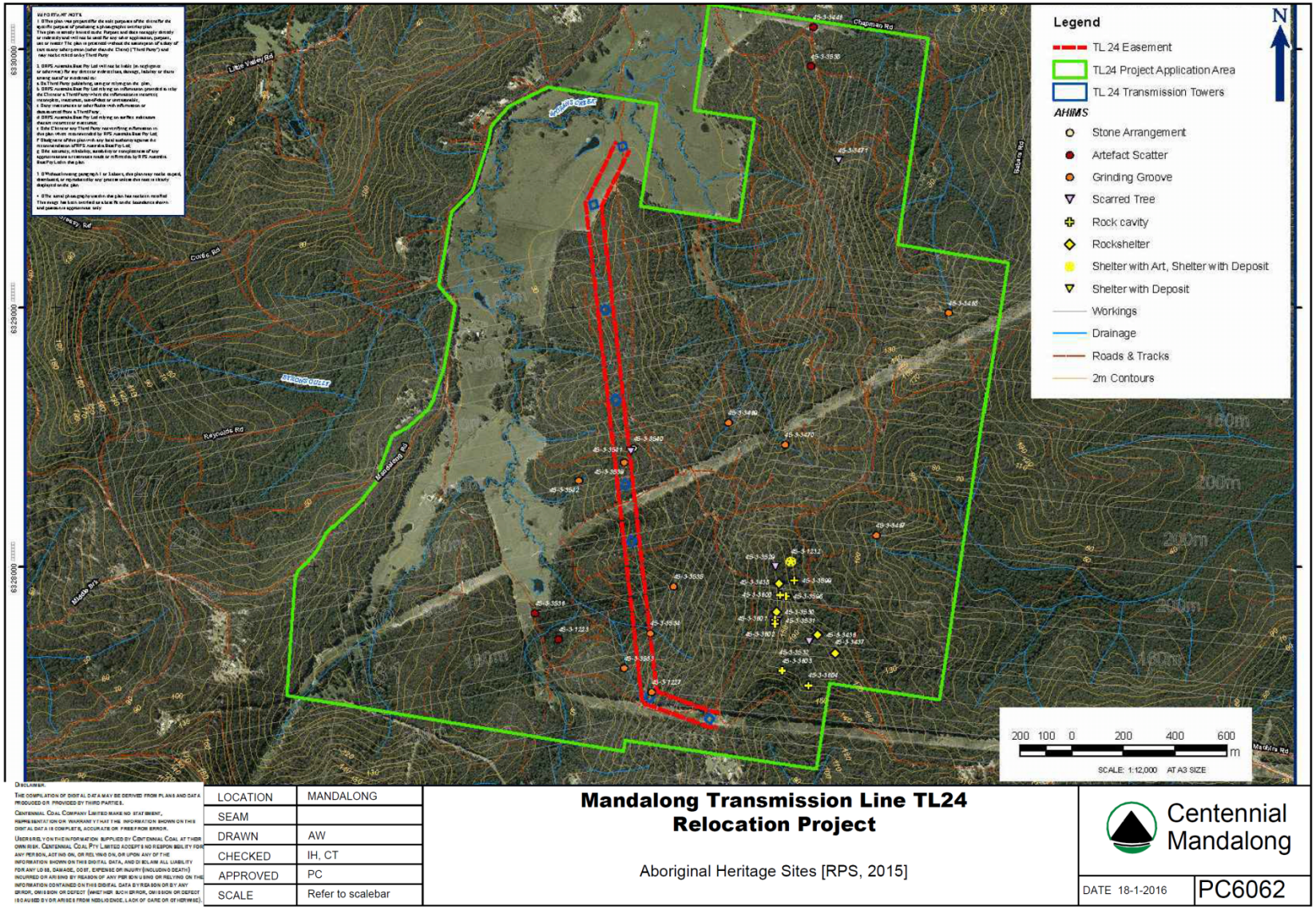

Figure 15: Aboriginal Heritage Sites – Project Application Area

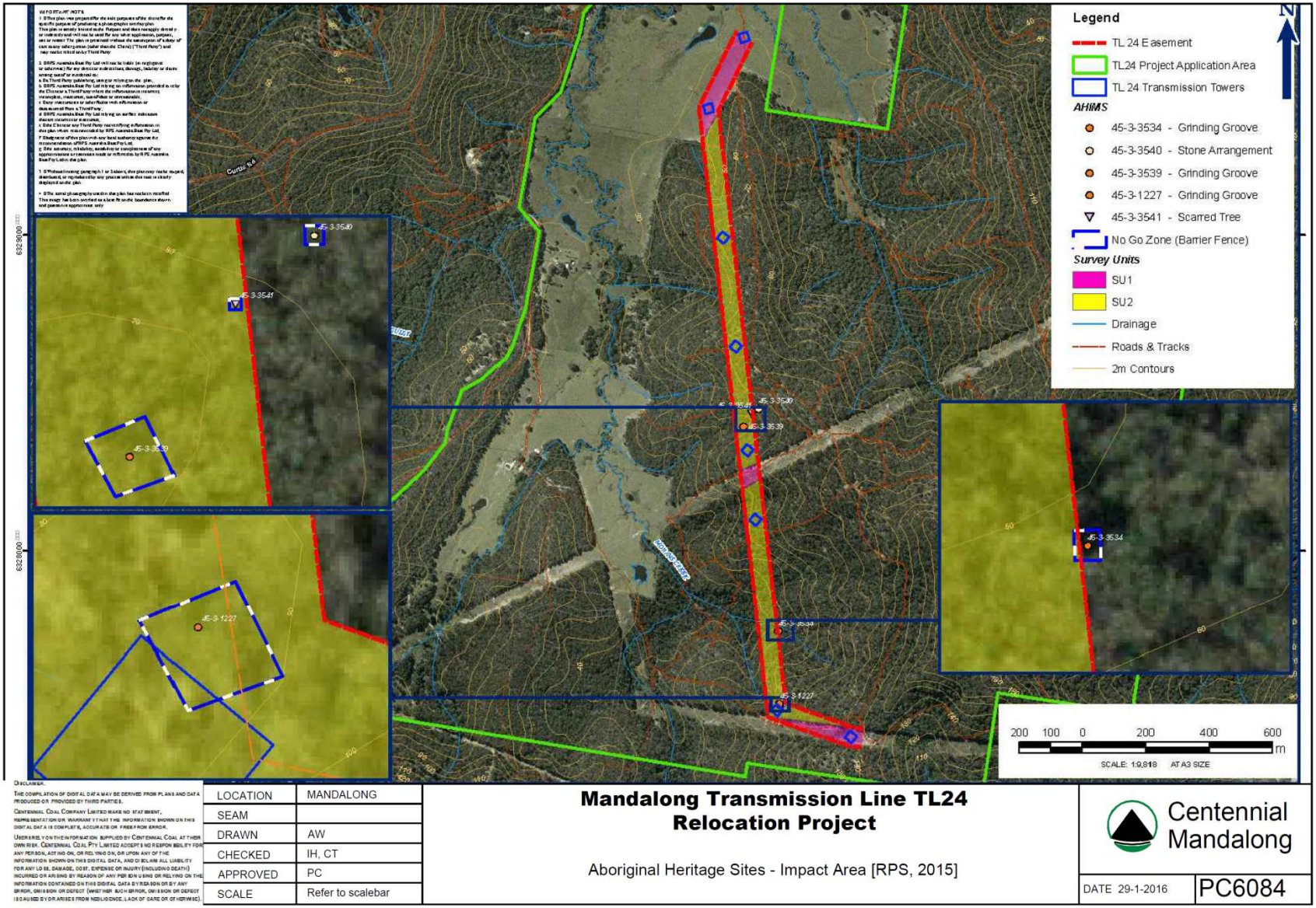

Figure 16: Aboriginal Heritage Sites - Impact Area

Field Survey

The proposed TL 24 Easement was surveyed in accordance with the requirements set out in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and the *Guide for Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011).

RPS (2013) undertook a Cultural Heritage Impact Assessment for the approved Mandalong South Extension Project that covered an area of approximately 45 square kilometres. A five-week field survey commencing in early 2011 was undertaken by a team of archaeologists in partnership with RAPs as identified through the ACHCRs. The survey resulted in 93 new Aboriginal cultural heritage sites being recorded.

On the 4th March 2015, a pedestrian survey within the TL24 Easement was undertaken by RPS and Centennial Mandalong in partnership with representatives from the Bahtabah Local Aboriginal Land Council, Biraban Local Aboriginal Land Council, Awabakal Descendants Traditional Owners Aboriginal Corporation, Awabakal Traditional Owners Aboriginal Corporation, Guringai Tribal Link Aboriginal Corporation, Kauwul TA / Wonn1 and Cacatua Culture Consultants. An additional pedestrian survey was undertaken on Thursday 16 July 2015 by RPS and Centennial Mandalong with representatives from Kauwul TA / Wonn1 and Cacatua Culture Consultants.

Four Aboriginal sites previously recorded within the TL24 Easement were resurveyed. No new Aboriginal objects or places were identified during the 2015 visual inspections, however a member of the Aboriginal community identified a feature on a previously logged tree trunk that was thought to be a possible scarred tree. A description of the four previously recorded sites in addition to the possible scarred tree appears below:

- **AHIMS#45-3-1227** is a grinding groove site initially recorded in 1981 which exists within the TL24 PAA within an existing first order tributary of Morans Creek.

- **AHIMS#45-3-3534** is a grinding groove site initially recorded in 2011 in an upper tributary of Morans Creek. The site is situated on the eastern boundary of the TL24 easement.

- **AHIMS#45-3-3539** is a grinding groove site initially recorded in 2011 and exists within the TL24 easement in an upper tributary of Morans Creek.

- **AHIMS#45-3-3541** is a scarred tree site initially recorded in 2011. The site is situated within the TL24 easement roughly three metres below a break in slope and at 70 metres AHD. The scar face was identified as 1.95 metres in length with possible axe marks on the reverse side.

- **AHIMS#45-3-3540** is a stone arrangement site that was initially recorded in 2011 approximately 80 metres outside the TL24 easement. The site is located approximately 60 metres from the top of a ridge elevation of 80 metres.

- **Possible ST1** is a possible scarred tree site situated on a mid to lower sloped spur in the vicinity of an intermittent drainage line on a gentle sloping low to mid slope. The trunk bears a single scar facing an easterly direction with an approximate length of 0.6 metres and width of 0.23 metres with a thickness of approximately 0.1 metres. The scar extends to the base of the tree and the scarred panel is missing, potentially from rot and age. No visible axe marks were observed around the scarred panel. It was found that ST1 did not satisfy sufficient archaeological criteria to determine it to be an Aboriginal scarred tree for the following reasons:

    - The panel face of the scar has decayed and is subsequently missing from the trunk. The panel face of the scar is important to assess for evidence of axe marks associated with bark removal;

- The visible scar is located very low on the tree trunk. The scarred surface extends from the base of the tree to a height of approximately 0.65 metres. The location of the scar is unconventional given that most cultural scars are located at the average height of an adult human; and

- The tree is situated within an area that has been heavily logged in the past with a number of timber landing skids also recorded in the local area. The area has been heavily disturbed by human land use. This is supported by a number of logged tree stumps in the nearby vicinity and many disused tracks, cleared for logging activities. It is possible that the scar is a result of impact caused by a vehicle and/or felling damage associated with the logging activity.

Although the scar on ST1 is relatively symmetrical, the reasons listed above offer stronger evidence that ST1 does not conform to the criteria of an Aboriginal scarred tree. The tree has suffered impact from logging and it possible that the scarred panel is also a result of logging activity. Following this determination, RPS did not register ST1 with AHIMS. This outcome was communicated to the Registered Aboriginal Parties.

9.5.4 Aboriginal Heritage Impact Assessment

The proposed activity is for the clearing of land to relocate a section of the existing electricity easement to the proposed TL24 easement. The works will require clearing of some vegetation and installation of transmission towers, including the access of machinery and vehicles.

The results of the desktop study identified four Aboriginal sites within the proposed TL24 Easement: AHIMS#45-3-1227, AHIMS#45-3-3539, AHIMS#45-3-3534 and AHIMS#45-3-3541. One stone arrangement site (AHIMS#45-3-3540) was identified in close proximity but 80 metres outside the TL24 Easement. It is understood the proposed works will not directly impact on the registered sites, however protection measures will need to be implemented.

9.5.5 Management and Mitigation Measures

The following recommendations were made by RPS in consultation with the RAPs and will be adopted in the Construction Environmental, Management Plan:

- AHIMS#45-3-1227, AHIMS#45-3-3534, AHIMS#45-3-3539, AHIMS#45-3-3541 and AHIMS#45-3-3540 will need to have a No Go Zone barrier fence erected around the sites for the duration of the proposed works;

- If unrecorded Aboriginal objects are identified in the TL24 Easement during future works, all works in the immediate area must cease and the area should be cordoned off as appropriate with high visibility tape. OEH must be notified via the Enviroline (131 555) so that the site can be adequately assessed and managed;

- If skeletal remains are identified all work must cease in the immediate area to prevent any further harm to the remains. Local NSW Police must be contacted immediately. No action is to be undertaken until police provide written notification. If the remains are identified as Aboriginal, the OEH Enviroline (131 555) must be contacted. No work is to continue until OEH provides written notification about the action plan for the management of the skeletal remains and formulated a management plan if required; and

- If during the course of development works, suspected historic cultural heritage material is uncovered, work should cease in that area immediately. The OEH Enviroline (131 555) should be notified and works only recommence when an approved management strategy has been developed.

9.5.6 Conclusion

The assessment considered the available environmental and archaeological information for the TL24 easement, the condition of the land and the nature of the proposed activity. The field survey conducted over the TL24 easement identified an open forest vegetation landscape with dense pockets of vegetation in the vicinity of drainage lines, with some portions having being cleared as a result of establishing electricity easements.

A number of tributaries of Morans Creek were identified in the TL24 easement draining to the west. None of these drainage lines contained flowing water but grinding groove sites were observed, being AHIMS#45-3-1227, AHIMS#45-3-3534 and AHIMS#45-3-3539. During the visual inspection, the location of AHIMS#45-3-1227 was revisited but the features of the site were not observed due to heavy sedimentation, rocks and vegetation. This site remains valid on the AHIMS database.

No new Aboriginal cultural heritage sites or objects were identified in the TL24 easement.

"No Go Zone" barrier fencing will be established to protect registered Aboriginal sites AHIMS#45-3-1227, AHIMS#45-3-3534, AHIMS#45-3-3539, AHIMS#45-3-3541 and AHIMS#45-3-3540 during construction. This requirement will be implemented through the CEMP.

9.6 European Heritage

9.6.1 Introduction

A desktop European heritage assessment was undertaken in the technical report *Heritage Due Diligence Letter Report for Landing Skids, Mandalong* (RPS 2016b) (**Appendix 11**). Specifically four landing skids that were part of the forestry industry were recorded in 2013 during the Heritage Impact Assessment completed for the Mandalong Southern Extension Project.

9.6.2 Existing Environment

The landing skids are consistent with infrastructure built to support the extraction and transportation of timber; a widespread practice in the Olney State Forest and elsewhere across NSW.

Landings skids or log landings are neither rare, nor in this case, historically significant, with the practice of fashioning them still being practiced in the timber industry today in order to aid the loading of logs onto trucks for transportation elsewhere.

In almost all cases logging skids are roughly fashioned to assist the job at hand. Intended for immediate use there is no intention to construct them in such a way as to ensure their life beyond the immediate need. They generally represent a haphazard utilitarian construction based on surrounding and immediately available material to suit the general topographic conditions encountered. They are, by virtue of being built to assist log loading onto trucks, almost always situated alongside access tracks.

9.6.3 Impact Assessment

The landing skids were assessed in 2012 as part of the works for the Heritage Impact Assessment and were deemed to have low significance at the local level and did not warrant inclusion on the State Heritage Inventory. While they do not rank for inclusion on the State Heritage Inventory, they still reflect past historic use of Olney State Forest. As such it is prudent to ensure they are not harmed and if harm is inevitable processes should be instigated to ensure a record of their presence is retained.

The four landing skids (L1, L2, L3 and L4) were inspected in March 2012 and again in November 2015. The skids, while intact, are in poor condition as a result of a lack of ongoing use and maintenance. As

discussed in the previous section, this type of forestry or logging infrastructure was never intended to be permanent or in continuous use. It was intended to solve an immediate need, the loading of cut logs onto a truck.

The impact on each skid varies with the proposed works as follows:

- **L1** – There is potential for impact during the relocation of the existing electricity transmission line to a new proposed alignment. L1 may be affected as it is adjacent to an existing access track that needs to be widened.

- **L2** – The proposed activity to impact on L2 is construction work associated with the MSSS. As these works were approved as part of the Mandalong Southern Extension Project it is not relevant to this project.

- **L3** – The landing skid is close to a work site but will not need to be dismantled or damaged.

- **L4** – No impact is anticipated.

9.6.4 Management and Mitigation

The following mitigation measures are recommended to ensure minimal impact on historic items:

- **L1**: In accordance with the historic heritage mitigation measures detailed in the Mandalong Southern Extension Project EIS, if it is not possible to avoid harming the skid, it should be archivally recorded by a qualified historical archaeologist prior to dismantling. The archival recording should be in accordance with *How to Prepare Archival Records of Heritage Items* (NSW Heritage Office) and *Photographic Recording of Heritage Items using Digital Film or Capture* (NSW Heritage Office 2006). Consideration could be given to the use of 3D scanning as a faster and more accurate record of capturing data.

- **L3**: The area of the skid should be cordoned off to ensure no inadvertent physical impact. As part of the induction for works in the area of towers 33 and 33X all employees and contractors should be informed of the heritage value of the skid and directed to avoid the cordoned area.

- **L4**: No mitigation measures required.

9.6.5 Conclusion

As physical remnants of the forestry history of the Olney State Forest, all items are considered to be of low local significance. Whilst forestry practices are of high local interest in the Olney State Forest, and an integral part of the area's European industrial and social heritage, the physical remains are fragmentary and in the absence of further evidence, of limited scientific value. Whilst there is potential for impact on skids L1 and L3 during the construction works, management measures will be implemented to mitigate these potential impacts.

9.7 Soil and Land Resources

9.7.1 Introduction

Soil and land resources were assessed in the technical report *Soil and Land Resource Assessment Mandalong Transmission Line TL24 Relocation Project* (SLR 2015b) (**Appendix 12**). A field survey and desktop study were undertaken to assess the distribution of soil resources within the PAA.

The key objectives of the Soil and Land Resource Assessment undertaken by SLR were:

- **Objective 1:** Classify and determine the soil profile types within the PAA using the *Australian Soil Classification* (ASC) system (Isbell, 1996), including a description and figure showing the distribution of each soil type.

- **Objective 2**: Provide a description of, and figures showing, the land capability within the PAA using *The Land and Soil Capability Assessment Scheme: Second Approximation* (OEH, 2013).

- **Objective 3**: Provide selective topsoil and subsoil management recommendations using the *Guide for Selection of Topdressing Material for Rehabilitation of Disturbed Areas* (Elliot and Reynolds, 2007).

- **Objective 4:** Provide recommendations to mitigate soil erosion and sedimentation associated with the works and soil stockpiles using *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Volume 2E Mines and Quarries* (DECC, 2008).

9.7.2 Land and Soil Capability Assessment

The land and soil capability (LSC) classification system adopted by SLR (2015b) is in accordance with *The Land and Soil Capability Assessment Scheme: Second Approximation* (OEH, 2012). The scheme uses the biophysical features of the land and soil to derive detailed agricultural suitability rating tables for a range of land and soil hazards. SLR (2015b) advises that the scheme consists of eight classes, which classify the land based on the severity of long-term limitations in consideration of:

- The biophysical features of the land to derive the LSC classes associated with various hazards; and

- The management of the hazards, including the level of inputs, expertise and investment required to mange the land sustainably.

The LSC classes are described by SLR (2015b) as listed in **Table 10**.

Table 10: Land and Soil Class Description (SLR, 2015)

Class	Land and Soil Capability
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	**Extremely high capability land**: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
2	**Very high capability land**: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	**High capability land**: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	

Class	Land and Soil Capability
4	**Moderate capability land**: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5	**Moderate–low capability land**: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
6	**Low capability land**: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	**Very low capability land**: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8	**Extremely low capability land**: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

The Land and Soil Classes (LSC) within the PAA as determined by SLR (2015b) are illustrated on **Figure 17**. As evident, the pre-disturbance classes range from class 5 (moderate-low capability land) to class 7 (very low capability land). Approximately 72 percent of the PAA is classed as low to very low capability land. Specifically within the PAA, 152 hectares is classified as LSC Class 5, 94 hectares is classified as LSC Class 6 and 294 hectares is classified as LSC Class 7.

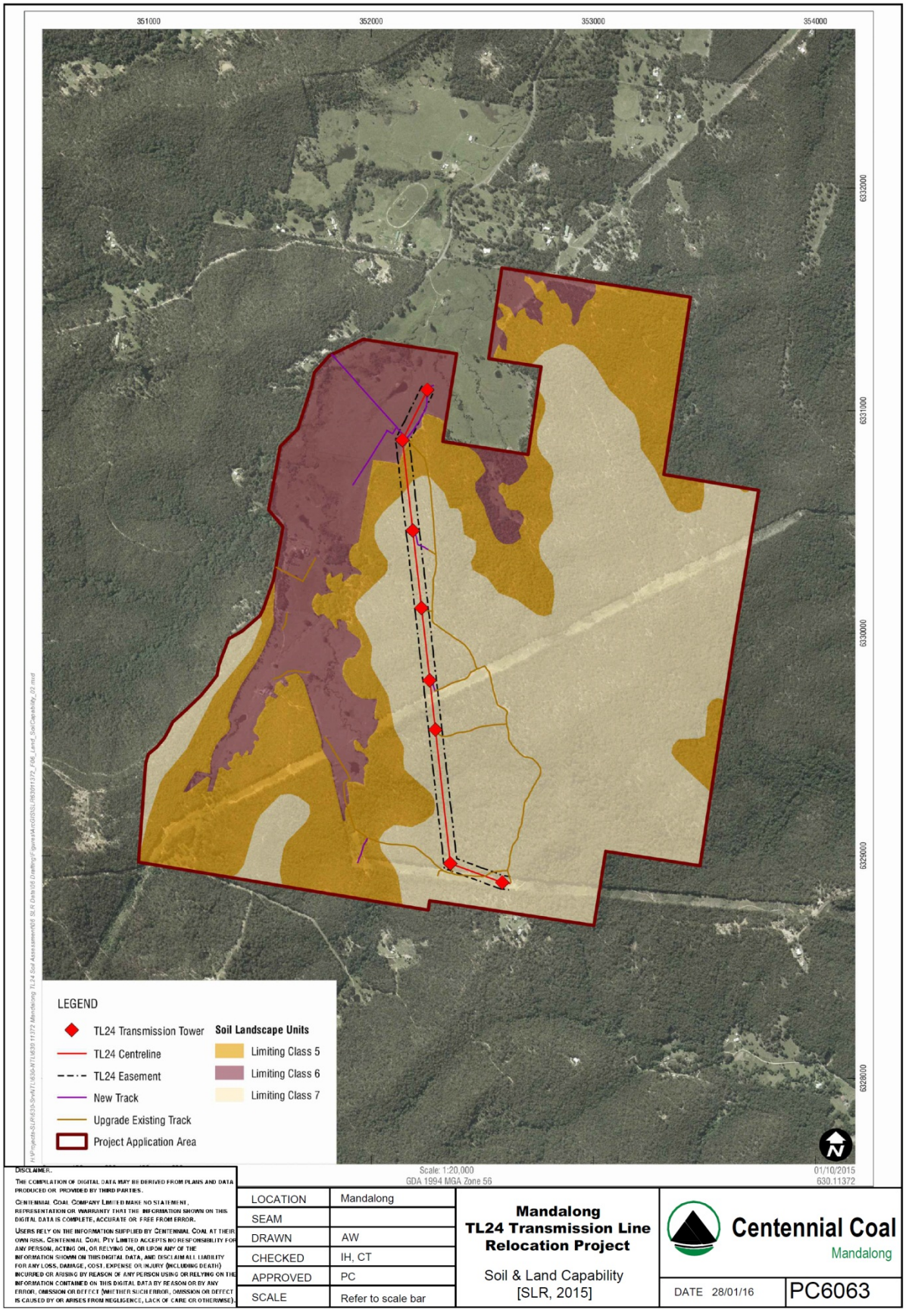

Figure 17: Soil and Land Capability

The LSC classes impacted by surface disturbance resulting from the Project are approximately 0.5 hectares of LSC Class 5, 1.5 hectares of LSC Class 6 and 6.5 hectares of LSC Class 7. Based on the minor and temporary impacts to the areas of the PAA defined as LSC classes 5 (moderate-low capability land) to 7 (very low capability land), SLR (2015b) determine the impacts of the Project on land and soil resources to be negligible. Soils that are subject to surface disturbance from the proposed development can be managed in order to minimise impacts and ensure appropriate rehabilitation of the disturbed areas can be undertaken.

9.7.3 Biophysical Strategic Agricultural Land

In April 2013, the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (Interim Protocol) was released by the NSW Government. The Interim Protocol outlines the process for seeking verification of whether or not land mapped as Biophysical Strategic Agricultural Land (BSAL) meets the Interim Protocol's BSAL criteria. The *State Environment Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2013* (the 2013 Mining SEPP amendment) requires State Significant Developments to verify whether the proposed site is on BSAL.

The purpose of the Interim Protocol is to assist proponents and landholders to understand what is required to identify the existence of BSAL and outlines the technical requirements for the on-site identification and mapping of BSAL. SLR Consulting completed the BSAL assessment in accordance with the Interim Protocol which appears as **Appendix 13**. An Agricultural Impact Statement was also prepared by SLR Consulting and appears as **Appendix 14**.

As required by the Interim Protocol, the study area for the Project consisted of the PAA plus a 100 metre buffer totalling 658.7 hectares. The BSAL status was determined on the dominant soil type within each Soil Unit. Only one Soil Unit was identified and mapped with the study area, and was verified as non-BSAL due its failure of Criteria 9 (poor soil drainage). There are 108.0 ha of land verified as non-BSAL within the Study Area based on the soil survey results. Additionally 550.7 hectares was excluded as BSAL due to being greater than 10 percent slope or being of an area less than 20 hectares. SLR (2015c) and (2015d) conclude that there is no qualifying BSAL within the study area.

9.7.4 Mitigation and Management

The PAA contains no areas of potential BSAL and the Project will not result in any changes to the land and soil capability classes. Whilst there is the potential for sediment and erosion impacts to occur during the construction phase, mitigation and management measures will be implemented as required in accordance with *Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004)* also known as *The Blue Book.*

9.7.5 Conclusion

The PAA contains no areas of potential BSAL and the Project will not result in any changes to the land and soil capability classes. The Project will have a negligible impact on surface water and groundwater resources relied on by agriculture. Measures will be detailed in the CEMP to avoid the introduction of weeds at construction and demolition sites. Top soil management will be included in the Construction Environmental Management Plan.

9.8 Air Quality

9.8.1 Introduction

An air quality impact assessment has been undertaken by SLR for the Project to:

- Assess the potential air quality impacts on surrounding sensitive receptors (**Figure 5**) associated with construction and demolition of the Project; and

- Identify appropriate mitigation measures to minimise air emissions, along with appropriate monitoring and management strategies.

The air quality impact assessment (AQIA) referred to information derived and provided as part of the Mandalong Southern Extension Project AQIA (SLR 2013). To assess the background air quality of the region a number of industrial facilities with the potential to have a cumulative impact on the local airshed were identified. This also included the impacts of the proposed Mandalong Southern Extension Project. A dispersion modelling exercise was performed to determine suitable background concentrations of pollutants in order to appropriately assess the cumulative impacts.

Following initial modelling to determine the worst case scenarios, dispersion modelling was conducted for the identified emission sources for two scenarios representing the 'Foundation' and 'Demolition' phases of the construction works related to the Project. It was concluded from the dispersion modelling exercise that the maximum 24-hour concentrations of PM_{10} and $PM_{2.5}$, along with annual average levels of dust and TSP, PM_{10} and $PM_{2.5}$ concentrations are unlikely to exceed the relevant air quality criterion at any of the identified sensitive receptors.

SLR's assessment was completed in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC, 2005) (the Approved Methods). A copy of the AQIA (SLR, 2015a) is contained within **Appendix 15** with significant findings and recommendations summarised below.

9.8.2 Sensitive Receptors

As is apparent from **Figure 5**, there are a number of privately owned residences in the area surrounding the PAA. The residences are generally situated along Mandalong Road and Chapman Road and are consistent with those applicable to the MSSS assessed as part of the Mandalong South Extension Project. It is noted that receptors R16 and R20 are within 200 metres of the proposed construction activities.

9.8.3 Existing Environment

A range of monitored data sources were analysed to form a regional background dataset. The monitoring data for particulates were analysed from the Wallsend monitoring station. The dust data was analysed from the dust gauges located around the Mandalong Mine Access Site.

The air quality in the region surrounding the PAA is influenced by emissions generated by a range of sources, originating from both within and outside of the local area. Specifically for the area surrounding the PAA, air quality will be influenced by pollution transported into the area from more distant sources, emissions from power stations in the area, traffic-generated pollution, pollution from the Mandalong Mine (including the Mandalong Southern Extension Project) in addition to air pollution generated by the Project itself.

The close proximity of these air pollution sources may have implications in terms of elevated background concentrations of combustion-related pollutants, including PM_{10} (particulate matter with an aerodynamic diameter of 10 microns (µm) or less), $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 microns (µm) or less), sulphur dioxide, oxides of nitrogen, carbon monoxide and volatile organic compounds.

A dispersion modelling exercise was performed using publicly available information to determine the contribution from power station emissions to particulate concentrations within the modelling domain. A full assessment methodology can be found in the AQIA for the Mandalong Southern Extension Project (SLR

2013). A summary of the results is shown in **Table 11.** It is noted that the power stations are located to the east of the PAA. The maximum increment from the power stations was predicted at receptor R22, which is closest to the power stations.

Table 11: Ambient Air Quality Environment (SLR, 2015)

Pollutant	Averaging Period	Summary
PM_{10}	24-hour	Maximum predicted increment 2.1 µg/m^3 at Receptor R22
	Annual	Maximum predicted increment 0.2 µg/m^3 at Receptor R22
$PM_{2.5}$	24-hour	Maximum predicted increment 0.5 µg/m^3 at Receptor R22
	Annual	Maximum predicted increment 0.04 µg/m^3 at Receptor R22
TSP	Annual	Maximum predicted increment 0.4 µg/m^3 at Receptor R22

9.8.4 Assessment Criteria

Air quality impact assessment criteria adopted by the EPA are contained in the Approved Methods (DEC, 2005). The criteria listed in the Approved Methods are derived from a range of sources and are the defining ambient air quality criteria for NSW and have been developed in consultation with a number of organisations.

The air quality goals adopted for this assessment, which conform to current EPA and Federal air quality criteria are summarised in **Table 12** below.

Table 12: Project Air Quality Goals (SLR, 2015)

Pollutant	Averaging Time	Goal
TSP	Annual	90 µg/m^3
PM_{10}	Maximum 24 Hours	50 µg/m^3
	Annual	30 µg/m^3
$PM_{2.5}$	Maximum 24 Hours	25 µg/m^3 (interim advisory reporting standard at the present time)
	Annual	8 µg/m^3 (interim advisory reporting standard at the present time)
Dust Deposition	Annual	Maximum Incremental increase of 2g/m^2/month Maximum Cumulative of 4g/m^2/month (Project and other sources)

Source: Approved Methods, DEC 2005

Emissions Estimation

One scenario was quantified to assess the pollutant emissions due to the construction activities of the Project being material handling, wheel generated dust and wind erosion. This scenario considers the emissions attributable to Project related construction activities. The construction activities for the proposed Project will be conducted in the following phases:

- Clearing and site establishment;
- Foundations;
- Tower erection/assembly;

- Stringing; and
- Demolition.

The longest running construction phase with dust generating activities will be 'tower erection/assembly' (approximately 18 weeks).

Particulate emissions for the construction activities have been calculated by SLR (2015a) using default or calculated emission factors for the relevant emission sources. Emission factors for PM_{10} and TSP were obtained from the National Pollutant Inventory EETM for Mining version 3.1 estimation values with $PM_{2.5}$ emission factors sourced from the US EPA AP-42 Emission Factor Handbook. The emission factors used for the estimation of TSP, PM_{10} and $PM_{2.5}$ emissions from the Project's construction activities are presented in **Table 13.**

Table 13: Emission Factors Used for Assessment (SLR, 2015)

Activity	Emission Factor Equation	Units	Source of Emission Factor	Controls Applied
Excavator/FEL on overburden	EF_{TSP} = 0.025 EF_{PM10} = 0.012 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/t	DSEWPC 2012 MRI 2006	 50% control at sources Within 200m of receptors
Trucks dumping	EF_{TSP} = 0.012 EF_{PM10} = 0.0043 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/t	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Compactor (Emission factor for Bulldozer has been adopted, as recommended by USEPA)	EF_{TSP} = 17 EF_{PM10} = 4.1 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/h/vehicle	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Bobcat & Backhoe (In the absence of specific emission factors for 'Bobcat & Backhoe' emission factors for 'Excavator/FEL on overburden' have been adopted)	EF_{TSP} = 0.025 EF_{PM10} = 0.012 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/t	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Scraper (removing topsoil)	EF_{TSP} = 0.029 EF_{PM10} = 0.0073 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/t	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Bulldozer	EF_{TSP} = 17 EF_{PM10} = 4.1 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/h/vehicle	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Wind erosion	EF_{TSP} = 0.4 EF_{PM10} = 0.2 $EF_{PM2.5}$ = 0.15 x EF_{PM10}	kg/ha/h	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Wheel generated dust from unpaved roads	EF_{TSP} = 4.23 EF_{PM10} = 1.25 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/t	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors
Wheel generated dust from unpaved roads (used by light duty vehicles)	EF_{TSP} = 0.94 EF_{PM10} = 0.33 $EF_{PM2.5}$ = 0.1 x EF_{PM10}	kg/t	DSEWPC 2012 MRI 2006	50% control at sources Within 200m of receptors

Emissions Inventory

Using site specific data and the emissions factors discussed above, SLR (2015a) calculated the emissions for the various construction phases. The emissions are outlined in **Table 14** below. It is noted that the highest emissions are estimated during the 'Tower Erection/Assembly' phase. This is largely attributed to the highest number of days in this phase and the wheel generated emissions occurring due to the transport of material. To estimate emissions to air during each phase SLR consider it appropriate to estimate the total emissions on a per day basis. On a per day basis, the particulate emissions are likely to be highest during the 'Foundations' construction phase followed by 'Demolition' and 'Tower Erection/Assembly' phase.

Table 14: Project Emissions Inventory

Phase	TSP (kg/phase)	PM_{10} (kg/phase)	$PM_{2.5}$ (kg/phase)
Clearing and Site Establishment (4 weeks)	4,784	1,476	148
Foundations (13 weeks)	25,243	7,834	783
Tower Erection / Assembly (18 weeks)	29,481	9,121	912
Stringing (2 weeks)	819	287	29
Demolition (4 weeks)	6,557	2,030	203
Wind Erosion (41 weeks)	6,205	3,102	465
TOTAL	**73,090**	**23,851**	**2,540**

Based on the estimated emissions and the schedule of phases during the construction of the Project, and taking into account the likely proximity of these works to the receptor locations, it was considered appropriate by SLR to assess the potential air quality impacts of the two highest contributing construction phases being 'Foundations' and 'Demolition'.

To assess the potential impact of worst case construction emissions due to the Project, two separate scenarios were assessed:

- Foundations phase – which represents a scenario where the 'foundations' phase is running for a full year; and
- Demolition phase – being a scenario where the 'demolition' phase is running for a full year.

The impacts from these two phases were listed for the identified sensitive receptors with the highest impact from the two phases taken forward for comparison against the relevant criteria.

9.8.5 Impact Assessment

Emissions associated with the two construction scenarios for the Project were modelled by SLR (2015a) using the US EPA's CALPUFF (version 6.267) modelling system. CALPFF is a multi-layer, multi-species, non-steady state puff dispersion modelling system that can simulate the effects of time and space as well as varying meteorological conditions on pollutant transport, transformation and removal. The advantages of using CALPUFF (rather than using a steady state Gaussian dispersion model such as AUSPLUME) is its ability to handle calm wind speeds (<0.5 m/s) and the effects of complicated terrain on plume dispersion. Steady state models assume that meteorology is unchanged by topography over the modelling domain and may result in significant over or under estimation of air quality impacts.

Dispersion predictions of dust deposition rates and TSP, PM_{10} and $PM_{2.5}$ concentrations attributable to the Project at the sensitive receptors have been modeled and a detailed assessment of the background concentrations in the area surrounding the PAA performed. A regional background concentration has

been determined, to which a contribution from local power stations has been added. A contribution from Project activities has been added to the background dataset in order to provide information on the cumulative impact of the Project and other activities on the air quality within the local area.

Dust Deposition

The results indicate that incremental and cumulative annual average dust deposition rates at all sensitive receptors surrounding the Project are predicted to be well below the criterion of 2 g/m^2/month (incremental increase in dust deposition) and below 4 g/m^2/month (cumulative dust deposition) during all scenarios (**Table 15**). As the sensitive receptors were chosen as being closest to surrounding residences/properties, it can be concluded that cumulative dust deposition levels at residences/properties surrounding those modelled would also be below the relevant criterion of 4 g/m^2/month during these scenarios.

Table 15: Predicted Incremental Annual Average Dust Deposition Rates (SLR, 2015)

Receptor ID	Annual Average Dust Deposition Rate (g/m^2/month)						
	Regional Background	Power Station	Extension Project	TL24 Foundation	TL24 Demolition	Total Background	Total Background + Project
R11	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3
R12	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3
R13	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3
R14	2.0	<0.1	0.1	0.1	<0.1	<2.2	<2.4
R15	2.0	<0.1	0.1	0.1	0.1	<2.2	<2.4
R16	2.0	<0.1	0.2	0.1	0.6	<2.3	<3.0
R17	2.0	<0.1	0.2	0.1	0.3	<2.3	<2.7
R18	2.0	<0.1	0.2	0.1	0.3	<2.3	<2.7
R19	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3
R20	2.0	<0.1	0.1	<0.1	0.1	<2.2	<2.4
R21	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3
R22	2.0	<0.1	<0.1	0.1	<0.1	<2.3	<2.4
R23	2.0	<0.1	<0.1	0.1	<0.1	<2.3	<2.4
R24	2.0	<0.1	0.2	0.1	0.1	<2.3	<2.5
R25	2.0	<0.1	0.2	0.1	0.1	<2.3	<2.5
R26	2.0	<0.1	0.2	0.1	0.1	<2.3	<2.5
R27	2.0	<0.1	0.2	0.1	0.1	<2.3	<2.5
R28	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3
R29	2.0	<0.1	0.1	<0.1	<0.1	<2.2	<2.3

Note: Criteria 2g/m^2/month (incremental), 4g/m^2/month (cumulative)

Total Suspended Particulates – Annual Average

During construction of the Project, annual average TSP concentrations are predicted to be well below the criterion of 90 $\mu g/m^3$ at all identified sensitive receptor locations (**Table 16**). As the nominated residences/properties were chosen as being indicative sensitive locations typifying the local surrounding communities, it is unlikely that annual average TSP concentrations at other residences and properties surrounding these modelled residences are currently in exceedances of the EPA criterion of 90 $\mu g/m^3$.

Table 16: Predicted Annual Average TSP Concentrations (SLR, 2015)

Receptor ID	Annual Average TSP Concentrations (µg/m^3)						
	Regional Background	Power Station	Extension Project	TL24 Foundation	TL24 Demolition	Total Background	Total Background + Project
R11	29.4	0.3	3.0	<0.1	<0.1	<2.2	<2.3
R12	29.4	0.3	1.7	<0.1	<0.1	<2.2	<2.3
R13	29.4	0.3	1.7	<0.1	<0.1	<2.2	<2.3
R14	29.4	0.3	1.9	0.1	<0.1	<2.2	<2.4
R15	29.4	0.3	2.3	0.1	0.1	<2.2	<2.4
R16	29.4	0.2	5.4	0.1	0.6	<2.3	<3.0
R17	29.4	0.2	4.2	0.1	0.3	<2.3	<2.7
R18	29.4	0.2	5.0	0.1	0.3	<2.3	<2.7
R19	29.4	0.2	1.4	<0.1	<0.1	<2.2	<2.3
R20	29.4	0.3	2.3	<0.1	0.1	<2.2	<2.4
R21	29.4	0.3	2.3	<0.1	<0.1	<2.2	<2.3
R22	29.4	0.3	0.7	0.1	<0.1	<2.3	<2.4
R23	29.4	0.3	1.1	0.1	<0.1	<2.3	<2.4
R24	29.4	0.2	3.4	0.1	0.1	<2.3	<2.5
R25	29.4	0.2	4.1	0.1	0.1	<2.3	<2.5
R26	29.4	0.2	4.1	0.1	0.1	<2.3	<2.5
R27	29.4	0.2	4.6	0.1	0.1	<2.3	<2.5
R28	29.4	0.2	3.2	<0.1	<0.1	<2.2	<2.3
R29	29.4	0.2	2.5	<0.1	<0.1	<2.2	<2.3

Note: Project criterion - 90 µg/m^3

Particulates as PM_{10} – Maximum 24 Hour Average

The maximum increment from the Project (24.3 µg/m^3) is predicted to occur at receptor 'R20'. The cumulative total background represents the maximum of the sum of contemporaneous increments of regional background, power station operations and construction of the Mandalong Southern Extension Project.

The maximum 24-hour average PM_{10} concentrations are predicted to be below the criterion of 50 µg/m^3 at all identified sensitive receptor locations (**Table 17**).

The assessment has considered the maximum daily emissions to be experienced on every day of the year. In reality, the construction of the Project would take only approximately 12 months. No additional air quality mitigation measures other than those to be implemented at sources within 200 m of receptors ('R16' and 'R20') have been included within the dispersion modelling exercise. Furthermore, it has been assumed that construction of both the Mandalong Southern Extension Project and the TL24 Project will occur concurrently.

Table 17: Predicted 24-Hour Maximum PM_{10} Concentrations (SLR, 2015)

Receptor ID	Increment	Increment	Increment	Increment	Increment	Cumulative	Cumulative	Cumulative	Cumulative
	Regional Background *Maximum predicted incremental result from background only*	**Power Stations** *Maximum predicted incremental result from power station sonly*	**Mandalong Southern Extension Project** *Maximum predicted incremental result from construction of Extension Project only*	**TL24 Foundation** *Maximum predicted incremental result from current project only*	**TL24 Demolition** *Maximum predicted incremental result from current project only*	**Total Background** *Maximum predicted concurrent and cumulative result from background and power stations*	**Total Background + Project** *Maximum predicted concurrent and cumulative result from background, power stations and project*	**Total Background on day of Maximum Increment from Project** *Maximum predicted concurrent and cumulative result from background and power stations on the day of the maximum predicted incremental result from the project*	**Maximum Cumulative Concentration on day of Maximum Increment from Project** *Maximum predicted concurrent and cumulative result from background and power stations on the day of the maximum predicted incremental result from the project*
	(µg/m^3)	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**	**(µg/m^3)**
R11	32.8	1.2	9.8	3.3	2.9	33.0	33.4	13.8	17.1
R12	32.8	1.0	6.2	6.9	6.4	33.8	33.9	14.1	20.9
R13	32.8	1.0	6.0	6.3	6.4	33.7	34.0	15.9	22.3
R14	32.8	1.0	7.2	6.0	6.3	33.6	34.1	15.9	22.2
R15	32.8	1.1	8.8	11.0	8.7	33.4	34.9	17.4	28.5
R16	32.8	1.0	15.5	4.1	21.1	32.9	46.8	16.8	37.9
R17	32.8	0.9	20.7	3.9	13.9	37.3	43.4	16.0	29.9
R18	32.8	0.8	27.4	3.0	15.6	42.0	44.4	15.8	31.4
R19	32.8	1.3	8.5	3.7	8.2	32.8	32.8	11.5	19.7
R20	32.8	1.2	18.1	24.3	12.5	32.8	48.5	24.3	48.5
R21	32.8	1.4	17.7	3.5	3.0	34.9	36.5	23.1	26.7
R22	32.8	2.1	4.0	1.1	1.4	32.8	32.8	12.3	13.7
R23	32.8	1.3	6.6	2.8	4.0	32.8	32.8	14.1	18.1
R24	32.8	1.1	14.2	10.4	6.9	39.0	41.3	18.4	28.8
R25	32.8	1.0	18.0	9.0	7.0	41.6	43.4	20.1	29.2
R26	32.8	1.0	16.5	6.7	7.2	39.0	40.5	21.8	28.9
R27	32.8	1.0	18.3	4.6	10.4	36.2	37.9	12.6	23.0
R28	32.8	1.0	12.8	2.4	4.7	35.6	37.1	14.1	18.9
R29	32.8	0.9	10.5	2.9	3.4	35.0	36.0	13.3	16.6

Project criterion – 50 µg/m^3
For further information refer to Air Quality Impact Assessment

Particulates as PM_{10} – Annual Average

During the construction and demolition associated with the Project, annual average $PM_{2.5}$ concentrations are predicted to be below the criterion of 30 µg/m^3 at all identified sensitive receptor locations (**Table 18**). As the nominated residences/properties were chosen as being sensitive locations typifying the local surrounding communities, it is unlikely that annual average $PM_{2.5}$ concentrations at other residences and properties surrounding these modelled residences are currently in exceedance of the EPA criterion of 8 µg/m^3.

Table 18: Predicted Annual Average PM_{10} Concentrations (SLR, 2015)

Receptor ID	Annual Average TSP Concentrations (µg/m^3)						
	Regional Background	Power Station	Extension Project	TL24 Foundation	TL24 Demolition	Total Background	Total Background + Project
R11	14.7	0.1	0.8	0.4	0.3	15.7	16.1
R12	14.7	0.1	0.5	0.5	0.	15.3	15.8
R13	14.7	0.1	0.5	0.5	0.5	15.3	15.8
R14	14.7	0.1	0.5	0.6	0.5	15.4	16.0
R15	14.7	0.1	0.7	1.2	1.0	15.5	16.7
R16	14.7	0.1	1.5	0.9	5.3	16.3	21.6
R17	14.7	0.1	1.2	0.7	3.1	16.0	19.1
R18	14.7	0.1	1.4	0.6	2.7	16.2	18.9
R19	14.7	0.1	0.4	0.3	0.5	15.2	15.7
R20	14.7	0.1	0.6	1.7	1.3	15.5	17.2
R21	14.7	0.1	0.6	0.3	0.2	15.5	15.8
R22	14.7	0.1	0.2	0.1	0.1	15.1	15.1
R23	14.7	0.1	0.3	0.2	0.2	15.1	15.4
R24	14.7	0.1	1.0	1.1	1.0	15.8	16.9
R25	14.7	0.1	1.2	11	1.0	16.0	17.1
R26	14.7	0.1	1.2	0.9	1.0	16.0	17.0
R27	14.7	0.1	1.3	0.8	1.1	16.1	17.2
R28	14.7	0.1	0.9	0.4	0.6	15.7	16.3
R29	14.7	0.1	0.7	0.3	0.4	15.5	15.9

Project criterion - 30 µg/m^3

9.8.6 Mitigation and Management

Air quality mitigation and management strategies will be implemented through the CEMP. This will include standard work procedures to minimise emissions of particulate matter for example maintaining plant and equipment to ensure optimal operating conditions and utilising water sprays/carts to dampen exposed surfaces and trafficable areas to minimise windblown and traffic generated dust emissions. It was identified that dust suppression would be required when work is occurring near R16 and R20 due to the close proximity of the tower to the residence.

9.8.7 Conclusion

In order to assess the background air quality of the region a number of industrial facilities with the potential to have a cumulative impact on the local airshed were identified. This also included the impacts of the proposed Mandalong Southern Extension Project. A dispersion modelling exercise was performed to determine suitable background concentrations of pollutants in order to appropriately assess the cumulative impacts.

Dispersion modelling was conducted for the identified emission sources for two worst case scenarios representing the 'Foundation' and 'Demolition' phases of the construction works related to the Project. SLR (2015a) conclude that the maximum 24-hour concentrations of PM_{10} and $PM_{2.5}$, along with annual average levels of dust and TSP, PM_{10} and $PM_{2.5}$ concentrations are unlikely to exceed the relevant air quality criterion at any of the identified sensitive receptors.

Overall, it is concluded that in regards to the air quality impacts, there are no limiting factors attributable to the Project.

9.9 Noise

9.9.1 Introduction

A Noise Impact Assessment (NIA) has been untaken by Global Acoustics for the Project. The NIA investigated potential noise impacts to sensitive receptors and considered mitigation measures regarding the following construction activities:

- Vegetation clearing;
- Foundation construction;
- Tower erection and assembly; and
- Demolition of redundant towers.

These construction scenarios were considered to assess worst case construction impacts. Predicted construction noise levels were also combined with predicted levels regarding the MSSS construction activities to assess potential cumulative impacts.

Stringing activities, involving the possible use of a helicopter, are of particularly short duration and were not modelled in the NIA.

The NIA was completed in accordance with the *NSW Industrial Noise Policy* (INP) (EPA, 2000) and the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009).

A copy of Global Acoustics NIA is contained within **Appendix 16** with significant findings and recommendations summarised in the subsequent sections.

9.9.2 Sensitive Receptors

As illustrated on **Figure 5** there are a number of privately owned residences in the area surrounding the PAA. The residences are generally situated along Mandalong Road and Chapman Road and are consistent with those applicable to the MSSS assessed as part of the Mandalong South Extension Project.

9.9.3 Existing Environment

Background noise data was presented as part of the Mandalong South Extension Project and is reproduced below in **Table 19**. Data was obtained from short-term operator attended and long-term unattended noise monitoring surveys at three locations representative of the nearest potentially affected receptors. The objective of the background noise survey was to measure the background and average noise levels at the nearest potentially affected residential locations during the day, evening and night-time periods.

The results of the operator-attended surveys indicate that the existing noise levels in the vicinity of the PAA include traffic along Mandalong Road, breeze in trees, bird song/calls and frogs. There was no existing industrial noise discernible at the noise monitoring locations.

Table 19: Existing Ambient Noise Levels (SLR, 2013)

Location	Period [1]	Rating Background Level [2] (dBA)	Measured $L_{Aeq\ (Period)}$ [3] (dBA)	Estimated Existing Industrial Noise, L_{Aeq} [3] (dBA)
NM1 24 Gimberts Rd (MMAS)	Day	52	61	<54
	Evening	54	61	<44
	Night	46	61	<39
NM2 238 Mandalong Rd (MMAS)	Day	40	55	<44
	Evening	41	52	<39
	Night	37	50	<34
NM3 22 Chapman Rd (MSSS)	Day	31	42	<44
	Evening	34	39	<39
	Night	32	37	<34
NM4 927 Mandalong Rd (MSSS)	Day	34	46	<44
	Evening	41	50	<39
	Night	33	48	<34
NM5 Rainbows Reach Retreat Toepfers Rd (MSSS)	Day	<30	45	<44
	Evening	<30	38	<39
	Night	<30	39	<34

Notes: All noise levels reported here are free-field measurements, meaning that no noise reflections occurred from building facades at the noise monitoring location.

1. Daytime 7am to 6pm; Evening 6pm to 10pm; Night 10pm to 7am. On Sundays and Public Holidays – Daytime 8am to 6pm; Evening 6pm – 10pm; Night 10pm – 8am.

2. The LA90, 15 minute represents the level exceeded for 90% of the 15 min period and is referred to as the average minimum or background noise level. The Rating Background Level (RBL) is the single-figure derived from monitoring the LAeq (Period) is the equivalent continuous noise level defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period. The Estimated Existing Industrial Noise is the estimated LAeq (Period) that is attributable to existing industrial noise sources only.

9.9.4 Assessment Criteria

The day-time construction criteria specified in the Mandalong South Extension Project NIA was adopted for the assessment of TL24 construction activities at the sensitive receptors. Construction will only occur during the day-time period as per the ICNG. **Table 20** presents the receptors and criteria as developed by Global Acoustics (2015).

Table 20: Project Receptors and Noise Criteria (Global Acoustics, 2015)

Receptor	Easting	Northing	Criteria LAeq Affected/highly affected
R11	353449	6331020	41/75
R12	353006	6331635	41/75
R13	352732	6331781	41/75
R14	352513	6331701	41/75
R15	352327	6331484	41/75
R16	351703	6330361	44/75
R17	351461	6330079	44/75
R18	351554	6329722	44/75
R19	352086	6328535	40/75
R20	352607	6328751	40/75

R21	352870	6328675	40/75
R22	355151	6328201	40/75
R23	351274	6328436	40/75
R24	351825	6331330	44/75
R25	351570	6331225	44/75
R26	351570	6331105	44/75
R27	351395	6330720	44/75
R28	351190	6329000	40/75
R29	350750	6329085	40/75

9.9.5 Impact Assessment

Noise levels were predicted using RTA Technology's Environmental Noise Model, a computer based environmental noise model, to determine the acoustic impact of construction on the sensitive receptors. The model considers account geometric spreading, atmospheric absorption as well as barrier and ground attenuation. Sound power data was used for model inputs for all sources. All acoustically significant noise sources were included in the models. Sound power data for the proposed construction activities were sourced from Global Acoustics'' technical database.

The Mandalong South Extension Project assessed construction noise impacts under calm meteorological conditions during standard construction hours. For consistency, predictions for the TL24 Project were calculated for calm meteorological conditions only and combined with predicted construction levels from the Mandalong South Extension Project NIA to assess potential cumulative impacts.

Given the importance of topography on noise modelling, digital landform contours were inputted for the surrounding area.

The following construction noise scenarios were assessed:

- Vegetation and clearing involving the clearing and/or widening for the necessary access tracks and clearing of the 60 metre wide easement;
- Foundation and construction consisting of the civil works for each foundation including the compaction of the pad and excavation and installation of road base material;
- Tower erection and assembly. Involving the delivery of materials, assembly of steel section and erection of the tower sections; and
- Demolition of redundant towers involving the dismantling of each structure and removal of steel.

Plant inclusions and sound power levels for each scenario are outlined in the NIA. Each scenario as modelled by Global Acoustics (2015) was conservative with all plant operating simultaneously. Stringing activities, involving the possible use of a helicopter, are of particularly short duration and were not modelled in the NIA.

Results

Cumulative Noise Results

Construction associated with the Mandalong South Surface (MSSS) site has the potential to occur concurrently with the TL24 Project. **Table 21** presents predicted results for the MSSS construction with the addition of the worst-case TL24 construction predictions at each receptor. Of the 19 receptors assessed, the following is predicted:

- Three receptors (R22, R24, R25) are predicted to receive no increase in noise levels due to cumulative MSSS and TL24 activities;

- Eleven receptors (R11, R12, R13, R14, R15, R21, R23, R26, R27, R28, R29) are predicted to receive an increase in noise levels of 1 or 2 dB due to cumulative MSSS and TL24 activities; and

- Five receptors (R16, R17, R18, R19, R20) are predicted to receive a significant increase in noise levels of 5 to 12 dB due to cumulative MSSS and TL24 activities. For receptors R16, R17, and R18, demolition of redundant towers is responsible for the predicted increase. The other TL24 activities result in an insignificant increase in received noise levels for these receptors. R19 and R20 are predicted to receive significant increases from all TL24 activities due to their proximity to the construction locations. However, predicted levels for these receptors remain less than the highly affected criteria and will only occur when tower construction is in progress or clearing activities are taking place, not for the entire project.

All receptors are predicted to receive cumulative construction noise levels less than the 'highly affected' criteria, with three receptors (R11, R21, R22) predicted to receive less than the 'affected' criteria.

Table 21: Cumulative Construction Noise Results (Global Acoustics, 2015)

Receptor	Criteria Affected/highly affected	Worst-case Clearing and MSSS Result	Increase due to Clearing	Worst-case Foundation and MSSS Result	Increase due to Foundation	Worst-case Tower Erection and MSSS Result	Increase due to Tower Erection	Worst-case Demolition and MSSS Result	Increase due to Demolition
R11	41/75	29	Nil	29	Nil	32	2	32	2
R12	41/75	**44**	Nil	**45**	1	**44**	Nil	**44**	Nil
R13	41/75	**47**	1	**47**	1	**46**	Nil	**46**	Nil
R14	41/75	**49**	1	**49**	1	**48**	Nil	**48**	Nil
R15	41/75	**54**	2	**53**	1	**54**	2	**54**	2
R16	44/75	**59**	1	**59**	1	**70**	12	**70**	12
R17	44/75	**54**	1	**54**	1	**61**	8	**61**	8
R18	44/75	**55**	1	**55**	1	**60**	6	**60**	6
R19	40/75	39	6	**41**	8	**45**	12	**45**	12
R20	40/75	**65**	10	**64**	9	**64**	9	**64**	9
R21	40/75	34	Nil	35	1	35	1	35	1
R22	40/75	29	Nil	29	Nil	29	Nil	29	Nil
R23	40/75	**45**	1	**45**	1	**45**	1	**45**	1
R24	44/75	**62**	Nil	**62**	Nil	**62**	Nil	**62**	Nil
R25	44/75	**61**	Nil	**61**	Nil	**61**	Nil	**61**	Nil
R26	44/75	**55**	1	**55**	1	**55**	Nil	**54**	Nil
R27	44/75	**53**	1	**53**	1	**53**	Nil	**52**	Nil
R28	40/75	**46**	Nil	**47**	1	**46**	Nil	**46**	Nil
R29	40/75	**43**	Nil	**44**	1	**43**	Nil	**43**	Nil

Note: Bolded results are above the ‘affected’ criterion

9.9.6 Mitigation and Management

To minimise impacts from noise emissions associated with construction and demolition works the following controls will be implemented through the CEMP:

- Community consultation will be undertaken prior to commencement of construction.
- Construction activities will be restricted to the day-time period as per the *NSW Interim Construction Noise Guideline* (DECCW, 2009) being Monday to Friday 07:00 to 18:00, Saturday 08:00 to 13:00 and no work on Sundays or public holidays. Exceptions to this include emergency works or delivery of equipment or materials outside of standard hours as requested by police or other authorities for safety reasons. There may also be a requirement for TransGrid to undertake some stringing or cutting in activities outside of the daytime hours stipulated in the ICNG if any of the required outages on the lines are not possible during normal construction times.
- All equipment will be inspected and maintained on a regular basis to ensure good working order.

9.9.7 Conclusion

Four construction scenarios were considered to assess worst-case construction noise impacts. These scenarios considered vegetation clearing, foundation construction, tower erection and assembly and removal of redundant towers. Predicted construction noise levels were combined with predicted levels for the MSSS construction to assess potential cumulative impacts from the developments as a whole. Construction is scheduled for the day-time period only as per the *NSW Interim Construction Noise Guideline* (DECCW, 2009). TL24 construction noise results indicate there are eleven receptors predicted to receive construction noise levels greater than the affected criteria during the day period. All receptors are predicted to receive construction noise levels less than the highly affected criteria.

Cumulative construction noise results indicate there are sixteen receptors predicted to receive construction noise levels greater than the affected criteria during the day-time period. Only five receptors are predicted to receive a noticeable increase in received noise levels due to the addition of the construction activities. All receptors are predicted to receive cumulative construction noise levels less than the highly affected criteria, with three receptors predicted to receive less than the affected criteria.

9.10 Electric and Magnetic Field

9.10.1 Introduction

Potential impacts from electric and magnetic fields (EMF) were identified as a potential environmental issue during the environmental risk assessment undertaken for the Project. Consequently, a detailed EMF Assessment has been prepared by Aurecon to address EMF issues. The report *Mandalong Transmission Line 24 Relocation Project EMF Assessment* (Aurecon 2015) appears as **Appendix 17**.

9.10.2 Electric and Magnetic Fields

The electric and magnetic fields associated with electrical equipment are essentially independent of one another. The electric field is associated with the voltage of the equipment and the magnetic field is associated with the current. In combination, these fields cause energy to be transferred along electric wires.

Electric Field

An electric field is a region where electric charges experience an invisible force. The strength of this force is related to the voltage, or pressure, which forces electricity along wires. Electric fields are strongest close to their source, and their strength diminishes rapidly with distance from the source, in much the same way as the warmth of a fire decreases with distance. Many common materials such as brickwork or metal block electric fields, so they are readily shielded and, for all practical purposes, do not penetrate buildings. They are also shielded by human skin, such that the electric field inside a human body will be at least 100,000 times less than the external field. Being related to voltage, the electric fields associated with transmission lines remain relatively constant over time, except where the operating voltage changes.

Magnetic Field

A magnetic field is a region where magnetic materials experience an invisible force produced by the flow of electricity (known as the electric current and measured in Amperes). As magnetic fields are related to the current rather than the voltage, high voltage equipment is not the only source of magnetic fields encountered in everyday life. Modern life involves frequent contact with magnetic fields from a variety of sources such as appliances in the home and workplace and electrical machinery.

The strength of a magnetic field depends on the size of the current (measured in amps), and decreases with distance from the source. While electric fields are blocked by many common materials, this is not the case with magnetic fields. This is why locating equipment in enclosures or underground will eliminate any external electric field but not the magnetic fields.

9.10.3 Scope and Methodology

The scope of the EMF assessment included;

- A brief description of the EMF health issue;
- Reasonable predictions of the EMFs associated with the proposed relocated line at 1 metre above ground level, under 85th percentile and time-weighted-average loads, both upon commissioning and in the ultimate condition;
- An assessment of compliance of the proposal against relevant national and international EMF guidelines;
- An assessment of the proposal against precautionary and prudent avoidance principles as defined by the relevant guidelines; and
- Magnetic field mitigation and management.

9.10.4 Health Guidelines and Standards

In the absence of a current Australian standard Aurecon have favoured the current *International Commission on Non-ionizing Radiation Protection (ICNIRP)* international guideline level of 2000mG[6] for this assessment. In applying the ICNIRP Guideline, it is important to recognise that the numerical limits (2000mG[6]) are based on established health effects. In ICNIRP's fact sheet on the guidelines, it notes that:

> *It is the view of ICNIRP that the currently existing scientific evidence that prolonged exposure to low frequency magnetic fields is causally related with an increased risk of childhood leukaemia is too weak to form the basis for exposure guidelines. Thus, the perception of surface electric charge, the direct stimulation of nerve and muscle tissue and the induction of retinal phosphenes are the only well established adverse effects and serve as the basis for guidance.*

The limits for both electric and magnetic fields contained in the various health guidelines are summarised in **Table 22**.

Table 22: EMF Health Guideline Reference Levels (Aurecon, 2015)

Parameter	NHMRC (1989)	ARPANSA 2006 Draft	ARPANSA 2007 Revised Draft	ICNIRP 2010	IEEE 2002 (Reaffirmed 2007)
Electric fields – General Public	5kV/m	5kV/m	5kV/m	5kV/m	5kV/m
Electric Fields – General Public: Controlled Circumstances (a) or Short Term (b)	10kV/m (b)	10kV/m (a)	10kV/m (a)	N/A	N/A
Electric Fields – Occupational	10kV/m	10kV/m	10kV/m	10kV/m	20kV/m
Electric Fields – Occupational Short Term	10-30kV/m	N/A	N/A	N/A	N/A
Magnetic Fields – General Public	1000mG	1000mG	3000mG	2000mG	9040mG
Magnetic Fields – General Public: Controlled Circumstances (a) or Short Term (b)	10000mG (b)	3000mG (a)	N/A	N/A	N/A
Magnetic Fields – Occupational	5000mG	5000mG	5000mG	10000mG	27100mG
Magnetic Fields – Occupational Short Term	Up to 50000mG	N/A	N/A	N/A	N/A

9.10.5 EMF Assessment

Based on the design information, Aurecon has assessed the electric and magnetic field contributions associated with the proposed 330kV Transmission Line 24 relocation against the relevant health guidelines and the principles of prudent avoidance.

Magnetic Fields

- The highest magnetic field contribution directly below the proposed Line 24 relocation is predicted to be 124mG under 85th percentile loads upon commissioning and 168mG under ultimate 85th percentile loads. Both occur at the low point of the span which has the greatest conductor sag, between Towers 32X and 33X. The higher of these is equivalent to 8.4% of the ICNIRP general public exposure reference level. At the edge of the easement, the predicted field contribution is approximately 26mG and 35mG under 85th percentile commissioning and ultimate loads respectively. The higher of these is equivalent to 1.8% of the ICNIRP general public exposure reference level.

- The typical magnetic field contribution at 1m above ground level is lower overall for the new section of Line 24 than for the existing, primarily due to the fact that it has been designed with greater conductor clearance to ground level. At the crossing of Line 25/26, the new line will now cross over the top of it instead of under it.

- Even under peak or emergency load conditions, the magnetic fields are still predicted to remain within the relevant guideline reference level.

Electric Fields

- The highest electric field contribution directly below the proposed Line 24 deviation is predicted to be 4.5kV/m, occurring at the low point of the span which has the greatest conductor sag, between Towers 32 and 33X. This is equivalent to 90% of the ICNIRP general public exposure reference level. At the edge of the easement, the predicted field contribution is approximately 1kV/m, or 20% of the ICNIRP general public exposure reference level.

- The typical electric field contribution at 1m above ground level is lower overall for the new section of Line 24 than for the existing as it has been designed with greater conductor clearance to ground level. This is particularly evident at the crossing of Line 25/26, where the new line will now cross over the top of it instead of under it.

- Even if the line were to be operated at a voltage 10% greater than the nominal voltage, the electric field contribution of the proposed line deviation is still predicted to remain within the relevant guideline reference level.

9.10.6 Mitigation Measures

Consistent with the notion of prudent avoidance, TransGrid has:

- Sited the electrical infrastructure within the mine property at a greater distance than currently exists for residences, such that the EMF contribution at residential properties is expected to be negligible; and

- Designed the line such that the clearance of the conductors above ground level is greater than that of the existing TL24 line, thereby reducing the EMF contribution at the relevant height of one metre above ground level.

9.11 Dangerous Goods

Dangerous goods and other hazardous materials are legislated under the *Work Health and Safety Act 2011* in addition to the *Workplace Health and Safety (Mines and Petroleum Sites) Act 2013*. Centennial Mandalong currently holds all necessary approvals under these Acts and maintains a system for managing dangerous goods and hazardous materials that satisfies the requirements of the legislation and relevant WorkCover NSW Codes of practice.

As the Project only involves surface construction works, there is no plan to introduce additional classes of dangerous goods or hazardous materials. The dangerous goods and hazardous materials currently used at Mandalong Mine, which will be used for the Project are:

- Oils and greases, including engine coolants, hydraulic oil, transmission oil and gear oil;

- Diesel;

- Gases including LPG; and

- Other general use chemicals including calcium lime rust remover, general paints, cleaning substances and dust suppression polymer.

The majority of dangerous goods will continue to be stored at the Mandalong Mine Access Site with some substances stored at the TL24 site office and laydown area throughout the construction phase. The

same controls will be implemented at the TL24 site office and laydown area regarding dangerous goods as are in place at the Mandalong Mine Access Site.

With the continued implementation of best management practices for these materials within the PAA, along with the effective implementation of the approved EMS and workplace health and safety management systems, the Project should not pose any significant risk in relation to its locality, to human health, life or property or the biophysical environment.

On this basis, the Project is not considered to comprise a "potentially hazardous industry" or a "potentially offensive industry" within the meaning of these expressions in *SEPP 33 Hazardous and Offensive Development*, and therefore a preliminary hazard analysis was not required.

9.12 Decommissioning and Rehabilitation

Following the construction of the relocated TL24 transmission line and demolition of the redundant section, disturbance around the new and redundant tower sites will be rehabilitated. Any temporary access tracks established to the redundant tower sites will be rehabilitated in consultation with relevant stakeholders. The new towers, easement and access tracks will remain in place to allow TransGrid to operate and maintain the transmission line.

The section of redundant easement within Centennial Fassifern's landholding will be rehabilitated to be commensurate with surrounding vegetation.

10.0 STATEMENT OF COMMITMENTS

The following Statement of Commitments is based on the mitigation and management measures identified in **Section 9** of this SEE, in addition to measures proposed in the technical specialist assessments. The existing Mandalong Mine Environmental Management System and supporting management plans are already in place to effectively monitor, mitigate and/or manage the potential environmental and socio-economic impacts of this Project should it be approved.

Category	Commitment/Action
General	Prior to commencement of construction activities for the Project, a Construction Environmental Management Plan (CEMP) will be developed. The CEMP will address mitigation and management actions identified for the relevant environmental values. TransGrid's existing Environmental Management System and supporting policies and procedures are in place for the operation and maintenance of TL24.
Ecology	A Flora and Fauna Management Plan will form an Appendix to the CEMP. This plan will include: • Unnecessary vegetation clearing will be avoided by marking the clearing limit with flagging tape; • All contractors will be advised of the designated work area through a site induction process; • Vehicles/machinery will use designated access tracks. Speeds will be limited to 40 kilometres per hour to reduce the potential of fauna strike and to reduce dust generation; • Measures will be implemented as required to prevent the spread of weeds and potential importation of Phytophthora; • Where possible, clearing activities should be timed to avoid removal of hollow-bearing trees during breeding season of threatened species (avoiding winter and spring); and • A suitably qualified person is to be present to supervise hollow-bearing tree clearing within the impact area. Lot 152 DP 755238 will be included in the Mandalong Mine Land Management Strategy to offset the impacts of vegetation clearing for the Project.
Erosion and Sediment Control	An Erosion and Sediment Control Plan (ESCP) will form an Appendix to the CEMP. The ESCP will identify works as necessary to ensure the required protection is given to downslope lands and waterways. The ESCP will specifically address: • Tunnel soil erosion; and • Mitigation and management measures in accordance with *Managing Urban Stormwater: Soils and Construction – Vol 1 (Landcom, 2004)* – also know as the 'Blue Book'.
Traffic	A Construction Traffic Management Plan will form an Appendix to the CEMP to address the impacts of the construction works on the local road network. Construction traffic will not exceed 79 vtph.
Heritage	The CEMP will include the following: • 'No go zone' to be established at sites AHIMS#45-3-1227, AHIMS#45-3-3534, AHIMS#45-3-3539, AHIMS#45-3-3541 and AHIMS#45-3-3540 for the duration of the proposed works; • If unrecorded Aboriginal objects are identified in the TL24 Easement during future works, all works in the immediate area must cease and

Category	Commitment/Action
	the area should be cordoned off as appropriate with high visibility tape. OEH must be notified via the Enviroline (131 555) so that the site can be adequately assessed and managed; • If skeletal remains are identified all work must cease in the immediate area to prevent any further harm to the remains. Local NSW Police must be contacted immediately. No action is to be undertaken until police provide written notification. If the remains are identified as Aboriginal, the OEH Enviroline (131 555) must be contacted. No work is to continue until OEH provides written notification about the action plan for the management of the skeletal remains and formulated a management plan if required; • If during the course of development works, suspected historic cultural heritage material is uncovered, work should cease in that area immediately. The OEH Enviroline (131 555) should be notified and works only recommence when an approved management strategy has been developed; • L1 landing skid: If it is not possible to avoid harming the skid, it will be archivally recorded by a qualified historical archaeologist prior to dismantling. The archival recording should be in accordance with *How to Prepare Archival Records of Heritage Items* (NSW Heritage Office) and *Photographic Recording of Heritage Items using Digital Film or Capture* (NSW Heritage Office 2006); and • L3 landing skid: The area of the skid will be cordoned off to ensure no inadvertent physical impact.
Air Quality	The CEMP will include air quality mitigation and management strategies which will include: • Standard work procedures to minimise emissions of particulate matter for example maintaining plant and equipment to ensure optimal operating conditions; and • Utilising water sprays/carts to dampen exposed surfaces and trafficable areas including operations near R16 and R20 due to the close proximity of the tower to the residence.
Noise	The CEMP will include noise mitigation and management strategies which will include: • Restrict construction activities to the day-time period as per the *NSW Interim Construction Noise Guideline* (DECCW, 2009) being Monday to Friday 07:00 to 18:00, Saturday 08:00 to 13:00 and no work on Sundays or public holidays. Exceptions to this include emergency works or delivery of equipment or materials outside of standard hours as requested by police or other authorities for safety reasons. [Noting that there may be a requirement for TransGrid to undertake some stringing or cutting in activities outside of the daytime hours stipulated in the ICNG if any of the required outages on the lines are not possible during normal construction times]; and • All equipment will be inspected and maintained on a regular basis to ensure good working order; and • Community consultation will be undertaken prior to commencement of construction.

11.0 JUSTIFICATION AND CONCLUSION

A description of the need and justification for the Project is provided in this chapter with regard to environmental, social and economic factors. This includes consideration of alternatives, the principles of Ecologically Sustainable Development (ESD) and the consistency of the Project with the objectives of the EP&A Act.

11.1 Project Justification and Alternatives

Following the commencement of the Mandalong Southern Extension Project, Centennial Mandalong initiated a strategic constraints analysis across the PAA. The current TL24 corridor posed a significant limitation to the mine layout now approved under SSD-5144. Suspension towers, which are those where the line passes through without changing direction, can withstand a certain amount of tilt and strain and can be protected from subsidence to a certain extent. Tension towers, where the line is fixed to the towers, are installed where there is a change of direction or a clearance issue and these towers have very low tolerance to tilt and strain due to the line being tightened or slackened and instability of the structure due to the change in line angle. Impact to TransGrid's infrastructure has been minimised by the mine layout, however it was not possible to avoid the line altogether.

A number of mine layouts were drawn up in an attempt to avoid the tension towers within the Southern Extension Area by relocating longwalls around them or developing main headings under them. However due to the location of the tension towers in the thick seam area (LWs 25 to 37) at the start of the Project and in an area where the proposed longwalls are already short, the impact on the Project's financial viability made these options unfeasible.

Several adjustments were made to the proposed mine plan, where possible, to avoid or limit impacts on TransGrid infrastructure. This included limiting the length of LWs 30 and 31 to avoid undermining a tension tower on line TL25/26, and providing a narrow corridor between the gateroads of LWs 38 and 61 to avoid undermining a section of the transmission line TL24 to the east of the Project.

Given the remaining unavoidable subsidence impacts to the five TL24 towers, a feasibility study concluded that the best option is to relocate the section of TL24 to avoid undermining of the tension towers. The Subsidence Predictions and Impact Assessment Report (DGS, 2013) for the Mandalong Southern Extension Project highlighted that five TL24 tension towers are within the proposed limits of the longwall extraction with two towers inside a 26.5° angle of draw from the panel limits. These towers are likely to be subjected to cumulative tensile or compressive strains in excess of 1mm/m. The relocation of the TL24 line to allow the approved Mandalong Southern Extension Project will enable the proposed longwall panels to be extracted without compromising the viability of the tower structures on the surface by way of predicted subsidence.

The preferred design will see the relocated TL24 transmission line crossing above the existing TL25/26 transmission line. To achieve a safe cross over height, the required tower heights are 65 metres and will be visible at some of the visual receptors. An undercrossing design being the alternative would normally be preferred, however in this case would result in an excessive amount of earthworks required for the safe cross under separation distance. This significant amount of disturbance would cause a number of environmental consequences in terms of vegetation disturbance as well as erosion and sedimentation issues.

Centennial Mandalong's approach to the Project has been to apply a best practice system of environmental management: that is a hierarchy of avoid, minimise, mitigate and finally, offset residual impacts. On this basis, the project planning and design process had already eliminated and designed out many of the potential environmental, social and economic consequences identified early in the risk management process.

As detailed in the SEE, the Project will have limited environmental, social and economic impacts beyond those approved in SSD-5144. The Project will enable continued safe operations at Mandalong Mine with reduced potential for surface infrastructure to inhibit productive operations.Project Impacts

This SEE, which includes technical specialist assessments, documents the various studies that have been undertaken to examine potential impacts that may occur as a result of the Project.

The assessment of environmental issues has been multi-disciplinary and involved consultation with key stakeholders. The Project is anticipated to pose minimal environmental impacts beyond those previously assessed and approved under SSD-5144.

Mitigation, management and offset measures are proposed to address the residual consequence.

11.2 Project Benefits

The social and economic assessments prepared in relation to the Project have considered the findings from the relevant technical specialist assessments which have assumed a worst case scenario, meaning that potential impacts may be less than predicted.

Overall the Project results in no long term social impacts with the Project being undertaken to reduce the risk of interruption to the existing TL24 power supply. Centennial Mandalong has negotiated a favourable outcome with TransGrid, which will see that business's infrastructure and service obligations safeguarded against potential impacts in the absence of the relocation of the relevant section of TL24.

A positive impact arising from the Project is the removal of towers from private land holdings and therefore a reduction in immediate visual impact and risk of Electromagnetic Radiation.

Approval of the Project will result in greater royalty and tax yields for state and federal governments. This will also have a positive social impact over the duration of the Mandalong Mine.

11.3 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) is a primary objective of environmental protection in NSW. The objects of the EP&A Act adopt the principles of ESD and it is defined under section 6(2) of the *Protection of the Environment Administration Act 1991* as:

> *6(2) For the purposes of subsection (1)(a), ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:*
>
> *(a)* ***the precautionary principle*** *- namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
>
> *(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
>
> *(ii) an assessment of the risk-weighted consequences of various options,*
>
> *(b)* ***inter-generational equity*** *- namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*

(c) ***conservation of biological diversity and ecological integrity*** *- namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*

(d) ***improved valuation, pricing and incentive mechanisms*** *- namely, that environmental factors should be included in the valuation of assets and services, such as:*

(i) *polluter pays - that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

(ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*

(iii) *environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The overall objectives of ESD are to use, conserve and enhance natural resources. This ensures that ecological processes are maintained facilitating improved quality of life, now and into the future.

Mandalong Mine is committed to the principles of ESD and understands that social, economic and environmental objectives are interdependent. The company acknowledges that a well-designed and effectively managed operation will avoid significant and/or costly environmental impacts or degradation. Consideration has been given to appropriately identifying, avoiding, mitigating and managing environmental risk. This demonstrates environmental due diligence and will provide for on-going and adaptive monitoring and management of the operation in line with the ESD principles outlined in the below sub-sections.

11.3.1 The Precautionary Principle

The precautionary principle, in summary, holds that where there are threats of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent the degradation.

The SEE has enabled an understanding of the potential impacts of the Project on environmental, social and economic factors. Management controls and mitigation strategies are proposed to effectively monitor, mitigate and/or manage the potential environmental and socio-economic impacts of the Project should it be approved.

11.3.2 Intergenerational Equity

Intergenerational equity is centered on the concept that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. There is a moral obligation to ensure that today's economic progress, which will benefit both current and future generations, is not offset by environmental deterioration.

Mandalong Mine undertakes on-going environmental monitoring with mitigation measures to provide effective environmental management across its operations. This management is provided through planning, communication, documentation, review and feedback. These environmental management measures ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations.

11.3.3 Conservation of Biological Diversity and Ecological Integrity

The principle of "conservation of biological diversity and ecological integrity" holds that the conservation of biological diversity and ecological integrity should be a fundamental consideration for development proposals.

The potential environmental impacts of the Project and measures to ameliorate these potential impacts are detailed in this report. By considering the proposed biodiversity offset strategy, the Project will involve no significant additional impacts to the environment above those for the existing operations at Mandalong Mine.

11.3.4 Improved Valuation, Pricing and Incentive Mechanisms

The principle of "improved valuation, pricing and incentive mechanisms" deems that environmental factors should be included in the valuation of assets and services. The cost associated with using or impacting upon an environmental resource is seen as a cost incurred to protect that resource.

Mandalong Mine will optimise the valuation and pricing of the coal resources by achieving planned extraction as approved under SSD-5144 by relocating the current TL24 transmission line which exists as a surface constraint. This will enable the mine to meet the site's business plan and allow progression of the Mandalong Southern Extension Project on schedule.

11.4 Conclusion

The Project has been assessed using a risk-based approach to identify and assess potential environmental, social and economic impacts. The assessment has been multi-disciplinary and has involved consultation with DP&E in addition to other stakeholders. Emphasis has been placed on ensuring minimal impacts to the environment and sensitive receptors whilst enabling Centennial Mandalong's operations to proceed in accordance with the site's business plan.

A range of potential impacts have been assessed in this report in addition to the attached technical specialist assessments. Conclusions indicate that the Project will have minimal environmental, social and economic consequences. Various mitigation and management measures have been outlined to address key risks. Existing management controls and mitigation strategies are in place for Mandalong Mine to effectively monitor, mitigate and/or manage the potential environmental and socio-economic impacts of the Project should it be approved.

The Project is considered to be consistent with relevant objectives of the EP&A Act, including the principles of ESD, and will not change the nature of the development originally approved. On considering the balance of environmental, social and economic impacts, it is considered reasonable to conclude that the benefits of the Projects outweigh the impacts. Based on the findings of this report, it is recommended that the Project be approved subject to conditions.

12.0 REFERENCES

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13.0 ABBREVIATIONS

ACHCR	Aboriginal Cultural Heritage Consultation Requirements for Proponents
ADTOAC	Awabakal Descendants Traditional Owners Aboriginal Corporation
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AQIA	Air Quality Impact Assessment
ATOAC	Awabakal Traditional Owners Aboriginal Corporation
BBRA	Broad Brush Risk Assessment
BoM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
DA	Development Application
DECCW	Former NSW Department of Environment, Climate Change and Water
DGS	Ditton Geotechnical Services Pty. Ltd.
DP&E	NSW Department of Planning and Environment
DRE	NSW Division of Resources and Energy
CALMET	California METeorological Model
CBA	Cost-Benefit Analysis
CCC	Community Consultative Committee
CEMP	Construction Environmental Management Plan
EIS	Environmental Impact Statement
EL	Exploration Licence
EMF	Electromagnetic Field
EMS	Environmental Management System
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EP&A Reg	NSW Environmental Planning and Assessment Regulation 2000
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EPA	Environment Protection Agency
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
EWP	Elevated Work Platform
FBA	Framework for Biodiversity Assessment
GHD	GHD Pty. Ltd.
ha	Hectares
ICNG	NSW Interim Construction Noise Guideline
INP	NSW Industrial Noise Policy
ISO	International Standards Organisation
km	Kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LMCC	Lake Macquarie City Council
LOS	Level of Service

LSC	Land and Soil Capability
LW	Longwall
mg/L	Milligrams per Litre
ML	Mining Lease
MNES	Matter of National Environmental Significance
MOP	Mining Operations Plan
MSB	Mine Subsidence Board
MSSS	Mandalong South Surface Site
Mtpa	Million tonnes per annum
MU	Mapping Unit
NGER Act	National Greenhouse and Energy Reporting Act 2007
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PAA	Project Application Area
PAC	NSW Planning Assessment Commission
$PM_{2.5}$	Particulate matter less than 2.5µm
PM_{10}	Particulate matter less than 10µm
POEO Act	NSW Protection of the Environment Operations Act 1997
RAP	Registered Aboriginal Party
ROM	Run of Mine
RPS	RPS Australia East Pty. Ltd.
SEE	Statement of Environmental Effects
SEP	Stakeholder Engagement Plan
SEPP	State Environmental Planning Policy
SIA	Social Impact Assessment
SILO	Scientific Information for Land Owners
SLR	SLR Consulting Australia Pty. Ltd.
SSD	State Significant Development
TL	Transmission Line
TSC Act	NSW Threatened Species Conservation Act 1995
TSP	Total Suspended Particulates
vtph	Vehicle trips per hour
WM Act	NSW Water Management Act 2000
WSP	Water Sharing Plan

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