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Agricultural Impact Statement  
Mandalong Transmission Line  
TL24 Relocation Project

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Centennial Mandalong Pty Limited

Version: Final

# Agricultural Impact Statement

## Mandalong Transmission Line

### TL24 Relocation Project

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#### DOCUMENT CONTROL

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## List of Abbreviations

ABS	Australian Bureau of Statistics
AEMR	Annual Environmental Management Report
AHD	Australian Height Datum
AIS	Agricultural Impact Statement
dB	decibel
BOM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
DGRs	Director-General's Requirements
DPI	NSW Department of Primary Industries
EPA	Environment Protection Authority
LGA	Local Government Area
LSC	Land and Soil Classification
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PM <sub>2.5</sub>	Particular matter with an aerodynamic diameter of 2.5 microns or less
PM <sub>10</sub>	Particular matter with an aerodynamic diameter of 10 microns or less
Project, the	Mandalong Transmission Line TL24 Relocation Project
SLR	SLR Consulting
TSP	Total suspended particulate matter
µS/cm	Micro Siemens per centimetre
°C	Degrees Celsius

## 1 INTRODUCTION

SLR Consulting (SLR) was engaged by Centennial Mandalong Pty Limited (Centennial Mandalong) to prepare an Agricultural Impact Statement (AIS) for the proposed Mandalong Transmission Line TL24 Relocation Project (the Project). This AIS will be used to support the modification to the existing development approval under Section 96(2) of the NSW *Environmental Planning and Assessment Act 1979*.

### 1.1 Project Overview

The Project is located near Morriset, approximately 35 kilometres south-west of Newcastle, in the Lake Macquarie Local Government Area (LGA) (**Figure 1**).

Centennial Mandalong is seeking to modify its existing development consent SSD-5144 for the Mandalong Transmission Line TL24 Relocation Project. To achieve optimum coal extraction and limit subsidence effects on surface infrastructure, Centennial Mandalong 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 transmission towers.

It is estimated approximately 8.5 hectares of vegetation clearing is required for the new section of TL24 which includes a 60 metre wide easement entirely on freehold land owned by Centennial Fassifern Pty. Ltd. 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 proposed TL24 is illustrated on **Figure 2**. 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.

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;
- Removal and remediation of redundant TL24 structures; and
- Operation and ongoing maintenance.

### 1.2 Project Application Area

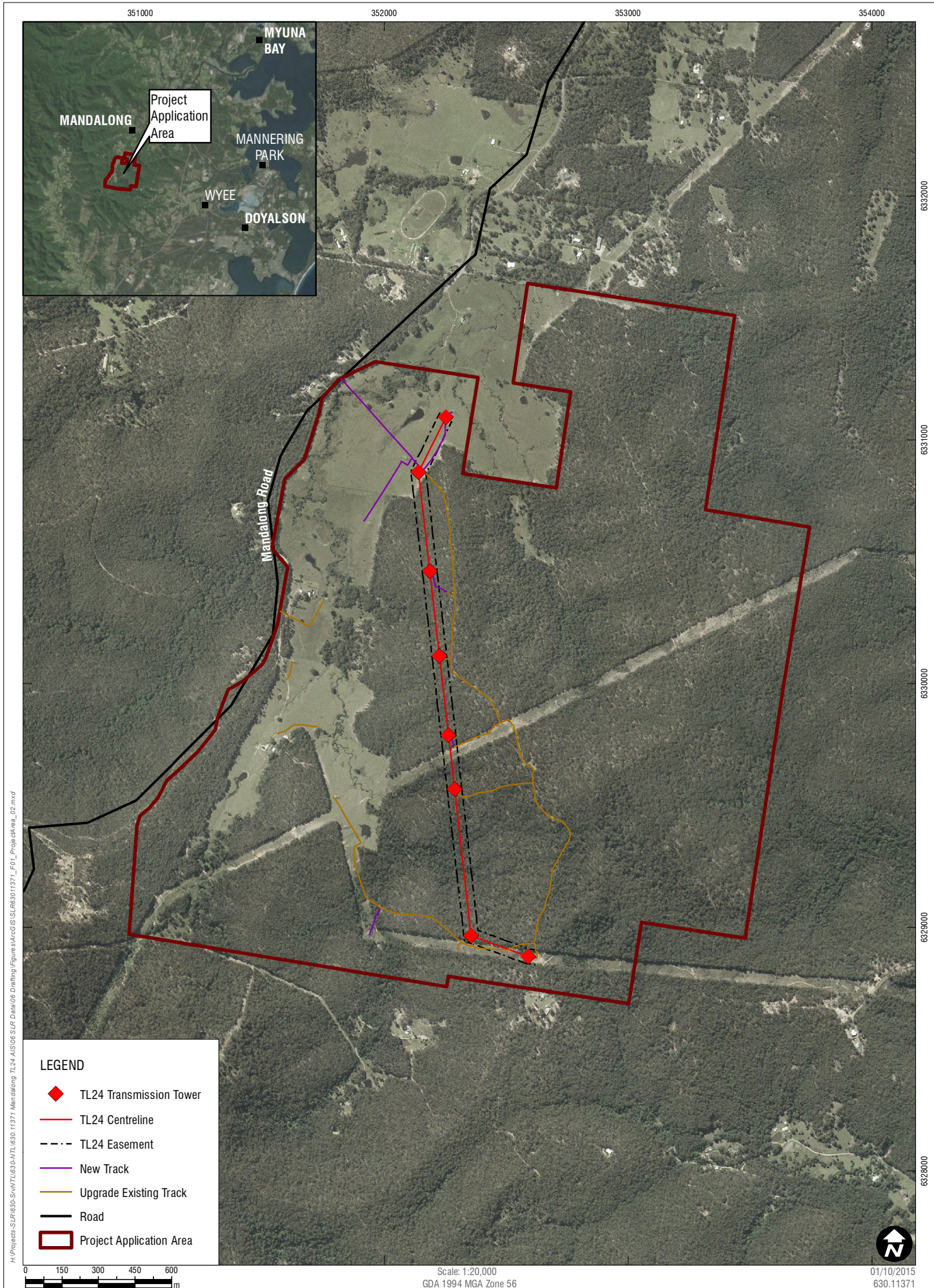
The Project Application Area is illustrated on **Figure 1** and includes the proposed new TL24 route encompassing a 60 metre wide easement. The general boundaries are Mandalong Road to the west, land owned by Centennial Coal to the south and east and Chapman's Road to the north. The Project Application Area has been designed to encompass all required laydown areas and access tracks to be utilised or upgraded during the construction period. The Project Application Area encloses a total area of approximately 540 hectares, comprising both native vegetation and cleared grassland.

### **1.3 Purpose of this Report**

This report has been prepared to address the *Strategic Regional Land Use Policy* (the Policy) (DP&I, 2012a). The Policy aims to assist the development of a long term strategy for continued progress of the mining industry that also ensures local community sustainability and on-going viability of existing agricultural industries. The Policy applies to areas within NSW where there is high value agricultural land and increasing activity in the coal and coal seam gas industries. Seven regions within NSW have been identified as applying under this Policy and each of these regions will progressively have a Strategic Regional Land Use Plan developed or alternatively a similar plan incorporated into the relevant proposed Regional Growth Plans.

Part of this policy requires all state-significant mining development proposals, whether or not they are located on land mapped as strategic agricultural land (SAL), to prepare an AIS for consideration at the development application stage. The purpose of an AIS is to assess and report on the potential impacts of the Project on agricultural resources and/or industries within and surrounding the Project Application Area. The term 'agricultural resource' is used to describe the land on which agriculture is dependent and the associated water resources (quality and quantity) that are linked to that land.





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## 1.4 Structure of this Report

This AIS, in accordance with the *Strategic Agricultural Land Use Policy: Guideline for Agricultural Impact Statements* (DP&I, 2012b), addresses the information listed in **Table 1**.

**Table 1 AIS Requirements**

This AIS must include the following information	Section addressed:
Information Relating to the Site and Region	
Detailed assessment of the agricultural resources and agricultural production of the project area	
This section should include detailed information (including maps) on:	
<ul style="list-style-type: none"><li>the soils, slope, land characteristics, water characteristics (availability, quality);</li></ul>	Section 2
<ul style="list-style-type: none"><li>relevant history of the agricultural enterprises from within the project area and also surrounding land acquired as part of the development's buffer and/or offset zone.</li></ul>	Section 3
For the project area this should include a description of:	
<ul style="list-style-type: none"><li>any land identified as SAL in a Strategic Regional Land Use Plan on or within two kilometres of the project site;</li></ul>	Section 2
<ul style="list-style-type: none"><li>the location and area of land to be temporarily removed from agriculture during operation of the project, and the period of time;</li></ul>	Section 4
<ul style="list-style-type: none"><li>the location and area of land to be returned to agricultural use post-project, and its productive potential relative to pre-project;</li></ul>	Section 4
<ul style="list-style-type: none"><li>the location and area of land that will not be returned to agriculture, including areas to be used for environmental plantings or biodiversity offsets;</li></ul>	Section 4
<ul style="list-style-type: none"><li>the agricultural enterprises to be undertaken on any buffer and/or offset zone lands for the life of the project, comparison with enterprises undertaken prior to the project.</li></ul>	Section 4
Identification of the agricultural resources and current agricultural enterprises within the surrounding locality of the project area	
The AIS must contain maps/information for areas within the locality surrounding the project describing existing agricultural resources. This should include:	
<ul style="list-style-type: none"><li>soil characteristics, including soil types and depth;</li></ul>	Section 2
<ul style="list-style-type: none"><li>topography/slope;</li></ul>	
<ul style="list-style-type: none"><li>key agricultural support infrastructure (e.g. roads, railways, processing facilities);</li></ul>	Section 3
<ul style="list-style-type: none"><li>water resources and other water users' extraction locations;</li></ul>	Section 2
<ul style="list-style-type: none"><li>location and type of agricultural industries;</li></ul>	Section 3
<ul style="list-style-type: none"><li>climate conditions.</li></ul>	Section 2
Describe the location and production levels of each commodity produced by all agricultural enterprises within the locality surrounding the project area.	Section 3
Assessment of Impacts	
Identification and assessment of the impacts of the project on agricultural resources or industries	
The AIS should identify any adverse impacts on agricultural resources and production on the site and in the local area during the operation and post-operation phases of the project. The AIS should include a risk-based assessment (guided by the DGRs) of:	
<ul style="list-style-type: none"><li>the effects of the project on agricultural resources;</li></ul>	Section 4
<ul style="list-style-type: none"><li>consequential productivity effects of this on agricultural enterprises, including productivity impacts of any water moved away from agriculture and any water quality issues as they affect agriculture (this should extend to farm productivity, land values and flow on impacts to regional communities and environment);</li></ul>	
<ul style="list-style-type: none"><li>uncertainty associated with the predicted impacts and mitigation measures and the consequences of and likelihood that these uncertainties will be realised;</li></ul>	
<ul style="list-style-type: none"><li>further risks such as weed management, biosecurity, subsidence, dust, noise, vibration and traffic conditions. The AIS should also consider other aspects, e.g. proposed biodiversity offsets that may result in the loss or dislocation of agricultural resources/industries).</li></ul>	
If the project site is located on or within two kilometres of any land identified as SAL in a Strategic Regional Land Use Plan, the AIS must specifically address the potential impacts of the project on the relevant SAL. This should include a consideration of the relevant Gateway criteria which include matters such as:	



This AIS must include the following information	Section addressed:
<ul style="list-style-type: none"><li>surface area disturbance, subsidence and soils;</li></ul>	Section 2
<ul style="list-style-type: none"><li>salinity, soil pH and groundwater;</li></ul>	
<ul style="list-style-type: none"><li>access to agricultural resources and infrastructure; and</li></ul>	
<ul style="list-style-type: none"><li>agricultural scenic and landscape values.</li></ul>	
Account for any physical movement of water away from agriculture	
Any water that is transferred or will no longer be available for agricultural use as a result of the proposal should be identified and fully accounted for.	Section 4
The potential impacts of the development on water resources should be assessed against the minimal impact considerations, consistent with the requirements of the Aquifer Interference Policy.	
All predicted impacts should be based on robust modelling.	
Assessment of socio-economic impacts	
The AIS should include an assessment of the impacts on agricultural support services, processing and value adding industries and regional employment.	Section 4
The socio-economic impact assessment must detail agricultural support services and value adding industries relevant to affected agricultural enterprises including potential impacts on local and regional employment.	
The socio-economic impact assessment must also address any potential impact on visual amenity, landscape values and tourism infrastructure relied upon by agricultural enterprises.	
Mitigation Measures	
Identification of options for minimising adverse impacts on agricultural resources, including agricultural lands, enterprises and infrastructure at the local and regional level	
The AIS should document feasible options to avoid, minimise or mitigate potential impacts on agricultural resources including:	
<ul style="list-style-type: none"><li>project design review/alternatives;</li></ul>	Section 5
<ul style="list-style-type: none"><li>proposed monitoring programs to assess predicted versus actual impacts;</li></ul>	
<ul style="list-style-type: none"><li>trigger response plans and trigger points at which operations will cease or be modified or remedial actions will occur to address impacts including unforeseen impacts;</li></ul>	
<ul style="list-style-type: none"><li>the proposed remedial action to be taken in response to a trigger event;</li></ul>	
<ul style="list-style-type: none"><li>the basis for assumptions made about the extent to which remedial actions will address and respond to impacts;</li></ul>	
<ul style="list-style-type: none"><li>demonstrated capacity for the rehabilitation of disturbed lands to achieve the final land use and restore natural resources;</li></ul>	
<ul style="list-style-type: none"><li>demonstrated planning for progressive rehabilitation minimising extent of disturbances.</li></ul>	
Consultation	
Document consultation with adjoining landusers and Government Departments	
An AIS should include details of an engagement strategy including:	
<ul style="list-style-type: none"><li>consultation undertaken to date, including consultation undertaken at the EL stage;</li></ul>	Section 6
<ul style="list-style-type: none"><li>consultation with relevant government agencies;</li></ul>	
<ul style="list-style-type: none"><li>consultation with impacted landholders and community groups;</li></ul>	
<ul style="list-style-type: none"><li>the issues identified and measures to address these issues;</li></ul>	
<ul style="list-style-type: none"><li>the outcomes of the consultation;</li></ul>	
<ul style="list-style-type: none"><li>any commitments for further consultation.</li></ul>	

## **1.5 Methodology**

The AIS was assessed using the methodology set out below:

- A desktop review of all publicly available information relating to the Project.
- Field visit and inspection of the Project Application Area and surrounding locality in July 2015 by SLR's Senior Agronomist, Murray Fraser.
- Description of the biophysical environment for the Project Application Area and surrounding locality.
- A review of specialist impact assessments prepared for the Project.
- Assessment of potential impacts on agricultural resources and industry, including mitigation measures for any identified impacts.
- Provision of Centennial Mandalong's demonstrated capacity for rehabilitation.

## 2 AGRICULTURAL AND WATER RESOURCES

### 2.1 Climate

A continuous daily rainfall dataset was obtained as SILO Patched Point Data, which is based on historical data from a particular Bureau of Meteorology (BOM) station with missing data 'patched' in from interpolations from nearby stations. SILO data was obtained for the BOM Cooranbong (Avondale) Station (station number 61012) which is located approximately 10 kilometres to the north-east of the Project Application Area. Daily rainfall records from January 1889 to December 2014 were utilised. The average annual rainfall for the area was 1,123 mm, with a range from 531 mm to 1,994 mm.

The BOM classifies the Project Application Area as being 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. Summer winds are generally from the south or south-east, with a tendency for afternoon north-easterly winds. During winter, winds are predominantly from the south or south-west.

### 2.2 Topography

The Project Application Area is typified by relatively flat, low lying areas surrounded by densely timbered ridgelines. Elevations on these ridgelines can exceed 200 metres Australian Height Datum (AHD). The small areas of relatively flat land adjacent to these ridgelines has generally been cleared and is used for small scale rural production, as shown in **Figure 2**. The flats are relatively low lying with surface elevations generally less than 30 metres AHD. The slope analysis (**Figure 3**) further highlights the low lying flats, in green, which have been cleared for grazing.

### 2.3 Hydrology

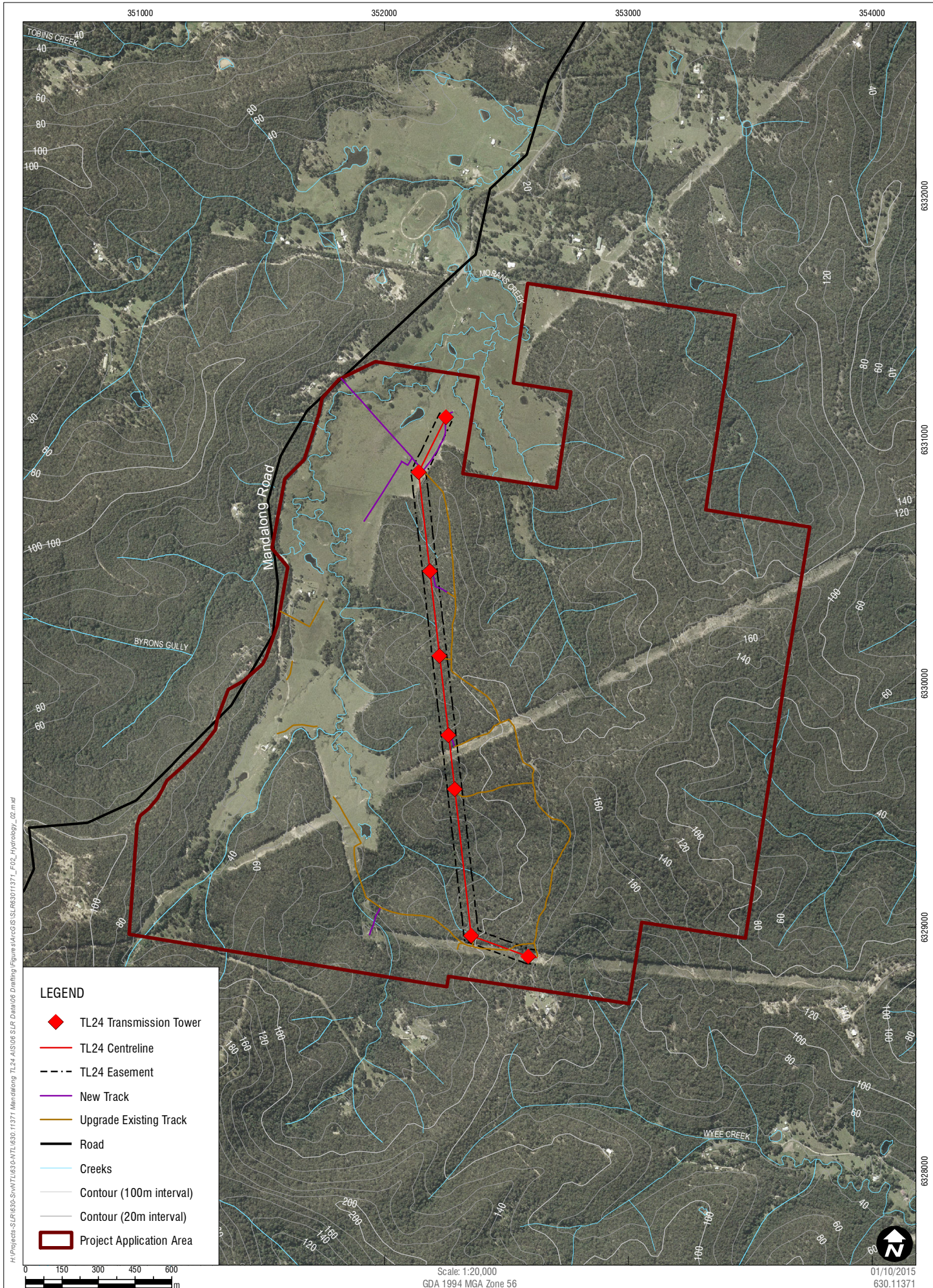
#### 2.3.1 Surface Water

The western portion of the Project Application Area is covered by a low lying valley floor associated with the upper reaches of Morans Creek, which flows in a north-easterly direction towards Mandalong, as shown in **Figure 2**. Morans Creek is a tributary of Dora Creek and forms part of the Lake Macquarie catchment (GHD, 2015).

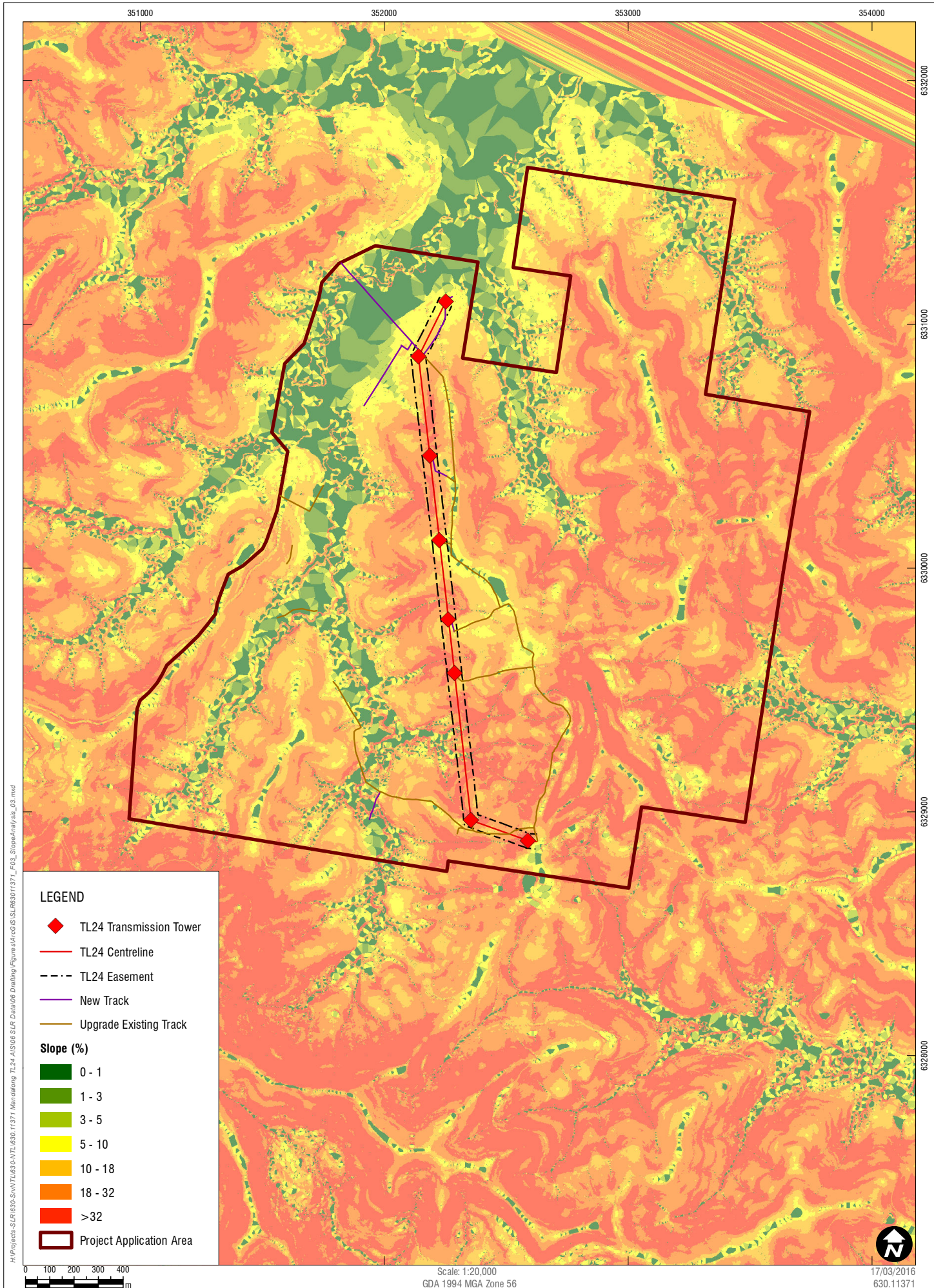
#### 2.3.2 Groundwater

The *Water Impact Assessment* (GHD, 2015) found the groundwater sources within the Project Application Area are predominantly within the Quaternary alluvium, weathered and/or fractured sandstone and coal seams. Due to the relatively high silt and clay content of the alluvium, the groundwater sources are generally low yielding and are classified as 'less productive' according to the NSW Office of Water (NOW) *NSW Aquifer Interference Policy* (NOW, 2012), as the yields are generally less than 5 litres per second and/or the total dissolved solids concentration is typically greater than 1,500 milligrams per litre.











### 2.3.3 Licenced Water Users

The interception and extraction of surface water and alluvial groundwater within the Project Application Area is regulated under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (NOW, 2009). The coal seam and sandstone groundwater sources are not currently managed under any Water Sharing Plans.

The Water Sharing Plan allows access to water within the South Lake Macquarie area for basic landholder rights of 0.07 megalitres per day, with extraction licences in the South Lake Macquarie Area totalling 167 megalitres per year of surface water entitlement.

The *Water Impact Assessment* (GHD, 2015) identified five water access licences within the vicinity of the Project Application Area, including designated water sources associated with the Dora Creek Water Source and the North Lake Macquarie Water Source. The exact location of these extraction points is not known, with available information on these water users shown in **Table 2**.

**Table 2 Licenced Water Users**

Licence Number	Approval Number	Lot/DP	Annual Allowance (ML)	Use
17939	20CA207242	55/9632	35	Farming/Industrial Irrigation
17935	20CA207224	A/110119	54	Irrigation
17936	20CA207224	902/541065	54	Irrigation
17926	20CA207238	2/557230	88	Irrigation
17931	20CA207244	53/755238	78	Industrial/Irrigation

Source: *Water Impact Assessment* (GHD, 2015)

There are no registered groundwater users within the Project Application Area. The closest registered groundwater user is approximately three kilometres to the north-east.

Morans Creek is considered intermittent with limited or zero flow during low rainfall periods suggesting that dependence by downstream agricultural users on flows from this watercourse would be limited.

## 2.4 Geology

The Project Application Area is located in the south-western part of the Newcastle Coalfield, which occupies the north-eastern portion of the Sydney Basin. The coal seams found here are the Wallarah seam and the Great Northern seam, which together form the upper part of the Permian Newcastle Coal Measures.

Above the Wallarah and 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.

## 2.5 Soil Landscape Units

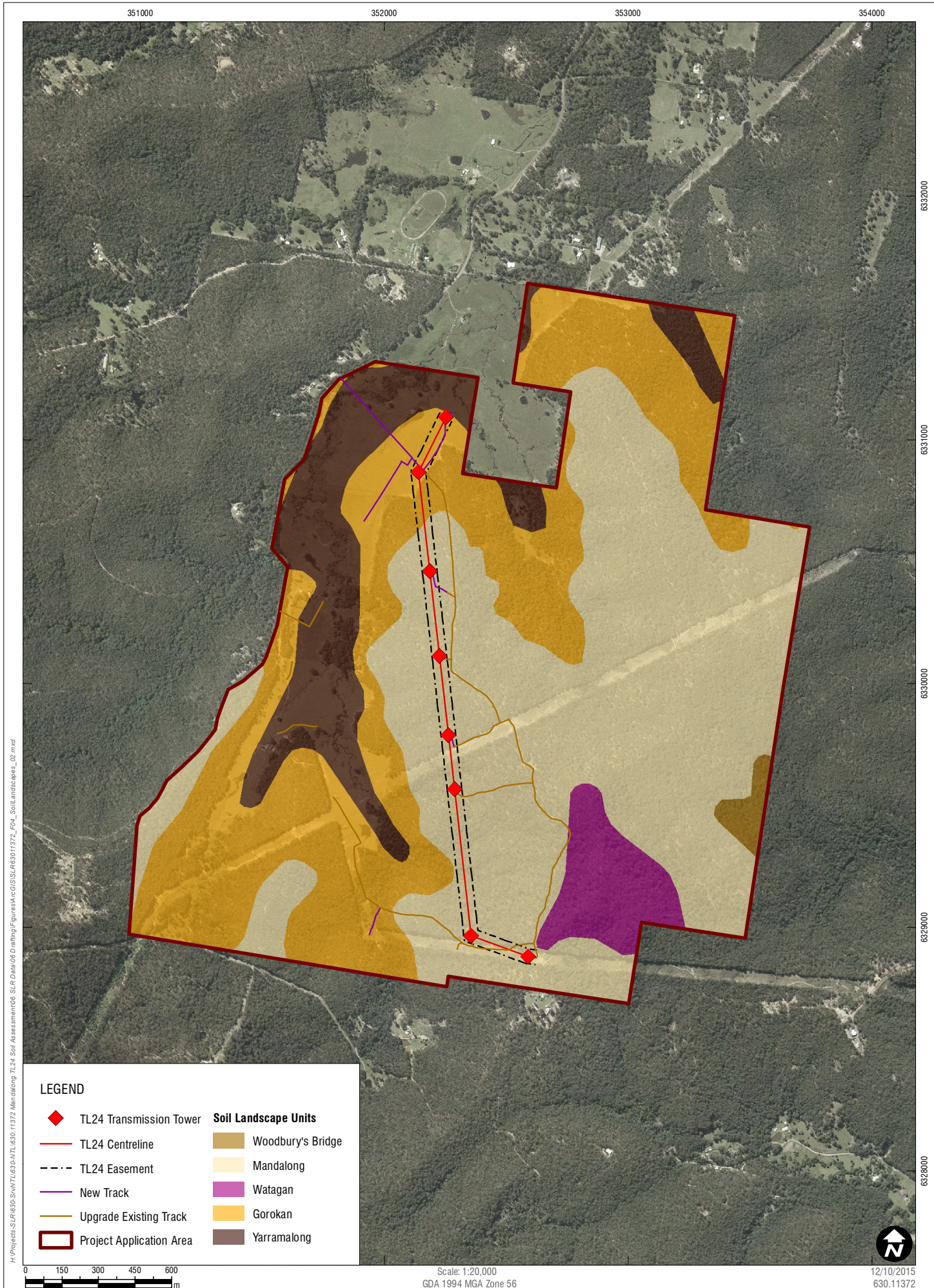
The Soil Landscapes Units within the Project Application Area have been mapped by the former NSW Department of Land and Water Conservation, incorporating the NSW Soil Conservation Service (now part of NSW Department of Primary Industries (DPI)), on the *Soil Landscapes of the Gosford – Lake Macquarie Sheet 1:100 000 Sheet* (Murphy, 1993) shown in **Figure 4**. Full descriptions of each soil landscape can be found in the Project's *Soil and Land Resource Assessment* (SLR, 2015a). Below is a summary of the key agricultural features of each Soil Landscape Unit:

- Five soil landscapes occur in the Project Application Area and are summarised in **Table 3**.
- The majority of the Project Application Area (88%) is highly to severely constrained for cultivation (cropping) enterprises.
- Land that is highly to severely constrained for any agricultural enterprises includes the Mandalong and Watagan Soil Landscape Units, which together cover 54% of the Project Application Area.
- Agricultural land best suited to grazing enterprises includes the Gorokan and Woodbury's Bridge Soil Landscape Units, which covers 34% of the Project Application Area.
- Agricultural land suited to both cultivation and grazing enterprises is associated with the Yarramalong Soil Landscape Units, which covers 12% of the Project Application Area.

**Table 3 Soil Landscape Units**

Soil Landscape Unit	Project Application Area		Agricultural Limitation Rating	
	Hectares	%	Grazing	Cultivation
Mandalong	271	50	High – Severe	High – Severe
Watagan	22	4	High – Severe	High – Severe
<b>Subtotal</b>	<b>293</b>	<b>54</b>		
Gorokan	176	33	Low	High – Severe
Woodbury's Bridge	4	1	Moderate	High – Severe
<b>Subtotal</b>	<b>180</b>	<b>34</b>		
Yarramalong	67	12	Low – Moderate	Low – Moderate
<b>Subtotal</b>	<b>67</b>	<b>12</b>		
<b>Total</b>	<b>540</b>	<b>100</b>		







## 2.6 Dominant Soil Types and Inherent Fertility

The dominant soil types within the Project Application Area were initially ground-truthed at the scale of 1:100,000 by GSSE (now SLR) as part of the *Mandalong South Extension Project Soil and Land Capability Assessment* (GSSE, 2013), and further confirmed during the *Land and Soil Resource Assessment* (SLR, 2015a) conducted for the Project as shown in **Figure 5**. These soil types are summarised in **Table 4**, and the major points listed below.

- Four major soil orders are present in the Project Application Area: Kurosols, Chromosols, Sodosols and Dermosols.
- Kurosols are soils that have a strong texture contrast between the topsoil and subsoil horizons and contain strongly acidic subsoil and comprise 51% of the Project Application Area.
- Chromosols are soils that have a strong texture contrast between the topsoil and subsoil horizons and are not strongly acidic or sodic at depth and comprise 4% of the Project Application Area.
- Sodosols are soils that have a strong texture contrast between the topsoil and subsoil horizons and contain a sodic subsoil and comprise 28% of the Project Application Area.
- Dermosols are soils with structured B2 horizons and lacking strong texture contrast between the A and B horizons. Dermosols comprise 17% of the Project Application Area.
- The Dermosol is classed as having moderately high inherent fertility whilst the other three soil types have moderately low inherent fertility.

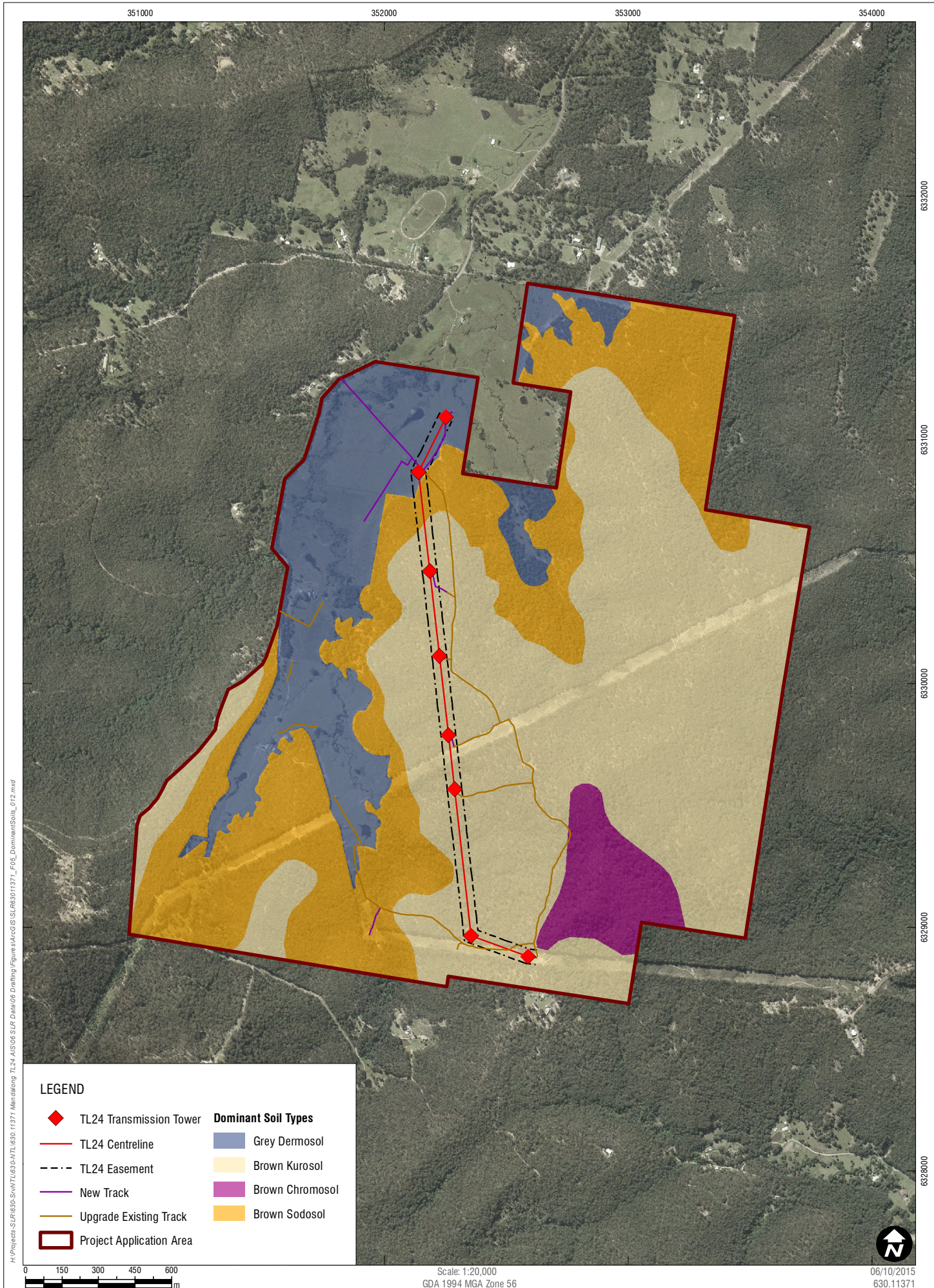
**Table 4 Dominant Soil Types and Inherent Fertility**

Australian Soil Classification	Associated Soil Landscape	Hectares	%	Inherent Fertility
Magnesian Natric Brown Kurosol	Mandalong, Woodbury's Bridge	275	51	Moderately Low
Eutrophic Brown Chromosol	Watagan	22	4	
Mesonatric Brown Sodosol	Gorokan	148	27	
Eutrophic Grey Dermosol	Yarramalong	95	18	Moderately High
<b>Total</b>		<b>540</b>	<b>100</b>	

## 2.7 Acid Sulfate Soils

The likelihood of acid sulfate soils occurring within the Project Application Area is very low due to its position away from the coast and potential acid sulfate landform type. This is supported by the Lake Macquarie City Council (2012a) Local Government acid sulfate soil maps. Furthermore, none of the Soil Landscape Units mapped within the Project Application Area have acid sulfate soil potential.







## 2.8 Vegetation and Land Use

Assessment of recent aerial images shows that the majority of the Project Application Area remains under native vegetation (approximately 80%), as shown in **Figure 2**. The remainder is land that has been previously cleared and may be suitable for agricultural enterprises. A site inspection in July 2015 by SLR's Senior Agronomist, in conjunction with a desktop assessment, has shown that small scale grazing of native grass species such as kangaroo grass (*Themeda australis*), Poa tussock (*Poa labillardierei*) and red grass (*Bothriochloa* spp.) is the dominant agricultural enterprise. No intensive cropping activities were observed at the time of the assessment.

Grazing within the Project Application Area appears to be used as a grass and vegetation management tool rather than an income generating agricultural enterprise. Overall farm size is considered small and many would be classified as hobby farms with a very low potential to produce agricultural income. Approximately 105 hectares of potential grazing land is currently available for agricultural use.

The Project Application Area borders the Olney State Forest along part of its western edge (**Figure 6**).



**Plate 1** Cleared grazing flat in the Project Application Area with grass pasture



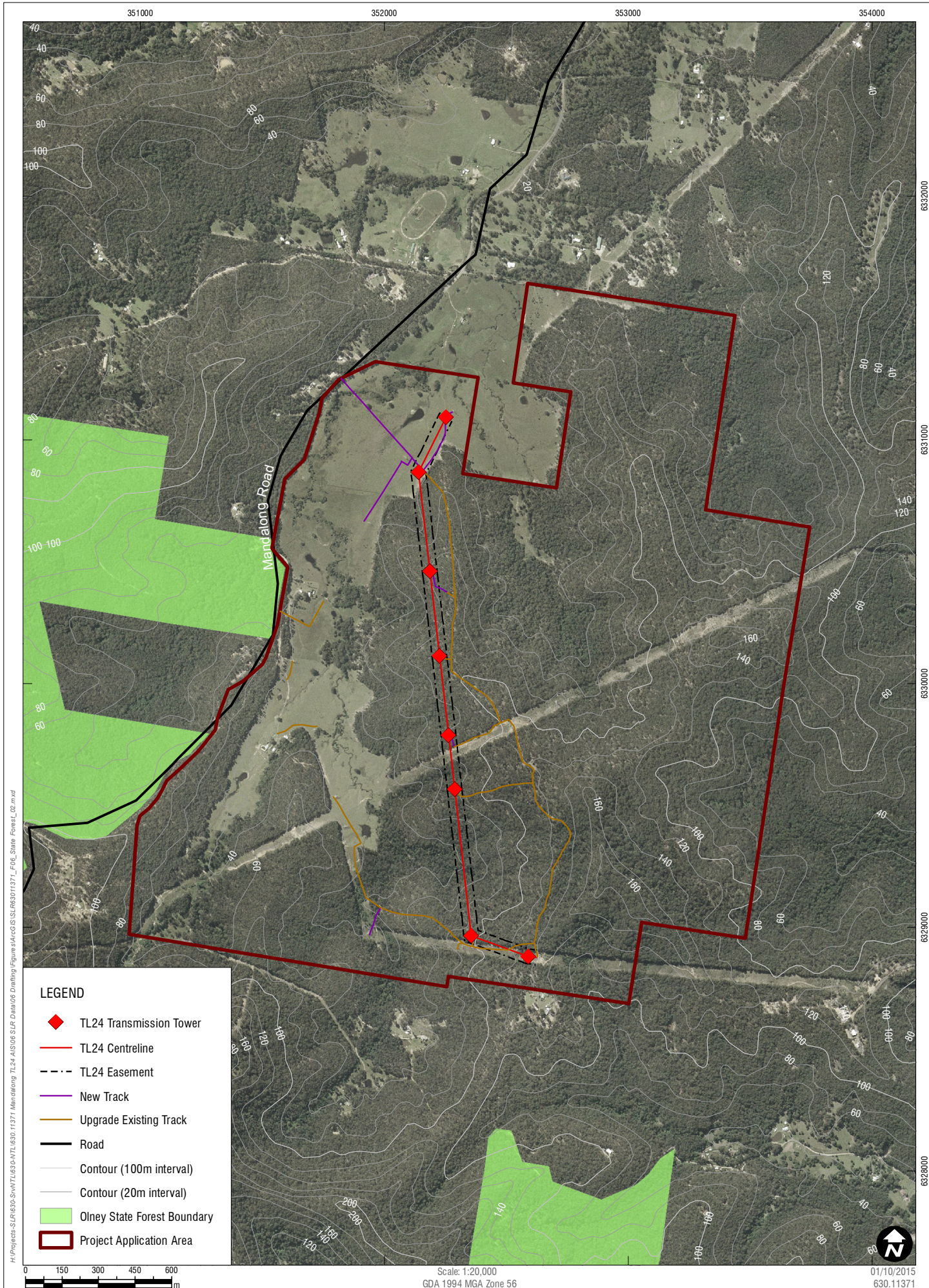


**Plate 2 Eucalypt wooded area on a steep slope within the Project Application Area**



**Plate 3 Eucalypt wooded area on a plateau the Project Application Area**







## 2.9 Land and Soil Capability Classification

In NSW the Rural Land Capability System developed by the former NSW Soil Conservation Service, which has been widely used to evaluate agricultural potential of land, has now been replaced by *The Land and Soil Capability Assessment Scheme: Second Approximation* (Office of Environment and Heritage (OEH), 2013a).

Full details regarding the Land and Soil Capability (LSC) assessment are provided in the Project's *Soil and Land Resource Assessment* (SLR, 2015a). The LSC Assessment for the Project Application Area is summarised in **Table 5** and shown in **Figure 7**. The major assessment points are listed below.

- Three dominant LSCs present in the Project Application Area are Classes 5, 6 and 7, comprising 152 hectares, 95 hectares and 293 hectares, respectively, as shown in **Figure 7**.
- LSC Class 5 land is associated with the Gorokan and Woodbury's Bridge Soil Landscape Units and is considered to have a moderately low capability that is primarily suited to grazing enterprises only. The land has high limitations for high-impact activities and covers a major portion of the Project Application Area. It comprises 28% of the Project Application Area.
- LSC Class 6 land is associated with the Yarramalong Soil Landscape Unit and is considered be low capability land restricted to low-impact land uses such as grazing, forestry and nature conservation. The land has high limitations for high-impact activities (e.g. regular cultivation) and careful management of these limitations is required to prevent severe land and environmental degradation. It comprises 18% of the Project Application Area.
- LSC Class 7 land is associated with the Mandalong and Watagan Soil Landscape Units and is considered to have a very low capability for agricultural enterprises and is suitable for green timber coverage with native vegetation. LSC Class 7 covers the major portion of the Project Application Area (54%).

Within the Project Application Area, 72% of the land area is considered to have low to very low agricultural capability according to definitions given in *The Land and Soil Capability Assessment Scheme: Second Approximation* (OEH, 2013a), whilst the remainder has a moderately low agricultural capability.

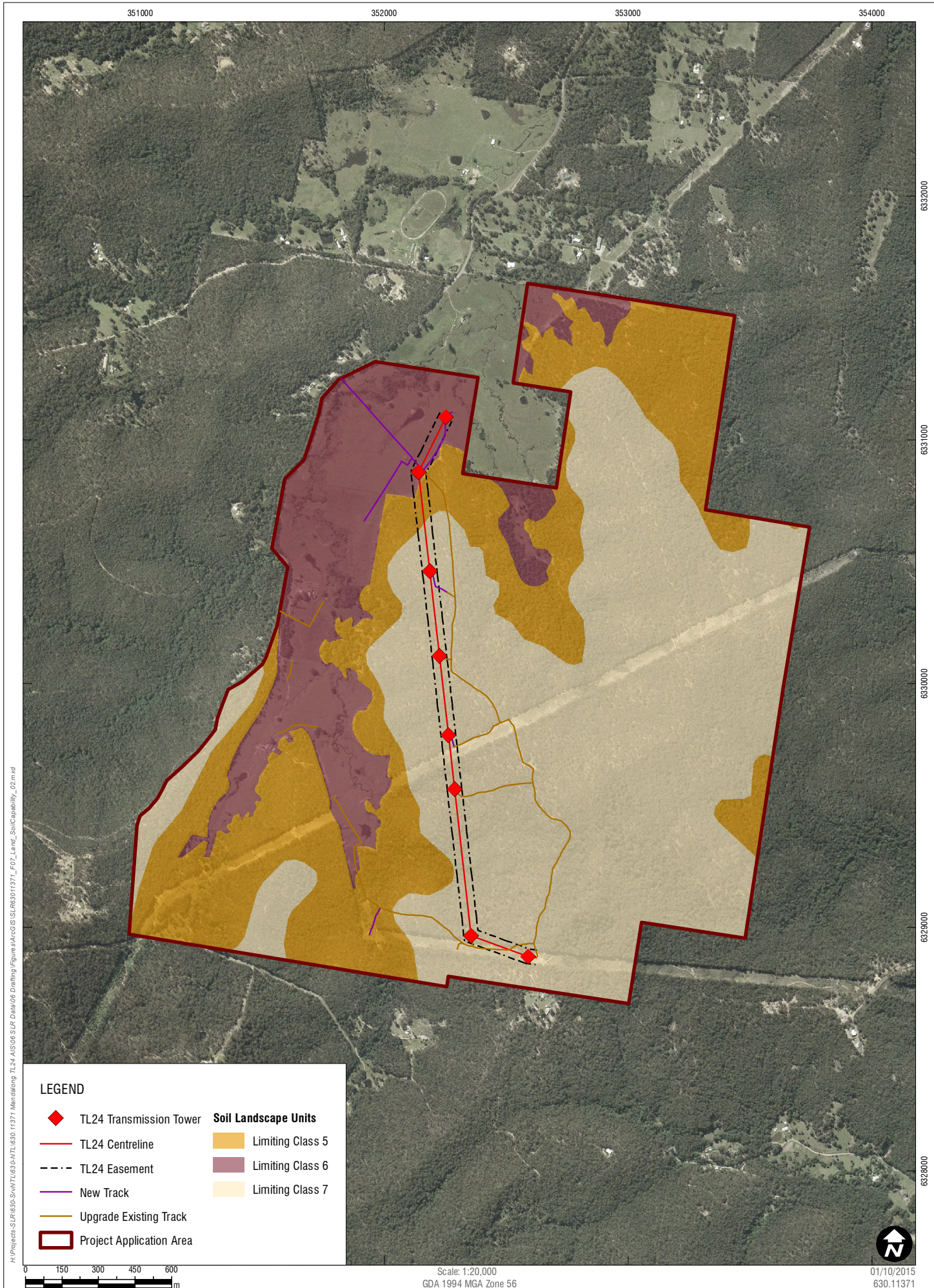
**Table 5 Land and Soil Classification**

LSC Class	Associated Soil Landscape	Associated Soil Type	Hectares	%	Agricultural Capability Rating
5	Gorokan	Brown Sodosol	148	27	Moderately Low
	Woodbury's Bridge	Brown Kurosol	4	1	
Subtotal			152	28	
6	Yarramalong	Grey Dermosol	95	18	Low
Subtotal			95	18	
7	Mandalong	Brown Kurosol	271	50	Very Low
	Watagan	Brown Chromosol	22	4	
Subtotal			293	54	
Total			540	100	

## 2.10 Biophysical Strategic Agricultural Land Assessment

The Project's *Biophysical Strategic Agricultural Land Assessment* (SLR, 2015b) found there is no BSAL within the Project Application Area according to the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (OEH, 2013b).







### 3 LOCAL AND REGIONAL AGRICULTURAL ENTERPRISES

#### 3.1 Regional Agricultural History

The Mandalong locality was settled in the mid 1850's, with farming and timber cutting being the mainstays of employment. Farming consisted of cattle and sheep grazing and some crop growing. In the late 1800's the timber industry declined and the poor soil could not sustain farming on a commercial scale. Mandalong is now regaining popularity as a hobby farming area (Lake Macquarie City Council, 2012b).

Within the Project Application Area, agricultural enterprises have traditionally been small farm enterprises conducted in pockets of cleared native bushland, reliant upon off-farm income to be sustainable. Cattle grazing, pleasure horse agistment and small orchard areas are the main agricultural activities in the area.

#### 3.2 Agricultural Enterprises and Associated Industries

##### 3.2.1 Regional Land Use

The agriculture land uses for the Lake Macquarie LGA were taken from the Australian Bureau of Statistics (ABS) Census Data (2011) and is displayed in **Table 6**. The major points are summarised below.

- Agriculture is a minor land use for the regional area, accounting for 6% of land use.
- Agricultural land is almost exclusively used for grazing, utilising more than 99% of all agricultural land. The primary enterprise is meat cattle farming, which accounts for 70% of livestock numbers, followed by milk cattle (30%). There is no sheep or pig farming present in the LGA.
- Cropping enterprises comprise a very minor portion of agricultural activities. The primary crops grown are vegetables, fruit and other non-cereal crops. No cereals for grains are grown in the region.
- Minimal irrigation cropping is carried out with agriculture only a minor water user in the Lake Macquarie LGA, with 325 ML used for irrigation and an additional 179 ML utilised for other agricultural purposes, such as poultry and egg production.

**Table 6 Lake Macquarie LGA Agricultural Land Use**

Classification	Units	Lake Macquarie LGA
<b>Agricultural Land Area</b>		
Total land area within LGA	Hectares	64,020
Area of agricultural land	Hectares	3,763
Proportion of agricultural land	%	6
<b>Agricultural Enterprise</b>		
Land under cropping activities	Hectares	18
Land under grazing activities	Hectares	3745
Proportion of agricultural land used for grazing	%	>99
<b>Grazing Enterprises</b>		
Sheep, lambs and pigs	Number	0
Meat cattle	Number	776
Milk cattle (excluding house cows)	Number	328



Classification	Units	Lake Macquarie LGA
Total	Number	1,104
<b>Cropping Enterprises</b>		
Cereals for grain	Hectares	0
Vegetables for human consumption	Hectares	6.6
Orchard trees (including nuts)	Hectares	5.5
All fruit (excluding grapes)	Hectares	6.1
Total land cropped	Hectares	18.2
<b>Irrigation</b>		
Irrigation volume applied	Megalitres	325
Other agricultural uses	Megalitres	179
Total water use	Megalitres	504

### 3.2.2 Regional Employment

Agriculture is a very minor employer in the Lake Macquarie LGA, according to the ABS Census Data (2011), there were 83,592 persons employed in the Lake Macquarie LGA, with agriculture accounting for only 0.3% of this total (2,508 people).

The majority of persons employed in agriculture work in poultry farming and processing, horse farming, vegetable production and floriculture production.

### 3.3 Regional Agricultural Production Value

Agricultural production values for the Lake Macquarie LGA (ABS, 2011) totals \$27.3 million per annum, as presented in **Table 7**. The main agricultural production by value is from nurseries and cut flowers, along with poultry (meat and eggs).

**Table 7 Regional Agricultural Production**

Agricultural Production Gross Value	Total (million)
Nurseries and cut flowers	\$11.2
Livestock slaughtering	\$2.4
Livestock products (including eggs)	\$13.7
<b>Total gross agricultural production</b>	<b>\$27.3</b>

### 3.4 Potential Agricultural Production Value of the Project Application Area

Potential agricultural productivity was determined using Department of Primary Industries (DPI) agricultural gross margin productivity data for agricultural enterprises suitable for each of the LSC classes (see **Section 2.9**) that are present within the Project Application Area. This analysis has been undertaken on the potential capability of the land rather than current land use. If potential agricultural production values were to be pursued, significant investment in land management and agricultural infrastructure would be required. However this information can be used to approximate potential farm incomes.

The *Beef Cattle Gross Margin Budget Yearling Southern/Central NSW* (DPI, 2012) has been applied to this assessment to determine potential agricultural income for the Project Application Area. The *NSW Department of Primary Industries Beef Stocking Rates & Farm Size* (DPI, 2006) was used to determine stocking rates in Dry Sheep Equivalents for the three LSC's found within the Project Application Area. Full agricultural gross margin information is contained in **Appendix A**.

**Table 8** summarises the potential gross margins for each applicable agricultural enterprise per LSC Class. The major points are listed below.

- Class 5 land has the potential to generate approximately \$109 per hectare from beef cattle grazing enterprises (yearling beef production).
- Class 6 land has the potential to generate approximately \$82 per hectare from beef cattle grazing enterprises (yearling beef production).
- Class 7 land has the potential to generate approximately \$54 per hectare from beef cattle grazing enterprises (yearling beef production).

**Table 8 Gross Margin per LSC Class**

LSC	Carrying Capacity	Cow and Calf Equivalent	Revenue	Variable Costs	Gross Margin
Class	Dry Sheep Equivalent	Per Hectare	Per Hectare	Per Hectare	Per Hectare
5	4	0.24	\$135	\$26	\$109
6	3	0.16	\$101	\$19	\$82
7	2	0.12	\$67	\$13	\$54

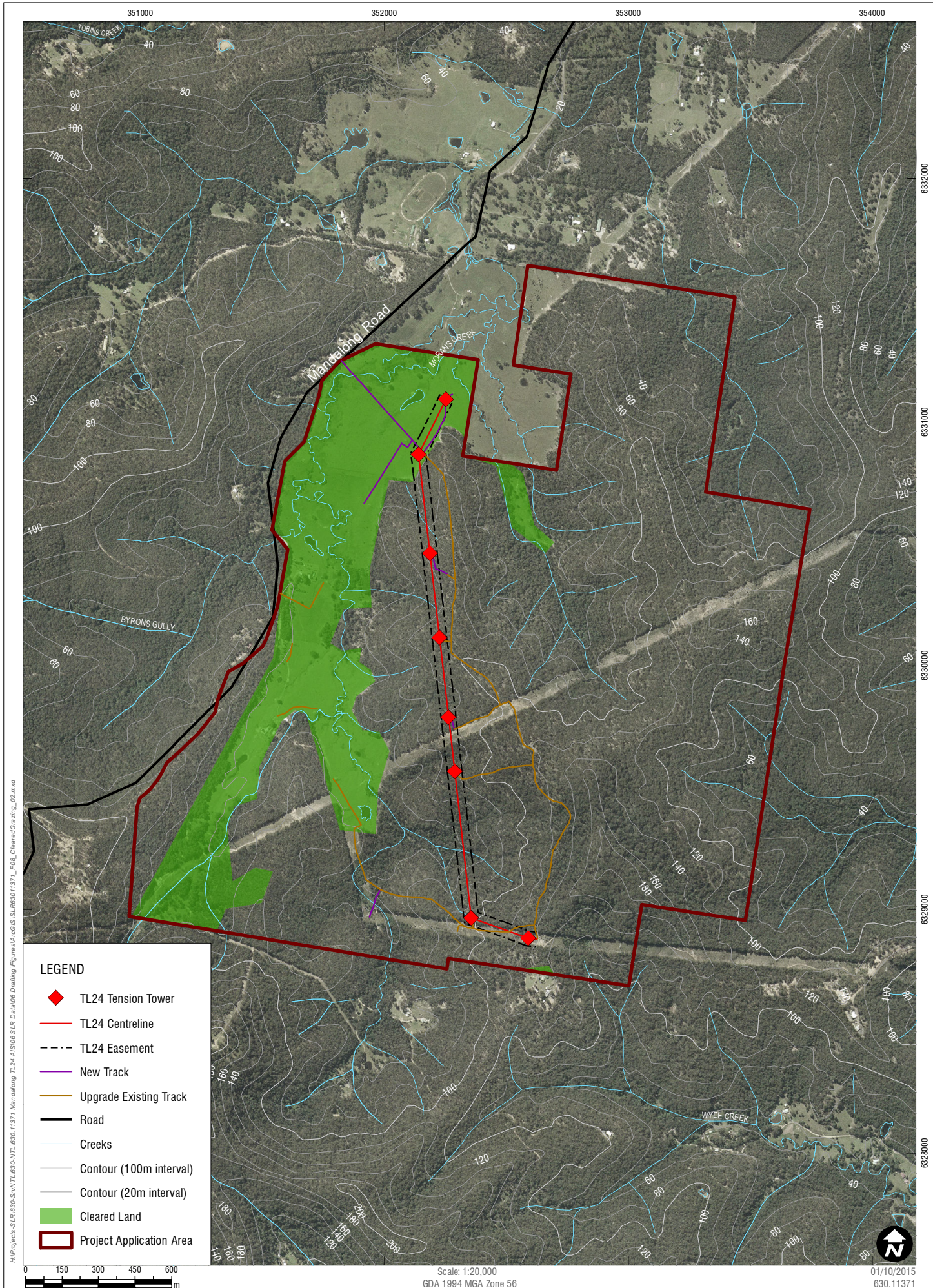
Based on the nominated gross margins, and assuming the required agricultural capital costs and fixed costs are outlaid (not included in the calculations in **Table 8**, the Project Application Area has the capacity to generate an estimated gross margin of \$40,180 per annum (see **Table 9**). It is important to note that these figures are derived from the optimum potential uses and are likely to be much higher than the actual incomes being achieved from the area under actual production.

**Table 9 Annual Gross Margins per LSC Class**

LSC	Gross Margin	Project Application Area	
Class	Per Hectare	Hectares	Gross Margin
5	\$109	152	\$16,568
6	\$82	95	\$7,790
7	\$54	293	\$15,822
<b>Total</b>		<b>540</b>	<b>\$40,180</b>

It is expected that income generated from agricultural enterprises within the Project Application Area would be minimal due to the small area (105 hectares) available for actual agricultural production (**Figure 8**). The majority of this cleared area is LSC Class 6 and using the gross margin information presented in **Table 8**, this area has a potential gross margin of \$8,610 per annum.







### **3.5 Agricultural Support Infrastructure**

Agricultural support infrastructure within the Lake Macquarie LGA includes the Sydney-Newcastle M1 Motorway as the major arterial road, and rail infrastructure providing transport from agricultural areas in the west and north of the state.

The main purpose-built agricultural support infrastructure is a number of large poultry sheds, which are used for raising meat chickens and egg production. There are a number of small retail agricultural suppliers that service the numerous hobby farms in the region. Outside of this, there is little formal infrastructure for the support of agricultural industries in the Lake Macquarie LGA.

Poultry processing is conducted outside the Lake Macquarie LGA. The Inghams Enterprises poultry processing facility (abattoir) is located at Mangrove Mountain in the Gosford LGA, while other poultry processors are located at in the Newcastle LGA (Baiada Poultry), Cessnock LGA (Valley Feeds) and Blacktown LGA (Red Lea).

## **4 ASSESSMENT OF POTENTIAL IMPACTS**

As outlined in **Section 1.2**, there is an area of potential surface disturbance associated with moving the transmission line. Within the area available for agricultural production it accounts for approximately two hectares, which is the cleared area at the very north of the TL24 transmission line.

### **4.1 Land Resources**

#### **4.1.1 Land Temporarily Removed From Agriculture**

The Project's surface disturbance will temporarily remove approximately two hectares of cleared LSC Class 6 land from potential cattle grazing during the life of the Project (approximately 12 months). However for the purpose of this assessment it is assumed the whole paddock (28 hectares) will be unavailable for potential cattle grazing for 12 months.

Using potential agricultural productivity information described in **Section 3.4**, the estimated net annual economic impact on potential agricultural productivity as a result of the temporary loss of land is \$2,296 for the 12 month period. When compared to the gross annual value of agricultural production for the Lake Macquarie LGA (\$27.3 million), the surface disturbance associated with the Project is considered a negligible impact on agricultural enterprises and related industries.

#### **4.1.2 Land Permanently Removed From Agriculture**

There is no land which will be permanently removed from agriculture as a result of the Project.

#### **4.1.3 Acid Sulfate Soils**

As outlined in **Section 2.7** there are no Soil Landscape Units associated with the Project Application Area with acid sulfate potential. The Project will not impact upon Acid Sulfate Soils.

### **4.2 Water Resources**

#### **4.2.1 Surface Water**

The primary potential impact on surface water resources is the mobilisation of sediment during construction of TL24, with mitigation measures to minimise this potential detailed in **Section 5.2**. GHD (2015) concludes that the Project is unlikely to cause short or long term impacts on surface water quality or quantity within the Project Application Area or further downstream.

#### **4.2.2 Groundwater**

The Project does not intercept any aquifers and will not impact groundwater resources (GHD, 2015) and as such will not require an aquifer interference licence.

#### **4.2.3 Water Reallocation**

The Project does not involve the purchase of any surface or groundwater licences. There will be no impact from the Project through water reallocation.

#### **4.2.4 Water Resource Impacts on Agricultural Productivity**

Given the very limited impacts described previously, the Project will result in negligible impacts on water resources relied upon by agricultural enterprises and will not result in any impact on agricultural productivity.

#### **4.2.5 Impact on Biophysical Strategic Agricultural Land**

There is no Biophysical Strategic Agricultural Land within the Project Application Area (SLR, 2015b). The Project will not impact any Biophysical Strategic Agricultural Land.

#### **4.3 Impact on Agricultural Resources from Biodiversity Offsets**

The proposed biodiversity offset for the Project is located in the eastern portion of the Project Application Area which is covered in native vegetation and not used for agricultural production. The major proportion of this area is LSC Class 7. Therefore there will be no impact to agricultural resources from biodiversity offsets.

#### **4.4 Impact on State Forests and Conservation Areas**

The Project does not impact State Forest or Conservation Areas.

#### **4.5 Other Impacts**

##### **4.5.1 Visual Amenity and Landscape Values**

The Project Application Area lies within a landscape context of sloping and ridgeline formations with moderate to dense tree cover and a high visual absorption capacity. Field inspection by SLR's Senior Agronomist did not identify any agricultural enterprises which were reliant upon visual amenity or landscape values as component of their operations. On this basis, the Project is considered to have negligible impact on visual amenity and landscape value relied upon by local and regional agricultural enterprises.

##### **4.5.2 Tourism**

The assessment has not identified any tourism infrastructure in the local area upon which agricultural enterprises are reliant. Therefore the Project is not anticipated to impact on agriculture-related tourism.

##### **4.5.3 Weed Management and Biosecurity**

There is moderate risk from weeds during the construction phase of the Project through continued vehicle movements on and off-site. Weeds will be managed within the frameworks of the Construction Environmental Management Plan, which will include issue-specific environmental management plans and monitoring programs, such as weed control prior to any soil stripping. Giant Parramatta grass (*Sporobolus fertilis*) (**Plate 4** and **Plate 5**) has been identified by one stakeholder as a weed with potential for concern. Continued inspection for weed germination will be conducted during the Project.

Where Giant Parramatta grass is identified control will be undertaken with registered herbicides including glyphosate, 2,2-DPA or flupropanate.



**Plate 4 Giant Parramatta grass mature plant    Plate 5 Giant Parramatta grass seed head**

Biosecurity is defined in the *NSW Biosecurity Strategy 2013 – 2021* (DPI, 2013) as ‘protecting the economy, environment and community from the negative impacts of pests, diseases and weeds’. It includes measures to prevent new pests, diseases and weeds from entering our country and becoming established. On a regional level, appropriate weed management will reduce biosecurity risks. Any import of equipment or machinery from overseas will follow the standard procurement safeguards and quarantine procedures as per Australian requirements.

Given the processes above, it is considered the Project is unlikely to represent an increased risk to the biosecurity of agricultural resources and enterprises within the region.

#### **4.5.4 Air Quality**

The Project's *Air Quality Impact Assessment* (SLR, 2015b) modelled particulate dispersion for the Project, measuring cumulative impacts upon dust deposition, total suspended particulate matter (TSP), particular matter with an equivalent aerodynamic diameter of 10 microns or less (PM<sub>10</sub>) and particular matter with an equivalent aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>).

##### **Dust Deposition**

The incremental and cumulative annual average dust deposition rates are predicted well below the NSW EPA incremental criterion of 2 g/m<sup>2</sup>/month and the cumulative deposition criterion of 4 g/m<sup>2</sup>/month during all scenarios. Therefore, dust deposition is expected to have negligible impact upon agricultural resources and enterprises.

##### **Total Suspended Particulates**

Total Suspended Particulate (TSP) concentrations are predicted to be well below the NSW EPA criterion of 90 µg/m<sup>3</sup> at all modelled receptors. Therefore, TSP is expected to have negligible impact upon agricultural resources and enterprises.

##### **PM<sub>10</sub> and PM<sub>2.5</sub>**

The maximum incremental contribution to the annual average PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are predicted to be well below the NSW EPA criterion of 30 µg/m<sup>3</sup> at all modelled receptors. Therefore, PM<sub>10</sub> and PM<sub>2.5</sub> are expected to have negligible impact upon agricultural resources and enterprises. On this basis, it is concluded the Project's predicted impacts on air quality will have negligible impact on agricultural resources and enterprises.

#### **4.5.5 Noise**

Generally, agriculture is only impacted by noise when constantly high noise levels leads to a decrease in animal production through increased livestock stress. The study *Responses of Farm Animals to Sonic Booms* (Casaday & Lehman, 1967) found that milk production dairy cattle was not impacted by sonic booms recorded between the range of 125 dB and 136 dB.

Results of the Project's noise modelling assessment undertaken by Global Acoustics (2015) indicates that the relevant construction noise emissions will be below the highly affected criterion of 75 dB at all sensitive receptors. On this basis, noise is highly unlikely to impact agricultural production within the area.

#### **4.5.6 Blasting**

The Project does not involve any blasting as such there will be no impact to agricultural resources from blasting.

#### **4.5.7 Traffic**

The *Traffic Impact Assessment* (Intersect Traffic, 2015) found that the Project will not adversely impact on the local road network. On this basis, the impact to agricultural resources and enterprises as a result of increased traffic movements associated with the Project is considered negligible.

### **4.6 Other Agricultural Regional Community Impacts**

No other impacts which may affect the regional agricultural community, resource or enterprises were identified in this assessment.



## 5 MITIGATION MEASURES

As part of the Mandalong Southern Extension Project numerous mine layouts were developed in response to information being received on geological, geotechnical, environmental and surface infrastructure constraints. Impact to TransGrid's infrastructure was minimised by the mine layout, however it was not possible to avoid the lines altogether. As such, a feasibility study was been undertaken by TransGrid which determined that the best option was to relocate a section of TL24 to avoid undermining of the towers.

The proposed location and design was identified and selected by TransGrid as part of a Network Modification Scoping Study.

The Project Application Area 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.

The Project will have a negligible impact on surface water and groundwater resources relied on by agriculture. Measures will be detailed in the Construction Environmental Management Plan to avoid the introduction of weeds at construction and demolition sites. Top soil management will be included in the Construction Environmental Management Plan.

### 5.1 Rehabilitation of Disturbed Lands: Demonstrated Capacity

Centennial Mandalong operates the Mandalong Mine which is an underground mine located to the north of the Project Application Area in the Lake Macquarie LGA. In order to demonstrate Centennial Mandalong's capacity for rehabilitation, examples of successful rehabilitation of surface disturbance are taken directly from the *2014 Centennial Coal Mandalong Mine Annual Environmental Management Report* (AEMR) (Centennial, 2014). The majority of Mandalong Mine site has been rehabilitated following the completion of construction activities in 2005. Rehabilitated sections of the Mandalong Mine's surface area are well established and have provided vegetation cover to effectively minimise the potential for erosion.

Centennial Mandalong will utilise successful rehabilitation techniques developed and refined at Mandalong during the life of the Project. Examples of two recent successful rehabilitation activities are given in the sections below.

#### 5.1.1 VAM-RAB Installation Rehabilitation

Installation of a ventilation air methane regenerative after burner (VAM-RAB) unit in 2012 involved clearing of some native vegetation. Two endangered ecological communities were included in the areas to be cleared, Swamp Sclerophyll Forest and River-Flat Eucalypt Forest. Consent condition 76A included a requirement for a 1.25 hectare rehabilitation off-set area to be established on cleared land adjoining the VAM-RAB construction site. An ecology survey prepared by Hunter Eco for the VAM-RAB project application described the area to be rehabilitated as mostly dominated by weeds. This being the case, active regeneration was required and this was commenced in January 2012.

The progress of rehabilitation has been monitored since 2012 by Hunter Eco, who concluded that the results to date are encouraging suggesting that the measures taken should result in successful rehabilitation.

### **5.1.2 Exploration Site Rehabilitation**

Mandalong Mine carried out surface exploration at three drill sites during 2014. These three sites required minor clearing within the Olney State Forest and were rehabilitated following the sealing of the boreholes. Existing tracks were utilised to gain access to these exploration drill sites where possible and required limited vegetation clearing.

Forestry Corporation of NSW were consulted prior to commencing these works, in order for rehabilitation to meet with their land use requirements. All rehabilitation works were completed by November 2014 and inspected by a Forests NSW representative on the 20<sup>th</sup> November, 2014. Forests NSW were satisfied with the standard of the rehabilitation which had been achieved. Ongoing monitoring and maintenance of rehabilitated sites will be reported in the 2015 AEMR.

## **5.2 Demonstrated Planning for Progressive Rehabilitation**

Progressive rehabilitation for the Project will be undertaken on areas of disturbance as soon as reasonably practicable. Centennial Mandalong's principal rehabilitation objectives for the Project include:

- Achieve an acceptable post-disturbance land use.
- Commencing progressive rehabilitation of disturbed areas as soon as practicable.
- Creating a stable post-construction landform that is consistent with surrounding areas and preserves downstream water quality.

In addition to the above key rehabilitation objectives, the Centennial Environment and Community Policy also makes specific reference to:

- Making appropriate decisions which comply with or exceed approvals, licences and agreements.
- Working constructively with local authorities, stakeholders and communities.
- Contributing to the conservation of biodiversity.
- Planning, designing and closing operations in a manner that enhances sustainable development.
- Engaging and communicating openly with communities, with due regard and respect for local interests, cultures and customs.

Centennial Mandalong has committed to a policy of post-mining land use being consistent with the pre-mining land use, including woodland and grassland commensurate with the surrounding area.

Regular monitoring of rehabilitated areas will occur during the initial vegetation establishment period and beyond, to demonstrate whether the rehabilitation objectives are being achieved and whether a sustainable environment has been provided. In the event that monitoring confirms that rehabilitation is not successful or has achieved limited success, maintenance works will be undertaken to address the issue.

## 6 STAKEHOLDER CONSULTATION

Centennial Mandalong has undertaken consultation with government agencies, local Aboriginal groups, the Mandalong Mine Community Consultative Committee, surrounding residents and the wider community and service providers during pre-feasibility, feasibility and planning stages of the Project. Prior to the commencement of the Project, a *Stakeholder Engagement Strategy* was developed to provide a consistent management framework for the identification and consultation with stakeholders that have an interest in the Project. The objectives of the *Stakeholder Engagement Strategy* are to:

- Establish a process for engagement with stakeholders, with clear outcomes for Centennial Mandalong and the various stakeholders.
- Openly communicate with stakeholders about the Project.
- Provide a means of community access to the Centennial Mandalong Project Team via a dedicated information phone line.

A number of different strategies for communicating with the community throughout the Project were identified and undertaken, including:

- The Mandalong Mine Community Consultative Committee.
- Meetings with individual landowners and stakeholders.
- Community newsletters.
- Community open days and information sessions.

Full details of consultation undertaken by Centennial Mandalong are contained in the Statement of Environmental Effects prepared for the Project.

Two issues regarding impacts to agricultural resources, enterprises or stakeholders were raised during the extensive consultation process. Stakeholder concern has been expressed over the potential for:

- Giant Parramatta grass to be spread as a result of the Project. Control of Giant Parramatta grass, which is described in **Section 4.5.3** (Weed Management and Biosecurity).
- Increased tunnel soil erosion as a result of the Project. Mitigation measures to minimise the potential for increased soil tunnel erosion are described in **Section 5.1.2** (Soil and Water Resources).

Centennial Mandalong is committed to on-going community consultation and will continue to engage with the community for the purposes of providing information relating to the Project and on-going operations of Mandalong Mine.

## 7 KEY FINDINGS

This Agricultural Impact Statement has been prepared for the Mandalong Transmission Line TL24 Relocation Project in accordance with the *Strategic Regional Land Use Policy* (DP&I, 2012a) and *Guideline for Agricultural Impact Statement* (DP&I, 2012b).

The purpose of this Agricultural Impact Statement is to assess and report on the potential impacts of the project on agricultural resources and/or industries within and surrounding the Project Application Area with key findings listed below:

- Within the Project Application Area 20% (105 hectares) of the total area could be utilised for agricultural production in its current form, with a potential gross margin of \$8,610.
- The majority of agricultural land use within the Project Application Area is for hobby farms and small cattle grazing areas, which are not major contributors to income generation. Grazing is mostly carried out as a land and vegetation management tool.
- There will be approximately 28 hectares of Land & Soil Capability Class 6 land within the Project Application Area temporarily removed from potential agricultural production for a period of approximately 12 months.
- There is no Biophysical Strategic Agricultural Land within the Project Application Area.
- The Project will have no impact on groundwater resources or surface water resources relied upon by agriculture.
- The Project will have no impact on noise, air quality, visual amenity, tourism or traffic relating to agricultural resources and enterprises.
- Two issues raised regarding potential impacts to agricultural resources by stakeholders during the consultation process have been addressed in the mitigation of potential impacts resulting from the Project in **Section 6**.
- Any impacts resulting from the Project are expected to be temporary and can be managed through application of appropriate mitigation measures and management strategies.

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