# NOWA NOWA IRON PROJECT

## ATTACHMENT 11 :

## LAND AND WATER USE STUDY

Prepared for Eastern Iron Limited by Earth Systems

**REVISION 1**

EARTH SYSTEMS
Environment | Water | Sustainability

EASTERN IRON LIMITED

October 2013


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| | | | |

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# Annexes

# Abbreviations

| | |
|---|---|
| ANZECC | Australian and New Zealand Environment Conservation Council |
| ASX | Australian Securities Exchange |
| BOM | Bureau of Meteorology |
| Bonn Convention | Convention on the Conservation of Migratory Species of Wild Animals |
| CAMBA | China-Australia Migratory Bird Agreement |
| CMA | Catchment Management Authority |
| DAFF | Department of Agriculture, Fisheries and Forestry (Federal Government) |
| DSE | Department of Sustainability and Environment (State Government), now DEPI |
| DPCD | Department of Planning, Community and Development (State Government), now DTPLI |
| DPI | Department of Primary Industries (State Government), now DEPI |
| DEPI | Department of Environment and Primary Industries (State Government) |
| DTPLI | Department of Transport Planning and Local Infrastructure (State Government) |
| EES | Environmental Effects Statement |
| EGCMA | East Gippsland Catchment Management Authority |
| EPBC Act | Environment Protection and Biodiversity Conservation Act |
| JAMBA | Japan-Australia Migratory Agreement |
| MOU | Memorandum of Understanding |
| Mt pa | Million Tonnes Per Annum |
| ROKAMBRA | Republic of Korea-Australia Migratory Bird Agreement |
| SEFE | South East Fibre Products |

# Executive Summary

## *Introduction*

Eastern Iron Limited ('Eastern Iron'), through its wholly owned subsidiary Gippsland Iron Pty Ltd, proposes to develop the Nowa Nowa Iron Project ('the Project'). The Project is a greenfield development of a high grade magnetite/hematite deposit generally referred to as '5 Mile'. It is located approximately 7 km north of the township of Nowa Nowa, which is situated on the Princes Highway between Bairnsdale and Orbost in East Gippsland, Victoria.

Earth Systems has been commissioned by Eastern Iron to prepare this *Land and Water Use Study* to support a referral to the Minister for Planning for advice as to whether an Environment Effects Statement is required for the Project pursuant to the *Environment Effects Act* 1978 ('EES Referral').

The objectives of this *Land and Water Use Study* are to:

- Describe the main regional and local land and water resources in the area of the proposed mine site;
- Determine the social, economic and cultural significance of the land and water resources to the local community and other stakeholders, and describe current resource use (including public land use);
- Describe current land tenure and land use planning in the vicinity of the Project;
- Describe upstream and downstream land and water resource use on the main river systems relevant to the Project;
- Assess the potential impacts on land and water resource uses in the vicinity of the Project; and
- Propose measures to avoid, mitigate and manage any potential adverse effects identified.

Indigenous land and water use and native title rights are covered in detail in the ***Aboriginal Cultural Heritage Management Plan Interim Report*** (EES Referral Attachment 10), and are therefore only briefly addressed in this report.

The purpose of this report is to support the EES Referral and, therefore, the focus of the report is on the components of the Project within Victoria. The Project components at the South East Fibre Exports (SEFE) wharf in Edrom, NSW will be subject to approval under the NSW planning system.

## *Land Use Setting*

No landscape or environmental significance overlays were identified in the vicinity of the proposed mine site, and no landscape values of regional or State significance have been identified in the area.

The proposed mining area is located entirely on Crown Land within the Tara State Forest which is zoned as a Public Conservation and Resource Zone (PCRZ), and currently managed by the Victorian Department of Environment and Primary Industries (DEPI) primarily for timber harvesting. This area is currently significantly disturbed from previous logging activities, with most of the area having been logged over the last 60 years. Several recently cleared logging coupes are present in the area, with additional logging proposed in the current Timber Release Plan.

In addition to timber harvesting, the Tara State Forest is utilised for small-scale apiculture and biodiversity conservation, and is also available for recreational use, although rarely used for this purpose. There are no designated recreation areas within the Project Area (e.g. picnic, camping, walking tracks). The closest recreational (walking tracks) are located at Lake Tyers and Nowa Nowa.

No agricultural or urban land is located in the vicinity of the proposed mine site, with the closest farmland located at least 2 km from the mine site, and the nearest residences being isolated farmhouses located over 3 km from the mine site. The nearest community is the farming hamlet of Wairewa located 4 km away. The Nowa Nowa-Buchan road runs through the area of the proposed mine site, which is an unsealed road with a low volume of traffic (mainly used by forestry vehicles). An existing 22 kV transmission line is located adjacent to the proposed mine site, running along the eastern side of the sealed Bruthen-Buchan Road.

### *Potential Impacts on Land Use*

As the mine site and surrounding areas are located entirely within Crown Land in the Tara State Forest, the primary land use impact on this area will be associated with vegetation clearance and landform alteration which will temporarily displace forestry activities, with approximately 146 ha of forest expected to be removed for the Project. No residential or agricultural land uses are expected to be impacted by the proposed mine site, as no such areas occur within 2 km of the site.

The Project will not affect landscape values of regional or State significance, as no such values have been identified in the area. Potential impacts on landscape values and visual amenity due to the presence of the mine site are expected to be negligible as the area is surrounded by State Forest and no residential areas or tourist sites occur in the vicinity. Disturbed land will also be progressively rehabilitated and revegetated to minimise potential impacts on landscape values.

The majority of the forest within the proposed mine footprint was previously harvested between 1960 and 1969 and the regrowth is expected to be of adequate size for commercial harvesting. Clearing of the site will be undertaken in accordance with an agreement with the Public Land Manger (DEPI). It is anticipated that this will be in the form of a 'Forest Produce Licence' (or similar). At closure, it is anticipated that the mine site will be rehabilitated and vegetated with the aim of returning the land to timber production where possible. The impacts on forestry activities in the areas that are able to be returned to production forest will therefore be temporary.

Other minor impacts on land use associated with the development of the mine site include potential indirect impacts on recreational activities and small-scale apiculture. While recreation activities such as hiking, bird-watching and mountain biking are undertaken in the surrounding area (and particularly around Mt Nowa Nowa and Lake Tyers), potential impacts on recreation are not expected to be significant as there are no designated recreational or tourism areas (such as picnic areas, camping areas, walking tracks) within the proposed mine site, and observations suggest the area is rarely used for recreational activites.

Apiculture in practiced within the Tara State forest, with a number of small clusters of beehives observed in the forest surrounding the mine site. Minor impacts on apiculture in the local area may occur due to the vegetation loss resulting from the Project, however given that the area is currently actively managed for forestry activities and the surrounding area is densely forested, this impact is not expected to result in any significant reduction in overall productivity of beekeeping activities in the area.

The mine site will affect land held under Native Title by GLaWAC. Negotiations regarding the use of the mine site are currently underway and an agreement will be reached prior to Project commencement in accordance with the *Native Title Act* and other relevant legislation.

Land access to the area surrounding the mine site is not expected to be adversely impacted by the Project. A 1.8 km section of the unsealed Nowa Nowa-Buchan Road will be impacted by the mine footprint, however the Project design includes a diversion of the road around the eastern side of the mining area to maintain a through route and effectively mitigate this impact. The existing 22 kV transmission line located adjacent to the proposed mine site is not expected to be impacted.

## *Water Use Setting*

The proposed mine site occurs principally within the catchment of Boggy Creek, and is located adjacent to the boundary of the Hospital Creek Catchment. Several small creeks intersect the mine site area, which are ephemeral/intermittent and dry for most of the year. There is little standing water and no natural or man-made water bodies in the vicinity. Surface water allocations in the subcatchment of the mine site (Boggy Creek) are managed by Southern Rural Water.

The Boggy Creek catchment is classed as a Declared Water Supply Catchment, and therefore use of land within the Catchment is regulated by the *Catchment and Land Protection Act* 1994. Up until 2007, water from Boggy Creek was extracted for industrial purposes (e.g. sawmills) and as a drinking water supply for Nowa Nowa township. However the catchment is no longer used for drinking water supply as drinking water for Nowa Nowa township is now sourced from the Mitchell River. The main downstream water uses at the current time are associated with the use of Lake Tyers as a recreational area and tourist site. The main part of the lake is a popular tourist destination and is used by nearby residents and visitors for a number of shore-based and water-based recreational activities. The lake is also an important biodiversity conservation area, forming part of the Gippsland Lakes Ramsar Site (refer EES Referral Attachment 9). Beneficial uses of downstream water for aquatic ecosystems in Lake Tyers are therefore of significant importance.

There are no Groundwater Management Areas in the Nowa Nowa region. No direct utilisation of groundwater resources has been identified within 2 km of the mine site, as no residential or agricultural areas occur within this area.

## *Potential Impacts on Water Use*

The assessment of potential impacts on water use is based on the results of the ***Surface and Ground Water Baseline and Assessment*** (EES Referral Attachment 5) as well as data/information collected from field visits, consultations and GIS analyses.

While the Boggy Creek catchment remains classified as a Declared Water Supply Catchment, no impact on drinking water supplies are expected to result from the Project as water in this catchment is no longer utilised as a water supply for Nowa Nowa township and the water supply infrastructure on the creek has been decommissioned.

The primary use of water downstream of the Project is related to recreational use of Lake Tyers and ecological values associated with the Nowa Nowa Wetlands and the Gippsland Lakes Ramsar Site. No water allocations for agriculture or industry are expected to be affected for the creeks downstream of the mine site, which are ephemeral and primarily flow through State Forest before reaching Lake Tyers. The Project will need to be carefully designed and managed in accordance with Victorian regulations to ensure that no significant impacts on beneficial uses for downstream ecosystems occur. If managed effectively, no significant effects on downstream water uses are expected from the Project.

No impact on Groundwater Management Areas is expected to occur as no such areas occur in the region. No impact on use of groundwater resources (e.g. through dewatering of the pit) is expected to result from the Project as no direct utilisation of groundwater has been identified within 2 km of the mine site.

## *Summary and Conclusions*

The land and water use impacts of the Project are expected to be limited by the fact that the proposed mine site and surrounds is located on Crown Land primarily managed for timber harvesting, and no agricultural or residential areas occur nearby. The primary potential impact on land use associated with the Project development will be due to impacts on forestry activities within the Tara State Forest resulting from vegetation clearance and reduced access to land associated with the mine site area. This area

represents a very small proportion of the overall forest managed for timber harvesting in the surrounding area and is not expected to have a significant impact on forestry activities in the region. Key measures to minimise land use impacts will include minimising land disturbance and close coordination with the land managers (DEPI) to agree on the approach to land clearance and management of forestry operations in the vicinity of the Project. Other key stakeholders such as Native Title holders and local communities will also need to be consulted regarding changes in land access at the mine site. The measures outlined in this report for minimising potential impacts on land use should be incorporated into in the *Environmental Management Plan* for the Project.

With regards to water use, the primary downstream water uses are associated with recreational and conservation values within Lake Tyers, and beneficial uses for aquatic ecosystems in the wetlands and ephemeral creeks downstream. Minimization of potential effects of the Project on downstream hydrology and water quality will need to be a key focus for the Project. However, provided that appropriate management and monitoring measures are implemented, it is considered that the Project can be successfully delivered with no significant long-term impact on water resource use in the region. As the Project will be capturing and using water within the Boggy Creek Catchment, appropriate water allocations and licences will need to be obtained in consultation with Southern Rural Water and the EPA.

# 1 Introduction

## 1.1 Background

Eastern Iron Limited, through its subsidiary Gippsland Iron Pty Ltd, proposes to develop the Nowa Nowa Iron Project ('the Project'). The Project is a greenfield development of a high grade magnetite/hematite deposit generally referred to as '5 Mile'. It is located approximately 7 km north of the township of Nowa Nowa, which is situated on the Princes Highway between Bairnsdale and Orbost in East Gippsland, Victoria.

Earth Systems has been commissioned by Eastern Iron to prepare this *Land and Water Use Study* to support a referral to the Minister for Planning for advice as to whether an Environment Effects Statement is required for the Project pursuant to the *Environment Effects Act* 1978 ('EES Referral').

## 1.2 Objectives and Scope

The purpose of this *Land and Water Use Study* is to:

- Describe the main regional and local land and water resources in the area of the Project;
- Determine the social, economic and cultural significance of the land and water resources to the local community, and describe current resource use (including public land use);
- Describe current land tenure and land use planning in the vicinity of the Project;
- Describe upstream and downstream land and water resource use on the main river systems relevant to the Project;
- Identify potential key affected stakeholders that currently use potentially impacted land or water resources;
- Assess the potential impacts on land and water resource use in the vicinity of the Project, including upstream and downstream land and water use; and
- Propose measures to avoid, mitigate and manage any potential adverse effects identified.

Indigenous land and water use and native title rights are covered in detail in the ***Aboriginal Cultural Heritage Management Plan Interim Report*** (EES Referral Attachment 10), and are therefore only briefly addressed in this study (refer Section 5.3).

The purpose of this report is to support the referral under the Victorian *Environment Effects Act* and, therefore, the focus of the report is on the components of the Project within Victoria. The Project components at the South East Fibre Exports (SEFE) wharf in Edrom, NSW will be subject to approval under the State and local planning system.

# 1.3 Brief Project Description

The Project is a greenfield development of a high grade magnetite/hematite deposit generally referred to as '5 Mile'. It is located approximately 7 km north of the township of Nowa Nowa, which is situated on the Princes Highway between Bairnsdale and Orbost in East Gippsland, Victoria. The site is wholly within the Tara State Forest (Figure 1-1).

The Project involves an open cut mining operation from a single pit with dry processing at the site to upgrade the material to a saleable product. It is anticipated that the Project will produce up to 1Mt of ore per annum, over an initial mine life of 8-10 years. The mine will be operated using a mining contractor and local employees (i.e. no onsite accommodation).

It is proposed to transport the processed ore by road to the existing South East Fibre Exports (SEFE) wharf at the Port of Eden in Edrom, NSW. The majority of the transport route between the mine and the Port is via the Princes Highway. The material will be temporarily stockpiled before being loaded onto 50-60,000 t vessels and exported to international markets.

The main components of the Project at the mine site will include:

- Open Pit;
- Mine Infrastructure (includes the Run of Mine (ROM) pad, processing plant and Mine Operations Centre);
- Waste Rock Dump;
- Temporary Low Grade Ore Stockpile;
- Water Storage Infrastructure;
- Mine Access and Haul Roads; and
- Ancillary Infrastructure.

These components are depicted at Figure 1-2, and further details of the Project are provided in the ***Project Description and Proposed Mine Plan*** (EES Referral Attachment 1).

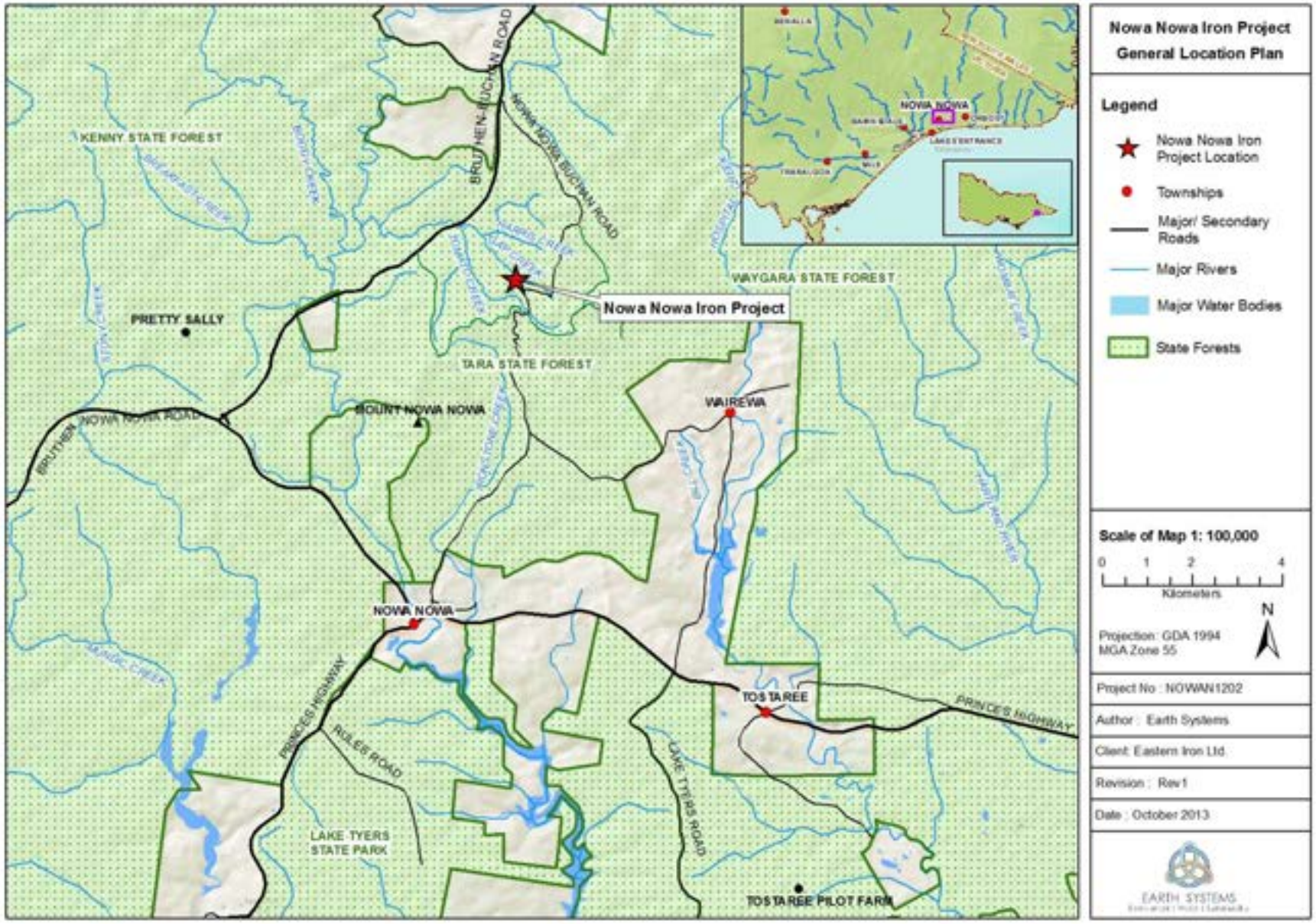



**Figure 1.1 Project Location**

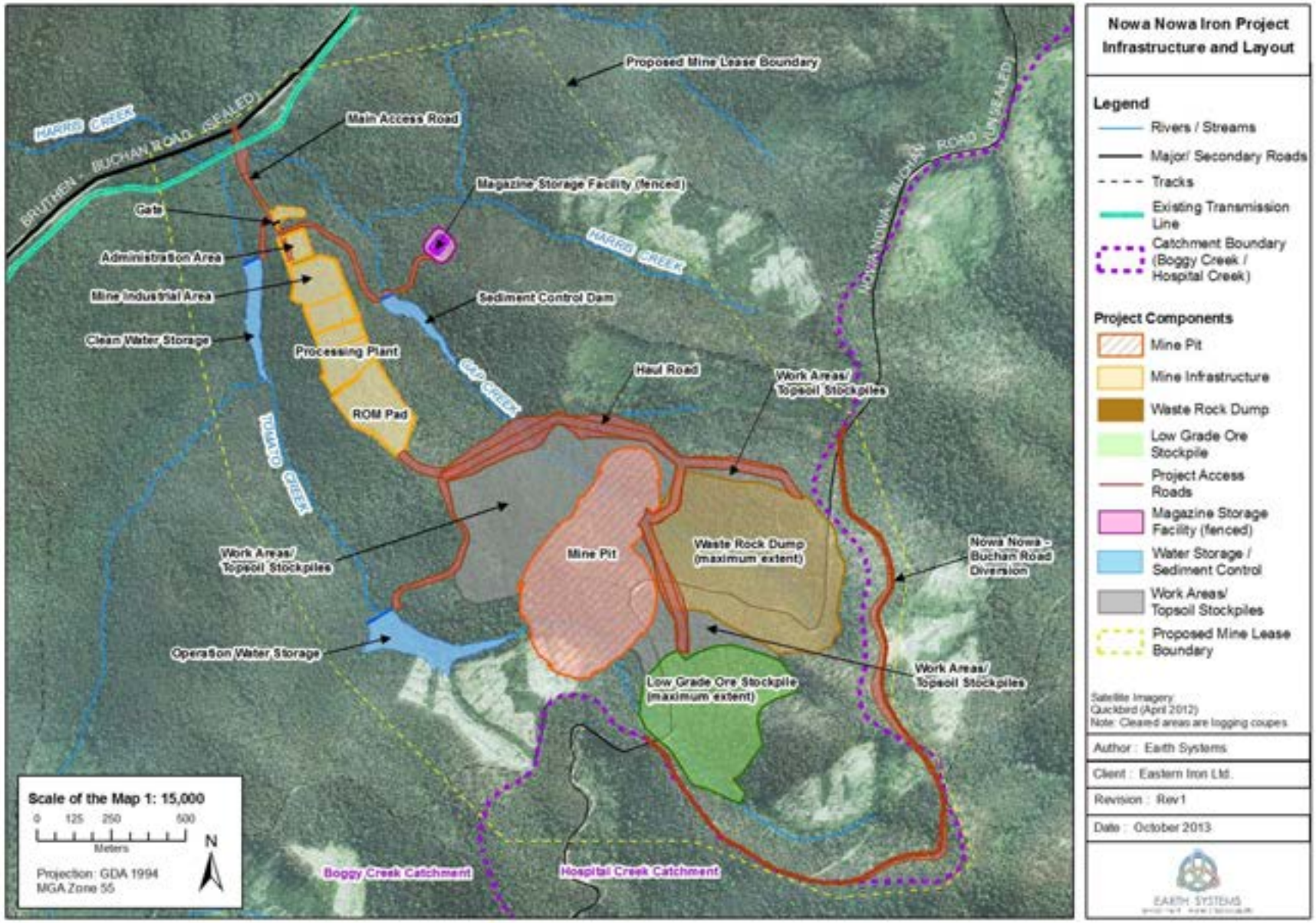



**Figure 1.2 Proposed Project Infrastructure and Layout**

# 2 Project Setting

## 2.1 Location and Topography

The proposed mine site for the Project is located approximately 7 km north of the township of Nowa Nowa, 18 km northeast of the town of Lakes Entrance and 250 km east of the city of Melbourne in East Gippsland, Victoria (refer **Figure 1.1**). East Gippsland is east of the Latrobe Valley (VIC) and south of the Southern Highlands (NSW).

The site is situated within the East Gippsland Shire local government area, which is bordered by the coast to the south and by the border of New South Wales to the north-east. The mine site is also located within the area governed by the East Gippsland Catchment Management Authority (EGCMA). The main regional centres of East Gippsland are Bairnsdale in the south-west, Lakes Entrance and Orbost along the coast, and Omeo in the north.

The proposed mine site is situated in a low-lying region with gently undulating hills flanked by coastal plains, dunefields and inlets. The hills rarely reach over 320 metres above sea level (m asl); however there are several tributaries that feed into the Gippsland Lakes system. Directly to the north are tablelands and mountains up to 1,400 m asl. Lake Tyers (the eastern lake of the Gippsland Lakes Ramsar Site) is located approximately 8 km south of the mine site.

The proposed mine footprint is located entirely on Crown Land and intersects two Crown Allotments, SPI5~B\PP3326 Allotment 6 and SPI23~A\PP3326 Allotment 23 (Figure 2.1).

## 2.2 Climate

The climate of East Gippsland is temperate, with a mean annual rainfall of approximately 821 mm recorded at Mount Nowa Nowa, in close proximity to the proposed mine site (BOM 2013). Mean maximum temperatures recorded at Mount Nowa Nowa are highest in January (25ºC) and mean minimum temperatures are lowest in July (6ºC). Relative humidity levels range between 57% (in January) and 78% (in May). Mean wind speeds recorded at Mount Nowa Nowa are approximately 12 km/hr. The prevailing wind direction is from the north-west in the morning and south-east in the afternoon.

Meteorological data is collected at a number of Bureau of Meteorology (BOM) weather stations in proximity to the proposed mine site (Table 2.1).

**Table 2.1 Bureau of Meteorology weather stations in proximity to the proposed mine site.**

| Location | Station Nº | Data Collection Period |
|---|---|---|
| Mount Nowa Nowa | 84144 | 1995-2013 |
| Nowa Nowa Township | 84028 | 1948-2013 |
| Lake Tyers | 84045 | 1953-2013 |
| Lakes Entrance (Eastern Beach Road) | 84150 | 2006-2013 |

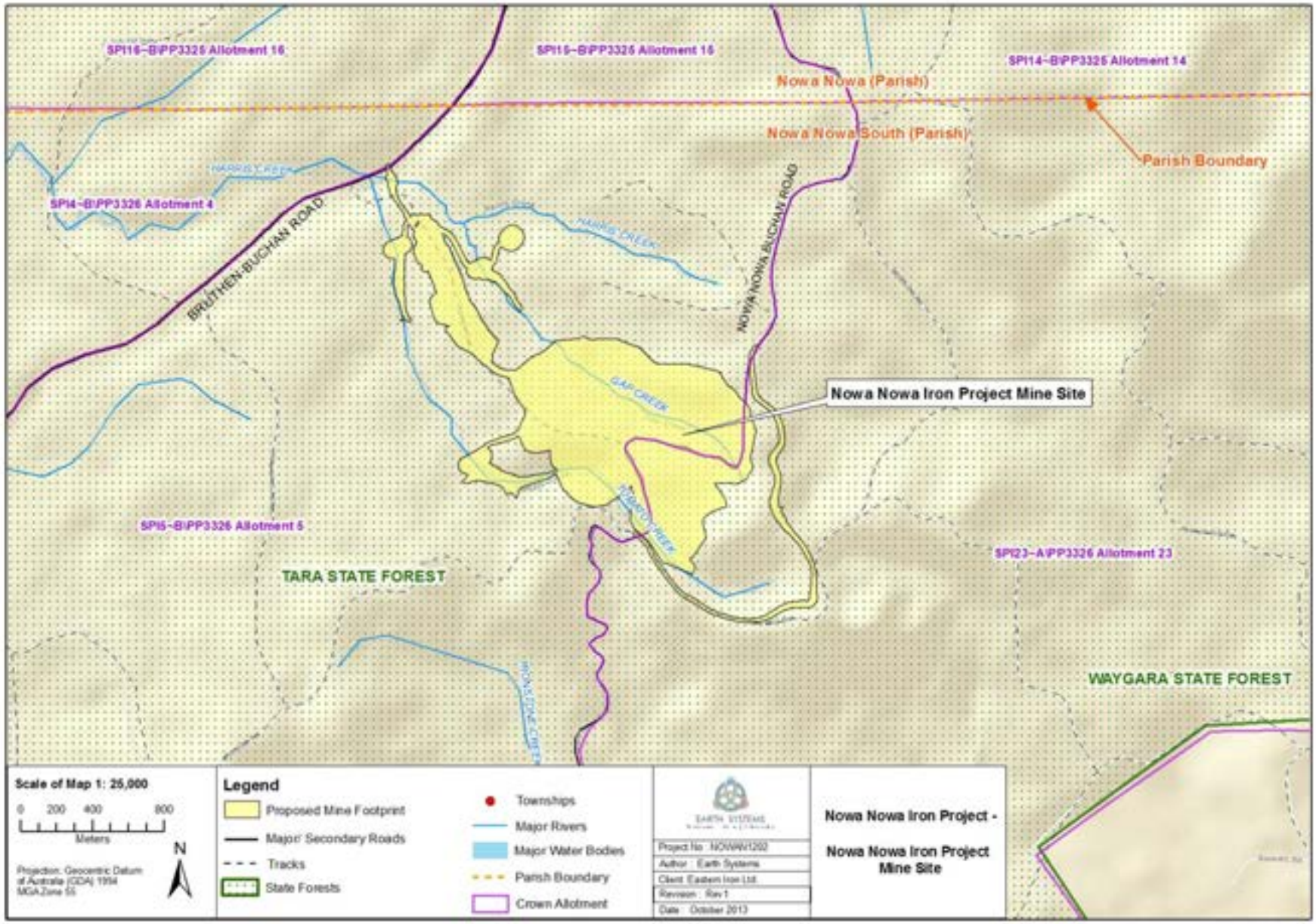



**Figure 2.1 Regional Plan**

# 2.3 Regional Geology

Most of the regional area is composed of Neogene (late Tertiary) alluvial sediments. These alluvial sediments form terraces and fan out from the uplands. The lowlands are sandy loams overlying clays. There has been some structural movement with early deposits being dissected with sediment composed of organic matter and iron, and volcanic intrusions.

The proposed mine site is dominated by Palaeozoic acid volcanics, with lithosol soils (Bell, 1959). The iron deposits are situated in the north-south trending Buchan Rift basin filled with felsic Snowy River volcanics (lavas, ignimbrites and sediments), and the overlying Buchan Group of silurian limestones, calcareous mudstone and very minor volcanogenic clastics.

Intense faulting and shearing has been observed at the 5 Mile outcrop. A prominent belt of shearing, about 1 km wide, passes from Nowa Nowa, crosses Ironstone Creek, through the 5 Mile outcrop and Iron Mask (iron and manganese outcrops north-east of Seven Mile outcrop) flanking the western edge of a narrow belt of Ordovician. The iron-ore bodies, chloritized shales and Silurian limestones are associated with this wide shear zone.

Upper Ordovician graptolites are located at Gap Creek. Ordovician slates also occur in Boggy Creek and Ironstone Creek. Where the effect of regional stress-metamorphism and shearing has been strongest, the slates have been chloritized while sandy facies have been converted to quartzite.

Some sulphides are present in the geologic materials at the proposed mine site. Secondary pyrite is present throughout the ore-body and there are regions of chloritic material and large pyrite crystals, where nearly half the material may be pyrite.

# 2.4 Landscape and Soils

The Carrabungla (Ca) and Collins (Cs) land systems underlie the proposed mine site. These land systems comprise short, steep slopes on acidic, volcanic rocks. Low to moderate rainfall acting on slow-weathering rocks in a landscape with moderate and steep slopes leads to a low rate of soil formation but a high rate of natural erosion. The soils, therefore, tend to be stony, shallow and acidic and have little profile differentiation. Topsoils have a weak crumb structure, while subsoils are usually apedal (single grained or massive) and earthy. In protected pockets the soils are often deeper and have clayey subsoils.

Surface soils are moderately to highly acidic, particularly along the coast. Soils range from sandy loams to dark grey brown loamy sands. Surface soils also have a low nutrient and water holding capacity, and are particularly prone to wind erosion (if exposed). Deeper layers of heavy clay can also be moderately to strongly acidic.

# 2.5 Water Environments

Detailed information on the water resource setting of the Project is available in the ***Surface and Ground Water Baseline and Assessment*** (EES Referral Attachment 5). Key aspects are summarised below.

## 2.5.1 Surface Water

The proposed mine site occurs principally within the catchment of Boggy Creek, and is located adjacent to the boundary of the Hospital Creek Catchment. Several small creeks intersect the mine site area, which are ephemeral and dry for most of the year. Boggy Creek flows into Lake Tyers approximately 15 km downstream of the proposed mine site.

There is little standing water and no natural or man-made water bodies in the vicinity. Surface water allocations in the subcatchment of the mine site (Boggy Creek) are managed by Southern Rural Water.

**Harris Creek, Gap Creek and Tomato Creek**

The proposed mine site is situated at the headwaters of Gap Creek and Tomato Creek, and the proposed Mine Footprint directly intersects these two waterways. Gap Creek, along with Tomato Creek, flow to the north-west, joining Harris Creek close to the Bruthen-Buchan Road. Harris Creek then flows into Boggy Creek. Harris Creek, Gap Creek and Tomato Creek are ephemeral and dry for most of the year.

**Boggy Creek**

The mine site is located primarily within the catchment of Boggy Creek, which runs to the south and eventually flows into Lake Tyers, a coastal estuary. Boggy Creek is one of the two main streams of the Boggy Creek (Nowa Nowa) sub-catchment which covers 340 $km^2$ between Mt Victoria in the north (northwest of Buchan) and the township of Nowa Nowa in the south (Russell 1983). The second main stream-complex of the sub-catchment area is Harris Creek and its tributaries. The Boggy Creek Catchment is classified as a Declared Water Supply Catchment, and therefore use of land within the Catchment is regulated by the *Catchment and Land Protection Act* 1994. From the 1980's to 2007, water from Boggy Creek was extracted for industrial purposes (e.g. sawmills) and as a drinking water supply for Nowa Nowa township. Drinking water for the township is now sourced from the Mitchell River (Department of Health 2008). Approximately 8 km to the south of the proposed mine site, Boggy Creek then flows into the Nowa Nowa Wetlands at the northern end of the Nowa Nowa arm of Lake Tyers. The Nowa Nowa Wetlands at the Nowa Nowa township is a local recreational area and provides habitat for a variety of species. The saline waters of Lake Tyers extend to this northern arm of the lake.

**Gippsland Lakes Ramsar Site**

The Gippsland Lakes system, including Lake Tyers, is protected by the international Ramsar Convention on Wetlands, and classified as an 'Important Wetland of Australia' by the Australian and New Zealand Environment Conservation Council (ANZECC). The main lakes of the Gippsland Lakes system are Lake Wellington, Victoria and King, and these lakes are linked to the sea by an artificial entrance at Lakes Entrance. The artificial entrance was created in the 1880's and is often maintained by dredging sand. Lake Tyers is the eastern-most wetland in the Gippsland Lakes system.

**Lake Tyers**

Lake Tyers is situated to the east of Lakes Entrance and has a surface area of approximately 25 $km^2$, with an average water depth of 3-4 m. The north-eastern extent of Lake Tyers is located just south of the township of Nowa Nowa. Lake Tyers is located approximately 15 km downstream from the proposed mine site. Lake Tyers is an estuary consisting of a main lake connected to two main riverine arms: Nowa Nowa and Toorloo. The estuary is intermittently blocked from Bass Strait by a sand bar which leads to variations in water quality (particularly salinity levels, dissolved oxygen concentrations, aquatic vegetation growth and turbidity levels). However, the waters are generally well-mixed as a result of wind driven circulation (DPI 2012). Consequently, Lake Tyers is predominantly made up of brackish or saline lagoons.

## 2.5.2 Groundwater

The proposed Project area is located within the Gippsland groundwater basin which underlies a significant proportion of the Gippsland region. The Gippsland basin was first developed as a rift basin during the Lower Cretaceous. Sedimentation, in the onshore areas, stopped during the Middle Cretaceous during uplift of the South Gippsland Highlands. Subsidence continued and major structural zones were formed during the Tertiary. Deposition of non-marine and marine sediments and several periods of volcanism resulted in thick deposits, which include the major aquifers in the Gippsland basin (SRW, 2010).

The major aquifers in the Gippsland Basin are contained within the Tertiary to Quaternary sequences (SRW, 2010). The various stratigraphic units include:

- The Latrobe Group:
    - Traralgon Formation.
- Latrobe Valley Group:
    - Thorpdale Volcanics.
    - Childers Formation.
    - Balook Formation.
- Seaspray Group:
    - Seaspray sands.
    - Lakes Entrance formation.
    - Gippsland limestone.
    - Lake Wellington formation.
- Sale Group:
    - Boisdale formation.
    - Jemmy's point formation.
    - Tambo river formation.
    - Haunted hill formation.
- Quaternary formations:
    - Recent floodplain deposits.
    - Coastal lagoon deposits.
    - River terrace deposits.

Groundwater flow in the Gippsland Basin is generally from the recharge areas in the north and northwest, offshore to the south (DSE, 2010). Discharge for aquifer units closer to the surface are likely to occur as baseflow to the lower reaches of the rivers and smaller creeks flowing over the coastal plains. Additional groundwater discharge will also occur to the Gippsland Lakes and other estuarine bodies (eg. Lake Tyers) (DSE, 2010).

Limited information is available for the aquifer systems to the east of Lakes Entrance or the proposed Project area (AECOM, 2013b). Aquifer yield and salinity maps cover the proposed Project area, however

the proposed mine site is located on the margins of the mapped area. Aquifer salinity (total dissolved solids (TDS)) maps (AECOM, 2013b) indicate:

- Water table aquifers in the vicinity of the proposed Project area, TDS concentrations between 1,000 - 3,500 mg/L.
- Lower Tertiary to mid Tertiary aquifers in the vicinity of the proposed Project area, TDS concentrations between 500 – 3,500 mg/L.

Aquifer theoretical bore yields were mapped and are based on a number of assumptions, actual bore yields may differ significantly (SRW, 2010). Mapped aquifer bore yields in the vicinity of the proposed Project area (AECOM, 2013b) indicate:

- Water table aquifers, estimated yield <1 L/s.

Lower Tertiary to mid Tertiary aquifers, estimated yield 1-10 L/s.Refer to the ***Surface and Ground Water Baseline and Assessment*** (EES Referral Attachment 5) for further detail.

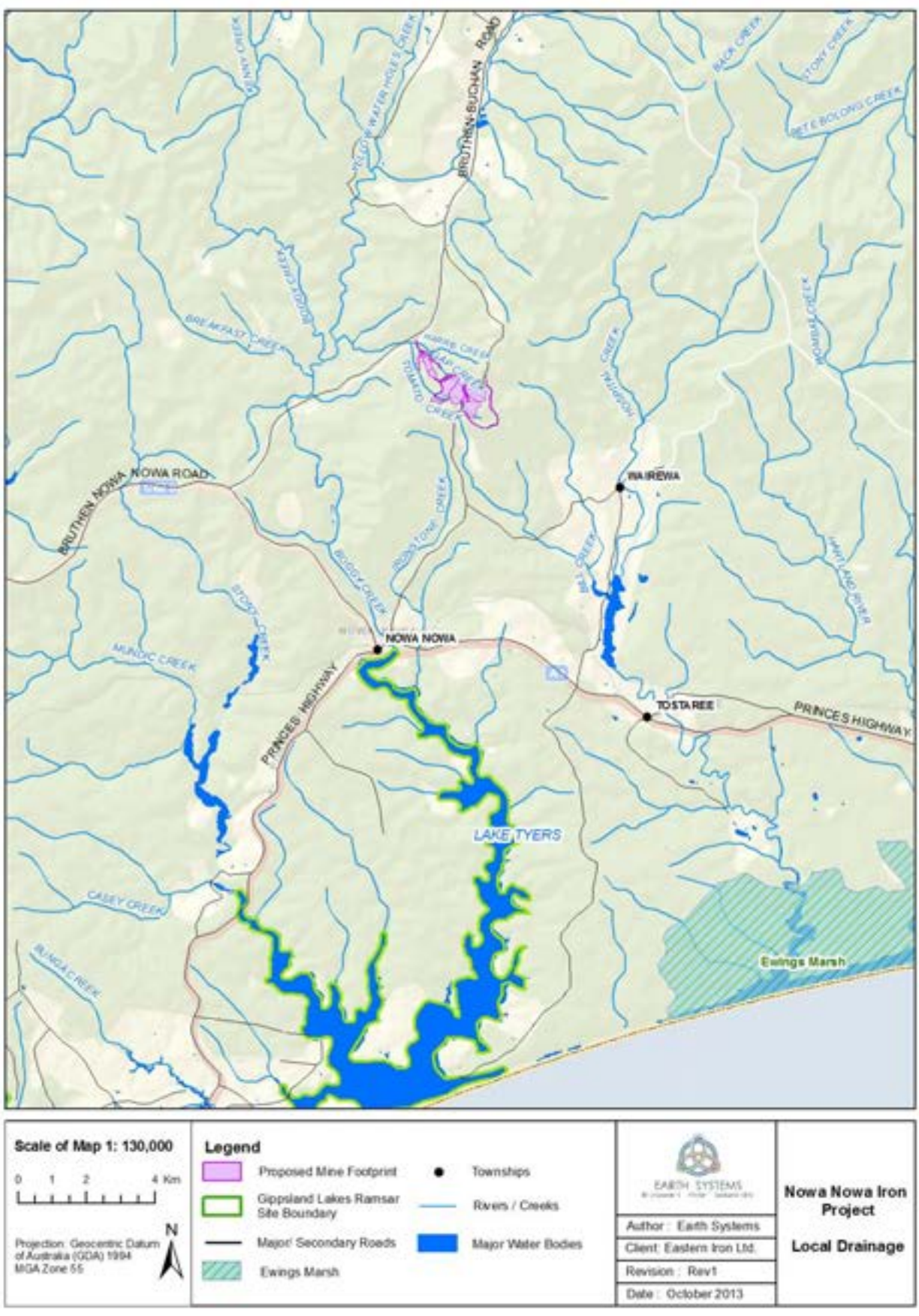



**Figure 2.2 Local Drainage in the vicinity of the proposed mine site**

# 2.6 Social Environment

Key stakeholders for the Project include:

- Government (local, State, Federal);
- Residents of communities in areas surrounding the mine site (e.g. Nowa Nowa and Wairewa).
- Recreational users of Tara State Forest;
- Downstream water users (e.g. recreational users of Lake Tyers);
- Indigenous stakeholders – including the Gurnaikurnai Land and Water Aboriginal Corporation (GLaWAC) which holds native title for the area;
- Residents along transportation routes;
- Local business / industry; and
- Community and interest groups.

There are no nearby residential areas surrounding the mine site. The nearest communities to the mine site are the small township of Nowa Nowa and the farming hamlet of Wairewa (approximately 20 dwellings) located approximately 7 km to the south and 4 km to the southeast of the mine site, respectively. In 2011, Nowa Nowa township had a population of approximately 147 residents (DPCD 2011) while Wairewa and its surrounding communities had an estimated population of 231 residents. While no residences occur in the area directly surrounding the proposed mine site, a number of isolated farmhouses occur on agricultural land in the broader area. Those nearest to the mine site are:

- Single farmhouse on agricultural land associated with Wairewa hamlet just over 4 km southeast of the pit and 3.5 km southeast of the mine footprint; and
- Single farmhouse on agricultural land adjacent to Bruthen-Buchan Road approximately 3.6 km west of the processing plant, 4 km west of the pit and 3.3 km west of the mine footprint.

A number of regional centres occur in the broader area surrounding the proposed mine site, such as Lakes Entrance (37 km by road from site), Orbost (51 km) and Bairnsdale (55 km).

# 3 Methodology

The methodology used to identify and assess the land and water uses in the vicinity of the Project included:

- Literature review and compilation of available data and planning policies regarding national, regional and local land and water resource use;
- GIS analysis of existing spatial data;
- Field based ground-truthing; and
- Consultation with relevant government authorities and other stakeholders regarding land and water resource use patterns and land allocation.

## 3.1 Literature and Data Compilation

A review of available information and data relating to land and water resource use at the national, regional and local levels was undertaken, including planning and policy documents. Key documents and data sources reviewed included:

- Biodiversity Interactive Maps (DEPI 2013);
- East Gippsland Catchment Management Authority – Regional Catchment Strategy (EGCMA 2005);
- East Gippsland Forest Management Plan (DSE 1995);
- East Gippsland Regional River Health Strategy (EGCMA 2006);
- Forest Explorer Online (DSE 2013);
- GeoVic – Explore Victoria Online (DPI 2013b);
- Land Inventory of East Gippsland (Rees 1996);
- Victorian Planning Maps Online (DPCD 2013);
- Victorian Resources Online – East Gippsland (DPI 2013a);
- East Gippsland Planning Scheme;
- Gippsland Regional Plan 2010;
- East Gippsland Shire Council Plan 2009-13 (updated for 2012/2013);
- East Gippsland Shire Council Plan (draft) 2013 – 2017 ;
- Urban Design Framework - Orbost and District, Lake Tyers Beach 2007 (Meinhardt Infrastructure & Environment Pty Ltd, 2007);
- East Gippsland Environmental Sustainability Strategy 2008-2013;
- Regional Growth Plan - Gippsland (draft) 2013 (DPCD);
- East Gippsland Forest Management Plan, 1997 (DEPI);

- East Gippsland Wood Utilisation Plan 2011/12 to 2013/14 (DSE);
- Gippsland Region Fire Protection Plan (DSE); and
- Fire Operations Plan 2012/13-2014/15 (DSE).

## 3.2 GIS Data Analysis

Available geospatial data of the regional and local area surrounding the proposed mine site was collated, including Project specific data provided by Eastern Iron.

Geospatial Information Systems (GIS) data resources used to analyse existing land and water assets and use included:

- High resolution satellite imagery, including the following images:
    - Quickbird, April 2012 (0.6 m resolution) – covering the mine site and immediate surrounds
    - LiDAR data, May 2013 (0.15 m accuracy) – covering the mine site
- ASTER Digital Elevation Model covering Lakes Entrance including Nowa Nowa region (90 m resolution);
- Land Use planning GIS data (East Gippsland State Forest Management Zoning 2011, and; Victoria Timber Release Plan as at 26 June 2012, sourced from DEPI);
- Project Infrastructure design layout supplied by Eastern Iron;
- 1 m, 5 m and 20 m contour data over the Nowa Nowa Region;
- Field data collected during Earth Systems field surveys;
- National administrative boundaries for Australia;
- Regional watercourse data; and
- Regional transport (road) data.

## 3.3 Field Ground-Truthing

A large proportion of the proposed mine site and surrounds were traversed on foot and by vehicle to provide an overview assessment of the entire region. Areas that were not accessible by foot or by vehicle (e.g. private property, dangerous terrain) were assessed remotely using satellite imagery and GIS software. Some areas could be visually assessed from afar on the nearest road or track. Land use types and potential water resource use were assessed and classified into meaningful (e.g. forestry, cattle farm) categories.

As part of this ground-truthing, as well as consultations with government representatives, land tenure and ownership patterns in vicinity of the proposed mine site were determined. Land tenure was determined based on Victorian Planning (DTPLI 2013) and Biodiversity Maps Online (DEPI 2013). This information was compiled and digitised using GIS to determine the area of land utilised by each town that may be impacted by the Project, and to understand land and water resource use patterns in the surrounding area.

As part of the Land and Water Use field surveys, a survey of upstream and downstream water (and surrounding land) use was undertaken in order to establish uses of the creeks upstream and downstream of the proposed mine site. Key water access points and general field observations were recorded along the local waterways. Observations were taken in conjunction with field monitoring and surveys for the ***Surface Water and Groundwater Baseline and Assessment*** (EES Referral Attachment 5), ***Flora, Fauna and Ecological Characteristics and Assessment*** (Attachment 8) and ***Aquatic and Wetland Ecology Study*** (Attachment 9).

The use of creeks by local communities was also recorded, as well as type and reliability of the creeks as a water source, and observed water quality. No formal interviews were held with locals, but any information from informal conversations was incorporated into observations.

This survey focused on the following key sections of the creeks:

- Boggy Creek upstream (2 sites within Kenny State Forest);
- Boggy Creek downstream (near Bruthen-Buchan Road);
- Boggy Creek downstream (in Lake Tyers Park);
- Lake Tyers (in and around Nowa Nowa); and
- Lake Tyers (tourist areas).

# 3.4 Government Consultation

Initial consultations regarding land and water use have been conducted with the following government departments and agencies:

- Department of Environment (Cth);
- Department of Environment and Primary Industries (DEPI);
- Department of Transport, Planning and Local Infrastructure (DTPLI);
- East Gippsland Shire Council;
- VicRoads;
- Southern Rural Water; and
- East Gippsland Catchment Management Authority.

Further consultation with these groups as well as other stakeholders in relation to land and water use will be required as part of the approvals process for the Project.

# 4 Legislative and Policy Context

## 4.1 Local Frameworks and Strategies

Local council and the EGCMA have several strategies and frameworks that manage the land and water use of the East Gippsland region. The EGCMA is currently updating their regional strategies and therefore are not included below. Relevant local / regional policies, plans and strategies are listed in Table 4.1 and briefly described in the sections below.

**Table 4.1 Relevant local / regional policies, plans and strategies**

| Local Policies, Plans and Strategies | Date |
|---|---|
| Local Policy Planning Framework | Current |
| Gippsland Regional Plan | 2010 |
| East Gippsland Shire Council Plan | 2009-13 (updated for 2012/2013) |
| East Gippsland Shire Council Plan (draft) | 2013 – 2017 |
| Urban Design Framework - Orbost and District, Lake Tyers Beach | 2007 |
| East Gippsland Environmental Sustainability Strategy | 2008-2013 |
| Regional Growth Plan (draft) | 2013 |
| East Gippsland Regional Catchment Strategy | 2013 - 2019 |
| East Gippsland Forest Management Plan | 1997 |
| East Gippsland Wood Utilisation Plan | 2011/12 to 2013/14 |
| East Gippsland Forest Fire Plan | 2011/12 to 2013/14 |
| Gippsland Region Fire Protection Plan | Online (Updated 2013) |
| Fire Operations Plan | 2012/13-2014/15. |

### 4.1.1 State Planning Policy Framework

The State Planning Policy Framework (SPPF) forms the basis for all land use planning in Victoria. It seeks to ensure that planning objectives in Victoria, as set out in the *Planning and Environment Act* 1987are fostered through appropriate land use and development planning policies and practices which promote community benefits and sustainable development.

Each municipality also has a Local Planning Policy Framework (LPPF) which outlines the specific strategic planning policies of the municipality. Together the SPPF and the LPPF provide the strategic planning framework for the assessment of any proposed land use development in Victoria. Further information on the LPPF is in provided in Section 4.1.2.

Key clauses from the SPPF are outlined below:

Clause 12 of the Planning Scheme has regard for Victoria's environmental, landscape and biodiversity values. Clause 13 of the SPPF relates to Environmental Risks and requires that:

*'Planning should adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. Planning should identify and manage the potential for the environment, and environmental changes, to impact upon the economic, environmental or social well-being of society'.*

Clause 14 outlines State level strategic policy with regard to Natural Resource Management and recognises:

*'Planning is to assist in the conservation and wise use of natural resources including energy, water, land, stone and minerals to support both environmental quality and sustainable development'.*

Clause 14.02-1 seeks *to 'to assist the protection and, where possible, restoration of catchments, waterways, water bodies, groundwater, and the marine environment',* whilst clause 14.02-2 seeks '*to protect water quality'.*

Clause 14.03 has regard for resource exploration and extraction and maintains the following objective:

*'To encourage exploration and extraction of natural resources in accordance with acceptable environmental standards and to provide a planning approval process that is consistent with the relevant legislation'.*

Strategies of relevance to the Project at Clause 14.03 include, inter alia:

*'Protect the opportunity for exploration and extraction of natural resources where this is consistent with overall planning considerations and application of acceptable environmental practice'.*

Clause 17 outlines the State's policy with regard to Economic Development. Clause 17 relates to the proposal in a general sense and recognises that:

*'Planning is to provide for a strong and innovative economy, where all sectors of the economy are critical to economic prosperity'.*

Clause 18 of the Planning Scheme outlines policies relevant to Transport and includes the following strategy (inter-alia):

*'Ensure careful selection of sites for freight generating facilities to minimise associated operational and transport impacts to other urban development and transport networks'.*

### 4.1.2 Local Policy Planning Framework

The Local Planning Policy Framework (LPPF) contains a Municipal Strategic Statement (MSS) and local planning policies that outline the long term direction for land use and development in the East Gippsland Shire and provide the rationale for zoning and overlay requirements. Key clauses from the LPPF relevant to the Project include:

***Clause 21.02-1 'Key issues and influences'***

Key issues and influences relevant to the Shire include:

- *'Managing the biodiversity and natural assets of the region in an environmentally sustainable manner.*
- *Managing fire and fire risk.*
- *Water quality of lakes and rivers, especially excessive nutrient levels*
- *Land degradation and tree decline in some rural areas.*

- *Slow economic growth.*
- *High unemployment rate, especially for young people.*
- *A narrow economic base.*
- *Maintenance and extension of community services, cultural and recreation facilities.'*

***Clause 21.04 'Environmental and Landscape Values'***

Objectives of this clause include, inter alia:

- *To maintain, conserve and enhance the biodiversity of East Gippsland,*
- *To recognise, protect and maintain environmental, cultural and aesthetic values within East Gippsland.*

***Clause 21.05 'Environmental Risk'***

Clause 21.05-2 'Erosion' seeks to *'ensure that land use and development is directed to locations and carried out in ways that minimise its vulnerability to the threat of erosion'.*

Clause 21.05-3 'Bushfire' seeks to *'ensure that land use and development is directed to locations and carried out in ways that minimise its vulnerability to the threat of fire.'*

***Clause 21.06 'Natural Resource Management'***

The following clauses relate to natural resource management

- Clause 21.06-1 seeks to *'ensure that rural land is used and developed in a way that will support efficient agricultural production' and to 'protect and increase the sustainable productivity of soils in East Gippsland.'*
- Clause 21.06-3 Water Quality seeks to *'improve water quality in rivers, coastal estuaries and lakes'*
- Clause 21.06-4 Resource Exploration and Extraction seeks to *'encourage exploration for and development of mineral resources in appropriate areas'.*

***Clause 21.09 'Economic Development'***

Clause 21.09-2 'Industry' seeks to *'expand the number and range of employment opportunities in rural industries.'*

### 4.1.3 Planning Zones and Overlays

The proposed mine site is located entirely on Crown land within the Tara State Forest, and extends over two crown allotments.

The site is predominantly within the Public Conservation and Resource Zone (PCRZ); affected by the Wildfire Management Overlay (WMO); and partially affected by the Erosion Management Overlay (EMO) in accordance with the relevant provisions of the Planning Scheme. The existing Nowa Nowa - Buchan Road is located within the Road Zone, Category 1. These controls are also typical of the broader area.

In accordance with of the East Gippsland Planning Scheme, the proposed use falls within the land use category of 'Earth and Energy Resources Industry' and is more particularly defined as 'Mineral Extraction'. The definition of 'Mineral Extraction' (at clause 74) is: "*Land used for extraction of minerals in accordance with the Mineral Resources (Sustainable Development) Act 1990*."

In accordance with the zoning and overlay controls, 'Mineral Extraction' is a permitted land use once a planning permit is in place. Planning property reports for the proposed mine site are provided in Annex A.

### 4.1.4 Gippsland Regional Plan (2010)

The Gippsland Regional Plan (GRP) is a long-term strategic plan that aims to manage the emerging challenges in the Gippsland Region and provide a strategy for the future. The plan outlines 10 priority areas for improving liveability, productivity and sustainability in the region, which include:

- Gippsland Low Carbon Economy Transition Plan;
- Post Secondary Education;
- Gippsland's Gateways;
- Centre for Sustainable Technologies;
- Gippsland Lakes Sustainable Development Framework;
- Health and Wellbeing Outcomes;
- Gippsland Integrated Land Use Plan;
- Gippsland's Water;
- Broadband Connectivity; and
- Tourism Infrastructure.

Each regional priority consists of recommended projects, plans and/or policy support actions.

### 4.1.5 East Gippsland Environmental Sustainability Strategy 2008-2013

The Strategy outlines East Gippsland Shire's position on issues relating to the protection, preservation and enhancement of the environment. It also consolidates the Shire's existing achievements, policies and plans regarding environmental sustainability. Major considerations for environmental sustainability include biodiversity, water quality and consumption, greenhouse gas emission and waste generations. Specifically, in relation to land use and development, the priority objectives of the Strategy are:

- *Strategic planning for sustainable communities that are environmentally sustainable, that use resources wisely and that have minimal environmental impact.*
- *Development that enhances and protects the environment in which we live.*
- *In relation to water consumption and quality, the objectives of the Strategy are to:*
- *Reduce water consumption Shire-wide.*
- *Improve the quality of water in our waterways*

### 4.1.6 Regional Growth Plan (draft) - Gippsland 2013

The draft Regional Growth Plan for Gippsland (published by DPCD) provides a long-term view of the region to 2041 and beyond, allowing for some short-term actions, and providing long-term strategic land use direction. It will integrate emerging state-wide regional land use planning policy and provide a basis for regional coordination and future planning of infrastructure to support regional land use objectives. The plan was released for consultation in June 2013.

The plan identifies that Gippsland's economy is predominantly based around natural resources and commodities, with key industry sectors including agriculture, forestry, dairy and pastoral industries,

fishing, and coal mining, oil and gas extraction and processing. In relation to mining, the plan identifies that there may also be economic opportunities for a local mining industry in Gippsland, with recognised deposits for various resources particularly in East Gippsland. These resources have the potential to be commercially productive subject to variables such as world prices, the value of the Australian dollar, and demand from major markets such as China.

### 4.1.7 East Gippsland Regional Catchment Strategy 2013

The strategy provides an integrated planning framework for managing land, water and biodiversity in the East Gippsland region and has been prepared pursuant to the requirements of the Catchment and Land Protection Act 1994. The objectives of the strategy, developed by the East Gippsland Catchment Management Authority, are to:

- *Establish a framework for the integrated and coordinated management of catchments; and*
- *Establish processes that can be used to assess the condition of the region's land and water resources, and the effectiveness of land protection measures.*

The East Gippsland Catchment Management Area covers 2.2 million hectares of land, lakes and coastal waters in eastern Victoria. It is located south of the Great Dividing Range and includes the catchments of streams from the Mitchell River eastwards to the Victoria–New South Wales border.

### 4.1.8 East Gippsland Forest Management Plan 1997 (amended)

Publicly owned forest in East Gippsland covers approximately 1 million hectares, with State forest comprising 640,000 ha of this land. This Plan, administered by the DEPI, addresses a number of conservation and resource use requirements, including the Flora and Fauna Guarantee Act 1988, the National Forest Policy Statement, current sawlog licence commitments to the timber industry and the sustainable yield requirements of the Forests (Timber Harvesting) Act 1990.

The strategy used in the Plan has three main components:

- Conservation guidelines which specify minimum levels of planned protection to be provided for natural values in State forest.
- Forest management zones which set priorities and permitted uses in different parts of State forest.
- A process for reviewing management strategies and zones which will enable progressive refinement of the Plan in response to new information and developments in natural resource management.

The East Gippsland Forest Management Plan was also under a zoning review in 2011.

### 4.1.9 Forest Management Zones

Forest management zones set priorities and permitted uses in different parts of State forest. These are managed by DEPI. Many of the management strategies developed in the Forest Management Plans are expressed through zoning decisions which either set aside areas from timber harvesting or which permit harvesting or other activities to continue under specified conditions.

- General Management Zone (GMZ) – this zone is managed for a range of uses and values, with the sustainable production of timber and other forest products being a major use. Some areas

within this zone are excluded from harvesting operations due to the requirements of the Code of Practice for Timber Production.

- Special Management Zone (SMZ) – this zone covers a range of natural or cultural values and are managed to conserve specific features. The zone contributes substantially to the conservation of important species, particularly fauna, as well as encompassing landscape values and water management issues. Timber and other forest produce may be harvested from this zone under certain conditions.
- Special Protection Zone (SPZ) – this zone is managed for conservation. Larger components of the zone are based on representative examples of vegetation communities and old growth, as well as localities of key threatened and sensitive flora and fauna species. Each component of this zone is managed to minimise disturbances or processes that threaten their respective values, and timber harvesting is excluded.

# 4.2 National and State Policies and Frameworks

The Project will be delivered in accordance with relevant Commonwealth and State legislation. Key legislation and policies that may be applicable this land and water resource use assessment are listed in Table 4.2 below.

**Table 4.2 Legislation and policies relevant to land and water use.**

| Legislation and Policies | Date |
|---|---|
| ***State of Victoria*** | |
| Environmental Protection Act | 1970 |
| Water Act | 1989 |
| Land Act | 1958 |
| Crown Land (Reserves) Act | 1978 |
| Flora and Fauna Guarantee Act | 1988 |
| Planning and Environment Act | 1987 |
| Wildlife Act | 1975 |
| Forest Management Zones Management Framework | - |
| National Parks Act | 1975 |
| Fisheries Act | 1995 |
| Forests Act | 1958 |
| Catchment and Land Protection Act | 1994 |
| Coastal and Management Act | 1995; |
| National Parks Act | 1975 |
| State Policy Planning Framework SPPF | - |
| Victorian Coastal Strategy | 2002 |
| Victoria's Biodiversity Strategy | 1997 |
| ***Commonwealth*** | |
| Environment Protection and Biodiversity Conservation Act | 1999 |

| Legislation and Policies | Date |
|---|---|
| Water Act | 2007 |
| Fisheries Management Act | 1991 |
| National Parks and Wildlife Conservation Act | 1975 |
| National Water Initiative | 2004 |

## 4.3 International Treaties and Agreements

The Convention on Wetlands of International Importance (Ramsar Convention 2013) is an international treaty designed to conserve and manage the sustainable use of wetlands. Australia became a signatory in 1971 and protects its 64 Ramsar wetlands under Commonwealth Legislation, specifically the EPBC Act (DSEWPaC 2010).

# 5 Land and Water Use Setting

## 5.1 Land Resource Use Setting

The proposed mining area is located entirely on Crown Land within the Tara State Forest which is zoned as a Public Conservation and Resource Zone (PCRZ) in accordance with the East Gippsland Planning Scheme, and currently managed by the Victorian Department of Environment and Primary Industries (DEPI) for timber harvesting. This area is currently significantly disturbed from previous logging activities, with most of the area having been logged over the last 60 years (refer Figure 5.1).

No landscape or environmental significance overlays were identified in the vicinity of the proposed mine site, and no landscape values of regional or State significance have been identified in the area.

The proposed mine footprint occurs within both Special Protection (SPZ) and Special Management Zones (SMZ) in accordance with the East Gippsland Forest Management Plan. A number of planned logging coupes which are part of the current Timber Release Plan (DSE 2012) also occur in the vicinity of the proposed mine site.

In addition to timber harvesting, the Tara State Forest is utilised for small-scale apiculture and biodiversity conservation, and is also available for recreational use, although rarely used for this purpose. There are no designated recreation areas within the proposed mine ste (e.g. picnic, camping, walking tracks). The closest recreational (walking tracks) are located at Lake Tyers and Nowa Nowa.

No agricultural or urban land is located in the vicinity of the proposed mine site, with the closest farmland and residential properties located over 2 km from the mine site. The Nowa Nowa-Buchan road runs through the area of the proposed mine site, which is an unsealed road with a low volume of traffic (mainly used by forestry vehicles). An existing 22 kV transmission line is located adjacent to the proposed mine site, running along the eastern side of the sealed Bruthen-Buchan Road

The different land use types in the East Gippsland Region, and in the vicinity of the proposed mine site are discussed in Sections 5.1.1 to 5.1.7 below. Plates 5-1 to 5-6 illustrate the representative land use types in the surrounding area.

### 5.1.1 Forestry

***Proposed Mine Site***

The proposed mine site is located within the Tara State Forest which has a total area of approximately 165 km$^2$. Approximately half of this state forest has been harvested at one point during the last 55 years. Much of the area of the proposed mine site was harvested during the 1960's. While most areas in the vicinity of the proposed mine site now consist of tall regrowth forest, some patches within and surrounding the proposed mine footprint have been recently clearfelled (visible of satellite imagery in Figure 1.2).

Previous logging (pre-1980) targeted poor regenerator species such as Gippsland grey box (*Eucalyptus bosistoana*) and yellow stringybark (*E. muelleriana*) (DSE 1995). Large-scale harvesting of these species in the vicinity of mine site has allowed prolific seeding and uniform growth of predominantly white stringybark (*E. globoidea*), silvertop ash (*E. sieberi*), messmate (*E. obliqua*), mountain grey-gum (*E. cypellocarpa*), red stringybark (*E. macrorhyncha*) and red ironbark (*E. tricarpa*).

Tara State Forest is managed under the three Forest Management Zones (refer Section 4.1.9). The proposed mine site occurs mainly within a Special Management Zone and also intersects a Special Protection Zone (**Figure 5.1**). Some sections of forest include areas approved as timber coupes in the VicForests' latest Timber release Plan, including several areas within the proposed mine footprint (2009-2014, see **Figure 5.1**).

During site visits and fieldwork conducted for the Project, it was evident that there has been significant habitat disturbance by previous logging activities. As discussed in the ***Flora, Fauna and Ecological Characteristics and Assessment*** (Attachment 8), historical timber harvesting has resulted in significant habitat fragmentation and degredation and has also increased the number of weeds and pests.

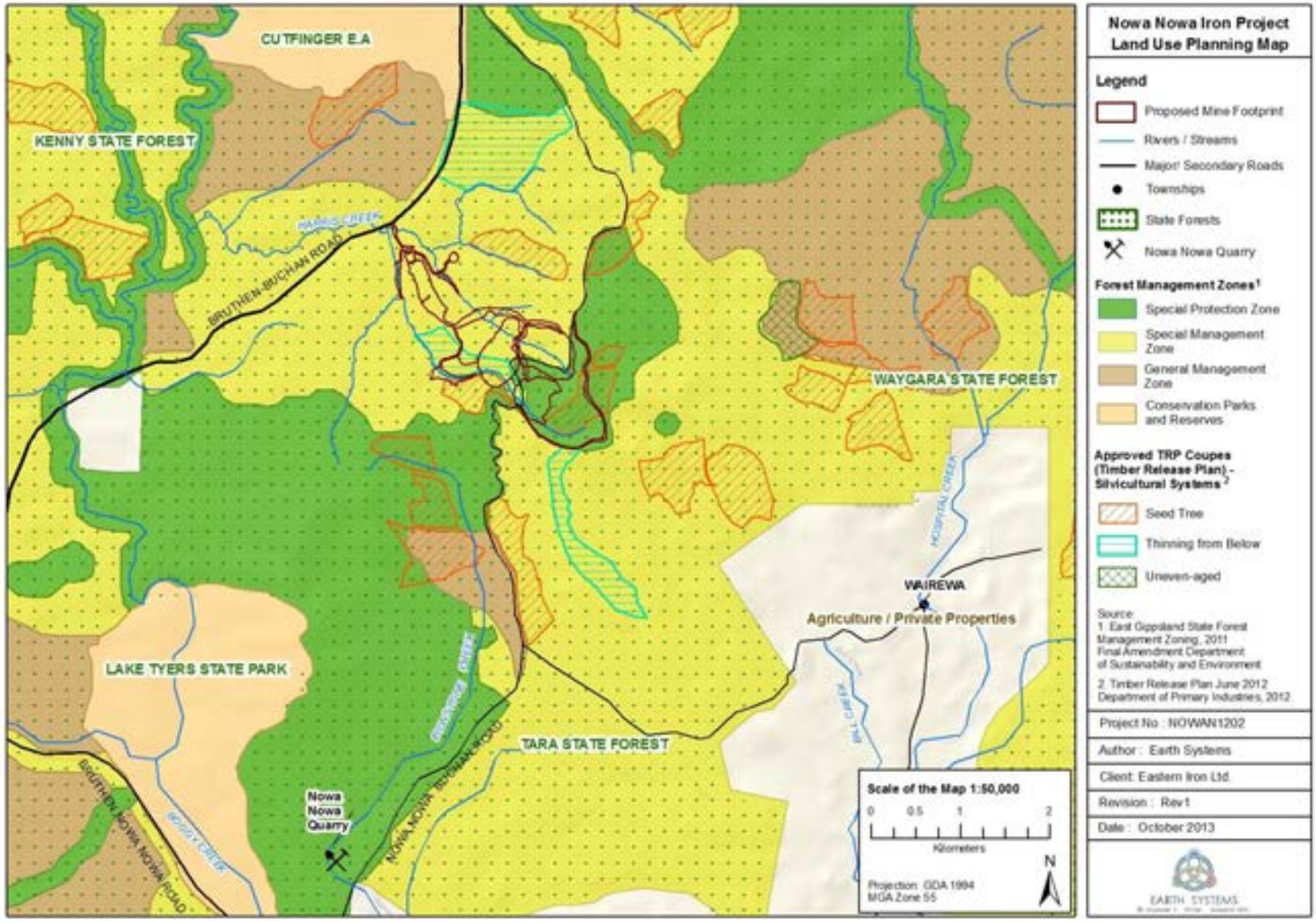



**Figure 5.1 Land use planning in the vicinity of the proposed mine site**

Plate 5-1 Nowa Nowa town

Plate 5-2 Houses and farming land at Wairewa

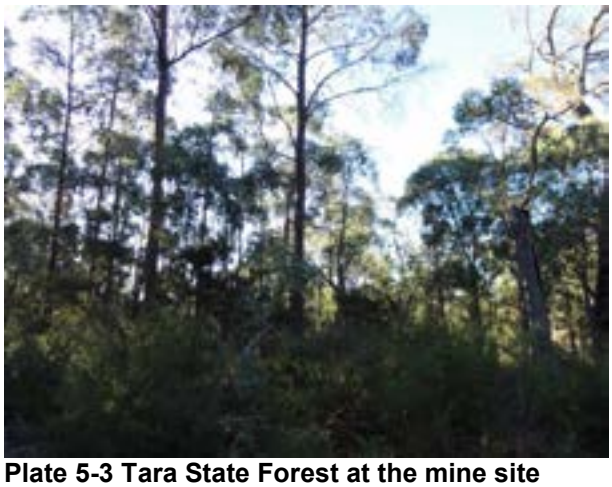


Plate 5-3 Tara State Forest at the mine site

Plate 5-4 Nowa Nowa – Buchan road

Plate 5-5 Existing power line near the mine site

Plate 5-6 Nowa Nowa quarry

***Regional Context***

A large proportion of the East Gippsland region is set-aside for forestry, much of it within Crown Land, particularly State Forests. Timber harvesting began in the 1850s, but became a major industry in the early part of the 20th century (DAFF 2006). Forestry is widespread throughout East Gippsland and within various forest types. The East Gippsland harvesting activities provides a large proportion of the State's total timber production (Rees 1996, DPI 2013c). Milling is occasionally on-site or located near the harvesting area, however large sawmills and production warehouses are typically in regional centres, such as Orbost.

Native hardwoods

The primary type of tree harvested in East Gippsland is eucalypts. The targeted harvest species varies with area and forest type. Alpine species include narrow leaf peppermint (*Eucalyptus radiata*) and broad leaf peppermint (*E. dives*) (DPI 2013c). Lowland/foothill species include messmate (*E. obliqua*) and manna gum (*E. viminalis*), and there are stands where sugar gum (*E. cladocalyx*) dominate in the drier areas. Products of the timber harvesting can vary, from woodchips to high quality timber used for furniture. The DPI's plan for East Gippsland in the next few years is to produce 100 $m^3$ of sawlog, 11,460 $m^3$ of firewood and 1,000 $m^3$ of minor produce (DPI 2013c). A variety of silvicultural systems are used, but most land is currently being harvested/managed using single tree selection and seed tree techniques (DEPI 2013). A much smaller area is being clear-felled or thinned from below.

Exotic softwood

There are a few pine (*Pinus radiata*) plantations in the East Gippsland region, but pine is a small proportion of total timber harvesting products.

## 5.1.2 Conservation, Tourism and Recreation

***Proposed Mine Site***

Within the proposed mine site, there are no designated tourism and recreation areas (e.g. picnic, camping, walking tracks). The closest recreational areas (walking tracks) are at Lake Tyers and Nowa Nowa. Downstream of the proposed mine site, Lake Tyers is an important recreational fisheries reserve (refer to Section 5.2.3). Hikers and cyclists are attracted to the East Gippsland Rail Trail which follows the disused Bairnsdale-Orbost railway, crossing Boggy Creek and Ironstone Creek and passing through Nowa Nowa

***Regional Context***

Conservation

Large tracts of land have been set-aside within national and state parks and forests in the East Gippsland region. Generally national parks are afforded the highest protection, with little development and no destruction or removal of habitat allowed (except by the Commonwealth government). Many of the national parks are located in the mountainous areas in the north of the region. The main purpose of national parks is to conserve habitat for flora and fauna and maintain biodiversity.

State parks and forests are often afforded a lesser level of protection and are often harvested for timber production. Consequently, species diversity is typically lower in these parks and forests, and the vegetation is of lesser conservation value. Nevertheless, some small remnant patches of high quality habitat remains within these parks and forests and the areas may be inhabited or frequented by threatened fauna. Land set-aside for conservation purposes is second in area to forestry.

Tourism and Recreation

Tourism is a growing sector in East Gippsland, with the Ramsar listed wetlands, lakes, forests, rivers and the Alps key attractions. East Gippsland local government area is comprised of four tourism sub-regions, each with its own thematic tourism focus. The study area is located at the junction of three Tourist Regions - Great Alpine Road Region, Gippsland Lakes and Snowy River Country regions with the most significant nearby tourist attractions of Lakes Entrance and Lake Tyers located within the Gippsland Lakes Region.

The Gippsland Lakes region is comprised of a network of inland waterways extending from the hinterland to the coast. Analysis undertaken by the Gippsland Coastal Board found that the most popular destinations for recreational boat users included Loch Sport, Paynesville, Metung, Lakes Entrance, Bunga Arm and McLennan Strait.[1] The Gippsland Lakes region is the largest recreational fishery in Victoria for black bream (*Acanthopagrus butcheri*) producing between 20-50% of the total recreational bream catch in Victoria (DPI 2010).[2]

The Gippsland Lakes region promotes a range of cycling, walking and horse-riding trails, linking to broader routes through East Gippsland. The East Gippsland Rail Trail is a recreational and conservation reserve, running from Bairnsdale to Orbost, along the disused Bairnsdale-Orbost railway. A track connects to the Gippsland Lakes Discovery Trail, which retraces the route of a historic rail tramway between Bairnsdale and Lakes Entrance. The trail crosses Boggy Creek and Ironstone Creek, passing through Nowa Nowa, before extending on-road to Lakes Entrance. Destination Gippsland has identified walks of interest through broader Gippsland –including the 'Nowa Nowa Walk' which includes various trails along the edge of Lake Tyers.

**Table 5.1 Land Uses in East Gippsland Natural Resources Management region 1997 (Bureau of Rural Sciences 2009)**

| Land use | Area (Ha) | Area (%) |
|---|---|---|
| Nature conservation | 553,800 | 26.4% |
| Other protected areas | 16,400 | 0.8% |
| Minimal use | 30,500 | 1.5% |
| Grazing native vegetation | 273,400 | 13.0% |
| Production forestry | 818,700 | 39.0% |
| Plantation forestry | 128,700 | 6.1% |
| Grazing modified pastures | 220,900 | 10.5% |
| Dryland cropping | 0 | 0.0% |
| Irrigated pastures | 14,200 | 0.7% |
| Irrigated cropping | 1,500 | 0.1% |
| Irrigated horticulture | 1,000 | 0.0% |
| Intensive uses (mainly urban) | 11,500 | 0.5% |
| Rural residential | 700 | 0.0% |
| Mining and waste | 3,900 | 0.2% |
| Water | 24,600 | 1.2% |
| **Total** | **2,099,800** | **100.0%** |

[1] A recreational boat user survey was sent to 1,345 recreational boaters. 152 responses were received. This provided a qualitative analysis of boat user aspirations and demands for boating infrastructure on the Gippsland Lakes.

[2] http://www.gippslandlakes.net.au/wp-content/uploads/2013/04/Theme-21.pdf

## 5.1.3 Apiculture

***Proposed Mine Site***

Small-scale bee-keeping occurs within the Tara State Forest, including areas in the vicinity of the proposed mine site. There are at least four apiary sites (consisting of small clusters of beehives) within 500m of the site, and at least 24 registered apiary sites within 7 km of the site.

***Regional Context***

Apiculture (bee-keeping) is widely practiced in East Gippsland State forests by a range of commercial, semi-commercial and recreational beekeepers (DAFF 1995). Nectar is harvested from a variety of flowering native trees and shrubs – including eucalypts, acacia, tea-tree and banksia.

## 5.1.4 Agriculture

***Proposed Mine Site***

Clearing of land for agriculture in the vicinity of the proposed mine site has been minimal, with the mine site and surrounds dominated by State Forest. The closest agricultural areas to the site are pasture areas associated with Wairewa hamlet over 2 km to the southeast.

***Regional Context***

Agriculture is a large contributor to the economy in the region, but does not rival the forestry industry. Since a large proportion of the region is native forest (protected and harvested), large-scale agriculture is confined to the major valleys and coastal regions (EGCMA 2005). The most intensive agricultural activity is typically located in close proximity to major towns and transport hubs. However, food manufacturing and production is still a major driver of the regional economy (East Gippsland Shire Council 2013).

Livestock

Sheep farming is widespread, but alone is not a large industry. Most sheep farms are generally located in the north or in the drier, flatter south. Beef cattle farms are typically located in the main valleys and nearer the coast (milder conditions). Dairy cattle production requires high quality, lush pasture and therefore is predominantly situated in the floodplains or irrigation is used. Large dairy factories are located near Lakes Entrance and Bairnsdale.

Cropping and Irrigated Agriculture

Cropping and irrigated agriculture is generally located near major rivers or on floodplains due to the heavy reliance on water sources. This also includes market gardening, which has grown in popularity in the last decade. Crops can include beans, sweet corn and potatoes.

Wineries and vineyards are also located throughout East Gippsland, some are large international enterprises, but smaller businesses also profit (East Gippsland Shire Council 2013).

## 5.1.5 Mining

***Proposed Mine Site***

The 5 Mile Deposit area shows no indications of prior mining activities although previous mineral exploration has been conducted at the site. To the north, a small iron deposit named 7 Mile has been quarried in the past and evidence of site disturbance is still noticeable. The Nowa Nowa Quarry is located just north of Nowa Nowa township and it is believed that gravel from this quarry has been used as road material in the region.

***Regional Context***

There has been a history of small scale mining in East Gippsland since the 1850s. More than 200 mineral occurrences, old mines and deposits have been identified within the region. However, few significant mines by international standards have been operated in the region. The Stockman (Benambra) Copper-Zinc Mining and Processing Project is the largest nearby mining operation some 100 km to the north. It is currently closed, however a proposal to re-establish the mine is currently being assessed.

### 5.1.6 Residential and Commercial

***Proposed Mine Site***

No residential or private properties occur in the direct vicinity of the proposed mine site, which occurs within an area of State Forest. The nearest private land is located over 2 km from the proposed mine site, which is agricultural land associated with the farming hamlet of Wairewa. The nearest residences are isolated farmhouses which occur over 3 km away, and the nearest residential area is the community of Wairewa located 4 km to the southeast of the mine site.

***Regional Context***

There are several large towns within East Gippsland, the most densely populated being Bairnsdale, Lakes Entrance, Mallacoota, Metung and Orbost (all along/near coast). Most private and commercial residences are located within these towns. The commercial manufacturing sector includes ship and boat building, computer and electronic equipment, motor vehicles and parts (East Gippsland Shire Council 2013). Based on area alone, residential and commercial use is a much smaller proportion of land use compared to other uses.

### 5.1.7 Land Access and Infrastructure

The unsealed Nowa Nowa-Buchan Road runs through the proposed mine site (Figure 2.1). This road has a low volume of traffic, and is likely to be mainly used by vehicles related to forest management activities. A number of small unsealed tracks also intersect the proposed mine site (e.g. Tomato track).

An existing 22 kV transmission line runs parallel to Bruthen-Buchan Road past the proposed mine access road.

## 5.2 Water Resource Use Setting

The proposed mine site occurs principally within the Boggy Creek Catchment, and is located adjacent to the major catchment boundary with the Hospital Creek Catchment. Several small creeks intersect the mine site area, which are ephemeral/intermittent and dry for most of the year. There is little standing water and no natural or man-made water bodies in the vicinity. Surface water allocations in the subcatchment of the mine site (Boggy Creek) are managed by Southern Rural Water.

The Boggy Creek catchment is classed as a Declared Water Supply Catchment, and therefore use of land within the Catchment is regulated by the *Catchment and Land Protection Act* 1994. Up until 2007, water from Boggy Creek was extracted for industrial purposes (e.g. sawmills) and as a drinking water supply for Nowa Nowa township. However the catchment is no longer used for drinking water supply as drinking water for Nowa Nowa township is now sourced from the Mitchell River. As per East Gippsland Water's Annual Report 2012/13, an entitlement of 118 ML/year from the Boggy creek remains in place for the Nowa Nowa water supply system. None of this water allocation was used as "all the infrastructure to

enable harvesting from Boggy Creek has been decommissioned." No other water allocations have been identified for the Boggy Creek. As a result, the primary downstream water uses at the current time are associated with recreational and conservation values within Lake Tyers. Apart from human use, there are also beneficial uses for aquatic ecosystems for the creeks and wetlands located downstream.

There are no Groundwater Management Areas in the Nowa Nowa region. No direct utilisation of groundwater resources has been identified within 2 km of the mine site, as no residential or agricultural uses occur within this area.

Water resource use is discussed in relation to the direct vicinity of the proposed mine site, as well as upstream and downstream of the area, in Sections 5.2.1 to 5.2.5 below.

## 5.2.1 Proposed Mine Site

The proposed mine site is located in the area of the Harris, Gap and Tomato Creeks which are situated between Bruthen-Buchan and Nowa Nowa-Buchan Roads (for detailed description see Section 2.5). Tomato and Gap Creeks are ephemeral and are dry most of the year, flowing only with heavy and lengthy rainfall. There is little standing water and no large or small natural water bodies in the area. No active use of surface water has been identified at the proposed mine site. The only beneficial use of the water in the creeks when flowing is for aquatic ecosystems.

No active use of groundwater has been identified at the proposed mine site or in the immediate surrounds.

## 5.2.2 Upstream

The main waterway that joins with creeks draining the proposed mine site is Boggy Creek. Boggy Creek originates near Mount Johnston and the ridgeline that follows Timbarra River, approximately 20 km north of the mine site.

Boggy Creek was historically a source of sediment and nutrients for Lake Tyers (EGCMA 2005). Additionally, Boggy Creek was an important site and source of fresh water for the local Indigenous people. Currently, Boggy Creek flows primarily through state forest. There are some private residences, farms and market gardens along the creeks upstream of the proposed mine site which may utilise water in the creeks when flowing. However, as described above, there are no water allocations for the Boggy Creek catchment apart from the historical entitlement for the Nowa Nowa water supply system which is no longer utilized.

## 5.2.3 Downstream

Water from the creeks intersecting the proposed mine site flows into Boggy Creek which passes mainly through State forest before draining into Lake Tyers just south of the township of Nowa Nowa. The main beneficial use of the downstream water between the mine site and Nowa Nowa is for aquatic ecosystems in the local creeks. Lake Tyers is approximately 15 km downstream of the proposed mine site and is the eastern-most lake of the Gippsland Lakes system. Lake Tyers is a popular recreational area and is also of significant importance for biodiversity conservation (refer below).

***Nowa Nowa Township and Agricultural Use***

From the 1980's to 2007, water from Boggy Creek was extracted for industrial purposes (e.g. sawmills) and as a drinking water supply for the Nowa Nowa township. As described above, drinking water for the township is now sourced from the Mitchell River (Department of Health 2008) and the entitlement of 118 ML/year for the Nowa Nowa water supply system that remains in place for the Boggy creek is not

utilised. There are two sawmills in Nowa Nowa, however these sawmills do not have an entitlement to utilise water from the Boggy Creek.

A single large agricultural holding occurs adjacent to the Boggy Creek downstream of the mine site (located on the Bruthen-Buchan Road approximately 4 km downstream of the mine site). This property has 10 small dams present for stock watering and does not have a water allocation from the Boggy Creek.

***Lake Tyers and Downstream Aquatic Ecosystems***

Boggy Creek flows into the 'Nowa Nowa Wetlands' at the northern end of Lake Tyers. The Nowa Nowa Wetlands are located adjacent to Nowa Nowa township and is a local recreational area/tourist site. The main part of the lake is a popular tourist destination and is used by nearby residents and visitors for a number of shore-based and water-based recreational activities. The lake is also an important biodiversity conservation area, forming part of the Gippsland Lakes Ramsar Site (refer EES Referral Attachment 9).

A portion of the Gippsland Lakes Ramsar site, specifically Lake Tyers, is downstream of the proposed mine site. Boggy and Ironstone Creeks flow into the Nowa Nowa Wetlands at the northern arm of Lake Tyers. The Nowa Nowa Wetlands is a local recreational area and provides habitat for a variety of species. The saline waters of Lake Tyers extend to this northern arm of the lake.

Lake Tyers is a popular destination for visitors and residents engaging in shore-based and water-based recreational activities. Visitors and residents primarily use the lake for bird-watching, fishing, swimming and other water sports and nature-based activities. It is an important recreational fisheries reserve; commercial fishing (finfishing) was closed in 2003, and in 2004 the Lake was declared a Fisheries Reserve under the provisions of Section 88 of the *Fisheries Act* 1995. The Lake is a popular recreational fishing destination year round for local residents, and is seasonally popular for anglers visiting from Melbourne and other parts of Victoria (DPI 2012).

Black bream (*Acanthopagrus butcheri*) and dusky flathead (*Platycephalus fuscus*) are currently by far the most popular target species for both boat-based and shore-based recreational anglers in Lake Tyers. Tailor (*Pomatomus saltatrix*) and luderick (*Girella tricuspidata*) were also significant components of the boat-based catch during cooler months of the year, and garfish (*Hyporhampus regularis, Hyporhampus melanochir)* for shore-based anglers. Commercial fishing activity in Lake Tyers is limited to the harvest of recreational fishing bait species such as eels (DPI 2012).

# 5.3 Indigenous Land and Water Use and Values

The traditional owners of Gippsland, including the study area, are the Gunaikurnai people. Represented by Gurnaikurnai Land and Waters Aboriginal Corporation (GLaWAC), the Gunaikurnai people are made up of five major clans (GLaWAC, 2013):

- **Brabralung** people in Central Gippsland. Mitchell, Nicholson, and Tambo rivers; south to about Bairnsdale and Bruthen;
- **Brataualung** people in South Gippsland. From Cape Liptrap and Tarwin Meadows east to the mouth of Merriman Creek; inland to near Mirboo; at Port Albert and Wilsons Promontory;
- **Brayakaulung** people around the current site of Sale. Providence Ponds, Avon and Latrobe rivers; west of Lake Wellington to Mounts Saw Saw and Howitt;
- **Krauatungalung** people near the Snowy River. Cape Everard (Point Hicks) to Lakes Entrance; on Cann, Brodribb, Buchan, and Snowy rivers; inland to about Black Mountain; and

- **Tatungalung** people near Lakes Entrance on the coast. Along Ninety Mile Beach and about Lakes Victoria and Wellington from Lakes Entrance southwest to mouth of Merriman Creek, also on Raymond Island in Lake King.

The Gunaikurnai have a strong connection with the land and water of Gippsland and are engaged in jointly managing several parks and reserves including land surrounding Lake Tyers. The parks and reserves are jointly managed with Parks Victoria, DEPI and local associations, and GLaWAC rangers work in conjunction with, and independently, to conserve, protect and enhance natural and cultural values.

On 22 October 2010 the Federal Court recognised that the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) hold Native Title (VID482/2009) over much of Gippsland. On the same day, the State entered into an agreement with the GLaWAC under the Traditional Owner Settlement Act 2010.

The GLaWAC is recognised as the sole holder and representative body of these native title rights and interests on behalf of all Gunaikurnai people. The agreement and the native title determination affect undeveloped Crown land within the Gippsland region, including the area of the proposed mine site.

Eastern Iron currently holds an agreement with the GLaWAC for exploration activities within their Exploration Licence, and has commenced processes associated with entering into an agreement for the development of the mine.

Indigenous land and water use and native title rights are covered in detail in the ***Aboriginal Cultural and Heritage Management Plan Interim Report*** (EES Referral Attachment 10).

# 6 Potential Project Impacts

## 6.1 Potential Land Use Impacts

As the mine site and surrounding areas are located entirely within Crown Land in the Tara State Forest, the primary land use impact on this area will be associated with vegetation clearance and landform alteration which will temporarily displace forestry activities, with approximately 146 ha of forest expected to be removed for the Project (refer vegetation assessment in EES Referral Attachment 8). No residential or agricultural land uses are expected to be impacted by the proposed mine site, as no such uses occur within 2 km of the site.

The Project will not affect landscape values of regional or State significance, as no such values have been identified in the area. Potential impacts on landscape values and visual amenity due to the presence of the mine site are expected to be negligible as the area is surrounded by State Forest and no residential areas or tourist sites occur in the vicinity. Disturbed land will also be progressively rehabilitated and revegetated to minimise potential impacts on landscape values.

### 6.1.1 Forestry

The proposed mine site is located within the Tara State Forest, which is managed for logging and conservation purposes. The majority of the forest within the proposed mine Footprint was previously harvested between 1960 and 1969 and the regrowth is expected to be of adequate size for commercial harvesting. Clearing of the site will be undertaken in accordance with an agreement with the Public Land Manger (DEPI). It is anticipated that this will be in the form of a 'Forest Produce Licence' (or similar). At closure, the mine site is expected to be rehabilitated and revegetated with the aim of returning the land to timber production where possible.

### 6.1.2 Conservation, Tourism and Recreation

While recreation activities such as hiking, bird-watching and mountain biking are undertaken in the surrounding area (and particularly around Mt Nowa Nowa and Lake Tyers), potential impacts on recreation are expected to be very limited as there are no designated recreational or tourism areas (such as picnic areas, camping areas, walking tracks) in the vicinity of the proposed mine site, and observations suggest the area is rarely used for recreational activites. In line with Victorian legislation and guidelines for mining projects, disturbed land is also expected to be progressively rehabilitated and revegetated to minimise potential impacts on landscape values.

### 6.1.3 Apiculture

Apiculture in practiced within the Tara State forest, with a number of small clusters of beehives observed in the forest surrounding the mine site. Minor impacts on apiculture in the local area may occur due to the vegetation loss resulting from the Project; however, given that the area is currently actively managed for forestry activities and the surrounding area is densely forested this impact is not expected to result in any significant reduction in overall productivity of beekeeping activities in the area.

### 6.1.4 Agriculture

As there is currently no agriculture within the direct vicinity of the proposed mine site or surrounds, it is not expected that agricultural areas will be significantly impacted by the Project. The closest agricultural areas to the proposed mine site are pasture areas associated with Wairewa located over 2 km to the southeast. Additionally, no water allocations for agriculture have been identified for creeks downstream of the proposed mine site.

### 6.1.5 Residential and Commercial

As the closest residences are located over 3 km from the proposed mine site, no residential properties will be directly impacted by the Project.

### 6.1.6 Indigenous Land Use

The mine site will affect land held under Native Title by GLaWAC. Negotiations regarding the use of the mine site are currently underway and an agreement on land use will be reached prior to Project commencement in accordance with the *Native Title Act* and other relevant legislation.

### 6.1.7 Land Access and Infrastructure

Land access to the area surrounding the mine site is not expected to be adversely impacted by the Project. A 1.8 km section of the unsealed Nowa Nowa-Buchan Road will be impacted by the Mine Footprint, however the Project design includes a diversion of the road around the eastern side of the mining area which is expected to effectively mitigate this impact (refer ***Traffic Impact Assessment***, EES Referral Attachment 7). The existing 22 kV transmission line located adjacent to the proposed mine site is not expected to be impacted.

## 6.2 Potential Water Use Impacts

While the Boggy Creek catchment remains classified as a Declared Water Supply Catchment, no impact on drinking water supplies are expected to result from the Project as water in this catchment is no longer utilised as a water supply for Nowa Nowa township, and the water supply infrastructure on the creek has been decommissioned.

The primary use of water downstream of the proposed mine site is related to recreational use of Lake Tyers (which forms part of the Gippsland Lakes Ramsar Site) and beneficial uses for aquatic ecosystems in the wetlands and ephemeral creeks downstream. No water allocations for agriculture or industry occur downstream, and the creeks downstream of the mine site primarily flow through State Forest before reaching Lake Tyers. To protect beneficial uses downstream, the Project will need to be carefully designed and managed in accordance with Victorian regulations to ensure that no significant impacts on the hydrology or water quality of downstream areas occur. A detailed assessment of potential water quality and hydrology impacts of the Project has been conducted in EES Referral Attachments 5 and 6.

No impact on Groundwater Management Areas are expected to occur as no such areas occur in the region. No impact on use of groundwater resources (e.g. through dewatering of the pit) is expected to result from the Project as no direct utilisation of groundwater has been identified within 2 km of the mine site.

# 7 Management and Mitigation

The following management and mitigation measures will be required to minimise the impact on land and water resources near the proposed mine site:

- Restrict land disturbance and vegetation clearance to areas directly required for Project infrastructure;
- Undertake vegetation clearance in accordance with an agreement with the Public Land Manger (DEPI). It is anticipated that this will be in the form of a Forest Produce Licence (or similar);
- Progressively rehabilitate and revegetate disturbed areas;
- Ensure the Project is appropriately designed and managed in accordance with relevant regulations to avoid significant impacts on downstream hydrology and water quality;
- Obtain appropriate water allocations and licences in consultation with Southern Rural Water and the EPA;
- Implement measures to avoid soil erosion and sediment transport draining from the mine into the waterways. This can be mitigated by an appropriate storm water management and mine rehabilitation program;
- Develop Water and Waste Management Plans to control impacts of the proposed development on water downstream. These plans will include appropriate handling and storage of hazardous materials;
- Ensure an agreement on land use is reached with GLaWAC prior to Project commencement in accordance with the *Native Title Act* and other relevant legislation;
- Ensure appropriate management measures are implemented to minimise dust impacts;
- Consult with DEPI regarding the proposed diversion of the Nowa Nowa-Buchan Road;
- Ensure a *Rehabilitation and Closure Plan* is developed for the proposed mine site including completion criteria for post-closure rehabilitated areas that are agreed through consultation with the existing land managers (DEPI); and
- Monitor the waterways draining from the proposed mine site during all phases of the Project.

Measures for minimising potential impacts on land and water use will need to be included in the *Environmental Management Plan* for the Project. A key objective of the Project's management and mitigation program will be to minimise impacts on downstream water quality and hydrology. Ongoing monitoring will be required to ensure any significant effects can be detected and management measures updated accordingly.

It will be important to ensure effective consultation with native title holders, community groups and Government authorities regarding land and water use issues. In addition, appropriate secondary approvals and licences for water use will need to be obtained where required.

# 8 Summary and Conclusions

The land and water use impacts of the Project are expected to be limited by the fact that the proposed mine site and surrounds is located on Crown Land managed for forestry, and no agricultural or residential areas occur nearby. No landscape or environmental significance overlays were identified in the vicinity of the proposed mine site, and no landscape values of regional or State significance have been identified in the area.

The primary potential impact on land use associated with the Project development will be associated with impacts on forestry activities within the Tara State Forest due to vegetation clearance and reduced access to land associated with the mine site area. This area represents a small proportion of the forest managed for timber harvesting and is not expected to have a significant impact on forestry activities in the region. Key measures to minimise land use impacts will include minimising land disturbance and close coordination with the land managers (DEPI) to agree on the approach to land clearance and management of forestry operations in the vicinity of the Project. Other key stakeholders such as native title holders and local communities will also need to be consulted regarding changes in land access at the mine site. Further measures for minimising potential impacts on land use will be required in the *Environmental Management Plan* for the Project.

With regards to water use, the primary downstream water uses are associated with recreational and conservation values within Lake Tyers, and beneficial uses for aquatic ecosystems in the wetlands and ephemeral creeks downstream. Minimization of potential effects of the Project on downstream hydrology and water quality will need to be a key management focus for the Project. Provided that appropriate management and monitoring measures are implemented, it is considered that the Project can be successfully delivered with no significant long-term impact on water resource use in the region. As the Project will be capturing and using water within the Boggy Creek Catchment, appropriate water allocations and licences will need to be obtained in consultation with Southern Rural Water and the EPA.

# 9 References

Beekman, M. & F. L. W. Ratnieks (2000). Long-range foraging by the honey-bee, *Apis mellifera* L. *Functional Ecology* 14(4): 490-496.

BOM. (2013). *Climate Data Online*. Melbourne, Bureau of Meteorology, from http://www.bom.gov.au/climate/data/index.shtml.

Bureau of Rural Sciences (2009). *Land Use Summary: East Gippsland NRM Region - Victoria*. Canberra, Australian Collaborative Land Use and Management Program, Commonwealth of Australia.

DAFF (2006). *East Gippsland: Resource and Economics Report*. Canberra, Department of Agriculture, Fisheries and Forestry.

Department of Health (2008). *Annual Report on Drinking Water Quality in Victoria 2007-08*. Victoria, Victorian Department of Health.

DEPI. (2013). *Biodiversity Interactive Map*. Melbourne, Department of Sustainability and Environment, Victorian Government, from http://www.dse.vic.gov.au/about-dse/interactive-maps.

DPCD (2010a). *Buchan-Snowy River Historical Notes*. Melbourne, Department of Planning and Community Development.

DPCD (2010b). *East Gippsland (Croajingolong) Historical Notes*. Melbourne, Department of Planning and Community Development.

DPCD. (2013). *Planning Maps Online*. Melbourne, Department of Planning and Community Development, from http://services.land.vic.gov.au/landchannel/jsp/map/PlanningMapsIntro.jsp.

DPI (2012). *East Gippsland Fishery Management Plan*. Fisheries

Victoria Management Report Series No. 84. Melbourne, Department of Primary Industries, Victorian Government.

DPI. (2013a). *East Gippsland Land Use - Victorian Resources Online*. Melbourne, Department of Primary Industries, from http://vro.dpi.vic.gov.au/dpi/vro/egregn.nsf/pages/eg_landuse_map.

DPI. (2013b). *GeoVic - Explore Victoria Online*. Melbourne, Department of Primary Industries, from http://www.dpi.vic.gov.au/earth-resources/exploration-and-mining/tools-and-resources/geovic.

DPI (2013c). *Wood Utilisation Plan: East Gippsland Forest Management Area*. Melbourne, Department of Primary Industries.

DSE (1995). *East Gippsland Forest Management Plan*. Melbourne, Department of Sustainability and Environment.

DSE (2012) *Timber Release Plan 2009 – 2014.* Melbourne, Department of Sustainability and Environment.

DSE. (2013). *Forest Explorer 5*. Melbourne, Department of Sustainability and Environment, from http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site=forestexplorer.

DSEWPaC (2010). *Gippsland Lakes Ramsar site Ecological Character Description*. Canberra, Department of Sustainability, Environment, Water, Population and Communities; Commonwealth of Australia.

East Gippsland Shire Council. (2013). *Economic and Industy Profile*. Bairnsdale, from http://www.eastgippsland.vic.gov.au/Business_and_Tourism/Lets_Do_Business/Economic_and_Industry_Profile.

EGCMA (2005). *East Gippsland Regional Catchment Strategy 2005-2010*. Victoria, East Gippsland Catchment Management Authority.

EGCMA (2006). *Protecting and Improving Our River Health: The East Gippsland Regional River Health Strategy 2005-2010*. Bairnsdale, East Gippsland Catchment Management Authority.

Ramsar Convention (2013). *The Ramsar List of Wetlands of International Importance*. Switzerland, The Ramsar Convention of Wetlands.

Rees, D. B. (1996). *Land Inventory of East Gippsland: A reconnaissance survey, January 1996*. Melbourne, Department of Conservation and Natural Resources.

Russell, L. D. (1983). *A Report on Three Water Supply Catchments in East Gippsland*. Victoria, Soil Conservation Authority.

Seeley, T. D. (1995). *The Widsom of the Hive*. London, Harvard University Press.

Visscher, P. K. & T. D. Seeley (1982). Foraging strategy of honeybee colonies in a temperate deciduous forest. *Ecology* 63(6): 1790-1801.

# Annex A
# Planning Property Reports

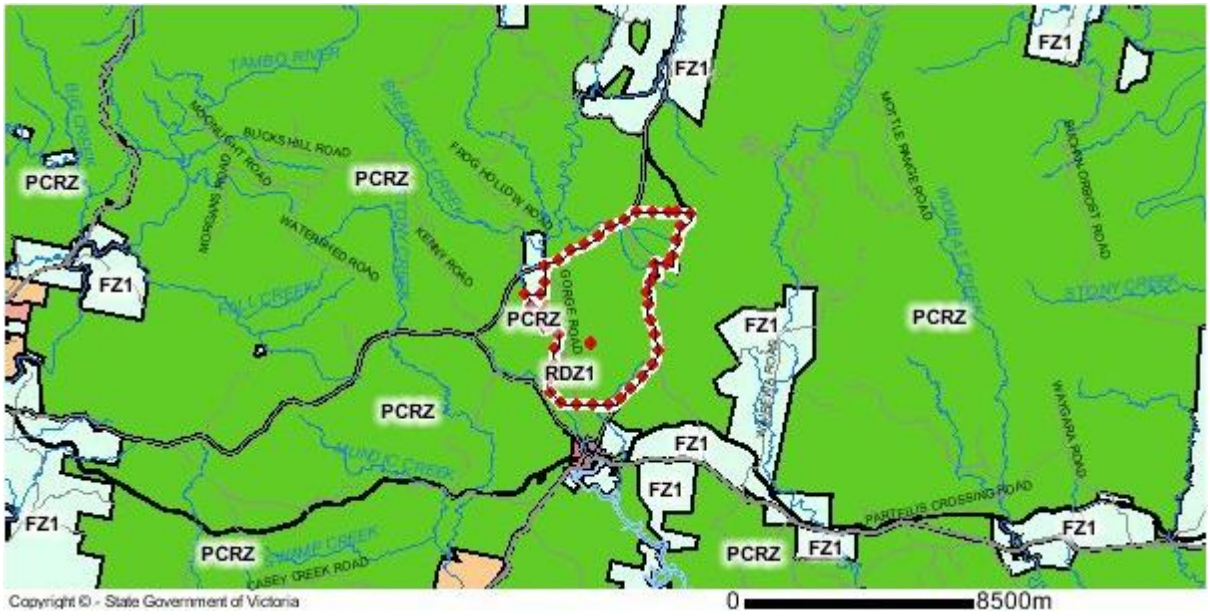
# Planning Property Report

From www.dpcd.vic.gov.au/planning on 13 September 2013 12:31 PM

**Address:** HARRIS CREEK TRACK NOWA NOWA 3887
**Crown Description:** Allot. 2012 (ROAD parcel) PARISH OF NOWA NOWA SOUTH
This property has a total of 2 parcels.
For full parcel details get the free Basic Property report at Property Reports
**Local Government (Council):** EAST GIPPSLAND **Council Property Number:** N/A
**Directory Reference:** VicRoads 85 C5

## Planning Zone

PUBLIC CONSERVATION AND RESOURCE ZONE (PCRZ)
SCHEDULE TO THE PUBLIC CONSERVATION AND RESOURCE ZONE



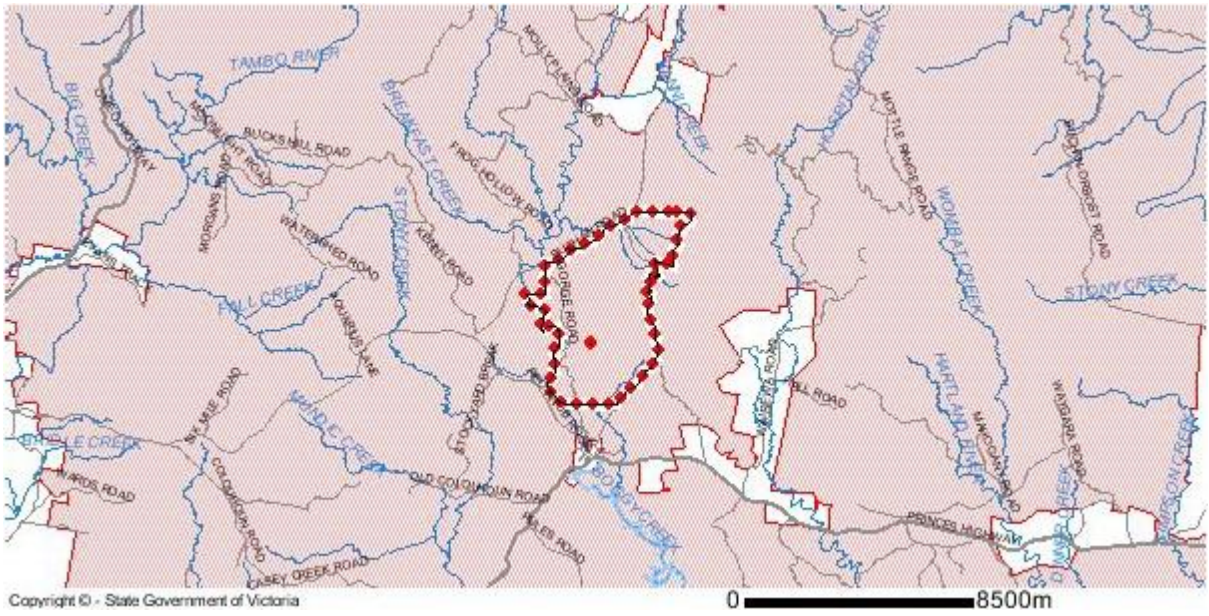

Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

Zones Legend

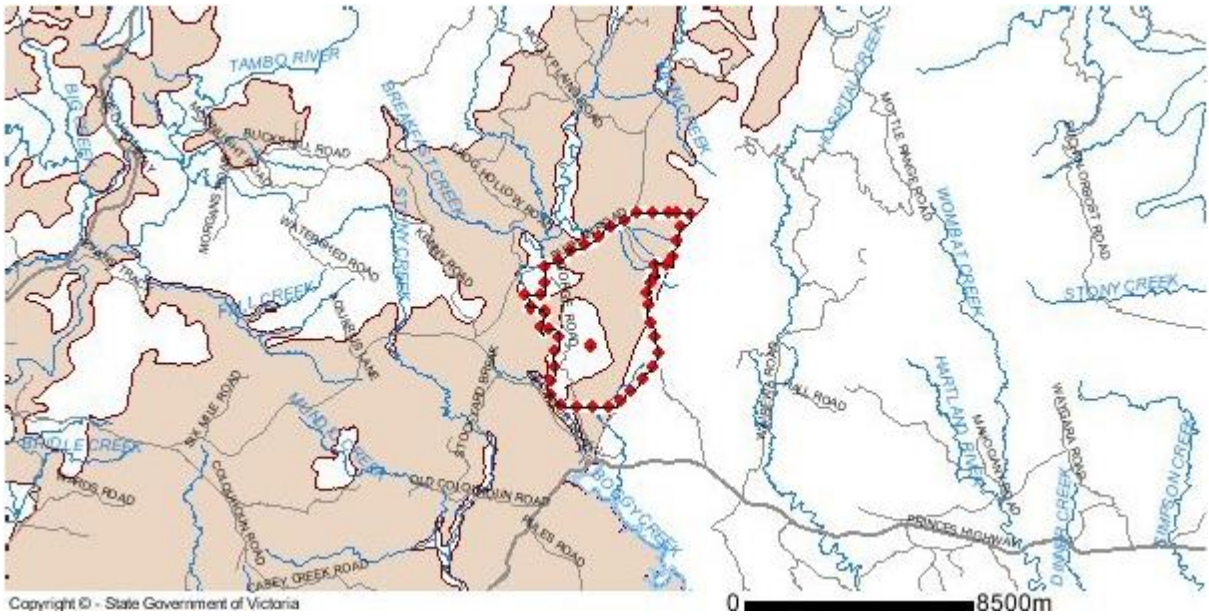
- ACZ - Activity Centre
- B1Z - Commercial 1
- B2Z - Commercial 1
- B3Z - Commercial 2
- B4Z - Commercial 2
- B5Z - Commercial 1
- C1Z - Commercial 1
- C2Z - Commercial 2
- CA - Commonwealth Land
- CCZ - Capital City
- CDZ - Comprehensive Development
- DZ - Dockland
- ERZ - Environmental Rural
- FZ - Farming
- GRZ - General Residential
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- IN1Z - Industrial 1
- IN2Z - Industrial 2
- IN3Z - Industrial 3
- LDRZ - Low Density Residential
- MUZ - Mixed Use
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PDZ - Priority Development
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service & Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ4 - Public Use - Transport
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public Use
- R1Z - Residential 1
- R2Z - Residential 2
- R3Z - Residential 3
- RAZ - Rural Activity
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- RDZ2 - Road - Category 2
- RGZ - Residential Growth
- RLZ - Rural Living
- RUZ - Rural
- SUZ - Special Use
- TZ - Township
- UFZ - Urban Floodway
- UGZ - Urban Growth
- Urban Growth Boundary

## Planning Overlays

WILDFIRE MANAGEMENT OVERLAY (BMO or WMO)




EROSION MANAGEMENT OVERLAY (EMO)
EROSION MANAGEMENT OVERLAY SCHEDULE (EMO)



## Planning Overlays Legend


Note: due to overlaps some colours on the maps may not match those in the legend.

## Areas of Aboriginal Cultural Heritage Sensitivity

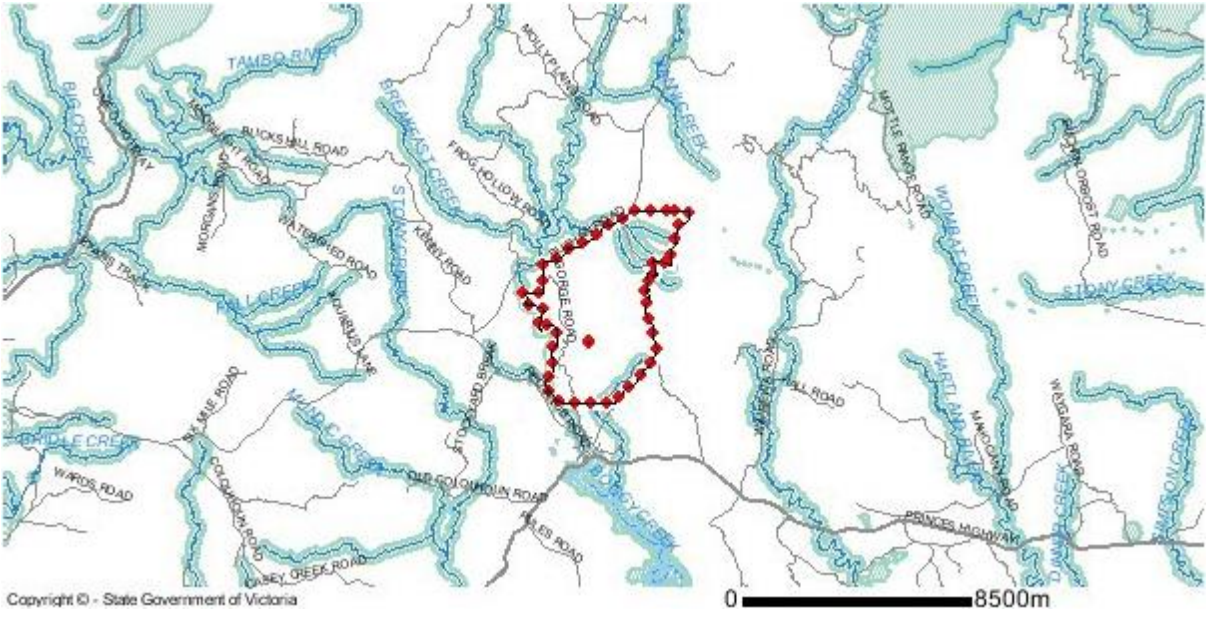
This property is within, or is affected by, one or more areas of cultural heritage sensitivity as described in the Aboriginal Heritage Regulations 2007.

The data provides indicative information about the location and extent of areas of Aboriginal cultural heritage sensitivity and is provided to assist with the decisions about the potential need to prepare a Cultural Heritage Management Plan in relation to proposed activities on this property.

For further information about whether a Cultural Heritage Management Plan is required go to Aboriginal Heritage Planning Tool

To find out if your property has any recorded Aboriginal cultural heritage places, such as scarred trees, occupation sites or places of burial, you can request information from the Victorian Aboriginal Heritage Register.

Find out more about the Victorian Aboriginal Heritage Register



## Further Planning Information

Planning scheme data last updated on 12 September 2013.

A **planning scheme** sets out policies and requirements for the use, development and protection of land.
This report provides information about the zone and overlay provisions that apply to the selected land.
Information about the State, local, particular and general provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the Planning & Environment Act 1987.
It does not include information about exhibited planning scheme amendments, or zonings that may abut the land.
To obtain a Planning Certificate go to Titles and Property Certificates

For details of surrounding properties, use this service to get the Reports for properties of interest

To view planning zones, overlay and heritage information in an interactive format visit Planning Maps Online

For other information about planning in Victoria visit www.dpcd.vic.gov.au/planning

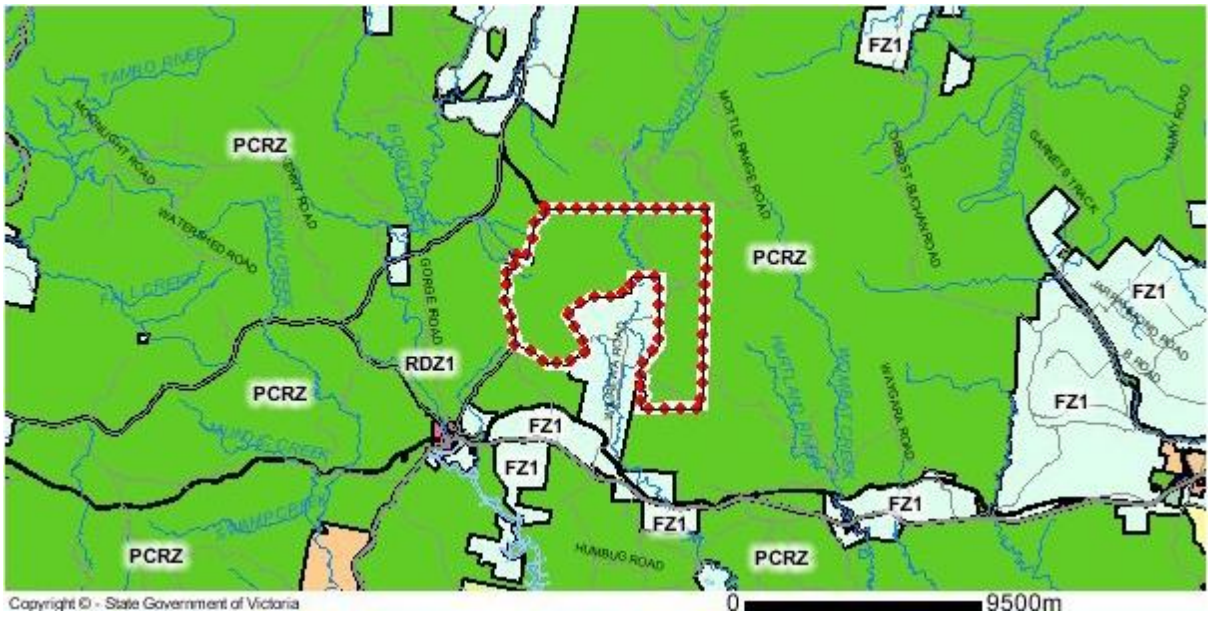
# Planning Property Report

From www.dpcd.vic.gov.au/planning on 13 September 2013 11:58 AM

**Crown Description:** Allot. 23 Sec. A PARISH OF NOWA NOWA SOUTH
**Address:** JUNCTION CREEK TRACK WAIREWA 3887
**Local Government (Council):** EAST GIPPSLAND **Council Property Number:** N/A
**Directory Reference:** VicRoads 85 D4

## Planning Zones

PUBLIC CONSERVATION AND RESOURCE ZONE (PCRZ)
SCHEDULE TO THE PUBLIC CONSERVATION AND RESOURCE ZONE
ROAD ZONE - CATEGORY 1 (RDZ1)





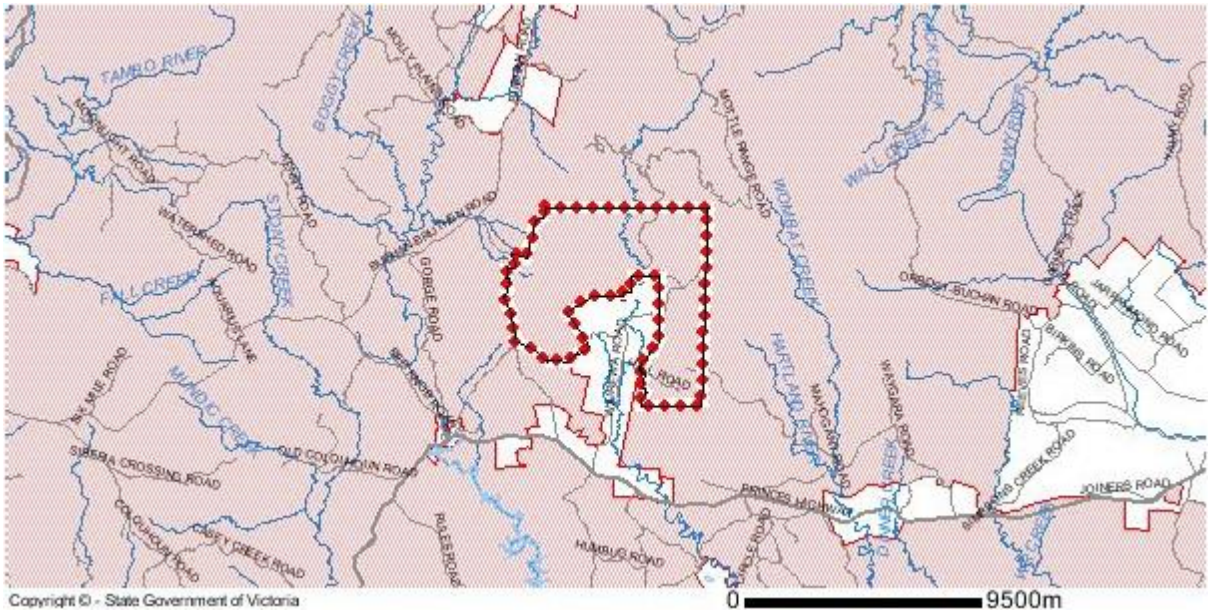

Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

Zones Legend

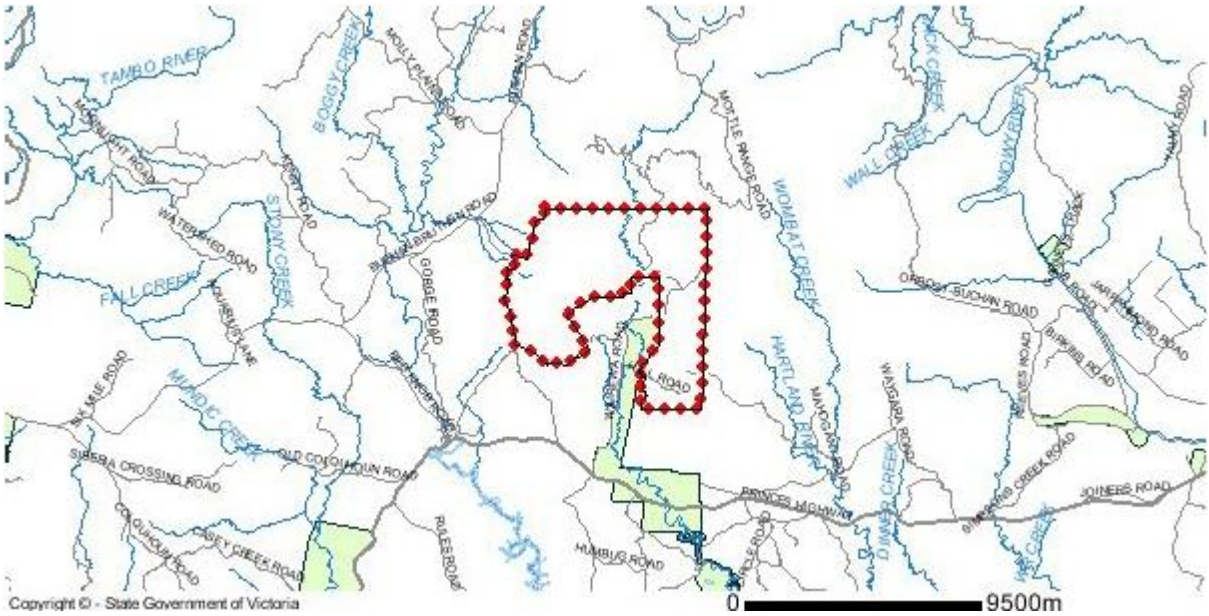
- ACZ - Activity Centre
- B1Z - Commercial 1
- B2Z - Commercial 1
- B3Z - Commercial 2
- B4Z - Commercial 2
- B5Z - Commercial 1
- C1Z - Commercial 1
- C2Z - Commercial 2
- CA - Commonwealth Land
- CCZ - Capital City
- CDZ - Comprehensive Development
- DZ - Dockland
- ERZ - Environmental Rural
- FZ - Farming
- GRZ - General Residential
- GWAZ - Green Wedge A
- GWZ - Green Wedge
- IN1Z - Industrial 1
- IN2Z - Industrial 2
- IN3Z - Industrial 3
- LDRZ - Low Density Residential
- MUZ - Mixed Use
- NRZ - Neighbourhood Residential
- PCRZ - Public Conservation & Resource
- PDZ - Priority Development
- PPRZ - Public Park & Recreation
- PUZ1 - Public Use - Service & Utility
- PUZ2 - Public Use - Education
- PUZ3 - Public Use - Health Community
- PUZ4 - Public Use - Transport
- PUZ5 - Public Use - Cemetery/Crematorium
- PUZ6 - Public Use - Local Government
- PUZ7 - Public Use - Other Public Use
- R1Z - Residential 1
- R2Z - Residential 2
- R3Z - Residential 3
- RAZ - Rural Activity
- RCZ - Rural Conservation
- RDZ1 - Road - Category 1
- RDZ2 - Road - Category 2
- RGZ - Residential Growth
- RLZ - Rural Living
- RUZ - Rural
- SUZ - Special Use
- TZ - Township
- UFZ - Urban Floodway
- UGZ - Urban Growth
- Urban Growth Boundary

## Planning Overlays

WILDFIRE MANAGEMENT OVERLAY (BMO or WMO)

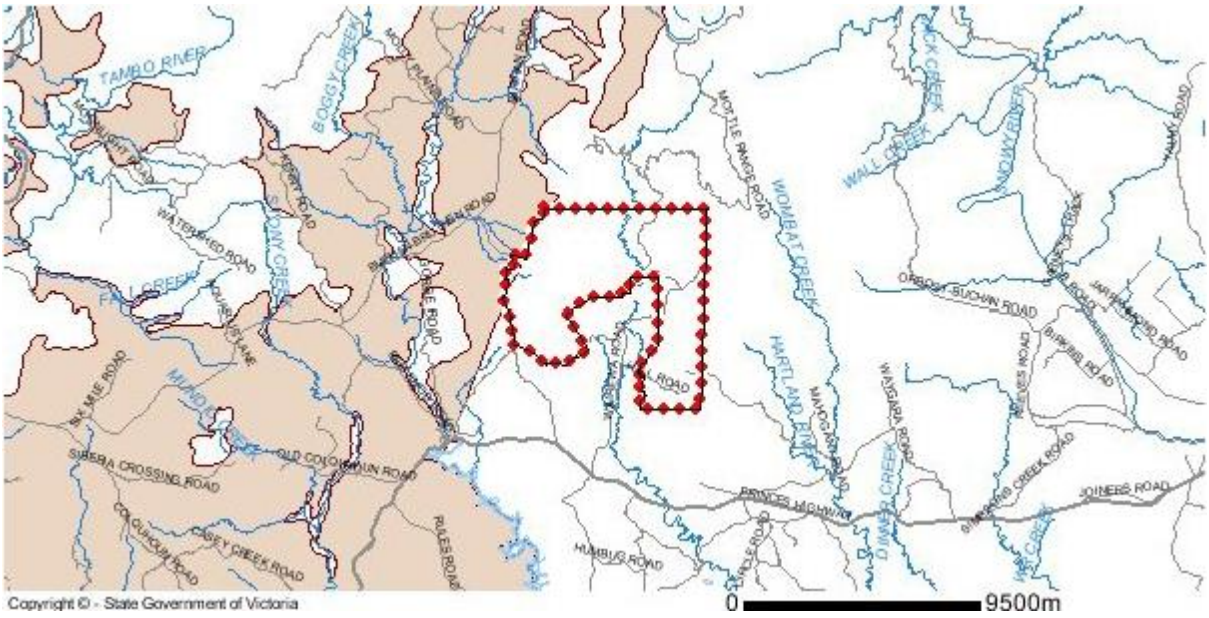



ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)
ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 1 (ESO1)



## Planning Overlays

EROSION MANAGEMENT OVERLAY (EMO)
EROSION MANAGEMENT OVERLAY SCHEDULE (EMO)




**Overlays Legend**

- Airport Environs
- City Link Project
- Development Contributions Plan
- Design & Development
- Design & Development Part
- Development Plan
- Environmental Audit
- Erosion Management
- Environmental Significance
- Floodway
- Heritage
- Incorporated Plan
- Land Subject to Inundation & Floodway
- Melbourne Airport Environs 1
- Melbourne Airport Environs 2
- Neighbourhood Character
- Public Acquisition
- Restructure
- Road Closure
- Special Building
- Significant Landscape
- Salinity Management
- State Resource
- Vegetation Protection
- Bushfire Management - Wildfire Management

Note: due to overlaps some colours on the maps may not match those in the legend.

## Areas of Aboriginal Cultural Heritage Sensitivity

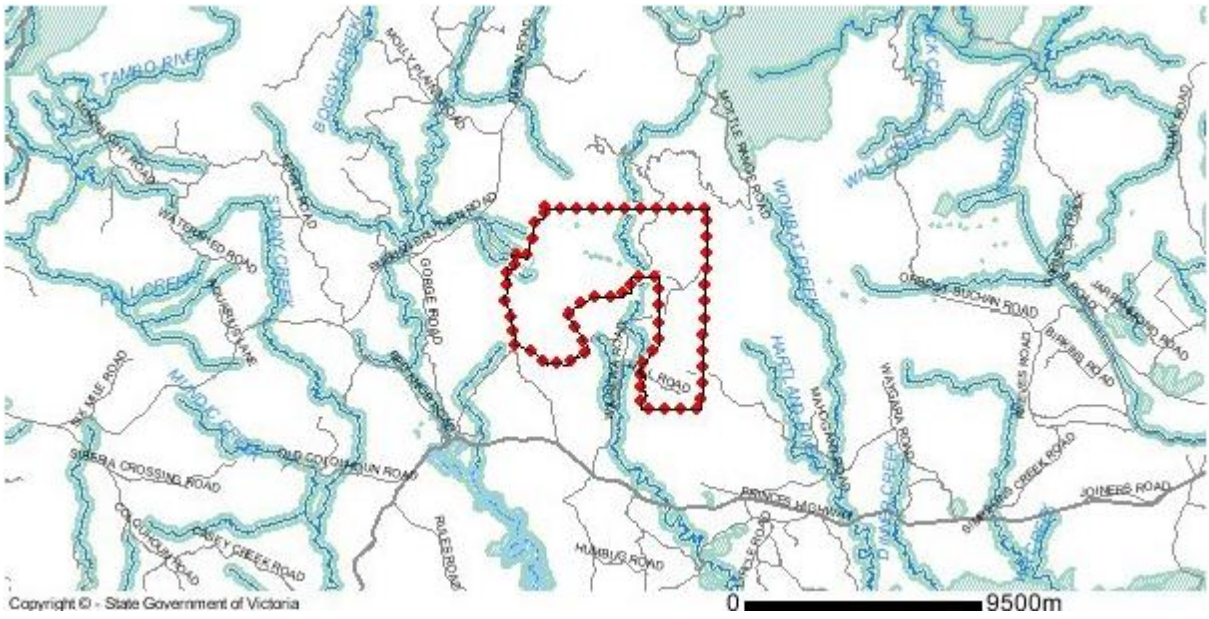
This parcel is within, or is affected by, one or more areas of cultural heritage sensitivity as described in the Aboriginal Heritage Regulations 2007.

The data provides indicative information about the location and extent of areas of Aboriginal cultural heritage sensitivity and is provided to assist with the decisions about the potential need to prepare a Cultural Heritage Management Plan in relation to proposed activities on this property.

For further information about whether a Cultural Heritage Management Plan is required go to Aboriginal Heritage Planning Tool

To find out if your property has any recorded Aboriginal cultural heritage places, such as scarred trees, occupation sites or places of burial, you can request information from the Victorian Aboriginal Heritage Register.

Find out more about the Victorian Aboriginal Heritage Register




Aboriginal Cultural Heritage Sensitivity | Aboriginal Cultural Heritage Sensitivity | Selected Land

## Further Planning Information

Planning scheme data last updated on 12 September 2013.

A **planning scheme** sets out policies and requirements for the use, development and protection of land.
This report provides information about the zone and overlay provisions that apply to the selected land.
Information about the State, local, particular and general provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting Planning Schemes Online

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the Planning & Environment Act 1987.
It does not include information about exhibited planning scheme amendments, or zonings that may abut the land.
To obtain a Planning Certificate go to Titles and Property Certificates

For details of surrounding properties, use this service to get the Reports for properties of interest

To view planning zones, overlay and heritage information in an interactive format visit Planning Maps Online

For other information about planning in Victoria visit www.dpcd.vic.gov.au/planning