

LAKE NARRACAN

BACKGROUND REPORT
DRAFT - JUNE 2014



CONTENTS

1.	INTRODUCTION	1	5.3.	Post-contact Cultural Heritage	9
1.1.	Introduction	1	6.	SERVICING AND UTILITIES	10
1.2.	Precinct Structure Plans and the Metropolitan Planning Authority	1	6.1.	Electricity	10
1.3.	Background Report	1	6.2.	Water and Sewer	11
2.	PRECINCT CONTEXT	2	6.3.	Gas	11
2.1.	Local and Regional Context	2	7.	LAND CAPABILITY	11
2.2.	Policy Context	2	7.1.	Desktop Environmental, Hydrological and Geotechnical Report	11
3.	LANDSCAPE AND CHARACTER	4	7.2.	Outcomes and Recommendations of Report	12
3.1.	Landscape and Character	4	7.2.1.	Site Contamination Assessment Conclusion	12
4.	BIODIVERSITY	6	7.2.2.	Geotechnical Assessment Conclusions	12
4.1.	Biodiversity assessment overview	6	7.2.3.	Hydrogeological Assessment Conclusions	12
4.2.	Native vegetation values within the precinct	6	7.2.4.	Overall Recommendations	13
5.	CULTURAL HERITAGE	7	8.	TOWN CENTRES AND RETAIL	13
5.1.	Desktop Aboriginal Cultural Heritage Assessment Overview	7	8.1.	Retail Advice Report	13
5.2.	Outcomes and Recommendations of Assessment	7	8.2.	Outcomes and Recommendations of Report	14
5.2.1.	Aboriginal Ethno History	7	9.	INTEGRATED WATER MANAGEMENT	14
5.2.2.	Outcomes and Recommendations of Assessment	8	9.1.	Flood Management	14
			9.2.	Water Quality Treatment	15
			9.3.	Waterways	15
			9.4.	Water Level of the Lake	15

9.5.	Whole of Water Cycle Strategy	15	13.8.	Waterways and wetlands	21
10.	FIRE MANAGEMENT	15	14.	LAND VALUATIONS	21
10.1.	Lake Narracan Fire Management	15	15.	REFERENCES	22
11.	SURROUNDING LAND USES	16	16.	APPENDIX A	23
11.1.	Yallourn Power Station and Coal Mine	16	17.	APPENDIX B	25
11.2.	Moe Waste Water Treatment Facility	16	18.	APPENDIX C	26
12.	TRAFFIC AND TRANSPORT	17	19.	APPENDIX D	29
12.1.	Roads	17	20.	APPENDIX E	31
12.2.	Pedestrians and Cyclists	17	21.	APPENDIX F	34
12.3.	Traffic projections	18	22.	APPENDIX G	37
13.	COSTING OF INFRASTRUCTURE	18	23.	APPENDIX H	58
13.1.	Arterial road intersections	18	24.	APPENDIX I	61
13.2.	Connector road intersections	19	25.	APPENDIX J	63
13.3.	Roads	20	26.	APPENDIX K	72
13.4.	Culverts	20			
13.5.	Open space	20			
13.6.	Shared paths	21			
13.7.	Community facilities	21			

1. Introduction

1.1. Introduction

Latrobe City Council and the Metropolitan Planning Authority (MPA) have prepared a draft Precinct Structure Plan (PSP) for the land between Lake Narracan and the existing townships of Moe and Newborough. The PSP area of Lake Narracan and existing land use zoning is shown in Appendix A.

1.2. Precinct Structure Plans and the Metropolitan Planning Authority

A PSP is a 'big picture' plan that sets the vision for developing new communities and is the primary plan for guiding development.

PSPs identify roads, town centres, schools, parks, housing, employment areas, connections to transport and generally resolve the complex issues of biodiversity, cultural heritage and infrastructure provision.

The MPA is the statutory authority responsible for overseeing the preparation of PSPs in Melbourne's growth areas and advising the Minister for Planning on their approval.

The State Government made a commitment in *The Latrobe Valley Industry and Employment Roadmap* policy document that the Growth Areas Authority (now the MPA) would provide assistance to Latrobe City in the structure planning of its growth areas. The Lake Narracan area has been identified by Latrobe City as a priority growth area, and the MPA is assisting Latrobe City to plan this area through the preparation of the Lake Narracan PSP.

1.3. Background Report

This Background Report provides an overview of the local and regional context of the Lake Narracan precinct, and outlines the studies and considerations that have informed the preparation of the Lake Narracan PSP and its associated documents.

2. Precinct Context

2.1. Local and Regional Context

The PSP area of Lake Narracan is located in Latrobe City in Victoria's Gippsland region.

Lake Narracan is in close proximity to the established towns of Newborough to the south and Moe to the south-west. Lake Narracan itself is located immediately to the north of the PSP area whilst the Yallourn Power Station is located to the east of the PSP area.

The municipality of Latrobe City is situated east of Baw Baw Shire, west of Wellington Shire and north of the South Gippsland Shire Council.

Lake Narracan is approximately 140kms south-east of Melbourne's CBD and approximately 85kms from Pakenham in Cardinia Shire (one of Melbourne's growth areas).

The Latrobe Valley is significant as it generates 85% of Victoria's electricity, from its large reserves of brown coal (DPCD).

Lake Narracan is connected to Melbourne and its south-eastern suburbs via the Princes Freeway (M1), located approximately 4kms to the south. The Princes Freeway also connects Lake Narracan to the regional townships of Warragul and Drouin to the west and Morwell, Traralgon and Sale to the east.

Lake Narracan is also serviced by a regional train system (V Line) via the Moe Train Station approximately 5kms from the Lake Narracan PSP area. This regional V Line train is accessible from Melbourne CBD and

Melbourne's south-eastern suburbs, whilst also connecting Moe with the regional townships of Warragul, Drouin, Morwell and Traralgon.

2.2. Policy Context

At a local level the document *Latrobe 2026* defines the community of Latrobe's long term aspirations for the Latrobe Valley. 'In 2026 the Latrobe Valley is a liveable and sustainable region with collaborative and inclusive community leadership' (Latrobe 2026). It is this community vision that underpins *Latrobe City's Council Plan 2013-2017* which identifies strategic directions for planning future residential settlements such as the Lake Narracan precinct (Latrobe City Council Plan 2013-2017).

Latrobe City Council's *Municipal Strategic Statement*, within the Latrobe Planning Scheme, provides a strong emphasis on the principles of good urban design. In particular Latrobe's Healthy Urban Design Good Practice Guideline – Meeting Healthy by Design Objectives provides policies and guidelines aimed at promoting an active and healthy lifestyle for residents in Latrobe City (Latrobe City MSS, 2013).

The *Moe-Newborough Structure Plan 2007* describes the townships of Moe and Newborough as constituting one urban settlement. Relative to Melbourne, it is the first of the four major towns that constitute Latrobe City and consequently can be identified as the 'Gateway to Gippsland's Regional City' (*Moe-Newborough Structure Plan 2007*).

On a regional level, the *Gippsland Regional Growth Plan 2014* directs projected population growth to eight defined growth nodes consisting of Moe/Newborough, Morwell and Traralgon (as the Regional City of Gippsland) and the regional centres of Bairnsdale, Leongatha, Sale, Warragul/Drouin and Wonthaggi.

The report's identification of Latrobe City as the Regional City of the Gippsland region signifies its importance for future growth and development. The assets of Latrobe City, such as the regional hospital, airport and university campus at Churchill, in conjunction with rail and road transport connections, provide a platform to support a knowledge driven economy.

In the Regional Growth Plan, the land between Lake Narracan and Moe and Newborough is identified as 'Future Urban Growth (Planned)' as shown in Appendix B. The detailed planning of this area has then been undertaken through the preparation of the draft Lake Narracan PSP.

The *Moe-Newborough Structure Plan* has also been updated to reflect the planning of the Lake Narracan area, which extends the township boundary to incorporate the Lake Narracan precinct within the wider township area.

3. Landscape and Character

3.1. Landscape and Character

The key landscape and character features of the Lake Narracan PSP area include:

- Significant tree lines
- Patches of vegetation (Ecological Vegetation Classes)
- Landform (contours and edge of terrace lines)
- Key views
- Existing publically accessible recreation facilities; and
- Named areas or zones of the lake

The Lake Narracan area is characterised by a lower flatter area adjacent to the lake, particularly west of the Moe Golf Course. The land then rises noticeably up to a higher terrace in the southern section of the site. The edge of the terrace offers views down to the lake below, which is an opportunity to be considered in the placement of roads and parks to provide views to the lake from publically accessible spaces.

The character of the spaces along the lake foreshore changes along its length:

- The eastern end is characterised by smaller picnic spaces adjacent smaller bays/coves of the lake, set within the native foreshore vegetation
- The jetty and beach opposite the caravan park is a key publically accessible area of the lake which experiences a significant amount of use by existing Moe and Newborough residents. This

area offers easy access over the lake via the jetty, and into the lake itself via the beach

- Land rises adjacent to the lake opposite the golf course, offering great views over the lake but with limited or no access to the lake
- The land flattens out between the golf course and Hayes Road, offering wider grass areas containing a number of established scattered native trees; and
- The western end is characterised by the La Trobe River delta comprising numerous stream channels between banks of vegetation and mud/sand banks within the lake. This area provides a significant amount of habitat for birds and other animals.

The lake itself has existing named sections such as Becks Bay, Turras Reach, Fernlea Channel, Thompsons Bay and Halls Bay. This existing identification of the different areas of the lake, offers the opportunity to provide identity for any new urban areas adjacent to the water.

These existing names have been referenced in the names of adjacent neighbourhoods, village centres and parks in the Lake Narracan PSP. For example the new urban area between Becks Bridge Road and Hayes Road has been identified as the neighbourhood of 'Becks Bay', the large park on the foreshore opposite the Turras Reach section of the lake has been named the 'Turras Reach Foreshore Park', and the new village centre associated with the existing jetty and beach area has been identified as 'Fernlea Village'.

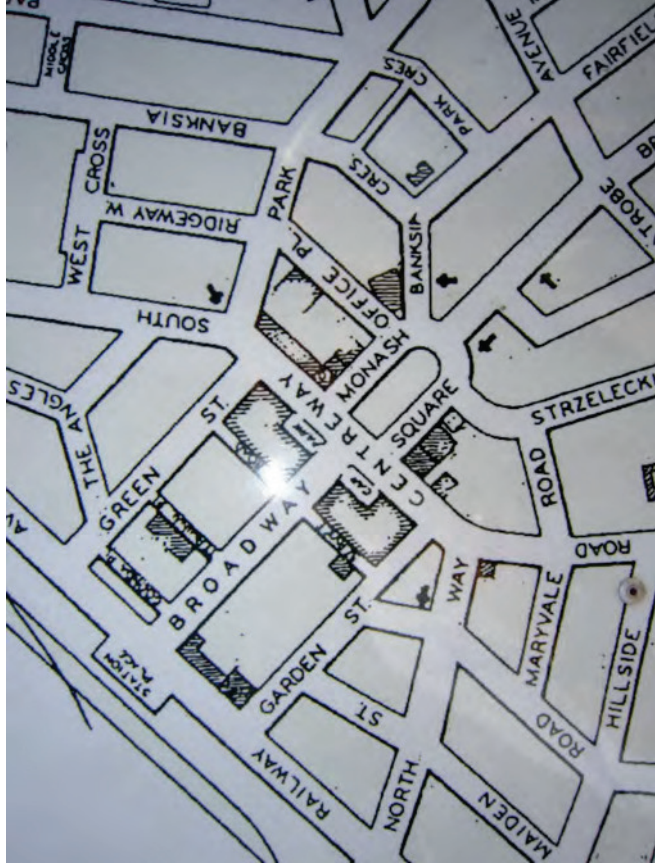
The Lake Narracan area is also quite close to the previous township of Yallourn, which was removed during the 1970s and early 1980s to provide access to the coal deposits beneath. The original town of Yallourn was

planned around a well laid-out town centre (see Figure 1 below) and contained picturesque streets with significant tree planting.

Source: Photograph of Interpretive sign at Decampo Drive, Yallourn in February 2013, by *Yallourn North and District Historical Society*

The planning of the Lake Narracan area provides the opportunity to reference some of the elements of the Yallourn Township, so they may live on in this new urban area. This has been done through the use of the key street names of 'Broad Way' and 'Centre Way' from Yallourn in the new urban area. The park name of 'Monash Square' (which was the park in centre of Yallourn), has been given to the central open space in the future Becks Bay Village Centre.

Figure 1: *Plan of central area of Yallourn Township*



4. Biodiversity

4.1. Biodiversity assessment overview

The MPA engaged WSP Environmental to complete a Biodiversity Assessment for the Lake Narracan growth area.

The purpose of this assessment was to synthesise historical ecological information, collect biodiversity data from field surveys and inform the preparation of a Native Vegetation Precinct Plan (NVPP) for the Lake Narracan area. The NVPP will complement the PSP document as it will identify the native vegetation to be retained in the Lake Narracan PSP area (WSP, 2013).

WSP Environmental undertook field surveys on those properties for which access had been expressly given by landowners in February and March 2013. WSP Environmental was able to gain access to 89% of the parcels requiring survey (WSP, 2013).

The objectives of this study were to:

- Identify, assess and map specified significant flora and fauna species in the precinct area, and determine their level of conservation significance
- Map and assess the quality of remnant vegetation within the precinct utilising the habitat-hectares methodology
- Ensure the development of the precinct is able to comply with government legislative and policy requirements on the protection of indigenous flora and fauna species and ecological communities
- Combine all results into a Biodiversity Assessment Report of sufficient detail to allow for the preparation of a NVPP for the Lake Narracan PSP area

The field ecological assessment and report were informed by Victorian and Commonwealth Government requirements and legislation (WSP, 2013).

Additional remnant native vegetation in the precinct was also identified by Latrobe City and has been considered in the preparation of the draft Lake Narracan NVPP.

4.2. Native vegetation values within the precinct

Past agricultural and farming practices have had a marked effect on the quality and extent of native vegetation within the precinct. Despite this, the area still supports a number of pre 1750 Ecological Vegetation Classes (EVCs), comprising Plains Grassy Forest, Riparian Forest, Swamp Scrub, Lowland Forest and Floodplain Riparian Woodland.

The largest areas of remnant native vegetation are found along the lake foreshore at the eastern end of the precinct. This vegetation has been protected as a priority in the draft NVPP as it comprises the most significant area of habitat for Strzelecki Gum (*Eucalyptus strzeleckii*). This threatened species is present within the precinct, and is protected under both the *Environment Protection and Biodiversity Conservation Act* and *Flora and Fauna Guarantee Act*.

Other significant areas of native vegetation will be protected within the Moe Yallourn Rail Trail reserve, the Moe Golf Course, through the centre of the western section of the precinct, and along Becks Bridge and Old Sale Roads.

5. Cultural Heritage

5.1. Desktop Aboriginal Cultural Heritage Assessment Overview

The MPA engaged Andrew Long and Associates to complete an Aboriginal Cultural Heritage Desktop Assessment for the Lake Narracan area. The purpose of the assessment was to:

- Identify known Aboriginal places and sites within the activity area
- Identify areas of Aboriginal cultural heritage significance in consideration of environmental features which may have influenced past Aboriginal settlement and the nature of archaeological sites likely to be present
- Identify sites or places of significance identified in Aboriginal oral history of the study area; and
- Identify areas that will require a mandatory Cultural Heritage Management Plan (CHMP)

The identification of the above is necessary to ascertain areas of cultural heritage sensitivity which will inform the PSP design.

Andrew Long and Associates prepared the assessment by:

- Consulting relevant literature such as the Victorian Aboriginal Heritage Register
- Meeting with the relevant Registered Aboriginal Party (RAP) being the Gunaikurnai Lands and Waters Aboriginal Corporation
- The collection and review of oral history and Aboriginal cultural values relating to the PSPs
- Visits to the study area with authorized representative of the RAP
- A geomorphological study by Dr Neville Rosengren
- The production of an Aboriginal Heritage Site Prediction Plan for the PSP; and

- The development of detailed recommendations for actions to be taken in the PSP and the identification of sites that require a mandatory CHMP

5.2. Outcomes and Recommendations of Assessment

5.2.1. Aboriginal Ethno History

The following is a brief excerpt of Aboriginal ethno history from the assessment (Andrew Long and Associates):

The Lake Narracan PSP forms part of the territory belonging to the Gunaikurnai tribe of Gippsland whose territory extended 'between the Tarwin River and the Snowy River and north to the alps' (Wesson 2000:17).....The Gunaikurnai tribe was comprised of six clan or land owning groups – Brataualong, Braiakaulung, Tatungalung, Brabralung, Krauatungalung and Bidawal – which were divided into multiple clans (Clarke 1998:184).

The study area falls within the territory of Braiakaulung clan which occupied the LaTrobe River valley (Howitt 1904). The Bunjil Kraura – a Braiakaulung clan – appear to have occupied the Yallourn region (Clarke 1998: 187-188).

The Gunaikurnai are estimated to have been between 700 and 5,000 people at the time of European contact (Fison and Howitt 1880; Rhodes 1996). The Gunaikurnai moved through the landscape seasonally – exploiting the wide variety of resources on offer for food, clothing, decoration and utilitarian purposes.

Contact with European sealers along the Victorian coast at Wilsons Promontory and Phillip Island, between 1800 and 1829, lead to a

decline in Braiakaulung numbers as a result of disease (Gaughwin 1983: 46-7). The establishment of pastoral runs in the 1840s and the gold rush in the 1850s contributed to the decline in Gunai numbers as land was cleared and the availability of bush foods declined, forcing the Gunai to rely on the Europeans for provisions. Conflict between the Gunai and Europeans ensued resulting in ongoing violent and deadly encounters between the two groups including the massacre of Aboriginal people by heavily armed European settlers (Thompson 1985: 23).

By 1857 the Braiakaulung population was reduced to 50 people (Pepper and de Araugo 1985: 98). In 1963 the Braiakaulung were forced to move to the newly established Ramahyuck Aboriginal Mission Station located along the Avon River, near Lake Wellington (Rhodes 1996:27-30). When Ramahyuck closed in 1907, the remaining inhabitants were sent to Lake Tyers Station. Gunai people continue to live at Lake Tyers and were granted formal ownership of the land at Lake Tyers under the Aboriginal Lands Act 1970 (Pepper and de Araugo 1985:221-229, 262).

5.2.2. Outcomes and Recommendations of Assessment

The results of the research, site assessments and predictive modelling were that few areas of cultural heritage sensitivity were identified, namely within 200 metres of a named waterway, in this case the LaTrobe River and Narracan Creek (Andrew Long and Associates).

Areas of cultural heritage sensitivity act as triggers for CHMPs as a mandatory requirement of the planning process. The *Areas of Cultural Heritage Sensitivity Plan* in Appendix C shows the areas of cultural heritage sensitivity in the Lake Narracan PSP areas, which are:

- A strip of land adjacent to Narracan Creek and the LaTrobe River in the north-west; and
- A discontinuous strip of land along the Lake Narracan foreshore in the north-east, where the former course of the LaTrobe River meanders close to the lake edge

The land form of the Lake Narracan PSP area comprises a lower area adjacent the lake, and a higher terrace area located along the southern sections of the PSP area, as shown in the *Landform Features Plan* in Appendix C (Andrew Long and Associates).

The *Landform Features Plan* also shows areas of high cultural value and archaeological potential, as identified by Lloyd Hood of the Gunaikurnai Lands and Waters Corporation (RAP for the area). The cultural values identified extend beyond the purely archaeological values of this area, and include community views (Andrew Long and Associates).

Lloyd Hood identified an area at the western end of Lake Narracan where he used to swim when he was a teenager. This is shown as Area A on the *Landform Features Plan*. The higher ground in the Lake Narracan PSP area, in particular the edge of Terraces 1 and 2 on the eastern PSP boundary (Area C shown in the *Landform Features Plan*) and the northern edge of Terrace 2 (Area B shown in the *Landform Features Plan*) were also identified as having the potential to contain Aboriginal sites (Andrew Long and Associates).

Recommendations made by Andrew Long and Associates include:

- Proactive, ongoing consultation with the RAP regarding the form and process of cultural heritage investigation and management in the PSP

- The reservation of a buffer zone around Lake Narracan, amounting to the existing foreshore reserve plus any additional adjoining areas that may contain high value archaeological heritage associated with Terrace 1 (although predicted, no Aboriginal cultural heritage has been identified to date on Terrace 1). The Lake Narracan PSP has therefore outlined a foreshore reserve along the southern edge of the lake, which will protect any values present, as well as providing open space and shared paths for the enjoyment of the community.
- The preservation of a representative section of the edge of Terrace 2 to preserve view shed across the Latrobe Valley, following investigations to determine the presence or absence of archaeological values. In considering locations for a central sporting reserve within the precinct, the Lake Narracan PSP has identified the area adjacent the edge of Terrace 2 on the west side of Hayes Road as the most appropriate location for this reserve. This location will provide a sporting reserve that is centrally located within the precinct to maximise its accessibility to the future community, and will also protect a prominent section of Terrace 2 and the views it offers across the Latrobe Valley.
- The preservation of the active floodplain of the Latrobe Valley to manage natural resources of significance to the Gunaikurnai. It is assumed that this will already be covered under a flood overlay; and
- Preparation of voluntary CHMPs, where mandatory CHMPs are not required.

5.3. Post-contact Cultural Heritage

Latrobe City had previously engaged Context Pty Ltd to complete a Heritage Study for its municipality. For the purposes of this Issues and

Opportunities Review the Thematic Environmental History section of the Context *Latrobe City Heritage Study* will be used.

The purpose of the environmental history is to provide an explanation of the themes and activities that have been important in shaping the present day Latrobe City. Post-contact cultural heritage refers to the period where first contact between indigenous peoples and non-indigenous explorers and settlers' occurred during the nineteenth century (Context, 2010).

The following are excerpts of thematic history from the *Latrobe City Heritage Study*, prepared by Context (Context, 2010).

The Pastoral era began with the settlers who began flooding into the Port Phillip district after 1834.... The pastoral occupations of the central Gippsland plains was swift after 'Gipps Land', as it was originally known, was proclaimed a squatting district in 1843, enabling the squatters to occupy large tracts of land that were called runs.

The squatters were not destined to keep control over their large tracts of leasehold. After the gold rushes significantly increased Victoria's population, the government introduced legislation that promoted more intensive use of the land and enabled many former gold miners to 'select' land and develop farms. Under a series of land acts, the former squatting runs were thrown open for selection.

A decade later, the railway line that was under construction provided further inducement to select in the study area and a Lands Office was opened in Traralgon.

Selection has had a major impact on shaping the land in this region. It attracted large numbers of people to the area, resulted in widespread clearing of land, and was responsible for many of the towns and communities in the study area developing. Selection led to the foundation of institutions such as schools and churches and to new local government areas.

Since European settlement in the 1840s, successive waves of migrants have settled in the study area and have shaped the landscape with names, buildings and sites that reflect their cultural traditions. In the nineteenth century and up to the middle of the twentieth century English, Scottish and Irish migrants predominated. This began to change during the first phase of the electricity generation in the 1920s when Maltese workers came to work for the mines Department and State Electricity Commission of Victoria (SEC).

In the post war years, the power industry was responsible for establishing a greater cultural diversity in Latrobe City as migrants from many parts of Europe came to work for the SEC.

Latrobe City has no record of any post-contact heritage sites of significance in the Lake Narracan PSP area.

6. Servicing and Utilities

6.1. Electricity

The PSP area contains a number of overhead high voltage powerlines and associated easements. The *Overhead Electricity Line Plan* in Appendix D

shows the alignment of these powerlines, and voltage of the powerlines is represented by different colours on the plan:

- Purple lines - existing overhead high voltage 220 kv power lines
- Double yellow lines – existing overhead high voltage 66kv power lines
- Single yellow lines with red dots - existing overhead low voltage 22kv power lines

Both the overhead 220kv and 66kv power lines are located on large steel-frame pylons. The overhead power lines and associated pylons do detract visually from the PSP area, however there is limited ability to place these lines underground. SPAusnet have advised the highest voltage lines (220kv) cannot be placed underground. Possible options for the 66kv power lines are:

- Place underground (which would entail significant cost)
- Place the power lines on smaller poles and remove the large steel pylons (however this would require more poles than the current number of pylons); and
- Place the power lines on smaller poles and remove the large steel pylons and re-route the power lines to another location less disruptive to the layout of the future urban area (eg adjacent the Moe Yallourn rail trail corridor). However this would have impact on other properties which are not currently encumbered by overhead power lines

The draft Lake Narracan PSP proposes to retain existing overhead high voltage power lines and easements in their current location due to cost and other implications of implementing the above options.

It would be preferable to put underground any existing overhead 22kv power lines in the PSP area as part of future development, which should not be cost prohibitive.

SPAusnet have advised that with the planned upgrade to an existing zone substation in Moe, there will be sufficient capacity to supply electricity to the Lake Narracan area.

6.2. Water and Sewer

Gippsland Water have advised that under its current sequencing strategy, development in the Lake Narracan area would need to fund the majority of any works required to extend water and sewer services to the area under Essential Services Commission guidelines.

Gippsland Water have advised that the Moe Waste Water Treatment Plant will need to be upgraded in the future to provide sewer services to all of the Lake Narracan area. The site currently occupied by the waste water treatment plant has available space to accommodate the additional treatment pond that would be required.

Latrobe City and the MPA have worked with Gippsland Water and Southern Rural Water to assess water supply options for the Lake Narracan area. These options will be considered further by Gippsland Water in the planning for the future water supply to the Lake Narracan area.

6.3. Gas

Envestra have confirmed that natural gas can be supplied to the eastern half of the PSP area (in previous advice to Millar Merrigan, *Narracan Lakes: Preliminary Infrastructure Services Advice*, December 2011). It is

expected that natural gas can be supplied to the remainder of the PSP area given this area is adjacent to the existing urban areas of Moe and Newborough.

7. Land Capability

7.1. Desktop Environmental, Hydrological and Geotechnical Report

The MPA engaged Sinclair Knight Merz (SKM) to complete a Desktop Environmental, Hydrological and Geotechnical Assessment for the Lake Narracan PSP area.

The aim of the assessment is to identify opportunities and constraints to the proposed land development which may potentially be caused by existing or past land uses and site and sub-surface conditions (SKM, 2013).

The scope of works included:

- Gathering of relevant information (including the use of literature sources) for the purposes of identifying potential sources of contamination, hydrogeological and geotechnical issues; and
- Inspecting the site from publically accessible areas for potential sources of contamination and areas of geotechnical and hydrogeological significance (e.g. areas of water logging, existing groundwater bores, etc.)

7.2. Outcomes and Recommendations of Report

7.2.1. Site Contamination Assessment Conclusion

According to the SKM report there do not appear to be any significant risks from a site contamination perspective which would render the land unsuitable for a particular land use. Localised contamination is likely to be able to be effectively managed or remediated (SKM, 2013).

The Lake Narracan study site has a long history of agricultural uses, with much of the areas remaining under cultivation or grazing to the present day (SKM, 2013).

There are three primary potential sources of contamination as shown in the *Desktop Site Contamination, Hydrogeological and Geotechnical Assessment Plans* in Appendix E. These are:

- Property LN09, vehicle maintenance garage
- Property LN36, former poultry/broiler farm; and
- Property LN28, dilapidated former piggery site

These primary potential sources of contamination may not be confined to a single, localised area but instead encountered across the wider extent of the site, to one degree or another owing to the intensity and nature of the associated land use (SKM, 2013).

Since completion of the SKM study, another potential source of contamination has been identified which is associated with the past practice of cleaning the septic tank of the existing caravan park.

The *Urban Growth Zone Schedule* associated with the Lake Narracan PSP requires that any development application provide an environmental site assessment for the land, prepared by a suitably qualified environmental

professional, that provides clear advice on whether the condition of the land is suitable for the proposed use, and whether any further environmental assessment is recommended.

7.2.2. Geotechnical Assessment Conclusions

The SKM report found that the PSP area is underlain by highly reactive residual clay overlying basalt rock (SKM, 2013).

Key geotechnical issues associated with development of the PSP area include the depth and reactivity of the clay in terms of its influence on site classification, foundation selection, differential settlement, sub grade performance and excavations (SKM, 2013).

Fill material, if present, is expected to be uncontrolled and may not be suitable for development in its present state. Areas subject to poor drainage may compromise soft material which provides low bearing capacity for foundations (SKM, 2013).

7.2.3. Hydrogeological Assessment Conclusions

The SKM report determines no significant hydrogeological constraints which would render land unsuitable for development (SKM, 2013). The following issues would need to be considered however in the planning and design of any development:

- The shallow water table may cause groundwater inflow to excavations
- The high quality of groundwater will require careful monitoring and protection as the beneficial use of the groundwater cannot be altered below its current classification of A1

- Increases to groundwater recharge rates (particularly over summer and autumn) has the potential to raise the water table within a few metres of the ground surface potentially causing damage to infrastructure and buildings; and
- Decreased local groundwater recharge in winter and early spring has the potential to reduce discharge to nearby surface water features, which could potentially have a negative impact on the ecological health of local waterways

7.2.4. Overall Recommendations

Overall no general contamination, geological or hydrogeological constraints have been identified warranting further investigation prior to the finalisation of the Lake Narracan PSP.

8. Town Centres and Retail

8.1. Retail Advice Report

The MPA engaged SGS Economics and Planning to complete a Retail Advice report for the Lake Narracan PSP area.

The purpose of the report was to explore the economic context for the wider region, local policy context and present indicative frameworks for future retail and economic development in the area as it begins to accommodate increased residential development (SGS, 2013).

This retail analysis has been informed by a review of the demand and supply contexts for retail floorspace development at the local and regional levels. In particular, analysis has also been undertaken for Moe and Newborough's existing retail areas (SGS, 2013).

After the review of relevant policy documents, SGS Economics and Planning have concluded that the relevant policy context suggests that:

- A future small scale supermarket if less than 1,500 sqm in Lake Narracan would be consistent with the intent of the MPA and local strategies to facilitate mixed use development, local shopping needs and walkability outcomes
- Protecting the Moe Town Centre is a high priority and new retail centres should be regulated to avoid over- competition with such existing centres; and
- It is important to connect existing and future settlements with the amenity and tourism features of Lake Narracan

In their report, SGS Economic and Planning identified the existing retail hierarchy and floorspace supply regionally surrounding Lake Narracan as follows:

- Regional centres include Traralgon, Morwell and Warragul; and
- Sub-regional centres include Moe (Town Centre)

On a local level the following local shop nodes around Lake Narracan include:

- An IGA anchored strip at the corner of Elizabeth Street and Prince Street, Moe
- A collection of shops and offices including a post office at the corner of Monash Road and Rutherglen Road, Newborough
- A Foodworks anchored strip on Boolara Avenue, Newborough; and
- A small collection of shops including a milk bar at the corner of Old Sale Road and Newark Avenue, Newborough

A centre in Lake Narracan is likely to perform a local neighbourhood function within this overall hierarchy, whilst the Moe Town Centre will be the dominant retail centre for Lake Narracan (SGS, 2013).

8.2. Outcomes and Recommendations of Report

The SGS Economics and Planning Report concludes that the PSP area of Lake Narracan can accommodate one or two retail nodes whilst reinforcing the primacy of the Moe Town Centre (SGS, 2013).

The report recommends that the Lake Narracan PSP area should initially accommodate a small supermarket of 1,500 sqm of floorspace once the population of Moe, Newborough and Lake Narracan exceeds 23,800 (approximately year 2033) (SGS, 2013). It is recommended that this first supermarket based node be established in the eastern part of the PSP area, as this will allow it to be integrated with the caravan park and recreational facilities fronting the lake (SGS, 2013).

A second retail node is recommended to trade without a supermarket anchor until the population of Moe, Newborough and Lake Narracan exceeds 29,000 (expected to be after the year 2046). This retail node is recommended to be established in the western end of the PSP area (SGS, 2013).

Given the east- west dimension of the Lake Narracan PSP area, the two retail nodes are ultimately considered the favourable solution as this will help maximise the walking catchments of activity centres in Lake Narracan (SGS, 2013).

The draft Lake Narracan PSP has therefore proposed two village/neighbourhood centres located adjacent the lake foreshore. The

draft Lake Narracan PSP will stipulate a shop with a leasable retail floor area exceeding 600m² requires a planning permit. This will mean any proposed supermarket (which typically have a leasable floor area are greater than 600m²) will require a planning permit and will need to be justified in terms of any potential impact on the Moe Town Centre. In assessing such permits, Council will need to give consideration to the SGS report.

9. Integrated Water Management

9.1. Flood Management

The West Gippsland Catchment Management Authority (WGCMA) has advised that Lake Narracan will act as a retarding basin for any flood water generated from the PSP area in a major storm event, therefore stormwater retardation is not required within the PSP area.

Waterway corridors and road crossings of waterways have been appropriately designed to convey the flood volumes through to the lake.

The WGCMA has refined the 100 year ARI flood line for the broader area, which has been reflect in the draft Lake Narracan PSP. There is one location adjacent the lake in the Becks Bay/Turras Reach area that is affected by the 100 year flood line. Any proposed development of this area will need to demonstrate how the development will be protected from the 100 year flood event and how the development will not produce any unreasonable downstream flooding impacts. Given the La Trobe River does not pass through another township area for over 10 kilometres downstream of Lake Narracan, it is very likely any development of this area will not produce any unreasonable downstream flooding impacts.

9.2. Water Quality Treatment

The treatment of stormwater quality needs to be to best practice standards to protect water quality in the lake Ramsar listed Gippsland lakes wetlands. Latrobe City Council has expressed a preference to minimise the number of water quality treatment assets in the PSP area to make future maintenance of these systems more effective and efficient. On-line water quality treatment will be the most efficient and effective option both in terms of the number of assets required to achieve best practice water quality treatment and in terms of the amount of land required.

9.3. Waterways

The land adjacent to the lake is generally quite flat, but rises to an upper terrace level in the southern section of the PSP area. There are a number of defined waterway channels and valleys through the higher sections of the site however a number of waterways become less defined once they reach the flatter lower section of the PSP area (particularly west of the Moe Golf Course).

In the flatter lower level in the west of the PSP area, a series of agricultural drains have been dug to drain these areas. Through the planning of the Lake Narracan PSP this network of drains has been rationalised to define key new waterway alignments, and stormwater from the surrounding areas will be conveyed to these waterways through the future street and underground drainage network. This will not only increase developable area but remove the fragmentation to the new urban area that would result if this network of drains was retained, and will instead create a number of more substantial waterways which then can become key natural and open space features of the area.

9.4. Water Level of the Lake

The *Gippsland Regional Sustainable Water Strategy* makes a commitment that Southern Rural Water will maintain Lake Narracan between 55 and 90% of full capacity between 1 December to 30 April every year and at a suitable level for holding major water ski events. This is subject to:

- The upstream Blue Rock Reservoir storage volume being more than 80 per cent of capacity on 1 December each year; and
- Consideration of views of water entitlement-holders and seasonal climate information

This provides a reasonable level of confidence that a suitable water level will be maintained to enable summer enjoyment of the lake to continue and would support additional summer lake-based recreational use (such as canoeing, paddle boats etc).

9.5. Whole of Water Cycle Strategy

A Whole of Water Cycle Strategy was undertaken by Alluvium which outlines recommendations for waterways, stormwater quality treatment, water supply options and managing blue green algae blooms in Lake Narracan, which has informed the preparation of the Lake Narracan PSP.

10. Fire Management

10.1. Lake Narracan Fire Management

The Lake Narracan study area is not covered by a Wildfire Management Overlay (WMO). The area to the north of the lake is however covered by a WMO given the substantial amount of native vegetation in this area.

The CFA have confirmed that the width of the lake will ensure that the effect of any bushfires would be limited to smoke and ember attack to the future Lake Narracan residential area. The western and eastern ends of the precinct may experience grass fires however the placement of roads bounding the precinct is considered an appropriate design response to mitigate the impact of grass fires. An appropriate level fire protection will also be achieved by the application of the Victoria Building Regulations to home construction.

11. Surrounding Land Uses

11.1. Yallourn Power Station and Coal Mine

The Yallourn Power Station is located approximately 1km south-east of the eastern boundary of the PSP area. The power station and associated coal mine is considered an extractive industry (brown coal) in the planning scheme, with associated power generation and distribution facilities.

The mine and power station land is zoned Special Use Zone Schedule 1 (SUZ1 – Brown Coal) in the Latrobe Planning Scheme. The SUZ1 land extends to the eastern edge of Newborough and borders the south-eastern section of the Lake Narracan area as shown in Appendix A. Not all of the SUZ1 land has been developed for coal mining or power generation purposes.

The SUZ1 zone allows use of the land for extractive industry, industry, mining, utility installation and warehouse without a planning permit provided these uses are located on land at least 1km away from sensitive uses (residential, primary school, kindergarten etc) and are directly

associated with coal/electricity production. A permit may be granted for these uses where these conditions are not met.

Residential development in the eastern part of the PSP area may be considered to restrict the scope of the coal mine and power station, as this area is within 1km of SUZ1 zoned land.

The Department of Primary Industries has however advised that this would not be the case, given any expansion of mining activities associated with the Yallourn Power Station would not extend further west.

11.2. Moe Waste Water Treatment Facility

The Moe Waste Water Treatment Facility is located to the west of the PSP area, approximately 700m west of Becks Bridge Road. The treatment facility land is zoned Public Use Zone Schedule 1 (PUZ1) in the Latrobe Planning Scheme, as shown in Appendix A.

Being a sewer treatment facility, odour from the site is a potential issue in planning for sensitive land uses near the facility.

The EPA guideline *Recommended Separation Distances for Industrial Residual Air Emissions* (EPA 2013), would be used to guide considerations around what a suitable buffer distance would be between the facility and any sensitive uses. It is expected the resulting buffer would be between 300 and 500m.

Given the buffer would result in much of the land between Becks Bridge Road and the facility being unsuitable for sensitive uses, it is recommended that farming use of this land continue.

12. Traffic and Transport

12.1. Roads

Thompsons Road that runs through the southern portion of the precinct is a VicRoads declared road and was intended to act as a northern bypass road for the townships of Moe and Newborough. Traffic counts collected by Council and VicRoads however shows that this road does not carry a substantial amount of traffic, with Old Sale Road and John Field Drive carrying substantially more traffic.

The Lake Narracan PSP offers the opportunity to maximise physical connection between the Moe and Newborough townships and the lake. Existing Becks Bridge Road and Sullivans Road currently link Moe and Newborough respectively to the PSP area, however more direct connections to the centre of each township are missing.

The PSP includes the realignment of the western end of Thompsons Road to connect to the Old Sale Road and Haigh Street roundabout. This will create a direct connection between the Moe Town Centre and the lake via Haigh Street, Thompsons Road and Macphersons Road.

The PSP also includes the extension of John Field Drive through to Thompsons Road and a new road (named 'Broad Way') will then connect to the lake. This will create a direct connection between the heart of Newborough and the lake.

The PSP also proposes to reduce the length of Thompsons Road that will act as a VicRoads arterial road. With the extension of John Field Drive through to Thompsons Road, Thompsons Road east of the John Field Drive extension and Sullivans Track will no longer need to be a VicRoads

arterial road, and these roads can be down-graded to a local connector road in the future.

12.2. Pedestrians and Cyclists

The Moe Yallourn Rail Trail is a significant aspect of the existing shared trail network in Moe and Newborough and the Lake Narracan PSP will create a shared trail network connecting to rail trail in a number of locations.

The PSP provides pedestrian and cyclist paths along the entire southern foreshore of the lake, to promote public use and enjoyment of the lake foreshore. The foreshore path system in time could also be extended to provide a path system around all sides of the lake, subject to property ownership considerations and resolving crossings of the LaTrobe River at the east and west ends of the lake.

The PSP also provides shared paths along the electricity easements that run through the site, which would provide a central east-west shared path link. The waterways that run through the site also offer the opportunity to incorporate shared paths with the waterway corridors, providing north-south shared path links.

The existing wide reserve along Old Sale Road between Becks Bridge Road and Moe Yallourn Rail Trail offers the opportunity to establish a shared path link along this boundary of the PSP area. The PSP also will establish a shared path link adjacent to Becks Bridge Road.

Shared path links to the Moe town centre can be provided via the Moe Yallourn Rail Trail, Moore Street and Narracan Creek, and to Newborough via the open space network on the west side of John Field Drive.

Between a foreshore path, electricity easements, waterways, rail trial and key roads the PSP creates a significant pedestrian and cyclist path network for the enjoyment of the existing Moe and Newborough community and future residents of the Lake Narracan PSP area.

12.3. Traffic projections

The MPA prepare traffic projections for the Lake Narracan PSP area, which informed discussions with Council and VicRoads regarding the road network and intersection configurations. The traffic projections are provided in Appendix F.

The projections were prepared on the following basis:

- The projections have been based on existing traffic counts provided by Latrobe City - which includes both VicRoads and Council roads in the area.
- The projections assume full development of the Lake Narracan area – which is in the order of 3,800 dwellings, based on an average of 11 dwellings per hectare.
- The projections assume 20 years for full development of the Lake Narracan area, factoring in 3% per annum growth of existing volumes.
- The traffic projections for Lake Narracan are conservative in nature as they have been prepared on the following assumptions:
 - 8 vehicle trips per household per day
 - 100% of trips leave the precinct in the AM peak period.
 - There are no internal trips.
 - There is a defined peak hour.

AM peak projections (dated 22 April 2014):

- The figures in black are the total AM peak volumes forecast for each section of the road network. The volumes shown are directional (in the direction indicated by the arrow).
- The figures in red are the total AM peak volumes forecast for each section of the road network that are solely attributable to the development of the Lake Narracan area. The volumes shown are directional (in the direction indicated by the arrow).

Daily volume projections (dated 21 May 2014):

- The figures are total daily two-way volume forecast for each section of the road network.
- The daily volume was calculated as a percentage of the AM peak, multiplied by two to obtain a two-way daily volume.
- The AM peak percentage used was 70 per cent within the PSP area, and 60 per cent outside the PSP and on the PSP boundary.

13. Costing of Infrastructure

13.1. Arterial road intersections

The scope for key arterial intersection projects was established by Latrobe City Council, VicRoads and the MPA. These projects included:

- Intersections of Old Sale Road and Thompsons Road (including realignment of Thompsons Road to connect to the recently constructed Old Sale Road and Haigh Street roundabout).

- Intersection of Macphersons Road with the realigned Thompsons Road.
- Extension of John Field Drive through to Thompsons Road, including a new intersection on the John Field Drive extension and an intersection on Thompsons Road.
- Upgrade of the intersection of Thompsons Road and Sullivans Track to improve sightlines and safety.
- Upgrade to the intersection of Old Sale Road and John Field Drive.

The intersection layout was agreed with the relevant road authority as were the scope of works. The general assumptions used were:

- No trunk services have been allowed for.
- Drainage allowance is for 'road reserve or project land' areas i.e. no external catchments. However, major drainage such as culverts have been included as separate projects in the DCP.
- A standard excavation depth has been allowed for. Final pavement requirements will be determined at construction stage responding to actual ground conditions.
- Where required an allowance has been made for existing services adjustment or relocation (e.g. electricity poles, water fittings, manholes etc)

The design and costing of these intersections was undertaken by GTA Consultants. The design plans and cost estimates are provided in Appendix G.

An upgrade to the intersection of Old Sale Road and John Field Drive will be required in the future as the existing intersection cannot

accommodate the projected future traffic volumes. The upgrade of this intersection has been informed by a SIDRA analysis that has been based on the traffic projections prepared for the Lake Narracan PSP. A copy of this SIDRA analysis is provided in Appendix H.

The cost to upgrade this intersection has been apportioned to the Lake Narracan DCP based on the proportion of future traffic volumes at this intersection that are expected to be generated from the Lake Narracan area (as shown in Appendix F).

13.2. Connector road intersections

A number of standardised intersections were also developed for local roads by Council and the MPA for use in this DCP.

Construction of standard unsignalised T intersection on connector roads.

Connector road T intersections do not typically require any additional land or road pavement at the intersection than required for a standard length of connector road. The cost of the construction of the T intersection has therefore been covered by the cost allowed for the construction of intersecting connector roads, as the length of these roads has been measured to the centre of the intersection.

A cost of \$15,000 per T intersection has been allowed in the DCP to cover any additional line marking, kerb work or footpaths that may be required at the intersection that are not covered by the road construction costs.

Construction of T intersection with protected right turn lane

An allowance of \$500,000 has been made for construction of T intersections that require a protected right turn lane, based on MPA experience with similar intersections.

Construction of standard roundabout

The cost for a standard connector road roundabout has been based on a cost estimate prepared by GHD for a similar intersection funded by the Warragul and Drouin Development Contribution Plans. The intersection design and associated costing are provided in Appendix I.

13.3. Roads

Reserves required for arterial and connector roads have been calculated consistent with the road cross sections provided in the Lake Narracan PSP.

Standard per metre road construction rates were developed by GHD and adjusted to reflect the cross sections of individual roads by the MPA. The resulting per linear metre construction rate for roads funded by the Lake Narracan DCP are provided in Appendix J.

13.4. Culverts

The size and costing for culverts required at arterial and connector road crossings of waterways in the precinct was undertaken by Alluvium. The costs are outlined in the *Lake Narracan Whole of Water Cycle Strategy* report by Alluvium.

The allowance for the construction of roads over the culverts has been allowed by the per metre construction cost for the respective road project.

13.5. Open space

Local sports reserves

Costs for construction of basic improvements and facilities in local sports reserves in the Lake Narracan precinct has been calculated on a per hectare basis rather than an itemised cost estimates. The use of a per hectare rate allows Council a greater degree of flexibility to meet the needs of the future community as they change over time.

The per hectare rate has been derived from an analysis of previous recreation project cost estimates that was adopted for the *Wyndham North Development Contributions Plan*. The construction rate is \$459,112 per hectare.

Local parks

Costs for construction of basic improvements and facilities in local parks in the Lake Narracan precinct has been calculated by using a per hectare construction rate that was included in the *Officer Development Contributions Plan*. Given the Officer DCP was prepared in September 2011, the per hectare rate has been indexed to update it to 2014 dollars. The details of the costing are outlined below:

Rate per hectare in the Officer DCP	Indexation allowance	Rate increase for indexation	Adjusted rate per hectare
\$58,339.08	8.20%	\$4,783.80	\$63,122.88

Foreshore environmental improvements

Costs for environmental works to Lake Narracan (weed management and bank stabilisation) have been calculated by Latrobe City Council based on previous experience with such works. The costs have been calculated on the following basis:

Foreshore environmental improvement	Rate type	Rate
Bank stabilisation	Per metre	\$200
Weed management	Per hectare	\$500

Boardwalks

Boardwalk cost estimates have been prepared on a per linear metre basis, using rates established by the MPA. These rates are:

Boardwalk	Rate per metre
2.5m wide boardwalk	\$946.75
3.5m wide boardwalk	\$1,325.45

13.6. Shared paths

Shared path cost estimates have been prepared on a per linear metre basis, using rates established by the MPA. The shared paths within the Lake Narracan precinct have been costed at 3.0m wide, at a rate of \$300.00 per linear metre.

13.7. Community facilities

The costing of the community facility proposed in the Lake Narracan precinct is based on a cost estimate prepared by CDCE for the *Wyndham West Development Contributions Plan*. The costing is provided in Appendix K.

13.8. Waterways and wetlands

The strategy for the placement and sizing of constructed waterways and stormwater quality treatment wetlands in the precinct was undertaken by Alluvium. The costs are outlined in the *Lake Narracan Whole of Water Cycle Strategy* report by Alluvium.

14. Land valuations

The area of land to be acquired for each DCP project on each property was identified based on information drawn from the Lake Narracan PSP. A description of the area of land was provided to Lee Property Valuers and Advisors as a registered valuer to prepare a valuation which determined the value for each area of land required by the DCP.

Each parcel where land is required for a DCP project was individually assessed using a 'before and after' methodology to ensure fair compensation for each affected land owner. These values have then been used to calculate the cost of the land component for all relevant projects included in this DCP.

15. References

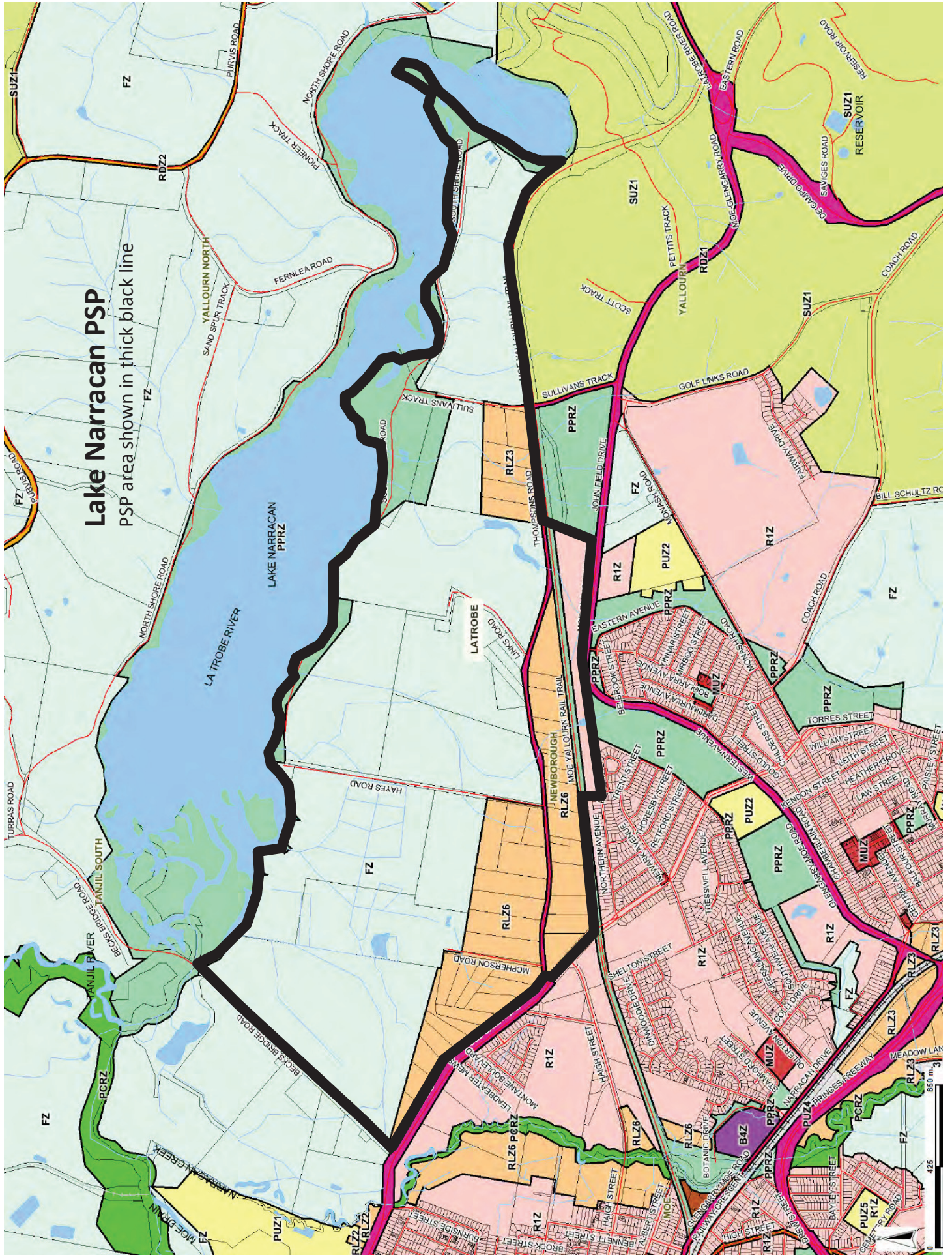
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16. Appendix A

- PSP area and existing land use zoning

Lake Narracan PSP

PSP area shown in thick black line



17. Appendix B

- Gippsland Regional Growth Plan (2014)

As Gippsland's regional city, Latrobe City will accommodate urban growth and be the focal point for high order regional infrastructure and service investment. Growth will be planned to achieve greater integration across the four centres of Traralgon, Morwell, Moe and Churchill to support them functioning as a single urban system.

Planning for urban growth

Implementation of growth frameworks has provided land for residential development across the city to meet short-term and medium-term needs. Further planning work is underway to determine development requirements including infrastructure provision, transport access and amenity and landscape considerations. Considerations for any future urban expansion include managing the interface with coal buffer areas as well as flood and bushfire hazards. A strategy will be developed to advance the growth of Latrobe City as a single urban system.

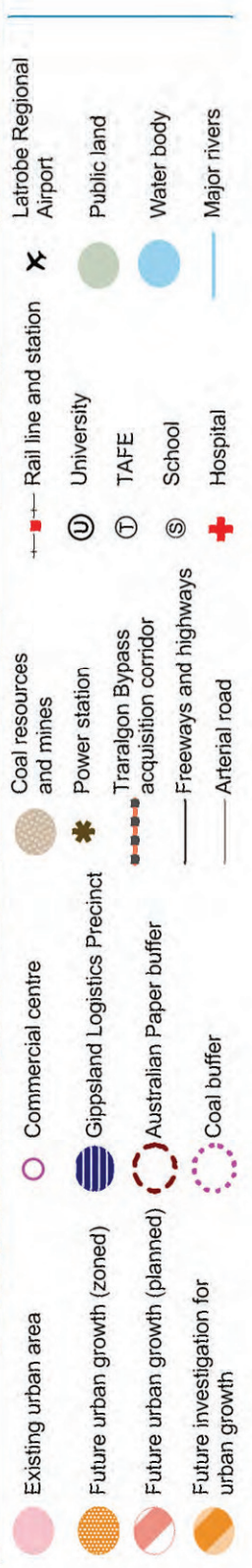
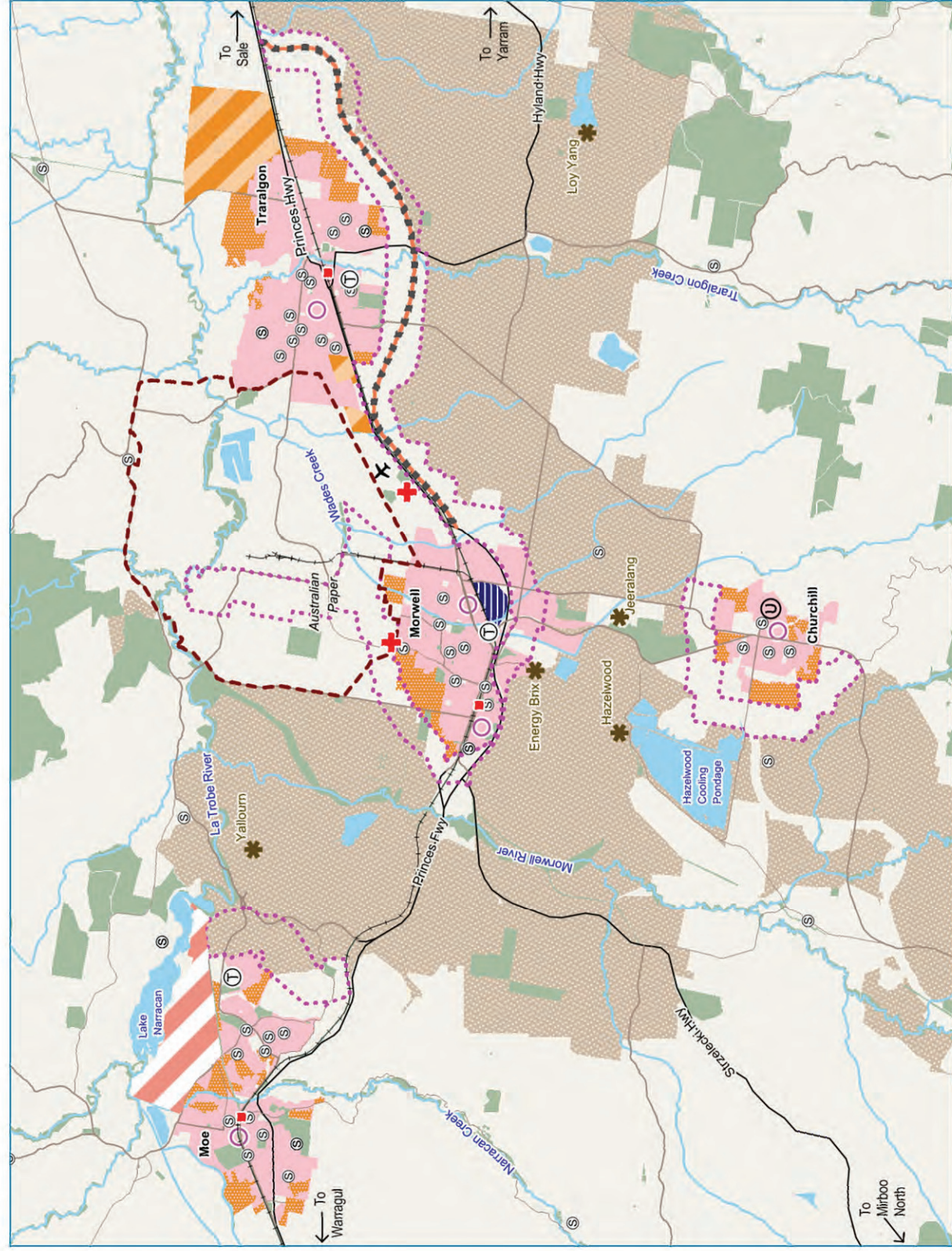
Growth opportunities in business, manufacturing and services

The commercial and manufacturing sectors, together with the university campus at Churchill provide skills and research capacity to expand economic opportunities based on the region's energy resources. Strategies to improve the city's commercial centres will support greater attraction of technical and professional services, providing more diverse employment opportunities for the city and the wider region.

Transport networks

The city is located along the Princes Highway road and rail corridor and is connected to the southern part of the region via the Strzelecki Highway. The Gippsland Logistics Precinct has been identified to facilitate freight movement through export gateways from the region. Latrobe Regional Airport is a key asset providing access to air services.

Note: Further detailed investigation and planning for growth should consider natural hazards (including bushfire, flooding and erosion), environmental assets (including water and assets identified in regional catchment strategies), cultural heritage assets (including Aboriginal and historic heritage) and natural resources (including Extractive Industry Interest Areas, other mapped earth resources and timber plantations).



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18. Appendix C

- Areas of Cultural Heritage Sensitivity Plan (Figure 14, Andrew Long and Associates, Aboriginal Heritage Desktop Assessment)
- Landform Features Plan (Figure 15, Andrew Long and Associates Aboriginal Heritage Desktop Assessment)

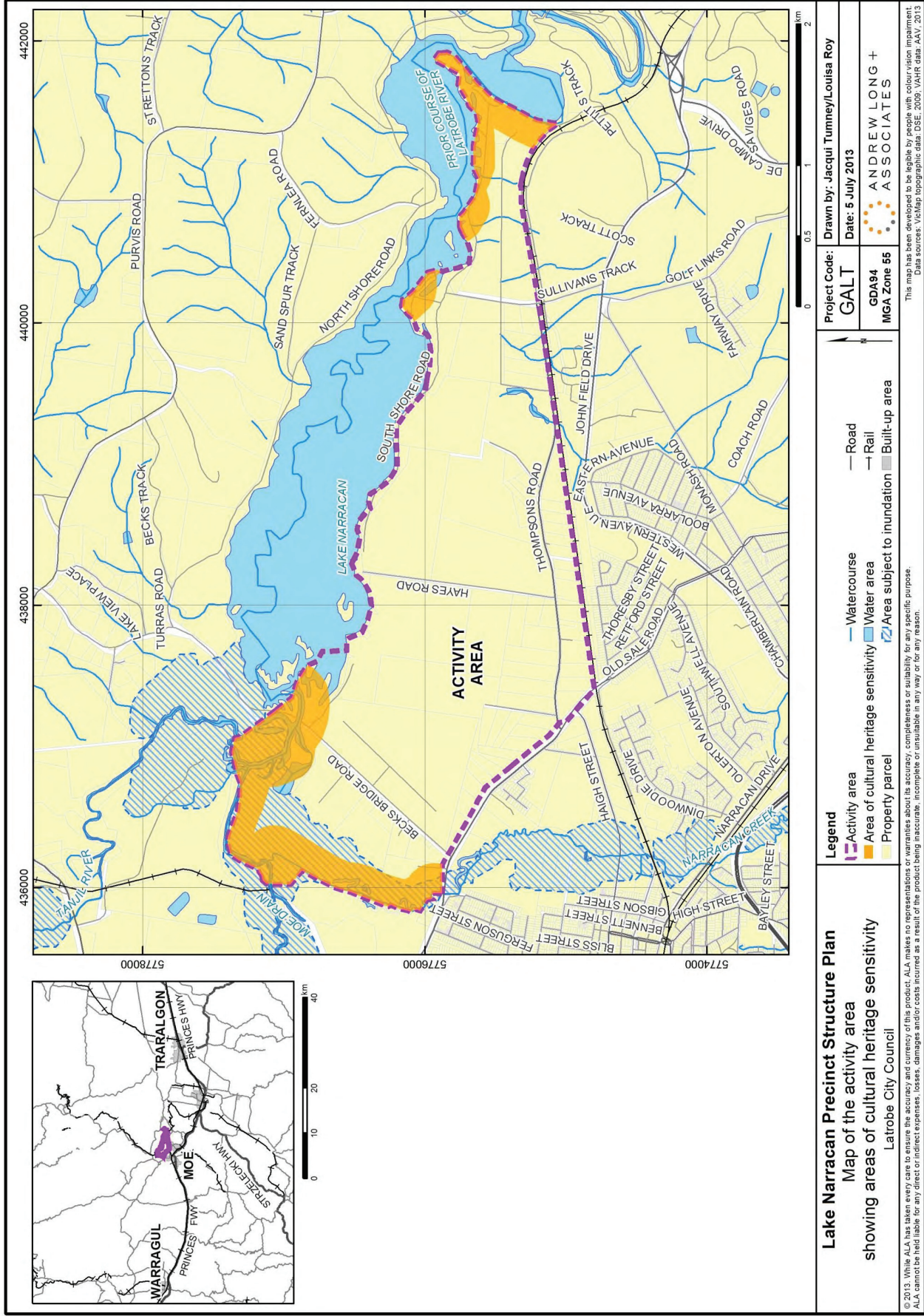


Figure 14: Map of the activity area showing areas of cultural heritage sensitivity

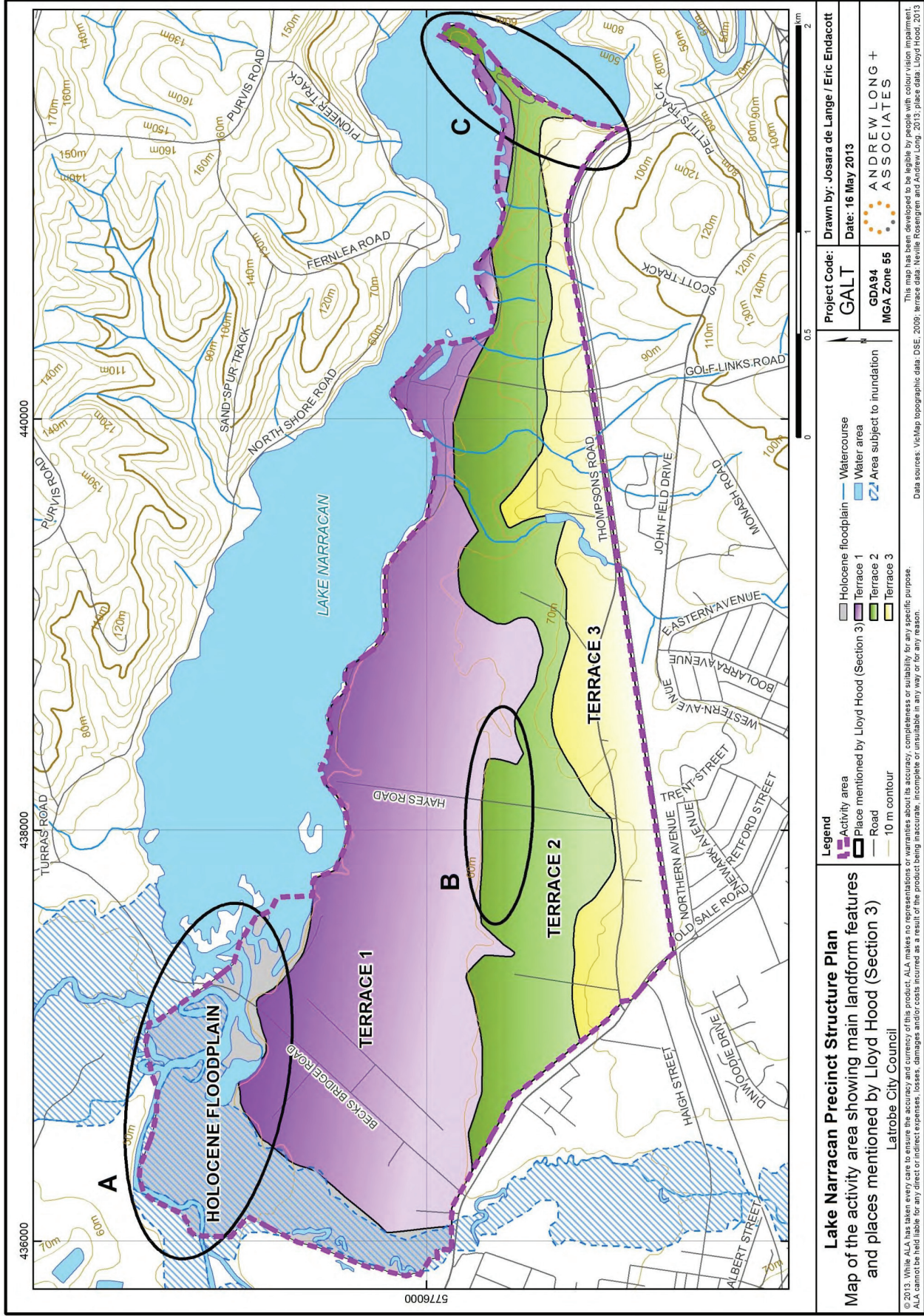


Figure 15: Lake Narracan Precinct Structure Plan Study Area – Aboriginal Heritage Prediction Plan

19. Appendix D

- Overhead Electricity Lines Plan (Latrobe City)

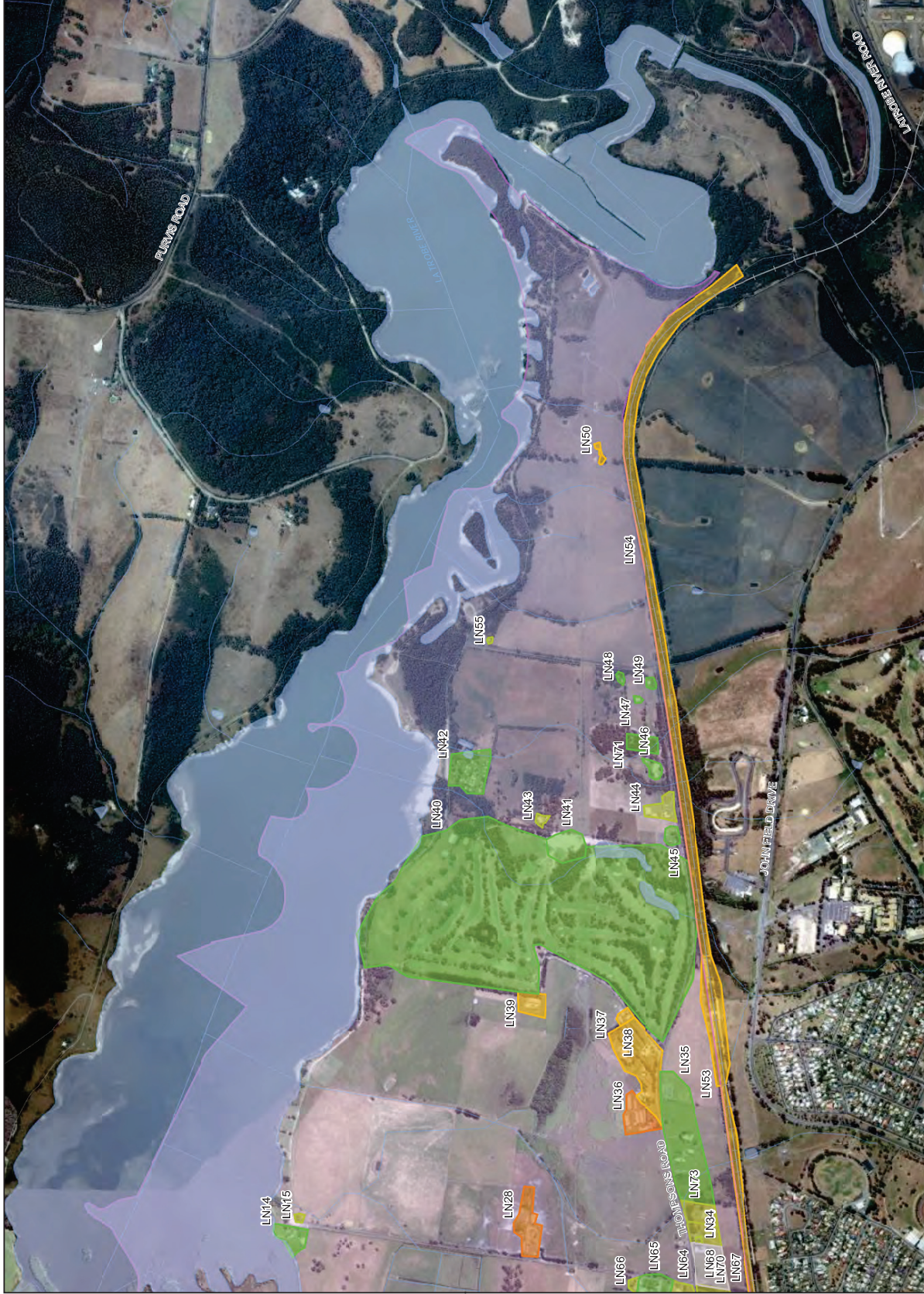
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20. Appendix E

- Desktop Site Contamination, Hydrogeological and Geotechnical Assessment Plans (Figure 7A and 7B, SKM Desktop Environmental, Hydrological and Geotechnical Assessment)

[Figure 7B - Lake Narracan PSP Site Qualitative Risk Assessment]



- LEGEND**
- Precinct Structure Plan
 - Boundary
 - Qualitative Risk Rating
 - H
 - M - H
 - M
 - L - M
 - L
 - VL
 - Infrastructure
 - Road
 - Railway Station
 - Railway
 - Hydrology
 - Watercourse
 - Waterbody

NOTES

DRAFT ONLY

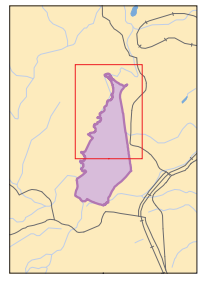
DATA SOURCES
 [Contains Vicmap Information © State of Victoria 2013, © Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3, GeoEye IKONOS 1m Imagery 2000-2011 from ESRI Map Service]

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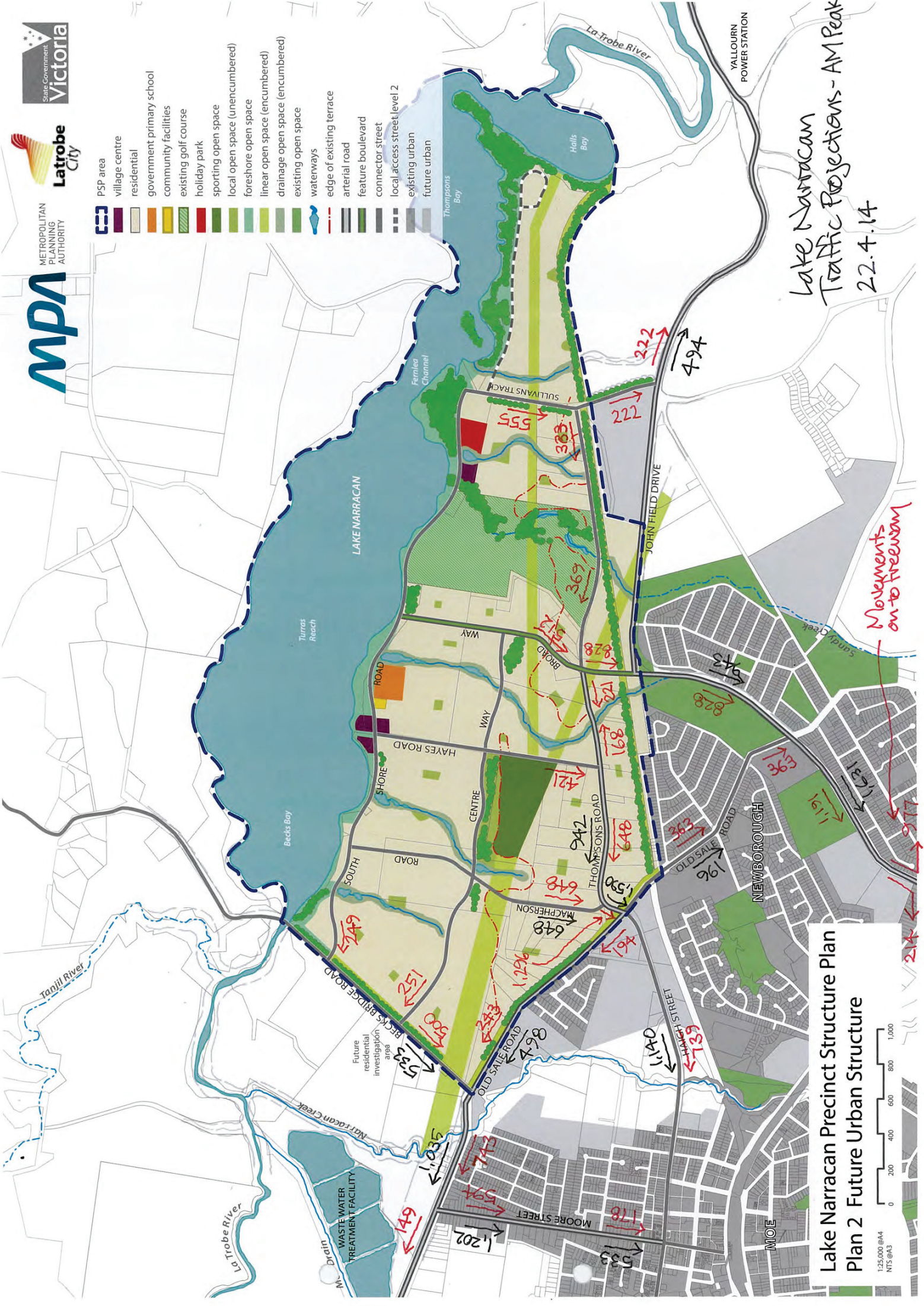
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21. Appendix F

- Traffic projections (AM peak)
- Traffic projections (Daily volumes)

- PSP area
- village centre
- residential
- government primary school
- community facilities
- existing golf course
- holiday park
- sporting open space
- local open space (unencumbered)
- foreshore open space
- linear open space (encumbered)
- drainage open space (encumbered)
- existing open space
- waterways
- edge of existing terrace
- arterial road
- feature boulevard
- connector street
- local access street level 2
- existing urban
- future urban



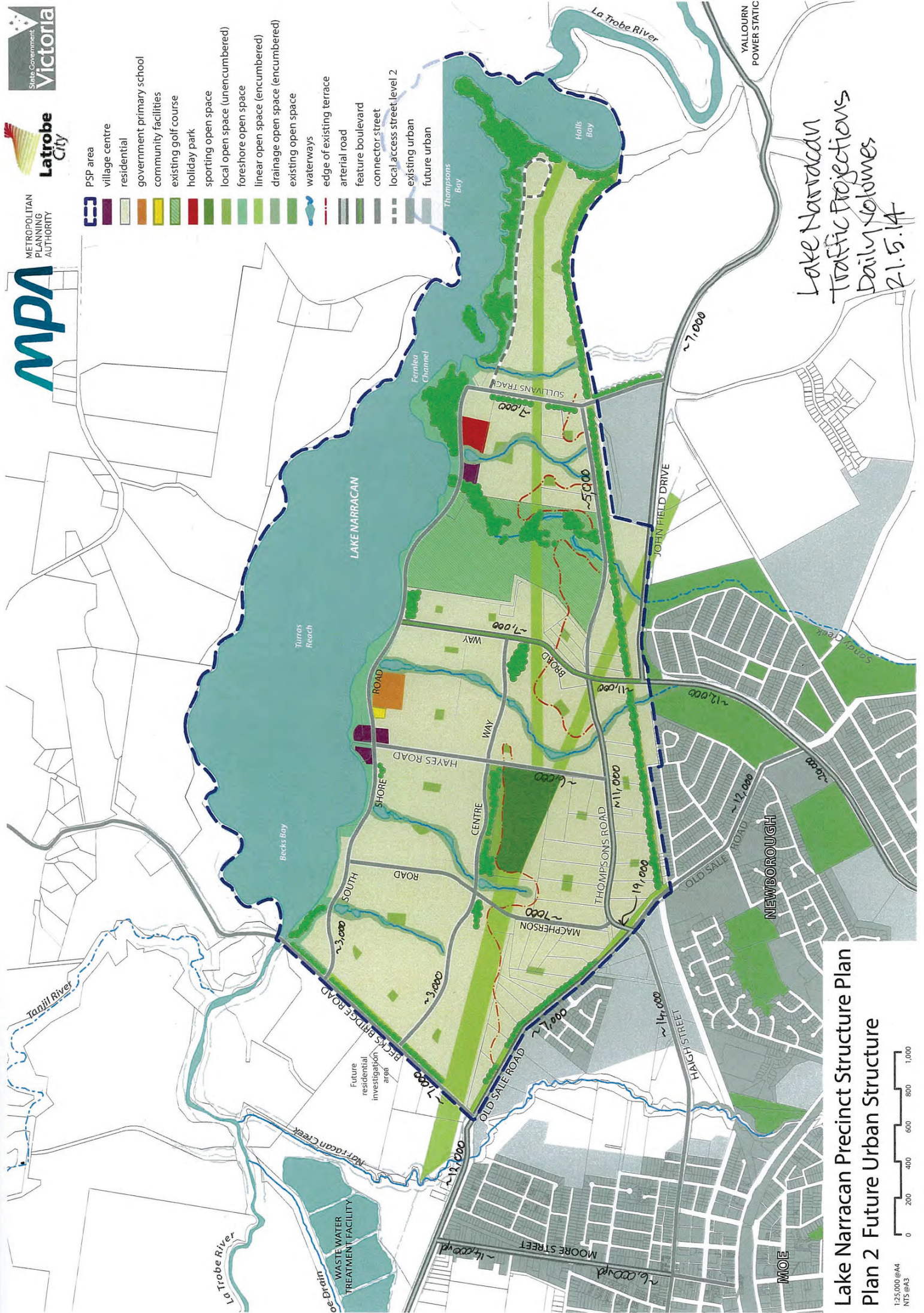
Lake Narracacan
Traffic Projections - AM Peak
22.4.14

Movements on to freeway

Lake Narracacan Precinct Structure Plan
Plan 2 Future Urban Structure

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NTS @A3
0 200 400 600 800 1,000

- PSP area
- village centre
- residential
- government primary school
- community facilities
- existing golf course
- holiday park
- sporting open space
- local open space (unencumbered)
- foreshore open space
- linear open space (encumbered)
- drainage open space (encumbered)
- existing open space
- waterways
- edge of existing terrace
- arterial road
- feature boulevard
- connector street
- local access street level 2
- existing urban
- future urban

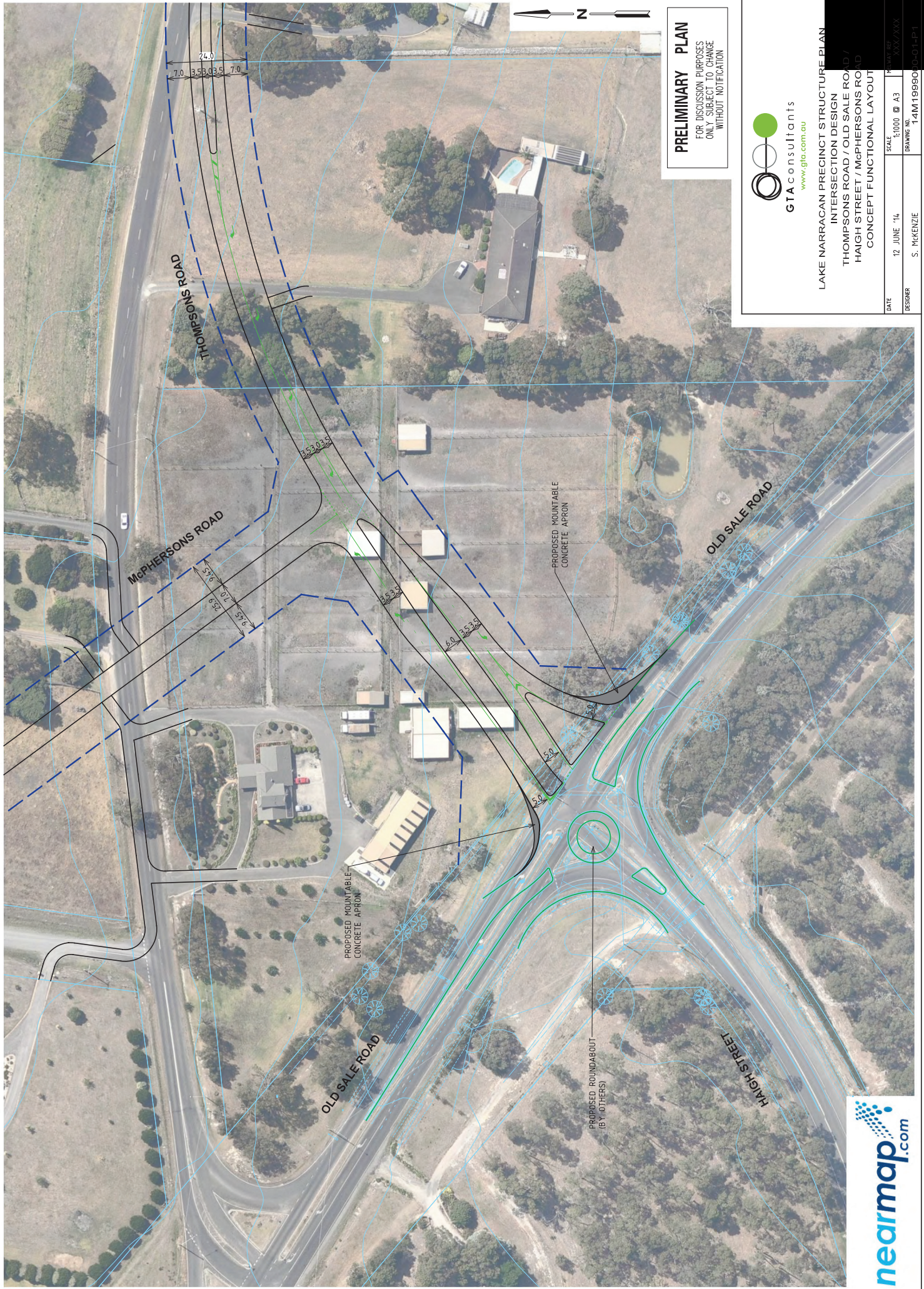


Lake Narracan
 Traffic Projections
 Daily Volumes
 2.1.5.14

Lake Narracan Precinct Structure Plan
 Plan 2 Future Urban Structure

22. Appendix G

- Arterial road intersections designs and costings



PRELIMINARY PLAN
 FOR DISCUSSION PURPOSES
 ONLY. SUBJECT TO CHANGE
 WITHOUT NOTIFICATION



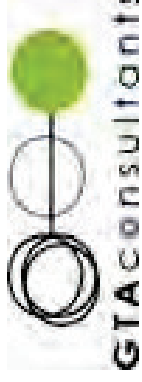
LAKE NARRACAN PRECINCT STRUCTURE PLAN
 INTERSECTION DESIGN
 THOMPSONS ROAD / OLD SALE ROAD /
 HAIGH STREET / McPHERSONS ROAD
 CONCEPT FUNCTIONAL LAYOUT

DATE	12 JUNE '14	SCALE	1:1000 @ A3	PROJECT NO.	XXX/XXX
DESIGNER	S. MCKENZIE	DRAWING NO.	14MT199901		



14M199900 - Lake Narracan PSP Costings

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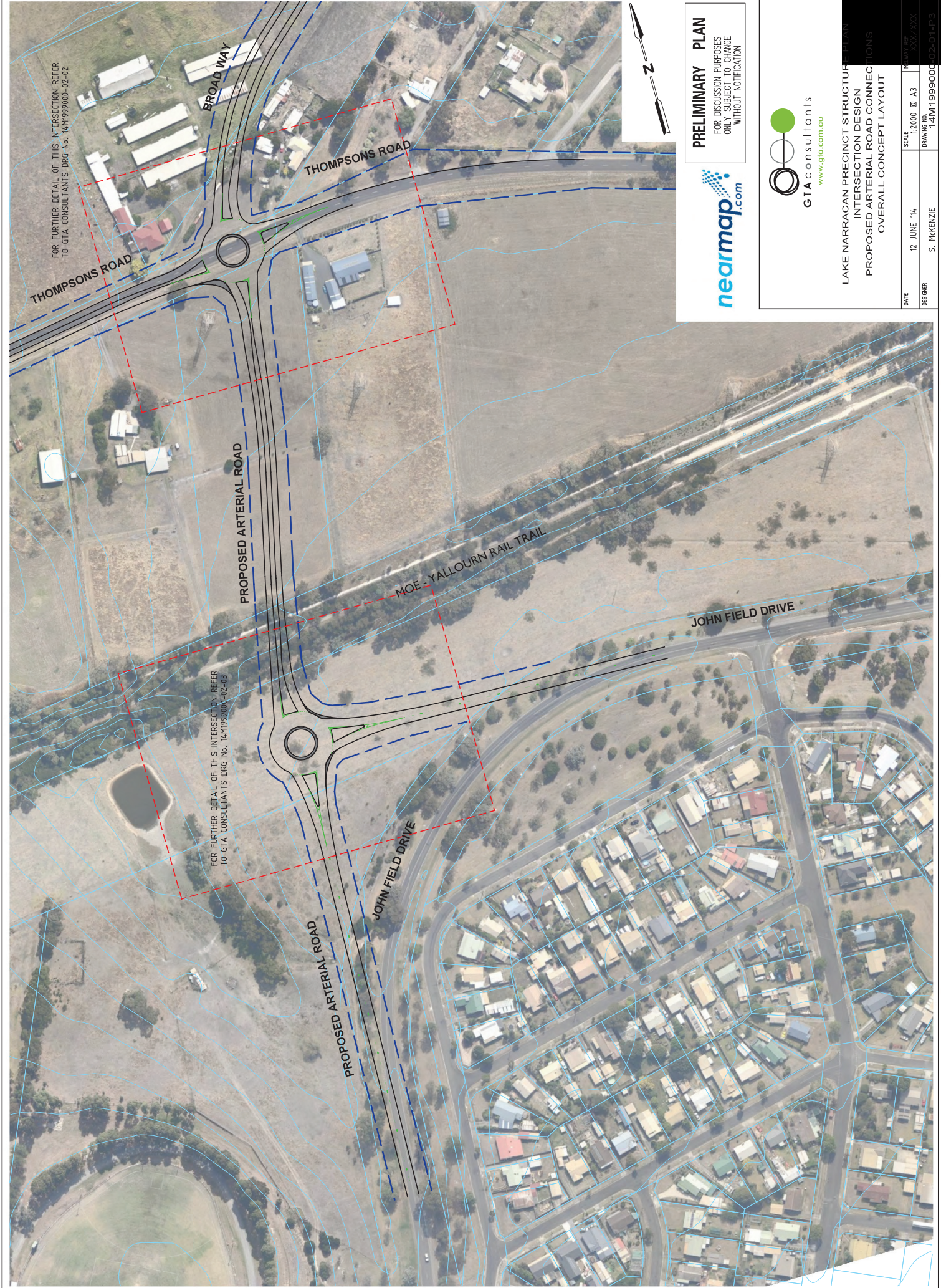


Project 1 - Thompsons Road/Old Sale Road/Haigh Street/McPhersons Road

Civil Works				
Item	Description	Quantity	Rate	Total
1.0	Demolition Works			
1.01	Breakout and remove existing asphalt pavement	3350m2	\$40.00/m2	\$134,000.00
1.02	Remove existing trees	5 Item(s)	\$1,000.00/Item	\$5,000.00
1.03	Remove existing landscaping	4960.00m2	\$20.00/m2	\$99,200.00
	CIVIL WORKS	Quantity		
2.0	Bulk Earthworks			
2.01	Stripping and stockpiling of selected topsoil for reuse, excavation to proposed formation levels, including trimming, rolling, cutting and shaping, compaction of subgrades, removal and disposal of trees, shrubs, spoil, surplus unapproved soil, etc. Assumed nom. depth of 300mm average across site. This item is to incorporate subgrade preparation and the supply and placement of fill material as specified and directed including compaction to 98% modified compaction, as per AS1289, where specified.	6000m3	\$50.00/m3	\$300,000.00
3.0	Concrete and Kerb Works			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
3.01	Kerb and Channel, Concrete Strength			
	25MPa Standard			
3.01.1	Kerb and channel	988m	\$100.00/m	\$98,753.90
3.01.1	Mountable kerb	62m	\$75.00/m	\$4,617.15
4.0	Pavements, Rigid			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
4.01	150mm depth concrete pavement within median and traffic islands, including bedding and kerb and channel	1467m2	\$100.00/m2	\$146,700.00
4.02	200mm depth mountable pavement, colour and finish as specified	80.00m2	\$130.00/m2	\$10,400.00

5.0	Pavements, Flexible				
	The supply and installation of the following compacted depth asphalt wearing courses including labour, materials, compaction and bituminous prime coat, to relevant specifications and as specified.				
5.01	Regulation asphalt resheet including road profiling of pavements as specified. Nominal depth varies to suit design.	675m ²	\$40.00/m ²	\$27,000.00	
5.02	Full-depth asphalt pavement. Nom. 470mm thickness based on geotechnical report dated 01/11/2013.	5740m ²	\$250.00/m ²	\$1,435,000.00	
6.0	Drainage				
6.01	Allowance for underground pits and pipes	1 Item(s)	\$280,000.00/Item	\$280,000.00	
6.02	Allowance for sub soil drainage and flushout risers	1 Item(s)	\$60,000.00/Item	\$60,000.00	
7.0	Delineation				
7.01	Signage				
7.01.1	The supply and installation/relocation of directional and advisory traffic signage all inclusive and removal of all redundant signs as specified	1 Item(s)	\$5,000.00/Item	\$5,000.00	
7.02	Linemarking				
7.02.1	Installation of proposed linemarking to VicRoads standards, including but not limited to lane division lines, directional arrows, bus lane surface treatment, stopping lines and RRPMP's all inclusive	1 Item(s)	\$8,000.00/Item	\$8,000.00	
8.0	Landscaping/ Topsoil and Reinstatement				
8.01	Topsoiling and seeding of nature strips, medians, and all disturbed areas to a min. of 150mm depth	12000m ²	\$25.00/m ²	\$300,000.00	
9.0	Miscellaneous				
9.01	Final clean-up, including demobilisation and removal of temporary structures, etc.	1 Item(s)	\$20,000.00/Item	\$20,000.00	
	Sub Total - Civil			\$2,933,671.05	
10.0	General				
10.01	Traffic Management		5% of sub total	\$146,683.55	
10.02	Site Establishment		2.5% of sub total	\$73,341.78	
10.03	Survey and Design		5% of sub total	\$146,683.55	
10.04	Supervision and Project Management		9% of sub total	\$264,030.39	
10.05	Council Fees		3.25% of sub total	\$95,344.31	
10.06	VicRoads Fees		1% of sub total	\$29,336.71	
	Total with 15% Contingency			\$3,689,091.35	

Assumptions and exclusions:				
1. Insurances and bank guarantees have been excluded.				
2. Allowances for existing services relocations, lowering or realignment thereof have been excluded				
3. Protection of underground services during construction has been excluded				
4. The above opinion of probable cost is for initial planning only and must not be relied upon for quoting, budgeting or construction purposes. It is recommended that you seek a detailed				
5. Specific construction works including rock boring, rock blasting or rock excavation and removal have been excluded as geotechnical conditions are yet to be confirmed.				
6. This estimate also excludes an allowance for abnormal weather conditions.				
7. GST is excluded.				
8. Price escalation is excluded.				
9. Cost of property acquisitions is excluded				



FOR FURTHER DETAIL OF THIS INTERSECTION REFER TO GTA CONSULTANTS DRG No. 14M1999000-02-02

FOR FURTHER DETAIL OF THIS INTERSECTION REFER TO GTA CONSULTANTS DRG No. 14M1999000-02-03

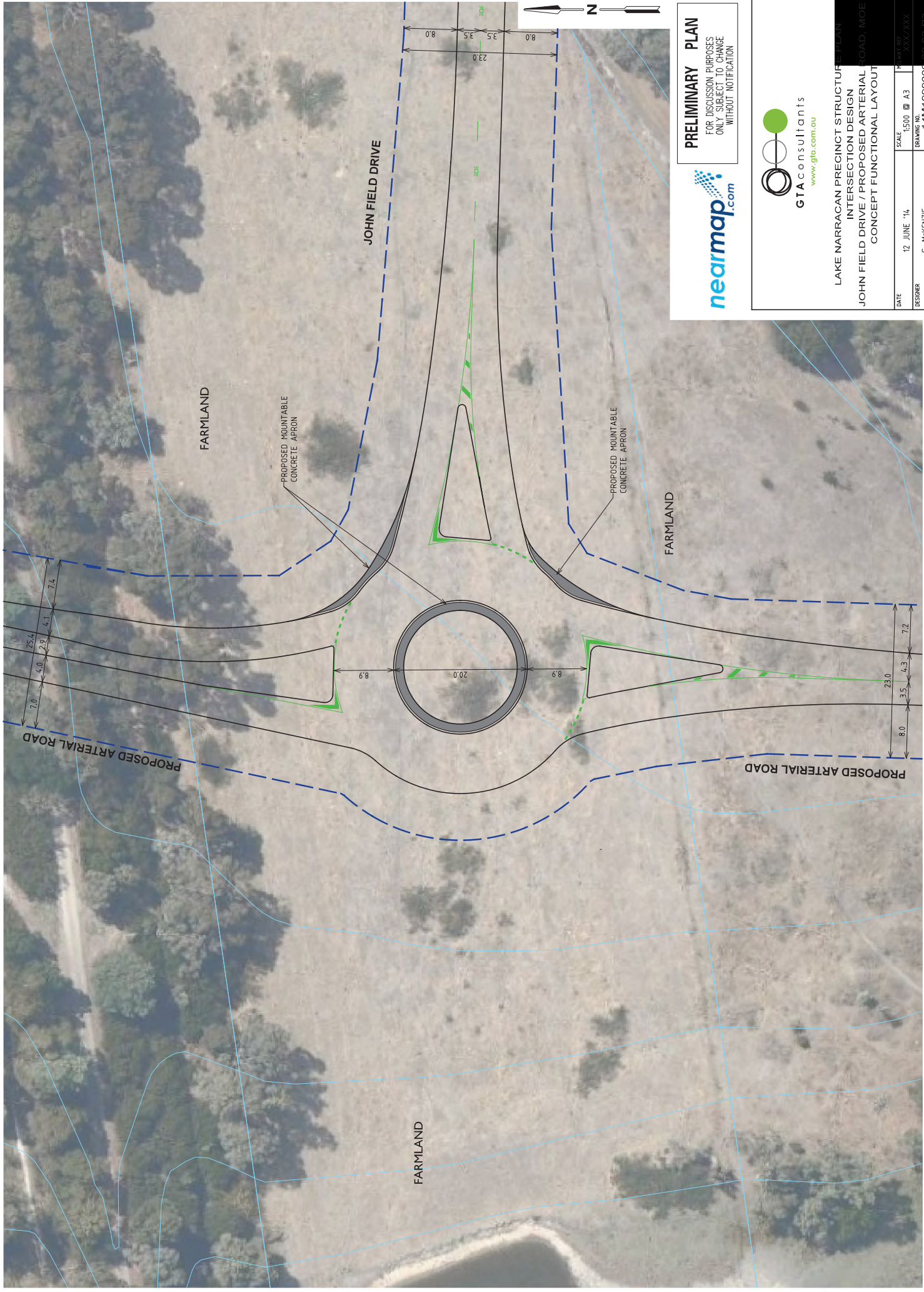


PRELIMINARY PLAN
 FOR DISCUSSION PURPOSES
 ONLY SUBJECT TO CHANGE
 WITHOUT NOTIFICATION



LAKE NARRACAN PRECINCT STRUCTURAL
 INTERSECTION DESIGN
 PROPOSED ARTERIAL ROAD CONNECTIONS
 OVERALL CONCEPT LAYOUT

DATE	12 JUNE '14	SCALE	1:2000 @ A3	PROJECT NO.	14M1999000-02-01-IP3
DRAWN BY	S. MCKENZIE	BRANING NO.			



PRELIMINARY PLAN
 FOR DISCUSSION PURPOSES
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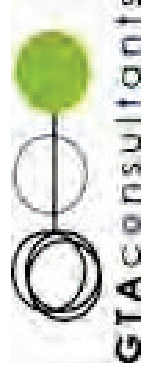


LAKE NARRACAN PRECINCT STRUCTURAL
 INTERSECTION DESIGN
 JOHN FIELD DRIVE / PROPOSED ARTERIAL
 CONCEPT FUNCTIONAL LAYOUT

DATE	12 JUNE '14	SCALE	1:500	A3	PROJECT NO.	14M199900C
DESIGNER	S. MCKENZIE	BRANING NO.				

14M199900 - Lake Narracan PSP Costings

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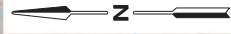
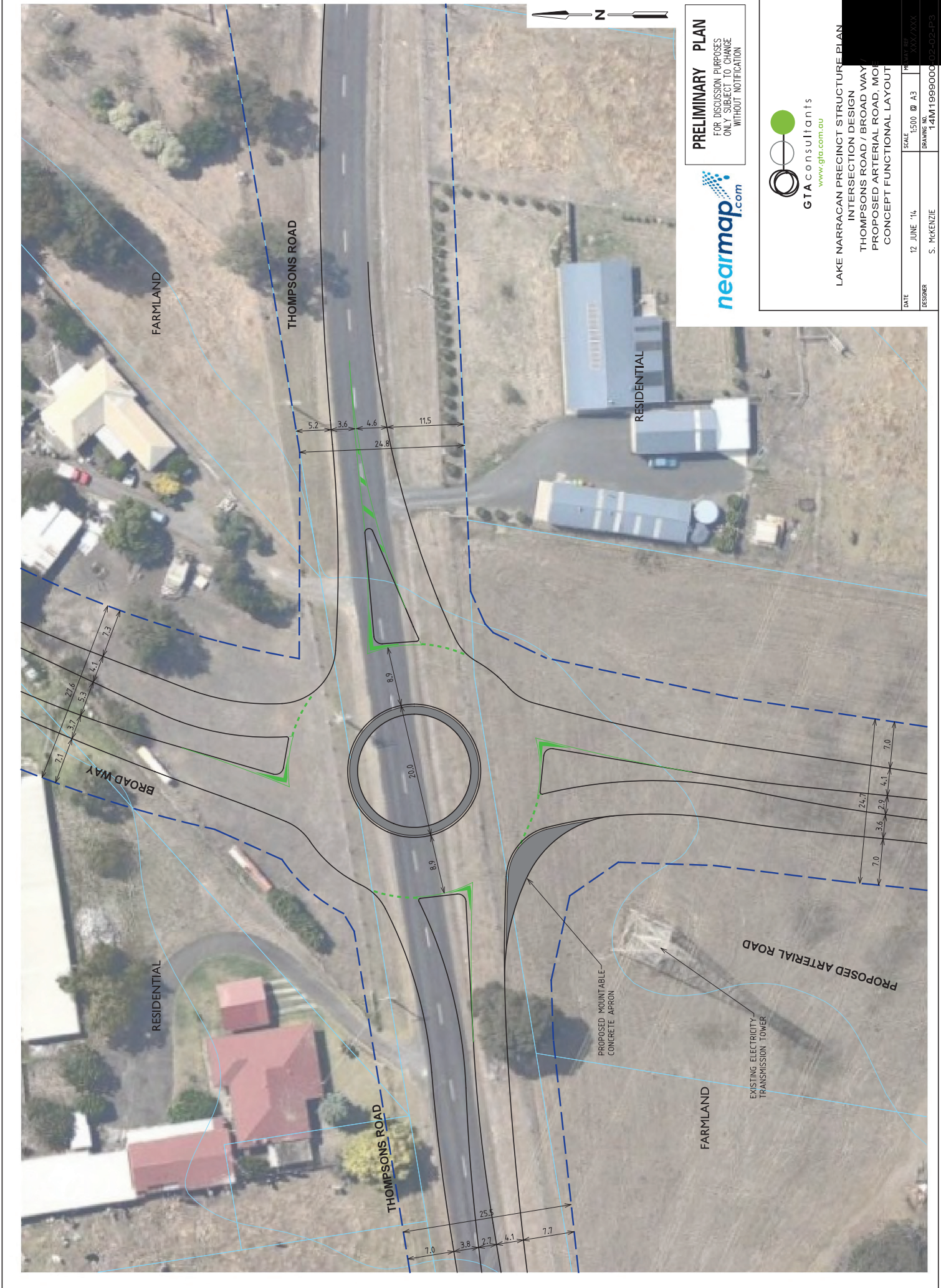
Project 2A - John Field Drive/ Extension

Civil Works				
Item	Description	Quantity	Rate	Total
1.0	Demolition Works			
1.01	Remove existing trees	15 Item(s)	\$1,000.00/Item	\$15,000.00
	CIVIL WORKS	Quantity		
2.0	Bulk Earthworks			
2.01	Stripping and stockpiling of selected topsoil for reuse, excavation to proposed formation levels, including trimming, rolling, cutting and shaping, compaction of subgrades, removal and disposal of trees, shrubs, spoil, surplus unapproved soil, etc. Assumed nom. depth of 1500mm average across site. This item is to incorporate subgrade preparation and the supply and placement of fill material as specified and directed including compaction to 98% modified compaction, as per AS1289, where specified.	18504m ³	\$50.00/m ³	\$925,200.00
3.0	Concrete and Kerb Works			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
3.01	Kerb and Channel, Concrete Strength			
	25MPa Standard			
3.01.1	Kerb and channel	849.33m	\$100.00/m	\$84,933.00
3.01.2	Mountable Kerb	124.25m	\$75.00/m	\$9,318.90
4.0	Pavements, Rigid			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
4.01	150mm depth concrete pavement within median and traffic islands, including bedding and kerb and channel	275.00m ²	\$100.00/m ²	\$27,500.00
4.02	200mm depth mountable pavement, colour and finish as specified	105.00m ²	\$130.00/m ²	\$13,650.00
5.0	Pavements, Flexible			
	The supply and installation of the following compacted depth asphalt wearing courses including labour, materials, compaction and bituminous prime coat, to relevant specifications and as specified.			

5.01	Regulation asphalt resheet including road profiling of pavements as specified. Nominal depth varies to suit design.	650m2	\$40.00/m2	\$26,000.00
5.02	Full-depth asphalt pavement. Nom. 470mm thickness based on geotechnical report dated 01/11/2013.	4413.00m2	\$250.00/m2	\$1,103,250.00
6.0	Drainage			
6.01	Allowance for underground pits and pipes	1 Item(s)	\$300,000.00/Item	\$300,000.00
6.02	Allowance for sub soil drainage and flushout risers	1 Item(s)	\$75,000.00/Item	\$75,000.00
7.0	Delineation			
7.01	Signage			
7.01.1	The supply and installation/relocation of directional and advisory traffic signage all inclusive and removal of all redundant signs as specified	1 Item(s)	\$3,000.00/Item	\$3,000.00
7.02	Linemarking			
7.02.1	Installation of proposed linemarking to VicRoads standards, including but not limited to lane division lines, directional arrows, bus lane surface treatment, stopping lines and RRPM's all inclusive	1 Item(s)	\$7,000.00/Item	\$7,000.00
8.0	Landscaping/ Topsoil and Reinstatement			
8.01	Topsoiling and seeding of nature strips, medians, and all disturbed areas to a min. of 150mm depth	6960.00m2	\$25.00/m2	\$174,000.00
9.0	Miscellaneous			
9.01	Final clean-up, including demobilisation and removal of temporary structures, etc.	1 Item(s)	\$20,000.00/Item	\$20,000.00
	Sub Total - Civil			\$2,783,851.90
10.0	General			
10.01	Traffic Management		5% of sub total	\$139,192.60
10.02	Site Establishment		2.5% of sub total	\$69,596.30
10.03	Survey and Design		5% of sub total	\$139,192.60
10.04	Supervision and Project Management		9% of sub total	\$250,546.67
10.05	Council Fees		3.25% of sub total	\$90,475.19
10.06	VicRoads Fees		1% of sub total	\$27,838.52
	Total with 15% Contingency			\$3,500,693.76

Assumptions and exclusions:

1. The type of structure to be used over the rail trail is yet to be confirmed and as such a cost has been excluded
2. Insurances and bank guarantees have been excluded.
3. Allowances for existing services relocations, lowering or realignment thereof have been excluded
4. Protection of underground services during construction has been excluded
5. The above opinion of probable cost is for initial planning only and must not be relied upon for quoting, budgeting or construction purposes. It is recommended that you seek a detailed cost estimate from a suitably qualified quantity surveyor following further design development.
6. Specific construction works including rock boring, rock blasting or rock excavation and removal have been excluded as geotechnical conditions are yet to be confirmed.
7. This estimate also excludes an allowance for abnormal weather conditions.
8. GST is excluded.
9. Price escalation is excluded.
10. Cost of property acquisitions is excluded



PRELIMINARY PLAN
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LAKE NARRACAN PRECINCT STRUCTURE PLAN
 INTERSECTION DESIGN
 THOMPSONS ROAD / BROAD WAY /
 PROPOSED ARTERIAL ROAD, MOE
 CONCEPT FUNCTIONAL LAYOUT

DATE	12 JUNE '14	SCALE	1:500 @ A3	PROJECT NO.	14M1999000
DESIGNER	S. MCKENZIE	DRAWING NO.		REVISED BY	XXX / XXX

EXISTING ELECTRICITY TRANSMISSION TOWER

PROPOSED MOUNTABLE CONCRETE APRON

FARMLAND

RESIDENTIAL

BROADWAY

THOMPSONS ROAD

FARMLAND

RESIDENTIAL

PROPOSED ARTERIAL ROAD

THOMPSONS ROAD

7.0 3.8 2.7 4.1 7.7 25.5

7.0 3.6 2.9 4.1 7.0 24.7

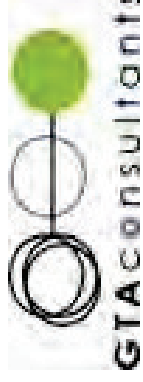
5.2 3.6 4.6 11.5 24.8

20.0

7.1 3.7 27.6 5.3 4.1 7.3

14M199900 - Lake Narracan PSP Costings

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Project 2B - Thompsons Road/ John Field Drive Roundabout/ Approaches

Civil Works				
Item	Description	Quantity	Rate	Total
1.0	Demolition Works			
1.01	Breakout and remove existing asphalt pavement	661.00m2	\$40.00/m2	\$26,440.00
1.02	Remove existing trees	4 Item(s)	\$1,000.00/Item	\$4,000.00
1.03	Remove existing concrete footpath	0.00m2	\$35.00/m2	\$0.00
	CIVIL WORKS	Quantity		
2.0	Bulk Earthworks			
2.01	Stripping and stockpiling of selected topsoil for reuse, excavation to proposed formation levels, including trimming, rolling, cutting and shaping, compaction of subgrades, removal and disposal of trees, shrubs, spoil, surplus unapproved soil, etc. Assumed nom. depth of 300mm average across site. This item is to incorporate subgrade preparation and the supply and placement of fill material as specified and directed including compaction to 98% modified compaction, as per AS1289, where specified.	5925m3	\$50.00/m3	\$296,250.00
3.0	Concrete and Kerb Works			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
3.01	Kerb and Channel, Concrete Strength			
	25MPa Standard			
3.01.1	Kerb and channel	1450.14m	\$100.00/m	\$145,014.30
3.01.2	Mountable Kerb	100.00m	\$75.00/m	\$7,500.00
4.0	Pavements, Rigid			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
4.01	150mm depth concrete pavement within median and traffic islands, including bedding and kerb and channel	2044.00m2	\$100.00/m2	\$204,400.00
4.02	200mm depth mountable pavement, colour and finish as specified	111.27m2	\$130.00/m2	\$14,465.10

5.0	Pavements, Flexible				
	The supply and installation of the following compacted depth asphalt wearing courses including labour, materials, compaction and bituminous prime coat, to relevant specifications and as specified.				
5.01	Regulation asphalt resheet including road profiling of pavements as specified. Nominal depth varies to suit design.	661.00m2	\$40.00/m2		\$26,440.00
5.02	Full-depth asphalt pavement. Nom. 470mm thickness based on geotechnical report dated 01/11/2013.	5623.00m2	\$250.00/m2		\$1,405,750.00
6.0	Drainage				
6.01	Allowance for underground pits and pipes	1 Item(s)	\$325,000.00/Item		\$325,000.00
6.02	Allowance for sub soil drainage and flushout risers	1 Item(s)	\$85,000.00/Item		\$85,000.00
7.0	Delineation				
7.01	Signage				
7.01.1	The supply and installation/relocation of directional and advisory traffic signage all inclusive and removal of all redundant signs as specified	1 Item(s)	\$4,000.00/Item		\$4,000.00
7.02	Linemarking				
7.02.1	Installation of proposed linemarking to VicRoads standards, including but not limited to lane division lines, directional arrows, bus lane surface treatment, stopping lines and RRPIM's all inclusive	1 Item(s)	\$8,000.00/Item		\$8,000.00
8.0	Landscaping/ Topsoil and Reinstatement				
8.01	Topsoiling and seeding of nature strips, medians, and all disturbed areas to a min. of 150mm depth	11305.00m2	\$25.00/m2		\$282,625.00
9.0	Miscellaneous				
9.01	Final clean-up, including demobilisation and removal of temporary structures, etc.	1 Item(s)	\$20,000.00/Item		\$20,000.00
	Sub Total - Civil				\$2,854,884.40
10.0	General				
10.01	Traffic Management		5% of sub total		\$142,744.22
10.02	Site Establishment		2.5% of sub total		\$71,372.11
10.03	Survey and Design		5% of sub total		\$142,744.22
10.04	Supervision and Project Management		9% of sub total		\$256,939.60
10.05	Council Fees		3.25% of sub total		\$92,783.74
10.06	VicRoads Fees		1% of sub total		\$28,548.84
	Total with 15% Contingency				\$3,590,017.13

Assumptions and exclusions:

1. Insurances and bank guarantees have been excluded.
2. Allowances for existing services relocations, lowering or realignment thereof have been excluded
3. Protection of underground services during construction has been excluded
4. The above opinion of probable cost is for initial planning only and must not be relied upon for quoting, budgeting or construction purposes. It is recommended that you seek a detailed
5. Specific construction works including rock boring, rock blasting or rock excavation and removal have been excluded as geotechnical conditions are yet to be confirmed.
6. This estimate also excludes an allowance for abnormal weather conditions.
7. GST is excluded.
8. Price escalation is excluded.
9. Cost of property acquisitions is excluded



PRELIMINARY PLAN
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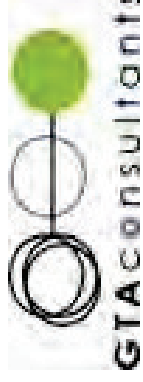


LAKE NARRACAN PRECINCT STRUCTURE PLAN
 INTERSECTION DESIGN
 THOMPSONS ROAD / SULLIVANS TRACK
 MOE
 CONCEPT FUNCTIONAL LAYOUT

DATE: 02 MAY '14
 SCALE: 1:500 @ A3
 DESIGN NO: XXX/XXX
 RESORER: S. MCKENZIE
 DRAWING NO: 14MT99900-03-P22

14M199900 - Lake Narracan PSP Costings

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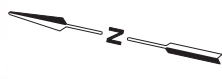
Project 3 - Thompsons Road/ Sullivans Track

Civil Works				
Item	Description	Quantity	Rate	Total
1.0	Demolition Works			
1.01	Breakout and remove existing asphalt pavement	1270m2	\$40.00/m2	\$50,800.00
1.02	Remove existing trees	3 Item(s)	\$1,000.00/Item	\$3,000.00
1.03	Allowance to remove existing line marking using water blasting	1 Item(s)	\$5,000.00/Item	\$5,000.00
1.04	Allowance to relocate guard rail based on level change at intersection	1 Item(s)	\$5,000.00/Item	\$8,000.00
	CIVIL WORKS	Quantity		
2.0	Bulk Earthworks			
2.01	Stripping and stockpiling of selected topsoil for reuse, excavation to proposed formation levels, including trimming, rolling, cutting and shaping, compaction of subgrades, removal and disposal of trees, shrubs, spoil, surplus unapproved soil, etc. Assumed nom. depth of 500mm average across site. This item is to incorporate subgrade preparation and the supply and placement of fill material as specified and directed including compaction to 98% modified compaction, as per AS1289, where specified.	635m3	\$50.00/m3	\$31,750.00
5.0	Pavements, Flexible			
5.01	The supply and installation of the following compacted depth asphalt wearing courses including labour, materials, compaction and bituminous prime coat, to relevant specifications and as specified. Regulation asphalt resheet including road profiling of pavements as specified. Nominal depth varies to suit design.	0m2	\$40.00/m2	\$0.00
5.02	Full-depth asphalt pavement. Nom. 470mm thickness based on geotechnical report dated 01/11/2013.	1270m2	\$250.00/m2	\$317,500.00
6.0	Drainage			
6.01	Realign table drain	480m2	\$28.00/m2	\$13,440.00
7.0	Delineation			

7.01	Signage				
7.01.1	The supply and installation/relocation of directional and advisory traffic signage all inclusive and removal of all redundant signs as specified	1 Item(s)	\$3,000.00/Item		\$3,000.00
7.02	Linemarking				
7.02.1	Installation of proposed linemarking to VicRoads standards, including but not limited to lane division lines, directional arrows, bus lane surface treatment, stopping lines and RRPM's all inclusive	1 Item(s)	\$4,000.00/Item		\$4,000.00
8.0	Landscaping/ Topsoil and Reinstatement				
8.01	Topsoiling and seeding of nature strips, medians, and all disturbed areas to a min. of 150mm depth	1500m2	\$25.00/m2		\$37,500.00
9.0	Miscellaneous				
9.01	Final clean-up, including demobilisation and removal of temporary structures, etc.	1 Item(s)	\$4,000.00/Item		\$4,000.00
	Sub Total - Civil				\$477,990.00
10.0	General				
10.01	Traffic Management			5% of sub total	\$23,899.50
10.02	Site Establishment			2.5% of sub total	\$11,949.75
10.03	Survey and Design			5% of sub total	\$23,899.50
10.04	Supervision and Project Management			9% of sub total	\$43,019.10
10.05	Council Fees			3.25% of sub total	\$15,534.68
10.06	VicRoads Fees			1% of sub total	\$4,779.90
	Total with 15% Contingency				\$601,072.43

Assumptions and exclusions:

1. Insurances and bank guarantees have been excluded.
2. Allowances for existing services relocations, lowering or realignment thereof have been excluded
3. Protection of underground services during construction has been excluded
4. The above opinion of probable cost is for initial planning only and must not be relied upon for quoting, budgeting or construction purposes. It is recommended that you seek a detailed
5. Specific construction works including rock boring, rock blasting or rock excavation and removal have been excluded as geotechnical conditions are yet to be confirmed.
6. This estimate also excludes an allowance for abnormal weather conditions.
7. GST is excluded.
8. Price escalation is excluded.
9. Cost of property acquisitions is excluded



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PRELIMINARY PLAN
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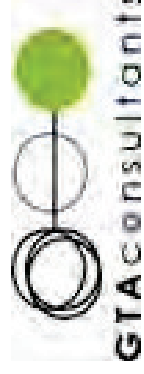


LAKE NARRACAN PRECINCT STRUCTURE PLAN
INTERSECTION DESIGN
MOE - GLENGARRY ROAD / OLD SALE ROAD,
NEWBOROUGH
CONCEPT FUNCTIONAL LAYOUT

DATE	20 JUNE '14	SCALE	1:1000	HWY REF	N/A
DESIGNER	E. SANSTOUPET	DRAWING NO.	14M11999000-04-P1		

14M199900 - Lake Narracan PSP Costings

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Project 4 - Old Sale Road/John Field Drive (Moe-Glengarry Road)

Civil Works				
Item	Description	Quantity	Rate	Total
1.0	Demolition Works			
1.01	Breakout and remove existing asphalt pavement	150m2	\$40.00/m2	\$6,000.00
1.02	Remove existing trees	5 Item(s)	\$1,000.00/Item	\$5,000.00
1.03	Allowance to remove existing line marking using water blasting	1 Item(s)	\$8,000.00/Item	\$8,000.00
1.04	Allowance to relocate existing traffic signals	1 Item(s)	\$300,000.00/Item	\$300,000.00
1.05	Breakout and remove existing median	456m2	\$40.00/m2	\$18,240.00
1.06	Breakout and remove existing kerb and channel	500m	\$30.00/m	\$15,000.00
	CIVIL WORKS			
3.0	Concrete and kerb Works			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
3.01	Kerb and Channel, Concrete Strength			
	25MPa Standard			
3.01.1	Kerb and channel	1335.00m	\$100.00/m	\$133,500.00
4.0	Pavements, Rigid			
	Construction of the following items including provision of all necessary plant and materials, trimming, bedding, forming, mixing, paving, jointing, making and finishing.			
4.01	150mm depth concrete pavement within median and traffic islands, including bedding and kerb and channel	187.50m2	\$100.00/m2	\$18,750.00
4.02	Reinstate existing private property driveways	2 Item(s)	\$3,500.00/Item	\$7,000.00
5.0	Pavements, Flexible			
	The supply and installation of the following compacted depth asphalt wearing courses including labour, materials, compaction and bituminous prime coat, to relevant specifications and as specified.			
5.01	Regulation asphalt resheet including road profiling of pavements as specified. Nominal depth varies to suit design.	6050m2	\$40.00/m2	\$242,000.00
5.02	Full-depth asphalt pavement. Nom. 470mm thickness based on geotechnical report dated 01/11/2013.	2150m2	\$250.00/m2	\$537,500.00

6.0	Drainage				
6.01	Allowance for underground pits and pipes	1 Item(s)	\$150,000.00/Item		\$150,000.00
6.02	Allowance for sub soil drainage and flushout risers	1 Item(s)	\$50,000.00/Item		\$50,000.00
7.0	Delineation				
7.02	Linemarking				
7.02.1	Installation of proposed linemarking to VicRoads standards, including but not limited to lane division lines, directional arrows, on road bicycle lane, stopping lines and RRPV's all inclusive	1 Item(s)	\$15,000.00/Item		\$15,000.00
9.0	Miscellaneous				
9.01	Final clean-up, including demobilisation and removal of temporary structures, etc.	1 Item(s)	\$25,000.00/Item		\$25,000.00
9.02	Landscaping of medians	1 Item(s)	\$15,000.00/Item		\$15,000.00
	Sub Total - Civil				\$1,550,990.00
10.0	General				
10.01	Traffic Management		5% of sub total		\$77,549.50
10.02	Site Establishment		2.5% of sub total		\$38,774.75
10.03	Survey and Design		5% of sub total		\$77,549.50
10.04	Supervision and Project Management		9% of sub total		\$139,589.10
10.05	Council Fees		3.25% of sub total		\$50,407.18
10.06	VicRoads Fees		1% of sub total		\$15,509.90
	Total with 15% Contingency				\$1,950,369.93

Assumptions and exclusions:

1. Insurances and bank guarantees have been excluded.
2. Allowances for existing services relocations, lowering or realignment thereof have been excluded
3. Protection of underground services during construction has been excluded
4. The above opinion of probable cost is for initial planning only and must not be relied upon for quoting, budgeting or construction purposes. It is recommended that you seek a detailed cost estimate from a suitably qualified quantity surveyor following further design development.
5. Specific construction works including rock boring, rock blasting or rock excavation and removal have been excluded as geotechnical conditions are yet to be confirmed.
6. This estimate also excludes an allowance for abnormal weather conditions.
7. GST is excluded.
8. Price escalation is excluded.
9. Cost of property acquisitions is excluded

23. Appendix H

- SIDRA analysis for the intersection of Old Sale Road and John Field Drive

MOVEMENT SUMMARY

Site: Future Traffic Volumes
(Double Right and Thru/Left)

Moe-Glengarry Road (John Field Drive)/Old Sale Road
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

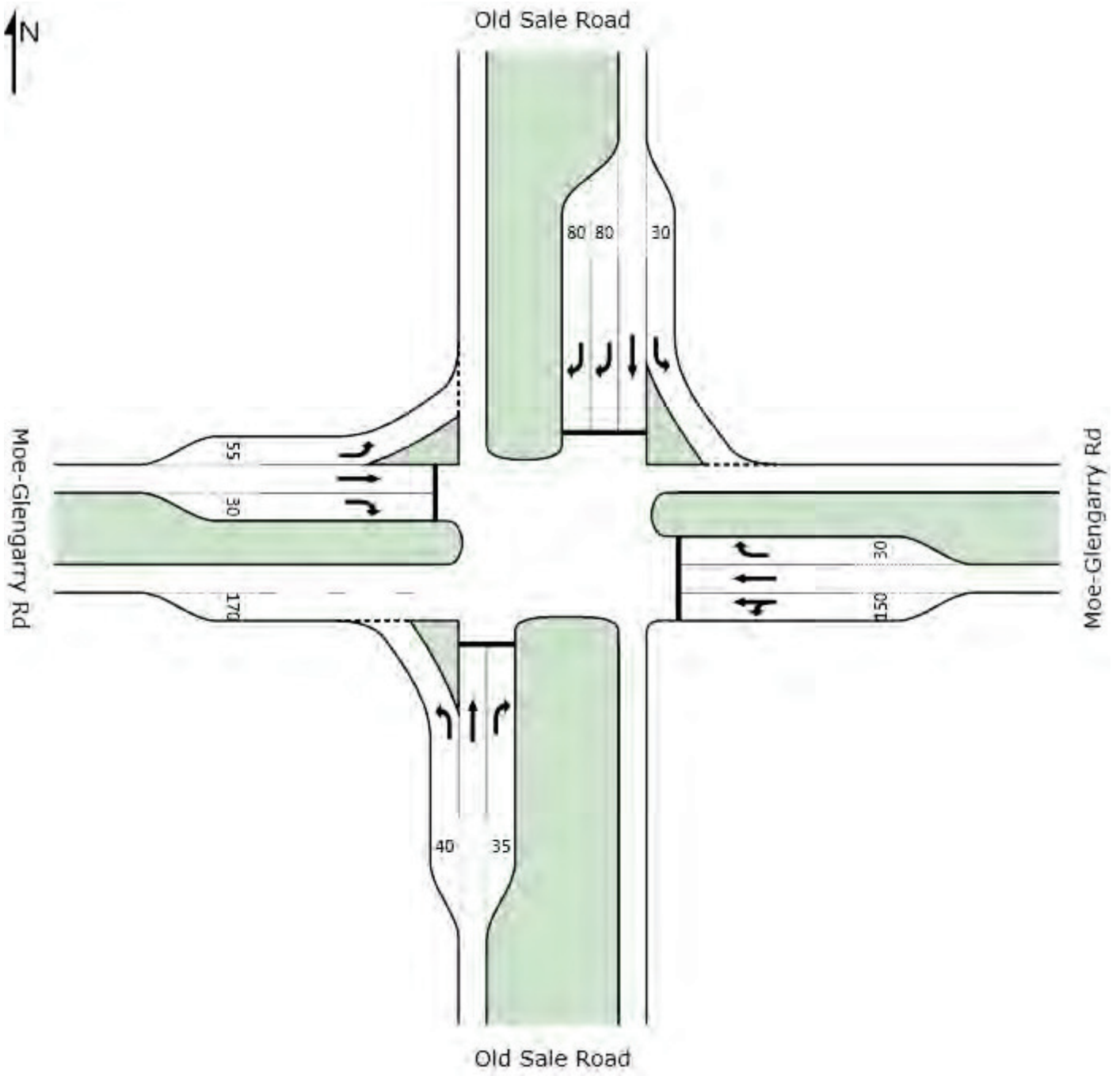
Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Old Sale Road											
1	L	36	0.0	0.070	16.4	LOS B	0.4	3.0	0.52	0.72	52.0
2	T	279	0.0	0.715	26.7	LOS C	8.3	58.2	0.99	0.87	39.9
3	R	5	0.0	0.021	32.5	LOS C	0.1	0.9	0.83	0.67	38.8
Approach		320	0.0	0.715	25.6	LOS C	8.3	58.2	0.93	0.85	40.9
East: Moe-Glengarry Rd											
4	L	1	0.0	0.686	27.8	LOS C	11.8	82.6	0.92	0.90	36.2
5	T	894	0.0	0.691	19.7	LOS B	12.0	83.7	0.92	0.82	36.8
6	R	99	0.0	0.457	36.3	LOS D	2.9	20.3	0.97	0.77	30.2
Approach		994	0.0	0.691	21.4	LOS C	12.0	83.7	0.93	0.81	36.0
North: Old Sale Road											
7	L	101	0.0	0.116	12.4	LOS B	0.6	3.9	0.29	0.71	56.7
8	T	506	0.0	0.556	12.6	LOS B	10.8	75.7	0.77	0.68	52.6
9	R	404	0.0	0.662	38.4	LOS D	6.1	42.6	0.98	0.84	35.4
Approach		1012	0.0	0.662	22.9	LOS C	10.8	75.7	0.81	0.75	44.4
West: Moe-Glengarry Rd											
10	L	156	0.0	0.171	10.5	LOS B	1.4	9.7	0.42	0.69	46.5
11	T	152	0.0	0.666	30.2	LOS C	4.7	32.7	1.00	0.85	31.1
12	R	12	0.0	0.070	34.6	LOS C	0.3	2.3	0.92	0.68	31.0
Approach		319	0.0	0.666	20.8	LOS C	4.7	32.7	0.72	0.76	37.1
All Vehicles		2644	0.0	0.715	22.4	LOS C	12.0	83.7	0.86	0.79	39.8

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.



24. Appendix I

- Standard roundabout design and costing



LAYOUT PLAN
SCALE 1:500



WARNING
SERVICES SHOWN ON THIS DRAWING ARE APPROXIMATE ONLY. THE EXACT LOCATION IS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS.

Project No.	31-31192-C205
Revision	06 Nov 2014 - 10:22PM
Drawn	A.H. A.M.*
Checked	A.H. A.M.*
Project Director	M.W. A.M.*
Date	05.05.14

Client Ref. No. 03103152-CADD/Engineering/31192-C205.dwg

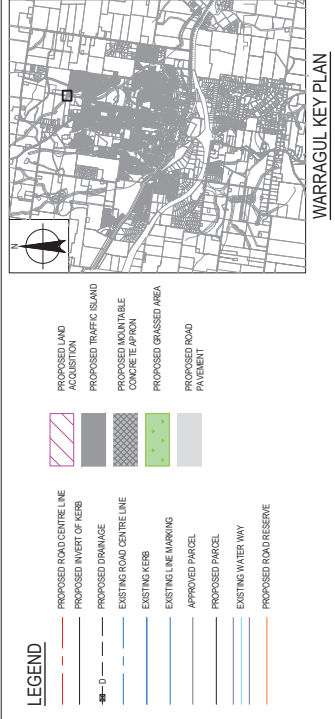


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Drawn: M. LUDVIGSEN
Checked: M. LUDVIGSEN
Project Director: M. LUDVIGSEN
Scale: 1:500

Client: METROPOLITAN PLANNING AUTHORITY
Project: MPA TRANSIT DCP, WARRAGUL & DROUIN
Title: INL-NE-07 - EAST-WEST CONNECTOR BOULEVARD / MILLS ROAD INTERSECTION
Drawing No: 31-31192-C205
Rev: A



QUANTITIES AND COST

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	RATE	AMOUNT
PRELIMINARIES	SERVICE ALTERATIONS	1	ITEM		\$10,000.00
	DEMOLITION/SITE PREPARATION				\$5,000.00
ROADWORKS	GEOTEXTILES	3414	m ²	\$30.00	\$102,420.00
	ASPHALT PAVEMENT	1430	m ²	\$150.00	\$214,500.00
	KERB & CHANNEL	449	m	\$80.00	\$35,920.40
	GRASSSED AREA	284	m ²	\$25.00	\$7,062.20
	CONCRETE PAVEMENT	19	m ²	\$1,000.00	\$18,900.00
	TRAFFIC ISLAND	39	m ²	\$200.00	\$7,800.40
LAND PURCHASE	AREA OF LAND PURCHASE	1344	m ²		\$4,605.00
STORMWATER	STORMWATER PIPES	172	m	\$2,500.00	\$430,000.00
	STORMWATER PITS	14	No.	\$40.00	\$560.00
	SUBSOIL DRAINAGE	449	m	\$17,975.60	\$8,050,420.40
MISCELLANEOUS	CURBSIDE PAVING	1	ITEM	\$2,000.00	\$2,000.00
	STORAGE & LABELLING	1	ITEM	\$2,000.00	\$2,000.00
	LIGHTING	1	ITEM	\$40,000.00	\$40,000.00
CONTINGENCIES	TRAFFIC MANAGEMENT 5%	1	ITEM	\$27,092.38	\$27,092.38
	CONSTRUCTION MANAGEMENT 10%	1	ITEM	\$54,184.71	\$54,184.71
	CONTINGENCY ALLOWANCE 20%	1	ITEM	\$108,369.42	\$108,369.42
	TOTAL				\$798,430.94

NOTES:

- ALL COSTS EXCLUDE GST
- COSTS HAVE BEEN ESTIMATED USING TYPICAL CONSTRUCTION RATES FROM SIMILAR PROJECTS
- DESIGN VEHICLE 2 TONS PER AXLE TO USE CONCRETE APPROX
- NO PROVISION FOR CAR PARKING OR BICYCLE LANES WITHIN ROUNDABOUT
- COST OF LAND ACQUISITION IS NOT INCLUDED IN TOTAL ESTIMATE
- STORMWATER 300mm RCP CLASS 2 WITH FOR SHOULDER 150mm RCP

25. Appendix J

- Road construction rates

Summary

Road	Unit	Rate
Cross section 3 - Arterial Road (24m)	Lin.m	2,036.22
Cross section 4 - Broad Way Connector Boulevard (27.6m)	Lin.m	2,423.99
Cross section 5 - Connector Street (21.6m)	Lin.m	2,079.82
Cross section 6 - Connector Street existing road reserve (21.5m)	Lin.m	2,079.82
Cross section 7 - Connector Street shared path (25.9m)	Lin.m	2,277.65
Cross section 8 - Forshore (20.0m)	Lin.m	1,993.05
Cross section 9 - Foreshore Connector constrained	Lin.m	1,605.27
Cross section 10 - Sullivans Track	Lin.m	2,125.80

Cross section 3 - Arterial Road (24m)

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	141.21
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	129.38
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	137.47
Kerb & Channel	Lin.m	90.00
Central Median	Lin.m	238.00
Footpath	Lin.m	120.00
AG Drain	Lin.m	88.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	276.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	58.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal		1,408.05
Traffic Management (5.0%)		70.40
Site Establishment (2.5%)		35.20
Survey and Design (5.0%)		70.40
Supervision and Project Management (9.0%)		126.72
Council Fees (3.25%)		45.76
Vic Roads Fees (1.0%)		14.08
Subtotal		1,770.63
Contingency (15%)		265.59
Total		2,036.22

Cross section 4 - Broad Way Connector Boulevard (27.6m)

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	234.00
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	214.40
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	227.80
Kerb & Channel	Lin.m	90.00
Central Median	Lin.m	238.00
Footpath	Lin.m	120.00
AG Drain	Lin.m	88.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	276.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	58.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal	\$	1,676.20
Traffic Management (5.0%)	\$	83.81
Site Establishment (2.5%)	\$	41.91
Survey and Design (5.0%)	\$	83.81
Supervision and Project Management (9.0%)	\$	150.86
Council Fees (3.25%)	\$	54.48
Vic Roads Fees (1.0%)	\$	16.76
Subtotal	\$	2,107.82
Contingency (15%)	\$	316.17
Total	\$	2,423.99

Cross section 5 - Connector Street (21.6m)

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	234.00
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	214.40
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	227.80
Kerb & Channel	Lin.m	90.00
Footpath	Lin.m	120.00
AG Drain	Lin.m	88.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	276.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	58.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal		1,438.20
Traffic Management (5.0%)	\$	71.91
Site Establishment (2.5%)	\$	35.96
Survey and Design (5.0%)	\$	71.91
Supervision and Project Management (9.0%)	\$	129.44
Council Fees (3.25%)	\$	46.74
Vic Roads Fees (1.0%)	\$	14.38
Subtotal		1,808.54
Contingency (15%)	\$	271.28
Total		2,079.82

Cross section 6 - Connector Street existing road reserve (21.5m)

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	234.00
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	214.40
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	227.80
Kerb & Channel	Lin.m	90.00
Footpath	Lin.m	120.00
AG Drain	Lin.m	88.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	276.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	58.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal		1,438.20
Traffic Management (5.0%)		71.91
Site Establishment (2.5%)		35.96
Survey and Design (5.0%)		71.91
Supervision and Project Management (9.0%)		129.44
Council Fees (3.25%)		46.74
Vic Roads Fees (1.0%)		14.38
Subtotal		1,808.54
Contingency (15%)		271.28
Total		2,079.82

Cross section 7 - Connector Street shared path (25.9m)

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	247.50
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	200.00
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	212.50
Kerb & Channel	Lin.m	90.00
Footpath	Lin.m	120.00
Shared Path	Lin.m	180.00
AG Drain	Lin.m	44.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	259.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	92.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal	\$	1,575.00
Traffic Management (5.0%)	\$	78.75
Site Establishment (2.5%)	\$	39.38
Survey and Design (5.0%)	\$	78.75
Supervision and Project Management (9.0%)	\$	141.75
Council Fees (3.25%)	\$	51.19
Vic Roads Fees (1.0%)	\$	15.75
Subtotal	\$	1,980.56
Contingency (15%)	\$	297.08
Total	\$	2,277.65

Cross section 8 - Forshore (20.0m)

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	234.00
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	214.40
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	227.80
Kerb & Channel	Lin.m	90.00
Footpath	Lin.m	60.00
AG Drain	Lin.m	88.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	276.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	58.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal		1,378.20
Traffic Management (5.0%)	\$	68.91
Site Establishment (2.5%)	\$	34.46
Survey and Design (5.0%)	\$	68.91
Supervision and Project Management (9.0%)	\$	124.04
Council Fees (3.25%)	\$	44.79
Vic Roads Fees (1.0%)	\$	13.78
Subtotal		1,733.09
Contingency (15%)	\$	259.96
Total		1,993.05

Cross section 9 - Foreshore Connector constrained

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	141.21
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	129.38
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	137.47
Kerb & Channel	Lin.m	90.00
Footpath	Lin.m	60.00
AG Drain	Lin.m	88.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	276.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	58.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal	\$	1,110.05
Traffic Management (5.0%)	\$	55.50
Site Establishment (2.5%)	\$	27.75
Survey and Design (5.0%)	\$	55.50
Supervision and Project Management (9.0%)	\$	99.90
Council Fees (3.25%)	\$	36.08
Vic Roads Fees (1.0%)	\$	11.10
Subtotal	\$	1,395.89
Contingency (15%)	\$	209.38
Total	\$	1,605.27

Cross section 10 - Sullivans Track

Item	Unit	Rate
Asphalt; 50mm compacted depth of size 14mm nominal size Type N asphalt with primer	Lin.m	247.50
150mm Compacted Depth Class 2, 20mm Nom. Size	Lin.m	200.00
200mm Compacted Depth Class 3, 20mm Nom. Size	Lin.m	212.50
Kerb & Channel	Lin.m	45.00
Footpath	Lin.m	60.00
Shared Path	Lin.m	180.00
AG Drain	Lin.m	44.00
Signs & Linemarking	Lin.m	20.00
Excavation (assume 0.4m depth)	Lin.m	259.00
Subgrade Testing & Preparation	Lin.m	10.00
Naturestrips, grassed only	Lin.m	92.00
Street Trees (2m Tall Staked Tree, 10m Centres)	Lin.m	100.00
Subtotal	\$	1,470.00
Traffic Management (5.0%)	\$	73.50
Site Establishment (2.5%)	\$	36.75
Survey and Design (5.0%)	\$	73.50
Supervision and Project Management (9.0%)	\$	132.30
Council Fees (3.25%)	\$	47.78
Vic Roads Fees (1.0%)	\$	14.70
Subtotal	\$	1,848.53
Contingency (15%)	\$	277.28
Total	\$	2,125.80

26. Appendix K

- Community centre costing

Community Centre Level 1

Name: Community Centre Level 1 Site 0.4ha
Scope of works: Double Kindergarten with carparking facilities
Detail: Double Kindergarten with community room and Carparking facilities
Notes: Costs based on estimate from previous community centres as provided by Wyndham City Council
 Estimate based on normal earthworks on fairly level site

Item	Unit	Rate	area	comments	subtotal	Amount
Community Centre						
Building	subtotal		712	square metres	\$ 272,100.00	\$ 2,277,247
Community room	m ²	\$ 2,721.00	100		\$ 2,721,000.00	
Kindergarten (double)	m ²	\$ 2,721.00	368	2 children rooms, Kitchen, Office/Admin, Storage internal & External, Children's toilets	\$ 1,001,328.00	
Central Management Offices	m ²	\$ 2,721.00	84	includes circulation space	\$ 228,564.00	
Kitchen/Kiosk	m ²	\$ 2,721.00	40		\$ 108,840.00	
Storage	m ²	\$ 2,439.00	61		\$ 148,779.00	
Public amenities	m ²	\$ 2,439.00	59		\$ 143,901.00	
Wall area	m ²	\$ 2,721.00	71.2	allowance for wall thickness 10% of room areas	\$ 193,735.20	
Playground	m ²	\$ 225.00	800	outdoor play space for kindergarten and 100m2 playgroups	\$ 180,000.00	
Carpark works			73	fixed cost	\$ 219,000.00	\$ 246,500
Landscaping Level A	m ²	\$ 55.00	500	Level A	\$ 27,500.00	
Subtotal					\$ 2,523,747.20	\$ 2,523,747
estimated total						\$ 504,749
Contingence			20%			\$ 50,000
Total + contingencies					\$ 3,028,497	\$ 126,187
Services for buildings	Item					\$ 252,375
Survey and Design			5%			\$ 63,094
Overheads (supervision etc)			10%			\$ 3,520,152
Site establishment			2.5%			
Total Estimated Cost						\$ 3,520,152
Adopted Cost						

Estimate Prepared by: **CDCE** Nov-11

