Planning Proposal - Rezoning

335 Hammond Avenue, East Wagga Wagga

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Document Status

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1.0 Introduction

RPS acts on behalf of our client, Mr and Mrs J & M Howard, in preparing this Planning Proposal for the rezoning of 335 Hammond Avenue, East Wagga Wagga.

This Planning Proposal has investigated the highest and best use of a section of land along Hammond Avenue, also known as the Sturt Highway, and has been prepared in accordance with the Department of Planning's Gateway rezoning process. It provides strong justification, based on strategic planning, spatial and environmental considerations, for the Wagga Wagga Local Environmental Plan 2010 (Wagga Wagga LEP 2010) to be amended from its current rural zone to allow the subject site to be used for light industrial purposes. The sites physical, environmental and servicing constraints have been balanced against the strategic merit of the site and the following report demonstrates that the proposed zone can be supported across a certain portion of the investigation area with the remainder of the investigation area removed from consideration due to flooding constraints.

While RPS acts in the interest of our client and their site we have looked beyond the boundaries of the site to the broader precinct to assess constraints and opportunities and identify any other land within the vicinity of the site which may also be suitable for light industrial uses. His report concludes that our client's site as well as a portion of land to both the east and west of the site is suitable for development as shown in **Appendix A**.

Figure 1 View of subject site from southern side of Hammond Ave

Figure 2 Location of site and Precinct investigation Area (PIA)

For the purposes of this report, where the precinct investigation area is referred to it will be described as the "PIA" and the client's site will be referred to as the "subject site"

1.1 Proposed Rezoning

335 Hammond Avenue, East Wagga Wagga, referred to herein as the "subject site", and the surrounding PIA is currently zoned RU1 Primary Production and RU4 Rural Small Holdings under the current planning instrument Wagga Wagga Local Environmental Plan 2010 (WWLEP), as shown at Figure 3.

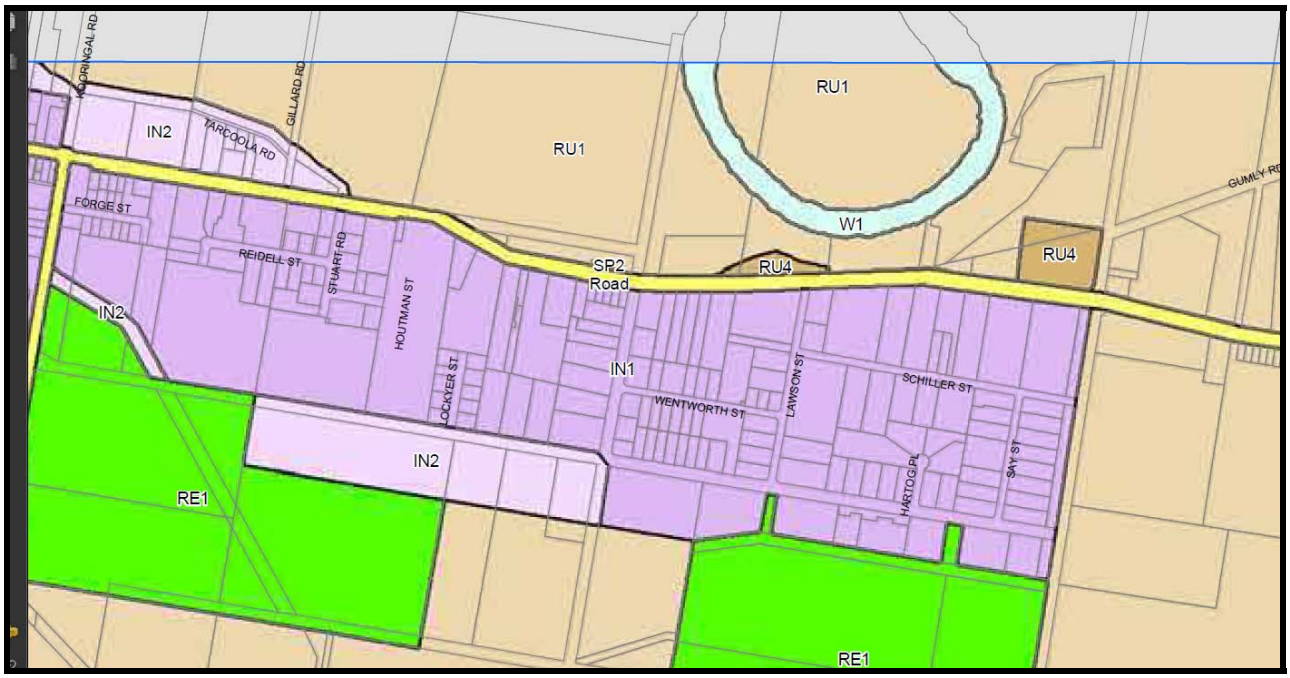


Figure 3 Existing zoning of the site and PIA

It is proposed to rezone the site and a portion either side of the site to IN2 – Light Industrial so that it is in keeping with the IN1 Industrial lands to the south of the site whilst providing a land use that is compatible with IN2 lands to the west and W1 Natural Waterways and RU1 Primary Production zoned land to the north, east and west of the site. This zoning will allow, with consent, uses such as:

- Depots
- Light industries
- Neighbourhood shops
- Take away food and drink premises
- Warehouse or distribution centres

A copy of the proposed zoning plan is provided at **Appendix A**.

It should be noted that consideration has been given to including this area of the site along the northern boundary (river front) as E2 Environmental Conservation. However, prior to the gazettal of the current WWLEP 2010, Council advised that although previously mapped and zoned 7a Environmental Protection – Riparian Area (Urban Living Area) under the 1995 LEP, this was merely an identification of land in close proximity to the river but did not necessarily determine that the site had significant ecological values. Accordingly, this area of land was not included as environmental protection under the recently gazetted LEP and this proposal accepts Council's previous determination and does not seek a special zoning for the riparian area.

1.2 Background

In April 2004 a submission prepared by Lennon Salvestro Planning was made to the Wagga Wagga LEP 2010 during the formal exhibition of the LEP by Wagga Wagga City Council (WWCC). The submission requested that Council consider the inclusion of the site as industrial zoned land within the LEP, with a small area of environmental conservation land along the northern Murrumbidgee River frontage. The Planning Panel in its consideration of the submission advised the following:

The submission was not supported. Although the area sought to be zoned for Industrial is flood free and has some development potential, a servicing strategy would be required to determine feasibility of sewering the land. There is also a river erosion issue associated with the river front on part of the land that needs further investigation.

Subsequent liaison with Council has confirmed that the flood status was to be established and defined and that any investigation should look beyond the site and include the precinct to avoid ad hoc rezoning of segments of land. Both a flood and bank stability report is provided as an appendix to this proposal. Furthermore, the bank stability report has been peer reviewed as requested by Council.

2.0 Site and Locality Analysis

2.1 Property Details and Land Use

The Planning Proposal investigates the properties situated on the northern side of Hammond Avenue, generally between Eunony Bridge Road to the east and Gillard Road to the west, referred to as the Precinct Investigation Area (PIA), and more specifically the subject site which is located within the PIA. The PIA is located within the Wagga Wagga City Council Local Government Area (LGA) and is approximately 4km east of the Central Business District of Wagga Wagga and the area is zoned for rural purposes, both primary production and small holdings. The location of the PIA and the subject site is shown at **Figure 2**. The properties covered in this investigation and a brief description of each are detailed in **Table 1** below. A more detailed description of the subject site is provided at **Section 2.1.1** below. The total area of the PIA is approximately 65 ha.

Table 1 Property Details and Land Use

Property Address	Lot and Deposited Plan	Area (ha)	Description
7 Gillard Road	2/1129044	16.08	Open farm land
213-215 Hammond Avenue	1//DP996350	27.92	Open farm land with dwelling and associated structure located at the south western corner
241 Hammond Avenue	1//DP741846	1.25	Heavily vegetated parcel of land with a dwelling located at the western edge of the site
273 Hammond Avenue	22//DP869161	5.83	Open farm land with a dwelling and associated structures located at the north western corner of the site
295 Hammond Avenue	21//DP869161	2.00	Rural residential dwelling and associated structures at the eastern end of the site
311 Hammond Avenue	11//DP1086349	2.93	Rural residential dwelling and associated structures located central to the site
335 Hammond Avenue (Subject Site)	1//DP164653	2.02	Rural residential dwelling and associated structures located within the eastern portion of the site
343 Hammond Avenue	234//DP757232	0.48	Disused service station fronting Hammond Avenue and associated structures

Eunony Bridge Road	Part lot 35//DP757232	Approx 1.60	Predominately open agricultural land with a dwelling located at the southern end of the property fronting Hammond Avenue
Eunony Bridge Road	Part Lot 7004//DP94145	Approx. 1.00	Part of a property comprising open agricultural land
Hammond Avenue	7007//DP1029599	0.23	Part of a property comprising open agricultural land
Hammond Avenue	Lot 2 DP 612871	0.67	Part of a property comprising open agricultural land
Hammond Avenue	266//DP43162; 1//DP612871	3.13	Rural small holdings with primary use as a hotel

2.1.1 335 Hammond Avenue

335 Hammond Avenue is approximately 2 hectares in area and irregular in shape with its northern boundary following the curve of the Murrumbidgee River. The approximate length of the boundaries is as follows:

- north 250m
- south 232m
- east 113m
- west 84m

The PIA is heavily vegetated along the northern edge of the site and is also moderately vegetated in the eastern and western third of the PIA, which also comprises rural residential dwellings. **Figure 4** below depicts the view from our client's site within the PIA looking west. The paddock in the foreground is cleared and forms the western portion of our client's land. Note the street trees along Hammond Ave to the left and river front vegetation to the right. Also note the roof of the neighbouring dwelling further to the west.

Figure 4 View west across the subject site

2.2 Current Land Use Zones

The subject site is currently zoned RU1 Primary Production under the current planning instrument Wagga Wagga Local Environmental Plan 2010 (WWLEP) as shown in **Figure 5**, whilst the greater PIA area comprises both RU1 Primary Production and RU4 Rural Small Holdings zoned land and is adjacent to other RU1 Primary Production, IN2 Light Industrial, and IN1 General Industrial land and a W1 Natural Waterway.

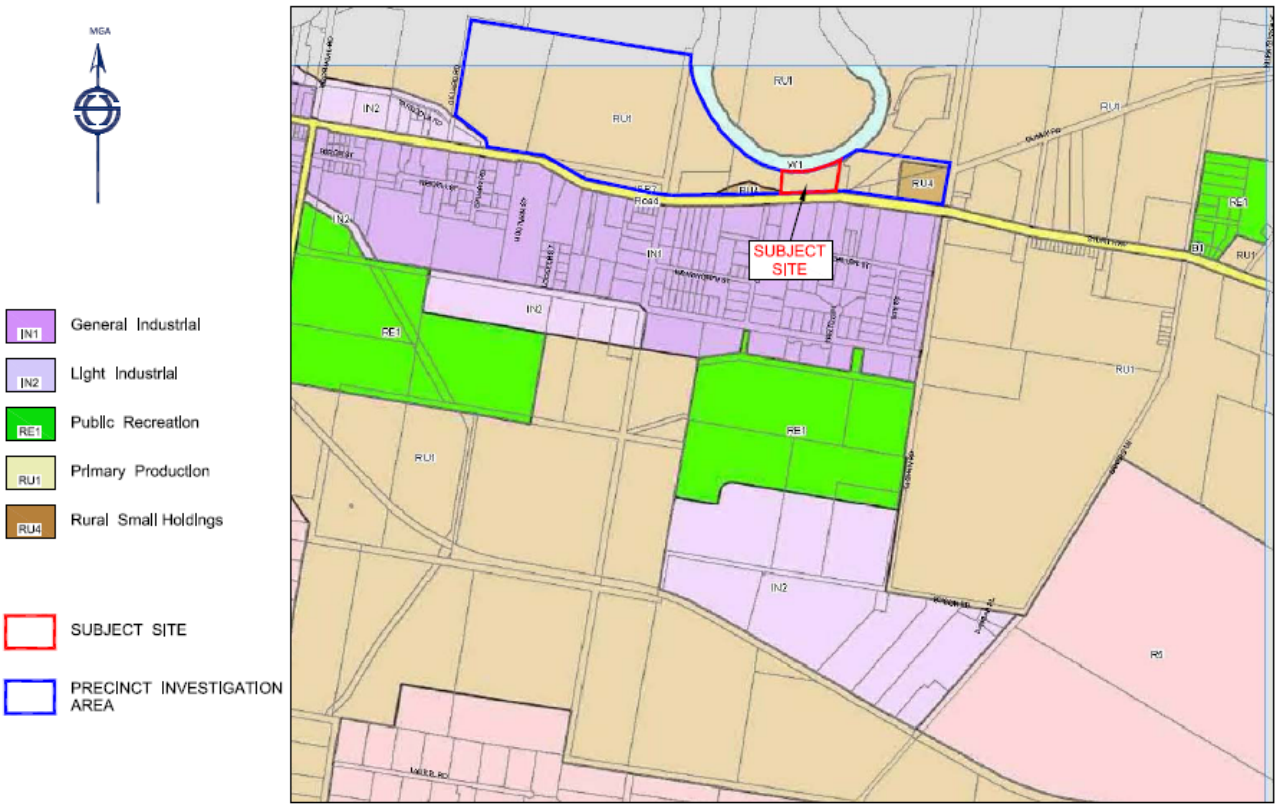


Figure 5 Current Zoning – Wagga Wagga Local Environmental Plan 2010

2.3 Traffic and Access

Hammond Avenue (Sturt Highway) is a state road under the care and control of the Roads & Traffic Authority (RTA) which provides an east to west connection from the Hume Highway in the east (via Wagga Wagga) to Narrandera further west. The road is dual carriageway, approximately 40m wide, with no median strip between oncoming traffic in the vicinity of the proposed PIA, though liaisons with the RTA have revealed that medians have been planned for Hammond Avenue as far east as Tasman Road but no timeframes for these works could be provided. Each of the properties within the PIA are accessed from Hammond Avenue (Sturt Highway) except for the property at 7 Gillard Road and the motel on the corner of Hammond Avenue and Eunony Bridge Road, which are accessed from Gillard Road and Eunony Bridge Road respectively.

Eunony Bridge Road is a local distributor road that provides a north to south connection along the western side of the site serving the Bomen Industrial Area. Eunony Bridge Road links to Tasman Road to the south of the Sturt Highway, via the 40m diameter roundabout to industrial / rural development further south. The 40m diameter roundabout on the Sturt Highway serves B-Double turning movements.

Figure 6 View east Hammond Avenue carriageway

The site has a street frontage of 232m. Visibility from the site along Hammond Avenue is good in both directions when exiting the site from the existing driveway situated to the east of the site.

A Traffic Study (**Appendix G**) has been undertaken by McLaren Traffic Engineering which confirms that the proposed rezoning application is supportable with respect to road safety, traffic flow efficiency and residential amenity considerations as outlined below.

2.3.1 Traffic Generated

The level of traffic generated for the proposed project is moderately low at 180 vehicle trips per hour during weekday commuters peak hourly periods such that external impacts will be minimal. The level of generated traffic is low as it equates to a total of 3 vehicles per minute. This means that during the weekday 8-9AM peak hour some 2 vehicles will arrive and 1 vehicle will depart per minute. Vice versa in the weekday 5.30-6.30PM peak hour.

2.3.2 Traffic Recommendation

The traffic report has concluded that the proposed rezoning application is supportable with respect to road safety, traffic flow efficiency and residential amenity considerations. The following recommendations were made:

- The development can accommodate on-site parking needs in full compliance with Council's controls.
- The report recommends left-in/ left-out access to and from the site with a median along Hammond Avenue across proposed driveways. This is based upon ultimate development of the site together with the cumulative impact of existing peak hour flows, 10 year background growth and the proposed Gumly Gumly Industrial Estate in the vicinity. The displaced right turn traffic entering and leaving the site (equating to 126 vehicle trips per hour, with 80% in the peak direction being 101 trips per hour) can utilise nearby existing roundabouts with some traffic detouring through industrial roads to the south with minimal impact.
- A lesser scale of development or individual proposed buildings may permit interim access arrangements that allow both right turn entry and exit movements (subject to supportive traffic assessments) until the combined traffic conditions of 10 year growth and the full development potential of the proposed Gumly Gumly Industrial Estate is realised.
- The design of vehicular access conditions will be the subject of more detailed traffic studies at future DA stages.

2.4 Infrastructure and Services

Infrastructure and servicing constraints and opportunities have been investigated and the findings demonstrate that the site can be suitably services without any downstream impacts on infrastructure or natural systems. Details of the issues considered are outlined below.

2.4.1 Sewer and Drainage

Sewer and drainage were identified by the Council's planning panel as issues that needed to be more closely considered with any planning proposal. MJM solutions have been engaged to explore the sewer and drainage network and advise on the status of the network and capability of the site to be adequately catered for in terms of sewer and drainage. A summary of their findings follows and their full report can be reviewed within Appendix B.

Council's Development Engineer has advised that the existing drainage systems are located in Lawson Street. This PIA is within close proximity to Lawson Street, as can be seen in the gas main location figure below (Figure 5). This system could be extended to accommodate this site and the estimated cost of the extensions to the network would be in the order of $140 000 and includes a detention basin and sediment and erosion control structures. A Pump well would be required to discharge internal storm water within the site to a storm water pit and avoid discharge direct to the river.

A Sewer Investigation (**Appendix B**) has been undertaken by MJM Solutions who confirm that it will be necessary to install a pressure sewer pumping system to service the subject site as there is insufficient grade to be able to service the property with a conventional gravity based system.

2.4.2 Water

There is currently potable water mains supply available to the allotment. There is a 250mm diameter water main located on the northern side of Hammond Avenue and a 150mm diameter main located on the southern side. There is also a redundant water main on the southern side of Hammond Avenue. The development could be accommodated by the existing mains in the area and water pressure would be good in the short to medium term according to Riverina Water. There are plans to build a reservoir in the medium to long term which would again improve water pressure in the area. Generally, Developer Servicing Charges applied by RWCC are at the rate of 1ET/hectare payable upfront, although their Development Servicing Plan does not reflect this. Further fees may apply for the future purchaser once water demands for the industrial activity are confirmed.

2.4.3 Telecommunications

There is telecommunications (Telstra) service currently available to the property. This could easily be extended to cater for additional development on the site. There are existing telecom cables located on both sides of Hammond Avenue. This would involve supply of a shared electrical/telecom trench for the contractor to work in. Cost to supply additional industrial allotments could be approximately $1,000 per lot plus trenching costs of approximately $33 per metre.

We also note that there is an Optus fibre optic cable located in Telstra ducts on the southern side of Hammond Avenue. Extreme care must be taken in this regard.

2.4.4 Electricity

According to Essential Energy records, there is currently overhead electricity supplied to the development site, which runs along the northern side of Hammond Avenue. The network in this location would be capable of servicing additional development of this site. Works required would include the installation of a transformer and either an underground or overhead service to each additional allotment, depending on direction from Essential Energy. We note that overhead electricity is preferable for industrial development. The works would be customer funded, with Essential Energy funding the provision of transformers up to 30kVA capacity. The estimated cost of servicing each additional allotment is contingent on the number of allotments proposed to be created.

2.4.5 Gas

The closest gas main is located in Lawson Street, as shown in **Figure 7** below. An extension to the existing reticulation system would be required to service the site at an approximate cost of $30 - $40 per metres (approx 400 metres). Servicing each lot would be an additional $1200 - $1500.

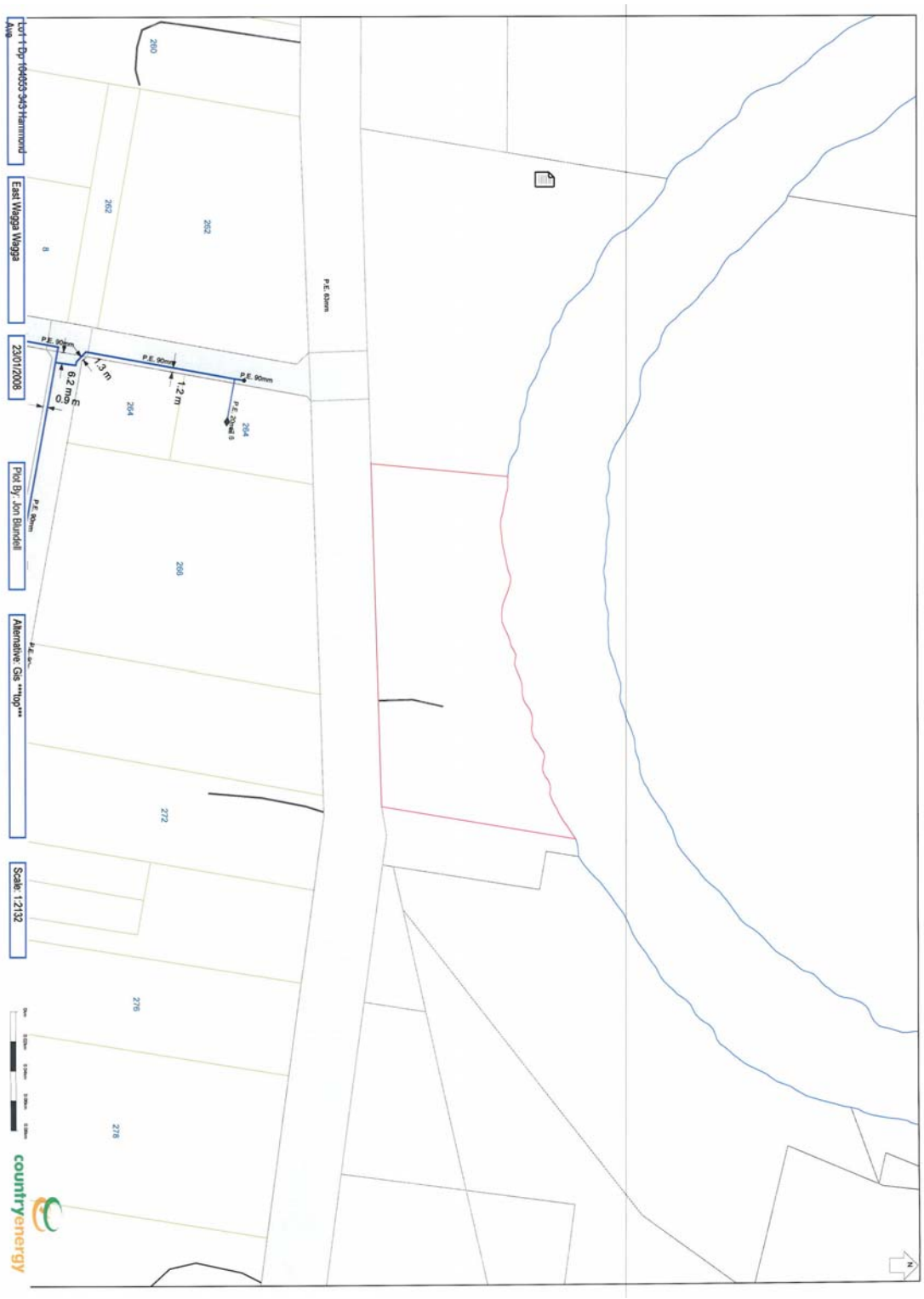


Figure 7 Location of gas main

2.4.6 Infrastructure Recommendation

The infrastructure investigation concludes that satisfactory servicing can be supplied to the site on a user pays basis without causing any negative impacts or strain on the existing servicing systems.

2.5 Surrounding Development

The land surrounding the PIA includes Industrial development to the south comprising truck sales and service, engineering establishment, other warehouses and showrooms and like industries. Industrial, service and office style land use activities also abut the PIA to the west, including GTES professional training offices, service station, earth moving company. To the east the PIA contains a disused service station and a large hotel/motel development which fronts the corner of Eunony Bridge Road and The Highway. Beyond Eunony Bridge Road another planning proposal is being presented for consideration of change of zone from Rural to Industrial, which would reflect the mixed uses already occurring in that precinct.

Figure 8 Hartwigs Trucks directly opposite the subject site and typical of the style of land uses to the southern side of Hammond Ave

2.5.1 Context Recommendation

The context of the PIA predominantly comprises the types of land uses that would be permissible within the proposed land use if this rezoning proposal is approved. The exception to this is the hotel / motel which are uses prohibited in the IN2 zone. From a compatibility perspective, the proposed zone is better suited within the context of the site as it would be more appropriate to see a reduction of dwellings within the precinct for the following reasons:

- the area becomes isolated during flood events
- removal of potential land use conflicts that could result from dwellings being located close to industry

2.6 Geology/Soils

The soil landscape of the PIA is the Kurrajong Plain group. The associated urban capability of this soil landscape is considered good with this landscape only being subject to occasional flooding and minor stream bank erosion which can cause difficulties for road and foundation building. The adjacent industrial land is also of the same soil landscape as well as land around Gumly Gumly and other industrial land fronting Copland Street through to Kooringal Road. However, as this site is elevated in comparison to the surrounding land it is unlikely that it would be affected by the nominated limitations.

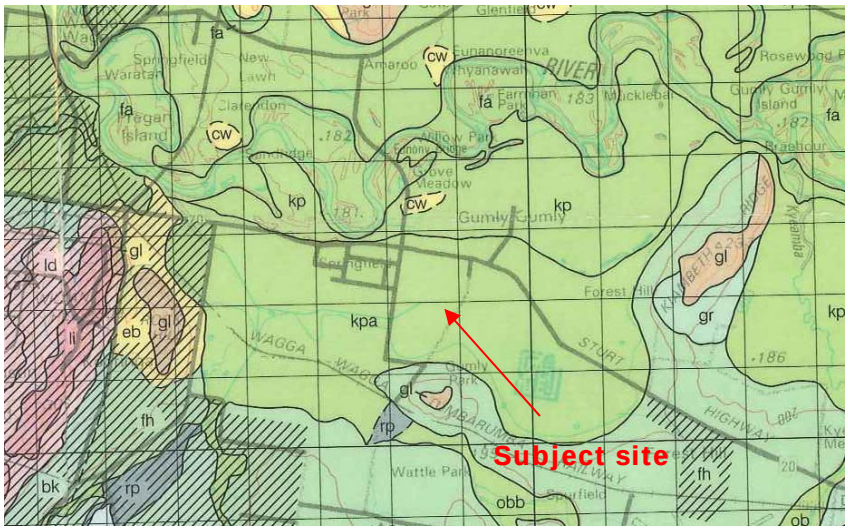


Figure 9 Soil landscapes of site and surrounds

2.6.1 Topography

The landscape of the Kurrajong Plain Group is described as extensive level plain of higher Murrumbidgee River Floodplain. Local relief is mostly <2m and slope gradients are <1%.

Specific to this site, there is a 180m AHD contour which runs parallel with the riverbank. The land slopes towards the river quite steeply from this point with a minimal drop in the southerly direction away from the river into the site. Overall, the site is elevated in comparison to the surrounding land and does not experience flooding as recorded by Council. In comparison to other industrial land in the vicinity this site is more suitable due to its elevated topography and absence of known flooding affectation.

2.6.2 Flooding

Wagga Wagga Council's Flood Precinct Map identifies the entire PIA as Rural Floodplain (High Flood Risk) as shown at Figure 10 below. This map has been derived from the WMA flood study that was carried out for the Council. WMA have confirmed that this study was based on broad modelling and a more site specific study would be required when considering change of zoning.

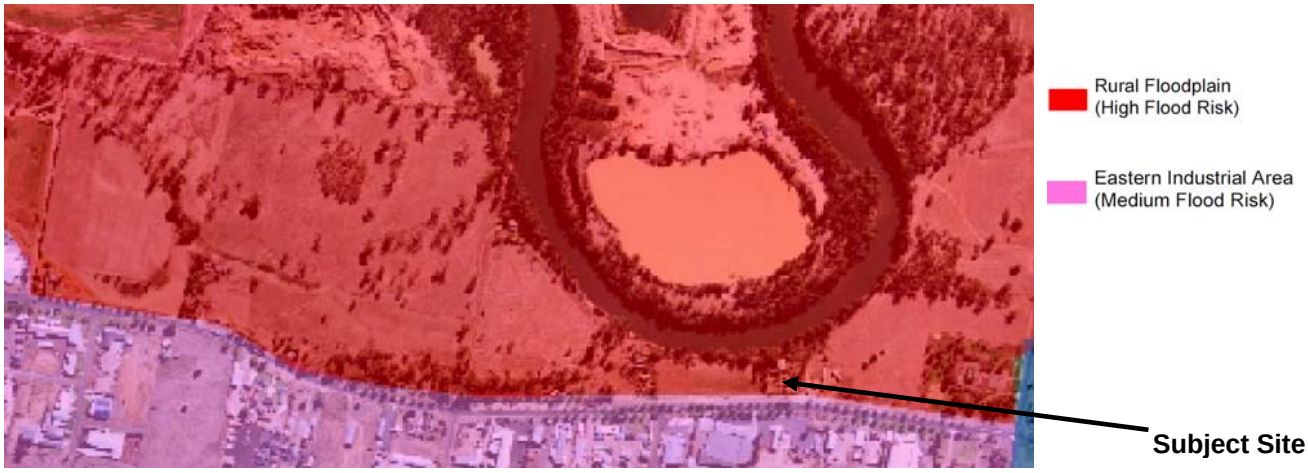


Figure 10 Wagga Wagga Flood Risk Precinct Map (Source: WWCC, 2011)

Figure 11 Aerial photo depicting the December 2010 Flood Event. Note -Our clients site and surrounds are above the flood waters

A Design Flood Information Report which covers the PIA has been prepared by WMA water and is provided at **Appendix C**. A 2D hydraulic model prepared for Wagga Wagga City Council by WMA water was used to assess both a 1% AEP (1in 100 year) and 5% AEP (1in 20 year) scenario. The findings from this assessment are as follows:

- During a flood event, water levels in the river are expected to first spill from the river near to Abbey Lake west of the site, and downstream of Eunony Bridge Road to the east. Out of bank flows then spread to fill the areas of lower lying land between these breakout points before spreading southwards surrounding the site.
- A majority of the western side of the PIA is High Hazard Flood Area and is therefore unsuitable for industrial/commercial land uses.
- The subject site would remain dry during a 5% AEP event. Flood free access would remain available to Hammond Avenue/Sturt Highway to the east and Tasman Road and Barkers Lane to the south.
- The subject site remains dry during a 1% AEP event but the surrounding lands become inundated causing the site to become an island. During a 1% AEP all access to the site would be cut 56 hours after

the gauge height reaches 7.5m and would remain isolated for around 60 hours. Access to the Sturt Highway would be likely to become available approximately 120 hours after the gauge height has reached 7.5m and flood waters have peaked and receded.

- The site could be included in the Eastern Industrial (Medium Flood Risk) Area if rezoned industrial and recommends that future floor levels allow a 500mm freeboard above the 5% AEP flood event in accordance with the NSW Floodplain Development Manual (NSW, 2005). Thus, floor levels for any development on the site should be at or above 181.75m AHD.
- Land adjoining the site to the east and west, as shown at Figure 1 of the Design Flood Information Report (**Appendix C**), has been identified as having similar flood risks to the subject site and may also be suitable for industrial/commercial uses.

The report concludes that although during a 1% AEP the subject site itself remains an island, access could be cut for a significant amount of time and therefore rezoning the site to a lower vulnerability use, such as for industrial purposes, could be appropriate considering the surrounding flood hazard.

The area of the PIA which is identified within the report as High Hazard Flood Area would not be suitable for uses which would support an increase in either residential or employment densities. At this point in time, the current rural zoning of this land is considered to be most appropriate. The land occupied by the hotel / motel is segregated from the area identified for development opportunities and it is also unsuited to the proposed zoning due to its current land use so this land has not been included as part of the rezoning.

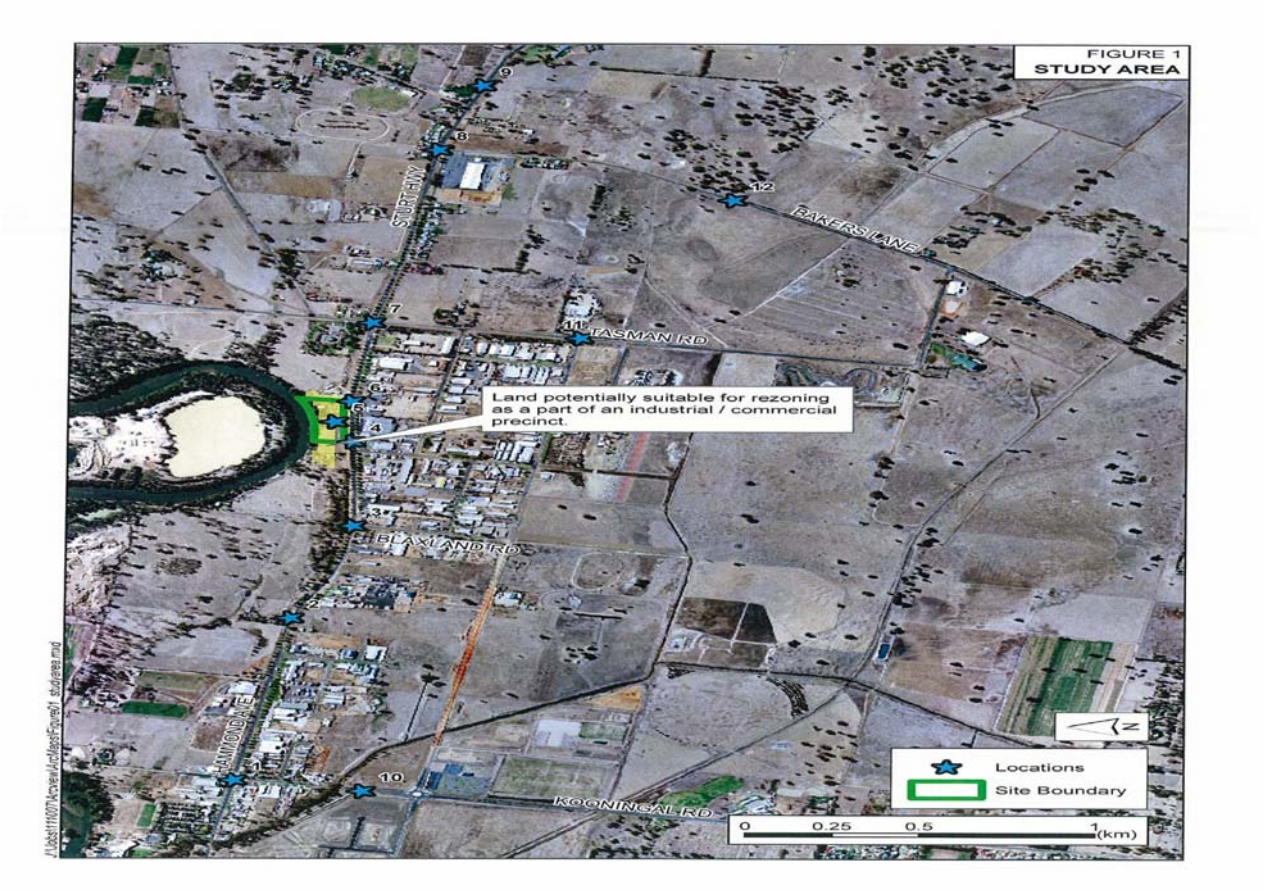


Figure 12 Extract plan from WMA Report revealing area of land suitable for rezoning in yellow

2.6.3 River Bank Stability

To fully understand the stability of the river bank and any potential migration, a Murrumbidgee Bank Condition Report has been prepared by Ken Page from Charles Sturt University. A copy of this report is provided at **Appendix D**, and is summarised below.

A survey on the property of Mr Joe Howard (Private Subdivision 164653) showed that:

- The bank at the outside bend of the Murrumbidgee River is unlikely to sustain more than 5 metres of lateral retreat during the next century.
- The bank is steep but occurs on a gently curving bend, is well vegetated and underlain for the most part by cohesive fine-grained alluvium.
- Comparisons of the bank top location in April 1971 with its present position indicate an erosion rate of less than 4 cm per year. This is at the lower end of long term estimates of Murrumbidgee cut bank retreat based on radiocarbon and optical luminescence dating.
- The most vulnerable part of the bank is the top section comprising about 4 m of windblown dune sand. This unit is above the reach of all but the largest floods but could be subject to gully erosion during severe rain storms or damage from recreational activities such as trail bike riding.

To minimise potential bank retreat the report recommends that a fenced and well-vegetated buffer zone not less than 10m wide be established to protect the sandy bank top. These recommendations could be included as a DCP control or as a condition of any future development consent for the site.

The findings from this bank stability report (BSR) have been peer reviewed and are supported by WMA water (**Appendix E**). The main comments are extracted as follows:

- The report acknowledges that the author of the BSR is suitability qualified to make recommendations regarding bank erosion.
- The report confirms the dune and property heights presented in the BSR.
- The report confirms the flood free status up to 1:100 year event as assumed in the BSR.
- The report generally agrees with the lateral channel migration suggested in the BSR.
- The report suggests consideration of the December 2010 event to confirm no additional erosion occurred following that event. (It is suggested that this could take place post gateway approval of this proposal as a further study).
- The report supports the conclusions of the BSR in terms of distances claimed for bend migration assessment.
- The report supports the management options presented in the BSR as reasonable.

2.6.4 Agricultural Capability

The following figure shows the agricultural land suitability for the site.

Figure 13 Agricultural land suitability

The subject site and PIA is classified as Prime Cropping Land, class 2. However, the land located to the south of the site is also classed as prime cropping land and this is zoned IN1 – General Industrial and is used for industrial purposes. This proposal does not propose a threat to agricultural activities because the area within the PIA that is free from flooding constraints:

- is not of a sufficient area to support rural uses
- is predominantly located within an urban environment
- is not currently being used for active agricultural activities

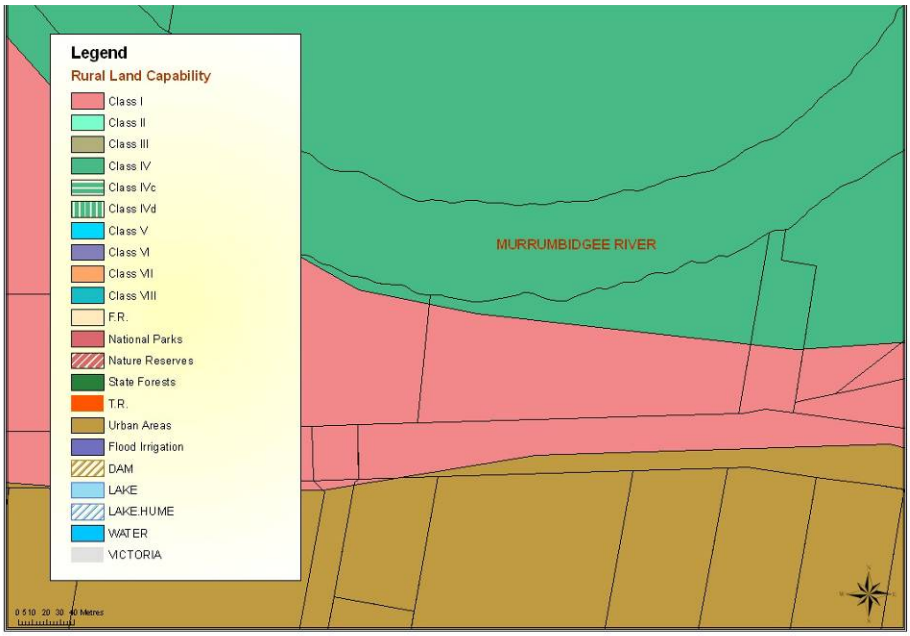


Figure 14 Rural Land Capability Classes

The rural land capability class of the subject land is made up of class 1 on the southern section of the land and class 4 on the northern/north-eastern section of the land. Land in class 1 is generally suitable for agricultural pursuits; however, similarly classified land in the vicinity of this proposal is currently being used for non agricultural pursuits of a similar nature to that being proposed for this land.

2.6.5 Bushfire

The subject site is classed as vegetation category 1 and is therefore bushfire prone, as shown in **Figure 15** below.

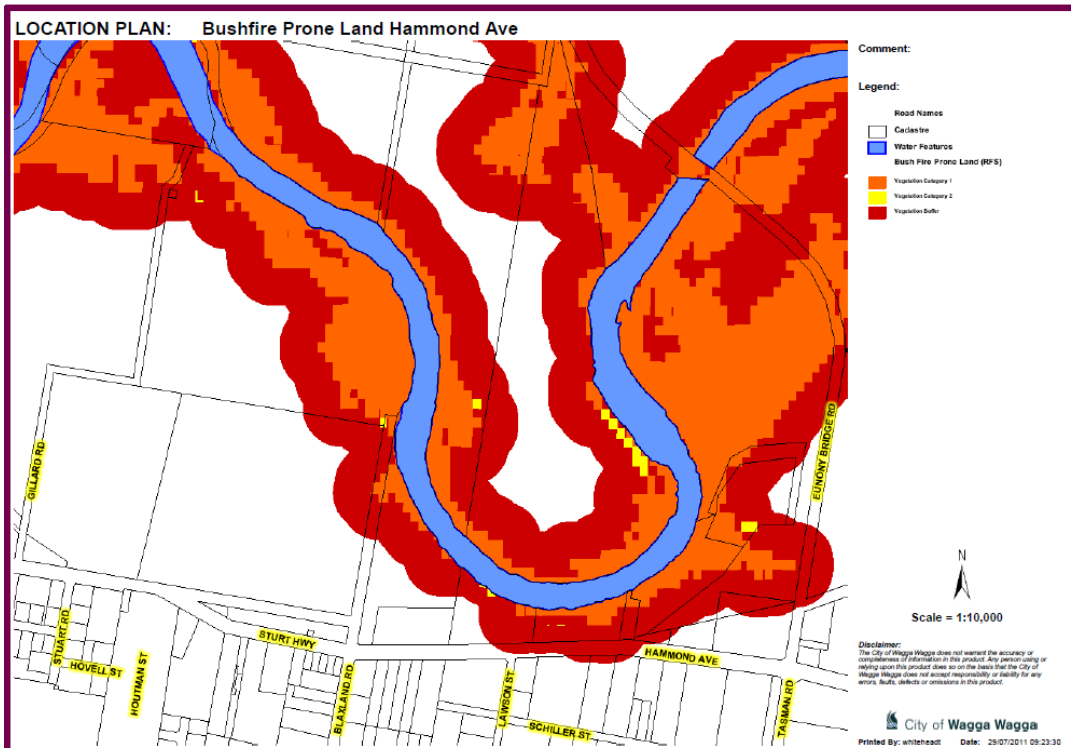


Figure 15 Bushfire Map. Red vegetation buffer, yellow Vegetation category 2 and orange vegetation category 1

Although the whole site is shown as being bushfire prone, it should be noted that the site, on the whole is not heavily vegetated. The vegetation on the site is restricted to a 5m to 10m wide buffer zone along the river bank.

Some commercial and Industrial developments (buildings of Class 5-8 and 10B of the BCA) on bush fire prone land will need to comply with the aims and objectives of Planning for Bushfire Protection 2006 (NSW Rural Fire Service publication) in relation to matters such as access, water and services, defendable space, emergency planning and landscaping/vegetation management.

The land is therefore suitable for rezoning, however, some forms of development mentioned above will have to consider and plan for adequate bushfire protection.

2.6.6 Native Vegetation

The northern portion of the site adjacent to the river is heavily vegetated, and forms the riparian zone which runs parallel to the Murrumbidgee River and extends approximately 5 to 10 metres. The riparian zone consists of weedy shrubs amongst the native vegetation. This area has been fenced off.

Other parts of the site, particularly within the eastern portion surrounding the house, comprise mature Blakely's Red Gum (Eucalyptus blakelyi) and Wattle species including seven mature wattles which are

located closely to each other on the western boundary of the site. The subject land contains no Eucalyptus blakelyi seedlings and very few wattle seedlings.

The remainder of the site has been cleared and consists of a variety of grass species.

Figure 16 Vegetation located adjacent to the Murrumbidgee River on the site.

2.6.7 Environmental Recommendation

Environmental analysis of the PIA supports the rezoning proposal for the following reasons:

- Geology, soils, land capability, topography and agricultural suitability of the precinct is conducive to agricultural activities; however, site area would not support a viable agricultural venture. These environmental conditions of the PIA are also suitable for industrial land use activities.
- Flooding analysis has identified lands that are flood free including in a 1 in 100 year event and are suitable for industrial development. Also, due to the situation of the land becoming isolated in major flood events, it would be appropriate to remove existing residential land use activities from the area.
- Bank stability can be adequately managed with a buffer zone to protect and enhance vegetation on the banks of the river. This will have the dual positive impact of enhancing endemic species along the river bank.
- The portion of the PIA that is suitable for rezoning is bushfire prone. The rezoning will result in the removal of dwellings from this precinct and some forms of industrial development will have to consider planning for bushfire protection.

3.0 Part 1 – Objectives or Intended Outcome

From the preceding PIA analysis the intended outcome of the Planning Proposal and Local Environmental Plan (LEP) is to rezone the identified suitable land, including our client's site, to allow industrial uses in accordance with section 55(2) of the Environmental Planning and Assessment Act 1979 (EP & A Act).

The intended outcome will enable the gazettal of the LEP as an amendment to Wagga Wagga Local Environmental Plan 2010.

3.1.1 Appropriate Zone

There are three types of industrial zones within the Standard Instrument – Principle LEP which each have different objectives, uses permissible with consent, and uses that are prohibited. The Wagga Wagga LEP 2010 does not include any land that is zoned IN3 Heavy Industrial and the IN1 and IN2 zones allow additional permissible and prohibited uses to those listed in the Standard Instrument LEP. The IN1 zone within the Wagga Wagga LEP 2010 and the IN3 zone within the Standard Instrument LEP allow industrial uses which have the potential to create more environmental impacts. These include general industries, hazardous storage establishments, heavy industries, and offensive storage establishments, which would not be suitable for the subject site considering the proximity of the site to adjacent dwellings and the Murrumbidgee River.

Rather, it is considered appropriate to zone the subject site and a portion of the PIA IN2 Light Industrial which prohibits heavy industrial storage establishments, heavy industries and offensive storage establishments, but supports light industrial and supporting uses, including:

- depots,
- light industries,
- neighbourhood shops,
- take away food and drink premises, and
- warehouse or distribution centres.

Future development would need to be consistent with the objectives of the IN2 Light Industrial zoning, which are:

- to provide a wide range of light industrial, warehouse and related land uses,
- to encourage employment opportunities and to support the viability of centres,
- to minimise any adverse effect of industry on other land uses, and
- to enable other land uses that provides facilities or services to meet the day to day needs of workers in the area.

A copy of the proposed zoning plan is provided at **Appendix A**.

4.0 Part 2 – Explanation of Provisions

The provisions to be included in the proposed LEP are outlined below, in accordance with section 55(2) of the Environmental Planning and Assessment Act 1979 (EP & A Act).

1 Name of plan

This plan is *Wagga Wagga Local Environment Plan 2010* (Amendment No. TBC).

2 Aims of the plan

This plan aims to amend *Wagga Wagga Local Environmental Plan 2010* to zone the land to which this plan applies as follows:

(a) To rezone the land to which this plan applies to Zone IN2 Light Industrial.

(b) To ensure any development on that land incorporates the principles associated with ecologically sustainable development in its planning and design.

(c) To ensure that any development on that land is in accordance with the relevant objectives of the zone to which it relates.

3 Land to which this plan applies

This plan applies to the land shown edged heavy red on the Proposed Zoning Plan contained in **Appendix A**.

5.0 Part 3 – Justification

5.1 Section A – Need for the Planning Proposal

5.1.1 Is the Planning Proposal a result of any strategic study or report?

The Planning Proposal is a response to numerous strategies and studies which have been prepared for land within the local and surrounding area, such as:

- State Government Policy to grow regional NSW.
- Vision 21 Land Use Strategy
- Wagga Wagga Industrial Land Use Study 2006
- Spatial Plan 2008
- Copland Street/Highway/Tasman Road Precinct Land Use Study
- Wagga Wagga Local Environmental Study 2008 (Willana and Associates)
- Submission prepared by Lennon Salvestro Planning to the Wagga Wagga LEP 2010 that was submitted to Council, and the response that was received from the Wagga Wagga Planning Panel.
- Market Needs Assessment prepared by Macroplan

State Government Policy

The state government has released a contract with NSW within which they pledge to rebuild the NSW economy including the creation of 40,000 jobs in regional NSW.

The NSW department of Trade and Investment has established an Enterprising Regions Program to assist community and regional development organisations to undertake planning activities and implement projects which have broad-based local support and the potential to generate economic benefits. Under this plan, funding is available for industry development strategies, preparation of masterplans, and employment land strategies, amongst other things.

In August 2010 the state government released a Regional Business Growth Plan for the Riverina Region. An identified strategy within this plan is “planning and employment lands”, where initiatives are being developed to ensure employments lands are available and needs and gaps are identified. The strategy aims to ensure that there are enough employment lands for current and future developments.

Due to the recent change in government, the above growth plan is currently being reviewed and the 2021 state plan is due to be released with the budget in September. Although the contents of this plan are not known, the rezoning of the subject site will facilitate the state government’s commitment to growing regional NSW and will contribute to the supply of employment lands within Wagga Wagga.

Vision 21 Land Use Strategy

The purpose of the Vision 21 document was to examine the constraints, issues and options for Wagga Wagga in regard to urban development and the changing social, environmental, and economic factors facing the community. Its preparation began in the late 1990s.

The Strategy includes a section titled Employment lands. This section makes reference to the Wagga Wagga Industrial Land Use Study 2006 which was completed at a similar time to the strategy.

Wagga Wagga Industrial Land Use Study 2006

The Wagga Wagga Industrial Land Use Study was completed in 2006 by Hill PDA. It considers industrial land use demand on a city wide basis, however, supply options surveyed were limited to a number of sites which had been nominated by Council which raises the possibility that other sites could exist which could satisfy requirements and meet anticipated demand just as adequately as those nominated for the study.

Council determined to prepare the study for a number of reasons, including:

- The existing land bank for small lot development and light industry is limited and much of it is subject to flooding from the Murrumbidgee River
- The existing industrial land bank for lots between 2 and 5 hectares is also limited and much of it is subject to flooding
- The existing land bank for large multi-hectare sites is not compatible to some industries due to the undulating landform
- The Council does not have a comprehensive strategy for the provision of industrial lands beyond those existing
- The Council wishes to support local industry and attract new employment generators to strengthen the local and regional economy

The Industrial Land Use study forecasts demand for industrial land up to 2016. Based on average take up rates of 4–5 hectares per annum over the past 25 to 30 years for the “east-end” and Bomen, it is expected that 176 ha of industrial land will be required in 2016, an increase from 161.2ha in 2011.

The Industrial Land Use study suggests that, although there appears to be a 15 year surplus of land, much of this is constrained by being owner–occupied, limited through environmental factors including topography, and vacant or underused land to the east of the city (adjoining the subject site) being owned by private owners who may not want to develop their land. The subject site is in private ownership with the owner wishing to develop the site.

The study identified a number of trends, the following of which can be related to the subject site and the planning proposal:

- Economic globalisation and the increasing trend towards greater flexibility in location choice, with firms requiring large sites for consolidation of previously fragmented activities.
- An increase in the development of economic gateways through which commodities are exchanged between regions.
- Increasing reliance on transport efficiencies and a growing number of industries seeking proximity to transport nodes.
- The relocation of traditional industries from Sydney to an increase in the number of business parks in regional centres.

Economic globalisation and the requirement for larger sites is evidenced in Wagga Wagga by companies such as John Deer and Hutcheon and Pearce, which are agricultural-based sales businesses, wanting to relocate to larger more high profile sites to create a regional head office style presence in the city.

The gateways for commodities relates more to the clustering of primary industries and value adding industries in precincts such as Bomen; however, by releasing some other industrial land on highway frontage locations, other industry clusters can still be supported.

The subject site is on an unrestricted B Double route which also allows for vehicles 4.5 metres in height. Being located on the highway with ready access for all types of vehicles gives this site an added advantage over other industrial areas in the city, and definitely provides proximity to transport nodes such the highway and airport, and ready access to other industrial areas for cross-pollination of services.

It is assumed that where industries are considering relocating out of metropolitan areas into regional areas they are likely to require sites with some profile to assist with becoming "known" within the region.

The subject site is in the vicinity of the area referred to as East Wagga Wagga in the study. The East Wagga Wagga area has been described as follows:

> *"East Wagga Wagga developed from the 1970s and some larger regional and national businesses located there in the 1980s. The area is predominately light industrial, transport and service, wholesaling and storage. On Sturt Highway there is some bulky goods retailing including a relatively new Harvey Norman centre. More recently there have been some quasi-commercial (office) uses establishing themselves in the area. Whilst there remains a considerable amount of undeveloped land, most of it is flood prone."*

The report further describes the area as enjoying a number of attributes including proximity and rapid travel times into the CBD and also the airport. It is along a major highway and major road and enjoys significant visual exposure between the CBD and airport.

Four alternative sites within close proximity to Wagga Wagga were proposed for possible future industrial use, as follows:

(1) **Copland Street South Side** – a 30 ha block, which is zoned industrial, generally flood free, the bulk of the site is in a single ownership, has minor potential land use conflicts, is close to the CBD, has existing infrastructure and is in close proximity to the airport. Strategy - suitable for small industrial parcels, light industry. Timing to be short term, providing around 5 years supply.

(2) **Sturt Highway North Side (Forest Hill)** – around 200 ha, generally flood free, close to airport, minor potential land use conflicts (little residential in area, opposite defence site), 15 minutes to CBD, requires rezoning. Strategy – requires further investigation. Timing to be medium term. Sizes ranging from 2000m2 to 20ha to large strata or community titled units.

(3) **Riverina Farm (Bomen)** – Approximately 100 ha, in single ownership – owners are currently seeking approval for masterplan of the site which includes a number of industrial parcels. Includes intermodal terminal. Strategy – timing is short term.

(4) **Elizabeth Avenue near the Airport** – on west side of Elizabeth Avenue, requires rezoning, around 400ha, excellent position close to airport, generally flood free, servicing likely to be inexpensive, building restrictions near airport, potential land use conflicts with residential areas of Forest Hill village. Strategy – requires further investigation. Timing to be medium term. Sizes ranging from 2000m2 to 20ha to large strata or community titled units.

Figure 17 shows the location of these sites.

Uranquinty has also been identified as a future industrial area; however it is 11km from Wagga Wagga so was considered less attractive than the other short listed sites.

In order to prevent the cost of industrial land rising too high, it was suggested that the supply be kept strong to hopefully maintain sufficient competition between multiple landowners, and thus keep prices lower than has been the case in the past few years where demand has exceeded supply.

This proposal supports the land use study as the proposed site is free from environmental constraints, is under single ownership, represents a logical extension to the industrial uses to the south of the site and is able to be developed in the short term.

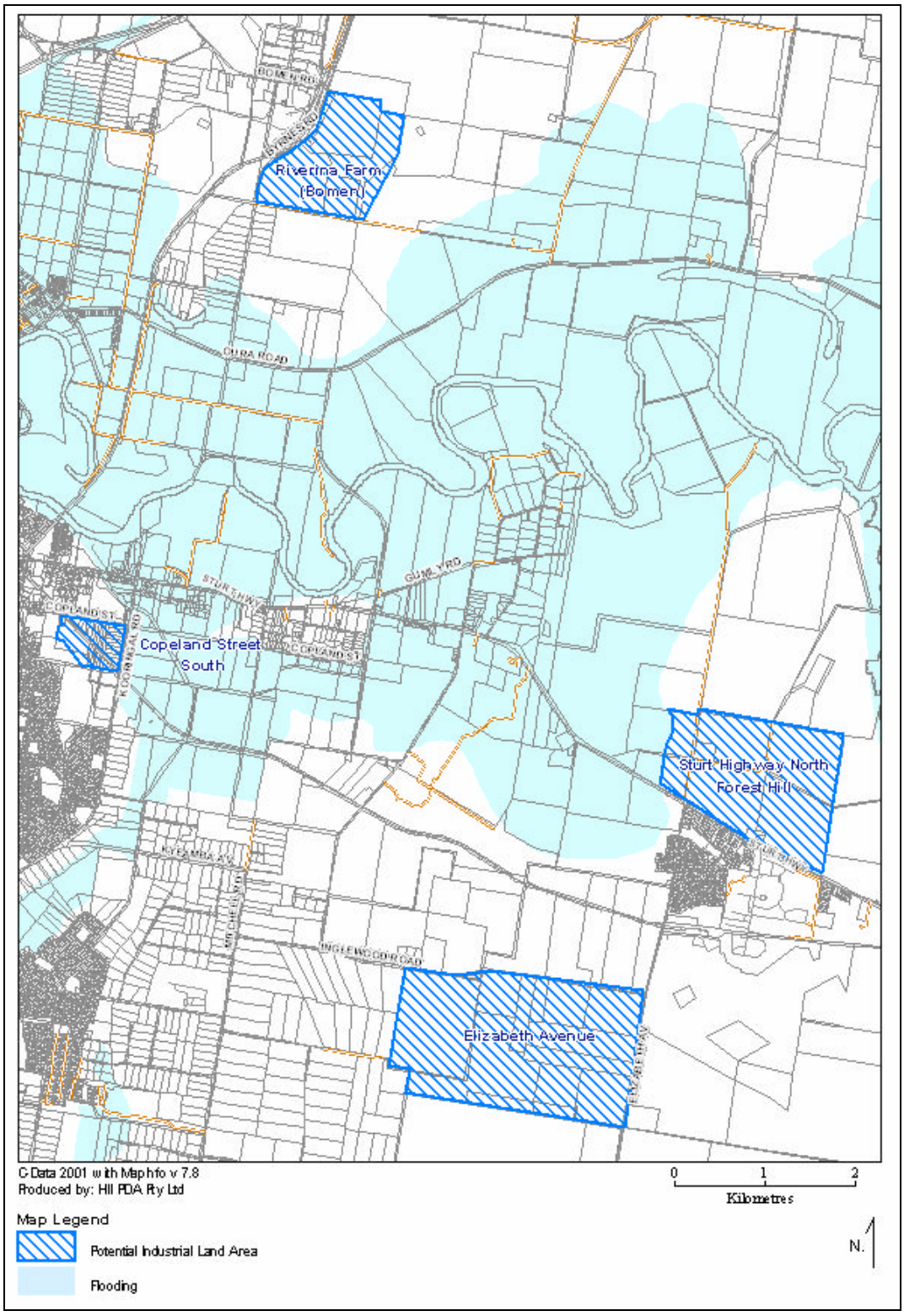


Figure 17 Location of sites nominated for investigation in the Wagga Wagga Industrial Lands Study

Spatial Plan 2008

The Wagga Wagga Spatial Plan maps out the key directions for the future development of Wagga Wagga, the villages and rural areas over the next 25 years or more. Section 2.6 of the spatial plan is devoted to discussion of industrial lands.

The existing land bank section suggests that of the available land within the city some of it suffers from serious constraints, either in terms of land ownership characteristics or environmental factors. The plan goes on to say that "vacant land with highway frontage is in demand, much of the land needs to be built up to meet flood constraints". The subject site falls into this category and is relatively elevated in terms of the precinct and does not require a great deal of additional elevation to support development free of flood hazard. The plan recognises that supply of industrial land must consider strategic clustering opportunities and the land requirements of particular industries.

Spatial Planning decisions arising from the study include:

(1) The formulation of an Industrial Lands Development Program which will ensure an adequate and timely supply for industrial land for the city, with a 15 year bank of land being included in the program and special opportunity sites being recognised and prepared for release. This will be achieved through the development of an Industrial Lands Register which will list and prioritise land suitable for industrial uses in the city. This proposal demonstrates the subject land is relatively unconstrained, suitable for industrial use, and can readily be developed. As such, it is requested that it be included in the spatial plan register as land to be developed for industrial use in the short to medium term.

(2) Link with Council's Acceler8 and WISDOM projects

(3) Identify Future Land Supply which will ensure sufficient supply of industrial land is available to meet the cities requirements. Nine areas have been nominated as options for possible future industrial zones. The nine areas are listed as :

    (a) Copland Street Southside (Council). Area - 30ha (approx)

    (b) Bomen Area – Larger study area is over 20km2

    (c) Riverina FARM (within Bomen). Area – 100ha (approx) undeveloped

    (d) Edison Road

    (e) Airport East. Area – 120ha (approx)

    (f) CSU and Biotech Precinct. Area – within CSU environs

    (g) Sturt Highway Northside. Area – 200ha (approx)

    (h) Elizabeth Avenue (near airport). Area – 400ha (approx)

    (i) Uranquinty/Kapooka area

(4) Advancing Serviced Land - A strategy for the timed release of industrial land in the future will be developed which will ensure the servicing of these lots is in place

(5) Clear rules and Investment Confidence Through Good Policy – using the standard instrument for development of LEPs to develop defined zones for industrial areas within the city

(6) Environmental and Amenity Outcomes

Wagga Wagga Local Environmental Study 2008 (Willana and Associates)

As a response to the Council's Spatial Plan and the Industrial Land Use Study, and as a supporting strategic document for the creation of a consolidated Local Environmental Plan, this Local Environmental Study was carried out to specifically address certain land use issues raised in previous studies and review a number of the sites nominated in those studies, as well as some new sites for suitability for development.

In terms of employment generating uses such as general or light industrial, the study confirmed the previous finding that there was a shortage of readily available larger blocks at competitive prices. The study also discussed the continued expansion of the transport, logistics and warehousing sectors and the likely increase in demand for industrial land in proximity to transport infrastructure. Manufacturing was also stated as an industry that had steady activity. The study focused on the Bomen industrial area as well as smaller sites in Copland Street, Hammond Avenue and Edison Road. The industrial sites that were studied and the outcomes of the investigation are presented in the following table.

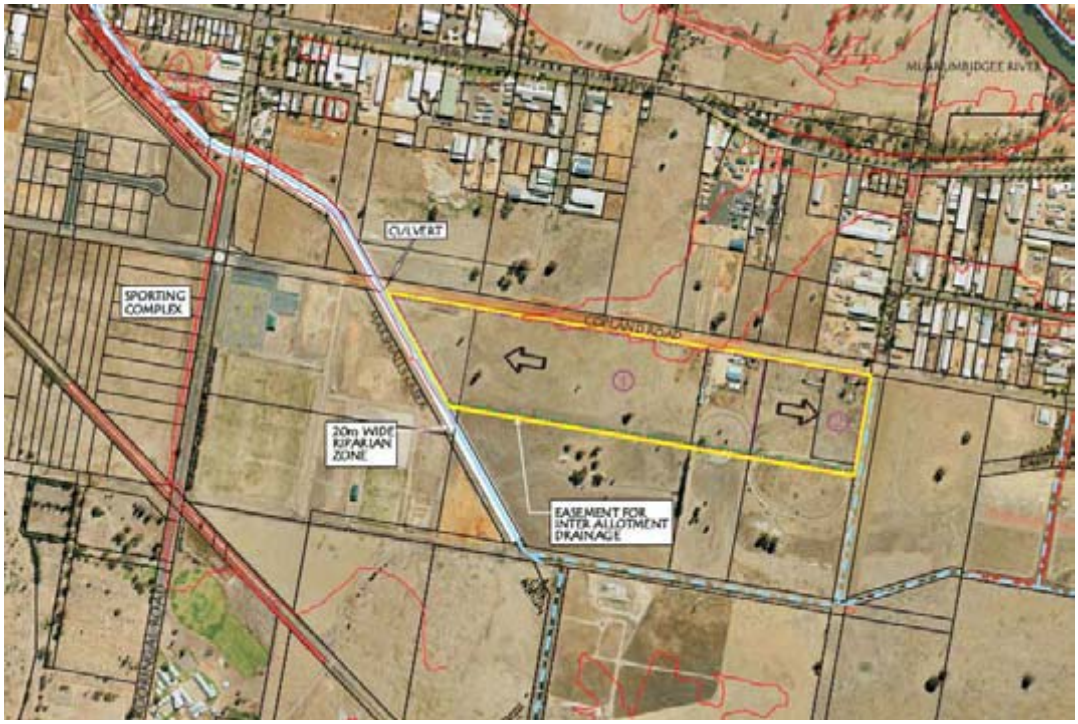


Figure 18 Copland Street Study Area

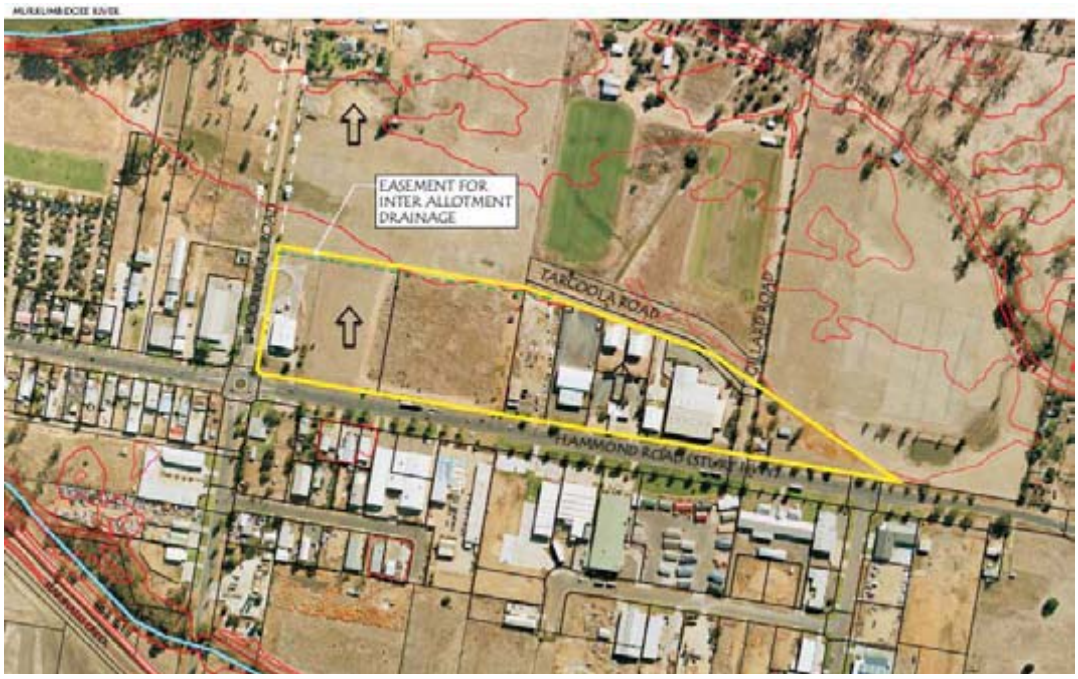


Figure 19 Hammond Ave Study Area: existing development to the east of the precinct

Figure 20 Edison Road site

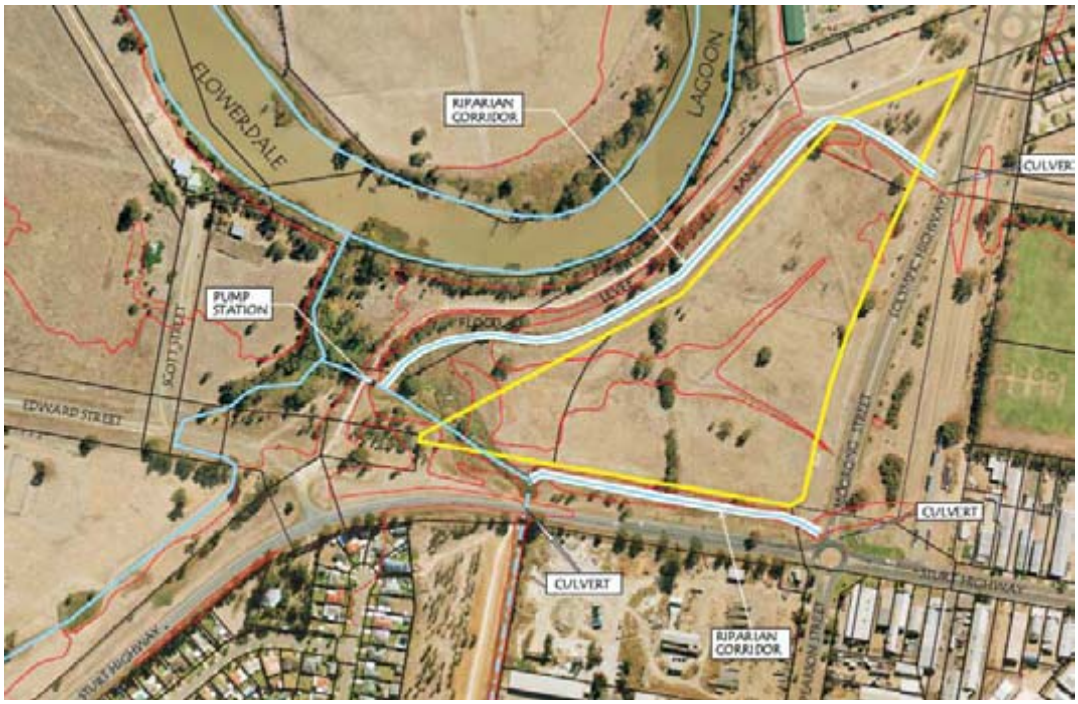


Figure 21 Moorong street site (located approximately 7km to the west of the PIA also on the Sturt Highway)

Table 2 Wagga Wagga LES 2008 study site attributes and outcomes

Site	Study Area (ha)	Attributes	Outcome	Comment
Bomen Industrial	3402	Large land mass Many background studies Proximity to rail line Opportunities for heavy, general and rural industry	Approximately 1700 ha of land has been rezoned for industrial purposes	Has historically attracted large manufacturing and agricultural style processing industries requiring large site areas and often internal buffer areas within sites to ensure compatibility with neighbours and the surrounding locality Push for intermodal terminal will foster freight dependant industries to develop in this location
Copland Street	47	Flood prone	Rezoned to IN2	Discussions with Council have

Site	Study Area (ha)	Attributes	Outcome	Comment
South			and part RE1	revealed that there has been no development interest in this site since it has been rezoned. Not highway frontage but within 2 km of the subject site.
Edison Road	23	Flood prone	Rezoned to IN2	Discussions with Council have revealed that there has been no development interest in this site since it has been rezoned. Not highway frontage but within 2 km of the subject site.
Hammond Ave North	16	Flood prone	Rezoned to IN2	A large portion of the site is already developed and the new zone is just reflective of existing uses. Of the remaining vacant land a large percentage of the residue is now the subject of a "Masters" bulky goods development proposal. Perhaps only 4 ha remain for development. Noted that a

Site	Study Area (ha)	Attributes	Outcome	Comment
				notable sized development has been proposed quickly on the highway frontage land compared with other sites. Within 1 km of the subject site.
Moorong Street	10	Flood Prone Site currently acts as a detention basin in storm events inside the city's levee system.	Further investigation required	

The table below provides a comparison between the above sites and the proposed PIA.

Table 3 PIA attributes and proposed outcome

Site	Study Area	Proposed Outcome	Comments
622 Hammond Ave and PIA	4 ha NB: Area remaining once constrained land has been removed	Rezone the site and surrounding flood free land to IN2 light industry	Highway Frontage Totally Flood Free Remove existing sensitive residential uses. Will allow clustering of like industrial uses with similar needs to congregate. The site is well suited to transport related industry or equally as a warehouse showroom use. A number of large agricultural machinery sales businesses have expressed interest for highway frontage relocation of their businesses.

Submission prepared by Lennon Salvestro Planning to the Wagga Wagga LEP 2010 that was submitted to Council and the response that was received from the Wagga Wagga Planning Panel.

The submission to the draft LEP in 2009 compared the subject site to the other sites in the vicinity that the council was considering at the time to rezone. The distinctive factor expressed was that the subject site, while similar in characteristics and qualities (topography, location, access etc) to the other sites, was also outside of the 1:100 year flood plain. The vast majority of existing and proposed industrial sites within the area were flood prone.

The Council's consideration of this report and the response received back from the Wagga Wagga Planning Panel are detailed at Section 1.2 above, but essentially while there was merit to the proposal the panel considered that some issues such as river bank stability and sewer capability needed further survey.

Market Needs Assessment prepared by Macroplan

MacroPlan Australia was commissioned on behalf of the proponent of this Planning Proposal to assess the market needs of the area in respect of a site within the adjacent suburb of Gumly Gumly. This assessment included a review Wagga Wagga Industrial Land Study and is relevant to the subject site due to it's proximity to the Gumly Gumly site approximately 1km away.

The assessment identified that there is a very limited supply of short to medium term industrial land and a risk of a 'gap' in the supply of suitable industrial land which could potentially stagnate the growth of some industry sectors within Wagga Wagga and result in leakage of investment and employment, as well as ensuring industrial land prices remain competitive.

It indicated that lands that were relatively free from landownership, servicing, and environmental constraints, and that would be readily developed for industrial uses, could:

- fulfil an important short term need for Wagga Wagga by satisfying 2-3 years worth of growth (based upon take up rates of 8-10 ha per year)
- free up room in other industrial land precincts which may have limited short to medium term supply, and
- allow other precincts to intensify development according to their existing profiles (e.g. bulky precincts, auto-motive repairs, food & beverage manufacturing, agri-business or transport and distribution)

Macroplan discussed the clustering of sub industries and that highway frontage land is attractive for the following types of industry:

- warehouse/showroom activities
- agricultural and farm machinery sales and service
- transport related industries

The report considered that although ample land across the local government area was likely to be rezoned for industrial purposes, the location of these land parcels may not actually suit the sub industries and therefore gaps in supply of appropriate land may still exist even if net supply appears adequate in terms of land area.

5.1.2 Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The proposal seeks to employ a zoning which allows a range of uses compatible with light industrial development across the site. Alternatively, the use of an enabling clause, such as Schedule 1 of *Wagga Wagga Local Environmental Plan 2010*, which permits a use that would normally be prohibited within the zone, could be used to allow a specified use such as warehouse and storage facility. However, this type of amendment to the LEP would not provide flexibility for different types of uses compatible with light industrial uses over time, and therefore would not promote the orderly and economic use of the site.

5.1.3 Is there a net community benefit?

The Department of Planning Guidelines (July 2009) includes the following advice in relation to the net community benefit assessment:

- The assessment should only evaluate the external costs and benefits of the proposal (i.e. the externalities).
- Consideration must be given to changes that reflect a higher community benefit.
- The proposal should be assessed against the matters specified in the justification. The Assessment should evaluate the proposal against a base case or base cases including retaining the existing zoning on the land.
- The Draft Centres Policy includes guidance on conducting a Net Community Benefit Test that should be followed when assessing the net community benefit of a Planning Proposal. This guidance has been reproduced in the Department of Planning's Guidelines but adapted to suit all types of Planning Proposals.
- Due to the difficulty in assigning values to certain costs and benefits associated with Planning Proposals, the Net Community Benefit Test will not be a purely quantitative test.

As outlined below the overall community benefit from the rezoning would be positive as future development of the land for light industrial purposes will improve opportunities for employment and provide services to the public in close proximity to the city of Wagga Wagga.

The area of East Wagga Wagga is reasonably well serviced, as discussed in Section 2.4. The development is not of a scale that is likely to place unreasonable demand on existing services whilst accommodating the demand for industrial land in the locality. Water, telecommunications, and electricity services are available to the site. Gas, sewerage and drainage services are available at Lawson Street within close proximity to the site and would be extended by the developer of the land. Any necessary traffic upgrades to Hammond Avenue to facilitate safe access and egress from the site would be provided by the developer; however, any upgrade is anticipated to be minor as future traffic to the site would likely be restricted to a single access point with a left in/ left out arrangement.

As discussed at Section 1.2, consideration has been given to other uses which may contribute to a higher community benefit such as including a portion of the site along the northern boundary as E2 Environmental Conservation. Prior to the gazettal of the current WWLEP 2010, Council advised that although mapped 7a Environmental Protection – Riparian Area (Urban Living Area) under the 1995 LEP, this was merely an identification of land in close proximity to the river, but did not necessarily determine that the site has significant ecological value.

The construction and building works associated with future development of the site will also provide temporary employment opportunities. Rezoning of the land will facilitate an orderly extension of industrial land within East Wagga Wagga and the proposal will address a genuine need for additional industrial land identified in the Wagga Wagga Industrial Landuse Study.

In terms of base case, maintaining the existing rural zoning would not represent the best use of the land. This is a predominately due to the area of the site not being of sufficient area to support rural land uses and is the predominate reason why the site has not been used for agricultural purposes for at least the last 20 years.

Some community benefit would result from the removal of a dwelling from an area that will become isolated during a flood event.

Overall the proposal will result in numerous community benefits, and external costs are expected to be minor or negligible.

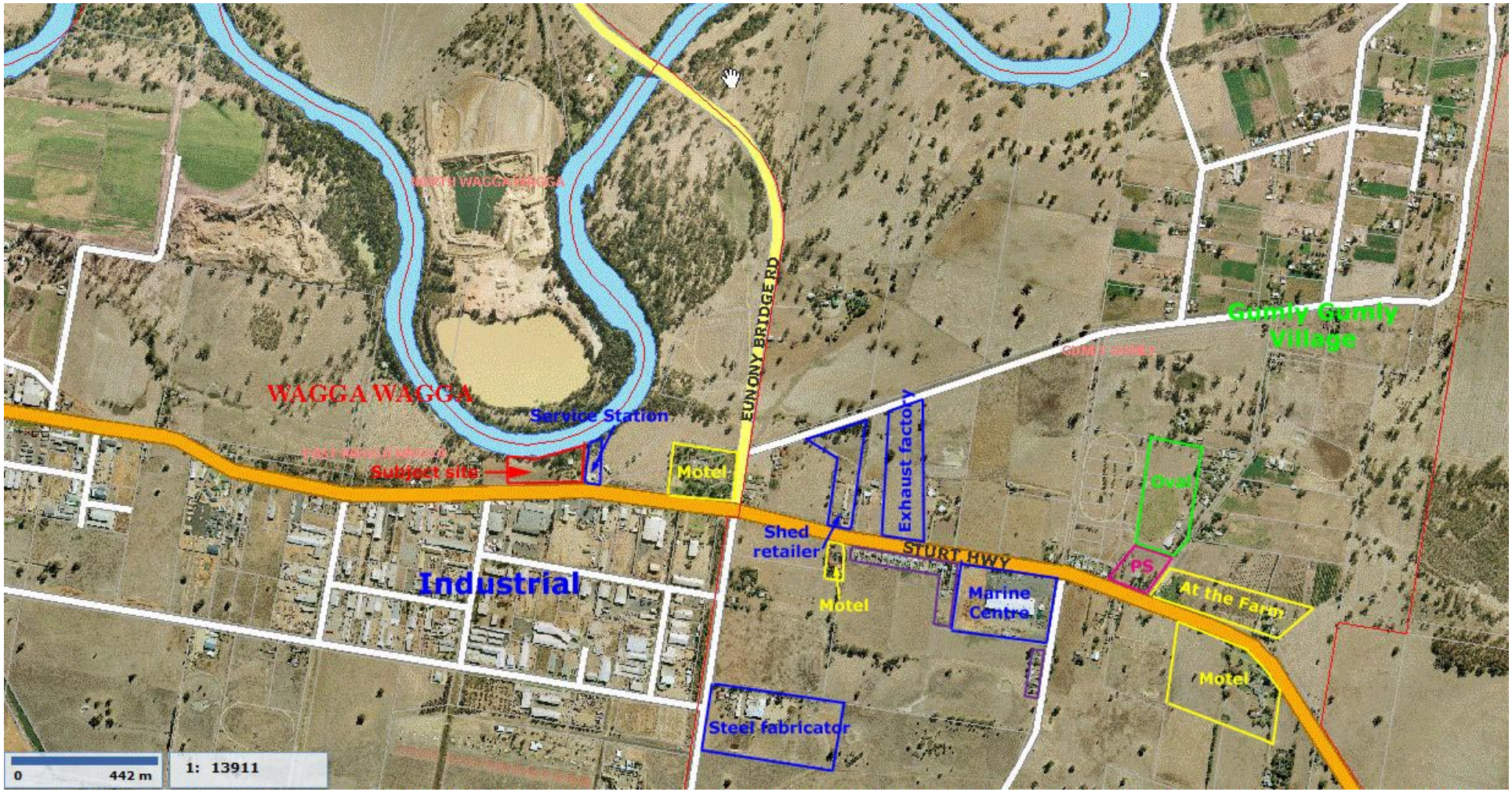


Figure 22 Land use survey of area around subject site. Note exhaust factory although an approved development did not proceed.

5.2 Section B – Relationship to strategic planning framework

5.2.1 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

There are no regional or sub-regional strategies that are relevant to the site; however, rezoning of the site will ensure short term supply of employment lands which is consistent with the state government's election pledge to support regional growth and employment.

5.2.2 Is the planning proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

There are numerous local strategic plans and studies that are relevant to the proposal. The relevance of these plans to the site and the proposal has been discussed at **Section 5.1.1**. The most relevant study to this proposal, which underpinned the Spatial Plan 2008, is Wagga Wagga's Industrial Land Use study prepared by Hill PDA. A review of this study by Macroplan reports that this study is general in terms of demand but targeted in terms of supply, that is, only specific sites were reviewed rather than a city wide review. The Macroplan report suggests that other suitable unconstrained land, such as the subject site, could be developed to reduce the risk of a 'gap' in the supply of suitable industrial land, particularly in the short to medium term. This would support Council's strategic objectives and ensure that growth within Wagga Wagga is not constrained by a lack of supply of industrial land.

Another point raised in the macroplan peer review is the concept that different industrial precincts often attract industry groupings or clustering of like or inter-dependant industries. The subject site and PIA exists in a precinct that includes transport, showroom and agricultural sales type uses and there has been strong inquiry from similar businesses to move into the area.

The planning proposal supports consistent flood plain management and protection of life and property by the proposed outcome that will result in the removal of dwellings from land that becomes isolated during major flood events

As discussed at **Section 5.1.1**, due to the subject site's availability and suitability for industrial use in the short to mid term, it is requested that it be included in any future Industrial Lands Development Register which is referred to in Wagga Wagga's Spatial Plan 2008.

5.2.3 Is the planning proposal consistent with applicable state environmental planning policies?

The following state environmental planning policies (SEPPs) apply to the site:

- State Environmental Planning Policy (Rural Lands) 2008
- State Environmental Planning Policy 44 – Koala Habitat
- State Environmental Planning Policy 55 – Remediation of Land

The proposal's relevance to and consistency with these SEPPs is discussed below.

State Environmental Planning Policy (Rural Lands) 2008

The aim of this policy is to facilitate the orderly and economic use and development of rural lands for rural and related purposes. It applies mainly to rural subdivision and the development of dwellings on rural land but also contains rural planning principles that are relevant to this proposal. These are as follows:

Clause 7 Rural Planning Principles

The relevant rural planning principles are listed and addressed below.

- The promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas,
- Recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State,
- Recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development,
- In planning for rural lands, to balance the social, economic and environmental interests of the community,
- The identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land,
- Ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.

Comment

As discussed at Section 2.6.3, the subject site is classified as Prime Cropping Land, class 2 and is directly adjacent to land also classed as Prime Cropping Land but zoned IN1 – General Industrial which is currently used for industrial purposes. This proposal does not propose a threat to agricultural activities as the site:

- is not of a sufficient area to support rural uses,
- is predominantly located within an urban environment, and
- is not being used for active agricultural activities.

The location of the site between the Murrumbidgee River and other industrial zoned land represents a logical extension of urban land without causing fragmentation of rural land or resulting in any land use issues.

In terms of the protection of native vegetation, the 5 to 10 metre wide riparian zone associated with the Murrumbidgee River which is located on the site consists of weedy shrubs amongst native vegetation including mature Blakely's Red Gum (Eucalyptus blakelyi) and Wattle species. As discussed at Section 1.2, consideration has been given to including this area of the site along the northern boundary as E2 Environmental Conservation. Prior to the gazettal of the current WWLEP 2010, Council advised that although mapped 7a Environmental Protection – Riparian Area (Urban Living Area) under the 1995 LEP, this was merely an identification of land in close proximity to the river but did not necessarily determine that the site has significant ecological values. Accordingly, this area of land was not included as environmental protection under the recently gazetted LEP. The Murrumbidgee Bank Condition Report which has been prepared by Ken Page from the Charles Sturt University (**Appendix D**) recommends that a fenced and well-vegetated buffer zone not less than 10 m wide be established to protect the sandy bank top. These recommendations could be included as a DCP control or as a condition of any future development consent for the site and would ensure that this area remains vegetated and free from development.

The proposal will provide additional employment land close to the town centre of Wagga Wagga which will have ongoing economic and social benefits.

The proposal supports Wagga Wagga's Industrial Land Use Study 2006 as it is free from environmental constraints, is under single ownership, represents a logical extension to the industrial uses to the south of the site and is able to be developed in the short term.

State Environmental Planning Policy 44 – Koala Habitat

This SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas. For the preparation of draft LEP's, the Director of Planning and Infrastructure will consider giving a direction that Section 57 and the EP&A Act is to apply to a draft local environmental plan. This means an environmental study is to be prepared if, under the draft plan, it is proposed to zone (or rezone) land that is a potential koala habitat or a core koala habitat otherwise than as environment protection.

The site is predominately cleared with vegetation being mainly located within a 5 to 10 metre wide riparian zone at the north of the site. We are not aware of any trees being located on the site which may constitute potential koala habitat and we are also not aware of any koalas being sighted on the property. The Council's threatened species layer dos not notify of the existence of any threatened species within the PIA therefore, the site is not likely to be potential or core koala habitat.

State Environmental Planning Policy 55 – Remediation of Land

This SEPP introduces planning controls for the remediation of contaminated land. The policy states that land must not be developed if contamination renders it unsuitable for a proposed use. If the land is unsuitable, remediation must take place before the land is developed.

The site has been used in the past for agricultural purposes which is listed within Table 1 of the *Managing Land Contamination Planning Guidelines, SEPP 55–Remediation of Land* as an activity which may cause contamination.

Local land use history relating to the site reveals that the land use activity for at least the last 20 years has included rural residential activity on the majority of land nominated as having industrial potential. It is highly unlikely that any activities such as ship dipping and other pesticide use would have occurred on these lots. To the east of this land is a disused service station site which would need to be properly decommissioned and have a preliminary contaminated land assessment carried out as part of any rezoning process post gateway approval.

The proposed IN2 Light Industrial zoning prohibits sensitive land uses such as residential, educational, recreational facilities (major) and childcare uses and therefore any potential contamination of the site would not be likely to preclude development of the site for those uses permitted in the IN2 zone in the future.

5.2.4 Is the planning proposal consistent with applicable Ministerial Directions (s117 directions)?

The Minister for Planning, under section 117(2) of the EP&A Act, issues directions that relevant planning authorities such as local councils must follow when preparing planning proposals for new LEPs. **Table 4** contains a response to each of the directions in relation to the Planning Proposal.

Table 4 Compliance with Section 117 Directions

Relevant S 117 direction	Response
1.1 Business and Industrial Zones	This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed business or industrial zone The objectives of this direction are to: *(a) encourage employment growth in suitable locations,* *(b) protect employment land in business and industrial zones, and* *(c) support the viability of identified strategic centres.* A planning proposal must: *(a) give effect to the objectives of this direction,* *(b) retain the areas and locations of existing business and industrial zones,* *(c) not reduce the total potential floor space area for employment uses and related public services in business zones,* *(d) not reduce the total potential floor space area for industrial uses in industrial zones, and* *(e) ensure that proposed new employment areas are in accordance with a strategy that is approved by the Director-General of the Department of Planning.*

Relevant S 117 direction	Response
	Comment The proposal involves the rezoning of currently underutilised rural land for low density employment uses which is compatible with the adjacent IN1 zoned land to the south. It will create an additional 2 hectares of industrial land which will assist Wagga Wagga Council to meet the anticipated demand of 176.0 ha by 2016 as identified in the Wagga Wagga Industrial Land Use Study 2006. The proposal represents a logical extension to an existing industrial area rather than a new employment area and removes sensitive receptors from adjacent agricultural and industrial uses. As discussed at Section 5.1.1 above, it is requested that any future Industrial Lands Development Register include the subject site as land to be developed in the short to medium term.
1.2 Rural Zones	This direction provides that a planning proposal must: *(a) not rezone land from a rural zone to a residential, business, industrial, village or tourist zone.* *(b) not contain provisions that will increase the permissible density of land within a rural zone (other than land within an existing town or village).* *The proposal may be inconsistent with this direction where it is justified by* *(a) a strategy which:* *(i) gives consideration to the objectives of this direction,* *(ii) identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and* *(iii) is approved by the Director-General of the Department of Planning, or* *(b) justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or* *(c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or* *(d) is of minor significance.* **Comment** The proposal is justified for the following reasons: ▪ The subject site and PIA exist within the urban area of Wagga Wagga which extends at least until Eunony Bridge Road and arguably further west until the Gumly Gumly village / locality. ▪ The Wagga Wagga Industrial Land Use Study 2006 prepared by Hill PDA considers the supply and demand of industrial land within Wagga Wagga and has been peer reviewed by Macroplan. The identified land within the PIA is appropriate for the stated purpose and can facilitate the outcomes sought by the study which is further justified by the Macroplan review. Hence this proposal is consistent with the objectives of this direction. ▪ The subject site is within the vicinity of the area referred to as East Wagga Wagga in the study. Land in the East Wagga Wagga area is described as *"predominately light industrial, transport and service, wholesaling and storage"*.

Relevant S 117 direction	Response
	▪ The objective of this direction is to protect the agricultural production value of rural land. The land is not of sufficient size for agricultural uses, is predominantly located within an urban environment and is not currently being used for active agricultural.
1.3 Mining, Petroleum Production and Extractive Industries	N/A
1.4 Oyster Aquaculture	N/A
1.5 Rural Lands	This direction requires that a planning proposal that will affect land within an existing or proposed rural or environmental protection zone be consistent with the SEPP (Rural Lands) 2008. The requirements of this direction have been discussed above in Section 5.2.3 and the proposal is found to have been consistent with this SEPP.
2.1 Environment Protection Zones	This direction requires that a planning proposal must include provisions that facilitate the protection and conservation of environmentally sensitive areas. Consideration has been given to rezoning the northern portion of the site which contains the riparian area, E2 Environmental Conservation. Prior to the gazettal of the current WWLEP 2010, Council advised that although mapped 7a Environmental Protection – Riparian Area (Urban Living Area) under the 1995 LEP, this was merely an identification of land in close proximity to the river but did not necessarily determine that the site has significant ecological values. Accordingly the current WWLEP 2010 does not zone any part of the site for environmental conservation. Notwithstanding, the Murrumbidgee Bank Condition Report which has been prepared for the site by Ken Page of the Charles Sturt University (**Appendix D**) recommends that a fenced and well-vegetated buffer zone not less than 10 m wide be established to protect the sandy bank top. These recommendations could be included as a DCP control or as a condition of any future development consent for the site and would ensure that this area remains vegetated and free from development.
2.2 Coastal Protection	N/A
2.3 Heritage Conservation	This direction requires that a planning proposal must contain provisions that facilitate the conservation of: (a) *items, places, buildings, works, relics, moveable objects or precincts of environmental heritage significance to an area, in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item, area, object or place, identified in a study of the environmental heritage of the area,* (b) *Aboriginal objects or Aboriginal places that are protected under the National Parks and Wildlife Act 1974, and* (c) *Aboriginal areas, Aboriginal objects, Aboriginal places or landscapes identified by an Aboriginal heritage survey prepared by or on behalf of an Aboriginal Land Council, Aboriginal body or public authority and provided to the relevant planning authority, which identifies the area, object, place or landscape as being of heritage significance to Aboriginal culture and people.*

Relevant S 117 direction	Response
	Comment The land is highly disturbed having being previously used for agricultural purposes. The property does not contain any local or State listed heritage items and it is not located within a heritage conservation area. An Aboriginal Heritage Information Management Search within a 200m radius of the site has found that there are no recorded Aboriginal sites or Aboriginal Places (refer **Appendix E)**. If any heritage items or relics are located on the site in the future they would be subject to Clause 5.10 of the WWLEP which relates to heritage conservation.
2.4 Recreation Vehicle Areas	N/A
3.2 Caravan Parks and Manufactured Home Estates	N/A
3.3 Home Occupations	N/A
3.4 Integrating Land Use and Transport	The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives: (a) *improving access to housing, jobs and services by walking, cycling and public transport, and* (b) *increasing the choice of available transport and reducing dependence on cars, and* (c) *reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and* (d) *supporting the efficient and viable operation of public transport services, and* (e) *providing for the efficient movement of freight.* *This direction applies when a council prepares a draft LEP that creates, alters or removes a zone or a provision relating to urban land, including land zoned for residential, business, industrial, village or tourist purposes. A council must ensure that a draft LEP shall locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of:* *(a) Improving Transport Choice – Guidelines for planning and development (DUAP 2001), and* *(b) The Right Place for Business and Services – Planning Policy (DUAP 2001).* **Comment** The proposal satisfies the principles of the *Improving Transport Choice – Guidelines for planning and development as follows:* ▪ the IN2 zone would accommodate businesses with significant freight movements and low employment density, ▪ the site is ideally located adjacent to an established industrial area and approximately 4km from the Wagga Wagga Town Centre,

Relevant S 117 direction	Response
	▪ the site has sufficient area to accommodate well designed car parking facilities in the future ▪ access and car parking would be directly accessible from Hammond Avenue (Sturt Highway) ▪ the proposed IN2 zone allows a different but compatible and supportive mix of uses to the IN1 zone to the south ▪ access to the site could be achieved via a single in and out access point which links to a service road and will adhere to existing RTA policy. The *Right Place for Business and Services – Planning Policy* only applies to retailing, leisure and entertainment facilities, offices, health and educational facilities and community and personal services. None of these uses are permitted within the proposed IN2 zone and as such this policy is not relevant to the proposal.
3.5 Development Near Licensed Aerodromes	N/A. The proposal does not include any permissible land uses that would be sensitive to noise associated with the Wagga Wagga Airport.
4.1 Acid Sulphate Soils	N/A
4.2 Mine Subsidence and Unstable Land	N/A
4.3 Flood Prone Land	Wagga Wagga Council's Flood Risk Precinct Map identifies the site as Rural Floodplain (High Flood Risk). A Design Flood Information Report prepared by WMAwater (**Appendix C**) concludes that the site remains dry during both a 1% AEP (1 in 100 year) and 5% AEP (1in 20 year) event. It provides recommendations for finished floor levels for future development of the site in accordance with the NSW Floodplain Development Manual (NSW, 2005), if rezoned for industrial purposes. Refer to Section 2.6.2 above.
4.4 Planning for Bushfire Protection	The site is identified as bushfire prone land. The planning proposal must: (a) *have regard to Planning for Bushfire Protection 2006,* (b) *introduce controls that avoid placing inappropriate developments in hazardous areas, and* (c) *ensure that bushfire hazard reduction is not prohibited within the APZ.* Although the whole site is shown as being bushfire prone, it should be noted that the site, on the whole is not heavily vegetated. The vegetation on the site is restricted to a 5m to 10m wide buffer zone along the river bank. It is not expected that bushfire would pose a significant risk to life or assets if the land was rezoned to an industrial use and would remove the more sensitive residential use from the site.
5.1 Implementation of Regional Strategies	N/A

Relevant S 117 direction	Response
5.2 Sydney Drinking Water Catchments	N/A
5.3 Farmland of State and Regional Significance on the NSW Far North Coast	N/A
5.4 Commercial and Retail Development along the New England Highway, North Coast	N/A
5.5 Development in the vicinity of Ellalong, Paxton and Millfield (Cessnock LGA)	N/A
5.6 Sydney to Canberra Corridor (Revoked 10 July 2008. See amended Direction 5.1)	N/A
5.7 Central Coast (Revoked 10 July 2008. See amended Direction 5.1)	N/A
5.8 Second Sydney Airport: Badgerys Creek	N/A
6.1 Approval and Referral Requirements	The Planning Proposal will not include provisions that require the concurrence, consultation or referral of development applications to a Minister or public authority. Therefore, the Planning Proposal is consistent with this direction.
6.2 Reserving Land for Public Purposes	N/A
6.3 Site Specific Provisions	N/A
7.1 Metropolitan Planning	N/A

6.0 Section C – Environmental, social & economic impact

6.1 Likely adverse effects on critical habitat or threatened species, populations or ecological communities, or their habitats.

As discussed in Section 2.6.6, the site is predominately cleared with majority of vegetation located within a 5 to 10m wide riparian zone associated with the Murrumbidgee River adjacent to the northern boundary of the site. The riparian zone consists of weedy shrubs amongst the native vegetation. Trees species within the riparian zone include mature Blakely's Red Gum (Eucalyptus blakelyi) and Wattle species. Other parts of the site comprise including seven mature wattles which are located closely to each other on the western boundary of the site. The subject land contains no Eucalyptus blakelyi seedlings and very few wattle seedlings. The remainder of the site has been cleared and consists of a variety of grass species. As discussed at Section 5.2.3 Council have indicated that the site is not of environmental significance. Nevertheless, the Murrumbidgee Bank Condition Report (**Appendix D**) which has been prepared for the site recommends that a fenced and well-vegetated buffer zone not less than 10 m wide be established to protect the sandy bank top. These recommendations could be included as a DCP control or as a condition of any future development consent for the site and would ensure that this area remains vegetated and free from development. Trees on the site would be subject to Clause 5.9 of the WLEP which requires development consent or a permit to be issued by Council prior to a tree being ringbarked, cut down, topped, lopped, removed, injure or wilfully destroyed. Therefore, the land is relatively unconstrained and it is reasonable to expect that the land could be developed for urban purposes without any significant impacts on the environment.

7.0 Section D – State and Commonwealth Interests

7.1 Is there adequate public infrastructure for the planning proposal?

Section 2.4 discusses the existing public infrastructure available to the site. Water, telecommunications and electricity is available to the site. Gas, sewerage and drainage infrastructure servicing the IN1 General Industrial zone to the south of the site is located in Lawson Street. MJM Services have confirmed that a pressure sewerage pumping system would be required to service the site (**Appendix B**). The extension and connection of these services, as well as any necessary upgrades to other services, to accommodate the future uses of the site would be borne by the developer of the land. It is not considered that the rezoning of the land would place an unreasonable demand on the existing public infrastructure available to the site and within the area beyond that which would be offset by Section 94 contributions.

7.2 What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

This Section of this Planning Proposal will be completed following consultation with the State and Commonwealth Public Authorities identified in a Gateway Determination.

Any issues raised by these Authorities will be summarised and addressed as appropriate.

8.0 Part 4 - Community Consultation

A Gateway Determination will specify the community consultation that must be undertaken in relation to this Planning Proposal. Consultation is tailored to specific proposals generally on the basis of a 14 day exhibition period for low impact Planning Proposals and a 28 day exhibition period for all other Planning Proposals.

Community consultation will be commenced by the placing of a public notice in the local newspapers and on the website of Wagga Wagga Council and/or the Department of Planning. In addition, adjoining landowners will be notified in writing.

Normal exhibition material will be made available by the relevant planning authority during the exhibition period. The community consultation process will be completed when the relevant planning authority has considered any submissions received concerning the proposed Local Environmental Plan and has forwarded those reports to the Department of Planning for final consideration by the Minister.

9.0 Conclusion

This planning proposal involves the rezoning of approximately 4 ha of currently underutilised land for light industrial purposes. Environmental, economic and servicing investigations support the rezoning across the site and the portion of the PIA a shown in **Appendix A**. The report demonstrates that despite the constraints which have been considered the proposed land uses can be supported without negative effect downstream and negligible local environmental impacts.

The opportunities offered by subject site and surrounding lands selected from the above analysis includes the following:

- The land is currently unoccupied rural land and is not of a sufficient area for viable agricultural operations.
- The land is situated within a context of surrounding similar land uses and compatible uses to the uses permissible within the proposed zone.
- It is relatively unconstrained and is above the 1 in 100 year flood event.
- The level of traffic generated from the site via future proposed uses is moderately low.
- Access to and from the site can be safely achieved via one or two driveways on Hammond Drive (Sturt Highway) serving the site with localised medians to restrict traffic to left turn entry and exit movement only.
- The site is well located in terms of public infrastructure and any upgrade and extension of the existing infrastructure network to accommodate the future uses of the site would be borne by the developer of the land.
- It is expected that Wagga Wagga is going to require 176 ha of new industrial land by 2016. This proposal and the Macroplan Industrial review discuss the clustering of sub industries and that highway frontage land is attractive for the following types of industry:

    i. warehouse / showroom activities

    ii. Agricultural and Farm machinery sales and service

    iii. transport related industries.

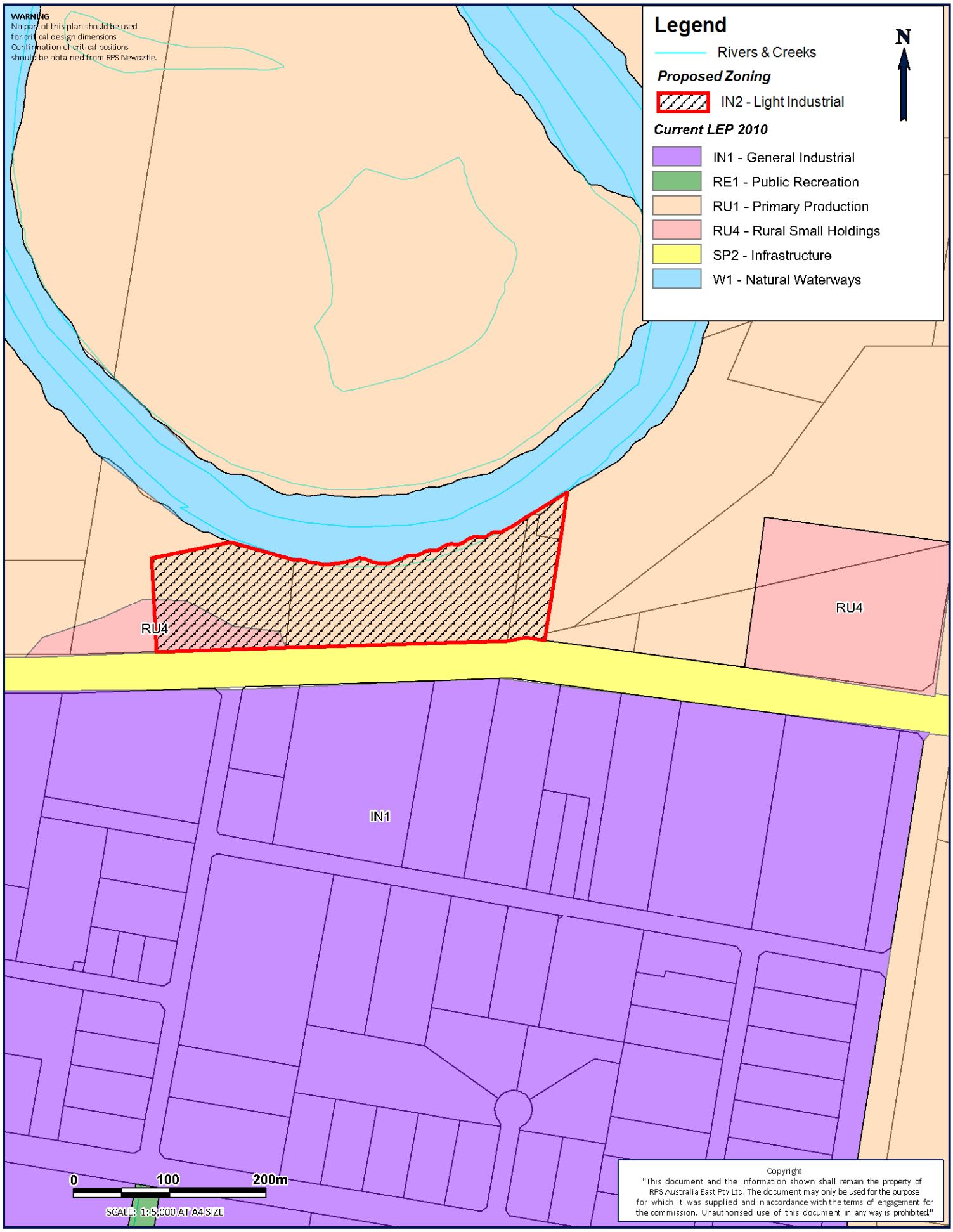
- Much of the land identified in the Wagga Wagga Industrial Land Use Study as possible future industrial use is constrained by environmental and tenure issues
- The subject site is in private ownership and can be developed immediately

As such, the site represents a logical extension to the existing industrial area to the south of the site and presents Wagga Wagga Council with an excellent opportunity to meet some of the demand for industrial land.

After positive consideration of this proposal, it is requested that the site be included in any future Industrial Lands Development Register which is referred to in the Wagga Wagga Spatial Plan 2008 as land to be developed in the short to medium term.

Appendix A

Proposed Zoning Plan prepared by RPS



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TITLE: LOCAL ENVIRONMENTAL PLAN 2010 DRAFT AMENDMENT NO.1
LOCATION: HAMMOND AVE WAGGA WAGGA
DATUM: (GDA 94)
PROJECTION: MGA ZONE 55
DATE: 26/10/2011
PURPOSE: REZONNING
LAYOUT REF: C:\\Documents\Mapinfo\ 108686 Hammond Ave
VERSION (PLAN BY):B A4 (NL-NW)

CLIENT: J & M HOWARD
JOB REF: 108686

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
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RPS

Appendix B

Sewer Investigation prepared by MJM Solutions

CONSULTING ENGINEERS
STRUCTURAL • CIVIL • BUILDING DESIGN

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Address Level 1, 25 Tompson Street
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Email admin@mjm-solutions.com

28th September, 2011

Attention: Nicole Lennon
RPS Group
GPO Box 4401
SYDNEY NSW 2001

RE: SERVICES INVESTIGATION 335 HAMMOND AVENUE EAST WAGGA WAGGA

Dear Nicole,

We have undertaken an investigation of the location of services (telecom, electricity, gas and water) and their ability to service development of the site at 335 Hammond Avenue. We provide the following details in addition to the accompanying maps.

Stormwater

Council records show that the existing drainage in Lawson Street would be the closest connection point to this site. It is estimated that the cost of providing a system to connect the internal drainage to that network would be approximately $140,000. Council has indicated that it would not favour direct disposal to the river, which will therefore require the installation of a pump well to discharge the internal runoff to an existing stormwater pit.

A detention basin has been included in the estimated cost of providing a drainage solution in order to minimise the cost of the pump system required. Also included in the estimate is a gross pollutant trap (GPT) which would separate bulky litter items, sediments, silt and petroleum hydrocarbons from stormwater leaving the site. It is considered that a GPT would probably be a Council requirement if industrial development of the site were approved. It should be noted that the above estimate does not include the cost of connecting individual internal buildings and carparks to the detention basin and pump well.

Sewer

A recommendation in the LES 2008 proposed that a new rising main be constructed from the pump station (SPS26) located in Edison Road to the existing rising main in Vincent Road. An upgrade of this pump station utilising Section 64 funds would not only provide for the discharge of sewage from the future Gumly Industrial Estate, but would also have the capacity to take existing sewage flows from developments along Bakers Lane and Sturt Highway to the east of Tasman Road.

The diversion of this existing discharge from developments located in the vicinity of the proposed Gumly Gumly Industrial Estate means that the loading of the existing sewer main in the Eastern Industrial area would be reduced by 93 equivalent tenements (ET's). This has a significant positive impact on the development at 335 Hammond Avenue as the design sewer loading from this 3 hectare site would be 45 ET's, based on an adopted design factor of 15 ET's/hectare. It can therefore be seen that a combination of the two development proposals at Gumly and 335 Hammond Avenue effectively reduce the total loading on the current system by 48 ET's as a result of diverting existing and future flows from the Gumly area to SPS26

Electricity
According to Essential Energy records, there is currently overhead electricity supplied to the development site, which runs along the northern side of Hammond Avenue. The network in this location would be capable of servicing additional development of this site. Works required would include the installation of a transformer and either an underground or overhead service to each additional allotment, depending on direction from Essential Energy. We note that overhead electricity is preferable for industrial development. The works would be customer funded, with Essential Energy funding the provision of transformers up to 30kVA capacity. The estimated cost of servicing each additional allotment is contingent on the number of allotments proposed to be created.
Telecom
There is telecommunications (Telstra) service currently available to the property. This could easily be extended to cater for additional development on the site. There are existing telecom cables located on both sides of Hammond Avenue. This would involve supply of a shared electrical/telecom trench for the contractor to work in. Cost to supply additional industrial allotments could be approximately $1,000 per lot plus trenching costs of approximately $33 per metre. We also note that there is an Optus fibre optic cable located in Telstra ducts on the southern side of Hammond Avenue. Extreme care must be taken in this regard.
Water
There is currently potable water mains supply available to the allotment. There is a 250mm dia water main located on the northern side of Hammond Avenue and a 150mm dia main located on the southern side. There is also a redundant water main on the southern side of Hammond Avenue. The development could be accommodated by the existing mains in the area and water pressure would be good in the short to medium term according to Riverina Water. There are plans to build a reservoir in the medium to long term which would again improve water pressure in the area. Generally, Developer Servicing Charges applied by RWCC are at the rate of 1ET/hectare payable upfront, although their Development Servicing Plan does not reflect this. Further fees may apply for the future purchaser once water demands for the industrial activity are confirmed.
Gas
According to APA Group's records there is currently no gas available to the site. The nearest gas main is located in Lawson Street just north of its intersection with Schiller Street. This is the most-westerly point of gas supply to industrial allotments. Gas could be extended to the site at the rate of approximately $30-40 per metre (approximately 400 metres) plus services to each additional industrial allotment would be around $1200-1500.

If you have any queries in relation to the information above, please don't hesitate to contact us.

Yours faithfully,
MJM CONSULTING ENGINEERS

MICHAEL J. McFEETERS
Director
Z:\jobs\100050_sewer investigation 335 Hammond Avenue\services investigation.doc

Appendix C

Design Flood Information Report prepared by WMA water

Mr J Howard
c/o Nicole Lennon
RPS Group
Level 12
92 Pitt Street
SYDNEY NSW 2001

111007/L_20110714

14 July 2011

Dear Mr Howard

Design flood information for 622 Hammond Avenue, Gumly Gumly

Further to your request we have reviewed our existing flood modelling data for your block at 622 Hammond Avenue, and present the findings below and in the figures enclosed with this letter report.

Background

It is understood that the owners of the property wish to rezone their land for the purposes of commercial/industrial development. The site is currently zoned Rural - Primary Production. The plot fronts Hammond Avenue (The Sturt Highway) and the Murrumbidgee River forms the rear boundary.

A 2D hydraulic model is available for the area, prepared for Wagga Wagga City Council (WWCC) by WMAwater. The model was used to assess a number of scenarios for Council. The scenario reviewed for this site considers the existing situation with assumed breaches of the main city levee near to Tarcutta Street and at Flowerdale Lagoon. The results for the 1% AEP (1 in 100 year) and 5% AEP (1 in 20 year) design events have been reviewed in relation to the site.

The ALS data used to determine ground levels was flown in 2008 and delivered to WWCC in May 2009. This 1m raster grid was used in the modelling process and has been determined to have a vertical accuracy of +/- 0.15 m.

Based on the ALS data, the site is generally elevated above 183.0mAHD, sitting above Hammond Avenue and the general surrounding area. Ground levels on the site are higher at the rear of the site at the embankment to the river (where they reach 184.9m AHD) sloping downwards toward Hammond Avenue which forms the southern boundary of the site.

Flooding Behaviour

In the vicinity of the site, during a flood event water levels in the river are expected to first spill from the river near to Abbey Lake west of the site, and downstream of Eunony Bridge Road to the east. Out of bank flows then spread to fill the areas of lower lying land between these breakout points before spreading southwards surrounding the site.

Peak flood levels and depths are summarised in Table 1 for key locations which are identified in Figure 1 (attached). The table also summarises velocity and hazard for the flood peak.

Webb, McKeown& Associates Pty Ltd (trading as WMAwater)

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Table 1: Peak Flood Statistics (for locations refer to figure 1)

Location	5% AEP (1 in 20)					1% AEP (1 in 100)				
	Peak Flood Level (mAHD)	Gauge Height* (m)	Peak Flood Depths (m)	Velocity (m^3/s)	Hazard	Peak Flood Level (mAHD)	Gauge Height* (m)	Peak Flood Depths (m)	Velocity (m^3/s)	Hazard
1	-	-	-	-	-	182.07	12.02	1.19	0.47	High
2	-	-	-	-	-	182.23	12.18	0.95	0.51	High
3	181.06	11.01	0.19	0.07	Low	182.30	12.25	0.95	0.21	High
4	-	-	-	-	-	182.73	12.68	0.09	0.08	Low
5	-	-	-	-	-	182.85	12.8	0.00	0.00	Dry
6	-	-	-	-	-	182.88	12.83	0.11	0.04	Low
7	-	-	-	-	-	182.99	12.94	0.13	0.03	Low
8	-	-	-	-	-	183.11	13.06	0.58	0.23	Low
9	-	-	-	-	-	183.22	13.17	3.96	0.54	High
10	180.62	10.57	0.14	0.03	Low	182.16	12.11	0.18	0.16	High
11	-	-	-	-	-	182.97	12.92	1.29	0.30	High
12	-	-	-	-	-	183.13	13.08	1.23	0.37	High
*Referenced to Hampden Bridge Gauge with 0 value at 170.05mAHD.										

The above flood levels are taken from the hydraulic model. The assessment undertaken for Council also considered a scenario where the main city levee was upgraded to provide a 1% AEP level of protection. The results of this scenario were also considered in relation to the site, however there is negligible difference between the resultant flood levels at the site and its immediate area, and are therefore not referred to further.

Site Access

During the 5% AEP event river flood levels near to the site are approximately 181.25m AHD which are over 1m lower than the site. Therefore the site would remain dry from river flooding during the 5% AEP event.

Flood free access is available to Hammond Avenue/Sturt Highway to the east and Tasman Road and Bakers Lane to the south. To the west there is likely to be some shallow depth flooding on Hammond Avenue, near to the junction with Blaxland Road, at less than 0.3m. Some localised flooding could occur also where Marshalls Creek crosses Blaxland Road and Hammond Avenue.

During the 1% AEP event, peak flood levels are in the order of 182.85m AHD on Hammond Avenue at the entrance to the site. The site is therefore elevated a minimum of approximately 0.15m above the peak flood level at its lowest location and therefore remains dry during the 1% AEP flood.

Although the site itself remains above the flood level, the surrounding area becomes inundated causing the site to become an island. Figure 2 shows the peak flood depths for the 1% AEP event. Hammond Avenue initially becomes inundated to the west of the site at around 53 hours after the gauge height reaches 7.5m, and to the east of the site by 55 hours, although at this point in time dry access is still available southwards via Tasman Road to Bakers Lane. Access to the site is effectively cut by 56 hours when Hammond Avenue/Sturt Highway is significantly inundated both to the west and east of the site and Tasman Road also becomes flooded.

The site remains isolated for around 60 hours while floodwaters continue to rise surrounding the site and flooding the industrial area to the south before receding sufficiently to reinstate access again. Although low hazard ponding remains, access to the Sturt Highway is likely to become available approximately 120 hours after gauge height has reached 7.5m and flood waters have peaked and receded.

Flood Hazard

During the 5% AEP flood event access to the site is still retained although it should be noted that during intense rainfall events there may still be short duration overland flooding present.

Figure 3 shows the peak hazard presented in the surrounding area. Hazard has been determined based on the NSW Floodplain Development Manual (NSW, 2005) which gives a rating of high or low hazard based on a factor of velocity and depth.

As the site itself is elevated above the 1% AEP flood levels the onsite hazard is considered to be none, although as the site is an island during this flood event, the hazards surrounding the site and on access points to the site should be considered.

At the flood peak, the hazard on Hammond Avenue immediately adjacent to the site is low. However, a combination of significant flood depths and velocities, cause Hammond Avenue to rise to high hazard approximately 500m to the west and 1.8km to the east of the site. The majority of Tasman Road and Baker Lane becomes high hazard, with depths of over 1.5m in lower spots. The low spot on Blaxland Road (junction approximately 400m to the west of the site) is likely to become flooded to over 2m depth and classified as high hazard. From the site, it is roughly 3km to reach the edge of the floodplain by road although this is through approximately 1km of high hazard flooding and it is not recommended to traverse through these waters by vehicle, foot or otherwise.

Appropriate Development

Council's Flood Precinct map shows the site currently zoned as Rural Floodplain (High Flood Risk). However, the modelling shows the site to remain dry in the 1% AEP event and in looking at the individual merits of the site from a flooding perspective it could be included in the Eastern Industrial Area (Medium Flood Risk) zone if rezoned to an industrial commercial use. Considering the flood hazard to the surrounding area, in particular the access routes to the site and available warning time, a less vulnerable development use such as commercial/industrial could be considered more appropriate than more vulnerable use such as residential dwellings.

Should the site be rezoned to industrial/commercial WWCC's DCP (Section 4.2) requires all new development to have floor levels greater than the 20-year ARI flood event (5% AEP) plus a freeboard allowance. In deciding upon an appropriate floor level for proposed development, a freeboard above the flood level should also be considered. The NSW Floodplain Development Manual (NSW, 2005) recommends a freeboard of 0.5m thus it is recommended that finished floor levels for any development on the site should be at or above 181.75m AHD. Setting the minimum floor level at a less frequent flood level (100-year ARI for example) would assist in reducing the flood damages imposed on its future use. It is also recommended that a Flood Plan is prepared for the operation of the site.

Summary
Although during the 1% AEP event the site itself remains an island, access could be cut for a significant amount of time. Therefore, rezoning the site to a lower vulnerability use could be considered appropriate considering the surrounding flood hazard.

While the focus of this assessment has been the land at 622 Hammond Avenue, a brief review of the flood free land immediately adjacent to 622 Hammond Avenue shows that the land marked on Figure 1, could considering flooding aspects also be suitable for rezoning as part of a commercial/industrial precinct. The land marked on Figure 1 is exposed to similar flood risks as 622 Hammond Avenue and appropriate floor level and flood planning controls should apply.

There are also some adjacent areas which are subject to low provisional hydraulic hazard, which following a detailed assessment of other flood risk aspects and potential flood impacts may also be appropriate for rezoning as part of a commercial/industrial precinct.

Yours Sincerely,
WMAwater

Erin Askew
Associate


FIGURE 1
STUDY AREA
STURT HWY
BAKERS LANE
TASMAN RD
BLAXLAND RD
HAMMOND AVE
KOONINGAL RD
Land potentially suitable for rezoning as a part of an industrial / commercial precinct.
1
2
3
4
5
6
7
8
9
10
11
12
Locations
Site Boundary
N
0
0.25
0.5
1
(km)
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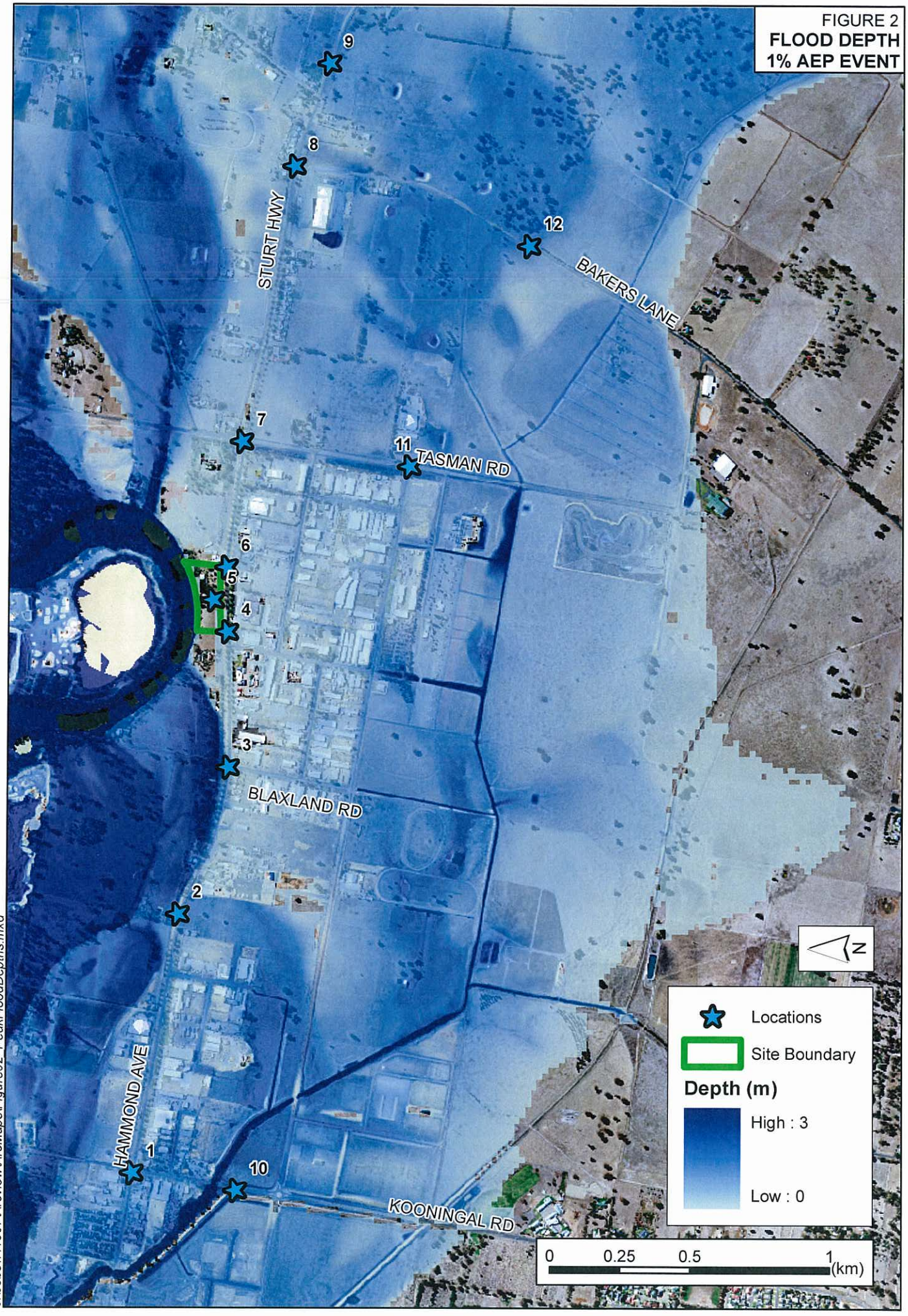
FIGURE 2
FLOOD DEPTH
1% AEP EVENT
STURT HWY
BAKERS LANE
TASMAN RD
BLAXLAND RD
HAMMOND AVE
KOONINGAL RD
1
2
3
4
5
6
7
8
9
10
11
12
N
Locations
Site Boundary
Depth (m)
High : 3
Low : 0
0
0.25
0.5
1
(km)
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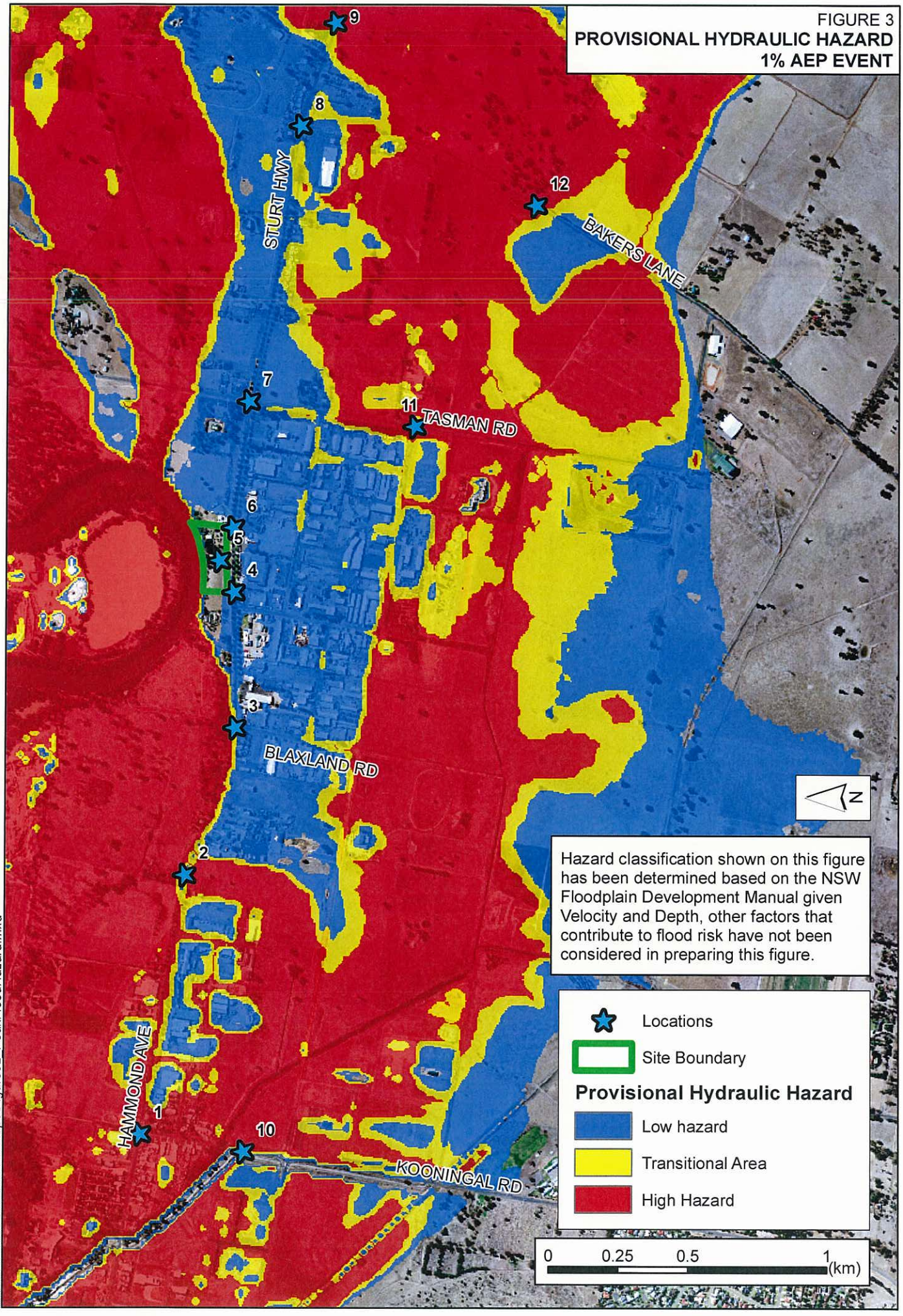

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Appendix D

Murrumbidgee Bank Condition Report prepared by Ken Page

Murrumbidgee Bank Condition Report Private Subdivision 164653

Ken Page
Adjunct Associate Professor
School of Environmental Sciences
Charles Sturt University

Summary and recommendation

A survey on the property of Mr Joe Howard (Private Subdivision 164653) showed that:

- the bank at the outside bend of the Murrumbidgee River is unlikely to sustain more than 5 metres of lateral retreat during the next century.
- the bank is steep but occurs on a gently curving bend, is well vegetated and underlain for the most part by cohesive fine-grained alluvium.
- comparisons of the bank top location in April 1971 with its present position indicate an erosion rate of less than 4 cm per year. This is at the lower end of long term estimates of Murrumbidgee cut bank retreat based on radiocarbon and optical luminescence dating.
- the most vulnerable part of the bank is the top section comprising about 4 m of wind-blown dune sand. This unit is above the reach of all but the largest floods but could be subject to gully erosion during severe rain storms or damage from recreational activities such as trail bike riding.

Recommendation: that a fenced and well-vegetated buffer zone not less than 10 m wide be established to protect the sandy bank top.

Murrumbidgee Bank Condition Report Private Subdivision 164653

Location:

The river bank reported on is located on the property of Mr Joe Howard (Private Subdivision FP164653) about 4 km east of Wagga Wagga railway station on the Sturt Highway. Mr Howard's property is bounded by the Sturt Highway to the south and the Murrumbidgee River to the north (Figure 1)

Site Description

The property is located on a sand dune (Page et al, 2001) which overlies a river terrace situated at the outside of a bend on the Murrumbidgee River. The crest of the dune has an elevation greater than 184 m above AHD but all of the property lies above the 182 m AHD contour shown on 1:4000 orthophotomap series Gumly Gumly Sheet (3610-VI). Flood records for the Murrumbidgee River (WMA Water, 2009) list the two largest peaks as having occurred in August 1974 (180.79 m above AHD) and July 1853 (181.09 m above AHD). Therefore, the property is not thought to be prone to flooding under the present flow regime of the Murrumbidgee.

Murrumbidgee River

At Wagga Wagga the Murrumbidgee River has a well-defined meandering channel and a scrolled floodplain formed by lateral channel migration. At the stage of bankfull discharge (620 m^3s^{-1} or about 177 m AHD) channel width is about 70 m, mean depth 6 m, sinuosity 2.0 and slope 0.0002. The specific energy of the bankfull flow is about 17 Wm^2 which according to Nanson and Croke (1992) indicates a relatively low energy channel environment. The present floodplain of the Murrumbidgee, which is best developed at the inside of river bends, dates from about 4000 years ago (Owens, 1992; Page et al, 2003) and was formed by lateral channel migration with erosion at the outside of bends (cut banks) being approximately balanced by deposition at the bank opposite (point bar). Lying two to three metres above the Late Holocene floodplain is a river terrace that is often found at the outside of meander bends. In places the terrace is mantled by sand dunes deposited (Page et al, 2001) more than 12000 years ago during the Late Quaternary geological period.

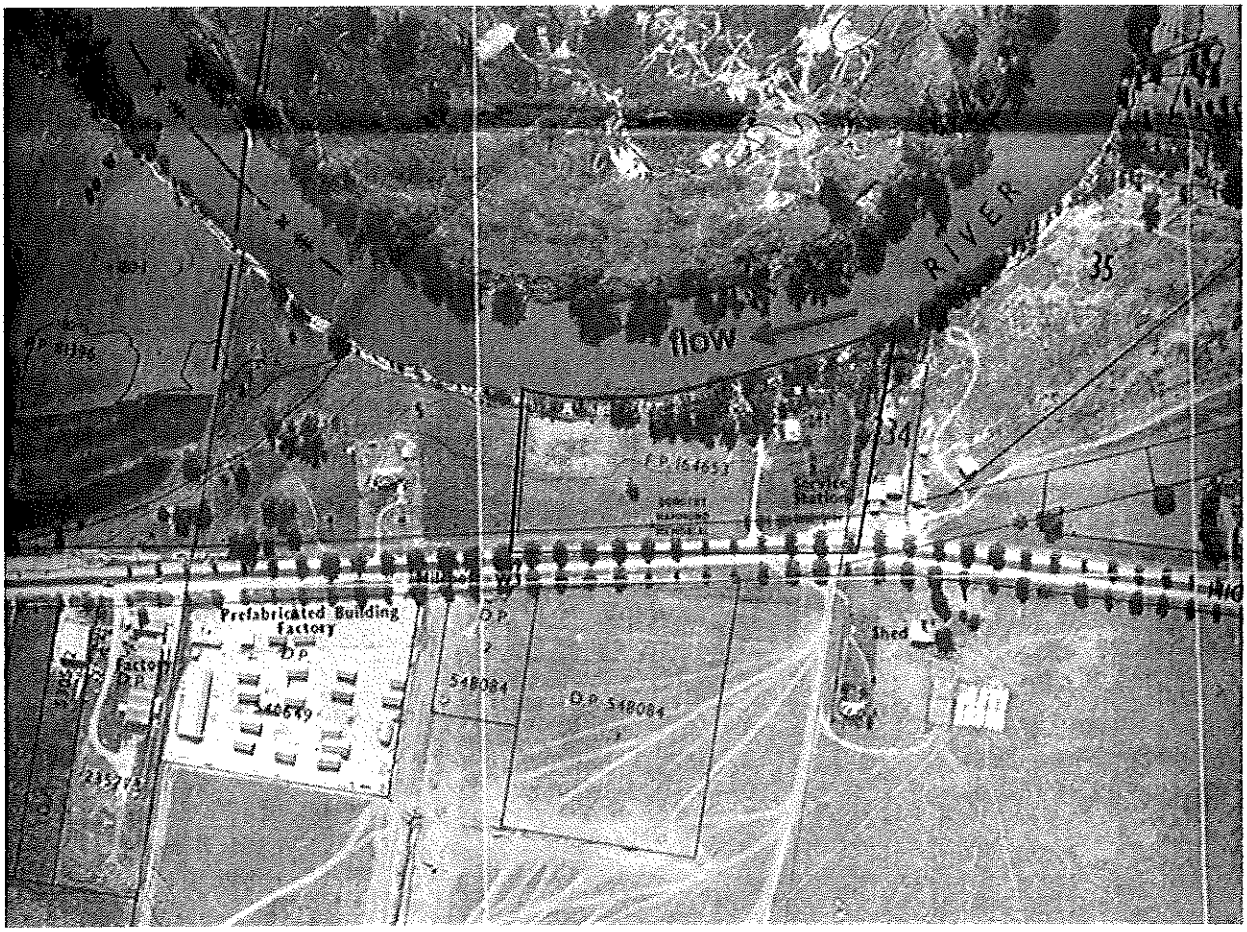

Figure 1. Location of private subdivision FP 164653 and Murrumbidgee River (Gumly Gumly 3610-VI, 1:4000)

Channel Migration

Rates of channel migration vary widely between rivers in different geographic settings. In general, the ability of an alluvial stream (ie, one not confined by bedrock) to erode its boundary depends on the relationship between flow energy and the nature of the boundary (particularly bend curvature, sediment grain size and riparian vegetation). Where stream energy is low and sediments at the cut bank are fine-grained, low rates of channel erosion (ie cut bank retreat) result. Hickin and Nanson (1984) and Nanson and Hickin (1986) found that rates of channel migration attained a maximum on bends with radius of curvature (r) to width (w) ratios (r/w) between 2 and 3. As bends became more open (r/w >3) the migration rate declined until at a r/w value of 6 average channel migration was less than 25% of the maximum at more tightly curved bends. Rates of erosion are also less where cut banks are well-vegetated, particularly at the slope toe.

Owens (1992) and Page et al (2003 estimated Late Holocene rates of lateral channel migration by the Murrumbidgee River on the basis of radiocarbon dates on logs buried in the floodplain. The average rate they calculated of about 0.08 my^{-1} is in broad agreement with recent estimates based on unpublished optical luminescence data for the Murrumbidgee provided by Tim Pietsch from Griffith University (pers. comm. 2009) who calculated rates ranging from about 0.04 to 0.10 my^{-1} for the last 3500 years. Rates of channel migration

since European settlement based on artefacts buried in floodplain sediments (Page et al, 2003), which ranged from 0.06 to 0.11 my^{-1} are also in agreement with the long term estimates.

Bend migration at Private Subdivision 164653

A visual inspection of the cut bank at Private Subdivision 164653 suggested little to indicate abnormally high rates of erosion at this site. The combination of channel curvature, bank height and steepness, sediment grain size, riparian vegetation and in-channel coarse woody debris (SWD) suggested that erosion rates would be consistent with those found at other locations along the river. Site details are listed in Table 1.

However, because bank erosion rates can vary greatly, in both space and time, even on low energy rivers, it was considered desirable to make direct estimates at the bend on Private Subdivision FP164653. An opportunity to estimate bank erosion rates site since April 1971 was provided by the existence of a large scale (1:4000) orthophotomap for Gumly Gumly (3610-VI) which included the bend in question. Distances between the sealed edge of the Sturt Highway and the cut bank top were measured at three transects on the orthophotomap (Figure 2) and then compared with tape measurements made in the field on 15 May 2010 (Table 2).

Table 1. Bend condition at Private Subdivision FP164653

Bend property	**Observations**	**Comments**
Curvature	r/w = 6.2	Open bend
Height	14 m above low flow level	Height increased by wind blown dune sand capping
Steepness	>45°	Steep cut bank typical of Murrumbidgee River in this reach.
Sediments	Fine-grained alluvium from base to about 180 m AHD; fine dune (Aeolian) sand 180 to 184 m+ AHD (Figure 4).	Fine grained alluvium resistant to erosion; dune sand readily eroded but only rarely reached by floodwaters.
Riparian Vegetation	Well-vegetated with trees and shrubs (Figures3 and 5).	**Toe slope** trees species include river red gums, river oaks, willows and one plane tree. **Upper slope** dominated by shrubs. **Floodplain/dune crest** has large river red gums and numerous small silver wattles
Coarse woody debris in channel	Moderate quantity of CWD in channel near bank (Figure 4).	Provides protection from erosion of th3e bank toe region.

Table 2. Estimate of bank erosion at Private Subdivision FP164653.

Surveyed Sections	Top bank to bitumen edge 16 April 2009	Top bank to bitumen edge 15 May 2010	Loss 16 April 1971 to 15 May 2010.	Rate
1 (fence line)	102 ± 1 m	100.2 m	1.8 ± 1 m	0.046±0.026 my^{-1}
2	96 ± 1 m	95.3 m	0.7 ± 1 m	0.018±0.026 my^{-1}
3	94 ± 1 m	92.3 m	1.7 ± 1 m	0.044±0.026 my^{-1}

These measurements are limited in precision by the scale of the orthophotomaps (1:4000). However, I consider that the estimates of bank erosion rates are reliable given that they are in good agreement with bend erosion rates estimated at other sites on the Murrumbidgee River near Wagga Wagga. The three sections together indicated a mean bank erosion rate of 0.036±0.026 my^{-1}. Even if the maximum rate of rate of 0.072 my^{-1} is used, bank loss over the next century would amount to less than 8 m.

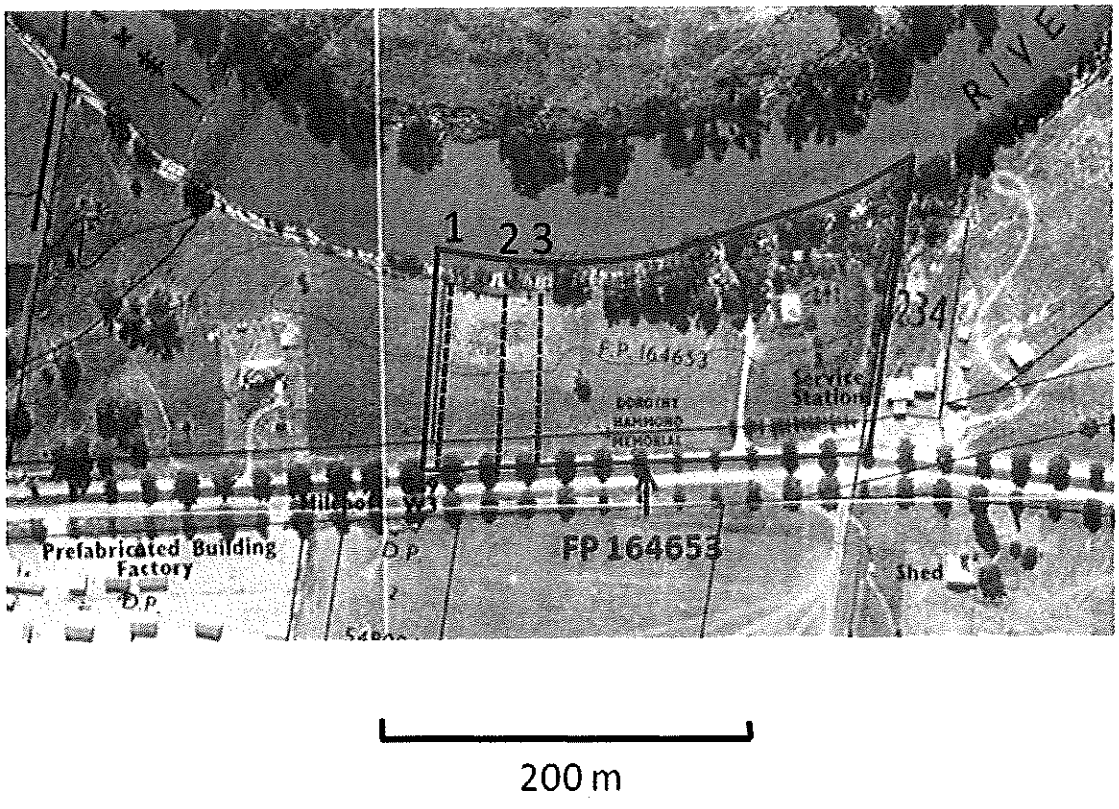

Figure 2. Location of three surveyed traverses on Private Subdivision FP 164653.

Recommendations

On the basis of my observations at Mr Howard's property it is unlikely that more than about five metres of bank erosion will during the next hundred years. However, to minimise potential bank retreat, I recommend the following:

1. Provision of a fenced buffer zone

A zone not less than 10 m wide should be fenced off at the top of the river bank. The fencing should be designed to prevent access by stock and any human recreational activity (for example, trail bike riding) likely to damage vegetation and exacerbate erosion of the cut bank.

2. Maintenance of riparian vegetation and in-channel CWD

The present tree cover on the bank, and particularly at the toe of the bank, should be maintained. Any trees that topple into the channel should not be removed. Any removal of exotic plants species (for example, willows) should be carried out only when other measures to guarantee bank stability are put in place.

3. Dune sand stabilisation

The cut bank sediments most vulnerable to erosion are the wind-blown fine dune sands that overlie the alluvial terrace deposits between about 180 and 185 m AHD. These sediments lie above the level of all but the largest floods but they are subject to gully erosion and slumping, particularly during and following periods of heavy precipitation. The maintenance of a complete vegetation cover on the dune surface near the river bank is desirable to help bind the sandy sediments and increase the interception and infiltration of precipitation. Encouragement of the growth of silver wattles at the bank top within the recommended buffer zone is recommended.

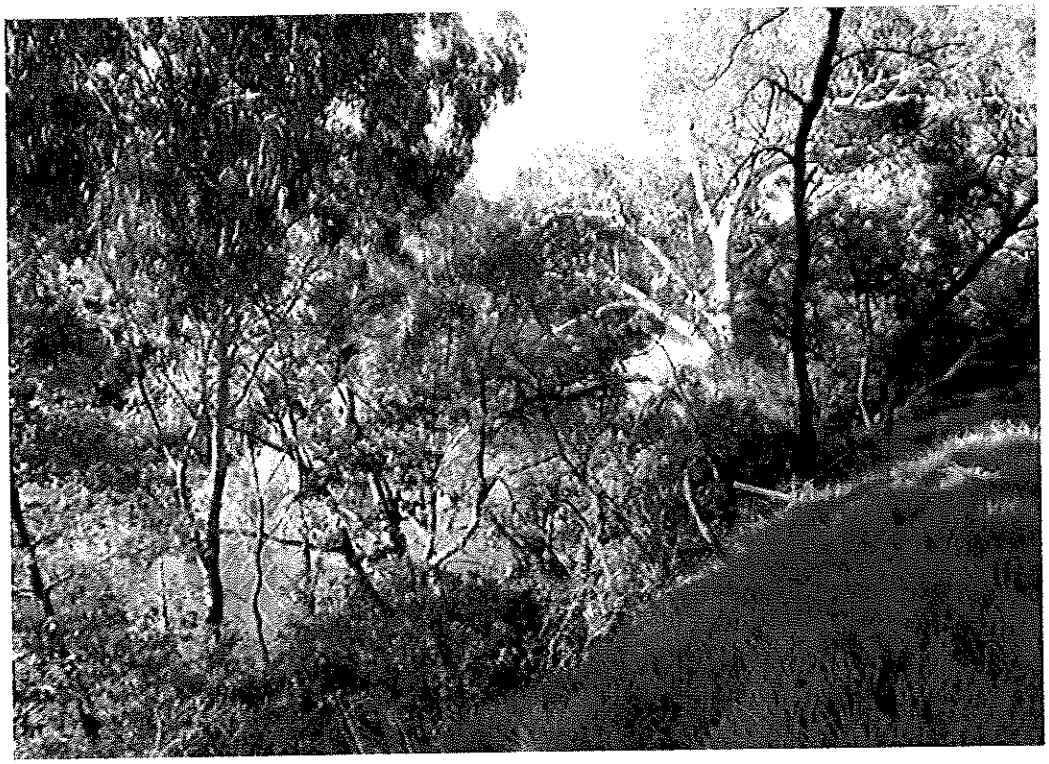

Figure 3. Riparian vegetation on cut bank at Private Subdivision FP 164653. Trees include river red gums, river oaks, willows and plane tree.

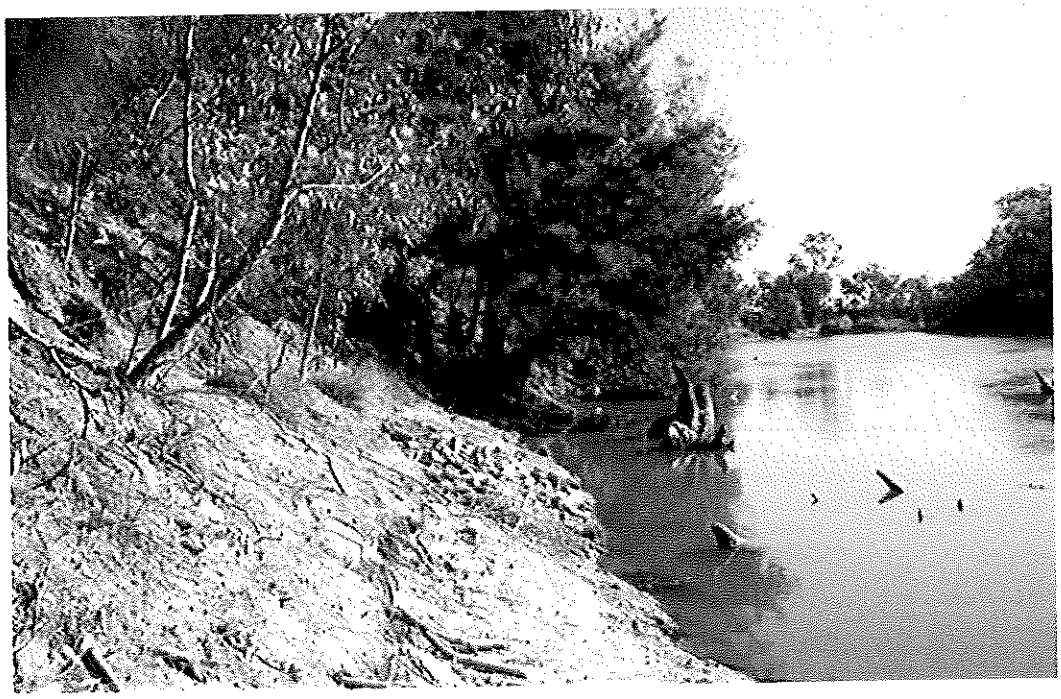

Figure 4. Top slope of cut bank at Private Subdivision FP 164653. Note fine-grained alluvium and in-channel CWD.

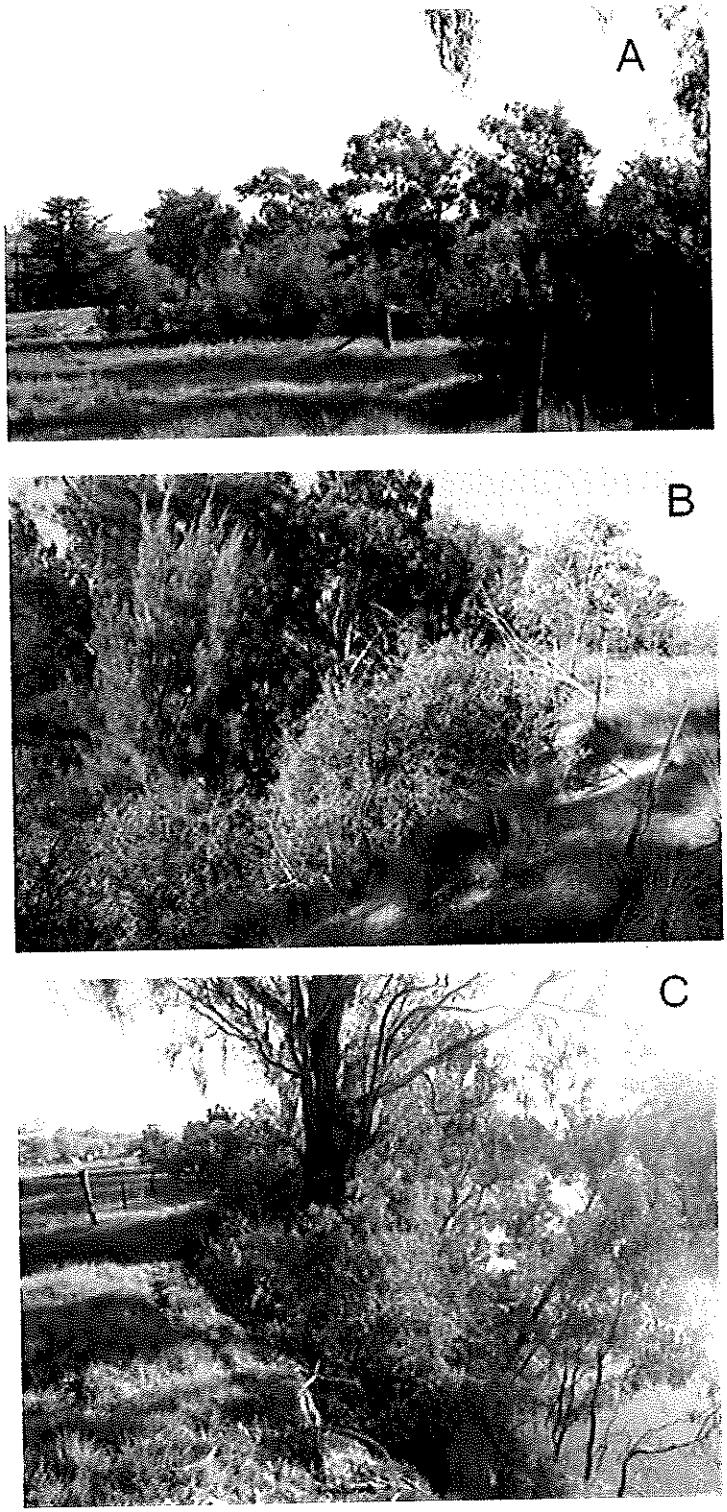

Figure 5. Upper bank and dune surface at Private Subdivision FP 164653.

A. Young stand of acacia dealbata on dune surface
B. River red gums with shrub understorey.
C. River red gum and shrubs

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KEN PAGE – RESUME 2010

SUMMARY

Ken Page is an Adjunct Associate Professor in the School of Environmental Sciences at Charles Sturt University with 37 years experience in university teaching, research and consultancy. His research interests include: river hydrology and geomorphology – processes of floodplain formation and channel migration; effects of flow regulation on the frequency, duration and spatial pattern of floodplain inundation; post-European settlement channel change in tributaries of the mid Murrumbidgee catchment; effects of sand and gravel extraction on channel stability; Late Quaternary and Holocene evolution of fluvial and aeolian deposits in the Murray Basin. He is presently subject coordinator of GEO513 River Hydrology and Geomorphology which is taught in the Post Graduate Diploma in River Restoration and Management.

ACADEMIC QUALIFICATIONS

MA [Hons 1] 1972, Dip Ed 1967 [Sydney], PhD 1994 [Wollongong]

CAREER PUBLICATIONS

At 1/5/2010: 39 refereed publications, 43 conference presentations, 2 Environmental Impact Statements, 13 consultancy reports.

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Appendix E

Bank Condition Report Peer Review prepared by WMA water

Mr J Howard
c/o Nicole Lennon
RPS Group
Level 12, 92 Pitt Street
SYDNEY NSW 2001

111007/L110721_ErosionReview

21 July 2011

Attention: Joe Howard

Dear Joe,

Re: Review of *Murrumbidgee Bank Condition Report*
Private Subdivisions 164653

WMAwater are currently undertaking a review of hydrologic and flooding aspects relating to 622 Hammond Avenue Wagga Wagga. As part of that work the client (Mr Joe Howard) has asked that WMAwater also review a document titled "Murrumbidgee Bank Condition Report Private Subdivisions 164653", in relation to flooding aspects. The document relates to bank condition and bank erosion potential at Lot 1 DP 164653 (622 Hammond Avenue Wagga Wagga).

WMAwater are a firm of specialist flood hydrologists and have been undertaking flooding assessments for 28 years. WMAwater are very familiar with flooding of the Murrumbidgee River having undertaken numerous assessments of flooding, particularly around Wagga Wagga. WMAwater are not specialist geomorphologists and can only provide advice on flooding aspects within the bank condition report.

The bank condition report has been prepared by Ken Page, an Adjunct Professor in the School of Environmental Sciences at Charles Sturt University with a specialisation in research of river hydrology and geomorphology. Based on his resume attached to the assessment, Ken Page is suitably qualified to make recommendations regarding bank erosion potential and mitigation strategies.

The site description describes levels across the site based on the 1:4000 orthophotomap Gumly Gumly 3610-VI. Elevations drawn from orthophotomaps can have elevation errors of +/- 2 m. As part of work undertaken for Wagga Wagga City Council, WMAwater hold ALS data of the site which was flown in 2008 and delivered to WWCC in May 2009. This ALS data has been determined to have a vertical accuracy of +/- 0.15 m on open hard surfaces. Despite the potentially large error associated with elevations from orthophotomaps, the ALS data confirms the crest of the sand dune to be generally above 184.8 m AHD (184 m AHD from orthophotomap) and the property generally above 182.3 m AHD (182 m AHD from orthophotomap).

Webb, McKeown & Associates Pty Ltd (trading as WMAwater)

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Email: enquiry@wmawater.com.au
Website: wmawater.com.au

The site description also discusses recorded flood levels taken from the Wagga Wagga Floodplain Risk Management Study prepared by WMAwater in 2009. The levels shown are applicable to the Hampden Bridge Gauge (180.79 m AHD for 1974 and 181.09 m AHD for 1953) approximately 7 km downstream of the site. Flood levels at the site for those events would have been slightly higher. WMAwater have recently undertaken updated flood modelling for Wagga Wagga City Council which has shown for the 100 year ARI event the flood level at Hampden Bridge to be approximately 181.3 m AHD and approximately 182.4 m AHD at the site. The same work has also estimated levels for the 500 year ARI event. The site description states that "*the property is not thought to be prone to flooding under the present flow regime of the Murrumbidgee*", while this statement is correct for the 100 year ARI, the site would be inundated during a 500 year ARI to a level of approximately 184.1 m AHD.

WMAwater are not qualified to comment on the various rates of lateral channel migration detailed in the report however they all appear to be in general agreement.

The assessment of bend migration at the site has been undertaken over a period from April 1971 to May 2010. This period is likely to give a reasonable indication of erosion potential as it contains at least one significant event in 1974 in addition to a number of moderate events in 1975, 1986, 1989 and 1991. A moderate event also occurred in December 2010, it may be worthwhile to confirm that no additional erosion occurred following that event.

The report states that distances for the bend migration assessment were measured from the orthophotomap Gumly Gumly 3610-VI and tape measured on site from the sealed edge of the Sturt Highway. There is nothing reported to confirm that the sealed edge of the Sturt Highway is a consistent base point for measurement over the 1971 to 2010 period. In addition, the method of measurement from the orthophotomaps is likely to be subject to a greater error than +/- 1m. The report notes this issue with accuracy of orthophotomaps but confirms that the measurements are in agreement with scientific rates. This is a reasonable conclusion.

Bank erosion is unpredictable and is based on a range of factors including but not limited to the number of significant flood events and vegetation and tree cover, it is therefore impossible to determine an absolute rate over any period. That being said, the management options presented in this report (buffer zone, maintenance, and bank stabilisation) are reasonable and would somewhat limit any acceleration of the rate of erosion disregarding the other causing factors (dying trees, flood events etc).

Yours faithfully,
WMAwater

E J Askew
Associate

Appendix F

Aboriginal Heritage Information Management Search prepared by RPS

AHIMS Web Services (AWS)
Search Result

Your Ref Number : Hammon Ave Wagga Wagga

Client Service ID : 46293

RPS Australia East Pty Ltd Sydney CBD
Level 12 92 Pitt Street
Sydney New South Wales 2000

Attention: Peter Mangels

Email: peter.mangels@rpsgroup.com.au

Date: 07 July 2011

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP164653 with a Buffer of 200 meters. conducted by Peter Mangels on 07 July 2011

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	**Aboriginal sites are recorded in or near the above location.**
0	**Aboriginal places have been declared in or near the above location. ***

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Appendix G

Transport, Traffic and Servicing Impact Assessment by McLaren Traffic Engineering

MR J HOWARD

NOVEMBER 2011

PROPOSED HAMMOND AVENUE INDUSTRIAL SUBDIVISION, EAST WAGGA WAGGA

TRANSPORT, TRAFFIC & SERVICING IMPACT ASSESSMENT

M^C^LAREN TRAFFIC ENGINEERING
Level 1, 29 Kiora Road Miranda NSW 2228
PH (02) 8543-3811 FAX (02) 8543-3849
Email : mclarenc@ozemail.com.au

CONTENTS PAGE

1.0 INTRODUCTION

M^CLaren Traffic Engineering was commissioned in October 2011 to undertake a traffic and parking impact assessment in support of a rezoning application for a large parcel of land generally contained by Hammond Avenue (Sturt Highway) to the south, Murrumbidgee River to the north and flood prone land to the east and west, within the suburb of East Wagga Wagga.

The full details of the land description, existing land use details and current / proposed land use zones are provided in the *Planning Proposal – Rezoning : 335 Hammond Avenue,East Wagga Wagga*, dated July 2011, prepared by RPS Australia East Pty Ltd. This traffic & parking report needs to be read in conjunction with that report.

The subject rezoning will need to be the subject of later development applications, and these will be assessed in detail under the provisions of SEPP Infrastructure (2007).

The traffic assessment of the subject site for the current rezoning application is therefore based upon a concept design for the site which demonstrates the likely development potential under current planning controls. This may be considered to result in a worst case scenario and will provide Council with a clear understanding of the traffic implications arising from the proposed rezoning.

The proposal involves a change of use of the site from *Rural Zone, RU1 Primary Production* to:

- *Light Industrial (IN2 Zone), or*
- *B5 – Business Development, or*
- *B6 – Enterprise Corridor.*

For the purposes of this traffic assessment we have adopted a worst case development scenario using a business park traffic generation level which is 10% higher than the generic industrial traffic generation rate.

2.0 THE SITE & SURROUNDING ENVIRONS

The site location is shown in **Figures 1a & 1b**. The site is currently used as rural land with a rural residence with very little traffic generation.

3.0 EXISTING ROAD & TRAFFIC CONDITIONS

3.1 Road Hierarchy

Hammond Avenue (Sturt Highway) is a STATE ROAD under the care and control of the Roads & Traffic Authority (RTA) which provides an east to west connection from the Hume Highway in the east (via Wagga Wagga) to Narrandera further west. It should be noted that only the central two lanes along Hammond Avenue are under RTA control. This roadway is dual carriageway

with no median strip between oncoming traffic in the vicinity of the proposed site.

Eunony Bridge Road is a local distributor road that provides a north to south connection along the western side of the site serving the Bomen Industrial Area. Eunony Bridge Road links to Tasman Road to the south of the Sturt Highway, via the 40m diameter roundabout to industrial / rural development further south. The 40m diameter roundabout on the Sturt Highway serves B-Double turning movements.

The surrounding road network and hierarchy in proximity to the subject sites is shown in **Figures 1a & 1b** and can be summarised as follows:

Road	Classification	Carriageway	Formation
Hammond Avenue (Sturt Highway)	STATE Road	6.5m to 7m (2LU)*	Sealed
Eunony Bridge Rd	Distributor	7 to 8m (2LU)*	Sealed

* 2LU = 2 lanes undivided

3.2 B-Double Routes

Hammond Avenue (Sturt Highway) and Eunony Bridge Road are both classified as B-Double routes.

3.3 Speed Limits

The posted speed limit along the Hammond Avenue (Sturt Highway) site frontage is 60km/h and further west through the city of Wagga Wagga.

3.4 Traffic Management

The following prevailing traffic management exist within the immediate vicinity of the site:

- 6.5m to 7m wide sealed traffic lanes for two way traffic along Hammond Avenue (Sturt Highway), wideing at roundabout junctions;
- 7m to 8m wide sealed traffic lanes for two way traffic along Eunony Bridge Road;
- 60km/hr speed limit along the Hammond Avenue (Sturt Highway) site frontage;

3.5 Traffic Flows

The most recent 2003 Roads & Traffic Authority (RTA) published data shows that the Annual Average Daily Traffic (AADT) along Sturt Highway, neaer the airport access road was 7,500 vehicles per day. Adopting a Council advised compound growth rate of +1.0% per annum results in an estimated 2011 ADT of 8,100 vehicles per day along the Sturt Highway near the site.

3.6 Traffic Generation Estimates & Traffic Assignment

Traffic Generation was generated using the following steps, as identified in **Figure 2**:

Area of Development= 40,888m^2

20% of site area used for subdivisional road network

0.8 x 40,888m^2 = 32,710m^2

FSR (Floor Space Ratio)

0.5:1

32,710m^2 / 2 = 16,355m^2

Traffic Generation for Business Park

1.1/100m^2 peak hour

= 180 veh/hour.

Trips Entering and exiting the site at peak hour:

	AM	PM
IN	80%	20%
OUT	20%	80%

Equivalent Car trips using the above ratios:

	AM	PM
IN	144	36
OUT	36	144

The expected traffic assignment is as follows:

- 70% along Hammond Avenue to the west
  30% along Hammond Avenue to the east, with 10% along Eunony Bridge Road and 5% along both Tasman Road and Bakers Lane with the residual 10% further east along the highway.

3.7 Intersection Performance

Traffic counts were undertaken at the intersection of Sturt Highway / Eunony Bridge Road / Tasman Road during the weekday AM & PM peak hour commuter periods.

The peak hour flows recorded are presented in **Figures 3** & **4** for the 8 to 9am and 5:30 to 6:30pm commuter peak hour periods.

The performance of the key intersections were analysed with the aid of the **SIDRA Intersection 5.1** computer program, which is used to evaluate the performances of intersections controlled by stop/give way signs, roundabouts or traffic signals. It provides a number of measures of performance including vehicle delay, degree of saturation and level of service.

The result of the analysis is shown in **Table 1** below.

TABLE 1 : EXISTING INTERSECTION PERFORMANCES ("SIDRA 5.1")

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
EXISTING PERFORMANCE						
Sturt Hwy / Eunony Bridge Rd / Tasman Rd	5.30-6.30pm	0.44	11.6 (19.1)	**A** (Worst: B)	Round-about	Right turn from Tasman Rd onto Sturt Hwy
Sturt Hwy / Eunony Bridge Rd / Tasman Rd	8.00-9.00am	0.32	11.4 (17.7)	**A** (Worst: B)	Round-about	Right turn from Tasman Rd onto Sturt Hwy

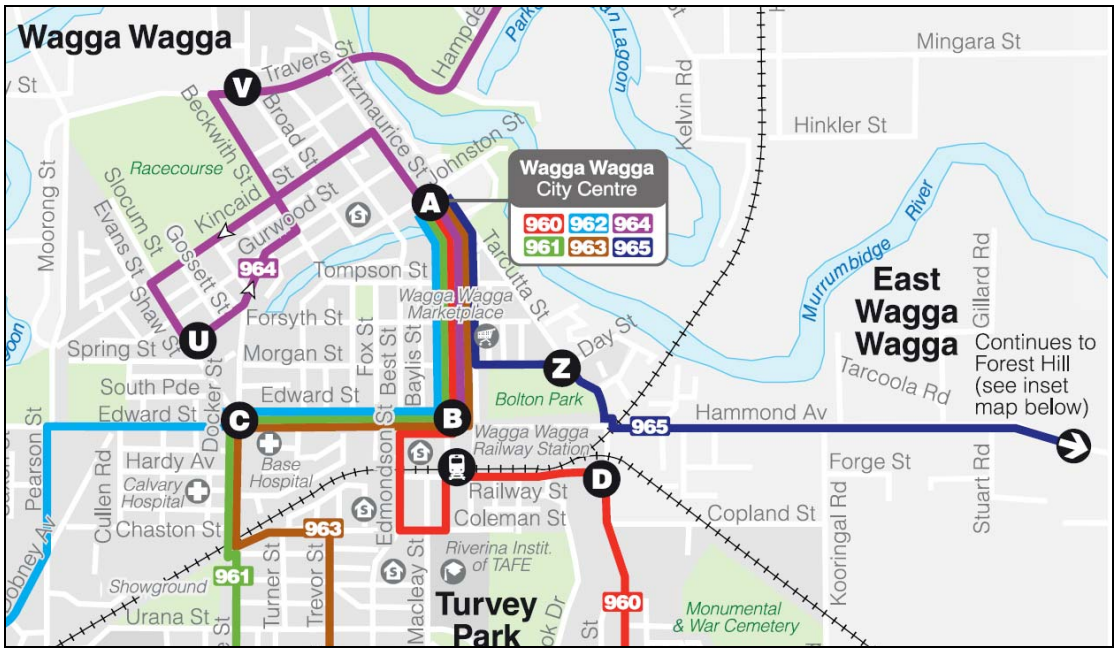
*** Maximum Delay to most critical movement shown in brackets.**

NOTES : (1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) Average delay is the delay experienced by the most disadvantaged movement under stop / give way or roundabout control modes. Maximum delay to the most disadvantaged movement shown in brackets.
(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst.

The criteria used to evaluate performance are shown in **Annexure A**. It is evident from **Table 1** above that the key intersection currently operate at a good level of service.

3.8 Public Transport Services

Limited bus services operate in the vicinity of the site, operating along Sturt Highway (Hammond Avenue). The diagram below illustrates current route near the site.



4.0 IMPACTS OF OTHER POTENTIAL DEVELOPMENT

This firm recently completed an assessment of a proposed Gumly Gumly Industrial Estate as part of a rezoning application.

In order to assess the cumulative impacts of that development in tandem with this subject rezoning application the base case condition for traffic flows includes background growth over a planning horizon of 10 years plus future roundabout provision at the junction of Sturt Highway / Bakers Lane further to the east. The SIDRA file for that FUTURE condition extracted from the October 2011 Traffic Report for the proposed Gumly Gumly Industrial Estate is presented in **Annexure B** to this report.

The background growt in traffic modelled includes the following outcomes over a 10 year planning horizon:

- 1%p.a growth along the Sturt Highway over 10 years resulting in inflated through traffic volumes by a factor of 1.1.
- Additional 100 vehicle trips generated associated with the residential subdivision off Bakers Lane to the south of Sturt Highway. The assignment assumed 80 vehicle trips in the peak direction of travel and 20 vehicle trips in the non-peak direction of travel.
- 0.5% p.a growth along the both Tasman Road and Eunony Bridge Road over 10 years resulting in inflated through traffic volumes by a factor of 1.05.

5.0 ASSESSED ACCESS OPTIONS FOR PROPOSED REZONING

The level of traffic generated based upon Section 4 of this report equates to a peak hourly volume of 180 vehicle trips per hour with 80% (i.e. 144 vehicle trips per hour) in the peak direction of travel with 70% towards the west (i.e. 101 vehicle trips per hour). This level of turning traffic therefore means up to 101 turning left into the site from Hammond Avenue and this same volume turning right out of the site. This reduces to less than 2 vehicles per minute turning left INTO (AM peak) or right OUT (PM peak) of the site during weekday commuter peak hour periods.

The site has a street frontage of approximately 415m, including the service station site. Visibility from the site along Hammond Avenue is very good in both directions for traffic exiting the site from any point along the frontage.

The minimum sight distance for planned driveways / vehicular access roads under AS2890.1-2004 and AS2890.2-2002 for a posted speed limit of 60km/h with NO RESTRICTIONS ON ACCESS are as follows:

- 83m desirable (65m minimum) under AS2890.1-2004.

- 133m desirable for 8 second gap (83m minimum for 5 second gap) under AS2890.2-2002.

The above distances allow traffic to turn right out of the site, if traffic is restricted to left turn only then the site distances reduce to that required for a 3 second gap, which at 60km/h equates to a distance of 70m for trucks.

The existing weekday 8-9AM & 5.30-6.30PM peak hourly PCU traffic flows along Hammond Avenue west of Eunony Bridge Road are as follows:

- AM Peak : **694** vehicles per hour comprising 250 eastbound & 444 westbound.
- PM Peak : **1,170** vehicles per hour comprising 554 eastbound & 616 westbound.

The forecast existing plus 10 years background traffic growth for the weekday 8-9AM & 5.30-6.30PM peak hourly PCU traffic flows along Hammond Avenue west of Eunony Bridge Road are as follows:

- AM Peak : **753** vehicles per hour comprising 273 eastbound & 480 westbound.
- PM Peak : **1,270** vehicles per hour comprising 600 eastbound & 672 westbound.

The forecast existing plus 10 years background traffic growth PLUS effects of the proposed Gumly Gumly Industrial Estate traffic generation (Annexure B) for the weekday 8-9AM & 5.30-6.30PM peak hourly PCU traffic flows along Hammond Avenue west of Eunony Bridge Road are as follows:

- AM Peak : **1,653** vehicles per hour comprising 999 eastbound & 654 westbound.
- PM Peak : **2,142** vehicles per hour comprising 782 eastbound & 1,360 westbound.

Therefore the access options that can be considered are as follows:

1. **OPTION A**:

   Single driveway serving the entire site located at a midpoint along the frontage and at least 70m east of the Lawson Street junction if traffic restricted to left turn movements only OR offset by 85m to 135m to the east of Lawson Street if right turn exit traffic is permitted. Existing driveways opposite to be considered when undertaking detailed design of driveway location.

2. **OPTION B**:

   Two driveways serving with each access complying with the constraint imposed as specified in Option A above. The second access driveway can be at either the eastern or westen ends of the site. Existing driveways opposite to be considered when undertaking detailed design of driveway location.

3. **OPTION C**:

   Public road access opposite Lawson Street junction under GIVE WAY or STOP sign regulatory control with the possibility of a second access in the form of a driveway at either the eastern end of the site or in a midblock location as per Option A above. Existing driveways opposite to be considered when undertaking detailed design of driveway location.

4. **OPTION D**:

   Left-in / left-out with median along Hammond Avenue across proposed driveway(s).

It is emphasised that the development assessed in the subsequent sections of this report is a conceptual scale only at this stage and may change at development application stage. However, in traffic terms, the traffic impacts created will be essentially similar to (if not less than) that assessed and this development scale may in fact be considered to represent a worst-case scenario. Traffic control options considered will include PRIORITY (GIVEWAY / STOP modes) or LEFT-IN / LEFT-OUT manoeuvres only. No SEAGULL control junctions will be considered.

All options assume internal roadway (or right-of-ways) with parking on-grade at the rear of buildings such that buildings gain maximum exposure to passing traffic.

6.0 PARKING IMPACT OF PROPOSED REZONING

The parking requirements of the proposed development scale has been assessed having regard for the requirements of Council's car parking rates (DCP No. 2010 - Section 2). For a GFA of some 16,355m^2, strict application of Council's DCP requires **164** parking spaces.

7.0 TRAFFIC IMPACT

The traffic generation levels of the development proposed have been assessed having regard for the rates contained in the RTA's "Guide to Traffic Generating Developments". The forecast traffic generation levels and traffic assignment were previously estimated in **Section 3.6** of this report.

The level of traffic generated is moderately low at 180 vehicle trips per hour during weekday commuters peak hourly periods such that external impacts will be minimal. The level of generated traffic is low as it equates to a total of 3 vehicles per minute (with 2 in the peak direction of traffic flow and 1 in the contraflow direction). This means that during the weekday 8-9AM peak hour some 2 vehicles will arrive and 1 vehicle will depart per minute. Vice versa in the weekday 5.30-6.30PM peak hour.

The SIDRA tests for all of the access options with the effects of existing peak hour traffic conditions, 10 year background growth and the full effects of the proposed Gumly Gumly Industrial Estate (as discussed in Section 4 of this report) are presented in **Annexure C**.

The criteria used to evaluate performance are shown in **Annexure A**.

It is evident from **Annexure C** that the key intersections based upon ULTIMATE development on the subject site together with the cumulative impact of existing peak hour flows, 10 year background growth and the proposed Gumly Gumly Industrial Estate will perform at a satisfactory level of service, subject to **OPTION D** conditions that permits either one or two driveways serving the site with localised medians to restrict traffic to left turn ENTRY & EXIT movements only.

Under the OPTION D condition, the displaced right turn traffic entering and leaving the site (equating to 126 vehicle trips per hour, with 80% in the peak direction being 101 trips per hour) can utilise nearby existing roundabouts with some traffic detouring through industrial roads to the south with minimal impact.

A lesser scale of development or individual proposed buildings may permit interim access arrangements that allow both right turn entry and exit movements (subject to supportive traffic assessments) until the combined traffic conditions of 10 year growth and the full development potential of the proposed Gumly Gumly Industrial Estate is realised.

The design of vehicular access conditions will be the subject of more detailed traffic studies at future DA stages.

8.0 TRAFFIC ACCESS / CIRCULATION & PARKING DESIGN

The on-site vehicle access and circulation for vehicles associated with the proposed development will satisfy Council's subdivisional road standards, AS2890.1-2004 & AS2890.2-2002 requirements depending upon the scheme developed. The design vehicle is expected to be a 19m long semi-trailer for a single development or a 12.5m long Heavy Rigid Vehicle (HRV) for individual tenancies.

9.0 CONCLUSIONS

In view of the foregoing, the proposed rezoning application is supportable with respect to road safety, traffic flow efficiency and residential amenity considerations.

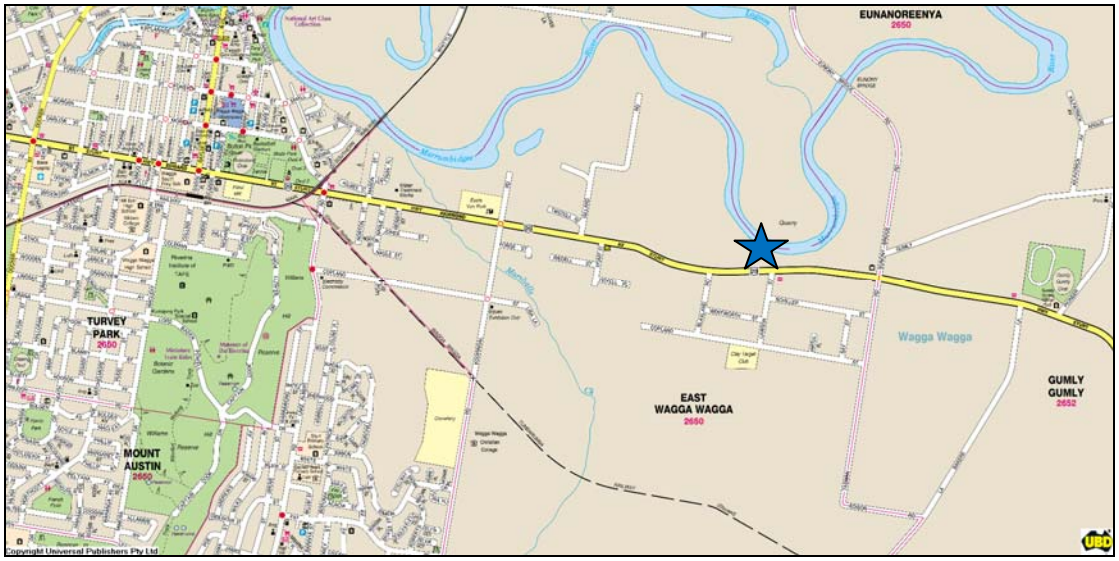
The development can accommodate on-site parking needs in full compliance with Council's controls.

It is evident from **Annexure C** that the key intersections based upon ULTIMATE development on the subject site together with the cumulative impact of existing peak hour flows, 10 year background growth and the proposed Gumly Gumly Industrial Estate will perform at a satisfactory level of service, subject to **OPTION D** conditions that permits either one or two driveways serving the site with localised medians to restrict traffic to left turn ENTRY & EXIT movements only.

Under the OPTION D condition, the displaced right turn traffic entering and leaving the site (equating to 126 vehicle trips per hour, with 80% in the peak direction being 101 trips per hour) can utilise nearby existing roundabouts with some traffic detouring through industrial roads to the south with minimal impact.

A lesser scale of development or individual proposed buildings may permit interim access arrangements that allow both right turn entry and exit movements (subject to supportive traffic assessments) until the combined traffic conditions of 10 year growth and the full development potential of the proposed Gumly Gumly Industrial Estate is realised.

The design of vehicular access conditions will be the subject of more detailed traffic studies at future DA stages. The design vehicle is expected to be a 19m long semi-trailer for a single development or a 12.5m long Heavy Rigid Vehicle (HRV) for individual tenancies.



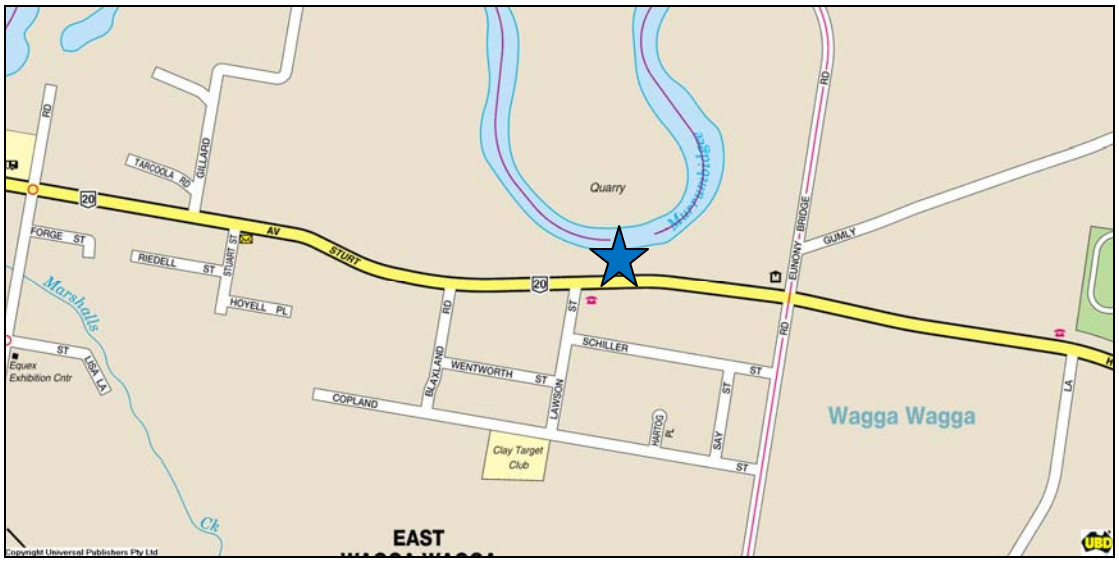
THE SITE

Proposed Industrial Subdivision
Hammond Avenue, East Wagga Wagga

FIGURE 1a
SITE LOCATION

PREPARED FOR: Mr J HOWARD

BY: M^CLAREN TRAFFIC ENGINEERING



THE SITE

Proposed Industrial Subdivision
Hammond Avenue, East Wagga Wagga

FIGURE 1b
SITE LOCATION

PREPARED FOR: Mr J HOWARD

BY: M[C]LAREN TRAFFIC ENGINEERING

Area of Site = 40,888m^2

Less 20% for subdivisional roads
=0.8 x 40,888 = 32,710m^2

FSR = 0.5:1 ⟶ 50% = 16,355m^2

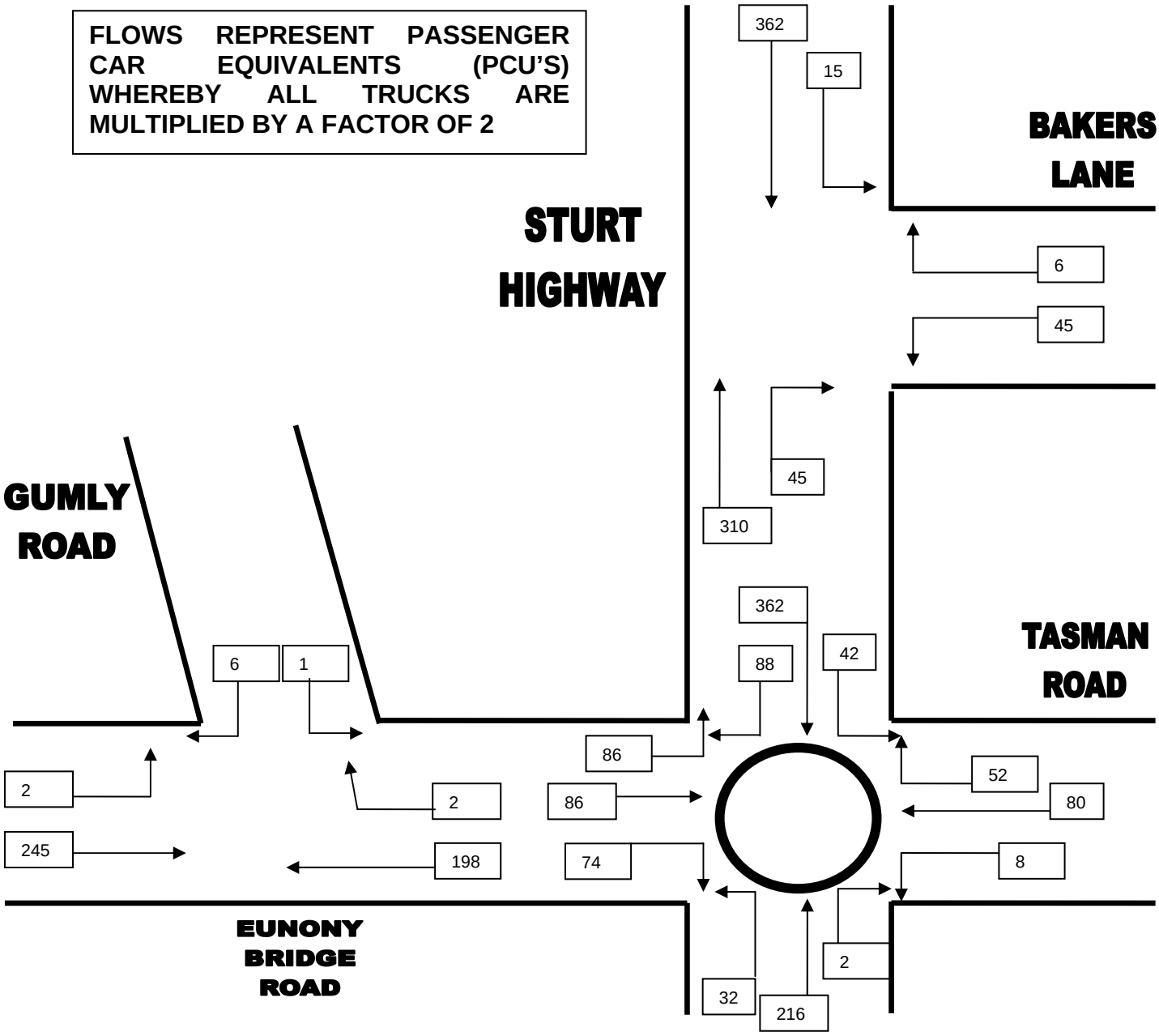
Therefore, 1.1 veh/100m^2 = 180 vehicle trips

Proposed Industrial Subdivision
Hammond Avenue, East Wagga Wagga

FIGURE 2: Land to be Developed

PREPARED FOR: Mr J HOWARD

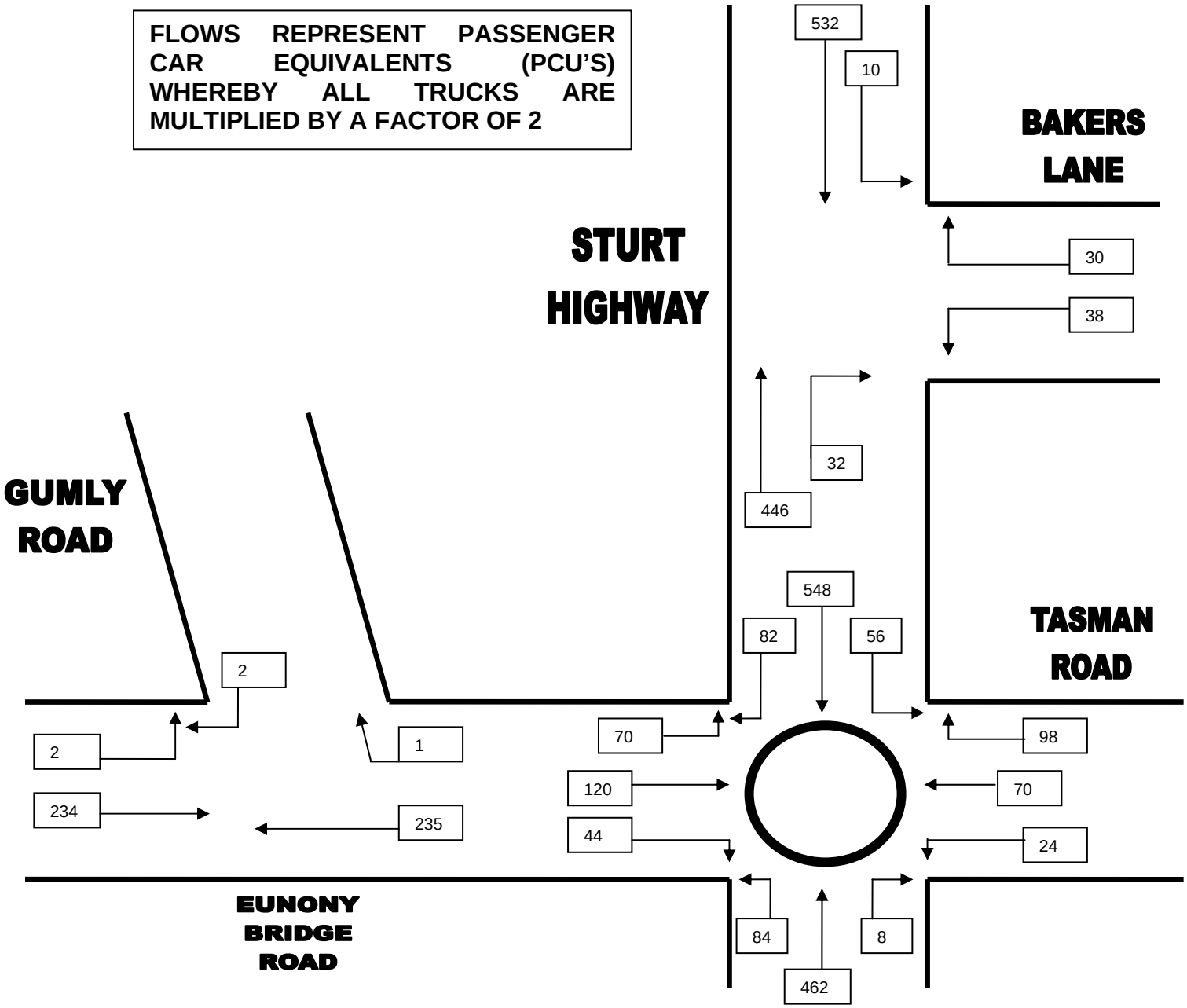
BY: M^CLAREN TRAFFIC ENGINEERING



Proposed Industrial Subdivision
Hammond Avenue, East Wagga Wagga

FIGURE 3: AM PEAK TRAFFIC FLOWS (8-9AM)

PREPARED FOR: Mr J HOWARD
BY: M^CLAREN TRAFFIC ENGINEERING



Proposed Industrial Subdivision
Hammond Avenue, East Wagga Wagga

FIGURE 4: PM PEAK TRAFFIC FLOWS (5:30-6:30PM)

PREPARED FOR: Mr J HOWARD

BY: M^CLAREN TRAFFIC ENGINEERING

ANNEXURE A: LEVEL OF SERVICE CRITERIA

Level of Service	Ave Delay per Vehicle (sec/veh)	Traffic Signals & Roundabouts	Give Way & Stop Signs
A	< 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	over 70	Extra capacity required	Extreme delay, traffic signals or other major treatment required

Adapted from RTA Guide to Traffic Generating Developments, December 2002

ANNEXURE B: SIDRA RESULTS FROM GUMLY GUMLY INDUSTRIAL ESTATE REZONING ASSESSMENT

10 year growth ANALYSIS + DEVELOPMENT

OPTION A- ROUNDABOUT

TABLE 2: FORECAST INTERSECTION PERFORMANCES (SIDRA INTERSECTION 5.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
FUTURE PERFORMANCE						
Tasman Rd / Sturt Hwy / Eunony Bridge Rd*	PM	0.96	31.9 (152)	**C** (Worst: F)	Round-about	Right turn from Tasman Rd onto Sturt Hwy**
Tasman Rd / Sturt Hwy / Eunony Bridge Rd	AM	0.60	13.7 (23.3)	**A** (Worst: B)	Round-about	Right turn from Eunony Bridge Rd onto Sturt Hwy

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

* ASSUMES UPGRADE OF STURT HIGHWAY WITH 100M EASTBOUND SHARED THROUGH & LEFT LANE PLUS 30M SHARED THROUGH / LEFT IN TASMAN ROAD & 30M TAPER IN EUNONY BRIDGE ROAD DOWNSTREAM OF ROUNDABOUT.

** WITH FUTURE ROUNDABOUT AT STURT HIGHWAY BAKERS LANE TRAFFIC FROM SOUTHERN REGION OF TASMAN ROAD CAN UTILISE EDISON ROAD TO GAIN ACCESS TO BAKERS LANE FOR RIGHT TURN ONTO STURT HIGHWAY

ANNEXURE C: SIDRA RESULTS

(Sheet 1 of 4)

10 year growth ANALYSIS + ANNEXURE B + DEVELOPMENT

OPTION A - SINGLE DRIVEWAY OFFSET TO THE EAST OF LAWSON ST

TABLE 3: FORECAST INTERSECTION PERFORMANCES (SIDRA INTERSECTION 5.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
FUTURE PERFORMANCE						
Hammond Avenue / Site Driveway*	PM	>1.00	>70 (>70)	**N/A** (Worst: F)	Driveway	Right turn from site*
Hammond Avenue / Site Driveway*	AM	1.00	13.4 (>70)	**A** (Worst: F)	Driveway	Right turn from site*
Tasman Rd / Sturt Hwy / Eunony Bridge Rd**	PM	1.00	37.7 (>70)	**C** (Worst: F)	Round-about	Right turn from Tasman Rd onto Sturt Hwy***
Tasman Rd / Sturt Hwy / Eunony Bridge Rd	AM	0.62	13.9 (20.6)	**A** (Worst: B)	Round-about	Right turn from Eunony Bridge Rd onto Sturt Hwy

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

* ASSUMES RIGHT TURN ENTRY FROM WESTBOUND LANE, NO RIGHT TURN BAY PLUS RIGHT TURN OUT ACROSS 4 LANES ULTIMATELY.

****** ASSUMES UPGRADE OF STURT HIGHWAY WITH 100M EASTBOUND SHARED THROUGH & LEFT LANE PLUS 30M SHARED THROUGH / LEFT IN TASMAN ROAD & 30M TAPER IN EUNONY BRIDGE ROAD DOWNSTREAM OF ROUNDABOUT.

*** WITH FUTURE ROUNDABOUT AT STURT HIGHWAY BAKERS LANE TRAFFIC FROM SOUTHERN REGION OF TASMAN ROAD CAN UTILISE EDISON ROAD TO GAIN ACCESS TO BAKERS LANE FOR RIGHT TURN ONTO STURT HIGHWAY

ANNEXURE C: SIDRA RESULTS

(Sheet 2 of 4)

10 year growth ANALYSIS + ANNEXURE B + DEVELOPMENT

OPTION B - TWO DRIVEWAYS OFFSET AWAY FROM LAWSON ST

TABLE 4: FORECAST INTERSECTION PERFORMANCES (SIDRA INTERSECTION 5.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
FUTURE PERFORMANCE						
Hammond Avenue / Site Driveway*	PM	>1.00	61.5 (>70)	**E** (Worst: F)	Driveway	Right turn from site*
Hammond Avenue / Site Driveway*	AM	1.00	9.6 (>70)	**A** (Worst: F)	Driveway	Right turn from site*
Tasman Rd / Sturt Hwy / Eunony Bridge Rd**	PM	1.00	37.7 (>70)	**C** (Worst: F)	Round-about	Right turn from Tasman Rd onto Sturt Hwy***
Tasman Rd / Sturt Hwy / Eunony Bridge Rd	AM	0.62	13.9 (20.6)	**A** (Worst: B)	Round-about	Right turn from Eunony Bridge Rd onto Sturt Hwy

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

* ASSUMES RIGHT TURN ENTRY FROM WESTBOUND LANE, NO RIGHT TURN BAY PLUS RIGHT TURN OUT ACROSS 4 LANES ULTIMATELY.

****** ASSUMES UPGRADE OF STURT HIGHWAY WITH 100M EASTBOUND SHARED THROUGH & LEFT LANE PLUS 30M SHARED THROUGH / LEFT IN TASMAN ROAD & 30M TAPER IN EUNONY BRIDGE ROAD DOWNSTREAM OF ROUNDABOUT.

*** WITH FUTURE ROUNDABOUT AT STURT HIGHWAY BAKERS LANE TRAFFIC FROM SOUTHERN REGION OF TASMAN ROAD CAN UTILISE EDISON ROAD TO GAIN ACCESS TO BAKERS LANE FOR RIGHT TURN ONTO STURT HIGHWAY

ANNEXURE C: SIDRA RESULTS

(Sheet 3 of 4)

10 year growth ANALYSIS + ANNEXURE B + DEVELOPMENT OPTION C - ONE DRIVEWAYS OFFSET AWAY FROM LAWSON ST & ONE OPPOSITE LAWSON STREET

TABLE 5: FORECAST INTERSECTION PERFORMANCES (SIDRA INTERSECTION 5.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
FUTURE PERFORMANCE						
Hammond Avenue / Site Driveway or opposite Lawson St*	PM	>1.00	61.5 (>70)	**E** (Worst: F)	Driveway	Right turn from site*
Hammond Avenue / Site Driveway or opposite Lawson St*	AM	1.00	9.6 (>70)	**A** (Worst: F)	Driveway	Right turn from site*
Tasman Rd / Sturt Hwy / Eunony Bridge Rd**	PM	1.00	37.7 (>70)	**C** (Worst: F)	Round-about	Right turn from Tasman Rd onto Sturt Hwy***
Tasman Rd / Sturt Hwy / Eunony Bridge Rd	AM	0.62	13.9 (20.6)	**A** (Worst: B)	Round-about	Right turn from Eunony Bridge Rd onto Sturt Hwy

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

* ASSUMES RIGHT TURN ENTRY FROM WESTBOUND LANE, NO RIGHT TURN BAY PLUS RIGHT TURN OUT ACROSS 4 LANES ULTIMATELY.

****** ASSUMES UPGRADE OF STURT HIGHWAY WITH 100M EASTBOUND SHARED THROUGH & LEFT LANE PLUS 30M SHARED THROUGH / LEFT IN TASMAN ROAD & 30M TAPER IN EUNONY BRIDGE ROAD DOWNSTREAM OF ROUNDABOUT.

*** WITH FUTURE ROUNDABOUT AT STURT HIGHWAY BAKERS LANE TRAFFIC FROM SOUTHERN REGION OF TASMAN ROAD CAN UTILISE EDISON ROAD TO GAIN ACCESS TO BAKERS LANE FOR RIGHT TURN ONTO STURT HIGHWAY

ANNEXURE C: SIDRA RESULTS

(Sheet 4 of 4)

10 year growth ANALYSIS + ANNEXURE B + DEVELOPMENT

OPTION D – TWO DRIVEWAYS OFFSET AWAY FROM LAWSON ST WITH LOCALISED MEDIANS TO RESTRICT TRAFFIC TO LEFT-IN/LEFT-OUT ONLY

TABLE 6: FORECAST INTERSECTION PERFORMANCES (SIDRA INTERSECTION 5.1)

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type	Worst Movement
FUTURE PERFORMANCE						
Hammond Avenue / Site Driveway*	PM	0.49	1.6 (23.8)	**A** (Worst: B)	Driveway	Left turn from site*
Hammond Avenue / Site Driveway*	AM	0.32	1.3 (29.3)	**A** (Worst: C)	Driveway	Left turn from site*
Tasman Rd / Sturt Hwy / Eunony Bridge Rd**	PM	1.00	37.7 (>70)	**C** (Worst: F)	Round-about	Right turn from Tasman Rd onto Sturt Hwy***
Tasman Rd / Sturt Hwy / Eunony Bridge Rd	AM	0.62	13.9 (20.6)	**A** (Worst: B)	Round-about	Right turn from Eunony Bridge Rd onto Sturt Hwy

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

* ASSUMES RIGHT TURN ENTRY FROM WESTBOUND LANE, NO RIGHT TURN BAY PLUS RIGHT TURN OUT ACROSS 4 LANES ULTIMATELY.

****** ASSUMES UPGRADE OF STURT HIGHWAY WITH 100M EASTBOUND SHARED THROUGH & LEFT LANE PLUS 30M SHARED THROUGH / LEFT IN TASMAN ROAD & 30M TAPER IN EUNONY BRIDGE ROAD DOWNSTREAM OF ROUNDABOUT.

*** WITH FUTURE ROUNDABOUT AT STURT HIGHWAY BAKERS LANE TRAFFIC FROM SOUTHERN REGION OF TASMAN ROAD CAN UTILISE EDISON ROAD TO GAIN ACCESS TO BAKERS LANE FOR RIGHT TURN ONTO STURT HIGHWAY