Wagga Wagga City Council

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urban planning and facilities management

Local Environmental Study 2008

Prepared for
Wagga Wagga City Council

Prepared by
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This report contains the findings of a Local Environmental Study (LES) undertaken by Willana Associates on behalf of Wagga Wagga City Council (the Council). The LES was undertaken in response to recommendations in Council's Wagga Wagga Spatial Plan 2007 that included advancing planning that may allow;

- residential development at Boorooma, Estella and Lloyd;
- industrial development at Bomen, and smaller sites at Edison Road, Copland Street and Hammond Avenue; and
- investigate the development potential for a site on Moorong Street.

The LES also considers the suitability of residential development at two smaller "infill" sites on Main Street, Lake Albert and Plumpton Rd located adjacent to existing urban areas. The location of the LES sites are provided in Figure 1: LES study areas.

The LES considers the suitability of the land for various uses and makes recommendations for future land use planning. It will support the preparation of a new consolidated Local Environmental Plan (LEP) which will form the principal planning framework for the City of Wagga Wagga.

Chapter 1 – Introduction

This chapter provides an overview of the study area sites within the context of the Wagga Wagga Local Government Area (LGA) and also provides an outline of the study process and the LES report structure.

Chapter 2 - Environmental Context

This chapter summarises the investigation of the existing natural and built environment factors that may influence future growth of the City.

Natural environment factors

Previous studies commissioned by the Council have revealed a lack of native vegetation in the LGA, with approximately 90% of original vegetation having been cleared. These outcomes have been subsequently associated with threats to native fauna through loss of habitat.

Increases in soil salinity have resulted in damage to property and impacts to agricultural capacity of the land. Water resources, including waterways, ground water and wetlands, have been degraded.

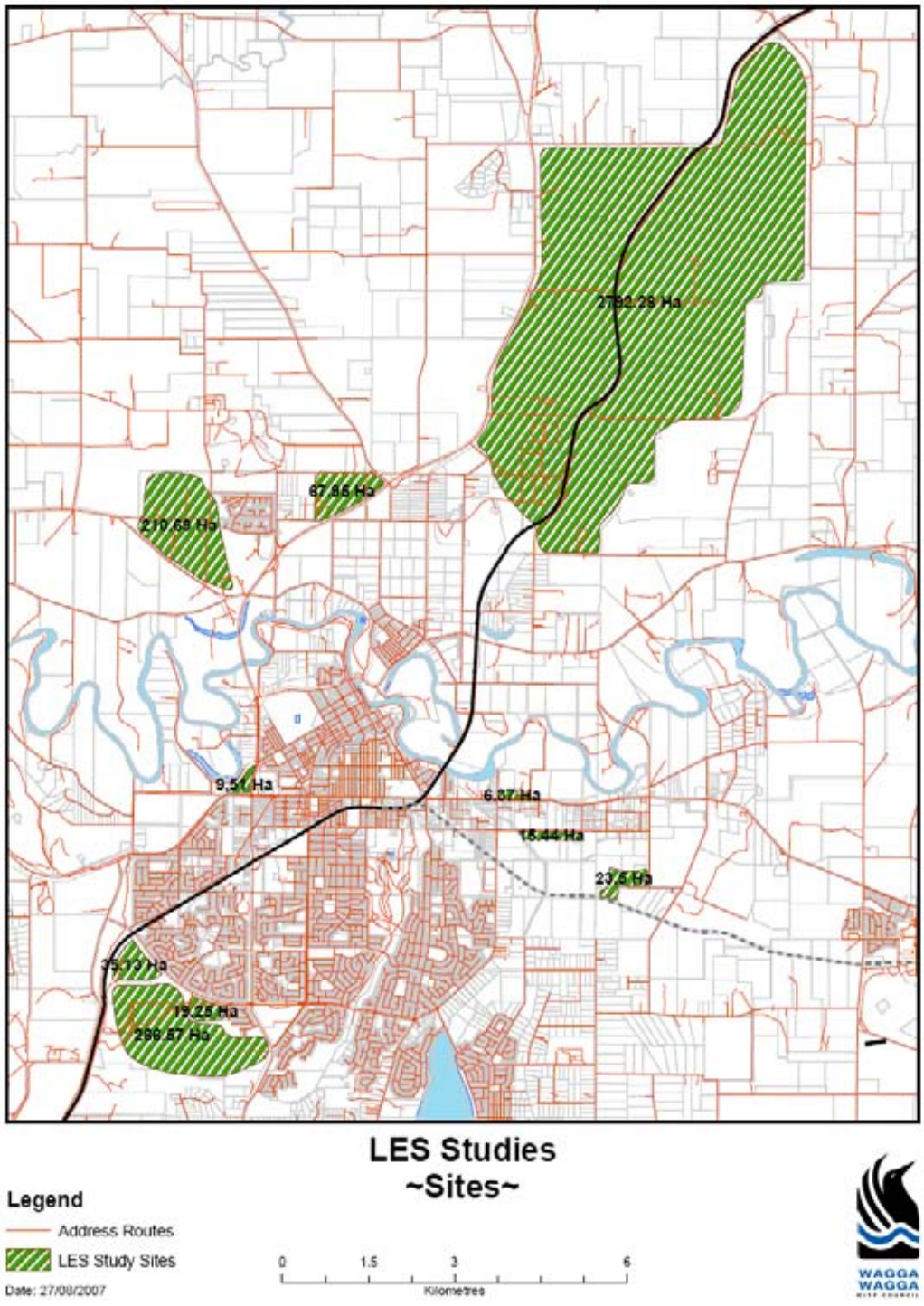


Figure 1: LES study areas

Built environment factors

It is anticipated that by the end of 2009, there will be approximately 338 allotments available as the "mainstream supply" of new residential land in Wagga Wagga. Considering increasing demand demonstrated by the "pre-selling" of allotments prior to the release of subdivision certificates, a shortfall

in residential land supply is likely. With a trend towards decreasing housing affordability in the City, supply of residential allotments must not be constrained to the extent that affordability is further affected. There is also evidence of an increase in the demand for industrial land.

Chapter 3 - Strategic Response

A review of strategic planning documents guiding the shape of Wagga Wagga was undertaken and considered in relation to the structure planning and strategy components of this LES. Recommendations guiding the future development of Wagga Wagga outlined in the Council's strategic planning documents include:

- A 15 year residential land bank should be adopted being 5 years supply available to market; 5 years supply with development approvals well advanced and a further 5 years supply with planning processes programmed to meet the schedule.
- A mix of block sizes and housing types should be explored when considering the promotion of "viable neighbourhoods".
- The supply of industrial land should promote the continued expansion of the City's industrial base through the ready availability of larger industrial lots at competitive prices.
- Opportunities for the provision of larger sites at Bomen, resulting from consolidated land ownerships, should also be considered. Bomen's accessibility via roads that can accommodate "B Double" trucks and the presence of sidings and a road/rail intermodal terminal providing links to capital cities, must be taken into account.
- Planning must consider a shortfall of retail floor space in the south of the City and the recommendation of a Council strategy that land for neighbourhood centres be provided at Lloyd and Boorooma/ Estella.
- Provision of land for open space and recreation should consider trends away from organised sporting activities to non-formal leisure pursuits and increased demand for improved parks and multi-functional areas.
- Adopting whole of community approaches to managing the problem of urban salinity.
- Identify opportunities with Department of Environment and Climate Change (DEC) for introducing Biodiversity Banking and Offset Scheme, or similar, in Wagga Wagga.
- Introduction of water conservation requirements for new developments.
- Work with the community and landowners in developing a better understanding and appreciation of the value of protecting and preserving Wagga Wagga's Indigenous and Cultural heritage.

Chapter 4 - Statutory Framework

The future Wagga Wagga Local Environmental Plan (LEP) provisions relating to the study area must have regard to the principles of Ecologically Sustainable Development (ESD), in order to serve the objectives of Section 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

Areas of good or moderate condition remnant native woodland, that are consistent with endangered ecological communities, must be retained in accordance with State Government legislation. The loss of low condition remnant woodland, that has been cleared during development, must be offset by the retention of existing trees or planting of saplings.

In accordance with State Government policy, access to housing, jobs and services by modes of transport other than the car, should be promoted and any changes in land use zonings must allow for increases in densities and a variety of housing types.

Section 94 plans will need to take into account the increased demand arising from new developments. In particular, planning for new areas must consider the need for community centres at Lloyd and Estella, as identified in Council's Developer Contribution Plans.

Chapter 5 - The Community

A projected future increase in the population of the City will drive an increase in demand for residential land. Recent trends in prices threaten the relatively high level affordability of housing in Wagga Wagga.

Planning for new areas must acknowledge projected increases in the proportion of people aged over 65 and decreases in the median household size, which will increase demand for smaller dwellings, adaptable homes and senior's accommodation. Demographic trends imply that the school aged populations of new urban areas at Lloyd, Boorooma and Estella would exceed thresholds for the provision of primary schools.

Community concerns about substandard open space in new areas must be addressed. Equity of access to schools, open space and community facilities should be promoted. It is envisaged that 4.5 hectares of land should be acquired for new sports facilities at Estella/ Boorooma.

Planning for economic development must consider a recent expansion in the transport, logistics and warehousing sectors that is likely to increase demand for industrial land in proximity to transport infrastructure. Steady activity in manufacturing and the locational advantages of Wagga Wagga imply a need to ensure sustained activity and promote future growth.

Site Assessments

The investigations of the sites resulted in the development of sound planning principles that relate to preserving the environment. The LES report deals with each large site as a separate chapter that can "stand alone" in terms of the planning outcomes. The following summary pulls together the generic principles that apply to more than one site and then provides a summary of site specific outcomes under the relevant Chapter heading:

- The conservation of remnant woodland in moderate to high condition should be a priority, with the objectives of minimising edge effects and increasing connectivity between woodland patches, both within and outside the site. Areas zoned for conservation should be transferred to public ownership, with conservation management plans for each area.
- Master plans should require minimisation of watered areas, advanced tree planting, connectivity to a piped stormwater drainage system and other measures to reduce ground water recharge.
- Urban development leads to increases in impervious area and stormwater runoff volumes and flow-rates. Runoff should be managed to minimise impacts on downstream waterways, property, habitats and landform while maintaining environmental flows.
- Stormwater detention facilities should be provided at a local catchment level and are best located toward the downstream end of the catchment, outside areas susceptible to flooding.
- Development should be consistent with the principles of Water Sensitive Urban Design (WSUD). These principles include the incorporation of drainage corridors in public open space and the use of sediment basins, swales and wetlands to remove sediments from runoff, while conveying stormwater and managing flows. WSUD infrastructure offers opportunities to enhance open space and road reserves. WSUD also promotes the minimisation of impervious surfaces to encourage infiltration and the retention of runoff as an alternative to potable water.
- Rainwater re-use schemes should be incorporated into developments. Harvested rainwater can easily be used for non-potable purposes (although, requirements for monitoring and treating the condition of harvested rainwater need to be considered).
- Generally, land in the study area does not appear to have a high degree of potential for contamination and the degree to which it may be contaminated could be ascertained at development application stage, should rezoning occur.
- Areas with the potential to contain sites and objects of heritage significance are also identified. Rezoning may occur, subject to the completion of more rigorous investigations at development application stage into the presence or otherwise of sites and objects. Should further

investigation identify sites and objects with heritage significance, then conservation of such sites should be mandated.

- Potential residential areas and smaller sites considered for industrial use are capable of being served by the road network that immediately surrounds them. Detailed recommendations of required road and intersection upgrades are contained in this report.
- Slopes along ridges at Lloyd and on the hilltop in the southern portion of Boorooma form bushfire risk constraints. Other sites predominantly present a low bushfire risk, with the exception of small areas of moderate risk at Estella and Bomen.
- In all instances, constraints can be addressed with appropriate asset protection zones and the provision of access for emergency vehicles.
- While the majority of the study area may be served by conventional sewer infrastructure, slope constraints may necessitate the implementation of high pressure systems in some areas.
- Once new infrastructure and upgrades have been provided, the cost of downstream infrastructure for potential new residential areas would be between $3,500 and $5,800 per equivalent tenement. Downstream costs for industrial areas would be between $4,800 and $8,300.
- As stated above, planning for new areas must consider the need for community centres at Lloyd and Estella, as identified in Council's developer contributions planning.
- Land for open space and recreation should be provided at a rate of 4ha per 1,000 people.

Chapter 6 - Lloyd

The rezoning of large areas of Lloyd for a combination of residential development and conservation land uses is generally supported.

Areas of low condition remnant woodland may be retained in order to offset the loss of trees during redevelopment and to provide connectivity between vegetated patches. In particular, a strip of woodland on a ridgeline to the south of Lloyd should be conserved to link areas of moderate to high condition woodland.

Salinity is a significant issue over the Lloyd site. The potential for urban development to reduce ground water recharge by replacing permeable soil with impermeable surfaces should be recognised. Development of new areas should involve the retention of remnant trees and regrowth of native woodland as one step to address the issue of salinity.

The ability for new development to impact on development further down the slope is significant and warrants careful consideration during the rezoning process. Consent to development proposals at Lloyd must be conditional upon

the demonstration that it will not result in soil salinity impacts in areas down slope of the site. A mechanism to recover the associated capital costs for dewatering recharge areas should be created in accordance with provisions of EP&A Act that relate to developer contributions.

Archaeological investigations conducted for this study have identified sites of Aboriginal heritage significance. These include scarred trees and open campsites at Lloyd, which must be conserved through statutory provisions and development controls.

There may be some contamination associated with the quarry at Lloyd. However, this would be likely to be limited to hydraulic oils from earthmoving equipment.

The bus route and collector road networks into the site should be designed so that all dwellings are within 500m of a bus stop. New footpaths should connect with the existing network in Glenfield Park. Provision for off-road cycling should be made along the main distributor road in Lloyd to provide for cyclists travelling on the relatively steep grades.

The existing transmission easement should be utilised as a corridor to promote continuity for pedestrians and cyclists along the corridor to the Glenfield Park Neighbourhood Centre.

It is recommended that the Wiradjuri Walking Track be relocated to a high ridgeline at the centre of Lloyd. This would improve views from the track and allow it to be incorporated into a conservation area to enhance its environmental qualities.

A neighbourhood centre to serve Lloyd, Bourkelands and rural areas further south, would be likely to include a 2,500m² supermarket and up to 1,000m² of specialty retailing.

Previous investigations also found that there is a high pressure gas main in the vicinity of Lloyd capable of supporting residential development without the need to upgrade.

The sites are generally close to major potable water infrastructure that will assist in the commencement of water supply into the area. However, the provision of water at Lloyd is not practicable above the 270m contour line.

Comment sought from telecommunications providers has not been forthcoming. However, previous investigations have concluded that Lloyd could be serviced by extending underground cables from the existing network.

Chapter 7 – Boorooma East

The rezoning of land for residential and conservation uses is generally supported for Boorooma.

Environmental living zoning at Boorooma should be implemented in residential areas where the conservation of woodland is required. These areas will provide connectivity between vegetated areas and promote appropriate visual character.

Ecological communities that are not listed as endangered may still require conservation on the basis of their scarcity within the region. This principle would apply to a small area of river redgum forest adjacent to the Olympic Highway at Borooma.

It is anticipated that a supermarket-anchored centre would be viable in the Boorooma/ Estella area and that it would include a supermarket of 2,000m² and an additional 800m² of retail and commercial space.

It is recommended that a primary school be provided at Estella to serve the combined Boorooma/ Estella area. A secondary school should be provided at Boorooma.

Chapter 8 – Estella West

The rezoning of land for residential and conservation uses is generally supported for Estella West.

In addition to conservation objectives, retention of low condition woodland should also be undertaken to promote amenity and consistency with surrounding rural character through the provision of “tree-lined boulevards”. To this end, it is recommended that a strip of low condition woodland along Harris Road in Estella be zoned for conservation.

Conservation zoning is also recommended along the southern part of Pine Gully Road to enable revegetation. This would provide offsets for trees cleared during development and create a flyway for Superb Parrots, which are native to the area.

The inadequacy of recreation infrastructure in Glenfield Park and Estella must be addressed. At Estella West, a hilltop park will be an important recreational facility, while open space and a sports oval are appropriate east of Pine Gully Road.

Chapter 9 - Smaller Residential Sites

Their relatively small scale and proximity to nearby existing residential areas imply that the smaller "infill" sites may be serviced by existing nearby infrastructure.

Rezoning of these sites may proceed on the basis that statutory processes are in place to ensure that isolated remnant trees and potential archaeological sites are identified and conserved during development.

Chapter 10 – Bomen

A section of the Bomen study area is suitable for rezoning to accommodate industrial land uses. This is subject to transition areas, acoustic buffers and low key industrial uses in certain peripheral areas.

The quarry site at Bomen is recommended for an environmental conservation zoning. The conservation zoning will provide offsets for lost native vegetation and form part of an acoustic buffer recommended for Bomen.

Two areas at Bomen - one to the east of Byrnes Road, the other, owned by Rivco Pty Ltd, to the north of East Bomen Road site, have been subject to an Environmental Site Assessment which found some contamination from agricultural industries. It was concluded that the contamination could be remediated to enable industrial uses.

Council has conducted an investigation, separate to the LES, into the impacts of existing industrial activities at Bomen on Cartwrights Hill with a view to considering the future of residential development in the suburb. It has been concluded from Council's investigations that existing industrial activities at Bomen result in unsatisfactory impacts on air quality to nearby residential areas, and that an increase in residential development at Cartwrights Hill would likely result in an increase in complaints about odour impacts from industry at Bomen. As a result, planning controls should not encourage an increased residential population at Cartwrights Hill. Emissions from future industrial activities should be made to comply with air quality criteria through the implementation of technical measures.

The provision of acoustic buffers around industrial uses at Bomen is recommended to ameliorate noise impacts. A 200 metre outer buffer should be zoned to prohibit industrial activity. An inner buffer of 300 meters should restrict development to "light industry" that may only take place during daytime hours.

Acoustic buffers offer opportunities for revegetation to further ameliorate noise impacts and provide offsets for the loss of trees cleared in development. Acoustic buffers should also consider existing noise generating activities. A

buffer adjacent to the railway line at Bomen, which carries frequent services between Sydney and Melbourne, may not significantly ameliorate impacts given the noise generated by trains.

Acoustic buffers could incorporate land that currently forms the Trahairs Road alignment. If the road were realigned to the south, the existing Trahairs Road (which is unsealed) could be revegetated to provide an acoustic buffer alongside the newly constructed sealed road.

Should Bomen be developed for industrial uses, larger scale upgrades and realignments for transport would be required. Bomen Road would be the most appropriate principal link from the area to Olympic Way, with Byrnes Road as an appropriate supplementary route. Trahairs Road could form an important link to central and north Bomen.

Industrial development at Bomen could be reticulated to a specialised facility which partially treats industrial sewage prior to transfer to the Narrung Street Sewage Treatment Works.

Chapter 11- Smaller Industrial Sites

At the smaller industrial sites to the east of the City (Copland Street, Hammond Ave and Edison Rd), stormwater should be managed on an individual lot basis and involve retention of runoff in order that it does not contribute to flooding downstream.

The Moorong Street site's function as a detention facility and is a constraint to development and the loss of flood storage volume that would result from developing the site must be considered.

Chapter 12 - Land Use Strategy

The process of determining appropriate land uses has involved two separate stages. The first stage being the collation of constraints maps identifying areas such as steeply sloping land; flood affected land; presence of threatened species and endangered ecological communities.

After the compilation of a constraint map, the land best suited for urban development was identified. The outcomes of the environmental studies also help identify preferred land uses for each of the various sites. In considering these land uses, particular consideration has been given to the need for various forms of development, particularly housing and employment lands. The demands for these development outcomes have also been balanced by the identified environmental and cultural constraints of the land.

Following the determination of land use maps, structure plans for the sites identified for major residential development (Lloyd, Boorooma East and Estella West) have been prepared. These structure plans are based on the recommendations and land use strategies in the LES and reflect accepted contemporary urban design principles including:

- New residential areas are to be designed around open space and "green corridors" connecting neighbourhoods. Drainage corridors and riparian areas are to enhance open space.
- Dwellings are to be no more than 400m from open space and neighbourhoods should be clustered to provide "walkable" points of interest and locations for play. Street layouts should be based predominantly on grid patterns to promote permeability.
- Schools should be located along open space corridors and easily accessed by road.
- Views from the public domain at Lloyd, Borooma East and Estella West should be preserved. Road alignments and allotment structure should take advantage of local and regional views along streets.
- Public access should be allowed to land at higher elevations at Lloyd and Boroooma East in order to take advantages of views.
- Development on the escarpment at Boorooma West should complement the visual qualities of a landscape likely to form a future gateway to the City Centre. To this end, subdivision should be restricted to large lots with built form located to preserve rural character.
- Conservation zoning implemented to protect moderate condition vegetation between Farrer Road and the hill in the southern portion of the Boorooma East study area offers the opportunity to create a "tree lined boulevard" forming a gateway to a new residential area. This will enhance amenity and promote consistency with surrounding character.
- "Tree-lined boulevards" may also be created through the application of conservation zoning to low condition woodland. This principle should apply to a strip of low condition woodland along Harris Road in Estella West. Conservation zoning should also be applied to a 20m strip of land along Pine Gully Road.
- Crime Prevention through Environmental Design (CPTED) principles should be applied to the design of allotment structure public areas including road boundaries to parks.
- Facilities and services should be provided at a local level, with direct links between future neighbourhood centres.
- An open space corridor is recommended along the transmission line easement through Glenfield Park up to Red Hill Road, west of Kirrang Avenue. The corridor should be extended into Lloyd to create a continuous network, providing access by walking and bicycle paths.

- Large lots residential zonings and vegetation screening is to be located to create a transition between rural and urban areas.
- Planning of new residential areas should consider the likely future development of Bourkelands and Hilltop Estate in order to promote spatial cohesiveness between suburbs.

Chapter 13 - Recommendations

Rezoning of Lloyd, Boorooma East, Estella West, Main Street and Plumpton Rd sites for residential development and rezoning of Bomen and the Eastern industrial sites for industrial development is supported by the LES, subject to various buffers and conservations areas being put in place. The land uses are defined in the various plans associated with each study area.

A summary of the generic recommendations for land use change within the study areas is provided. The list is not exhaustive, but serves as a starting point for matters that warrant inclusion in the preparation of the future Draft LEP for Wagga Wagga.

- The development of land must include water quality treatment devices to minimise urban runoff impacts into the Murrumbidgee River. This includes particular care for ensuring that “first flush” material does not travel directly into the river system.
- It is recommended that a Conservation Management Plan (CMP) be prepared for land zoned for conservation. The CMP must include quantifiable objectives and performance criteria and be integrated with other management issues including bushfire and recreational open space. The CMP can be prepared prior to, or in parallel with, environmental impact assessments and development applications.
- Other management plans (e.g. soil and water management plans, vegetation management plans) will be required for land that is not zoned for conservation. Management Plans will be required by the Council in accordance with the development approval process.
- The conservation areas should have adequate funding resources to provide for management of their values in-perpetuity. Options for funding include a sinking fund; Section 94 Developer Agreement or community title. Funding and management through habitat offsetting should be considered. Responsibility for management and funding needs to be determined.
- Passive recreation is desirable within conservation areas to assist people in ‘connecting’ with their environment. However, this must be managed to ensure public safety (e.g. near the ash dams) and maintain the environmental integrity of the site.

- Optimising biodiversity values within the development areas through maximising retention of existing trees and utilising local provenance, native species in any landscaping or revegetation works.

1 Introduction

1.1 Background

This local environmental study (LES) has been prepared by Willana Associates on behalf of the Wagga Wagga City Council. The LES has been prepared in accordance with Section 57 of the Environmental Planning and Assessment Act 1979 (EP&A Act). It will ultimately support the preparation a new consolidated Local Environmental Plan (LEP) which will form the principal planning framework for Wagga Wagga. The new LEP will be drafted pursuant to Section 33A of the EP&A Act and shall reflect the Standard Instrument Principal Local Environmental Plan.

The preparation of the LES has been prompted by the findings of the Council's Wagga Wagga Spatial Plan 2007. The Spatial Plan provides the key directions for the future development of the local government area (LGA) for at least the next 25 years, and identifies key strategic issues facing Council and the community which have geographical or physical dimensions.

The Spatial Plan anticipates a significant increase in demand for residential and industrial land commencing in the near term. The Spatial Plan emphasises the need to start providing for this demand to ensure the orderly development of the City. It identifies three geographical areas with the potential to supply land for housing and five areas with the capacity for future industrial use. **Table 1 - Sites for Investigation** lists these areas in addition to two smaller sites being considered for rezoning to allow residential uses.

Table 1 - Sites for Investigation

Site	Potential Use	Approximate area in Hectares (ha)
Boorooma East	Residential	68
Estella West	Residential	255
Lloyd	Residential	424
Bomen	Industrial	3,402
Copland St South	Industrial	48
Edison Rd	Industrial	23
Hammond Avenue North	Industrial	16
Moorong St	Industrial	10
Main Street	Small Residential Site	
Plumpton Road	Small Residential Site	3

A number of additional sites were originally identified for consideration, but have not been included in this study as outlined below:

- Riverside Precinct - Council and Crown land east of Tarcutta Street near the Civic Precinct for which planning continues. Matters associated with land contamination and remediation requires resolution before zoning changes can be further considered.
- Forest Hill – a proposal to increase the area of the existing residential land requires further land owner investigations before zoning changes can be further considered.

1.2 Wagga Wagga Local Government Area

The Wagga Wagga LGA is located in south western NSW, in the eastern Riverina region, on the banks of the Murrumbidgee River. It is between the foothills of the Snowy Mountains in the east and undulating Riverina country to the west. The City of Wagga Wagga is the largest inland city in NSW and is the regional centre of the Riverina region.

The Council's Vision 21 strategy estimates that over 150,000 people throughout the region utilise Wagga Wagga for its services and facilities. (Wagga Wagga City Council (2005), *Vision 21* p5). The City is strategically important as it is positioned midway between the major cities of Melbourne and Sydney and is well serviced by road and rail transport infrastructure. The LGA encompasses the urban living area of Wagga Wagga, farming lands and the villages of Galore, Humula, Mangoplah, Oura, Tarcutta, Uranquinty, Ladysmith, Forest Hill, Collingullie and Currawarna.

Demographic trends and recent activity in the residential land market, along with the strategic imperative to provide for the expansion of economic activity, have created a demand to assess future land use in Wagga Wagga. As the population of the LGA has risen, so too has the consumption of land in residential areas. Constraints on land supply are beginning to threaten both the orderly expansion of the City and housing affordability.

At census 2006, the LGA had a population of 57,602 people and a total land area of 488,600 hectares. The City's population has shown growth over the past five years following a minor decline between 1976 and 2001 where the population decreased by 0.84%. The population went on to increase by 4.62% between 2001 and 2006 to 57,602. According to the Council's Wagga Wagga Spatial Plan 2007, the increase in the City's population has created a demand for new housing that will require 3,250 new residential allotments to be supplied between 2008 and 2017. (Wagga Wagga City Council (2006), *Wagga Wagga Spatial Plan* 2007 p 30 - 44).

Contrary to state-wide trends, the City's economic base continues to maintain activity in manufacturing and growth in sectors such as transport and logistics. These activities demand larger allotments of industrial land. Wagga Wagga's transport links with Sydney and Melbourne have contributed to its development as a distribution point for the region. Wagga Wagga's strong

retail sector is supported by the City's status as a regional centre for retail, cultural and social activities.

Issues surrounding inequities in the provision of open space and human services such as schools, community centres and neighbourhood centres have emerged in the LGA. So too have issues relating to conservation of the natural environment and natural resources. These issues, combined with demographic trends and the demands of industry were drivers behind the preparation of both the 2007 Spatial Plan and this LES.

1.3 Purpose of the Local Environmental Study

In response to the recommendations of the Wagga Wagga Spatial Plan 2007, the Council resolved to advance planning that may allow residential development at Boorooma, Estella and Lloyd and industrial development at Bomen, Edison Road, Copland Street and Hammond Avenue. Council also resolved to prepare a principal Local Environmental Plan (LEP) for the LGA.

The purpose of this LES is to determine the suitability and capacity of the study areas for various land uses. Consideration of land uses is limited by environmental, economic and social constraints of each of the sites. Equally, the opportunities for fulfilling a particular need in the community may be an important factor in determining the most desirable future use. Land uses under consideration include:

- Conservation
- Recreation and Open Space
- Residential
- Employment generating uses such as general or light industrial
- Community facilities and infrastructure
- Special Uses (eg schools)
- Commercial (neighbourhood centres)

Two LEPs control land use in the LGA: The Wagga Wagga Local Environmental Plan 1985 relates to the urban area of the City, while the Wagga Wagga Rural Local Environmental Plan 1991 covers the outlying areas and villages. The Wagga Wagga Development Control Plan 1985 (DCP) combines with the LEPs to form an atypical approach to land use zoning.

The LEPs prescribe broad zones with very general provisions for permissible uses. The DCP contains sub-zones that provide a more detailed level of control than the broad zones in the LEPs. Table 2 Current and Potential Site Zonings indicates the land use sub-zones that are applicable to the study areas.

Table 2 Current and Potential Site Zonings

Site	Current Zoning	Applicable LEP
Boorooma	Zone 1e Future Urban	WWLEP 1985 (urban area)
Estella West	Zone 1e Future Urban	WWLEP 1985 (urban area)
	Zone 1e Future Urban	WWRLEP 1991 (rural area)
Lloyd	Zone 1e Future Urban Zone 5a (Hospital) Zone 7b (Hillscape)	WWLEP 1985 (urban area)
	Zone 1e Future Urban	WWRLEP 1991 (rural area)
Bomen	Zone 1b Small Holding Zone 1g Rural Industrial Zone 4c Rural Residential Zone 5a (Abattoir) Zone 5a (Saleyards) Zone 5a (Railway)	WWLEP 1985 (urban area)
	Zone 1g Rural Industrial	WWRLEP 1991 (rural area)
Copland Street	Zone 1d Floodplain	WWLEP 1985 (urban area)
Edison Road	Zone 1d Floodplain	WWLEP 1985 (urban area)
Hammond Avenue	Zone 1b Small Holdings	WWLEP 1985 (urban area)
Moorong Street	Zone 6a Open Space	WWLEP 1985 (urban area)
Smaller Residential Sites		
Main Street	Zone 1c Rural Residential	WWLEP 1985 (urban area)
Plumpton Road	Zone 1b Small Holding	WWLEP 1985 (urban area)

The LES reviews the suitability of the current land use zoning controls that apply to the study area and recommends changes where these are justified and appropriate.

1.4 The study process

Preparation of the LES has been undertaken in three stages:

Stage A Site investigations
Stage B Identification and discussion of issues
Stage C Formulation of recommended planning outcomes

Stage A of the study includes specialist investigations into the study area, a review of relevant planning documents and consultation with landowners, service providers and public authorities. Findings of Stage A are summarised in Chapters 2 to 11 of this report. Some matters considered in Stage A were prescribed by the Department of Planning (DoP) (pursuant to Section 57 and 61 of the EP&A Act).

These matters are:

- The potential new release areas as defined by Council.
- Potential land contamination (pursuant to State Environmental Planning Policy 55 – Remediation of Land).
- Infrastructure capacity available to service the potential release areas and the sequencing of development required to accommodate growth and timing of services.
- Minimum lot sizes in rural areas.
- Changes to current provisions and justification for those changes.
- A strategic review of all community and operational land with any changes addressed in a new principal LEP.
- Directions made by the Minister for Planning under section 117 of the EP&A (known as Section 117 Directions). These Directions prescribe the manner in which an LEP must address certain land use matters.

Stage B of the study involves consideration of the findings of Stage A and the summarising and articulation of those findings. This stage results in the identification of community priorities, constraints and opportunities for each of the sites within the study areas. The conclusions of Stage B are summarised under the heading of 'Key Implications' in Chapters 5 to 11.

Stage C includes the formulation of land use options and the identification of preferred options. Stage C results in the drafting of the preferred Structure Plan and proposed policy amendments, which are outlined in Chapters 12 and 13 of this report.

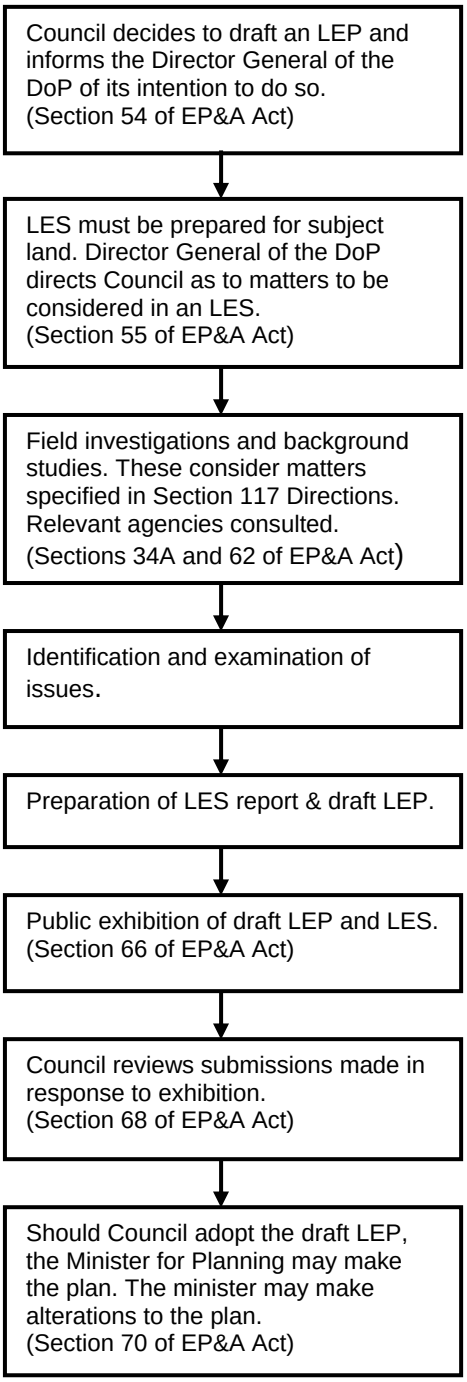
Legislative requirements

The EP&A Act prescribes a number of key requirements to be met by the preparation of an LES and subsequent LEP. These requirements include:

- Consultation with the Director-General of National Parks and Wildlife Service and Director of NSW Fisheries, if in the opinion of the Council, critical habitat or threatened species, populations or Ecological communities, or their habitats, will or may be affected by the LES. (Section 34A of the EP&A Act).
- Adherence to any specifications of matters to be considered by the LES, issued by the Director-General of the DoP, pursuant to Section 54 (see above).
- Consideration of any Directions made by the Minister for Planning in relation to the preparation of draft LEPs (Section 117 Directions).
- Consultation with relevant public authorities or bodies and other persons (pursuant to Section 62).
- Public exhibition of any draft LEP and the LES (Section 66).
- Consideration by Council of submissions made by any persons relating to the exhibited draft LEP and LES that are of sufficient significance.

A summary of the study process is included in Figure 2: Study Process.

Figure 2: Study Process



1.5 Report Structure

This report is divided into 13 chapters as indicated in **Table 3 - Report Structure**.

Table 3 - Report Structure

Chapter	Subject
1 Introduction	
2 Environmental Context	An overview of issues and challenges relevant to the study areas. Issues and challenges relate to matters such as biodiversity and environmental conservation; soil salinity; provision of land for housing and industry; Aboriginal and European heritage; the health of waterways and protection of water resources; economic development and the provision of open space.
3 Strategic Response	A review of the strategic response to the issues and challenges identified in Chapter 3, as articulated in the Wagga Wagga Spatial Plan 2007 and other strategic documents of Council and other authorities. Policies and strategic directions that Council and other authorities have resolved to pursue are discussed.
4 Strategic Framework	Discussion of the legislative and regulatory requirements which control the use of land in the LGA and the preparation of LEPs.
5 The Community	An analysis of demographic and economic trends likely to influence future land use in Wagga Wagga.
6 to 11 Study Area Sites	Each of these chapters examines the findings of expert investigations into the issues and environmental characteristics of each of the study areas. The issues investigated include biodiversity, Aboriginal archaeology, European heritage, drainage patterns, existing and likely future demand for transport infrastructure, sewer and potential impacts of land use in terms of air quality and noise.
12 Land Use Strategy	A discussion of various options identified for land use in the study areas.
13 Recommendations	This chapter makes recommendations on which land use options should be pursued.

1.6 Specialist Studies

Willana Associates Pty Ltd has been supported in the preparation of this LES by expert consultants who have completed investigations into each of the study areas. The findings of these detailed investigations form the basis of this report. These investigations have been conducted by specialist consultants and their findings are summarised in chapters 6 to 11. The consultants and their areas of expertise are summarised in **Table 4 - Consultancy Team**. Complete reports of the studies are included in the Appendices.

Table 4 - Consultancy Team

Consultancy	Area of Expertise	Appendix
Eco Logical Australia	*Biodiversity* ▪ The presence and condition of flora and fauna species and communities. ▪ The likelihood of threatened or protected species occurring. ▪ Recommendations for conservation and management.	A
Northrop Engineers	*Stormwater drainage* ▪ Existing overland flow of stormwater and how it may influence the location and form of future land uses. ▪ Management of stormwater flow and infrastructure requirements should rezoning and development take place.	B
GHD	*Traffic Management* ▪ Existing and planned road provision and how it may influence future land use. ▪ Demands that may be created by potential land uses and how they can be met.	C
Kelleher Nightingale Consulting (KNC)	*Archaeology* ▪ The location of Aboriginal archaeological deposits, places, and landscapes. ▪ Recommendations for conservation and management.	D
Michael Cuthbert Consulting	*Wastewater* ▪ Sewer infrastructure demands that may be result from future development and how such demand may be met.	E

Consultancy	Area of Expertise	Appendix
Atkins Acoustics	*Acoustics* ▪ Noise impacts of existing and potential land uses and how they may be managed and mitigated.	F
Holmes Air Sciences	*Air Quality and Odour* ▪ The intensity and acceptability of existing odour impacts resulting from existing industrial activities on the Bomen site.	G
Eco Logical Australia	*Bushfire Risk* ▪ Constraints resulting from bushfire risk and recommended management strategies.	H

1.7 Specialist Studies Methodology

The methodologies used by each of the Specialists, in order to make their observations and reach findings, are summarised below.

Biodiversity

The methodology used by Eco Logical Australia into the flora and fauna species and communities in each of the study areas is described in full in the reports produced by Eco Logical included in Appendix A. Eco Logical Australia utilises the three following methods:

- A literature review of documents relating to the site.
- Searches of databases listing species likely to occur, including protected species.
- Field surveys to ascertain the extent and condition of native vegetation and fauna habitat.

Based on the findings of the above investigations, the likelihood that threatened species may be present on or visit each of the study area sites was assessed. The loss of any native vegetation that is removed during development must be offset (pursuant to the NSW Native Vegetation Act 2003). Offsetting is achieved through the planting of new trees or the conservation of existing trees.

The number of trees to be planted or conserved is based on ratios recommended by the Department of Environment and Climate Change (DECC). These ratios are generally 10:1 for the loss of remnant vegetation in the study areas. Large trees, which are 40cm or more in diameter at breast

height (DBH), are to be offset by the preservation of existing large trees. Small trees (40cm or less DBH) are to be offset by the planting of saplings.

Stormwater drainage

The studies conducted by Northrop Engineers investigated the stormwater drainage provision that would be required should the sites be developed (Appendix B).

The studies consider existing runoff and watercourses; stormwater catchments; the influence of existing development and engineered flow controls and the need to manage stormwater quantity; quality and salinity impacts and ensure environmental flows.

Recommendations made in relation to provision for stormwater are based on the major/ minor stormwater drainage philosophy, which seeks to maintain convenience and amenity within the urban landscape during minor storms and provides protection for life and property during major storms. The major drainage system may consist of pavements, roadway reserves, open space, floodway channels and riparian zones designed to contain and convey stormwater runoff.

Traffic Management

Studies of existing and potential road networks in and around the study areas were undertaken by GHD Pty Ltd (Appendix C). Studies examined data on road and intersection capacities and traffic volumes. GHD consulted the Council regarding planned road upgrades and road safety concerns.

Studies contain projections of future traffic volumes should the study areas be developed. Projections considered data produced by the Roads and Traffic Authority (RTA) on traffic volumes that result from different forms of development. Such projections were the basis of recommendations on road upgrades and intersections. Potential demand for public transport is also projected and used as the basis of recommendations on public transport provision.

Archaeology

Kelleher Nightingale Consulting (KNC) conducted studies into the presence of items or places of Aboriginal heritage significance (Appendix D). Aboriginal objects such as scarred trees (the bark from which have been removed to make canoes) can be easily identified from the surface. The presence or otherwise of such items was ascertained through field surveys and reference to the Aboriginal Heritage Information Management System (AHIMS) database. The database is administered by the NSW National Parks and

Wildlife Service (NPWS) and includes records of reported Aboriginal objects and places.

Deposits of items such as stone tools that are buried under the surface are not easily discovered. Given this, archaeological investigations aimed to produce a predictive model which would indicate the degree of likelihood that land contained such underground deposits. The degree of likelihood is evidenced by the presence of scattered archaeological objects on the surface, the degree of disturbance (highly disturbed land is less likely to contain intact deposits than undisturbed land) and the nature of the landscape. Landscape features such as vantages that offer views and outcrops of rock that could have been utilised for tools may indicate prior occupation.

Under the predictive model, land may be a Potential Archaeological Deposit (PAD). PADs are areas with the potential to contain archaeological material that is significant in itself, or is evidence that an area constitutes a site of cultural significance. Further investigation is required into PADs to ascertain the presence or otherwise of archaeological materials. Such investigations may involve invasive techniques such as test pitting. Land may also be of high or moderate archaeological sensitivity. If so, further investigation may be required.

Areas of low archaeological sensitivity have been highly disturbed and either contains disturbed Aboriginal deposits or no deposits. Within the findings of the archaeological studies, these areas are generally developable.

European Heritage

An assessment as to whether the study contained any listed items of European Heritage was conducted by Willana Associates and involved reviewing the following registers:

- Wagga Wagga Development Control Plan 2005 Appendix 15 (Schedule of the Environmental Heritage).
- NSW Heritage Office - State Heritage Register.
- Federal Department of Environment and Water Resources - Australian Heritage Database. This database includes:-
  - National Heritage List.
  - Commonwealth Heritage List.
  - Register of the National Estate.
- Roads and Traffic Authority Heritage and Conservation Register.

Across the study areas, two items of European Heritage have been recorded; the Bomen Railway Station and Stationmaster's residence and the Estella Homestead. Recommendations are made in the report for the protection of these items.

Wastewater

Studies conducted by Michael Cuthbert Consulting (Appendix E) considered the location and capacity of existing waste water infrastructure including piping, pumps and sewage treatment plants. The likely demand for new or augmented infrastructure resulting from potential development in the study areas was projected. Projected demand, along with physical constraints to providing infrastructure, formed the basis of estimates of costing for sewer provision.

Acoustics

The study by Atkins Acoustics (Appendix F) into likely impacts that would result from industrial development at Bomen included measurements of existing noise impacts resulting from industrial activity and road and rail traffic. The study considered the likely nature, distribution and scale of potential future industrial development and resultant increases in road and rail traffic. Comparing likely future development scenarios with existing similar developments formed the basis of calculations of likely future impacts and recommendations as to how to protect surrounding land uses from such impacts.

Odour

It is not possible to anticipate the exact nature of industries likely to locate at Bomen in the future and thereby model resultant odour impacts. The odour study completed by Holmes Air Sciences quantifies odour levels due to existing industries at Bomen and maps the dispersion of odour (Appendix G).

The study resulted in mapping based on data gathered in the field and from previous studies. Concentrations of odour were measured in odour units. One odour unit represents the concentration of the particulates in air that cause an odour to be detected by 50% of the population.

Comparisons with relevant regulatory air quality criteria were made to ascertain the degree to which impacts are acceptable. Odour criteria and the way in which they should be applied to assess the likelihood of odour nuisance are still being developed and may be revised. Criteria take into account the level of exposure acceptable by community standards. The degree of acceptability depends, in part, on the type of odour (some being more offensive than others). It also depends on the population density of areas impacted (more dense populations are more likely to contain individuals who find the odour offensive than less dense ones).

Bushfire Risk and Management

Bushfire Risk and Management Studies for each of the study area sites were undertaken by Eco Logical Australia and are included in Appendix H. Assessments of bushfire risk consider the types and distribution of vegetation found at the study areas and the gradient of the land. Areas of relative bushfire risk are indicated on maps contained in subsequent chapters.

A draft LEP must meet the requirements of Planning for Bushfire Protection 2006, a publication produced by the NSW Rural Fire Service (RFS). The publication contains performance criteria and "acceptable solutions" that, if followed, should ensure performance criteria are met. Should it be impracticable or undesirable to implement acceptable solutions, "alternative solutions" may be proposed. Eco Logical Australia's recommendations for managing bushfire risk emphasise "acceptable solutions".

The studies make recommendations on Asset Protections Zones (APZs) that provide a protective separation between property and substantial vegetation and perimeter roads, which allow access for emergency services.

2 Environmental Context

2.1 Analytical Basis

There has been considerable analysis of land use planning issues in Wagga Wagga. This has culminated in the preparation and adoption by the Council of the 2007 Spatial Plan. The plan takes into consideration all relevant strategic directions and policies, as expressed in current Council documents (particularly 'Towards 2010 and Vision 21'). For the purposes of defining the direction for the development of Wagga Wagga for the next 25 years, the plan identifies key issues and challenges which are discussed below.

2.2 Natural Environment

Issues and challenges relating to the conservation of biodiversity and the prevention of further degradation of land and water include:

- Native vegetation clearing. The Spatial Plan cites data to the effect that 90% of the original vegetation of the LGA has been cleared and that the remaining 10% exists in pockets, very few of which are in good condition.
- Soil erosion and salinity.
- The degradation of water resources, including waterways, ground water and wetlands.
- Natural hazards such as flooding and bushfire.
- The need to maintain and improve viable ecological communities on private land.
- The need to balancing environmental objectives with economic imperatives.
- Threats to native fauna, particularly the 31 species in the LGA listed as threatened by the Threatened Species and Conservation Act 1995. Habitat conservation is vital to the continuation of such species.

The relevance of issues relating to water resources is increased by prevalence of drought conditions in recent years. The NSW Department of Primary Industries (DPI) publishes maps of areas suffering drought conditions every month. The maps are based on NSW Rural Lands Protection Board (RLPB) boundaries. The RLPB area for Wagga Wagga has been in drought for 39 out of 60 months between 2002 and 2007. For 12 of those months, the area was either part drought/part satisfactory or part drought/part marginal.

2.3 Cultural and Landscape Values

Issues and challenges that are keys to preventing the decline or loss of important heritage sites and places include:

- Protecting the more ephemeral values of heritage, particularly those associated with Indigenous heritage.
- Accommodating Indigenous people in the planning and development process.

- The nature and value of Wagga Wagga's European heritage, which dates from the establishment of the settlement in the 1840's.
- European heritage is evidenced not only by the building stock but also by parks, street layout, and street tree planting.

Wagga Wagga LGA lies within the heart of southern Wiradjuri Country/ Ngurambang. The 2002 Wiradjuri Heritage Study refers to a wide range of practices, materials and knowledge that comprises Wiradjuri heritage. This includes, but is not limited to, artefacts, sites of significance and evidence of occupation such as scarred trees and stone implements. A key element of Indigenous heritage is the notion of "cultural landscape". The cultural landscape is seen as consisting of the land, its natural resources, traditional sites and sites of ceremonial and spiritual significance.

2.4 Residential Settlement

The demand for, and supply of, housing in the LGA is a key concern of the 2007 Spatial Plan and one to which the following issues and challenges are relevant:

- The provision of the right type and amount of residential and rural-residential land to encourage growth and meet demand.
- Clarity and predictability in the development market.
- Housing affordability and ensuring supply is not constrained to the extent that affordability is adversely affected.
- Concentrating development to ensure services can be equitably provided.
- Maximising value and minimising costs to the wider community.
- Ensuring new housing is buffered from incompatible land uses.

The Spatial Plan identifies an approaching shortfall in the supply of land for residential development. The Plan cites the high incidence of "pre-selling" (the sale of lots prior to the release of subdivision certificates) as evidence of high demand. *Error! Reference source not found.* summarises the residential land supply position at the end of 2007.

Table 5 Approximate Land Supply – Developing Residential Areas

Residential Release Areas - Residual Lot Yield Estimates (Approx)			
	Subdivisions Certified since 01/07/07)	DA Approved subdivisions not complete	Remainder of "zoned" land
Boorooma	0	0	420
Bourkelands	0	96	233
Estella	55		289
Forest Hill	33	28	300
Glenfield	37	113	
Lakehaven			48
Tatton	108		60
Total	**233**	**237**	**1,350**

SOURCE: Wagga Wagga City Council: *Wagga Wagga Spatial Plan (2007)*

NOTE: The table does not include land at Cartwrights Hill, which is subject to a moratorium on development pending investigations into odour impacts resulting from the Bomen industrial estate. The data in the table is based on estimates made on 1 January 2008 and is subject to further consultation with developer and housing industry forums.

The Spatial Plan suggests a take up rate of 400 lots per annum should be assumed for 2008 and 2009. **Error! Reference source not found.** has to be considered in light of market constraints which will reduce the estimated number of lots available to market to the end of 2009 to 2011. *Table 6 - Supply position at end of 2009* indicates the supply position at the end of 2009.

Table 6 - Supply position at end of 2009

	Hypothetical Take-up 2008/9	Mainstream Supply Still Available	Constrained Supply
Boorooma	40		380 (say)
Bourkelands	200	189	
Estella	140	149	
Forest Hill	80		280 (say)
Glenfield	113	0	
Tatton	60	0	
Total	**633**	**338**	

SOURCE: Wagga Wagga City Council: Wagga Wagga Spatial Plan (2007)

2.5 Commercial Land Use

The Spatial Plan identifies the following key issues and challenges:

- The need to maintain the primacy of the City Centre as the retail and commercial hub for the region.
- Provision for local and district centres (and baseline shop access for neighbourhoods).

2.6 Industrial Land Use

The Spatial Plan estimates there to be around 60 ha of vacant developable industrial land and 20 ha of underdeveloped or underutilised land. Historically, such land is consumed at a rate of around 4 to 5 ha per annum. However, very recently, there has been much higher take up and/ or interest, particularly at Bomen. Future consumption is difficult to project, given the fluctuations in demand. Key issues and challenges relevant to industrial land use include:

- Evidence of an upturn in demand (rising land values) with no corresponding increase in supply.
- The opportunity to capitalise on local competitive advantages or industry specific relationships (eg clustering).

- Catering for future industrial opportunities in the face of uncertain requirements as to lot size and servicing needs.
- The protection of industrial activity and capacity by buffering its impacts.

2.7 Infrastructure and Open Space

Keys issues and challenges relating to infrastructure include:

- Appropriate phasing of new development and supply of infrastructure and services.
- Balancing lead-times and the need for fiscal responsibility against the desires of stakeholders for out-of-sequence (leapfrogging) service provision.
- Ensuring equity of human services, particularly schools, open space and community facilities in established and new areas.
- Early identification of land required to meet infrastructure and servicing needs.
- Evidence of inadequate and/ or inequitable service provision.
- Poor public school access in northern and southern Wagga Wagga.
- Ongoing demand for neighbourhood centres, village halls, public amenities (particularly those catering for young people and seniors).
- Low quality open space and recreation facilities in existing areas.

3 Strategic Response

The following chapter provides a summary of a number of strategic documents that have been developed to guide the future development of Wagga Wagga. These documents are important to the process of identifying the best possible land uses for the sites subject to this LES process. The list of strategic documents is not exhaustive, but rather provides a summary of the primary relevant documents. Section 3.20 - Key Land Use Issues and Strategic Responses identifies the land use issues pertinent to the study area sites and summarises the response to the issues from the relevant strategic documents outlined below.

3.1 Wagga Wagga Spatial Plan 2007

The Spatial Plan sets out how Council should respond to the issues and challenges it faces regarding growth n the LGA (which are described in chapter two). Recommended responses relate to the policy areas discussed below.

Natural Environment

The Spatial Plan's objectives include the protection and enhancement of viable areas of native vegetation and the development strategies to ensure their long-term management. The reversal of land degradation and improvement of water quality and water flows to the Murrumbidgee River are also important objectives.

The plan sets out principles through which objectives can be fulfilled. These principles include the protection of biodiversity through consolidation and expansion of areas of native vegetation. This can be achieved through policies that include identifying opportunities for offsetting the loss of native vegetation that results from development. Offsetting may be achieved through the planting of saplings or the conservation of existing areas of woodland.

The plan also identifies the amalgamation of areas of native vegetation into "green" corridors as policy and states that Council has acknowledged its importance. Other policies include landscaping and tree planting requirements for new urban development.

Cultural and Landscape Values

With objectives relating to the recognition of the importance of heritage for identity and sense of place and conservation of heritage items, the Spatial Plan sets out principles and policies promoting the protection of significant cultural landscapes.

Residential Development

The Spatial Plan sets the following objectives in relation to residential development:

- *Meeting diverse housing demand*: Accommodating population growth through adequate supplies of well planned residential land and providing a variety of housing options to achieve housing choice and affordability.
- *Building strong communities*: Well serviced residential areas displaying design excellence, which in turn enhance the security and wellbeing of individuals and families, and provide a base for strong, resilient communities.

In relation to these objectives, the Plan states that Council's role is to ensure effective planning and regulatory processes, for neighbourhood master plans and detailed design, including for road and engineering works. It sets out the following policies:

- Adopt a program based on a 15 year rolling supply of residential land, meeting diverse demand patterns.
- Clear plan for longer term residential areas which includes contingency planning to ensure "no surprises" in the rolling land supply chain.
- Adopt an LEP which contains zones/ map layers which indicate density provisions. For example, a low density zone with 600m² lots and 2 storey development or dual occupancy on 800m² lots; a medium density zone with duplexes; villas and apartments up to 3 storeys in height and a higher density zone.
- Each new neighbourhood (approx. 400m walking radius) to include at least one high quality community hub which responds to local features and needs.
- Coherent strategy for human services (including accessible local schools, parks, neighbourhood centres, and services) noting the role of schools as a hub for the building of local communities.

In order to achieve a 15 year rolling supply of residential land, the Spatial Plan recommends a take-up rate of around 350 dwellings per annum for planning purposes. The Plan asserts that this is not to be adopted as a supply figure and states that it is critical that contingency land supply plans be in place to ensure that any future demand, including unpredicted surges, can be well managed.

A land bank programme should ensure that 5 years supply is perpetually available to market. There should be another 5 years supply with development approvals well advanced and a further 5 years supply with planning processes programmed to meet the schedule. **Table 7 - Land Bank Targets for Wagga Wagga LGA** outlines the numbers of lots that should be made available to fulfil the land bank targets.

Table 7 - Land Bank Targets for Wagga Wagga LGA

	Dwelling equivalent	Cumulative land bank
5 year rolling supply – ready to develop	1,750	1,750
10 year supply - zoned and planning well in hand	1,750	3,500
15 year supply – commitment to rezoning studies	1,750	5,250
25 year supply – clear plan	3,500	8,750
Long term supply (35-50 years)		10,000 to 15,000

SOURCE: Wagga Wagga City Council: *Wagga Wagga Spatial Plan (2007)*

The Spatial Plan estimates that between the end of 2008 and 2018, around 900 lots will be supplied on land in developing areas that currently has appropriate zoning. This estimate assumes that market constraints which currently impede the supply of lots in Boorooma and Forest Hill will be overcome during the 10 year period.

The estimated yields of the sites identified for residential zoning demonstrate that Lloyd, Boorooma East and Estella West have a combined potential yield of 4,508 dwellings. Even without the addition of lots from land that already has the appropriate zoning, the three study area sites exceed the cumulative land bank target of 3,500 for 10 years. However, investigations should not be halted, as planning constraints may limit yields.

Location and Type of Future Residential Development

In December 2006, Council resolved to advance planning that may allow greenfield residential development in Boorooma East, Estella West and Lloyd. Their development would result in positive planning outcomes such as increased capacity to provide services such as schools and shops to existing residential areas.

As stated above, the Spatial Plan reviewed a comprehensive list of strategies and studies of the Council. The documents below have been considered by the Spatial Plan or are otherwise relevant in setting the strategic planning framework for this study.

Industrial Land

The Spatial Plan proposes the adoption of a 15 year land bank for Wagga Wagga, with 3-5 years rolling supply to be development ready. Decisions about the supply of industrial land must consider strategic clustering opportunities and the land requirements of particular industries. Locational

advantages and disadvantages of areas that are potentially suitable for industrial use should also be considered as should their capacity to deliver larger lots for heavy or specialised industry.

3.2 Vision 21 Land Use Strategy (2006)

The strategy examines the constraints, issues and options with regard to urban development and the changing social, environmental and economic factors facing the community. The strategy sets the context within which to review and update land use planning and policy initiatives. The strategy's objectives include:

- To conserve and manage the natural environment in a sustainable manner.
- To attract business to Wagga Wagga for employment and economic prosperity.
- To provide quality housing, public domain and public open spaces.

The strategy emphasises the need for new areas to be investigated for their potential for urban development, as well as possibilities for higher density residential development in the City Centre. Densities of new residential areas must also be higher than in the past.

The Strategy asserts that land currently zoned industrial has reached capacity. It identifies Copland Street, Riverina Farm (Bomen), Sturt Highway (north side) and Elizabeth Avenue as suitable for development within the medium term for a wide range of industrial uses.

Although there are a number of public parks scattered around the LGA, there is a need for greater diversity in parks, particularly for passive and unstructured uses.

3.3 Wagga Wagga Strategic Plan 'Towards 2010' (2005)

Although the Strategic Plan constitutes a five year plan, many of its broader outcomes will be relevant beyond 2010. The prioritisation of outcomes and strategies within the plan drives the formulation of Council's annual operational plans and budgets. It is informed by the Vision 21 Land Use Strategy.

Outcomes sought include the adequate supply of industrial land; the establishment of new businesses within the sectors identified in 'Acceler_8, An Economic Blueprint for Wagga Wagga' and a reduction in factors that contribute to groundwater and urban salinity. The establishment of a major road/ rail inter-modal hub connected to a national network of hubs is also a stated outcome.

Another desired outcome is the provision of public facilities that promote community networking and a sense of place. A range of housing options, including affordable housing, are to be provided to meet the changing needs of the community.

3.4 Draft Murrumbidgee Catchment Action Plan (2006)

The Plan was prepared by the Murrumbidgee Catchment Authority (CMA), pursuant to the Catchment Management Authorities Act 2003. The CMA is tasked with developing both the action plan and a strategy for investment in natural resource management through on-ground works. The plan provides direction for future investment in natural resource management through education, planning and partnership development.

It divides the natural and man made attributes of the Murrumbidgee catchment into community assets, biodiversity assets, water assets and land assets. It sets targets for the preservation and/or improvement of these assets. These targets include an increase in natural vegetation and in the number and extent of native fauna species.

The maintenance of habitat connectivity across the regional landscape, revegetation and an increase in areas of high conservation value are cited as appropriate responses to pressures on the catchment. Specifically, the Plan states that:

> *"To achieve the on-ground biodiversity conservation of 50,000 hectares of high conservation value existing native vegetation, through development of property vegetation plans with landholders."*

3.5 Native Vegetation and Threatened Species of the City of Wagga Wagga (2005)

Published by DECC, the report maps the distribution of native vegetation across the LGA. It informs Council's land use strategies and policies.

The pre-clearing distributions of native vegetation communities were modelled and compared with extant distributions to determine the conservation and reservation status of each community. The report identifies communities that are endangered, vulnerable and adequately reserved. Only two communities are considered to be adequately reserved, with the majority depleted or degraded.

3.6 Biodiversity Planning Pilot Project Report (2002)

The report aims to make improvements to the Council's plan making framework and to support ways of maintaining and enhancing native flora and fauna while allowing responsible development to proceed. Recommendations include:

- Securing of landscape-scale biodiversity conservation through a comprehensive reserve system.
- LEP objectives for biodiversity, conservation and ESD. This could include a biodiversity objective for each zone linked to identification of local Ecological planning settings.

3.7 Wagga Wagga Industrial Land Study (2005)

The study aims to inform the Council in making decisions on industrial land and identifies the following emerging trends:

- Rationalisation of agriculture, mining and manufacturing industries and resultant changes in the demographic profile of rural communities.
- Economic globalisation and an 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.

Demand

The report estimates demand for industrial land at around 4 to 5 ha per annum. It cites rising land prices as evidence of increasing demand, driven by emerging wholesale markets, economies such as lower land and transport costs and the LGA's location on the Sydney to Melbourne rail corridor and interstate highways.

Recommendations

The study asserts that a heavy industrial zone should be promoted in the Bomen Industrial Estate, as the area affords opportunities to provide amenity buffers for residential areas. Large parcels of land for heavy industry should be preserved, preferably adjacent to main roads and rail infrastructure.

3.8 Wisdom Study (1995)

The study was commissioned by the NSW Department of Business and Regional Development and Wagga Wagga City Council. It had the aim of formulating the Wagga Wagga Industrial Sustainable Development Opportunities Model (WISDOM). The model's purpose is to identify suitable locations within which to promote economic development in regional NSW and find ways in which industrial development can be environmentally sustainable. The model's application involved an environmental audit.

The audit concluded that "*the Bomen area provides suitable amenity for a potentially wide range of users and is not unique or precious in many of its characteristics*". The audit found that Bomen had no areas of vegetation with high conservation status and no unique or endangered species habitats. It was noted that Bomen offers significant locational advantages to industry by virtue of the site being well served by interstate roads and bisected by rail links to Sydney and Melbourne.

3.9 Acceler_8, An Economic Blue Print for Wagga Wagga

The strategy has three core objectives:

1. the growth of local businesses;
2. the attraction of new businesses in industry sectors in which the City has competitive advantages; and
3. the marketing of the City to potential residents and investors.

In order to promote these aims, eight core strategies are to be implemented. The strategies focus on Council support for business; partnerships between business institutions and all levels of government; supporting the biotech sector; communications infrastructure and "e-business" and fostering the City's relationship with defence bases to promote business opportunities.

3.10 Retail and Commercial Development Strategy, City of Wagga Wagga (2007)

The report was commissioned by Council to inform the preparation for a new LEP for the City. It concluded that there is a significant shortfall in the supply of retail floor space in the Southern Growth and South West subdistricts. Combined, these two areas would currently support approximately 16,731m² of retail space. The only retail centre in this area is Southcity (3,900m²). The Boorooma/Estella area would currently support some 4,731m² of retail space.

Projections in the report indicate that by 2021, the Southern Growth and South West subdistricts would support 28,615m² of retail space. Boorooma/Estella would support around 9,364m² of space.

Recommendations include the establishment by 2021 of three new centres. One of these should be located on the southern fringe of the City to service the growing suburbs of Lloyd, Bourkelands and the rural areas to the south. A neighbourhood-scale centre could be developed in this area by 2011 anchored by a 2,500m² supermarket, accompanied by up to 1,000m² of specialty retailing (i.e. 8 to 10 shops). A site on Holbrook Road, to the south of the existing playing fields in Lloyd, was considered as a potential location for such a centre. A site area of between 0.8 and 1.0 hectares would be required.

It is noted that there is current provision for a small retail site at the intersection of Bourkelands Drive and Bourke Street. The strategy did not consider that this provision negated the need for a larger supermarket-anchored centre in the Lloyd/ Bourkelands area over the longer term.

The strategy estimates that a supermarket-anchored centre will be viable in the Boorooma/ Estella area between 2016 and 2021. This centre should be in the order of 2,800m² anchored by a supermarket of around 2,000m². It would require a site area of approximately 0.6 to 0.8 hectares.

3.11 Wagga Wagga Recreation and Open Space Strategy (2004)

The strategy aims to ensure that the necessary policy framework for the delivery of recreation and cultural services is in place. It considers demographic and social analyses and the findings of extensive community and agency consultations. The standard for the provision of open space in Wagga Wagga is 4ha/1,000 people.

The strategy found that the cohorts that are the most active in formal sports are between the ages of 10 and 40 years. It also found that “pockets” of low income earners in the City contributed towards an increased demand for informal, free or low cost recreation opportunities such as tennis rebound walls, skate parks and cycleways, particularly in the south east and south west of the City. The relative ageing of the population was found to result in increasing demand for passive recreation opportunities such as walking and places to meet and socialise. Generally, a growing preference for non-competitive, passive and informal recreation opportunities, was identified.

The strategy found a significant oversupply of cricket ovals and tennis courts, whilst the supply of rugby fields, lawn bowls and soccer fields was adequate. Considering such trends the strategy proposes that, in the urban area of the City, Council’s standard of 4ha/1,000 people of open space be divided into:

- 2.5Ha for outdoor recreation facilities in the urban area.
- 1.5Ha for sporting facilities in the urban area.

Table 8 - Recreation and open space requirements per hectare of land developed in new residential areas. indicates the amount of open space required per hectare of land developed for residential use, based on the strategy's recommendations. (It considers ABS census data for median household sizes in the LGA).

Table 8 - Recreation and open space requirements per hectare of land developed in new residential areas.

Item	Rate	Area at 8 dwgs per ha	Area at 12 dwgs per ha
Outdoor recreation space	2.5ha per 1,000 people	521m² per ha	781m² per ha
Sporting Facilities	1.5ha per 1,000 people	312m² per ha	469m² per ha
Neighbourhood park (5ha) Typically includes minor car parking, play structures, lighting, sports field & toilets.	Has a catchment area of more than one suburb in urban area.		
Local park (1 to 3ha) Typically includes landscaping, natural shade, seating and basic play equipment.	Serves a suburb or an area within a radius of between 400m and 1.5km	1park per 50 to 707ha of new urban area (approx)	
Pocket park (0.5 to 1ha) Typically includes seating, small items of play equipment.	5 min. walk from or within a 400 – 600m radius of all dwellings	1 park per 50 to 113ha of new urban area (approx)	

SOURCE: Wagga Wagga City Council, Wagga Wagga Recreation and Open Space Strategy (2004)

The strategy recommends principles for the provision of open space that include:

- All residential blocks should be within approximately 400m – 1.0km of a local park.
- Trees should be planted along perimeters and paths of sports reserves to provide shade for users and improved definition.
- Where appropriate, circulation within sports reserve should connect directly with broader neighbourhood and regional trails.
- Facilities including playgrounds, tables, seats, BBQs, drinking fountains, litterbins, and bicycle parking facilities should be provided at points of public focus.
- Local parks should not cater for a single use, but rather should be flexible and multi-functional in character.

3.12 City of Wagga Wagga Social Plan (2004)

The report published in 2004 considered extensive community and agency consultations. It found changing lifestyles and family structures in the LGA that are likely to result in increased diversity of housing types. It also found that some suburbs, including Glenfield Park and Estella, lack adequate recreation infrastructure when compared with other suburbs.

The report recommends:

- A mix of block sizes and housing types should be explored when considering the promotion of "viable neighbourhoods".
- The use of the bicycle is increasing, along with the desire for improved and extended bikeways, off-road routes and walkways.
- Increased life expectancy and a trend towards "ageing in place" are changing expectations of living space.
- The need to plan for community and cultural activities and the inclusion of people of all ages in such activities.

The Plan highlights a trend away from organised sporting activities to non-formal leisure pursuits. This trend may necessitate a change of focus from sporting fields and sports facilities to improved parks, reserves, walking and bike tracks, local multi-functional areas where young people play basketball, skate or roller blade and improved landscaped public areas.

3.13 WWCC Social Issues Paper: Community Facilities

The issues paper was provided to Willana Associates by Council for the purposes of the LES. It advises that a budget is available to undertake a feasibility study and construction of a community centre at Estella, should the area be rezoned. The issues paper also advises that another such community centre would be required at Lloyd and would replace the Jubilee Park facility. The centre at Lloyd would also serve Bourkelands, Hilltop and Glenoak.

3.14 WWCC S94 Contributions Plan 2006

The plan specifies the need for community centres at Lloyd and Estella, as identified by the Wagga Wagga City Council Social Issues Paper: Community Facilities.

3.15 Wiradjuri Heritage Study for the Wagga Wagga Local Government Area of NSW (2002)

The purpose of the study is to document Wiradjuri cultural heritage and provide guidance to the Council on taking account of this heritage in land use planning and development, and in cultural heritage activities. It informs Council's land use strategies, plans and policies. The study describes the

cultural history of the Wiradjuri people and records places, landscapes and flora and fauna that are of significance to that history.

3.16 WWCC Urban and Rural Heritage Studies (2002).

Both the Urban Heritage Study and the Rural Heritage Study are the result of extensive research into the history of the Municipality and the historical and heritage significance of buildings and other items. Each report recommends items for inclusion in the State Heritage Register, the two Local Environmental Plans that apply to the LGA and/ or the Wagga Wagga Development Control Plan 1985.

3.17 State of the Environment Report (2005)

The primary objective of the State of the Environment Report (SOE) is to show the performance of key environmental indicators during the past year and compare with the performances of previous years. Information from the SOE is used by Council to guide its management plans, policy formulation, and to improve its implementation of the principles of ESD. The SOE focuses on Land, Air, Water, Biodiversity, Waste & Heritage resources.

3.18 Urban Salinity Annual Status Report (2006 / ongoing)

The report is formulated by Council's Urban Salinity Review Committee and Urban Salinity Working Group. The report provides a strategy for a coordinated approach toward managing the problem of salinity, with measurable outcomes. Based on measurements taken in the field, it emphasises a whole of community approach to addressing the problem of urban salinity.

3.19 Draft Wagga Wagga Flood Plain Risk Management Study (2007)

The study was prepared by Webb, McKeown and Associates Pty Ltd. It provides an examination of the nature and extent of the flood problem in the Murrumbidgee River floodplain and an evaluation of options for flood management.

3.20 Key Land Use Issues and Strategic Responses

Issue	Strategic Response
1. Natural Environment	
▪ Native vegetation clearing. ▪ Soil erosion and salinity. ▪ The degradation of water resources. ▪ The need to maintaining and improve viable Ecological communities on private land. ▪ Habitat conservation.	Wagga Wagga Spatial Plan sets out:- ▪ Council's objectives for the protection of native vegetation, the reversal of land degradation and improvement of water quality (esp. flows to the Murrumbidgee River). ▪ Principles for protection of biodiversity through consolidation and expansion of areas of native vegetation (including the use of offsets). ▪ Principle and policies for consolidation of native vegetation in "green" corridors. The Murrumbidgee Catchment Action Plan aims to promote maintenance of habitat connectivity and revegetation (target of conservation of 50,000 hectares of native vegetation through property vegetation plans. Native Vegetation and Threatened Species of the City of Wagga Wagga indentifies communities that are endangered or vulnerable. The Biodiversity Planning Pilot Project Report proposes securing of landscape-scale biodiversity conservation through a comprehensive reserve system and setting LEP objectives for biodiversity, conservation and ESD.
2. Cultural and Landscape Values	
▪ Protection of more ephemeral values of heritage, particularly those associated with Indigenous heritage. ▪ Conservation of European heritage.	The Wagga Wagga Spatial Plan sets out principles and policies for heritage and conservation.
3. Residential Settlement	
▪ High and increasing demand for land and diminishing supply. ▪ Need for clarity and predictability in the market. ▪ Housing affordability. ▪ Equitable service provision.	Wagga Wagga Spatial Plan sets out:- ▪ Objectives for meeting diverse housing needs and building strong communities in well serviced residential areas. ▪ Policy of a 15 year rolling supply of residential land. ▪ Policy for walkable neighbourhoods with community hubs. ▪ Policy for the provision of human services (local schools, parks and neighbourhood centres). ▪ Strategies that promote the provision of affordable

Issue	Strategic Response
	housing. The City of Wagga Wagga Social Plan recommends a mix of block sizes and housing types to create viable neighbourhoods.
4. Commercial Land Use	
▪ Provision of local and district centres. ▪ Shortfall in retail land in the south of the City.	Retail and Commercial Development Strategy, City of Wagga Wagga recommends new neighbourhood centres.
5. Industrial Land Use	
▪ Local competitive advantages and industry specific relationships (eg clustering). ▪ Future opportunities and uncertain lot size requirements and servicing needs. ▪ Conflicting land uses. ▪ Increasing land prices threaten the competitiveness of Wagga Wagga as a location for industry. ▪ The need to locate industry in areas unconstrained by conflicting land uses.	The Spatial Plan proposes the adoption of a 15 year land bank for Wagga Wagga, with 3-5 years' rolling supply to be development ready. Vision 21 identifies areas suitable for industrial development. Wagga Wagga Industrial Land Study asserts that a heavy industrial zone should be established in Bomen (affords opportunities to provide amenity buffers). Large parcels should be preserved for heavy industry. Wisdom Study finds that Bomen provides suitable amenity for a potentially wide range of users and is not unique or precious in many of its characteristics.
6. Infrastructure and Open Space	
▪ Lack of equity of human services (schools, open space and community facilities). ▪ Poor public school access in northern and southern Wagga Wagga. ▪ Low quality open space and recreation facilities in new areas. ▪ Oversupply of formal sporting facilities.	Wagga Wagga Spatial Plan sets out policy for the provision of human services including parks. Wagga Wagga Recreation and Open Space Strategy:- ▪ Recommends more informal recreation space. ▪ Makes recommendations on the balance between sporting and outdoor recreation facilities. City of Wagga Wagga Social Plan:- ▪ Finds a trend away from organised sporting activities to non-formal leisure pursuits. Recommends consideration of informal recreation space.

4 Statutory Framework

4.1 Environmental Planning and Assessment Act 1979 & Environmentally Sustainable Development

Section 5 of the Environmental Planning and Assessment Act 1979 (the EP&A Act) states that Ecologically Sustainable Development (ESD) is one of the instrument's objectives. Section 4 of the EP&A Act provides that ESD is to have the same meaning as that contained in Section 6(2) of the Protection of the Environment Administration Act 1991, which is as follows:

Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

(a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and Ecological integrity—namely, that conservation of biological diversity and Ecological integrity should be a fundamental consideration,

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

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

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

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

4.2 Section 117 (2A) Directions

Section 117 (2A) Directions make provisions that councils must observe when preparing LEPs. Directions with direct relevance to the possible rezoning of the study area are discussed below.

Direction 1.1 Business and Industrial Zones

The Direction's objectives include the protection of employment land in business and industrial zones and supporting the viability of strategic centres.

A draft LEP shall retain the area and location of existing zonings and shall not reduce the total potential floor space area for employment uses and related public services in business or industrial zones. New employment areas shall be in accordance with a strategy that is approved by the Director-General of the Department of Planning.

Direction 1.2 Rural Zones

The objective of this Direction is to protect the agricultural production value of rural land. A draft LEP shall not rezone land from a rural zone to a residential, business, village or industrial zone, or contain provisions which will increase the density of land within a rural zone. A draft LEP may be inconsistent with this Direction if it is justified by a strategy approved by the Director-General or an environmental study prepared in accordance with Section 57 of the EP&A Act.

Direction 1.5 Rural Lands

This Direction applies to councils preparing LEPs for land in existing or proposed rural zone or environmental protection zone (including those that propose to change the minimum lot size). Pursuant to this direction, draft LEPs must be consistent with the principles in State Environmental Planning Policy Rural Lands 2008.

Direction 2.1 Environmental Protection Zones

A draft LEP shall include provisions that facilitate the protection and conservation of environmentally sensitive areas. A draft LEP that applies to land identified for environmental protection purposes in a LEP, shall not reduce the environmental protection standards that apply to the land.

Direction 2.3 Heritage Conservation

A draft LEP shall contain provisions that facilitate the conservation of items, places, relics or precincts of environmental heritage significance and Aboriginal objects or places protected under the National Parks and Wildlife Act 1974. A draft LEP shall also facilitate the conservation of Aboriginal areas, objects, places or landscapes identified as having heritage significance.

Direction 3.1 Residential Zones

The Direction has the objectives of encouraging variety and choice of housing types; the efficient use of existing infrastructure and services and the minimisation of the impact of residential development on the environment. A draft LEP must include provisions that serve the objectives of the Direction and reduce the consumption of land for housing and associated urban development on the urban fringe. Provisions must also promote good design and ensure that residential development is not permitted until land is adequately serviced. There must be no provisions which will reduce the permissible residential density of land. A draft LEP may be inconsistent with this Direction if it is justified by a strategy approved by the Director-General or an environmental study prepared in accordance with section 57 of the EP&A Act.

Direction 3.4 Integrating Land Use and Transport

Objectives relate to improving access to housing, jobs and services by means of transport other than the car, reducing dependence on cars and supporting the operation of public transport and freight services.

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 Improving Transport Choice – Guidelines for Planning and Development (DUAP 2001), and The Right Place for Business and Services – Planning Policy (DUAP 2001).

Direction 4.3 Flood Prone Land

The objectives of this Direction are to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 and to ensure LEP provisions are commensurate with flood hazard. A draft LEP shall not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone. A draft LEP shall not permit:

- Development in floodways.
- Development that will result in significant flood impacts.
- A significant increase in the development of a flood planning area.
- Development likely to result in a substantial increase in government spending on flood mitigation measures.
- Development for the purposes of agriculture (not including dams, drainage canals, levees, buildings or structures) in floodways or high hazard areas.

A draft LEP must not impose flood related development controls above the residential flood planning level for residential development on land, unless a council provides adequate justification for those controls to the satisfaction of the Director-General.

For the purposes of a draft LEP, a council must not determine a flood planning level that is inconsistent with the *Floodplain Development Manual 2005 (including the Guideline on Development Controls on Low Flood Risk Areas*) unless a council provides adequate justification for the proposed departure from that Manual to the satisfaction of the Director-General.

Direction 4.4 Planning For Bushfire Protection

This Direction applies to all councils that are required to prepare a bush fire prone land map under section 146 of the EP&A Act or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of the Act. A draft LEP shall have regard to *Planning for Bushfire Protection 2006*, introduce controls that avoid placing inappropriate developments in hazardous areas and allow for bushfire hazard reduction (bushfire hazard reduction measures include the provision of Asset Protection Zones separating property from bushland and two-way access roads linking to perimeter roads and/ or fire trail networks). A draft LEP shall also minimise the perimeter of the area of land interfacing the hazard which may be developed.

Direction 6.2 Reserving Land for Public Purpose

This Direction has the objectives of facilitating the provision of services and facilities by reserving land for public purpose and facilitating the removal of land for public purposes where the land is no longer required for acquisition. Pursuant to the Direction, a draft LEP shall not create, alter or reduce existing zoning of reservations of land with public purpose without approval of the relevant authority and the Director-General. When a Minister or public authority requests a council to reserve land for a public purpose in a draft LEP and the land would need to be acquired, the council shall reserve the land in accordance with the request, and rezone it for its intended future use.

4.3 State Environmental Planning Policies

The requirements of the relevant state environmental planning policies (SEPPs) are discussed below.

State Environmental Planning Policy No 32—Urban Consolidation (Redevelopment of Urban Land)

The aims of the policy include enabling urban land, no longer required for the purpose for which it is zoned, to be redeveloped for multi-unit housing. Pursuant to the SEPP, the Council and the Minister must consider whether land is no longer needed or used for the purpose for which it is currently zoned, whether it is suitable for multi-unit housing and whether action should be taken to make the land available for such redevelopment. The Minister will consider whether the redevelopment of any urban land for multi-unit housing is a matter of regional planning significance.

State Environmental Planning Policy (Rural Lands) 2008

The SEPP sets out principles for the planning and subdivision of rural land. These principles include balancing the social, economic and environmental interests of the community; the protection of natural resources; providing opportunities for rural lifestyle; settlement and housing that contribute to the social and economic welfare of rural communities; consistency with regional strategies; and the consideration of existing agricultural holdings and the future supply of rural residential land when considering lot sizes.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)

SEPP 33 provides definitions for “hazardous industry”, “hazardous storage establishment”, “offensive industry” and “offensive storage establishment” to be incorporated into all environmental planning instruments. SEPP 33 prescribes additional matters to be considered by the consent authority in determining a development application.

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)

Clause 6 of SEPP 55 prescribes requirements to consider the potential contamination of land in preparing a draft LEP to rezone the land. Subclause 6(2) of the SEPP requires that, before including land in a particular zone, a Council is to obtain and have regard to a report specifying the findings of a preliminary investigation of the land carried out in accordance with the *Contaminated Land Planning Guidelines*.

Draft State Environmental Planning Policy No. 66 – Integration of Land Use and Transport (Draft SEPP 66)

Draft SEPP 66 prescribes that environmental planning instruments are consistent with the *Integrated Land Use and Transport (ILUT) Strategy* that accompanies the SEPP. It also requires that they are drafted with adequate consultation with the Director-General of the NSW Government Ministry of Transport. Planning provisions are to minimise demand for travel and the use of cars. The access needs of inter-modal terminals and other places that generate or attract freight trips are to be taken into account.

NOTE: There are no Regional Environmental Plans applicable to the study area.

4.4 Standard Instrument – Principal LEP

Pursuant to Section 33A of the EP&A Act, the Standard Instrument – A Principal Local Environmental Plan comprises of a template that will be used to replace LEPs for all councils in NSW. Each council is to draft a new LEP consistent with the Standard Instrument template. Once gazetted, new LEPs will repeal any existing LEPs. Councils will adapt the instrument to accommodate the characteristics of their LGAs.

Under the Standard Instrument (Local Environmental Plans) Order 2006, some of the provisions contained in the Standard Instrument are compulsory and must be included in an LEP, while others are optional. However, optional provisions must be adopted without variation. Councils may include their own additional provisions, but only if they are not inconsistent with the provisions of the Standard Instrument and comply with any relevant Directions in that Instrument.

The Standard Instrument nominates land use zones and prescribes objectives and permissible uses for each zone. Councils must select land use zones from the Standard Instrument for inclusion in an LEP. Objectives and land uses may be added to zones in order to allow for the characteristics of the land concerned. However, land uses cannot be removed from the list of those permitted in each zone of the Standard Instrument zone.

Any rezonings within the study area must therefore consider the zones contained in the Standard Instrument.

4.5 Local Environmental Plans (LEPs)

The LGA has two LEPs – the Wagga Wagga Local Environmental Plan 1985 (WWLEP 1985), which applies to the urban area of the LGA and the Wagga Wagga Rural Local Environmental Plan 1991 (WWRLEP 1991) which applies

to outlying villages and rural areas. Both LEPs were drafted in order to replace the numerous planning controls which preceded them. Both LEPs apply to various parts of the study area.

Wagga Wagga Local Environmental Plan 1985

WWLEP 1985 was gazetted on 14 October 1985 and contains seven broad zones which are applicable to the urban area of the LGA. All of the zones permit a wide range of development with consent and the LEP does not provide typical development standards. The zones are: Rural, Residential, Business, Industrial, Special Uses, Open Space and Environmental Protection. Each zone is divided into sub-zones by the Wagga Wagga Development Control Plan 2005 (WWDCP), which contains more detailed planning controls and schedules of land uses considered suitable within each subzone. The zones contained in the WWLEP 1985 that apply to the study area are described in subsequent chapters of this report.

Wagga Wagga Rural Local Environmental Plan 1991

The WWRLEP 1991 divides land in the rural areas of the LGA into two land use zones Zone 1 (Rural) and Zone 2 (Village). As with WLEP 1985, these zones are further divided into sub-zones in the WWDCP. The provisions of each zone, as they apply to the study area sites, are discussed in subsequent chapters.

4.6 Development Control Plans

Wagga Wagga Development Control Plan 2005 (WWDCP)

This plan amalgamates all previous DCPs, guidelines and policies that applied within the LGA. As discussed in section 1.3 of this report, the LEPs combine with the WWDCP to form an atypical approach to zoning. The DCP contains land use sub-zones that provide a greater, more detailed level of control than the broad zones on the LEP. Table 2 of this report indicates the land use subzones that are applicable to the study areas.

Items of the Environmental Heritage

Appendix 15 of the WWDCP comprises a schedule of ‘Items of the Environmental Heritage’. Items in each of the sites that are included in the schedule are identified and discussed in subsequent chapters of this report.

Energy Efficiency

Chapter 32 of the WWDCP addresses the provision of sustainable, energy efficient homes and sets controls relating to energy efficiency. Of relevance are controls relating to street and block layout, as well as block dimensions. Consideration of solar access principles at this stage will facilitate suitable building orientation at a later stage.

Bourkelands and Hilltop Estate

Chapters 38 and 39 of the WWDCP contain controls for the Bourkelands and Hilltop Estate residential areas. These lie adjacent to the Lloyd precinct, on the opposite (east) side of Mangoplah Road. An assessment of the potential re-zoning of the Lloyd precinct should consider the WWDCP's provisions relating to community facilities, roads, open space, stormwater, bushfire control and pedestrian access networks in Bourkelands and Hilltop Estate, so as to assess how connectivity may be achieved with a new residential area in Lloyd.

Appendix 7: Flood Policy

Appendix 7 of the WWDCP contains a flood policy that must be observed in any assessment of potential re-zonings within the study area.

Appendix 31 – Neighbourhood Design Guidelines

The Guidelines were prepared by Council to assist landowners and developers to prepare site specific Development Control Plans (or "neighbourhood plans") for new residential neighbourhoods. Such plans are required before rezoning can take place. The Guidelines contain principles that must be considered in the urban design of new residential areas.

4.7 Development Contributions Plans

Open Space and Recreation Facilities

Section 4.1.2 of Council's Section 94 Contributions Plan 2006 states that open space and recreation facilities identified under the Plan are part of the implementation of the Wagga Wagga City Council Recreation and Open Space Strategy (Stratcorp Consulting 2005). This Strategy and its implications have been summarised in Chapter 4 of this report.

The Plan also states that it will pursue a strategy which aims at providing new playgrounds, plantings and entry treatments on existing open space or Council owned land in Estella, Lloyd and Boorooma. The strategy to be pursued also aims for the embellishment and dedication of new local and neighbourhood public open space by developers in Estella, Boorooma and Lloyd.

Provision of new local open space in the urban release areas will be based upon a planning standard of 2.5 hectares of recreation space per 1,000 residents. (This is part if the total provision of 4.0 hectares of open and recreation space per 1,000 residents recommended by the Council's Recreation and Open Space Strategy.

As Section 4.1.2 of the 2006 Section 94 Contributions Plan explains, Council's strategy also involves the acquisition of 4.5 hectares of land for new sports facilities at Estella/Boorooma. This would provide for football codes up to an Australian Rules sized ground at 180m x 160m. The facility will augment the City's sports ground network and will be used by a City-wide population.

Community Centres

Section 4.3.2 of the Plan identifies the need for a new community or neighbourhood centre to serve the City's southern urban release areas up to 2016. The centre is to be located at Lloyd on land either owned by Council or dedicated by developers.

Another community centre will be constructed at Estella, which will be co-located with the sportsground. It is to include a playground, car parking and public amenities and facilities to be utilised in conjunction with the sportsground.

5 The Community

This section comprises an analysis of trends in population characteristics, employment, supply and demand of housing and industrial land that are of relevance to land uses that may be suitable within the study areas. Whilst the Spatial Plan is informed by a considerable analysis of demographic and housing market trends, new census data has become available since its date of publication. This chapter reflects the updated situation on the basis of the 2006 census.

5.1 Demographic Analysis of Wagga Wagga

In order to assess trends in population characteristics, census data from the Australian Bureau of Statistics (ABS) for Wagga Wagga has been examined and is reproduced in *Table 9 Population Indicators for Wagga Wagga LGA 1996 – 2006 compared to NSW 1996 - 2006*. The ABS statistical local area selected to represent the city is 'Wagga Wagga Part C – Local Government Area'. Data gathered from the 1996, 2001 and 2006 censuses has been considered and is compared with data for the entire of NSW. The comparison between Wagga Wagga and the State highlights any trends that have emerged in the LGA.

Table 9 Population Indicators for Wagga Wagga LGA 1996 – 2006 compared to NSW 1996 - 2006

Census Indicator	Wagga LGA 1996	Wagga LGA 2001	Wagga LGA 2006	NSW 1996	NSW 2001	NSW 2006
Population	55,519	55,056	57,602	6,038,696	6,371,745	6,585,733
Population % change		-0.8%	4.6%		5.5%	3.4%
Per annum intercensal average		-0.2%	0.9%		1.1%	0.67%
Median Age	29 years	31 years	33 years	34 years	35 years	37 years
Population aged under 15 yrs	24.4%	22.6%	21.7%	21.4%	20.4%	19.8%
Population aged over 65 years	9.7%	11.1%	12.3%	12.7%	13.1%	13.8%
Median household size	2.7 persons	2.6 persons	2.6 persons	2.7 persons	2.6 persons	2.6 persons
Couple family with children (% of total families)	50.9%	47%.	45.1%	50.5%.	48.4%	46.2%
Lone-person households (% of occupied private dwellings)	21.9%	23.0%	24.4%	21.9%	22.3%	22.8%

SOURCE: ABS, *Census 1996, 2001, 2006 (*Data taken on 21 January 2007)

Table 9 indicates that, while the population of Wagga Wagga decreased by 0.8% between 1996 and 2001, it went on to increase by 4.6% in the five years to 2006. This rate of increase is greater than that of NSW as a whole (which grew by 3.4% over the same period).

Population data also shows Wagga Wagga to have aged more rapidly than NSW as a whole, with an increase of 2.6% in the proportion of people aged over 65 between 1996 and 2006, compared with 1.1% for NSW. The median age also increased more rapidly compared to NSW with a rise of four years between 1996 and 2006 for Wagga Wagga, compared with a three year increase for the State. Therefore, while the City maintains a lower median age and a lower proportion of over 65's compared to NSW; the past ten years have seen an increased trend towards an ageing demographic profile.

While household size has decreased in line with the rate for NSW, the proportion of lone person households has come to surpass that of NSW between 1996 and 2006. 21.9% of the populations of both Wagga Wagga and NSW were lone person households in 1996 within ten years, this figure had risen to 24.4% in the WWLGA compared with 22.8% across the State.

5.2 Demographic Analysis of New Residential Areas

New residential areas of Wagga Wagga City Council that have developed over recent years exhibit unique population characteristics when compared to the rest of the City. The populations of new areas tend to have a high proportion of people aged 19 or under. High proportions of children in these suburbs are likely to have implications on the demand for schools in and around new urban area.

Table 10- Population characteristics for Tatton, Bourkelands and Estella compared with Wagga Wagga urban area. includes census data for the ABS collection districts that relate to the new residential areas of Bourkelands, Tatton and Estella. This data is compared with data for the entire urban area of Wagga Wagga. (This is represented by Wagga Wagga Part A SLA which includes the inner urban area but excludes villages).

Table 10- Population characteristics for Tatton, Bourkelands and Estella compared with Wagga Wagga urban area.

	Tatton		Bourkelands		Estella		Wagga Wagga Urban Area	
	2001	**2006**	**2001**	**2006**	**2001**	**2006**	**2001**	**2006**
Population	925	1,541	1,252	1,767	1,323	1,536	50,634	52,490
Median age	37	37	30	32	27	27	31	33
Aged 0 – 4 years	65 (7%)	118 (7.7%)	105 (8.4%)	179 (10.1%)	140 (10.6%)	109 (7.1%)	7.3%	7.2%
Aged 5 - 9	81	132	132	160	152	132	7.6%	7.4%

	Tatton		Bourkelands		Estella		Wagga Wagga Urban Area	
years	(8.8%)	(8.6%)	(10.5%)	(9.1%)	(11.5%)	(8.5%)		
Aged 10 – 14 years	86 (9.3%)	137 (8.9%)	113 (9%)	140 (7.9%)	118 (8.9%)	121 (7.8%)	7.5%	7.3%
Mean h/hold size	3.1	3.0	3.1	2.9	NA	2.7	2.6	2.5

SOURCE: ABS Census 2001 and 2006 (Data taken on 20 February 2008)

As **Table 10** demonstrates, new urban areas have a distinctive profile compared to the rest of the LGA. While the proportion of the population aged between 5 and 14 has declined marginally in the new residential areas, it is still significantly higher than in the urban area as a whole. Of significance is an increase in the proportion of 0 to 4 year olds in Tatton and Bourkelands. Intercensual increases for Tatton and Bourkelands between 2001 and 2006 were 81.5% and 70.5% respectively.

The new area of Estella has experienced a decrease in the proportion of population aged 14 or under. However, this may be explained in part by the establishment of a seniors living development in the area.

5.3 Population Projections

Population Projections for Wagga Wagga

The NSW Department of Planning's Transport and Population Data Centre (TPDC) produce population projections that relate to the same SLAs as those of the ABS census.

Table 11- Population projections for Wagga Wagga LGA.

Year	Projected population Wagga Wagga LGA	% aged 0 to 14 Wagga Wagga LGA	% aged 0 to 14 NSW	% aged 65+ Wagga Wagga LGA	% aged 65+ NSW	Median Age Wagga Wagga LGA	Median Age NSW
2006	57,840 (Actual: 57,602)	21% (Actual: 21.7%)	19.2 (Actual: 19.8%)	13% (Actual: 12.3%)	13.8 (Actual: 13.8%)	34 (Actual: 33)	37 (Actual: 37)
2011	59,090	19%	18	14%	14.9	36	38
2016	60,620	18%	17.2	17%	16.7	38	39
2021	62,380	17%	16.7	20%	18.4	39	40
2026	64,220	17%	16.3	22%	20.3	41	41
2031	65,970	16%	16	24%	21.9	42	42

SOURCE: TPDC, *'New South Wales Statistical Local Area Population Projections 2001 – 2031'.* (2005)

Table 11- Population projections for Wagga Wagga LGA. demonstrates a projected increase in the LGA's population of 8,130 (14%) between 2006 and 2031. The City is projected to age more rapidly than that of NSW as a whole. By 2031, almost a quarter of Wagga Wagga's population will be over 65, exceeding the proportion for NSW. The City's rate of ageing will bring its median age in line with that of NSW over the next 24 years. This is suggested to coincide with a decline in the proportion of people aged 14 or under.

Population Projections for New Residential Areas

It is unlikely that demographic projections for small statistical districts such as those that relate to Tatton, Bourkelands and Estella can be made with any great precision. The populations of the two suburbs are small enough for changes on a micro level to distort projections to the point at which they are not representative of long term trends.

Table 12– Likely future demographic profile of Tatton and Bourkelands and Estella at capacity. assists in making an estimate of likely future demographic characteristics, but is not intended as a definitive projection. The table assumes that the suburbs will be developed to the capacity estimated for them in the 2007 Spatial Plan and considers 2006 census data relating to the proportion of children in age groups under 15 and median household size.

Table 12– Likely future demographic profile of Tatton and Bourkelands and Estella at capacity.

	Tatton	Bourke-lands	Estella (existing urban area)
Total population	2,045	2,721	2,465
0 – 4	157	275	175
5 – 9	175	247	211
10 – 14	182	215	193

SOURCE: ABS, Census 2001 and 2006 (Data taken on 20 February 2008)

Using **Table 12** as a guide, it can be estimated that once they reach capacity, Bourkelands and Tatton will contain a combined total of around 1,250 children aged 14 or under. If it is assumed that many families with young children will remain in the suburbs in the coming years, then the increasing under 5 year old cohort in Tatton and Bourkelands will translate into an increased proportion of children in all age groups under 14. This is likely to reverse the decrease in the proportion of people aged 5 to 19 in the two suburbs. Therefore, the figures in **Table 12** should be considered as being conservative. It is likely that there will be a higher number of people aged 14 or under in the two areas at capacity.

Figures for Estella in **Table 12** are based on the historical data in **Table 10** that shows that the proportion of children in the existing area of Estella has diminished. It should be borne in mind that population data for the existing area of Estella takes in the seniors living development in the suburb. The presence of the development may become less influential on the demographic profile of the suburb as it grows.

5.4 Implications of Demographic Analysis and Population Projections

Schools

The Department of Education (DET) advised Council during the preparation of the 2007 Spatial Plan that the primary schools are to be provided at a rate of one school per 2,000 to 2,500 residential lots. The DET also recommends that primary schools be within 1.6km road distance of the bulk of their drawing area.

The potential yield of Lloyd is 2,375 lots. This is within the DET threshold for a primary school. When Lloyd's potential yield is combined with existing properties in surrounding suburbs that are more than 1.6km from a primary school, the threshold is far exceeded. As DET is not proceeding with the construction of a school at Glenfield Park, the consideration of Lloyd as a new urban area presents an opportunity to meet the strategic imperative for the provision of a primary school.

At 2,133 lots, the combined potential yield for the study areas of Estella and Booroma is also within the DET threshold. When the Spatial Plan's estimated remaining yield for the existing area of Estella is considered, the total number of dwellings is 2,477 at capacity. This almost reaches the upper margin of the DET threshold for a primary school.

The advice from the DET to Council regarding provision of primary schools also states that the nature of the population should also be considered in assessing provision. Of relevance to this are the anticipated high numbers of children that will be resident in the Boorooma, Estella and Lloyd study areas should they be developed as new urban areas.

It is assumed that the demographic profile of Bourkelands and Tatton would be reflected at Lloyd. Based on an anticipated yield of 2,375 lots, once at capacity, Lloyd will be resident to an estimated 1,833 children under 15 years. This number will be added to approximately 1,300 children of 14 years or under estimated to be resident to Bourkelands and Tatton once they have reached capacity.

The two study areas in the northern suburbs have a combined potential yield of 2,133 lots. If their demographic profile reflected the 2006 census for existing

urban area of Estella, they would be resident to approximately 1,343 children under 15 years. When this figure is added to the number of children anticipated to be living in the existing urban area, the total for the Boorooma – Estella area is 1,922 children under 15 years when capacity is reached.

The potentially high numbers of children anticipated to be resident to new urban areas add a strategic imperative to the requirement for the provision of a primary school under DET recommendations.

Dwelling Type

The rate of ageing of the LGA and trends towards smaller household size are likely to increase demand for attached dwellings, seniors' living developments and adaptable dwellings. Appropriate community facilities for seniors are also needed. A principal LEP that relates to the study areas should provide for "whole of life housing" and "ageing in place."

5.5 Housing Market

Trends in Dwelling Type

While Wagga Wagga has traditionally been characterised by a high proportion of detached houses, there is evidence of a recent trend towards increased demand for attached dwellings. Census data indicates that between 1996 and 2006, the proportion of occupied private dwellings that were detached in the LGA remained constant at 84% to 85%. This is relatively high compared with 71% for NSW in 2006. Attached dwellings (medium density homes and apartments) accounted for between 13% and 15% in Wagga Wagga LGA between 1996 and 2006. This compares with 27% for NSW in 2006. (ABS, *Census 1996 to 2006*).

The Spatial Plan includes data on development application (DA) approvals that indicates a recent increase in demand for attached dwellings in the LGA. This data indicates that the proportion of approvals for attached dwellings (excluding seniors living accommodation) between 2003/04 and 2006/07 was between 21% and 26%.

Affordability – Housing for Sale

Evidence suggests that recent trends indicate that housing affordability in the LGA is under threat. According to the Department of Housing (DoH), the median sale price for dwellings in the LGA rose by 75.7% between September 2002 and June 2007. This increase was higher than that for the State (24% over the same period). (DoH (2008), *Quarterly Rent and Sales Reports for June Quarter 2007* p13 and September Quarter 2002 p10; DoH (2006), *Submission to Wagga Wagga City Council* P4). It is considered unlikely that

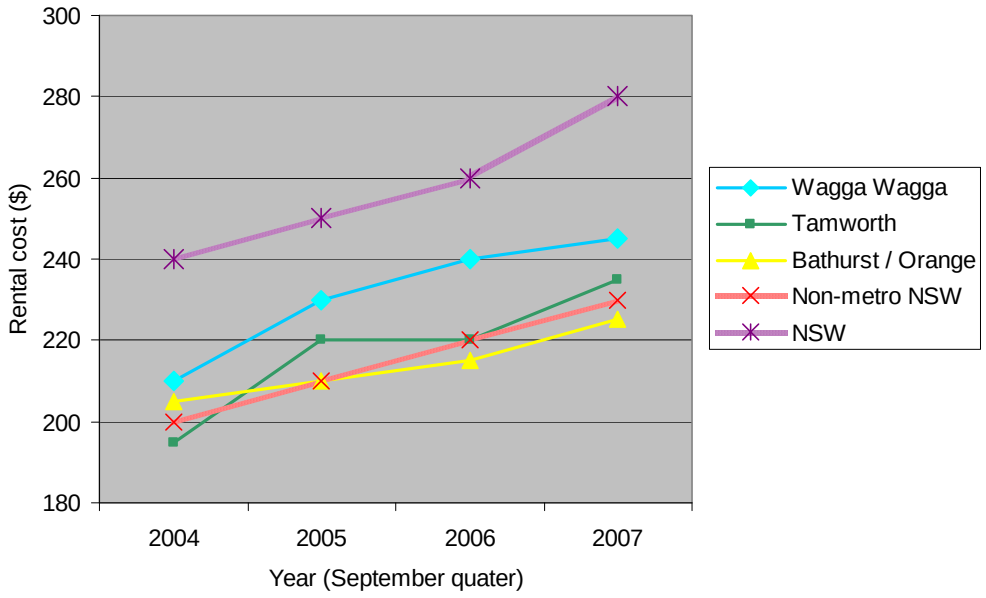
this trend is caused simply by constrained supply. Additional factors such as low interest rates are also assumed to have had an influence on prices. Supply and new market entrants can, however, assist in increasing housing affordability.

A DoH submission to the Council, made in relation to the preparation of the Spatial Plan, indicates that between June 2003 and December 2005, the proportion of dwellings in Wagga Wagga that were affordable for purchase by people at the 40th percentile of non-metropolitan household income declined from 22.3% to 7.8%. This placed housing in Wagga Wagga at a lower degree of affordability than the rest of NSW, in which 13.4% of dwellings were affordable to those at the 40th household income percentile in December 2005. (DoH (2006), *Submission to Wagga Wagga City Council* P4).

Affordability – Rental Housing

Table 13 - Median rental prices for three bedroom dwellings contains the median rental cost for a three bedroom dwelling in Wagga Wagga, compared with Tamworth, Bathurst/Orange, NSW and non-metropolitan NSW. Data in the table is taken from the DoH quarterly Rent and Sales Report.

Table 13 - Median rental prices for three bedroom dwellings



SOURCE: DoH, *Rent and Sales Report (*September quarters 2004 to 2007)

As **Table 13** demonstrates, the median rental cost for a three bedroom dwelling in Wagga Wagga has generally increased in line with the rate of increase for non-metropolitan NSW. The median rental cost in the LGA is relatively high, when compared with costs for Tamworth, Bathurst/ Orange and non-metropolitan NSW.

In its submission to the Council in relation to the Spatial Plan, the DoH provided data on the private rental market. The Department stated that the proportion of rental properties in Wagga Wagga that are affordable to people on the 40th percentile of Sydney household income declined from 48.5% in June 2003 to 40.1% in December 2005. This is compared with a figure of 43.1% for non-metropolitan NSW. (DoH (2006), *Submission to Wagga Wagga City Council* P4).

5.6 Local Economy

Industry Sectors

Table 14 - Industry by employed persons in Wagga Wagga LGA and NSW 1996 to 2006 contains the numbers of employees in industry sectors in the Wagga Wagga LGA between 1996 and 2006.

Table 14 - Industry by employed persons in Wagga Wagga LGA and NSW 1996 to 2006

	Wagga Wagga 1996	Wagga Wagga 2001	Wagga Wagga 2006	NSW 1996	NSW 2001	NSW 2006
Agriculture, forestry & fishing	1,343 (5.4%)	1,442 (5.7%)	1,240 (4.4%)	3.6	3.4	2.7
Manufacturing	2,294 (9.3%)	2,166 (8.5%)	2,249 (8.1%)	294,984 (11.5%)	301,561 (11.0%)	277,678 (9.6%)
Construction, mining, energy, water & waste	1,640 (6.7%)	1,580 (6.2%)	2,117 (7.6%)	8.1	8.2	9.0
Wholesale & retail	4,186 (17%)	4,531 (17.8%)	4,614 (16.5%)	15.9	16.1	15.8
Transport, postal & warehousing	1,084 (4.4%)	1,266 (5%)	1,280 (4.6%)	131,197 (5.1%)	135,982 (4.9%)	145,166 (5.0%)
Professional, scientific & technical services	803 (3.3%)	961 (3.8%)	1,019 (3.7%)	6.6	7.4	7.3
Public administration & safety	2,969 (12%)	2,772 (10.9%)	3,205 (11.5%)	5.6	5.2	6.0
Education & training	2,416 (9.8%)	2,505 (9.9%)	2,845 (10.2%)	179,214 (7.0%)	196,421 (7.1%)	219,257 (7.6%)
Health care & social assistance	2,329 (9.5%)	2,532 (10%)	3,221 (11.6%)	9.2	9.3	10.5

	Wagga Wagga 1996	Wagga Wagga 2001	Wagga Wagga 2006	NSW 1996	NSW 2001	NSW 2006
Other	5,581 (22.6%)	5,635 (22%)	6,091 (21.8%)	27.4	27.4	26.6
Total	24,645	25,390	27,881	2,558,875	2,748,396	2,901,482

SOURCE: ABS, Census 1996, 2001 and 2006 (Data taken on 20 February 2008)

Table 14 indicates that employment is concentrated in the industries of retail/ wholesale trade, government administration and defence (reflected in the 'other' category in table 14), education and health and community services. This reflects Wagga Wagga's status as the regional administrative centre and the presence of large defence establishments namely the RAAF Base and Kapooka Military Camp. Wagga Wagga is the retail and service centre for the Riverina Region.

Between 2001 – 2006, Wagga has experienced a slight decline in sectors such as Agriculture, forestry and fishing. This may be a result of issues relating to climate and drought.

The numbers of employees involved in manufacturing has fluctuated, only marginally, between 1996 and 2006. The retention of employees in this sector is evidence that economic activity in manufacturing is not diminishing in Wagga Wagga. This retention of employees contrasts with NSW as a whole, which experienced a decrease of 17,306 employees between 1996 and 2006 (-5.9%). This decrease in the number of employees in manufacturing in the State is reflected in the reduction of the proportion of people involved in the sectors from 11.5% to 9.6% (indicated in Table 14).

5.7 Community Facilities

Recreation and Open Space

Council's Recreation and Open Space Strategy identified 22 Council owned/ managed outdoor sports fields in Wagga Wagga. This does not include private facilities and sporting grounds at Charles Sturt University. Wagga Wagga possesses facilities of a regional scale and quality. Lookout Reserve, Willans Hill Reserve and the Botanic Gardens form the largest regional open space corridor in Wagga Wagga, stretching between the railway line near Central Wagga and Red Hill Road to Tolland in the South.

Childcare and education

Wagga Wagga LGA offers over 15 childcare services, approximately10 preschools, 18 primary schools and 6 high schools including public and private with denominations including Anglican, Catholic, Christian, Lutheran, and

Seventh Day Adventist. There is also a special school catering for students aged 4 to 18 with intellectual disabilities.

Riverina Institute of TAFE has a large campus in Wagga Wagga. The Riverina Campus of Charles Sturt University (CSU) is situated just outside Wagga Wagga City Centre. CSU offers over 100 courses at both undergraduate and postgraduate level within the Faculties of Arts, Commerce, Education, Health Studies, and Science and Agriculture.

Aged care

The demographic group aged over 60 years comprises 14.7% of the Wagga Wagga population. This includes 7.4% in the 60-69 age group; 7.1% in the 70-84 years age group; and just 1.5% over 85 years. In total and in each age category Wagga Wagga's percentages are slightly lower than those for NSW (ABS, 2006).

Cultural facilities

Wagga Wagga has high quality cultural facilities. These include the City Library and membership of the Regional Library, two Museum sites, a Civic Theatre, Riverina Play House, outdoor performance spaces, a Regional Art Gallery and the National Art Glass Gallery, Conservatorium of Music, all of which have rising visitor numbers. Additionally, there are many community based arts organisations and cultural clubs and leisure based businesses for people to access. The WWCC Cultural Plan 2006 – 2015 identifies that:

- There is a comprehensive range of public and private/professional arts and cultural services and programs available in Wagga Wagga.
- Services range from professional development and educational (for participants), to exhibitions and displays (for audience).
- Whilst Council has made (and continues to make) a significant investment in the provision and management of cultural venues and the provision of services, a large proportion of the arts and cultural programming is provided by non-for-profit community groups and individuals.

The Cultural Plan outlines the research, analysis, strategic direction and a range of Actions to guide the planning, development and management of arts and cultural facilities and services to 2015 and beyond, in the Wagga Wagga LGA and broader Riverina Region.

Wholesale and retail

The CBD has two sub-regional centres, namely the Sturt Mall and Wagga Wagga Marketplace. Bulky goods retailing is found at the Wagga Wagga Homemakers Centre and other locations around the CBD.

5.8 Health services

There are over 30 General Practitioners either working full-time or part-time in the City of Wagga Wagga with visiting rights to both Wagga Wagga Base Hospital and Calvary Private Hospital.

The Greater Southern Area Health Service (GSAHS) provides hospital and community based services throughout the South Western area of NSW, including Wagga Wagga. Wagga Wagga Base Hospital is the regional referral hospital of the GSAHS and it is also a significant teaching hospital with 256-acute bed facilities and has specialists in most major disciplines.

Community Health services include child and family health, adult health, mental health, developmental disabilities, rehabilitation and geriatrics, sexual health, aboriginal health, women's health, drug and alcohol, sexual assault and health education.

Wagga Wagga Ambulance Service has an accredited rescue unit and provides a 24-hour service for emergency and non-emergency cases

Calvary Hospital is a well-established private hospital in the Riverina providing acute surgical, medical and obstetric services.

5.9 Key Land Use Issues and Strategic Responses

Issue	Strategic Response
7. Social Profile	
• Housing affordability • Housing type • Access to open space, education, employment and health. • Future demographic profile	▪ A projected future increase in the population of the LGA will drive an increase in demand for residential land. ▪ Future changes in the demographic profile (including an increased degree of ageing and smaller household sizes) will result in higher demand for smaller dwellings, adaptable homes and senior's accommodation. ▪ New residential areas are likely to have significantly large numbers of people aged 19 or under, creating a need for schools. ▪ Recent trends in prices threaten the relatively high level affordability of housing in Wagga Wagga. ▪ An expanding transport, logistics and warehousing sector is likely to create high demand for industrial land in proximity to transport infrastructure. ▪ Steady activity in manufacturing and the locational advantages of Wagga Wagga imply a need to ensure sustained activity and promote future growth.

6 Lloyd

6.1 General Description of the Site

The Lloyd study area is located on the south-western fringe of Wagga Wagga, approximately 5kms from the CBD. It is bound by the Main Southern Railway Line and the Olympic Highway to the west. The existing urban development areas of Glenfield Park are to the north of the site and Bourkelands to the east. The site has an area of approximately 603ha and its southern boundary runs from the junction of Mangoplah Road and Clifton Street in the east to the Olympic Highway west of the Burgess Earthmoving site.

A corridor of Crown land forming a stock trail used for the movement of animals between pastures and abattoirs traverses the site from east to west. The "Wiradjuri" walking track is located within this corridor. An electricity transmission line easement transverses the north-western section of the site. The site generally comprises of undulating, cleared pastoral land with woodland located on ridge tops. The wider locality accommodates low-density suburban fringe development.

The site has been extensively disturbed through a combination of land uses. While the area is predominantly used for agriculture, there is a Quarry in the centre of the site that produces road base. There is also a potable water storage facility located on a central hilltop. Topography comprises of hilltops ridges and, gentle side slope terrain, with valleys running through the site.

On 18 December 2006, Council resolved to advance planning that may result in the residential development of Lloyd.

6.2 Site History

Lloyd has been formally recognised as having the potential for urban development since the adoption of the Wagga Wagga Development Control Plan 1986. The WWDCP classified the area as a 'future urban' zone, indicating this area as a location for the growth of the City. This zoning has been maintained by the WWDCP 2005.

Much of the area has already been the subject of a Local Environmental Study (LES). Following approaches by land owners, Council undertook a review of its Draft Strategic Land Use Plan in 2000. The review identified that the adjacent residential area of Glenfield Park was almost at capacity (with 90% of land developed) and that nearby land release areas needed to be considered. In February 2000, Council resolved to proceed with the consideration of the rezoning of Lloyd. A formal rezoning application was lodged in June 2000 and Willana Associates were commissioned to undertake the first LES for Lloyd, which was published in 2002.

The area of land under consideration in this study marks an expansion of the area covered by the 2002 LES for Lloyd. This expansion is the result of adding five allotments to the south east of the original site.

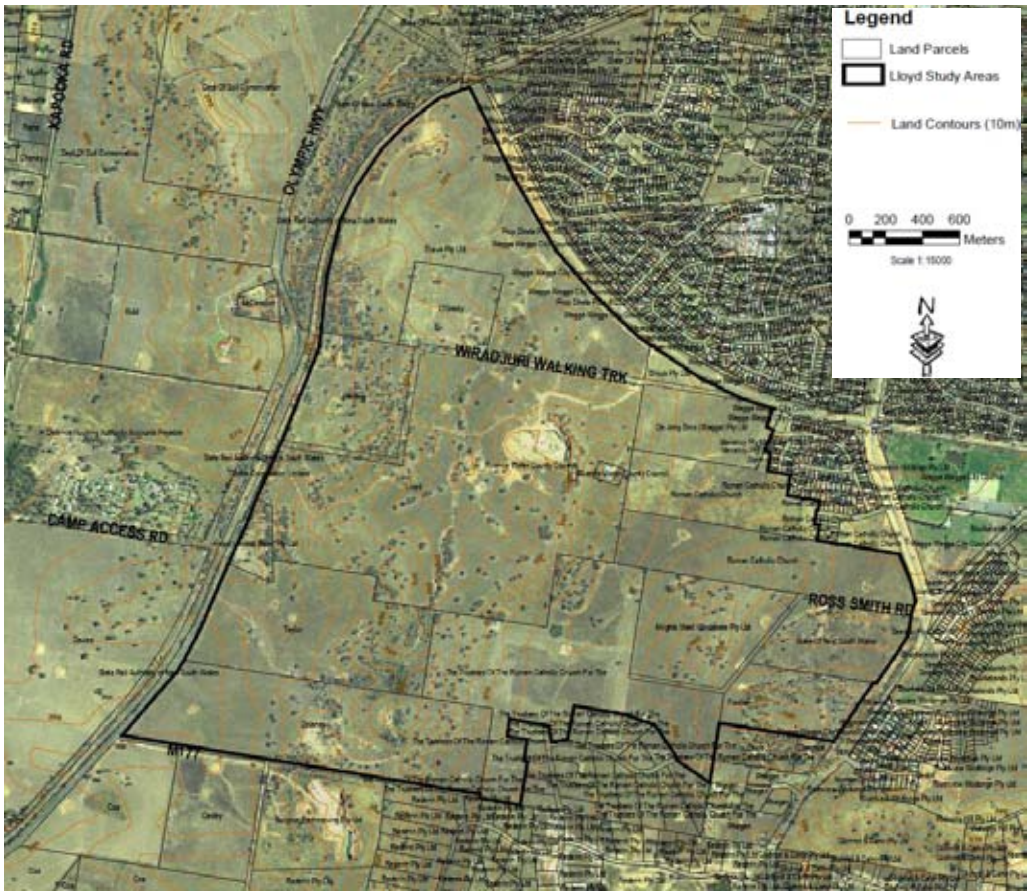


Figure 3: Lloyd Study Area

The 2002 LES for Lloyd considered land data available from the Council at the time and concluded that, while much of Lloyd was suitable for urban development, there was already a sufficient supply of appropriately zoned land. The LES recommended that the possible re-zoning of Lloyd be reviewed between 5 and 10 years from the date of its publication (2002). Such a review should consider the available land supply and any changes in planning procedure or practice which might affect the orderly release of the land. The LES also concluded that any review should be premised on the operations of the quarry having a finite life and on the basis that they will have ceased before the land is rezoned.

The findings of the LES were an impetus for Council's Residential Land and Housing Strategy and Review, which concluded that the supply of residential land in the City generally be reviewed in 2007. The potential for Lloyd to play a part in the coordinated growth of the City's urban area has also been acknowledged by several Council strategies, including Vision 21 Land Use

Strategy and the Wagga Wagga Spatial Plan 2007. The Spatial Plan found that Lloyd was:

> *"*a logical next phase of land release to the south of the city"; and that "locational interdependencies bring capacity to provide services to benefit existing residents in nearby suburbs which may be undersupplied". *(*Wagga Wagga City Council *(2007), Draft Spatial Plan* P42).

6.3 Surrounding Land Uses

Glenfield Park, located north of the site, is a low density residential area that has developed over the past few decades. It has a neighbourhood centre comprising shops, open space and a community centre. Development at Glenfield Park predominantly comprises of single storey detached dwellings. Dalman Parkway and Pinaroo Drive are the local feeder roads into the suburb, converging on the site of the neighbourhood centre. Dalman Parkway ends at Red Hill Road, on the northern boundary of the study area. A regional park with playing fields is situated further to the east between Glenfield Park Road and Bourke Street.

To the east, on the opposite side of Mangoplah Road, are the developing residential areas of Tatton and Bourkelands. At the north eastern corner of the site is a recreational centre at Jubilee Park that provides regional scale sporting facilities.

The Great Southern Railway line adjoins the west of the site, running parallel to the Olympic Highway. Further west of the highway and railway line is an Australian Defence Force base at Kapooka, comprising of three concentrations of buildings surrounded by grass fields and native forest.

Adjoining Urban Development

The surrounding suburbs are very similar in terms of street layout, allotment size and residential density, with large single detached dwellings, curved roads, loop roads and cul-de-sacs. Vision 21 states that "patterned" street layouts are not favourable as they have "proved quite confusing" and "visitors quickly loose their orientation".

Vision 21 states:

> "Current planning practices prefer a more grid like pattern which is sympathetic to the fall of the land and still tries to maintain a legible road hierarchy." (Wagga Wagga City Council (2006), *Vision 21* p59)

Consistent with this, the Urban Design Advisory Service (UDAS) Residential Subdivision handbook and the Integrating Land Use and Transport guidelines

encourage multiple connections, directional choice, permeable places, legibility, and direct routes for street networks.

6.4 Environment and Landform

Ecologically Sustainable Development Principles

The assessment of the natural environment and the identification of any issues or opportunities is the core component of this study. This assessment is necessary to ensure that development is ecologically sustainable and that it maintains a long-term balance. The definition of ecologically sustainable development, as defined by Section 5 of the EP&A Act is discussed in Chapter 4 of this report.

Topography

Lloyd forms part of a hillscape that defines the basin in which the Wagga Wagga urban area lies. The study area is characterised by hill tops connected by ridges, surrounded by gently sloping land. Almost the entire site has some degree of slope.

A valley runs north south through the centre of the site, contained to the east and west by hilltops connected by ridges. A watercourse with some riparian vegetation runs through along the bed of the valley to the northern area of the site. The head of the valley lies at the southern end of the site. At their northern ends, the eastern and western ridges terminate in hilltops which overlook the lower lying land of Glenfield Park. The land slopes at varied grades down from the hilltops towards the site's northern boundary along Red Hill Road. The more steeply sloping land on the site is found along the east facing side of the eastern ridge, which is incised by gullies. The slope in this area is steep enough to constitute a constraint to development.

A more shallow, gently sloping valley runs north south through the eastern part of the site, the sides of which are more gently sloping. To the south east of this valley are hills of a more moderate slope.

Landscape and Visual Character

The hilltops and ridges of Lloyd form part of the hillscape surrounding and defining the basin in which Wagga Wagga urban area is situated. The hillscape can be seen from across the western part of the city and is a valuable scenic resource. The visual character of Lloyd's ridges and hilltops is defined by a series of grass covered gentle peaks with sparse tree stands. While the character of these ridges is not unusual in the region, their prominence makes them significant. A ridge to the east of the site has been designated as an environmental protection zone for its scenic value.

The area of Red Hill Road that passes the study area is a major gateway to the city. The hilltops of Lloyd are visible from the road and will make a significant contribution to the visual qualities of this gateway.

Photo 1: Lloyd hilltops and ridges

Photo 2: Lloyd landform

Visual Vantages

Lloyd's hilltops and ridges provide extensive regional views over the City and countryside. The site's elevation, the moderate slopes to high ridge tops and absence of obstructions such as dense vegetation or built structures, result in the majority of the site having access to significant views.

Hilltops to the north offer regional views to the north east and west that include the City; the surrounding countryside and hillscapes to the north of Wagga Wagga. Views of moderate to high significance are obtained looking south from these hilltops and take in the ridges, valley and hilltops of the site itself. Views of a high significance are gained looking out of the site from the eastern ridges and hilltops.

Views from the northern midslope which rises from Red Hill Road (approximately 50 - 100m below the ridge) are of a moderate significance and take in the city. The midslopes beneath the eastern ridges and hills offer moderate views of local landforms over the railway line to the west.

Much of the central valley has only local views of the ridges and hilltops within the site, but offers an opportunity to create a unique local visual catchment. These local views are of "moderate significance".

The lower land along the northern boundary has minimal views of significance. The north-most land may currently overlook the Red Hill Road Corridor, but would easily lose views with the imposition of structures or landscaping. There are opportunities to create vistas down streets on these lower slopes. This should be encouraged by a predominantly north-south street layout in future plans and subdivision for the undulating land in the north.

Photo 3: View from the Lloyd site looking north.

Photo 4: View from the Lloyd site looking north east

Air Quality

Dust from the road base quarry and associated truck movement forms the main air quality impact on the site. This is visually evident in the immediate surrounds of the quarry on the eastern ridge. The extent to which dust is

carried by predominant breezes is restricted by the presence of ridges on the eastern and western side of the quarry. The impacts from dust emissions from the quarry will have an impact on the timing of residential development in the immediate vicinity.

6.5 Flora and Fauna

Ecological Communities

The biodiversity study conducted by Eco Logical Australia (Appendix A) found the site contains approximately 289.4ha of box gum woodland, which is listed as endangered under the NSW Threatened Species Conservation Act 1995 (TSC Act) and as critically endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act). Patches of remnant woodland range from moderate to good condition. There is also 6.1ha of remnant Wagga Wagga Hills Forest in good condition.

The flora on the remaining 313.9ha of the site was found to comprise of scattered paddock trees and exotic grassland. These areas are considered to have limited conservation value.

Eco Logical Australia completed investigations at Lloyd in accordance with requirements of DECC and in keeping with standard LES processes. The process of negotiating environmental offsets with the relevant agencies (such as DECC) may also enable the development of the more marginal areas, particularly when large areas of more sensitive land are set aside in public ownership. The development of these areas would be subject to negotiation with DECC regarding the nature, extent and management of offsets that may be required to mitigate any loss of vegetation.

Since the completion of Eco Logical's study, GHD Pty Ltd has undertaken more detailed investigations of some vegetation patches on the site, which included field surveys. These investigations concluded that some of the areas of remnant woodland that had been assessed as being of moderate condition were, on the basis of GHD's surveys, were more marginal in condition. These areas were therefore suitable for development, should appropriate offsets be provided. The DECC has indicated that it is satisfied with GHD's findings.

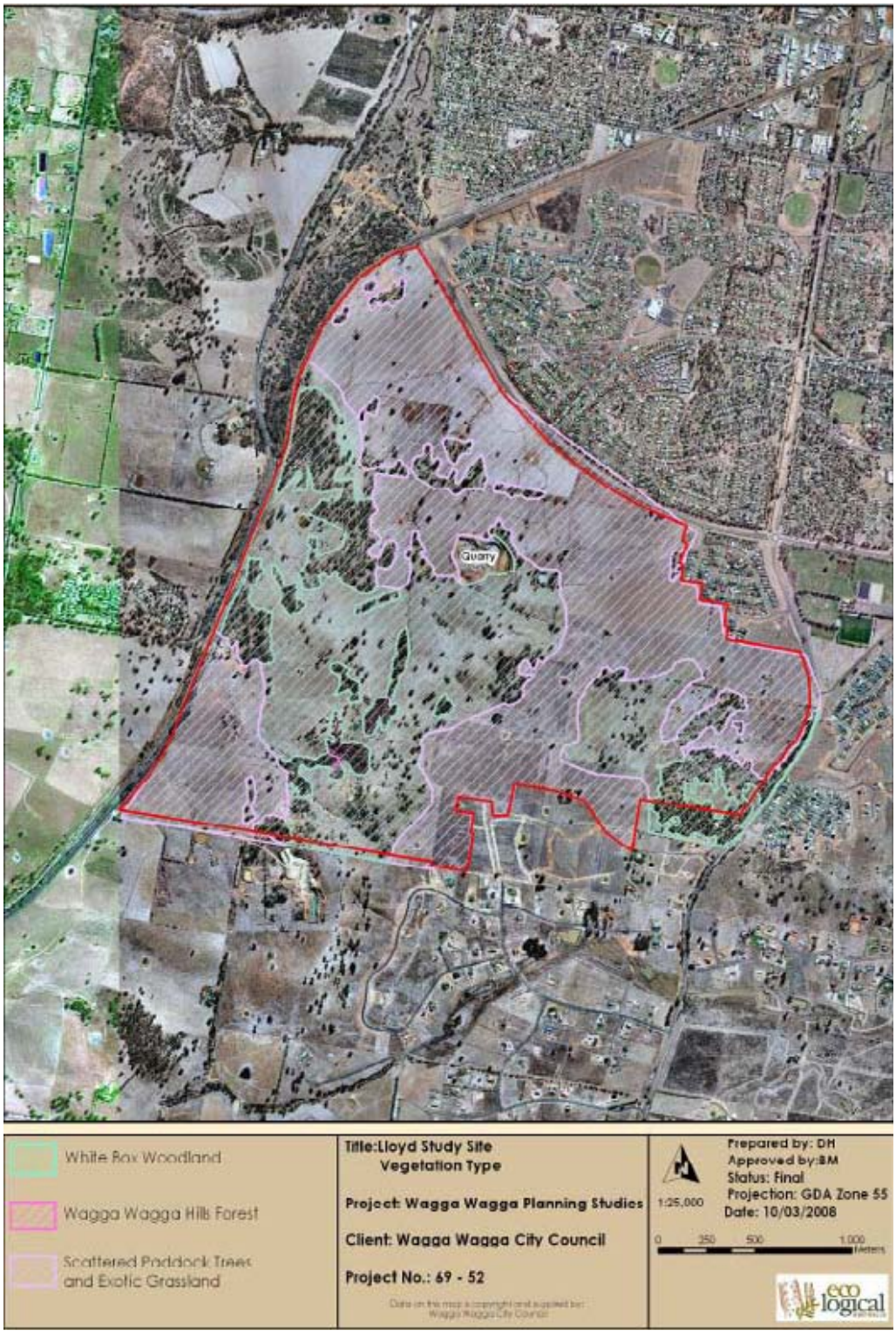


Figure 4: Lloyd vegetation type

Species and Habitat

Two threatened bird species - the grey-crowned babbler (Pomatostomus temporalis) and superb parrot (Polytelis swainsonii) were encountered, but in low numbers. Eco Logical Australia found evidence to suggest that squirrel gliders (Petaurus norfolcensis), which are listed as endangered in the TSC Act, are present on the site.

Five threatened species listed under the TSC Act and/ or EPBC Act are considered likely, or to having the potential to occur at the site - the eastern long-eared bat (Nyctophilus timoriensis), little pied bat (Chalinolobus picatus), yellow-bellied sheathtail bat (Saccolaimus flaviventris) and diamond firetail (Stagonopleura guttata).

Three species listed as migratory under the EPBC Act were considered likely or to potentially occur at the site, namely the rainbow bee-eater (Merops ornatus), cattle egret (Ardea ibis) and white-throated needletail (Hirandapus caudacutus).

Environmental Protection

Under state legislation, areas of good or moderate condition native vegetation that are consistent with endangered ecological communities must be retained. The areas of moderate or good condition box gum woodland on the site can not, therefore, be developed. Wagga Wagga Hills Forest is not currently listed as an endangered ecological community under either state or federal legislation. However, Priday and Mulvaney (2005) list the vegetation community as vulnerable owing to the very restricted distribution of the community. Areas comprising of scattered paddock trees and exotic grassland are considered to have limited conservation value and are suitable for development, if the loss of native paddock trees can be offset.

Regional Context

Vegetation on the site occupies an important position in the landscape, as it forms part of a fragmented link between the Murrumbidgee River to the north and Livingstone National Park to the south. It also provides linkages to other areas of vegetation to the north and south of the site.

Mitigation Measures

A structure plan has been produced which outlines the recommended location of potentially developable lands, lands to be retained and areas in which offsets may be located. In general, the location of retained lands and offset areas at the site aim to:

- Increase connectivity between currently isolated woodland patches.
- Increase vegetation cover of riparian corridors on site.
- Reduce soil erosion.

The loss of remnant trees within potentially developable lands of Lloyd will require offsetting to a ratio of 10:1. Moreover, remnant trees retained within a residential zoning will also require offsetting. It is unlikely that such offsets can be accommodated on site within 'moderate to good' condition vegetation. It is recommended that remnant trees within potentially developable lands be retained and incorporated into future Master Planning so as to maximise the retention of biodiversity values within any future urban landscape.

The offset ratios for the loss of native vegetation prescribe by DECC must be observed. On the basis of the findings of the Eco Logical study, the loss of scattered paddock trees that would result if the site were developed could be provided for in retained areas of woodland on the site. The findings of the further investigations conducted by GHD imply that more land will be required for offset provision.

6.6 Soils and Erosion Hazard

The site is predominately covered by the Lloyd soils group described by Chen and McKane (1997) with smaller areas of Becks Lane, Livingstone and Pulletop soils. These soils are prone to erosion and terracing has been established on some slopes to help alleviate erosion and sediment transport. Erosion is common along the drainage lines within the site. Should rezoning occur, then assessment of measures required to develop areas of high soil erosion hazard should be made at development application stage.

6.7 Soil Salinity

Salinity is associated with urban development, as it has traditionally involved the clearing of deep-rooted trees that would otherwise absorb water and dry out the soil. Suburban residential properties also typically involve water intensive gardens, the irrigation of which results in the addition of water to the soil leading to groundwater recharge and salinity issues.

It should be noted that much of Lloyd has been cleared and so the factors that may contribute towards soil salinity have already been created. Furthermore, urban development has the potential to reduce recharge rates by replacing permeable soil with the impermeable surfaces of buildings and streets which prevent rainwater entering the land. For such a benefit to be achieved, a regulatory/ legal framework is required to ensure the irrigation of private and public open space does not result in an increase in recharge rates that would outweigh the benefit delivered by the provision of impermeable surfaces.

This is particularly the case with water usage in domestic gardens which can add significantly to recharge of the ground water and subsequent offsite impacts in the lower part of Wagga Wagga. Urban development would need to be assisted with an educational program that limits the use of water needy plants, such as the preference for native drought resistant plants in domestic gardens.

A development strategy to reduce recharge would also involve maintaining remnant trees and requiring regrowth as part of the development process. Regrowth would be particularly important for critical recharge areas which could be maintained as open space. A report by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) investigated the causes of salinity and remedial measures to address the problem in Wagga Wagga. CSIRO recommendations included recharge reduction should be pursued to reduce water levels and the reduction of water tables through pumping (dewatering).

It should be noted that some of these conclusions were qualified by a lack of hydrologic data from the southern part of the catchment, uncertainties about the hydraulic conductivity of the aquifer and a need for large scale catchment modelling (CSIRO (2001), *Ground Water Recharge and Discharge in a Saline, Urban Catchment* p 60 - 61).

There are a number of factors that influence the rate of recharge. Estimates by CSIRO suggests that, prior to commencement of agriculture in the region, the average recharge rate was 1.3 mm/yr. Recharge rates on agricultural land are suggested to be in the order of 15 mm/yr. Recharge rates provided by the CSIRO for urban land are contradictory and include rates of both 55 mm/year and 42 mm/year. However, CSIRO staff has confirmed that they are in fact 42 mm/year. (CSIRO (2001), *Ground Water Recharge and Discharge in a Saline, Urban Catchment* p24 - 28).

Table 15 - Recharge Rates for Wagga Wagga

Diffuse recharge – rainfall	11 mm/yr
Diffuse recharge – irrigation	2 mm/yr
Rubble pits -absorption of roof runoff	12 mm/yr
Pipe leakage – water supply	13 mm/yr
Pipe leakage – sewer	4 mm/yr
TOTAL	42 mm/yr

Source: CSIRO, *Ground Water Recharge and Discharge in a Saline, Urban Catchment* (2001)

In new urban areas, and with modern sewage materials, the leakage from water supply and sewage systems could be much reduced. If the use of rubble pits were eliminated, the rate of recharge would be further reduced. Even so, efforts should be made to enhance the rate of water transpiration in aquifer recharge areas by planting trees.

Monitoring

Water tables in Lloyd are some 10m below existing ground level according to the two piezometers installed in March 2005. By contrast, groundwater in the Glenfield Park area is approximately 3m below ground level and rising. There is little seasonal variation experienced in the Glenfield Park water table levels. The depth to groundwater in the Lloyd piezometer needs to be monitored on a quarterly basis as an early indicator of the effect (if any) of future development on groundwater.

Council is in a position to monitor levels as development takes place. The monitoring could be linked to other management practices including varying excess water rates in a manner that reduces the excessive watering of lawns.

Preventative Measures

Measures that should be taken to minimise recharge and soil salinity should include:

- Enhancement of remnant vegetation zones and the minimisation of the removal of existing trees.
- Master plans that emphasise the preservation of existing significant trees and connectivity to a piped stormwater drainage system.
- Minimisation of watered garden areas.
- Elimination of watered nature strips.
- Automated watering systems.
- Provision of advanced tree species within the road reserve and open space areas at the time of subdivision.

Remedial Measures

Despite the foregoing measures for the subject site, increased groundwater levels may still occur down slope in Wagga Wagga. Should elevated groundwater levels be demonstrated through the piezometer monitoring, there will be a need for increased dewatering at the existing borefield. A mechanism to recover the associated capital costs exists under Section 94 of the EP&A Act, planning agreements pursuant to Section 93 of the EP&A Act and possibly under Section 64 of the Local Government Act 1919. Operation of the increased borefield would incur some additional costs for electricity as well as maintenance and monitoring.

These costs are in the order of $3,000 per bore per year at present. Using the same pro-rata basis as for the capital costs, the annual costs attributable to the Lloyd area could be some $6,000 to $12,000 per annum. A rating mechanism or environmental levy would be the preferred means of raising this charge. The use of such measures is clearly less desirable than preventative and management processes. Contributions may also be levied for

revegetation of public recharge areas to offset any increase in owned water levels resulting from development.

6.8 Drainage and Hydrology

Northrop Engineers have undertaken a comprehensive study of the stormwater requirements for Lloyd. A full copy of their report is included at Appendix B. Below provides a summary of the Northrop report.

General Description

The Lloyd site ranges in elevation from RL305m AHD in the south west portion of the site to RL220m AHD to the north. The site generally falls to the north towards the existing developments of Glenfield Park and the existing residential area of Lloyd. The portion of the site fronting the Olympic Highway falls to the west. Several ephemeral watercourses traverse the site. The watercourses are generally well defined and some are severely eroded. Figure 7 below illustrates the watercourses at Lloyd.

O*verland Catchments*

The study area consists of seven separate drainage catchments. Catchments 1 and 2, the eastern catchments, flow to the north towards the existing Lloyd development. The western catchments (Catchments 3-5) generally drain to the north. Although Catchment 5 initially drains to the west it ultimately drains to the north to join the Murrumbidgee River. Catchment 6 flows towards the existing rural residential development to the south, and catchment 7 consists of steeps hills and more densely wooded lands which drain to the west – towards the main southern railway.

Potential Drainage Scenario

Catchments 1 and 2 would drain to the drainage infrastructure at the existing residential area of Lloyd. Catchment 1 drains to a constructed vegetated channel adjacent to Glenfield Road. Catchment 2 discharges to a drainage reserve traversing the existing Lloyd suburb. Catchments 3 and 4 would drain north through Glenfield Park. A drainage path would flow north west, parallel to Red Hill Road to a culvert under the railway to a natural watercourse. These drainage catchments are shown in *Figure 5: Stormwater Catchments*.

Stormwater Management Recommendations

Development activity is likely to increased runoff volumes and pollutant loads. Post-development flows need to be managed to minimise impacts downstream, while maintaining existing (environmental) flows to support habitats.

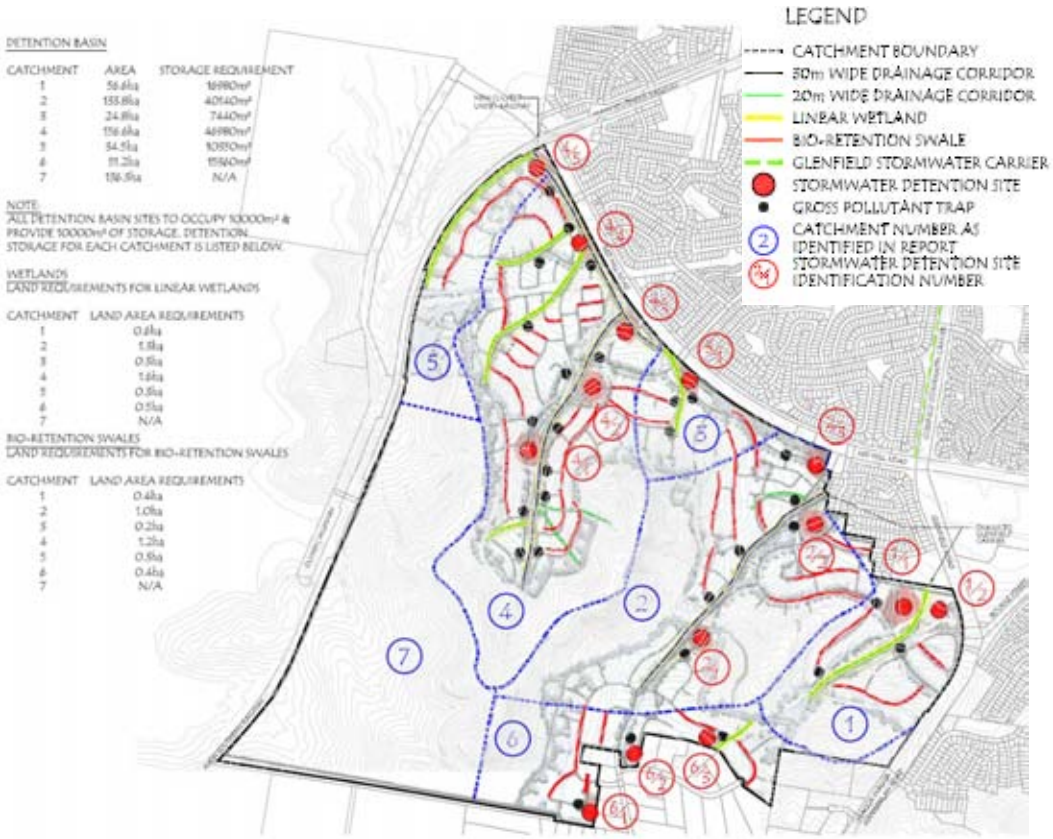


Figure 5: Stormwater Catchments

The following measures should be considered as part of an overall storm water management system. The system shall ensure existing site flows are maintained, while minimising the effects of excessive runoff rates and volumes.

- *Stormwater Detention* allows for the controlled release of stormwater runoff. In general, facilities should be provided at a local catchment level and located toward the downstream end of the catchment (outside areas susceptible to flooding – 100-year ARI).
- *Rainwater Re-use Schemes* provide an alternative water source. The harvested water can easily be used for non-potable purposes (although, requirements for monitoring and treating the condition of harvested rainwater need to be considered). Community-based systems for irrigation of open space areas are recommended to enable Council / Authority management of the potential effects to soil salinity.
- *Reducing Impervious Areas* assists to control the volume and rate of stormwater runoff. Measures to assist with optimising pervious / impervious ratios include limiting paved surfaces, incorporating of permeable paving and grass-lined corridors for drainage to complement landscaping. This strategy should be incorporated with a vegetation management plan to use plant species that contain water in the upper layers of the soil profile – again to minimise soil salinity implications.
- *Salinity* – Selection, planning and design for stormwater management measures needs to continually refer to potential effects to site soil

salinity. Infiltrating runoff needs to be controlled to manage the risk of raising groundwater levels.

- *Water Sensitive Urban Design (WSUD) Principles* that control the quality of stormwater discharged from the Study Area are to be incorporated (as outlined in Appendix D of the Northrop report for Lloyd). Specific measures include pollution control devices, wetlands systems, bio-retention treatment facilities and maintaining site discharge rates that support environmental habitat downstream.

- Water quality targets shall be determined by the procedure indentified in Appendix C of the Northrop report for Lloyd. As a minimum pollutant levels for the post-development scenario shall not exceed predevelopment levels.

6.9 Heritage

European Heritage

There are no significant items of European heritage recorded on the site.

Aboriginal Heritage

Sites and Deposits

The investigation by Kelleher Nightingale Consulting (Appendix D) considered previous studies which identified 13 archaeological sites and 7 Potential Archaeological Deposits (PADs).

Landscape Archaeological Sensitivity

Areas where Aboriginal archaeological sites have previously been identified are highly archaeologically sensitive. The more gently undulating terrain bordering drainage channels and associated low rises are likely to be moderately to highly archaeologically sensitive. A majority of the previously recorded Aboriginal artefact sites within the Lloyd study area were identified in drainage line or lower hillslope contexts.

Conservation Management Recommendations

The findings of the predictive model do not prevent the rezoning of any of the study areas. Rezoning may occur on the condition that further investigations will be required at development assessment stage to ascertain whether aboriginal objects are present. Should investigations demonstrate the presence of objects, development proposals and management practices will be required to ensure the conservation of objects and sites. Disturbed areas and areas of low archaeological sensitivity should not pose a constraint to future development.

Kelleher Nightingale makes the following recommendations for the Lloyd study area:

- Management of the identified Aboriginal heritage features will require consideration during the strategic planning process of Lloyd.
- Conservation should be the prime consideration when establishing Aboriginal heritage management strategies during the planning process.
- While rezoning may occur, it should be conditional upon further investigations being undertaken at development assessment stage to identify whether or not objects are, in fact, present within PADs and areas of high or moderate sensitivity. Such investigations may result in a requirement to ensure that sites and objects are conserved.
- Identified sites, PADs or areas of high/ moderate sensitivity not possible to conserve may require section 90 consent and / or section 87 permit for test/ salvage excavation.
- Consultation with the WWLALC is ongoing. This assessment will be finalised following consultation and input from the Land Council.
- A significance assessment of recorded Aboriginal sites in the western half of the current Lloyd study area was conducted by Kelton (2006). Kelton's investigation was comprehensive, and, in combination with the recommendations listed above, his recommendations should be adopted for future works in the portion of the current Lloyd study area covered by his study.

6.10 Contaminated Land

The degree to which the land may be contaminated can be ascertained at development application stage should rezoning occur. This is appropriate as the cost of the necessary investigations may be met by proponents of future development and because the land does not appear to have a high degree of potential for contamination.

There are no tailings dams evident and it appears that gold mining operations that took place on the site were exploratory in nature and did not involve large scale extraction. Examination of aerial photographs has shown no sign of shearing sheds or yards which would normally be associated with sheep dip facilities.

There may be some contamination associated with the quarry operations; however this would be likely to be limited to hydraulic oils from earthmoving equipment. There appear to be no buildings or remains of buildings associated with the storage of agricultural chemicals or fuel.

Given the apparent lack of potential for contamination, detailed examination of the site can take place should rezoning occur, as required by the development assessment process prescribed by the EP&A Act.

6.11 Utilities

Details of the availability of infrastructure services to the site are provided below. Generally, these necessary services are available to the site, although some areas are constrained. The pattern of development will affect developer

costs, while the level of development will impact upon the need to upgrade some infrastructure.

Electricity

In accordance with section 54 of the EP&A Act, service providers have been notified of the LES process and asked to provide any comment they may wish to make on servicing of the study areas should they developed. There was no response to the notification by Willana Associates of the LES process from Country Energy regarding servicing Lloyd with electricity.

Gas

In response to notification by Willana Associates of the LES process, Country Energy provided comment to the effect that it invests in gas infrastructure if demand is sufficient to make the sale of the fuel commercially viable. In instances where investment cost would be greater than return, developers have funded the installation of gas infrastructure. The company indicated that there is high pressure gas main “in the vicinity” of the study area.

The LES for Lloyd in 2002 found that there is existing mains pipe infrastructure running along the Red Hill Road corridor. The high pressure secondary main pipe had been extended along the western side of the site. The pressure in the pipes in the area was very high and upgrading the mains would not have been necessary for the study area under consideration in the 2002 study. It was found, however, that a new district regulating station may be required as development progressed. Country Energy advised in 2002 that the site is favourable for urban development and their preferred staging of development would be from Red Hill Road to the south.

Water

Riverina Water has indicated that Lloyd is “relatively close to major existing water infrastructure that will assist in the commencement of water supply into [the] area”. Previous investigations undertaken by Willana Associates in the preparation of the Lloyd Local Environmental Study concluded that the provision of potable water was not practicable above the 270m contour.

Telecommunications

There was no response to the notification by Willana Associates of the LES process from Telstra. However, during the preparation of the LES relating to land at Lloyd in 2002, the Telstra has advised that the site is generally suitable for development and could be serviced. Underground cables could be extended from the existing network.

Sewage & Effluent Disposal

The study of Lloyd prepared by Michael Cuthbert, Engineering Consultant (Appendix E) concludes that the site is characterised by well graded land well suited to conventional sewage systems. Areas proposed for rural residential housing may be more economically serviced using low pressure sewage technology.

The study divides the site into two main catchments. Should rezoning take place, Lloyd East could be serviced using a developer provided trunk main parallel to Red Hill Rd, draining towards Glenfield Rd, where it connects into the existing trunk sewer network. Once infrastructure required to overcome overloading problems had been provided, the value of downstream infrastructure would be approximately $3,900 per equivalent tenement, excluding the developer provided main.

Lloyd West could be serviced using a developer provided trunk main parallel to Red Hill Rd, draining towards the Great Southern Railway. Once a new pumping station had been provided, the value of downstream infrastructure is approximately $5,800 per equivalent tenement, excluding the developer provided trunk main.

The exception is a small area at the eastern end near Dalman Parkway that may be economically serviced using this main. This portion may need to be connected to the existing sewage network in Glenfield Park. It is possible that some capacity augmentation will be required through Glenfield Park to prevent overloading of sewer mains. The study recommended that Lloyd East and Lloyd West could be developed in parallel as they discharge to different parts of the sewage system.

The implementation of the technology to be implemented in sewer provision will be assessed by Council in its development service planning.

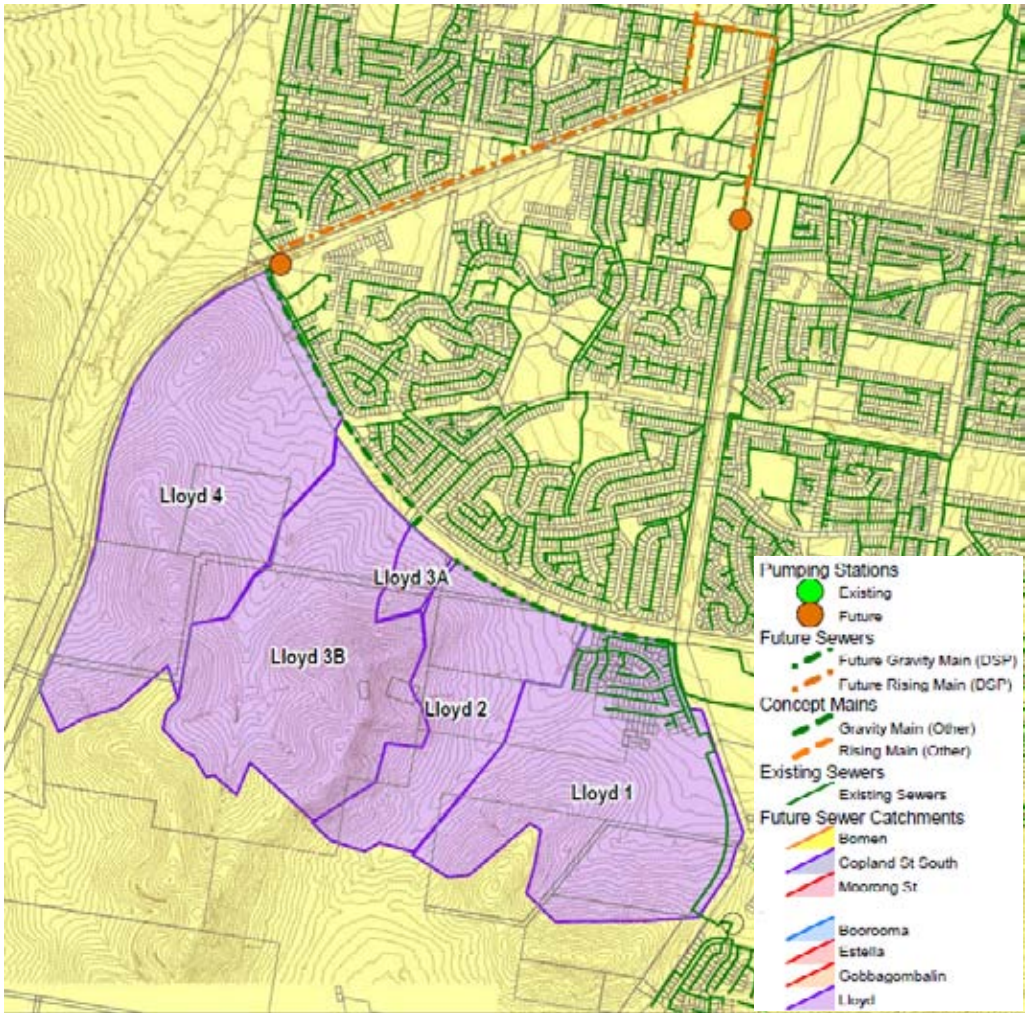


Figure 6: Sewer Catchments for Lloyd

6.12 Transport Infrastructure

Existing Road Network

The study area lies to the southwest of an intersection of two arterial roads which connect it with the City Centre to the north and the state highway system farther afield. The collector roads of Bourke Street, Yentoo Drive and Dalman Parkway connect with the arterial Red Hill Road to serve the residential areas to the north of Lloyd.

Red Hill Road has a posted speed limit of 70 km/hr. **Table 16 - Intersections with Red Hill Road** summarises the intersections of Red Hill Road and other roads that are in the vicinity of the study area.

Table 16 - Intersections with Red Hill Road

Road intersecting with Red Hill Road	Junction type
Olympic Way	Give-way T-junction
Dalman Parkway	Give-way T-junction
Hudson Drive	Give-way T-junction
Glenfield Road	Two-lane roundabout

Deakin Avenue intersects Glenfield Road as a give-way T-junction and provides an alternative access to Hudson Drive for the residents of the existing development of Lloyd. **Table 17 - Two way traffic volumes** summarises existing two way traffic volumes (data provided by the Council).

Table 17 - Two way traffic volumes

Road	Volume (vehicles per day)
Red Hill Road, between Dalman Parkway and Glenfield Road	2,020
Red Hill Road, between Glenfield Road and Bourke	4,940
Holbrook Road	2,040

No daily traffic flow data was available for Dalman Parkway and an estimate was made of 7,000 vehicles per day (vpd) at its northern end based on recent peak period intersection traffic counts. This is expected to be less at the southern end and in the order of 2000 vpd.

Potential Future Road Network

GHD's recommendations as to potential road layouts are contained in Appendix C. Figure 7: Recommended Lloyd Traffic Infrastructure Requirements of the potential future road network is provided below. It indicates that a potential road layout would incorporate a loop collector street with connections to Red Hill Road. The main connection point for the neighbourhood would be located on Red Hill Road, opposite Dalman Parkway. This would provide a direct link to the neighbourhood centre at Glenfield Park and minimise the number of intersections on the arterial toad.

Traffic signals are recommended for the four-way junction at Dalman Parkway and Red Hill Road. These would to provide for positive management of pedestrians crossing Red Hill Road and control of traffic using Dalman Parkway through signal phases. Three other access points could be p[provided on Red Hill Road, Hudson Drive and Mangoplah Road. C

Based on Austroads Roadway Capacity guidelines, the Olympic Highway can adequately absorb traffic volumes entering from Red Hill Road. The intersection of Olympic Highway and Red Hill Road has good sight distance in both directions along.

The intersection of Yentoo Drive and Red Hill Road has been constructed and line-marked to allow through traffic to pass turning traffic. The intersection is considered to be adequate for projected traffic volumes that would result from the development of Lloyd.

Projected Traffic Conditions

The traffic study conducted by GHD Pty Ltd estimates that should the entire study area be developed to its potential for residential uses, then approximately 1,000 vehicle trips would be added to the external road network during the peak period. Approximately 438 vehicles per hour (veh/hr), or 40% of vehicles would exit the study area via the main connection point opposite Dalman Parkway. Approximately 190 veh/hr would exit at the junction between Yentoo Drive and Dalman Parkway, while 282 veh/hr would exit via Hudson Drive and 95 veh/hr would exit via Mangoplah Road.

Midblock Capacity

Red Hill Road currently carries a relatively low volume of around 2,500 vpd. The additional traffic due to Lloyd would increase that volume approximately 6,500 vpd, with 4,500 vpd east and west of Dalman Parkway. These flows may be accommodated by a single two-lane two-way carriageway.

Construction costs

Table 18 - Costs for potential road upgrades indicates estimated costs of works required in the construction of appropriate intersections.

Table 18 - Costs for potential road upgrades

Location	Proposed Upgrade Works	Estimated Cost
Olympic Way –Red Hill RD Dalman Parkway/South Collector Road	Traffic signals	$350,000
Hudson Drive/ Red Hill Road	Single lane roundabout	$300,000

Public Transport Cycling And Footpaths

The bus route and collector road networks in Lloyd should be designed so that all dwellings are within 500m of a bus stop. New paths in Lloyd should connect with the existing network in Glenfield Park. A path is recommended along the north side of Red Hill Road with a possible underpass crossing to the west of Hudson Drive intersection. Provision for off-road cycling should be made along the main distributor road in Lloyd to provide an off-road alternative for cyclists travelling on the relatively steep grades.

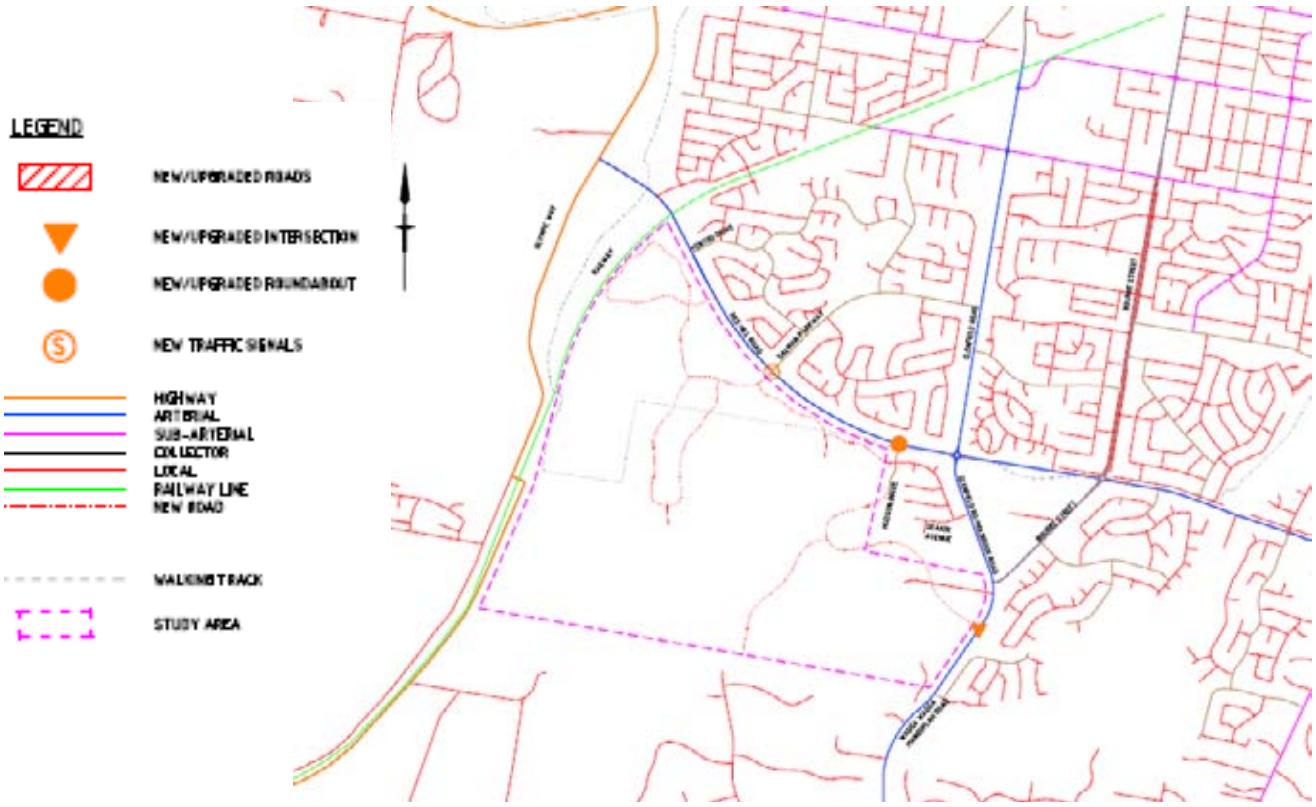


Figure 7: Recommended Lloyd Traffic Infrastructure Requirements

The existing transmission easement should be utilised as a corridor to promote continuity for pedestrians and cyclists along the corridor to the Glenfield Park Neighbourhood Centre.

6.13 Bushfire Risk Management

Risk Assessment

The study undertaken by Eco Logical Australia (Appendix H) concluded that the bushfire hazard across the site is generally low to moderate, with some high risk areas along the top of the ridge that runs north south though the site. Performance criteria of Planning for Bushfire Protection 2006 (published by the RFS) may be met by strategies such as provision of Asset Protections Zones (APZs) and perimeter roads or trails around new residential areas to provide access for emergency services.

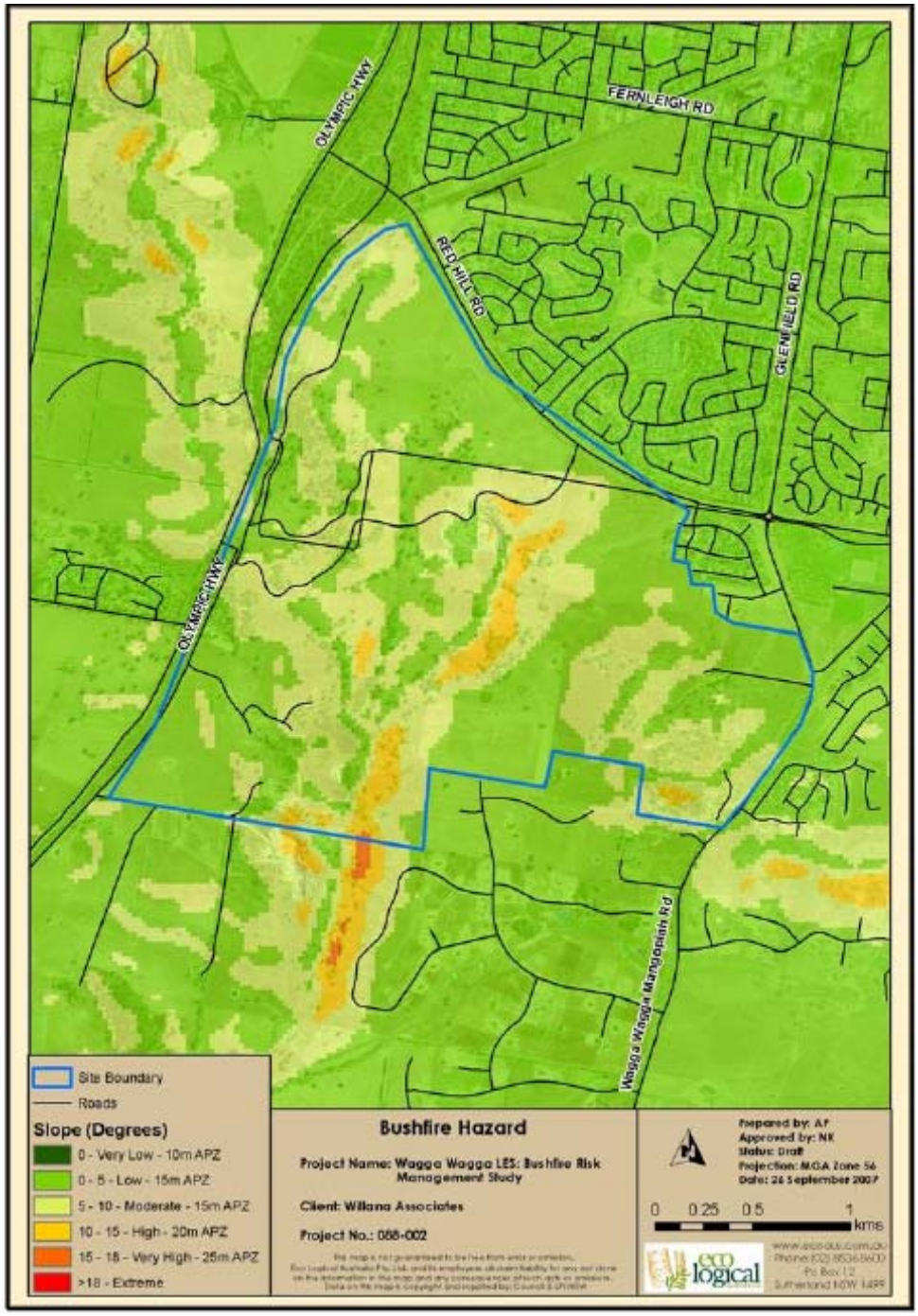


Figure 8: Lloyd bushfire hazard assessment map.

Risk Management Strategies

Eco Logical Australia concluded that the bushfire hazard has been assessed across the site and found to be low-moderate, based on the gentle slopes and low fuel accumulation of the vegetation present.

A number of strategies have been provided such that the risk from bushfire can be minimised and further that the approvals process can be streamlined.

Further, it has been found that development is indeed possible at the subject site from a bushfire planning perspective.

The main strategies suggested include:

- Ensure adequate setback from bushfire prone vegetation.
- Integrate non combustible infrastructure within Asset Protection Zones (APZs) such as roads, easements and parking areas.
- Ensure adequate access and egress from the site.
- Consider the adequacy of water supply and delivery of other services (gas and electricity).
- Provide temporary APZs during any staged development.
- Consider the requirements of ongoing APZ maintenance.

Further bushfire advice and input into the planning process can be provided through the rezoning process and when a development footprint is determined. Further, a formalised bushfire assessment will be required to facilitate the development approval process.

Infrastructure and Staging

Water supply would be via a ring main system.

Infrastructure such as electricity and gas provisions should be located underground to avoid damage by bushfire. Where possible, permanent large lines and temporary 11kv lines should be placed underground.

An assessment of the RFS and NSW Fire Brigade stations surrounding the site was completed by Eco Logical Australia in order to determine proximity to the subject site.

Consultation with the RFS and NSW Brigade is required to confirm whether existing stations can adequately service the proposed development site as well as the need for additional resources at these existing stations (and a Section 94 – developer contributions plan).

Eco Logical Australia has recommended that the staging of the development should be considered from a bushfire perspective such as to minimise the risks to the development during construction. Ideally, lots fronting the bushland interface would be developed first and APZs established upfront. Notwithstanding this, temporary APZs should be established around each stage of the development and identified in a section 88b instrument which would cease once the adjacent stage of development is undertaken.

6.14 Community Facilities

Schools

As discussed in Chapter 5, the anticipated yield of 2,375 lots for Lloyd, combined with existing dwellings in surrounding areas is anticipated to exceed the DET threshold of one primary school per 2,000 to 2,500 lots. Lloyd would have approximately 1,833 children under 15 once developed to capacity. This would add significantly to the primary school aged population in the wider locality.

General Facilities

Retail facilities are available at the South City development at Glenfield Park which is anchored by a supermarket. However, the Council's 2007 Retail and Commercial Development Strategy finds that there is a significant under-supply of retail floor space in the Southern Growth and South West subdistricts. On a combined basis, these two areas would in theory support some 16,731m² of retail space.

The strategy finds that retail land should be provided to service the growing suburbs of Lloyd, Bourkelands and rural areas to the south. A neighbourhood-scale centre could be developed in this area by 2011 anchored by a 2,500m² supermarket, together with up to 1,000m² of specialty retailing (eight to 10 shops).

A site on Holbrook Road to the south of the existing playing fields in Lloyd might be an appropriate location for such a centre. A site area of between 0.8 and 1.0 hectares would be required.

Community Health & Related Services

As Lloyd is located within approximately 5km of the centre of Wagga Wagga, it could be served by medical and health services located in the CBD and also by the medical centre at Glenfield Park.

Council's Social Planning Coordinator has advised that, should rezoning of Lloyd take place, a community centre would be appropriate at Jubilee Park to replace the existing facility. The centre would serve Lloyd, Bourkelands, Hilltop and Glenoak, none of which currently have community centres. Such a centre at Jubilee Park is identified in Council's Section 94 Plan.

Open Space and Recreation

Council's adopted rate for the provision of open space and recreational facilities is 4ha per 1,000 people. The potential yield for Lloyd could

accommodate a population of around 6,000. The provision of approximately 36ha of open space, as indicated on the land use plan (refer to chapter 12 of this report), will therefore exceed the council's requirement. The 36ha area includes land which would primarily be used for drainage purposes. Detailed land use allocations can be made at the DCP stage to ensure that there is not an unreasonable quantum of open space.

In assessing demand for open space, the following issues identified in the City of Wagga Wagga Social Plan should be considered:-

- Increased use of the bicycle as a form of transport and the desire within the community for improved and extended bikeways.
- The trend away from organised sporting activities to non-formal leisure pursuits. This trend may necessitate a change of focus from sporting fields and sports facilities to improved parks and reserves and multi-functional areas with basketball and skate board facilities and improved landscaped public areas.
- Inadequate recreation infrastructure in Glenfield Park and Estella when compared with other suburbs.
- Provision of open space and recreational facilities should also consider the findings of Council's Open Space and Recreation Strategy that there is an oversupply of sporting grounds in the LGA and a need for multi-purpose facilities.

In addition, there is a need to consider the Wiradjuri Walking Track. At present, a southern part of the track's alignment is located within the Lloyd area, along a Crown Reserve. It is proposed to relocate the track in this vicinity to the high ridgeline, in a similar arrangement to that which occurs at Willans Hill. There is capacity for this conservation area to also accommodate the relocated track for a positive environmental and recreational outcome.

6.15 Previous Relevant Studies

Willana Associates, Lloyd Neighbourhood Local Environmental Study (2002)

Eco Logical Australia, *Assessment of Significance, Lloyd Masterplan Wagga Wagga* (2006)

Johnstone Centre, *Lloyd Local Environmental Study, Environmental Investigations* (2002)

Navin Officer, *Lloyd Neighbourhood Land Release Area, NSW Wagga Wagga Local Environmental Study, Cultural Heritage Component* (2002)

Central West Archaeological Services, *An Aboriginal Archaeological Heritage Study of the Proposed Lloyd Residential Subdivision, Wagga Wagga* (2006)

Webb McKeown and Associates Pty Ltd, *Glenfield Park Drainage Study* (2006)

Wagga Wagga City Council, *Lloyd Salinity Future Discussions Paper* (2007)

Wagga Wagga City Council, *Urban Salinity Wagga Wagga* (2001)

Commonwealth Scientific and Industrial Research Organisation (CSIRO), Groundwater Recharge and Discharge in a Saline Urban Catchment, Wagga Wagga, NSW (2001)

Golder Associates, *Wagga Wagga Urban Salinity – Water Level and Quality Study* (2007)

6.16 Key Implications - Lloyd

Issue	Response
1. Biodiversity conservation	
Considerable areas of box gum woodland and other Endangered Ecological Communities (EEC) within the study area.	Expert investigations and negotiations with landowners have provided for an outcome which maintains and improves the environmental asset and provides for considerable development opportunities: 1. Conservation-2 zoning for areas indicated in the Lloyd Land Use map (refer to chapter 12). This comprises relatively large land areas adding significantly to the regional ecological resource base. 2. The Conservation- 2 area to be transferred to public ownership and conservation management plan to be prepared which includes offset planting and forms part of DCP for site. 3. Identified areas comprising paddock trees and grassland areas available for development mindful of offset opportunities.
2. Urban salinity	
Urban salinity already presents as a significant issue in parts of urban Wagga Wagga. Most of the study area is characterised as a significant groundwater recharge area. While it is noteworthy that most of the potential development area has already been cleared of vegetation, there is a need to be clear on how to manage any potential effect on saline groundwater discharge.	Salinity investigation and management program has been commenced which is aimed at allowing the planning of the Lloyd release area to be advanced while details of the salinity management strategy are completed. The program is based on two principles: 1. leading practice preventative measures in planning and development; and 2. ongoing use to minimise any change in groundwater recharge. The salinity management program is expected to include: ▪ Enhancement of remnant vegetation zones including above the Lloyd release catchment. ▪ Minimisation of removal of existing trees (considering capacity to draw groundwater) ▪ Adoption of release boundaries and subdivision layout principles consistent with minimisation of significant cut and fill in earthworks. ▪ Elimination of watered nature strips, and planting of mature deep rooted trees which draw groundwater. ▪ Advanced tree planting and minimising watered garden areas on Council open space and road

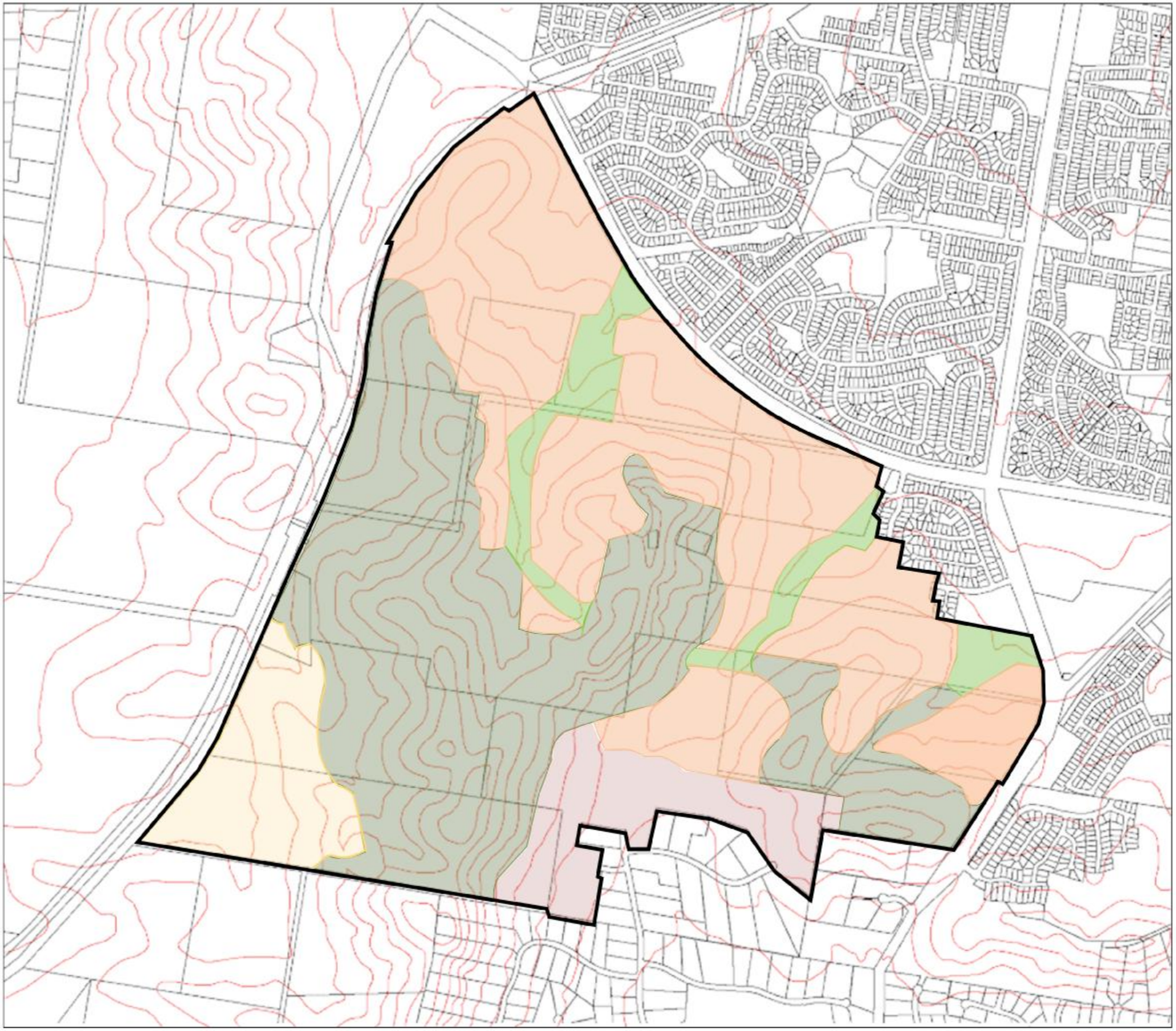
Issue	Response
	reservations. ▪ Preparation of prior to sale site plans indicating building areas taking into account the need to preserve significant trees, earthworks and the like. ▪ Education and regulatory program which acts to minimise watered garden areas on private property. Purchasers to be made aware through advisory information pre-purchase. Provision of advisory service to new owners on water efficient gardens. ▪ Leading practice infrastructure design for all water supply, stormwater management, (including both drainage lines and retention/detention basins) and sewage to minimise any leakage from infrastructure into the groundwater system. ▪ Provision of piezometer monitoring program at northern boundary of the release area and associated dewatering program should benchmark groundwater levels be reached. ▪ Building standards/requirements detailing permissible concrete and mortar mix designs, water proofing compounds and materials, paving cross-falls, etc. Provision of a fallback strategy which provides for: ▪ A program of piezometer monitoring at low points in Lloyd to monitor any increase in groundwater levels. ▪ A strategy to pump out groundwater should an agreed benchmark groundwater level be reached. It is acknowledged that any saline groundwater will not be pumped to the Murrumbidgee River, but to an alternative point for desalination either through evapo-transpiration, or other mechanical means. ▪ A funding plan which does not unreasonably disadvantage the wider Wagga Wagga community. Consultants have been appointed to advance the analysis of the issue, under direction from a Steering Group comprising Council, DWE and DECC.
3. Urban development physical limitations	
The potential development area is restricted by water supply infrastructure limits and steep topographical gradients, and the relationship with urban salinity considerations.	Urban development boundaries are bound by: ▪ RL 270m AHD (water servicing) ▪ Gradient constraints

Issue	Response
4. Stormwater management and water sensitive design	
There is a need to both: ▪ manage the potential impact of increased stormwater runoff elsewhere, and ▪ adopt a multi-disciplinary approach to water cycle management within the site which links water infrastructure, landscape design, salinity management response, water (asset) re-use, where relevant riparian (environmental) corridor function.	An initial stormwater management strategy is complete which provides for stormwater quantity and quality management indicating retention systems and stormwater corridor widths. The stormwater solution for the site acknowledges that the area is highly sensitive as a result of salinity recharge issues and stormwater solutions need to respond by the careful management of water and the minimisation of groundwater recharge.
5. Bushfire	
A substantial woodland area is existent and proposed to be improved along the southern bounds of the proposed urban area. A strategy is proposed which is responsive to the degree of threat posed to a future urban community.	Locations of APZs and perimeter roads (consistent with Planning for Bushfire Protection) are indicated in the Bushfire Report in ***Appendix A***. There is sufficient perimeter clearing to avoid the need for removal of any native vegetation. APZ's can be provided within cleared land at the edge of the urban zoning. Any future plan for subdivision will require detailed APZ plans along with relevant consultation with the Rural Bushfire Service as part of the development approval process for Integrated Development.
6. Indigenous cultural heritage	
Expert investigations have identified Aboriginal sites and objects in the study area. Investigations have also identified areas of high or moderate archaeological sensitivity and Potential Archaeological Deposits (PADs).	Principles and management strategies have been formulated to ensure appropriate conservation of any Aboriginal objects and sites that have been or may be identified in the future. An approach is recommended whereby rezoning may take place on condition that further, more rigorous investigations are undertaken as part of the development assessment process. Such investigations supplement existing walkovers which attempted to identify whether or not archaeological deposits are, in fact, present on the land. This will only be required in areas of intended disturbance for buildings sites and where these sites overlap with high potential areas.

Issue	Response
7. Physical services	
There is a need to ensure all sites are serviced economically and efficiently.	The site's ability to be serviced has been explored with the various utilities and agencies. These investigations included a review of sewer systems and any requirements for upgrading of systems.
8. Human services	
An anticipation that the study area would include a demographic with a large number of school aged children. Anticipated yield will exceed Department of Education and Training threshold of 1,500 homes per primary school. Identified demand for a community centre and the provision of open space and recreation facilities.	Education facilities: The site for a public primary school needs to be identified as part of the structure plan process. The site should provide maximum access for surrounding residential properties, ideally located along an open space corridor, adjacent to active open space and well accessed by road. Community facilities: These will be required as part of the development of the open space areas proposed within Lloyd. The specific works will include a multi-purpose hall providing a range of adaptable spaces.
9. Urban form	
There is a need to both: ▪ bring forward now widely accepted principles for good neighbourhood planning and urban form, which can help in achieving sustainable enjoyable lifestyles for future residents (as referenced in the Spatial Plan), and ▪ manage the potential impact of increased urban development in Lloyd on the existing local and regional setting.	Key outcomes include: ▪ Settlement pattern to respond to the characteristics of the landscape setting (retention of green backdrop on Lloyd Hills increasingly wooded with conservation management plan). ▪ Provide facilities and services at a local level including parks, shops, schools and health facilities. ▪ Adoption of the design principles in the structure plans prepared as part of this LES process. ▪ Create direct links to future neighbourhood centres. ▪ Provide open space that promotes local character and identity. ▪ Enhance safety, maximise surveillance and minimise opportunities for crime and anti social behaviour such as locating roads alongside open space areas. ▪ Maximise connectivity to hilltop locations. The Wiradjurai Walking Track, if re-routed, could provide a recreational pedestrian link to hilltops. ▪ Design road networks for direct links to parks wherever possible. ▪ Reinforce tree character with appropriate street

Issue	Response
	planting. ▪ Clustering of well-connected neighbourhoods with walkable points of interest and locations for play (see Structure Plan). ▪ Green corridors with pleasant character move through neighbourhoods (see Structure Plan). ▪ Design road network to capture views from site. ▪ Promote road layout and streetscape designs that assist in stormwater management, dealing with stormwater as a resource and an amenity, and mitigating changes in stormwater quality and flows at or near their source. ▪ CPTED principles applied to design of all public areas including public road boundaries to parks (see Structure Plan). ▪ Encouraging of a variety of housing forms and densities. ▪ Major recreation and community hub proposed in the vicinity of Jubilee Park. A future shopping area could also be located here in accordance with recommendations of specialist retail study, noting its location at/near intersection of major roads.
10. Roads and transport	
To provide links to existing infrastructure outside of the Lloyd study area such as the Glenfield shopping centre. Ensure adequate road and alternative transport modes are developed for the proposed increased growth.	The road network has been reviewed to determine the ability to service the increased growth. Suitable connections points to the existing road network and infrastructure requirements have been identified.

LLOYD
LAND USE



Study Area
Contours 10 m
Open Space
Conservation 1
Conservation 2
Residential 1
Residential 2
Rural

500.0

Approximate
scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

7 Boorooma East

7.1 General Description of the Site

Boorooma East is approximately 67ha in area and around 3.5km north of the centre of Wagga Wagga. The Olympic Highway forms its southern boundary, while its northern and eastern boundaries are defined by Farrer Road and the unsealed road of Amundsen Street respectively. Farrer Road provides access to the Olympic Highway via Coolamon Road, while Amundsen Street links with the Highway via Cooramin and Boorooma Streets. Another unsealed road, Kingsford Smith Road, runs through the eastern corner of the site. A boundary map of the Boorooma East study area is provided at Figure 9: Boorooma East Study Area.

The land is dominated by rural uses and its northern half is generally disturbed.

7.2 Site History

Much consideration has been given to potential use of both the Boorooma and Estella areas for residential development over recent years. Both areas have been the subject of proposals for rezoning as well as draft plans prepared by or on behalf of the Council. Previous plans include a draft structure plan initiated by Council in 1995, which became the basis for a draft DCP for the area. The NSW Urban Design Advisory Service (UDAS) were commissioned by Council to prepare structure plans and recommended development controls for the two areas, which were completed in 2000. In 2005, a consortium of land owners submitted an application for the rezoning of East Boorooma.

The area that lies to the west of the Boorooma study area was the subject of the Neighbourhood Plan for Boorooma West. Commissioned by Council, the plan was adopted in 2007.

Impediments to the use of the land for residential purpose have been removed following the opening of the Gobbagombalin Bridge in 1997 and the consolidation of land ownerships in the area. As discussed in Chapters 3 and 5 of this report, there has been a significant increase in demand for residential land in the LGA, combined with an increase in population (which is anticipated to continue).

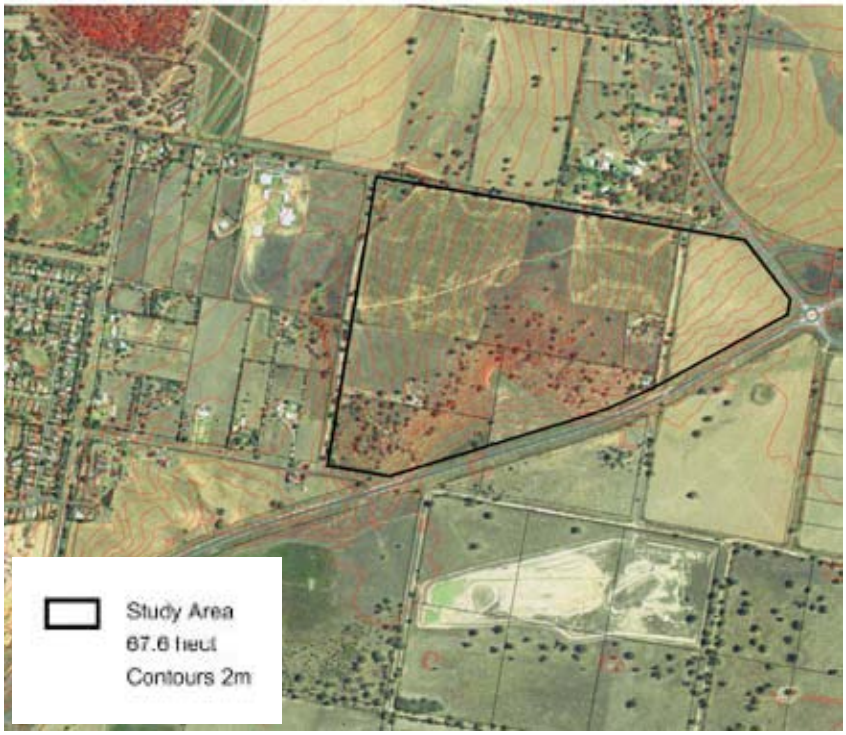


Figure 9: Boorooma East Study Area

7.3 Surrounding Land Uses

Rural and institutional (education) zonings apply to the areas of land to the north, east and south of the site. The subject land is predominantly used for agricultural activities. The area immediately to the west is zoned residential and currently comprises of a mixture of rural residential and general rural uses (with the exception of the Anglican College). Further to the west is the existing low density residential area of Estella, which comprises primarily of single dwellings and the Settlers Village seniors accommodation development.

Two allotments to the north, across Farrer Road, are owned by the Department of Training and Further Education (TAFE) and the DET. These allotments form part of Wagga Wagga's educational precinct which is dominated by nearby Charles Sturt University. The TAFE site is occupied by the Primary Industries Centre – a TAFE campus offering teaching in agriculture and horticulture.

7.4 Environment and Landform

Topography

Boorooma East is dominated by a knoll in the centre of the site and elevated approximately 46m above the Murrumbidgee floodplain (immediately to the south). From the knoll, an escarpment curves east and west across the site.

The land slopes steeply south from both the knoll and the escarpment to the Olympic Highway.

The escarpment is incised with shallow gullies and protrudes to form a spur to the south west. From north, west and east flanks of the knoll, the land slopes gently down to Farrer Road, the junction of Coolamon Road and the Olympic Highway and a shallow valley on the site's western boundary. Granite outcrops and boulders are visible across much of the site.

Landscape and Visual Character

The escarpment to the south of the site forms the steepest part of a line of hills that defines the edge of the Murrumbidgee floodplain. Its location makes the escarpment a clearly visible and defining element of the landscape. Its appearance is made more prominent by the rocky outcrops and boulders that characterize the land.

Visual Vantages

Steeply sloping topography imbues the southern portion of the site with views of the countryside and parts of the city to the south that are considered to be of moderate to high significance. Views of medium significance are gained at the mid-slope of the escarpment. Views south from the knoll include local landforms, including a ridgeline at the farthest visual extent, low hills covered in bushland in the middle distance and the floodplain in the foreground.

The view looking south west from the knoll also includes ridgelines at the farthest visual extent, with northern precincts of the central urban area of Wagga Wagga in the middle distance. Less steeply sloping land is visible to the east and consists of cleared paddocks with low ridge lines on the horizon.

The sloping land of the northern portion of the site offers views north, west and east that are of low to moderate significance. However, these views are sufficient to make a considerable contribution to amenity and help preserve the rural character of the area. These views extend for approximately two kilometres and include paddocks, scattered trees and low hills.

Views down the slope from the centre of the site to the north, east and west would be easily obstructed by built form. The steep slope ensures that a significant proportion of the views from the midslope of the escarpment could be preserved even if the land were developed.

The topography of Boorooma East also imbues the site with visual prominence from surrounding areas. Of particular importance is the view of the escarpment from the Olympic Highway. The section of the Highway adjacent to the site is just beyond the urban edge and as Wagga Wagga's

urban area grows, it is likely to form a gateway to the City. Any development that may take place on the top and midslope of the escarpment must complement the visual qualities of the landscape, thereby enhancing the gateway.

Photo 5: View from the knoll at the Boorooma East site looking south.

Photo 6: View from the knoll at the Boorooma East site looking south.

Photo 7: View from the knoll at Boorooma East looking south-west.

Air Quality and Acoustic Amenity

While the Olympic Highway has the potential to impact on the air quality of the southernmost areas at the bottom of the escarpment, the elevation of most of the site above the Highway ensures air quality is not likely to be adversely affected.

7.5 Flora and Fauna

Remnant Woodland Communities

The biodiversity study conducted by Eco Logical Australia found 25.5ha of boxgum woodland in low or moderate condition on the ridgeline and slopes in the south of the site and along Farrer Street and Amundsen Street. Boxgum woodland is listed as endangered under the TSC Act and as critically endangered under the Commonwealth EPBC Act.

An area of 0.83ha of River Redgum forest was found in a small floodplain in the south of the site adjacent to the Olympic Highway and was in low condition. River Redgum forest is not currently listed as threatened under state or federal legislation, however the conservation status of the community has been listed as vulnerable within the Wagga Wagga LGA (by a previous study by Priday and Mulvaney). The vulnerable listing reflects the high degree of clearing suffered by this community and the ongoing threats such as weed invasion and grazing which continue to degrade existing remnants.

The definition of appropriate offsets may facilitate a greater level of development than that recommended as being permissible by Eco Logical

(subject to negotiations with relevant authorities). The remainder of the site was found to comprise of cropped paddocks.

Figure 10: Vegetation types on the Boorooma East site below, maps the location of vegetation types at Boorooma East.

Species and Habitat

While no threatened fauna were observed, the Superb Parrot (Polytelis swainsonii) is known to utilise the site. A review of state and federal databases identified 5 threatened species that are likely or have the potential to occur on the site. These are the Grey-crowned Babbler (Pomatostomus temporalis temporalis), Diamond Firetail Finch (Stagonopleura guttata), Yellow-bellied Sheathtail Bat (Saccolaimus flaviventris), Little Pied Bat (Chalinolobus picatus) and the Swift Parrot (Lathamus discolour).

The site is considered to provide potential foraging habitat for two threatened bird species – the cattle egret and white-throated needletail, listed as migratory under the Commonwealth EPBC Act. The extent of habitat available for these threatened species is generally low, consisting of a few scattered paddock trees.

Environmental Protection

Under state legislation, native vegetation of good or moderate condition that is consistent with endangered ecological communities must be retained. The areas of moderate condition box gum woodland on the site can not, therefore, be developed. Vegetation in low condition is potentially developable if losses of native vegetation can be offset. Eco Logical Australia recommends that some low condition box-gum woodland also be retained to allow for connectivity between vegetation patches. Paddocks containing non-native vegetation are not considered to offer any significant conservation values and may be developed (Eco Logical Boorooma East Biodiversity report – Appendix A).

Figure 10: Vegetation types on the Boorooma East site

Regional Context

In a regional context, the site contains vegetation of a moderate to high value owing to its location within the Junee Hills and Slopes and Murrumbidgee – Tarcutta Channels and Floodplain Mitchell Landscapes. Both these

landscapes have been heavily cleared for agricultural production. The site, while displaying limited connectivity, is a known flyway of the Superb Parrot.

Vegetation within the Farrer Road reserve is linked to vegetation within properties bordering Coolamon Road. A drainage line occurs to the west of the site and provides a tentative link between vegetation in the north and south of the site.

Mitigation Measures

If the areas of non-native vegetation were developed, the loss of paddock trees would have to be offset by the preservation of existing trees or the planting of saplings. Offsetting must be undertaken in accordance with DECC's recommended offset ratio of 10:1 for native woody vegetation. Sufficient offsets for the loss of paddock trees are likely to be available within retained lands at the site. The recommended structure plan indicates the location and extent of retained lands on the hilltop in the centre of the site and along the watercourse to the west of the site.

Soils and Erosion Hazard

The East Bomen soils group dominates above the ridgeline in the northern section of the site. Along the ridgeline and southern slopes in the south of the site, soils of the Glenmornon soils group are dominant (Chen and McKane 1997). Both the East Bomen and Glenmornon soil groups are prone to erosion (WISDOM 1995). A small area of Kurrajong Floodplain soils group can be found on the floodplain area, immediately north of the Highway (Chen and McKane 1997). The Kurrajong Plain soil group is typically fertile and represents a low erosion hazard (WISDOM 1995).

7.6 Drainage and Hydrology

Northrop engineers have undertaken a comprehensive study of the stormwater requirements for Boorooma East. A full copy of their report is included at Appendix B. Below provides a summary of the Northrop report.

General Description

Borooma East ranges in elevation from RL 220m AHD to RL 180m AHD as the site falls to the north-west, north-east and south from a central high point. The steepest slope falls to the south. A watercourse traverses the north-west and south-west corners of the site.

Overland Catchments

The study area consists of three catchments which are shown in Figure 11: Boorooma East recommended Stormwater Management Plan. Catchment 1 falls to a culvert under the Olympic Highway near Amundsen Street and has a naturally occurring wetland located at its lowest point. Catchment 2 comprises of the steepest area of the site and falls south-west to another culvert under the Olympic Highway. Catchment 3 flows north-east to the Highway. Should the site be developed, runoff would flow south-west, parallel to the Highway to the culvert that drains Catchment 2. The risk of contamination to watercourses due to current usage is considered to be minor.

Potential Drainage Scenario

Should the site be developed for residential use, Catchments 2 and 3 could drain to a road culvert which discharges directly to the flood plain and the eastern side of the Olympic Highway. Smaller flows may be intercepted by Dukes Creek but it is envisaged that large flows would continue overland to join the Murrumbidgee River to the south. Similarly, Catchment 1, upon joining the water course, could be discharged to the floodplain via a culvert. Downstream of the culvert, smaller flows may be intercepted by Dukes Creek and larger flows would continue until the Murrumbidgee River. The proposed width of the respective drainage corridors is shown in **Table 19** below.

Table 19 - Drainage corridor specifications

Catchment	Drainage Corridor Width (m)
1	40
2	20 (No water course)
3	20 (No water course)

For the purpose of this study, “blue line” water courses are channels in which runoff is concentrated and have the potential to form riparian zones. They are defined by blue lines on 1:25000 topographical maps. A blue line watercourse to the west of the site and drains Catchment 1 to the culvert under the Olympic Highway. The watercourse could have a combined function as a drainage corridor and open space/riparian zone.

Infrastructure Requirements

Preliminary estimates for catchment-based on-site detention storage requirements are provided below in *Table 20 - On-site detention requirements*. The data is preliminary and based on managing flow-rates to equal existing catchment flow-rates.

Table 20 - On-site detention requirements

Catchment	Total Detention Volume (m^3)	Approx. Surface Area (m^2)
1	12,000	1,200
2	0	0
3	8,800	8,800

Note: The above volumes represent the total amount of storage required for a catchment. On-site stormwater detention may be provided as a single storage or as discrete storages strategically located throughout the catchment. Preliminary volumes will need to be reviewed against final development proposals and configuration of On-Site Detention facilities.

Catchment discharges may be limited by existing downstream drainage conditions which have inadequate capacity for pre-development flows. The capacity of the existing culverts under the Olympic Highway may dictate the storage volume required. Assessment of the culvert capacity is to be undertaken to confirm if its capacity is adequate for pre-development flows. If the capacity is found to be insufficient additional storage or amplification of the existing culverts may be required. Possible locations for on-site stormwater quantity management facilities are indicated in Appendix B – Stormwater Report.

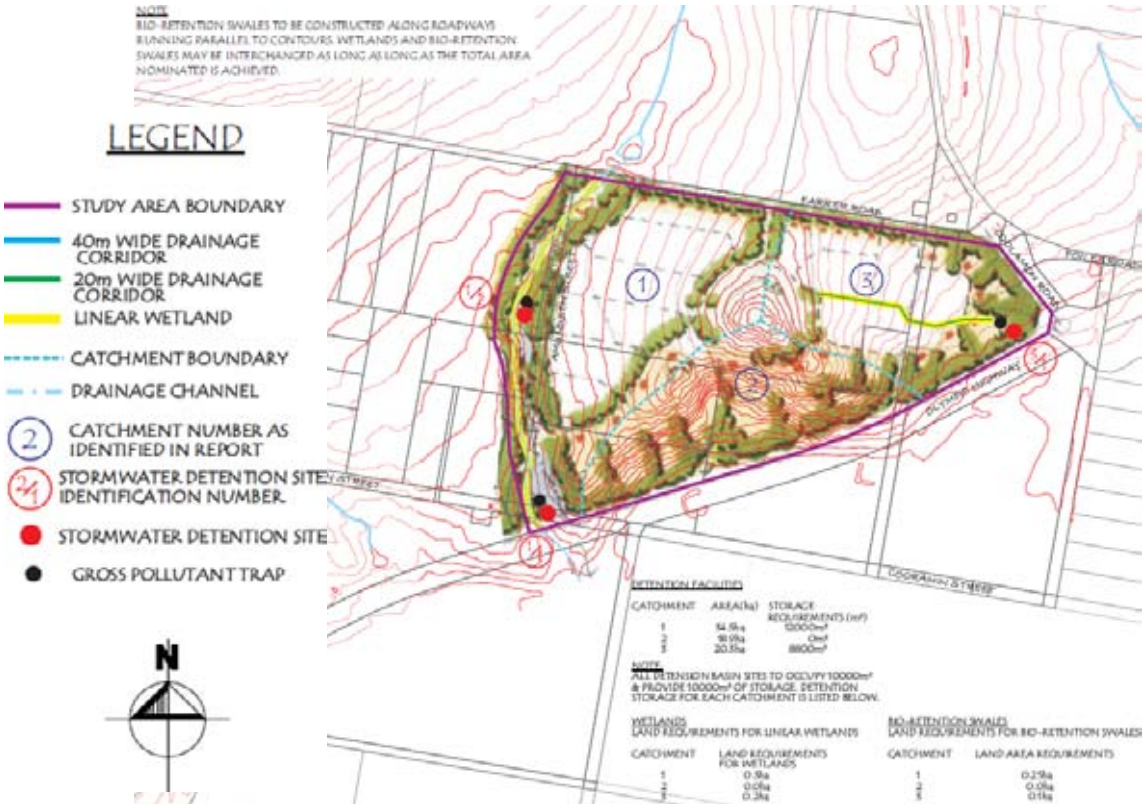


Figure 11: Boorooma East recommended Stormwater Management Plan

Stormwater Principles and Policies

Should rezoning occur, the following principles and policies should be adopted in order that development takes place in a manner that considers the site's environmental characteristics and constraints at Boorooma East:

- Management of runoff should maintain existing (environmental) flows to support habitats.
- Overland drainage systems should be incorporated into riparian corridors and open space where practicable to promote environmental and recreational outcomes.
- Stormwater detention facilities should be provided at a local catchment level and are best located toward the downstream end of the catchment, outside areas susceptible to flooding.
- Rainwater re-use where stormwater is collected should provide an alternative water source.
- Impervious areas should be reduced to limit the volume and rate of stormwater runoff.
- Water Sensitive Urban Design (WSUD) principles that control the quality of stormwater discharge should be incorporated (as outlined in Northrop report in Appendix B). Specific measures include wetlands bioretention swales and maintenance of environmental flows.

7.7 Heritage

European heritage

There are no items of significance of European heritage recorded on the site.

Aboriginal heritage

Aboriginal Archaeological Sites and Deposits

The investigation by Kelleher Nightingale Consulting found no Aboriginal sites in the study area.

Landscape Archaeological Sensitivity

Kelleher Nightingale Consulting concluded that the archaeological sensitivity of the site was moderate to high (Appendix D). Of relevance to this assessment is the site's elevated position offering views of the Murrumbidgee River floodplain and the presence of granite.

Recommendations

As stated previously, the findings of the predictive model do not prevent the rezoning of any of the study areas. Rezoning may occur on the condition that further investigations will be required at development assessment stage to ascertain whether aboriginal objects are present, and if there is evidence of the presence of objects and/ or sites of significance, conservation management practices will be required to be implemented.

Kelleher Nightingale makes the following recommendations for the Boorooma East study area:

- Management of the identified areas of potential Aboriginal archaeological sensitivity should be considered during the strategic planning process of Boorooma East.
- Conservation should be the prime consideration when establishing Aboriginal heritage management strategies during the planning process.
- The assessment has identified there is some potential for this study area to contain Aboriginal objects that were not visible at the time of the current site visit due to extensive ground cover and the preliminary nature of the investigation. As a result, this area warrants further survey and assessment for proposed future development, as part of the development assessment process.
- Identified area of high/ moderate sensitivity not possible to conserve may require further investigation through section 87 permit for test excavation.
- Consultation with the WWLALC is ongoing. This assessment will be finalised following consultation and input from the Land Council.

7.8 Utilities

Electricity, Gas and Telecommunications

As stated previously, Country Energy has stated that it invests in gas infrastructure if demand is sufficient to make the sale of the fuel commercially viable. In instances where investment cost would be greater than return, developers have funded the installation of gas infrastructure. The company indicated that there is high pressure gas main “in the vicinity” of the study area.

Country Energy and Telstra have been notified of the LES process. At the time of printing this report, no submissions have been received from these organisations.

Water Supply

Riverina Water has indicated that the study area is “relatively close to major existing water infrastructure that will assist in the commencement of water supply”.

Sewage & Effluent Disposal

The presence of rock at Boorooma East would make conventional sewer more costly than for most areas in Wagga Wagga. The Sewerage Services Study by Michael Cuthbert (Appendix E) divides the site into two sewer drainage catchments. Boorooma B catchment would cover the western half of the study area, with a downstream infrastructure cost of approximately $3,600 per equivalent tenement. Boorooma C would cover the eastern half of the study

area with a downstream infrastructure cost in the order of $3,900 per equivalent tenement. A triangular area immediately south of the knoll cannot be serviced by either catchment and would be likely to require low pressure sewage technology.

Developing the Boorooma B portion of the study area at the same time as the western part of Boorooma would be cost-effective as the sewage systems can be integrated. The design of the infrastructure network should consider future extensions to Hillgrove and Glenora and would require the provision of additional mains capacity, or the setting aside of an easement for a future sewer.

Areas not falling under the catchment areas discussed above would require low pressure sewage technology and therefore may be more suitable for rural residential development. The implementation of the technology to be implemented in sewer provision will be assessed by Council in its development service planning.

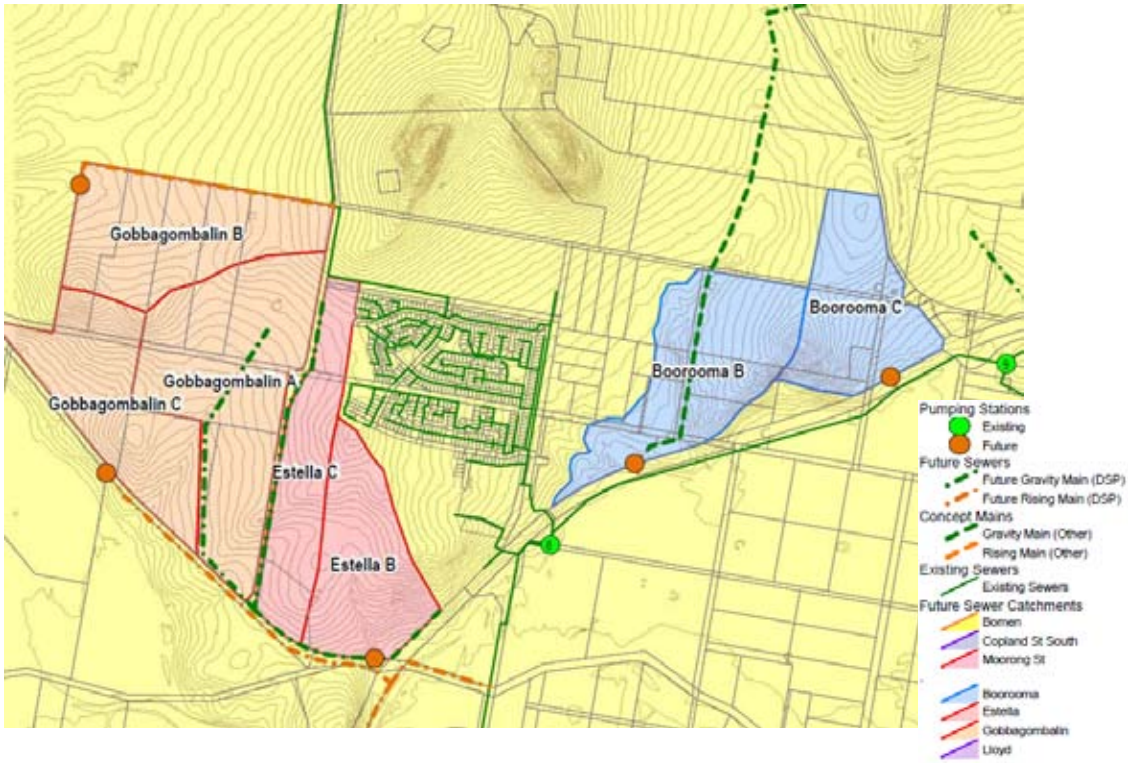


Figure 12: Boorooma East and Estella West recommended sewerage servicing requirements

7.9 Transport Infrastructure

Existing Road Network

Roads in and surrounding the study area can be summarised as follows:

- Boorooma Street: The primary road serving the Boorooma-Estella area. It is the main north-south access to Charles Sturt University and connects at its southern end to Olympic Way at a grade-separated junction. It has a posted speed limit of 70 km/hr.
- Farrer Road: A two-lane sealed road that provides secondary access to the University and connects with Olympic Way via Coolamon Road. It has posted speed limits of 80km/hr, 70 km/hr and 40km/h. Traffic on Boorooma Street has priority at the intersection with Farrer Road near the entrance to the University.
- Kingsford Smith Road: An unsealed road running off Farrer Road to provide property access without connecting to Olympic Way.
- Cooramin Street: A two-lane sealed road that provides access for several properties with a posted speed limit of 70 km/hr.
- Amundsen Street: An unsealed road that connects Cooramin Street to Farrer Road
- Coolamon Road: A two lane sealed road that connects Wagga Wagga centre to Coolamon and Ardlethan and provides a B-double route. It has a posted speed limit of 100 km/hr.

Table 21 summarises existing two way traffic volumes (data provided by the Council).

Table 21 - Existing two way traffic volumes.

Road	Volume (vehicles per day)
Boorooma Street north of Estella Rd	4,500
Boorooma Street (south of Avocet Estella Rd)	7,200
Farrer Road	500
Coolamon Road	2,200
Estella Road	650

Potential Future Road Network

The recommended road layout (refer to GHD Traffic study at Appendix C) incorporates two primary streets, Boorooma Street and a new east-west street intersecting at a neighbourhood centre. The new east-west and north-south primary streets separate through-traffic and public transport from traffic on local streets. The extension of Avocet Drive into Boorooma provides direct and safe access to the neighbourhood centre for residents in Estella.

The section of Farrer Road, east of about Amundsen Street, may require upgrading to strengthen the pavement, provide wider shoulders and accommodate greater volumes.

Figure 13: Boorooma East Post Development Traffic Management Recommendations – potential future road network

Intersections and Access

The most southern street in Boorooma West forms part of the main street network and could intersect Boorooma Street opposite Avocet Drive. GHD recommends a roundabout at this intersection to regulate traffic flows and speeds. A roundabout would also provide good access to the proposed neighbourhood centre. A new road may intersect Boorooma Street about 200 metres north of Cooramin Street and would also form part of the main street network though Boorooma.

Projected traffic volumes are not likely to exceed the capacity of intersections or roads, should certain upgrades be undertaken. These include a give-way controlled junction at Farrer Road and the new access road for Boorooma East and a single lane roundabout at the intersection of Boorooma Street and Estella Road. To address safety concerns, a single lane roundabout would be required at the cross junction on Boorooma Street, near the shopping centre in Boorooma West.

The Boorooma Street / Avocet Drive intersection is adjacent to the Boorooma Street intersection with Olympic Highway, where travel speeds for northbound traffic leaving the Highway are likely to be high. A roundabout would serve to reduce travel speeds and provide improved access for minor road traffic.

Projected Traffic Conditions

It is estimated that if the entire study area were developed by 2016, 277 trips would be added to the external road network during peak period. 80% of these trips would use Boorooma Street, with the remainder using Farrer Road / Coolamon Road. In addition, 20% of traffic from Estella West would also use Boorooma Street should both sites be developed.

The projected peak period two-way traffic flow that would be generated on Farrer Road in 2016 is relatively small and can be accommodated by the existing two lane road.

Boorooma Street is estimated to carry approximately 8,000 vpd in 2016 north of Avocet Drive and about 9,000 vpd south of Avocet Drive. The existing two lane road is sufficient for this volume. However owing to intersection turning movements on Boorooma Street, it is recommended that driveway access is not permitted. The western half of Farrer Road appears to have formed and graded shoulders, but the section east of about Amundsen Street may require upgrading to strengthen the pavement and to provide wider shoulders and to accommodate the higher levels of traffic expected by 2016.

Construction costs for works required to accommodate a new residential area are summarised in **Table 22**.

Table 22 - Construction costs for works required by a new residential area at Boorooma.

Location	Proposed Upgrade Works	Estimated Cost
Boorooma Street/ Estella Road	Single lane roundabout	$300,000
Boorooma Street/ Avocet Drive	Single lane roundabout	$300,000
Farrer Road (Amundsen St to Coolamon Rd)	Road and shoulder upgrade	$200,000

Public Transport, Cycle Paths and Footpaths

The existing bus service should be extended into Boorooma along the new east-west street connecting Boorooma Street and Farrer Road. New pedestrian links across and along the Amundsen Street open space corridor would connect residential areas to the neighbourhood centre.

7.10 Bushfire Risk Management

Risk Assessment

The study by Eco Logical Australia (Appendix H) concludes that bushfire hazard at Boorooma East is generally low to moderate, with high risk areas on the higher ground in the centre of the site. The performance criteria of Planning for Bushfire Protection 2006 may be met through the provision of

APZs and perimeter roads or trails around potential new residential areas. Specifications for APZs and perimeter roads are summarised in section 6.13.

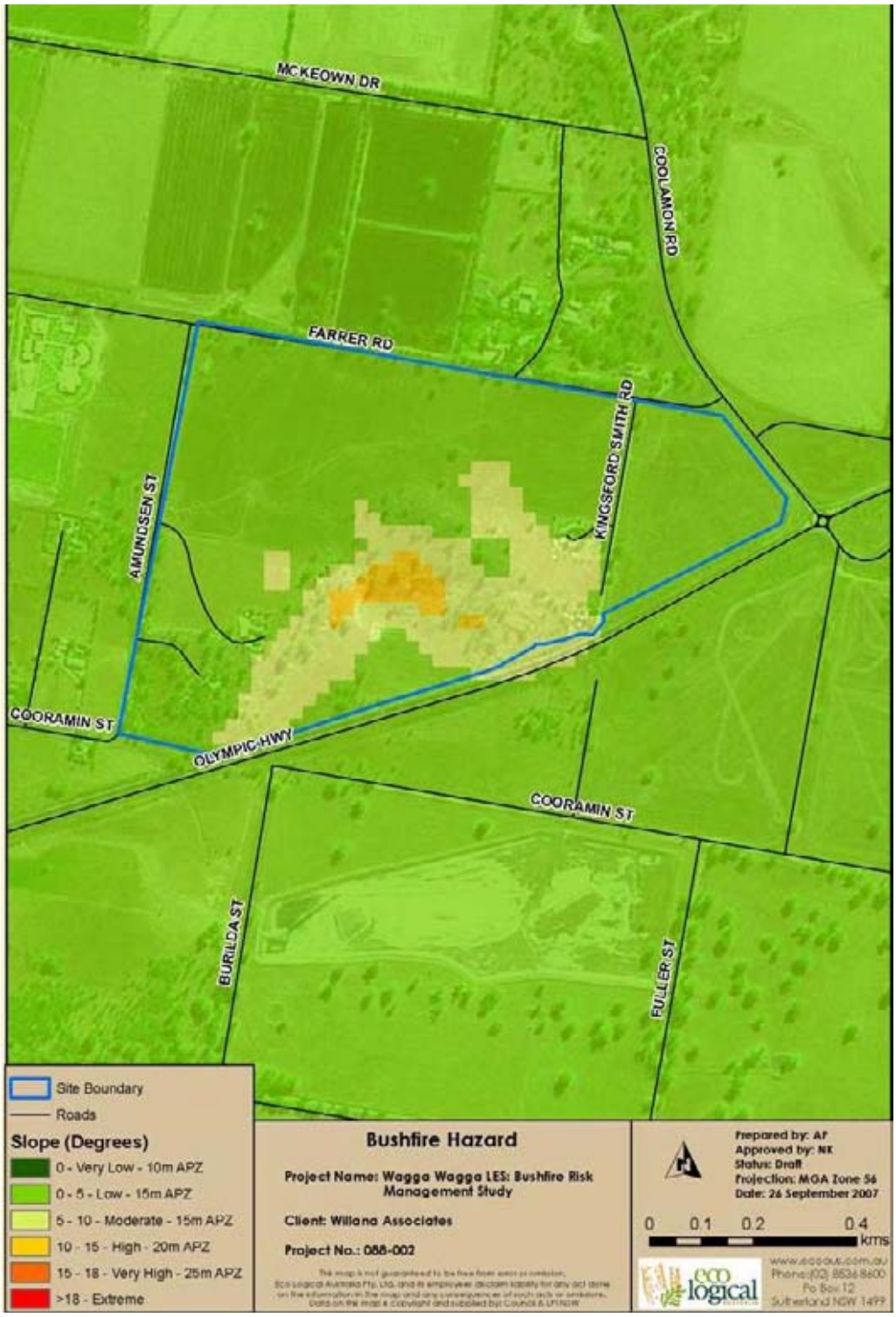


Figure 14: Boorooma East bushfire hazard assessment

Risk Management Strategies

Eco Logical Australia concluded that the bushfire hazard has been assessed across the site and found to be low-moderate, based on the moderate slopes and low fuel accumulation of the vegetation present.

A number of strategies have been provided such that the risk from bushfire can be minimised and further, that the approvals process can be streamlined. Further, it has been found that development is indeed possible at the subject site from a bushfire planning perspective.

The main strategies suggested include:

- Ensure adequate setback from bushfire prone vegetation.
- Integrate non combustible infrastructure within Asset Protection Zones (APZs) such as roads, easements and parking areas.
- Ensure adequate access and egress from the site.
- Consider the adequacy of water supply and delivery of other services (gas and electricity).
- Provide temporary APZs during any staged development.
- Consider the requirements of ongoing APZ maintenance.

Further bushfire advice and input into the planning process can be provided through the rezoning process and when a development footprint is determined. A formalised bushfire assessment will be required to facilitate the development approval process.

Infrastructure and Staging

It is recommended that water supply is provided via a ring main system.

Infrastructure such as electricity and gas provisions should be located underground to avoid damage by bushfire. Where possible, permanent large lines and temporary 11kv lines should be placed underground.

An assessment of the RFS and NSW Fire Brigade stations surrounding the site was completed by Eco Logical Australia in order to determine proximity to the subject site.

Consultation with the RFS and NSW Brigade is required to confirm whether existing stations can adequately service the proposed development site as well as the need for additional resources at these existing stations (and a Section 94 – developer contributions plan).

Eco Logical Australia has recommended that the staging of the development should be considered from a bushfire perspective such as to minimise the risks to the development during construction. Ideally, lots fronting the bushland interface would be developed first and APZs established upfront.

Notwithstanding this, temporary APZs should be established around each stage of the development and identified in a section 88b instrument which would cease once the adjacent stage of development is undertaken.

7.11 Community Facilities

Schools

As discussed in Chapter 5, the anticipated yield of 2,133 for Boorooma and Estella, is within the DET threshold of one primary school per 2,000 to 2,500 lots. These lots will be combined with those in the existing area of Estella. Also discussed in Chapter 5 is the potential number of children under 15 anticipated to reside in Boorooma and Estella (1,343). The size of the potential school aged population adds a strategic imperative to the requirement for a primary school. A strategy is recommended whereby a primary school is provided on land adjacent to the existing urban area of Estella. It would serve the study areas of Boorooma and Estella and the existing Estella neighbourhood.

Community and Health Facilities

Council's social issues paper on community facilities should be considered in relation to Boorooma. The issues paper recommends the provision of a community centre in the nearby area of Estella. It advises that a budget is available to undertake a feasibility study and construction of a community centre at Estella, should the area be rezoned.

Open Space and Recreation

The potential population of the study area is 891 and approximately 6ha of land is allocated for open space and drainage purposes. Therefore, the council's requirement of 4ha of open space per 1,000 people is met. The hilltop park will be an important facility. The recommended structure plan shows provision of open space and a sports oval east of Pine Gully Road.

In assessing provision of open space, issues identified in Council's City of Wagga Wagga Social Plan (2004) should be considered. These issues relate to increased need for bikeways, non-formal leisure facilities and inadequate infrastructure in Estella.

Urban Form and Regional Context

Boorooma East, while located outside of the concentrated urban area of Wagga Wagga, is connected to the centre of the City by the Olympic Highway. Its western boundary is adjacent to the existing residential area of Estella. Of relevance to potential urban form is Council's 2007 Retail and Commercial

Development Strategy, which estimates that a supermarket-anchored centre will be viable in the Boorooma/Estella area between 2016 and 2021. Such a centre should be in the order of 2,800m², with a supermarket of around 2,000m². It would require a site area of approximately 0.6 to 0.8 hectares with a yield of 330, the site has significant potential in meeting future housing demand.

7.12 Previous Studies

RJ Nairn & Partners, *Boorooma Traffic Study* (1998)

Wagga Wagga City Council, Draft DCP 17, Boorooma

Aitken Rowe Testing Laboratories, *Eight Part Test for Proposed Subdivision, Boorooma, Wagga Wagga* (2006)

The Urban Design Advisory Service, *Boorooma Estella Structure Plan Development Strategy* (2000)

Graham Moseley Planning (1995) Boorooma Estella Structure Plan Review

Resolve Planning (2005) Application to Rezone East Boorooma

Woodlots and Wetlands Pty Ltd, *Runoff Water Management, Boorooma Estate Wagga Wagga*

MJM Solutions, *Boorooma Neighbourhood Plan* (2006)

Central West Archaeological Services Pty Ltd, *A Preliminary Aboriginal Archaeological Heritage Study of the Henwood Property* (2006)

2007 Retail and Commercial Development Strategy

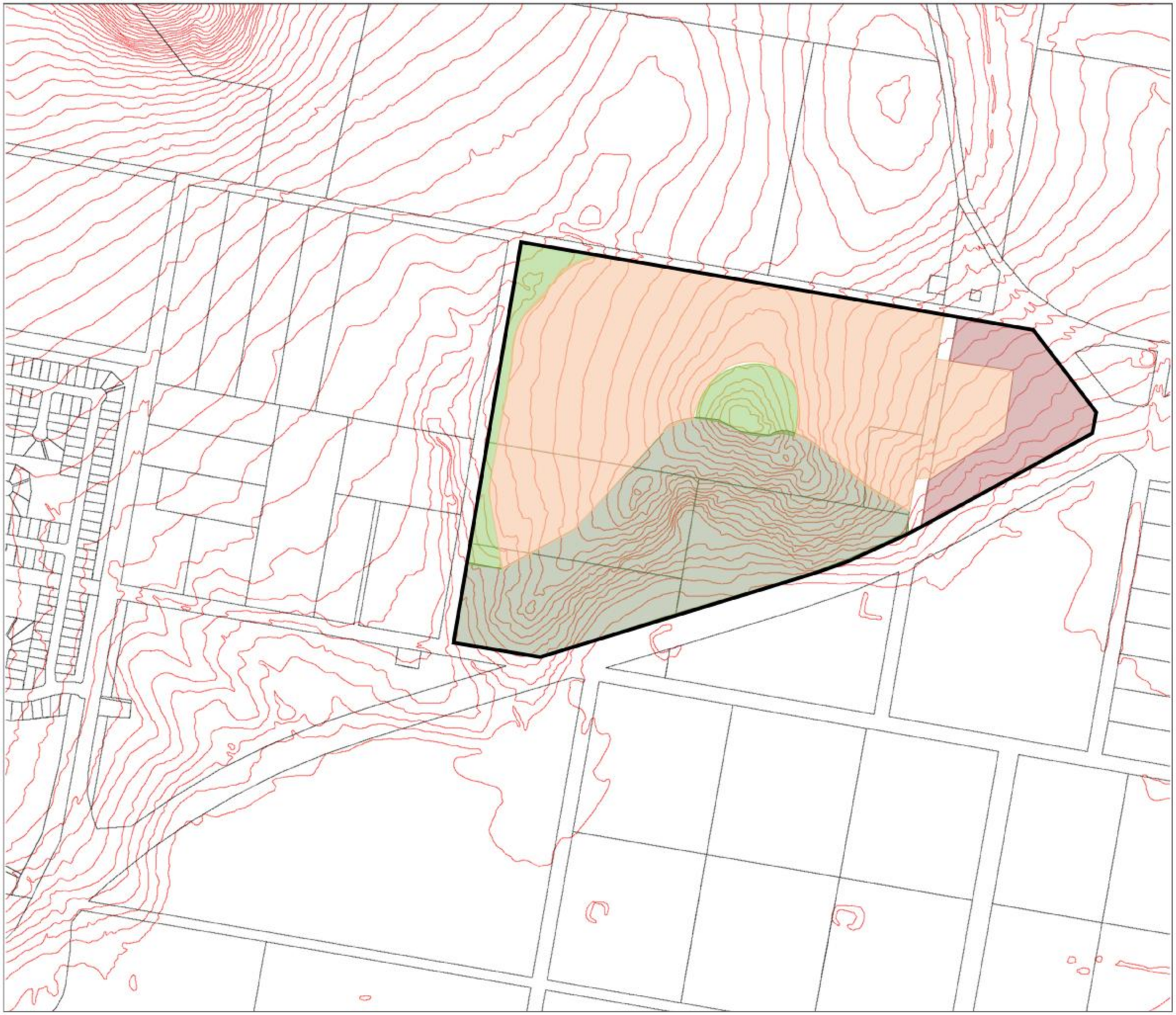
7.13 Key Implications - Boorooma

Issue	Response
1. Biodiversity conservation	
The need to conserve remnant vegetation of moderate condition (approximately 2ha). Role of areas of low condition woodland in providing linkages between vegetated areas on a regional scale. Demands created by the site's context that any future development should be consistent with surrounding visual character and have connectivity with existing and potential residential areas. The requirement that any loss of scattered paddock trees must be offset by conservation or planting.	Investigations conclude that the site has a considerable area of potential conservation given the extent of existing native vegetation across the southern section of the site. This area is also steeply sloping and highly visible from the river floodplain. An appropriate response would include: a) An environmental Living zoning would provide for the conservation of woodland and connectivity between areas of native vegetation. The resultant provision of woodland along road reserves would promote appropriate visual character and connectivity with areas of vegetation to the east. Conservation areas may accommodate provision of offsets for trees lost in development. b) Areas of moderate condition could be transferred to public ownership. A conservation management plan which includes provision for offsetting the loss of paddock trees should form part of a DCP for the site. c) Areas of paddock with low conservation value should be available for development (mindful of offset opportunities).
2. Stormwater management and water sensitive design	
The management of potential impacts resulting from increased stormwater runoff. The adoption of a multi-disciplinary approach to water cycle management which links water infrastructure, landscape design, water re-use and riparian (environmental) corridor function. Such an approach should be implemented along Amundsen Street. Existing environmental flows must be maintained.	An initial stormwater management strategy has been prepared. It provides for stormwater quantity and quality management and indicates retention systems and stormwater corridor widths. The diagrams provided with this material provide guidance on design solutions which are considered as providing the required level of quality and design outcome for stormwater systems.
3. Bushfire	
The need for development to be	Locations of APZs and perimeter roads

Issue	Response
responsive to the degree of threat posed to a future urban community.	(consistent with *Planning for Bushfire Protection 2006*, Published by the Rural Fire Service). There is sufficient perimeter clearing to avoid the need for removal of any native vegetation. APZ's can be provided within cleared land at the edge of the urban zoning. Any future plan for subdivision will require detailed APZ plans along with relevant consultation with the Rural Bushfire Service as part of the development approval process for Integrated Development.
4. Indigenous cultural heritage	
Expert investigations have identified areas of high or moderate archaeological sensitivity in the study area.	An approach is recommended whereby rezoning may take place on condition that further, more rigorous investigations are undertaken as part of the development assessment process. Such investigations would identify whether or not archaeological deposits are, in fact, present on the land. Should deposits or sites be found, appropriate principles and strategies have been formulated to ensure they are conserved when appropriate.
5. Physical services	
Riverina Water recommends limiting rural residential development with high water usage. There is a need to ensure all sites are serviced economically and efficiently.	There are few issues relating to servicing the site.
6. Transport	
Effects of increased traffic volumes on the performance and function of the surrounding road and intersection network.	A need has been identified for controls to be provided at intersections to regulate traffic flows and reduce speeds. It is recommended that a new road would intersect Boorooma Street and form part of the main street network through Boorooma.
7. Human services	
It is anticipated that the study area would have a large number of school aged children. School aged children also reside at the existing area of Estella and	A strategy is recommended whereby a primary school is provided on land adjacent to the existing area of Estella. The school's catchment will take in the Boorooma East study area, the existing area

Issue	Response
the potential new area of Estella West. Anticipated yield will exceed Department of Education and Training threshold of 1,500 homes per primary school. Identified demand for a community centre and the provision of open space and recreation facilities.	of Estella and a potential residential area at Estella. A secondary school is to be provided at Boorooma Provision of open space and recreation and community facilities. Based on anticipated yields and Council's strategic planning targets, the mix of formal and informal recreation space reflects the demands of users as identified in expert studies.
8. Urban form	
The need to adopt widely accepted principles for good neighbourhood planning and urban form to achieve sustainable and enjoyable lifestyles (as referenced in the Spatial Plan). The need to ensure connectivity with potential and existing urban areas to the east of the site. Opportunities to take advantages of views and vistas. The demand, created by the surrounding visual character of the site, for potential impacts of urban development to be managed. The demand for consistency with surrounding visual character.	Key principles include: ▪ Settlement pattern to respond to the characteristics of the landscape setting, for examples the hilltop park and Amundsen Street corridor. ▪ Provide facilities and services at a local level including parks, shops, schools and health facilities. ▪ Adoption of the design principles in the structure plans prepared as part of this LES process. ▪ Create direct links to future neighbourhood centres. ▪ Provide open space that promotes local character and identity. ▪ Maximise connectivity to hilltop locations. ▪ Design road networks for direct links to parks wherever possible. ▪ Reinforce street character with appropriate planting. ▪ Clustering of well-connected neighbourhoods with walkable points of interest and locations for play (see Structure Plan). ▪ Green corridors with pleasant character move through neighbourhoods (see Structure Plan). ▪ Design road network to capture views from site. ▪ CPTED principles applied to design of all public areas including public road boundaries to parks (see Structure Plan). ▪ Encouraging of a variety of housing forms and densities.

BOOROOMA EAST
LAND USE



Study Area
Contours 2 m
Open Space
Conservation 1
Residential 1
Residential 2

300.0

Approximate
scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

8 Estella West

8.1 General Description of the Site

The Estella West study area is approximately 3km north of the centre of Wagga Wagga. The site is approximately 255ha in area, roughly triangular and bounded by Old Narrandera Road to the south, with Harris Road running through the site east to west. Harris Road provides access to the existing suburb of Estella, while Old Narrandera Road provides access from the site the Olympic Highway. Pine Gully Road, which runs through the eastern part of the site intersects with Old Narrandera Road to the south. A boundary map of the study area is provided at Figure 15: Estella West study area.

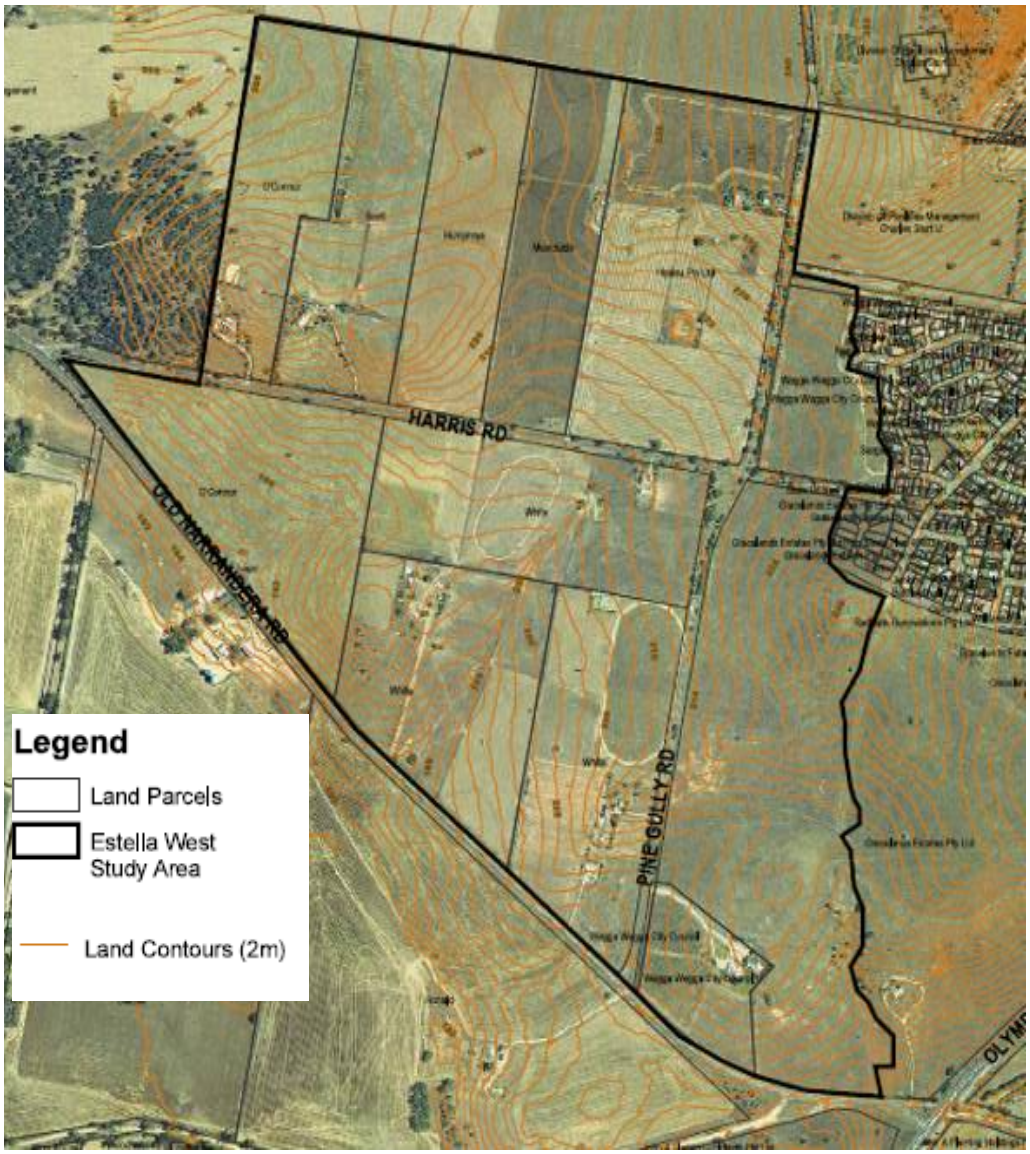


Figure 15: Estella West study area

The eastern boundary of the site is contiguous with the existing residential area of Estella, and the Charles Sturt University campus to the site's north

east corner. Vegetation has been almost entirely cleared. The land is generally used for rural and rural residential purposes and comprises predominantly of paddocks. There are five properties that contain buildings, including the Estella Homestead at the south eastern corner of the site, which is listed in both State and Council Heritage Registers.

8.2 Site History

Ownership of the site is relatively concentrated, with approximately two thirds of the land under three separate owners.

8.3 Surrounding Land Uses

Adjoining Urban Development

The existing residential area of Estella, that adjoins the site's eastern boundary, predominantly comprises of low density residential development. A seniors living development forms the south east corner of the existing residential area of Estella. Educational uses are located to the north east corner of the site at the Charles Sturt University campus. Surrounding land uses to the north, south and west of the site are predominantly agricultural and rural residential, with an area of bushland to the site's eastern corner.

8.4 Environment and Landform

Topography

The Estella West study area is part of a range of low hills that defines the edge of a plain to the north of the Wagga Wagga urban area. The southern portion of the site, to the south of Harris Road, forms the edge of the range and contains three hills elevated between approximately 28m and 56m above the plain. The two lower hills are at the edge of the range and are separated by a spur and a valley. The larger of the three hills rises on the eastern boundary adjacent to Harris Road.

The northern portion of the site contains two hills of up to approximately 48m elevation above the plain and a low spur that protrudes from the east. Viewed from the plain, the five hills step progressively up towards a higher hill (of approximately 124m elevation above the plain), the summit of which stands approximately 600m from the site's north east corner.

Landscape and Visual Character

The five hills on the site and the larger one to the north east form a significant feature of the landscape and are visible from surrounding areas. Their appearance is made more prominent by their location adjacent to the floodplain of the Murrumbidgee River.

Rural residential developments stand on both of the lower hills, the eastern most of which is the Estella Homestead. Being located on high ground makes the properties visually prominent. In the case of the Estella Homestead, this prominence contributes significantly to the positive visual qualities of the area.

Photo 8: Landscape character – Estella West

Visual Vantages

The summits of all five hills provide views of the plain to the south of the site, across the Murrumbidgee River to the bushland and hills of Pomigarlana Reserve to the west of the Wagga Wagga urban area. Views to the south west of the hills include the City Centre.

While views from the summits of the hills are considered to be of moderate to high significance, those from the southern flanks of the hills, at midslope close to the southern boundary, are of moderate significance. Given that the entire site rises from south to north and forms an area of sloping land that faces the plain, views sufficient to make a considerable contribution to amenity are available from all areas of the site, including the valleys incising land to the south of Harris Road.

Photo 9: Landscape character – Estella West

Photo 10: Landscape character Estella West

8.5 Flora and Fauna

Ecological Communities

The Biodiversity Report for Estella West is provided in Appendix A. The Biodiversity Report seeks to present the ecological values of the Estella West development site and discuss the potential impacts on ecological values, including threatened species, endangered populations and endangered Ecological communities, arising from the development of the site.

Paddocks

A total of 95.7% of the site area is occupied by paddocks with vegetation classified as scattered paddock trees/exotic grasslands.

Remnant Woodland

A small portion (4.3ha) of the site is occupied by remnant box gum woodland found along Harris Road and parts of Pine Gully Road. The woodland at the eastern end of Pine Gully Road is the western end of a vegetation corridor, running through the existing suburb of Estella. Box gum woodland is listed as endangered under the TSC Act and as critically endangered under the EPBC Act. Eco Logical Australia assessed the woodland as in either low condition or moderate condition. Figure 16: Vegetation types at the Estella West site below maps the vegetation types on the site.

Species and Habitat

One threatened species, the Superb Parrot (Polytelis swainsonii), has been previously recorded at the site and is known to regularly utilise the remnant woodland on Pine Gully Road as a flyway to and from the Murrumbidgee River.

The review of state and federal threatened species databases identified 7 species likely, or with the potential to occur: Diamond Firetail (Stagonopleura guttata): Brown Treecreeper (eastern subspecies) (Climacteris picumnus victoriae): Grey-crowned Babbler (Pomatostomus temporalis temporalis): Swift Parrot (Lathamus discolour): Yellowbellied Sheathtail Bat (Saccolaimus flaviventris): Little Pied Bat (Chalinolobus picatus) and Eastern Llong-eared Bat (Nyctophilus timoriensis).

The site is considered to provide potential foraging habitat for two bird species, White-throated Needletail and Rainbow Bee-eater (Merops ornatus), listed as migratory under the EPBC Act.

No threatened flora was considered likely or had the potential to occur at the site.

Figure 16: Vegetation types at the Estella West site

Environmental Protection

Under state legislation, areas of good or moderate condition native vegetation that are consistent with endangered ecological communities must be retained. The areas of moderate condition box gum woodland on the site can not, therefore, be developed. For the majority of threatened fauna species

identified as potentially occurring at the site, the loss of habitat provided by low condition box gum woodland is not likely to result in a significant impact, provided that appropriate offsets can be established. These areas can therefore be developed.

Areas comprising of scattered paddock trees and exotic grassland are considered to have limited conservation value and are suitable for development, provided that loss of native paddock trees can be offset.

Regional Context

The remnant woodland has a high regional value as it occurs within a landscape that has been extensively cleared for agricultural production. Moreover, the site is thought to have a moderate landscape value as remnant vegetation within the site provides important linkages to vegetation outside the site boundaries.

Mitigation Measures

The DECC has stipulated that for box gum woodland in low condition, an offset ratio of 1.92:1 is to apply to the area of land covered by the woodland. Therefore, an offset of 8.64ha of box gum woodland would need to be retained elsewhere if the low condition remnant woodland were removed. The DECC's recommended offset ratio of 10:1 would have to be observed in offsetting the loss of the site's paddock trees.

Eco Logical Australia recommends the retention of box gum woodland of both low and moderate condition along Harris Road, and also recommended is a strip of land approximately 20m wide along the southern part of Pine Gully Road for planting to offset the loss of paddock trees.

According to Eco Logical, this would fulfil conservation and offsetting requirements, while also providing connectivity between areas of vegetation to the east and west of the site and maintaining the existence of the flyway for Superb Parrots along Pine Gully Road. A possible alternate location being explored in the structure plan process is the combining of the flight corridor with of an open space corridor running north-south along the eastern boundary of the study area.

8.6 Soils and Erosion Hazard

Soils on the site are predominantly East Bomen soils (Chen and McKane, 1997 in Eco Logical Australia), although Pulletop soils, Lloyd soils and Becks Lane soils also occur on the eastern side of the site (Chen and McKane 1997 in Eco Logical Australia). These soils are moderately acid and have moderate to high erosion hazard. Should rezoning occur, then assessment of measures

required to develop areas of high soil erosion hazard should be made at development application stage.

8.7 Drainage and Hydrology

Northrop Engineers have undertaken a comprehensive study of the stormwater requirements for Estella West. A full copy of their report is included at Appendix B. Below provides a summary of the Northrop report.

General Description

The Estella West site ranges in elevation from RL 240m AHD to RL 180m AHD. The site generally falls to the south and south-west. One watercourse flowing north to south traverses the site, parallel to Pine Gully Road.

Overland Catchments

The study area consists of six separate catchments that can be summarised as follows:

- Catchment 1 is located to the north east. Approximately 40% of the catchment is within the site, with a further 20% located upstream of the site and 40% downstream.
- Catchment 2 is located in the south-west portion of the site. There is no defined depression or watercourse within this catchment but stormwater runoff would be concentrated upon reaching Old Narrandera Road.
- Catchment 3 is located wholly within the study area and drains to a watercourse which discharges to the floodplain via a culvert under Old Narrandera Rd.
- Catchment 4 is located wholly within the study area and generally drains south until intercepted by Old Narrandera Road's drainage system.
- Catchment 5 is located wholly within the study area and generally flows to the south. Stormwater runoff from Catchment 5 is concentrated at a culvert crossing the Olympic Highway and discharging to Dukes Creek.
- Catchment 6 is adjacent to the previously developed portion of Estella and is located wholly within the site. Runoff from this catchment flows to the drainage network servicing Boorooma. Flows from Estella West, Estella East and Boorooma combine at the intersection. Stormwater runoff from this catchment flows to the drainage network servicing Estella East.

No formal drainage networks exist within the study area, apart from culverts under Old Narrandera Rd and Olympic Highway. Table drains service the adjoining road. The table drains are graded to a convenient low point and discharged via overland flow.

Potential Drainage Scenario

Should the study area be developed, the blue line watercourses as shown in Figure 26 below, would form the routes of the major drainage corridors for each catchment. Drainage corridors generally following the route of the blue line watercourses to be provided. Required widths of possible drainage corridors are shown in **Table 23 - Drainage corridor specifications** below.

Table 23 - Drainage corridor specifications

Catchment	Drainage Corridor Width (m)
1	30 (Depression)
2	20 (Depression)
3	30 (Watercourse)
4	20 (Depression)
5	20 (Depression)
6	20 (Depression)

Where no “blue line” water course has been identified with a catchment, drainage corridors could still be provided where stormwater runoff is concentrated. Figure 17: Estella West study area recommended stormwater management plan illustrates where drainage corridors need to be provided, in addition to potential zones for riparian protection. Development cannot occur within these corridors.

Drainage corridors would consist of a major drainage system network above ground and a minor network below ground. Stormwater runoff would be discharged to privately owned flood prone land on the southern side of the Olympic Highway. Negotiation with the subject land holders is required, in order to agree an acceptable drainage path through downstream sites.

Stormwater Management Recommendations

Development activity is likely to increase runoff volumes and pollutant loads. Post-development flows need to be managed to minimise impacts downstream, while maintaining existing (environmental) flows to support habitats.

The following measures should be considered as part of an overall stormwater management system. The system shall ensure existing site flows are maintained, while minimising the effects of excessive runoff rates and volumes.

Figure 17: Estella West study area recommended stormwater management plan

The following strategies should be employed as part of an overall stormwater management and water cycle plan.

- *Stormwater Detention* allows for the controlled release of stormwater runoff. In general, facilities should be provided at a local catchment level and located toward the downstream end of the catchment (outside areas susceptible to flooding – 100-year ARI).
- *Rainwater Re-use Schemes* provide an alternative water source. The harvested water can easily be used for non-potable purposes (although, requirements for monitoring and treating the condition of harvested rainwater need to be considered). Community-based systems for irrigation of open space areas are recommended to enable Council / Authority management of the potential effects to soil salinity.
- *Reducing Impervious Areas* assists to control the volume and rate of stormwater runoff. Measures to assist with optimising pervious/ impervious ratios include limiting paved surfaces, incorporating of permeable paving and grass-lined corridors for drainage to complement landscaping. This strategy should be incorporated with a vegetation management plan to use plant species.
- *Water Sensitive Urban Design (WSUD) Principles* that control the quality of stormwater discharged from the Study Area are to be incorporated (as outlined in Appendix D of the Northrop report for Estella West). Specific measures include pollution control devices, wetlands systems, bio-

retention treatment facilities and maintaining site discharge rates that support environmental habitat downstream.

- Water quality targets shall be determined by the procedure indentified in Appendix C of the Northrop report for Estella West. As a minimum pollutant levels for the post-development scenario shall not exceed predevelopment levels.
- Provide drainage corridors to manage concentrated surface trunk drainage flow within catchments. The drainage corridors would be utilized in a similar manner to the "Blue Line" water courses/ riparian corridors.
- Analysis of existing culverts to confirm capacity and determine the impact of backwater effects (if any).

8.8 Heritage

8.8.1 European heritage

As stated in Section 1.5, federal, state and local government registers were reviewed by Willana Associates to ascertain whether any listed heritage items were present in the study area. The Estella Homestead, which is located to the south east corner of the site, is included in Appendix 15 of the WWDCP as being an "item of the environmental heritage". It is also listed in the Register of the National Estate. The Register's Statement of Significance for the property describes it as comprising a homestead, out buildings and barn and states that it has:-

> *"Aesthetic significance as fine and substantially intact collection of late Victorian farm buildings. The homestead survives as a generic rural vernacular building of simple geometric plan form and is substantially intact internally and externally….*
>
> *The Estella property has historic significance as a remnant of an original Wagga Wagga district farm. The outbuildings reveal the functional role of the buildings relative and integral to the Estella homestead, and provide insight to the planning attitudes and lifestyle prevalent throughout the operational life of this farming property.*
>
> *The Estella barn is an accomplished example of construction for this building type".*
>
> *(Australian Heritage Council, Australian Heritage Database 2007 Place ID 101895).*

Photo 11: The Estella homestead and surrounds.

The recommended structure plan indicates the possible extent of a new urban area at Estella and provides for a separation between the homestead, its curtilage and future development. This separation will enable the continued appreciation of the design features and aesthetic qualities of the homestead and outbuildings. By minimising visual impact in the heritage item, it will also allow for an interpretation of the relationship between the homestead and the outbuildings.

8.8.2 Aboriginal Heritage

Sites and Deposits

The investigation by Kelleher Nightingale Consulting (full report at Appendix D) found that there were no recorded Aboriginal archaeological sites within the Estella West study area and Aboriginal archaeological material was observed.

Landscape Archaeological Sensitivity

There are several areas of major impact to the landscape, including two horse training tracks, houses and associated buildings and roads. These areas are likely to have very low archaeological sensitivity. Areas of outcropping granite were observed in upper hillslope/crest contexts. Inclusions within the outcropping granite may have been used as a source of raw material for stone artefact manufacture. The site's proximity to, and elevation above, the floodplain would have provided a dry, elevated position above a resource rich area.

Recommendations

As stated in Section 6.8.1, the findings of the predictive model do not prevent the rezoning of any of the study areas.

Kelleher Nightingale makes the following recommendations for the Estella West study area:-

- Management of the identified areas of potential Aboriginal archaeological sensitivity should be considered during the strategic planning process of Estella West.
- Conservation should be the prime consideration when establishing Aboriginal heritage management strategies during the planning process.
- The assessment has identified there is some potential for this study area to contain Aboriginal objects that were not visible at the time of the current site visit due to extensive ground cover and the preliminary nature of the investigation. As a result, this area warrants further survey and assessment for proposed future development, as part of the development assessment process.
- Identified area of high/ moderate sensitivity not possible to conserve may require further investigation through section 87 permit for test excavation.
- Consultation with the WWLALC is ongoing. This assessment will be finalised following consultation and input from the Land Council.

8.9 Utilities

Electricity, Gas and Telecommunications

As stated in Section 6.11, Country Energy has stated that in instances where investment cost would be greater than return, developers have funded the installation of gas infrastructure. The company indicated that there is high pressure gas main "in the vicinity" of the study area.

Country Energy and Telstra are yet to provide comment on the provision of electricity and telecommunications to the study are.

Water Supply

Riverina Water noted that the study area is *"relatively close to major existing water infrastructure that will assist in the commencement of water supply".*

Sewage & Effluent Disposal

The study conducted by Michael Cuthbert Consulting (Appendix E) proposed dividing the study area into four catchments indicated in **Table 24**.

Within these catchment boundaries, grades are generally favourable and should permit a high degree of flexibility in layout. There could be some

restrictions to Gobbagombalin C near Old Narrandera Road as there is a slight fall away from the proposed pump station. The value of downstream infrastructure per equivalent tenement that would be utilised by each catchment is indicated in **Table 24**.

Table 24 - Infrastructure costs per equivalent tenement

Catchment	Sub-catchment	Est Cost ($/Equivalent tenement)
Estella Pump Station	Estella C	$3,500
	Estella D	$3,700
	Gobbagombalin A	$3,900
Gobbagombalin North	Gobbagombalin B	$5,100
Gobbagombalin West	Gobbagombalin C	$4,000

The report of the study by Michael Cuthebert Consulting recommends that Gobbagombalin A could be developed at the same time as Estella C and D, as the areas can utilise the same major assets. This would promote a rapid take-up of the pump station capacity, thereby minimising the associated investment risk and holding costs.

The northern and western parts of Gobbagombalin, are likely to need dedicated pump stations and long rising mains and therefore servicing costs for these areas would be higher should they be developed. The implementation of the technology to be implemented in sewer provision will be assessed by Council in its development service planning.

Figure 12: Boorooma East and Estella West recommended sewerage servicing requirements in Section 7.8 indicates the proposed sewerage servicing for the Estella West and Boorooma East sites.

8.10 Transport Infrastructure

Existing Road Network

The existing road network within and surrounding the site comprises of the following:

- *Old Narrandera Road*: a two lane sealed road, aligned along the southern boundary of the study area with a posted speed limit of 100 km/hr. The road's intersection with Olympic Highway is a priority controlled seagull intersection.
- *Pine Gully Road*: With a posted speed limit of 100 km/hr, this road runs parallel to Boorooma Street. It provides access to the western portion of Charles Sturt University campus, intersecting with Old Narrandera Road at a T-junction, at which Pine Gully Road traffic is controlled by a stop sign.
- *Harris Road*: A two-lane sealed road that connects Old Narrandera Road and Pine Gully Road, with a posted speed limit of 100 km/hr.

Table 25 - Existing two way traffic volumes

Road	Current volume (vehicles per day)
Old Narrandera Road (near Olympic Highway Intersection)	2,500
Harris Road	85
Pine Gully Road	2,000 (Based on estimates as no data for this road was available from the Council)

Intersections and Access

GHD recommends Old Narrandera Road and Pine Gully Road as the main roads accessing the site. For the area to the west of Pine Gully Road, there would be a central access road.

Projected traffic volumes at intersections along Old Narrandera Road would require improved capacity at Pine Gully Road and the Olympic Highway. At Pine Gully Road, a two-lane roundabout is recommended, with a slip lane for traffic moving onto Old Narrandera Road. At Harris Road, a dual circulating lane roundabout would be required. At the Olympic Highway, the capacity of the existing channelised intersection would be exceeded and a seagull roundabout would be required. The southbound traffic on the Olympic Highway would bypass the roundabout.

Refer to Figure 18: Estella West Post Development – Traffic Infrastructure Requirements below.

Projected Traffic Conditions

GHD estimates that there would be about 1,350 vehicle trips added to the external road network during the peak period if the site were developed. During the AM peak, approximately 30% of volume would exit onto Old Narrandera Road, with the balance existing to Pine Gully Road.

Public Transport

The existing bus service in Estella could be extended into Estella West along Dunns Road, Pine Gully Road and via the collector road system in Estella West then Old Narrandera Road to the city.

Cycling/Footpath Systems

The Cooramin Street reserve provides an opportunity to extend pedestrian links to Estella West along the Harris Road corridor.

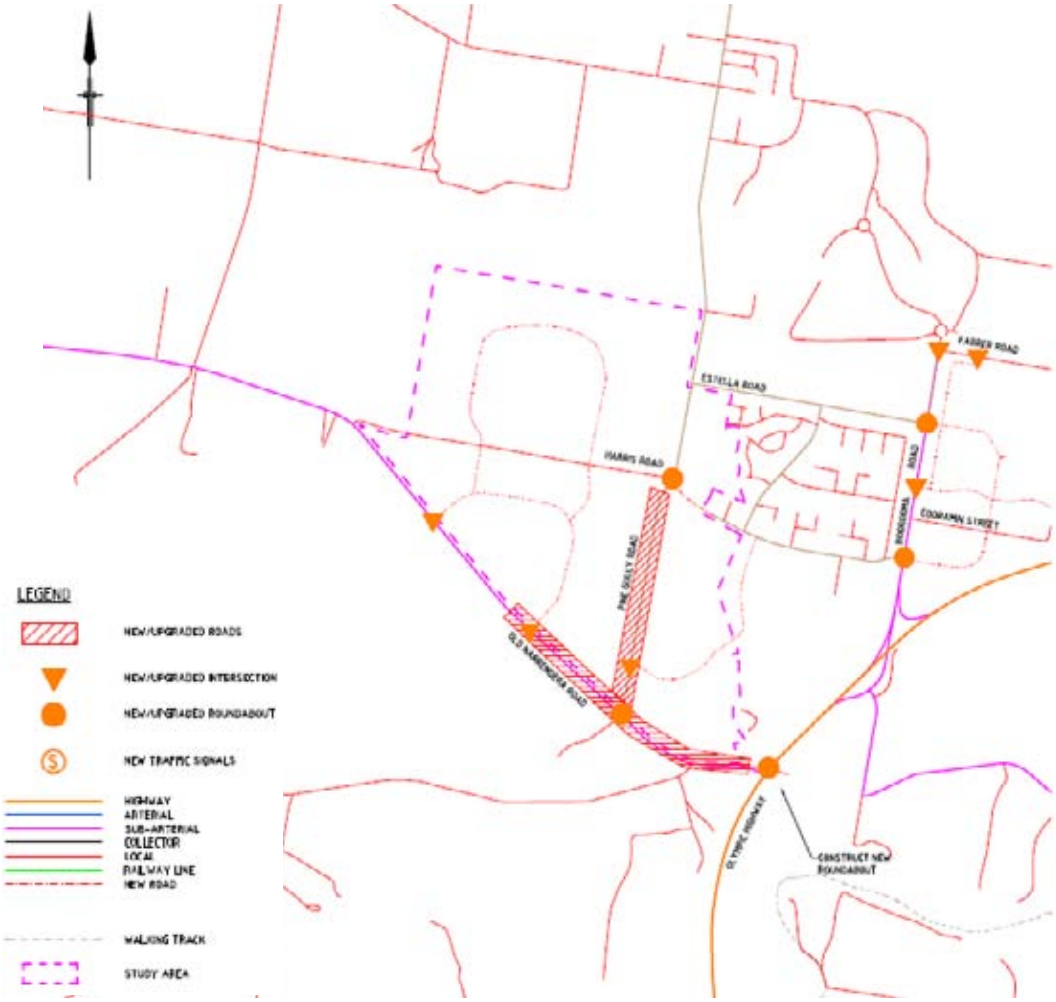


Figure 18: Estella West Post Development – Traffic Infrastructure Requirements

Construction costs

The costs involved in providing the required works and upgrades are shown in Table 26**.**

Table 26 - Intersection works construction costs for Estella West.

Location	Proposed Upgrade Works	Estimated Cost
At Old Narrandera Road/ Olympic Way	Seagull roundabout	$1,000,000
At Pine Gully Road/ Old Narrandera Road	Dual lane roundabout with slip lane	$500,000
At Harris Road/ Pine Gully Road	Dual lane roundabout	$500,000
Old Narrandera Road	Construct second carriageway for a distance of about 600 metres	$500,000 (excl property acquisition)
Pine Gully Road	Construct second carriageway for a distance of about 1.2 km	$1,000,000 (excl property acquisition)

A full copy of GHD's Traffic Management report for Estella West can be found at Appendix C.

8.11 Bushfire Risk Management

Risk Assessment

The study by Eco Logical Australia (Appendix H) concludes that bushfire hazard at Estella West is generally low, reflecting the moderate slopes and grassy woodland vegetation with low fuel accumulation levels prevalent across the study area. Eco Logical's study demonstrates that development at the subject site can meet the requirements of *Planning for Bushfire Protection* (NSW RFS 2006) given the incorporation of a number of strategies designed to minimise the risk from bushfire.

Risk Management Strategies

Eco Logical Australia concluded that the bushfire hazard has been assessed across the site and found to be low-moderate, based on the moderate slopes and low fuel accumulation of the vegetation present.

A number of strategies have been provided such that the risk from bushfire can be minimised and further that the approvals process can be streamlined. Further, it has been found that development is indeed possible at the subject site from a bushfire planning perspective.

The main strategies suggested include:

- Ensure adequate setback from bushfire prone vegetation.
- Integrate non combustible infrastructure within Asset Protection Zones (APZs) such as roads, easements and parking areas.
- Ensure adequate access and egress from the site.
- Consider the adequacy of water supply and delivery of other services (gas and electricity).
- Provide temporary APZs during any staged development.
- Consider the requirements of ongoing APZ maintenance.

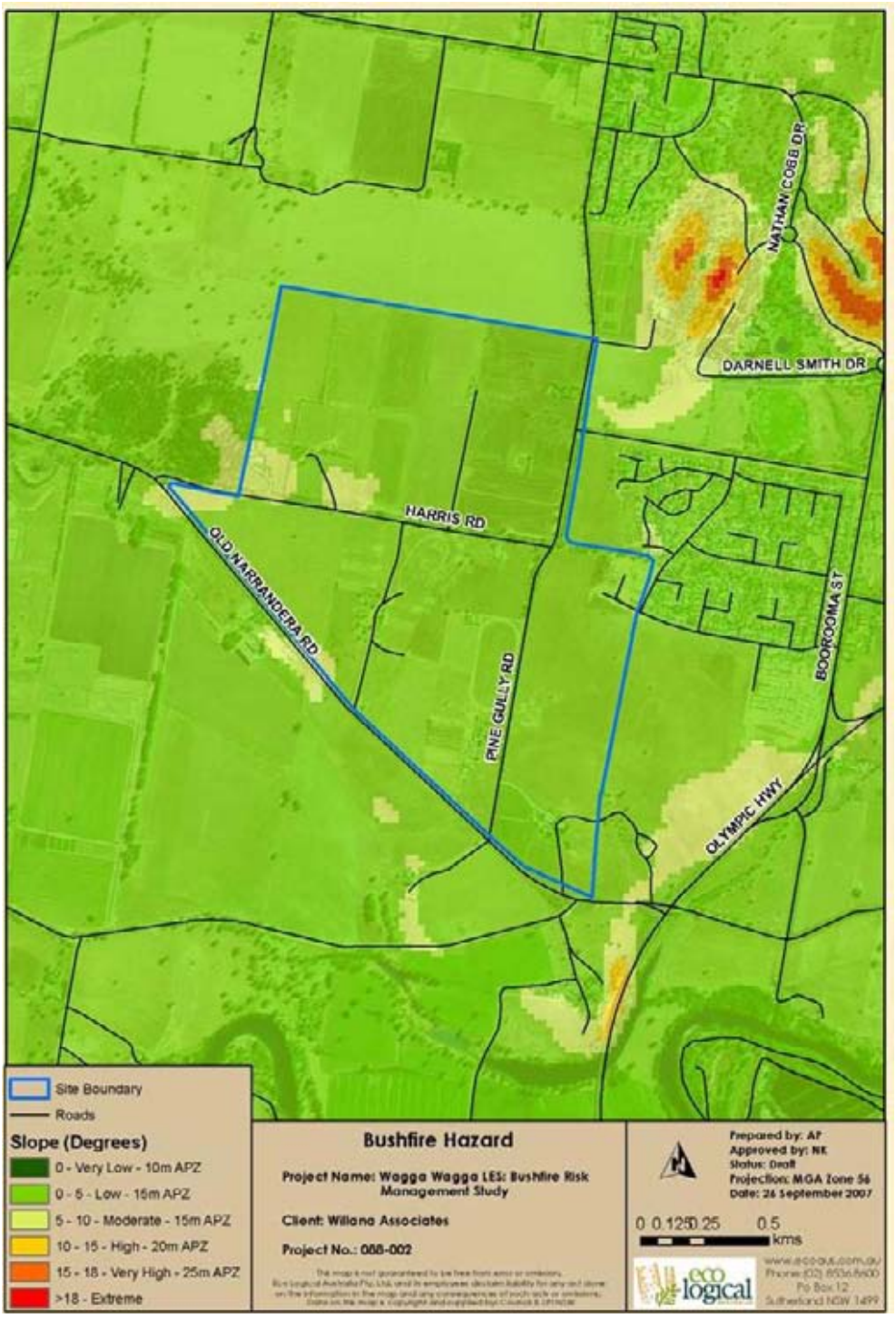


Figure 19: Estella West bushfire hazard assessment

Further bushfire advice and input into the planning process can be provided through the rezoning process and when a development footprint is determined. A formalised bushfire assessment will be required to facilitate the development approval process.

Infrastructure and Staging

It is recommended that water supply is provided via a ring main system.

Infrastructure such as electricity and gas provisions should be located underground to avoid damage by bushfire. Where possible permanent large lines and temporary 11kv lines should be placed underground.

An assessment of the RFS and NSW Fire Brigade stations surrounding the site was completed by Eco Logical Australia in order to determine proximity to the subject site.

Consultation with the RFS and NSW Brigade is required to confirm whether existing stations can adequately service the proposed development site as well as the need for additional resources at these existing stations (and a Section 94 – developer contributions plan).

Eco Logical Australia has recommended that the staging of the development should be considered from a bushfire perspective such as to minimise the risks to the development during construction. Ideally, lots fronting the bushland interface would be developed first and APZs established upfront. Notwithstanding this, temporary APZs should be established around each stage of the development and identified in a Section 88b instrument which would cease once the adjacent stage of development is undertaken.

8.12 Community Facilities

Schools

As discussed in Section 7.11, the DET threshold for the provision of primary schools is exceeded by the combined yield of Boorooma and Estella. A strategy is recommended whereby a primary school is provided on land adjacent to the existing urban area of Estella.

Community Facilities

Council's Social Planning Coordinator has advised that, should rezoning of Estella take place, a feasibility study will be undertaken for a Community Centre to serve the area. It is also advised that a budget be allocated for both the feasibility study and the construction of the centre.

Open Space and Recreation

In assessing demand for open space, issues identified in Council's City of Wagga Wagga Social Plan (2004) should be considered. These issues relate to increased need for bikeways, non-formal leisure facilities and inadequate infrastructure in Glenfield Park and Estella. The findings of Council's Open

Space and Recreation Strategy 2007, which indicates that there is a general oversupply of sporting grounds in the LGA, should also be considered. This needs to be balanced with the need to provide active sporting areas within easy reach of all communities and neighbourhoods.

Considering the potential population of around 4,800, Council's adopted rate of 4ha of open space per 1,000 people is not met by the 10.9ha indicated on the structure plan for the site in Section 13 of this report. However, open space provisions should be considered in light of the 15.9ha of land set zoned for conservation in the plan. This area will have some value as open space and may provide for passive forms of recreation.

8.13 Urban Form and Regional Context

Estella West has the potential to support urban residential development that will form an extension of the existing Estella neighbourhood. Council's Wagga Wagga Spatial Plan 2007 estimates that Estella West has the potential to yield 1,615 dwellings.

8.14 Previous Studies

Graham Moseley Planning, *Boorooma – Estella Structure Plan Review. Wagga Wagga City Council* (1995)

The Urban Design Advisory Service, *Estella Estate Development Controls. Wagga Wagga City Council* (2000)

Central West Archaeological Services Pty Ltd, *An Aboriginal Archaeological Heritage Overview of the Proposed Estella Residential Subdivision* (2005)

Bassett Acoustics, *Estella Neighbourhood Development, Olympic Highway, Wagga Wagga Environmental Acoustical Assessment* (2005)

Resolve Planning, *Estella Neighbourhood Plan* (2007)

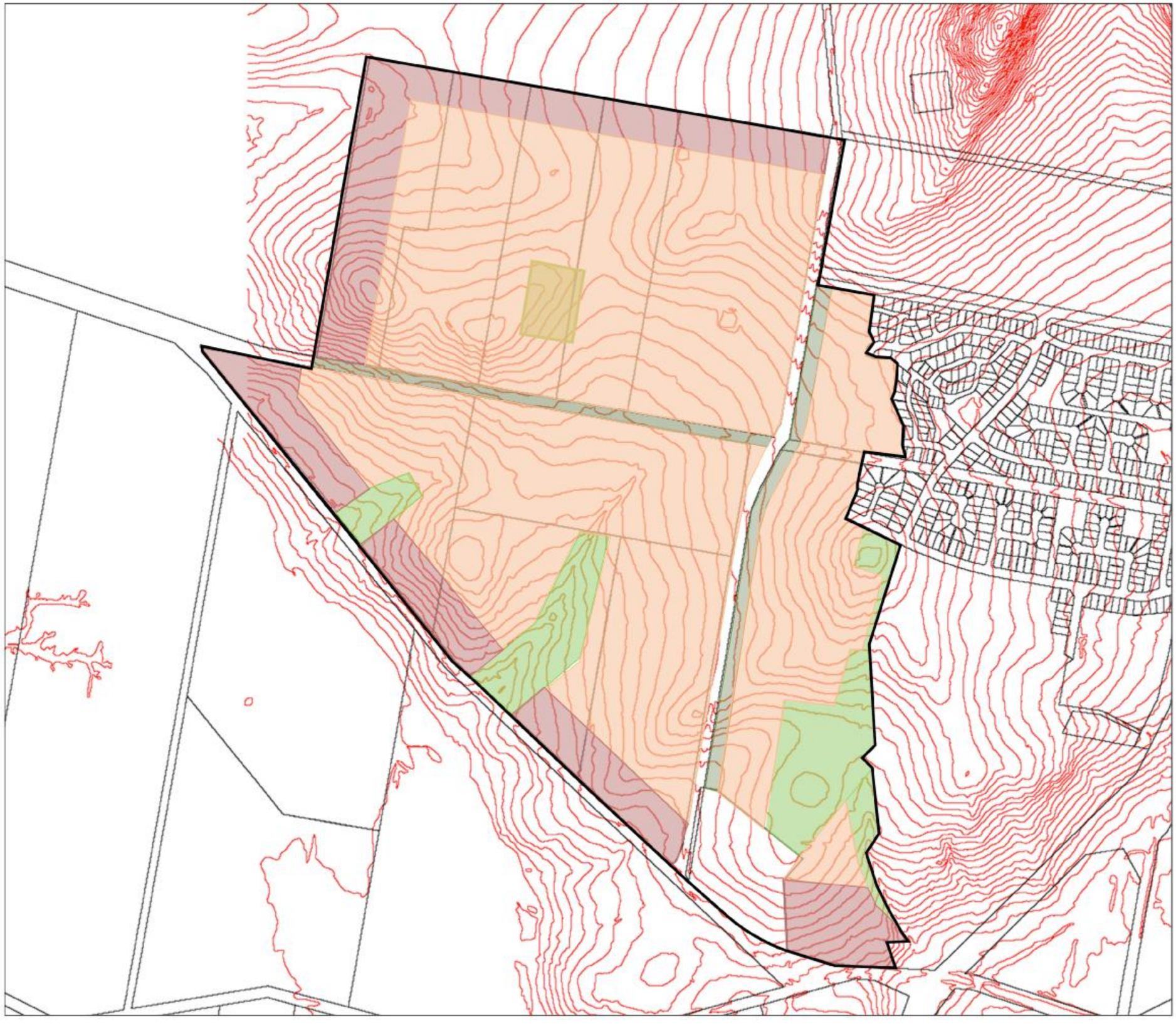
8.15 Key Implications – Estella West

Issue	Response
1. Biodiversity conservation	
The need to conserve remnant vegetation of moderate condition (approximately 2ha). Role of areas of low condition woodland in providing linkages between vegetated areas on a regional scale. Demands created by the site's context that any future development should be consistent with surrounding visual character and have connectivity with existing and potential residential areas. The requirement that any loss of scattered paddock trees must be offset by conservation or planting.	Expert investigations conclude that the site has a considerable potential yield, while environmental assets can be maintained and improved. An appropriate response would include: • An environmental conservation zoning would provide for the conservation of woodland and connectivity between areas of native vegetation. The resultant provision of strips of woodland approximately 20m to 30m wide along road reserves would promote appropriate visual character and connectivity with areas of vegetation to the east. Conservation areas may accommodate provision of offsets for trees lost in development. • Areas of moderate condition should be transferred to public ownership. A conservation management plan which includes provision for offsetting the loss of paddock trees should form part of a DCP for the site. • Areas of paddock with low conservation value should be available for development (mindful of offset opportunities).
2. Stormwater management and water sensitive design	
There is a need to manage potential impacts of increased stormwater runoff. The adoption of a multi-disciplinary approach to water cycle management within the site which links water infrastructure, landscape design, water re-use and riparian (environmental) corridor function. Existing environmental flows must be maintained.	An initial stormwater management strategy has been prepared. It provides for stormwater quantity and quality management and indicates retention systems and stormwater corridor widths. The diagrams provided with this material provide guidance on design solutions which are considered as providing the required level of quality and design outcome for stormwater systems.
3. Bushfire	
The need for development to be responsive to the degree of threat posed to a future urban community.	Locations of APZs and perimeter roads (consistent with *Planning for Bushfire Protection 2006*, Published by the Rural Fire Service). There is sufficient perimeter clearing to avoid the need for removal of any native vegetation. APZ's can be provided within cleared land at the edge of the urban zoning. Any future plan for subdivision will require detailed APZ plans along with relevant consultation with the Rural Bushfire Service as part of the development approval process for Integrated Development.

Issue	Response
4. Indigenous cultural heritage	
Expert investigations have identified areas of high or moderate archaeological sensitivity in the study area.	An approach is recommended whereby rezoning may take place on condition that further, more rigorous investigations be undertaken as part of the development assessment process. Such investigations would identify whether or not archaeological deposits are, in fact, present on the land. Should deposits or sites be found, appropriate principles and strategies have been formulated to ensure they are conserved when appropriate.
5. European heritage	
Need to conserve heritage significance of Estella Homestead.	Zoning to achieve separation of Estella Homestead and its curtilage from the urban area.
6. Physical services	
There is a need to ensure all sites are serviced economically and efficiently.	Riverina Water recommends limiting rural residential development with high water usage.
7. Transport	
Effects of increased traffic volumes on the performance and function of the surrounding road and intersection network.	Provision of controls at intersections along Old Narrandera Road and upgrade of Old Narrandera Road and Pine Gully Road.
8. Human services	
An anticipation that the study area would have a large number of school aged children. School aged children also resident at the existing area of Estella and the potential new area of Boorooma. Anticipated yield will exceed Department of Education and Training threshold of 1,500 homes per primary school. Identified demand for a community centre and the provision of open space and recreation facilities.	A strategy is recommended whereby a primary school is provided on land adjacent to the existing area of Estella. The school's catchment will take in the study area the existing area of Estella and a potential residential area at Boorooma. Provision of open space and recreation and community facilities. Based on anticipated yields and Council's strategic planning targets, a mixture of passive open space and sporting grounds are to be provided on the site. The mix of formal and informal recreation space will reflect the demands of users as identified in expert studies.
9. Urban form	
The need to adopt widely accepted principles for good neighbourhood planning and urban form to achieve sustainable and enjoyable lifestyles (as	Key principles include:- ▪ Settlement pattern to respond to the characteristics of the landscape setting.

Issue	Response
referenced in the Spatial Plan). The need to ensure connectivity with potential and existing urban areas to the east of the site. Opportunities to take advantages of views and vistas. The demand, created by the surrounding visual character of the site, for potential impacts of urban development to be managed. The demand for consistency with surrounding visual character.	▪ Provide facilities and services at a local level including parks, shops, schools and health facilities. ▪ Adoption of the design principles in the structure plans prepared as part of this LES process. ▪ Create direct links to future neighbourhood centres. ▪ Provide open space that promotes local character and identity. ▪ Maximise connectivity to hilltop locations. ▪ Design road networks for direct links to parks wherever possible. ▪ Reinforce tree character with appropriate street planting. ▪ Clustering of well-connected neighbourhoods with walkable points of interest and locations for play. ▪ Green corridors through neighbourhoods, linking parks and aligned along watercourses. ▪ Open space to take advantage of views and preserve existing visual character. ▪ Conservation of established woodland along road reserves consistent with surrounding visual character and forming a visual link with areas to the east. ▪ Zoning to restrict development adjacent to Narrandera Road and the rural-residential interface to large lot residential to ensure consistency with surrounding visual character. ▪ CPTED principles applied to design of all public areas including public road boundaries to parks (see Structure Plan).

ESTELLA WEST
LAND USE



Study Area
Contours 2 m

Open Space
Conservation 1
Residential 1
Residential 2

200.0

Approximate scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

9 Smaller Residential Sites

9.1 Overview

As discussed in Chapter 1, this study considers the suitability of two smaller sites for residential development. These sites are as follows:-

- Main Street
- Plumpton Road

Location maps (Figures) of the sites are provided on the following page.

Main Street and Plumpton Road are adjacent to existing residential / rural residential areas and, should they be developed, would form extensions of those areas. Given their relatively small scale, development of the sites would be unlikely to present significant implications for the provision of drainage, road, energy, water, sewer or other infrastructure. Their proximity to nearby residential / rural residential areas implies that the sites may be serviced by existing nearby infrastructure.

Site inspections of these sites indicate that they have been significantly disturbed and no longer contain areas of natural bushland. The Main Street and Plumpton Road sites are smaller land areas compared to the new release areas and have been used for smaller acre rural/ residential purposes. This has led to significant clearing of native vegetation on the land, such that there are only isolated stands of native trees on small portions of the land. Given the disturbance of the land and the lack of vegetation, it is not considered necessary to undertake detailed investigations into biodiversity or archaeological values of the smaller residential sites.

The statutory process to be followed if the land is rezoned for residential purposes will ensure that isolated trees or potential archaeological sites are protected. The site's inspections verify that the consequences of either of these two outcomes are likely to be minor and are therefore not seen as impediments to rezoning the land in the event that the sites are considered suitable for residential development within the urban form, social and economic context of the City of Wagga Wagga.

Rezoning may proceed on the basis that detailed investigations can be undertaken at the development assessment stage, if required.

Figure 20: Plumpton Rd – the area is shown as 1b Urban Living and is north of Springvale Rd and west of Plumpton Rd.

Figure 21: Main Street Lake Albert – Area is shown as 1c Urban Living Area and is bound by Main Street and Gregadoo Rd

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10 Bomen

10.1 General Description of the Site

Bomen is the largest of the study area sites with an area of approximately 3,402ha. It is irregular in shape, with Holloways Road at its most northern tip and Bavin Road to the south. State Rail's Main South railway line, which provides a connection for freight services between Sydney and Melbourne, bisects the site north to south, while the Olympic Highway forms the study area's western boundary. The now disused Bomen Station stands on the Main South line in the southern part of the site. Trahairs Road and East Bomen Road cross the site east to west, connecting with Byrnes Road. The land is undulating and rises from the Murrumbidgee plain in the south to gently sloping hills to the north.

A location map is provided at Figure 32 below.

While much of the site is used for agriculture, the zoning that applies to the area has allowed the development of a substantial number of rural industrial uses associated with agriculture, such as wool and meat processing. The area to the south and west of Bomen Station has come to form one of Wagga Wagga's significant industrial precincts and accommodates operations that account for much of the LGA's economic base. Industries that take place within the precinct include abattoirs, meat and food processing, agricultural machinery, oil, petroleum and gas, manufacturing, wool broking, waste management, transport and logistics and livestock trading.

The Wagga Wagga Industrial Lands Study 2005 asserts that both Bomen and the industrial area of Wagga Wagga to the east of the City have developed relatively quickly (ie over the past 25 to 30 years). Given the concentration and growth of industrial activity in Bomen, the site should be considered an important regional economic asset. Council's Spatial Plan 2007 describes Bomen as a regionally significant economic development centre and noted that it had widespread opportunities for industrial activities of a broad range of types and scales. The findings of the Spatial Plan 2007 support a decision by Council at a meeting on 18 December 2006 to advance planning which may allow further industrial development on the site.

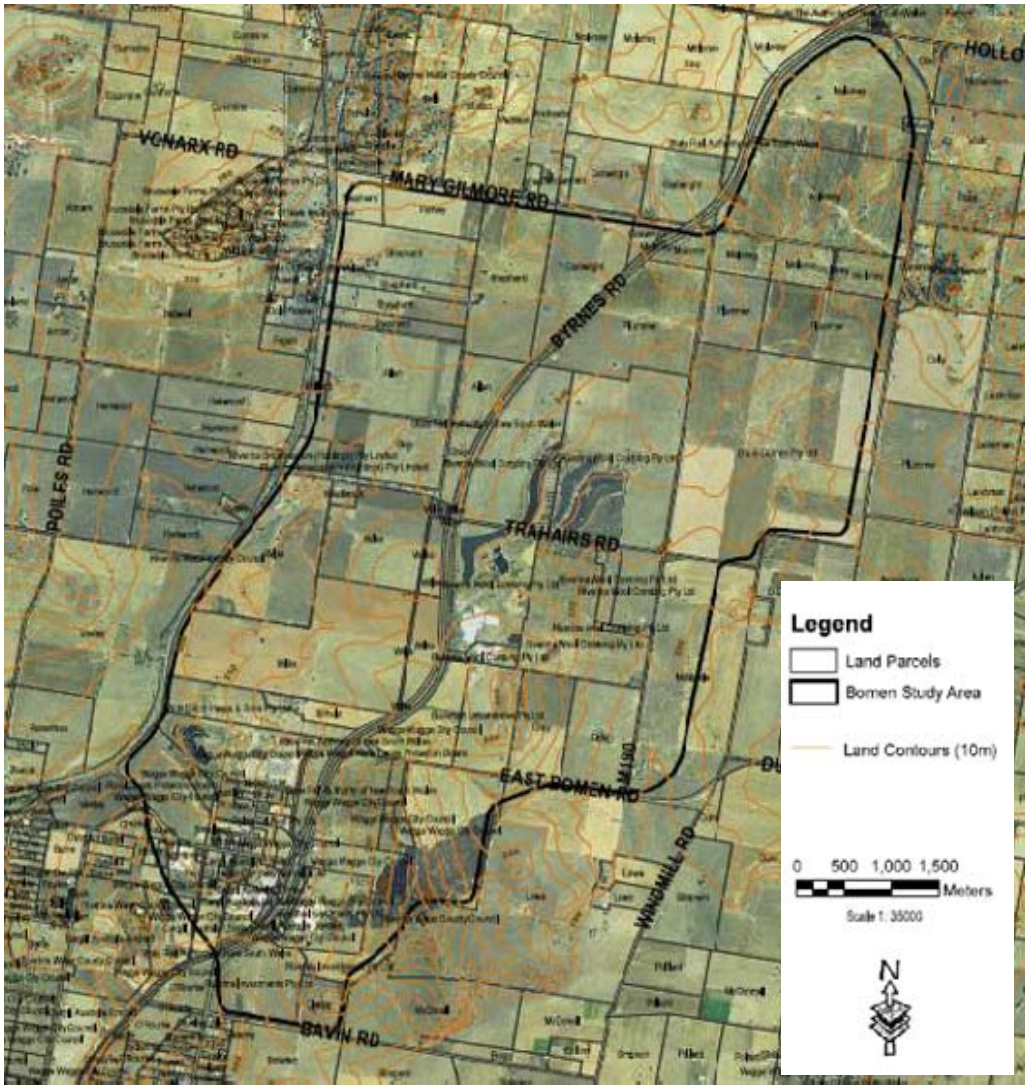


Figure 22: Bomen Study Area

The Council's 2005 Industrial Lands Study found that most of the industrial sites in Bomen have "B Double" access to the Olympic Highway. It also found that some sites have rail sidings, or the proximity required to be linked to the railway line. A road/ rail intermodal terminal enables the transfer of 20 and 40ft containers between road and rail. The terminal is part of a wider rail network with direct access to the ports. (*Wagga Wagga Industrial Lands Study*, Hill PDA 2005 pages 50 to 52). The railway line also provides rail links between Wagga Wagga and Sydney, Melbourne, Canberra, Albury, Bathurst, Orange and the Central West.

By virtue of its size, Bomen is under 35 different ownerships, 32 of which are private owners. The ownership of the area to the south and west of Bomen Station, which accommodates most of the industrial operations, is fragmented and contains several smaller allotments. However, there is considerable consolidation of ownership for the large new areas of Bomen which are the

subject of the LES. Approximately two thirds of the site that lies to the north (which includes the land owned by the Rivco Group Pty Ltd) is predominantly under nine ownerships.

10.2 Surrounding Land Uses

Land uses to the north, east and west of the site are predominantly agricultural with some rural residential development scattered along Shepherds Siding Road and the Olympic Highway. A greater concentration of development exists to the south of the site at Cartwrights Hill and along Byrnes Road and East Street. The proximity of Bomen to residential uses creates an imperative to consider potential amenity impacts on existing and future residents of nearby suburbs.

10.3 Environment and Landform

Topography

The railway line and Byrnes Road that bisect the site follow the top of a low ridge that runs through the site north to south. The sides of the ridge are gently sloping, falling away to the east and west, then rising again to create two long, shallow valleys running north south on either side of the ridge. Two knolls stand on either side of the ridge at the centre of the site.

Gradients are generally low across the site, typically rising by around 14m within 1km. The southeast area of the site, however, is steeper, with a gradient of approximately 1in10.

Landscape and Visual Character

The shallow gradients across most of Bomen do not allow landforms to be readily interpreted and the land appears predominantly flat. The two knolls can be appreciated from the immediately surrounding area. The site is predominantly cleared, with virtually no obstruction presented by vegetation across much of the site. Some trees lining roads and fence lines are visible on the horizon to the west.

While view corridors are generally vertically shallow, they extend a long way overland to include large paddocks and fence lines. Land to the east of the ridge in the southern portion of the study area is steeper than the rest of Bomen.

Photo 12: Bomen landscape character.

Photo 13: Bomen landscape character.

Photo 14: Bomen landscape character.

Photo 15: Bomen landscape character.

Visual Vantages

View corridors across the site extend a significant distance, given the vastness of the paddock size and the study area. The topographic variation on the site is sufficient to provide views both to and from the Bomen site, particularly in

the south eastern part of the site. There are sections of the site in the south which have high levels of visibility from the rural land to the east.

10.4 Air Quality

The study into existing impacts at Bomen conducted by Holmes Air Sciences (Appendix G) concluded that existing industrial activities result in unsatisfactory impacts on nearby residential areas such as Cartwrights Hill.

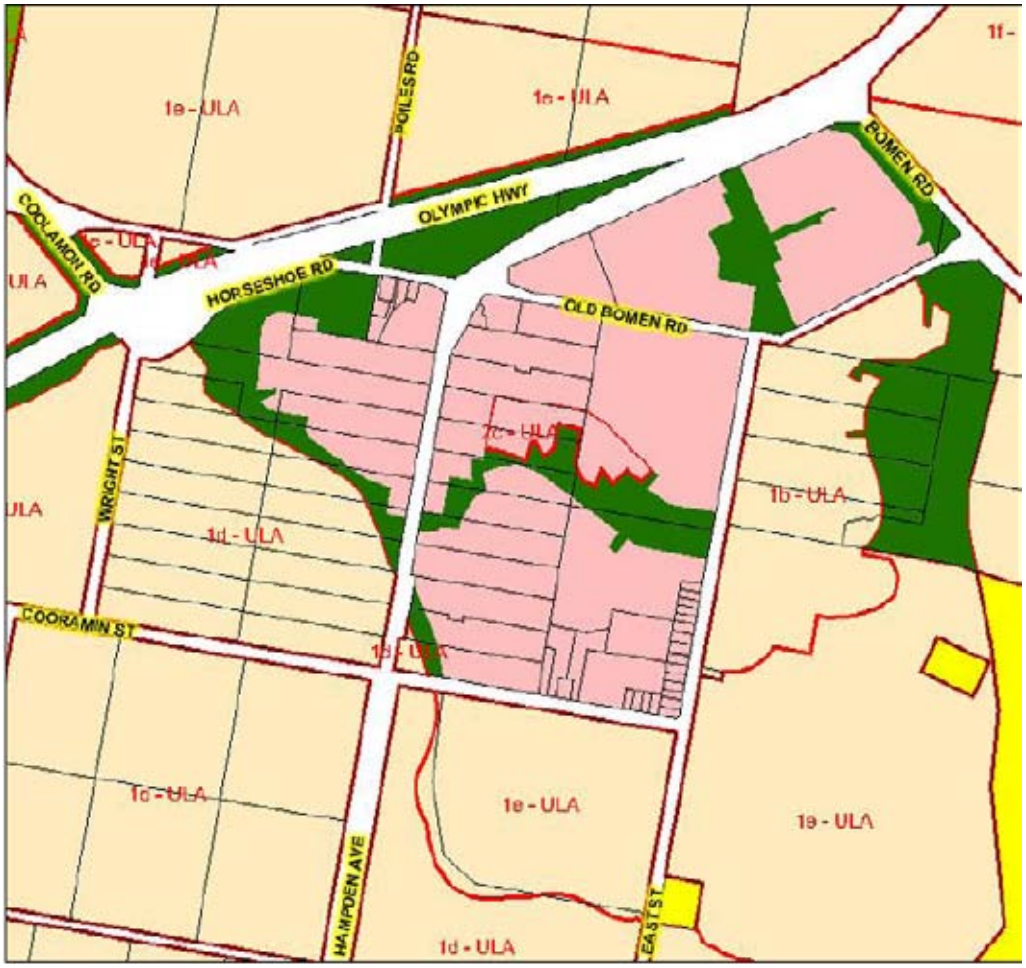


Figure 23: Cartwrights Hill and environs

The study concluded that industries currently located at Bomen result in odour levels that exceed acceptable levels for residential areas when measured at nearby Cartwrights Hill. The study also concluded that should rezoning of the Bomen sites occur, atmospheric emissions from future industrial activities could be made to comply with the required criteria through the implementation of technical emissions control measures. Accordingly, the odour issue does not restrict the ability for the land to be zoned for industrial purposes.

A number of owner's of land at Cartwrights Hill have indicated a desire to explore opportunities to rezone their land for further residential development.

Wagga Wagga City Council and DECC have raised concerns about the odour impact of existing industrial activity at Bomen on residents at nearby Cartwrights Hill. The Holmes Air Sciences report indicates that while mitigation measures such as buffer zones can be implemented for future industrial development to protect nearby residential areas from negative impacts, odour levels from the existing industry at Bomen are above DECC's criteria for the existing residential properties at Cartwrights Hill.

Consequently and independent to this LES, the Council has undertaken investigations into the impact of the Bomen industrial area on the potential for expanded residential development at nearby Cartwrights Hill. As the outcomes of Council's study impacts on land that is part of this LES, Council's investigations have been included as an Annexure to this report. It is concluded from Council's investigations that further residential development at Cartwrights Hill would likely result in an increase in complaints about odour impacts from industry at Bomen, and as a result planning controls should not encourage an increased population into the Cartwrights Hill area (refer to Annexure 1).

10.5 Acoustic Qualities

A study into the existing acoustic qualities of Bomen and likely impacts of development that would result should the site be rezoned for industrial use was conducted by Atkins Acoustics. The report of the study's findings is provided in Appendix F. It concludes that, with appropriate planning and engineering controls, noise emissions from the likely industrial development could be controlled to satisfy DECC criteria.

The Acoustic report recommends the provision of a buffer around industrial uses on the site that have the potential to result in noise impacts to surrounding land uses. The study recommends that the buffer be zoned so as to prohibit industrial activity and that it should be approximately 200m wide. Also recommended is the restriction of industrial operations on land immediately adjacent to the buffer so that they may not take place during hours at which residents of surrounding areas may be asleep. To this end, it is recommended that a strip of land approximately 300m wide is to be zoned to allow "light industrial" activity during daytime hours only.

In addition to the buffer, a low intensity industrial zone approximately 500m in width is recommended in areas of the site in which industrial activity would have a higher potential to result in impacts to surrounding land uses. This zone would allow lighter industrial development with restrictions on noise generating works, including controls over hours of usage. Controls in this zone might also include careful consideration of building design including

orientation of openings and building placement to provide an acoustic buffer to other development in the general industrial zone.

Noise from resultant traffic on Byrnes Road and Bomen Road was also anticipated to satisfy traffic noise control objectives. An alternative heavy vehicle route to service future industrial development was investigated to reduce traffic noise from Bomen Road for existing and potential future residential development in the vicinity of Cartwrights Hill.

10.6 Contamination

Two areas within the Bomen site have been subject to an Environmental Site Assessment (ESA) conducted by ENSR Australia Pty Ltd. One of the areas concerned forms the southern part of the site that lies to the east of Byrnes Road. The other area covers the land owned by Rivco Pty Ltd to the north of East Bomen Road. The assessment was completed as part of a rezoning application to the Council 2008. The study involved review of reports of previous investigations, historical information, aerial photographs site inspections.

The study found some contamination had resulted from wool processing, manufacturing, agricultural and other activities on the site. However, it was concluded that the contaminated land could be remediated and made suitable for industrial uses. It is therefore considered that contamination of land within the area considered by the ENSR Australia study is not an impediment to rezoning of the Bomen site. Should rezoning occur, further investigation will be required at development application stage in order to verify the nature and extent of contamination and remedial measures that may be necessary, pursuant to SEPP 55.

10.7 Flora and Fauna

Remnant Woodland

The study of Bomen undertaken by Eco Logical Australia (a full copy of the report is located at Appendix A) found that the site contains several areas of box gum woodland in moderate condition, the most notable of which occurs along the Trahairs Road reserve west of Byrne's Road (refer to Figure 34 below). Box-gum woodland is listed as an Endangered Ecological Community under the TSC Act. It is also listed as a critically endangered Ecological commodity under the EPBC Act.

Scattered Paddock Trees and Grassland

The site also contains several patches of scattered paddock trees and exotic grassland. Given the isolation of the trees amid improved pasture and

cropping, they are considered to have limited conservation value within the landscape. Paddocks to the northeast and northwest comprised of non-native vegetation associated with cropped paddocks (refer to Figures 34 and 35 below).

Species and Habitat

State and federal databases identified 5 threatened species likely, or with the potential to, occur at the site: Diamond Firetail Finch (Stagonopleura guttata), Yellow-bellied Sheathtail Bat 9Saccolaimus flaviventris), Little Pied Bat (Chalinolobus picatus), Swift Parrot (Lathamus discolour) and Superb Parrot (Polytelis swainsonii).

The site is considered to provide potential foraging habitat for two bird species; the Cattle Egret (Bubulcus ibis) and White-throated Needletail (Hirundapus caudacutus), listed as migratory under the Commonwealth EPBC Act. However, available habitat for threatened fauna species is generally low across the site. No threatened flora species were considered likely or with the potential to occur at the site.

Environmental Protection

Under state legislation, areas of good or moderate condition native vegetation that are consistent with endangered ecological communities must be retained. The areas of moderate or good condition box gum woodland on the site can not, therefore, be developed. Given their limited biodiversity value, areas of scattered paddock trees are suitable for development, provided that relevant offsets for the loss of native trees are achieved.

The study by Eco Logical Australia recommends that, should scattered paddock trees be lost as a result of the proposed structure plan, there would be no significant impact on the majority of threatened species that may potentially occur in the area.

Figure 24: Vegetation types located at Bomen

Regional Context

The study area has a general sparseness of native vegetation and lack of connectivity with surrounding vegetated areas. As a result, landscape value across the site is low.

Mitigation Measures

Developing the site would require the removal of up to 344 trees that are either large or very large (greater than 40cm diameter at breast height). Given the DECC's recommended offset ratio of 10:1 for native wood vegetation, the loss of the trees would need to be offset by the retention of 3,440 existing trees over 40cm diameter at breast height. Refer to Figure 37 below.

Willana Associates recommends a strategy whereby areas of existing woodland that are aligned along the site's boundaries, in particular those along Trehairs Road and Olympic Highway, can be incorporated into a 200m wide acoustic buffer. This would contribute significantly towards meeting offset requirements while considering the amenity of surrounding residences. The scale of the site may afford opportunities for the conservation of existing trees to further contribute to offsetting requirements.

10.8 Soils and Erosion Hazard

The site is predominately covered by the East Bomen soil group (Chen and McKane 1997 in Eco Logical Australia). This soil type is prone to erosion and occupies the undulating country and gentle slopes and hills across the site. Two small hill crests in the south east of the site are mapped as Glenmornon soils group. These soils are generally of low fertility and represent a high erosion hazard (Urban Concepts 1995 in Eco Logical Australia).

Should rezoning occur, then assessment of measures required to develop areas of high soil erosion hazard should be made at development application stage.

10.9 Drainage and Hydrology

Northrop engineers have undertaken a comprehensive study of the stormwater requirements for Bomen. A full copy of their report is included at Appendix B. Below provides a summary of the Northrop report.

General Description

Bomen ranges in elevation from RL 260m AHD to RL 180m AHD. The site generally falls to the south and south-east. Numerous water courses traverse the site.

Overland Catchments

The study area consists of 21 separate catchments, several of which extend beyond the study area (refer to Figure 35 below). The railway line located on the ridge through the site divides the catchments into east and west. The

eastern catchments drain to Dukes Creek. The western catchments drain to an unnamed water course which eventually flows to the floodplain of the Murrumbidgee River. Numerous dams have been constructed along the watercourses by land owners, the most significant being those servicing the wool processing facility at the centre of the site.

Due to the relatively large number of individual catchments, development of the western part of the site would be difficult. The difficulty arises due to topography, which necessitates separate stormwater management measures for each catchment. As such, staging of development would be difficult to manage.

No formal drainage networks exist in areas currently used for agriculture, with the exception of table drains adjacent to existing road and railways. The table drains are graded to a convenient low point and discharged via overland flow.

A formal drainage system exists for the parts of the site that have been developed for industrial uses. Industrial areas to the west of the railway line generally drain to Dukes Creek, while those to the east (comprising predominantly of the wool processing facility) drains to an unnamed creek.

Current runoff quality has been considered based and it is concluded that the risk of contamination to watercourses due to current flows is minor.

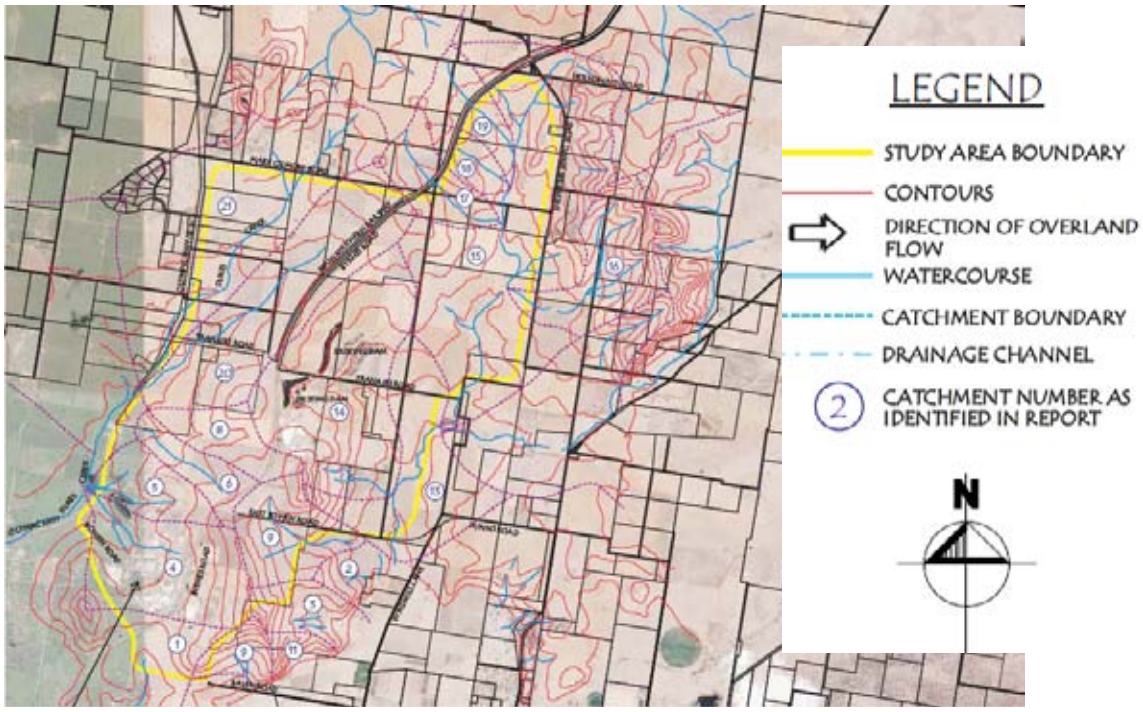


Figure 25: Bomen study area. Existing drainage patterns.

Potential Drainage Scenario

Table 27 - Required drainage corridors details a potential drainage scenario designed by Northrop Engineering, in which blue line watercourses would form the routes of the major drainage corridors for each catchment. Drainage corridors generally follow the route of blue line watercourses and the required width of the respective drainage corridors is shown in the report in Appendix B.

Table 27 - Required drainage corridors

Catchment	Drainage Corridor Width (m)
1	20 (No watercourse
2	20 (No watercourse)
3	30
4	40
5	30
6	60
7	30
8	30
9	30
10	30
11	-
12	60
13	40
14	40
15	50
16	30
17	30
18	30
19	30
20	40
21	40

Infrastructure Requirements

Estimates of capacities of catchment based on-site detention storage facilities that would be required are provided in Table 28 - On-site detention capacities required for Bomen. Capacities represent the detention volume required to limit discharge from the site to pre-development levels. The calculated volumes do not allow for the potential storage benefit that could be achieved due to rainwater re-use.

As a lot based stormwater detention system is proposed for the site figure below represent the total on-site detention that will be provided in each lot.

For planning purposes each lot shall provide as a minimum 400m^3/ hectare of detention storage.

Table 28 - On-site detention capacities required for Bomen

Catchment	Total Detention Volume (m^3)	Approx. Surface Area (m^2)
1	36800	46000
2	17600	22000
3	26000	32500
4	104000	130000
5	42000	52500
6	35200	44000
7	13200	16500
8	40800	51000
9	66800	84000
10	18400	23000
11	-	-
12	22400	28000
13	55200	69000
14	204400	255500
15	181200	226500
16	3960	4950
17	26800	33500
18	16800	21000
19	17200	21500
20	188000	235000
21	96800	121000

Note: The above volumes represent the total amount of storage required for a catchment. On-site stormwater detention may be provided as a single storage or as discrete storages strategically located throughout the catchment. Preliminary volumes will need to be reviewed against final development proposals and configuration of OSD facilities.

Recommended Stormwater Design Principles and Policies

Industrial sites have high impervious area ratios which result in greater runoff volumes. Therefore, consideration is to be given to existing downstream drainage systems and their capacity to receive the changed runoff volumes and patterns from the site, while maintaining existing flows to support habitats.

Industrial development also significantly increases the pollutant load of stormwater runoff. As it is impossible to predict the type of industry that may operate within the study area, it is impracticable to provide communal water quality management facilities. Therefore, should the site be developed, stormwater quality management would be undertaken at a local level.

Should rezoning take place, an overall stormwater management system should be implemented to ensure existing flows are maintained, while minimising the effects of excessive runoff rates and volumes. Such a system would adhere to the following principles:-

- A lot-based stormwater impact assessment should be provided at development application phase for each Lot.
- Provide community based quantity and quality management systems to control runoff from roadways and other communal lands.
- Rainwater re-use where stormwater is collected to provide an alternative water source. Water can then be used for various potable and non-potable uses depending on the level of treatment. The provision of rainwater re-use systems can have significant positive impacts on the quality of stormwater runoff.
- Reduction of impervious areas to reduce the volume and rate of stormwater runoff. Optimisation of pervious/impervious ratios may include the limiting of paved surfaces.
- Water Sensitive Urban Design (WSUD) Principles that control the quality of stormwater discharged from the Study Area are to be incorporated (as outlined in Appendix D of the Northrop report for Bomen).
- Water quality targets shall be determined by the procedure identified in Appendix C of the Northrop report for Bomen. As a minimum, pollutant levels for the post-development scenario shall not exceed pre-development levels.
- Provide drainage corridors to manage concentrated surface trunk drainage flow within catchments. The drainage corridors would be utilised in a similar manner to the "Blue Line" water courses/ riparian corridors.
- Analysis of existing culverts/ existing stormwater drainage systems to confirm capacity and determine the impact of backwater effects (if any).

10.10 European Heritage

10.10.1 European heritage

As discussed in section 1.5, federal, state and local registers were reviewed in order to ascertain whether there were any listed heritage items in the study area. The now disused Bomen Railway Station appears in WWDCP Appendix 15 (Schedule of the Environmental Heritage) and in the NSW Heritage Offices State Heritage Register. The Wagga Wagga City Council Rural Heritage Study identifies the Stationmaster's Residence on Bomen Road as being of heritage significance.

It is recommended that a principal LEP that relates to Bomen includes controls that conserve the heritage significance of the station and the Stationmaster's Residence.

Photo 16: Heritage listed Bomen Railway Station.

10.10.2 Aboriginal Heritage

Sites and Deposits

The investigation by Kelleher Nightingale (refer to the Bomen Archaeological Study at Appendix D) identified three Aboriginal archaeological sites on the AHIMS database as follows:-

- East Bomen IF1: An isolated find consisting of one stone artefact within an exposed paddock in the Riverina Wool Combing property (AHIMS # 56-1-0045),
- East Bomen IF2: An isolated find IF2 (AHIMS # 56-1-0044)
- East Bomen 1: An Aboriginal surficial hardstone basalt quarry (AHIMS # 56-1-0043).

The quarry at East Bomen 1 is located in Wagga Wagga City Council property on the crest and upperslopes of a spur. Based on the scarcity of lithic raw material in the region, this site would likely have been a very important source of quality material for artefact production.

Landscape Archaeological Sensitivity

Parts of the study area that have been highly disturbed, including the earthworks in the Riverina Wool Combing property and allotments used for industrial activities. These areas of highly disturbed land have very low archaeological sensitivity.

The more gently undulating terrain along drainage channels, such as along Dukes Creek, are likely to be moderately to highly archaeologically sensitive. This is demonstrated by the location of East Bomen IF1 and by previous archaeological investigations that have demonstrated that a number of Aboriginal archaeological sites and Potential Archaeological Deposits (PAD) have been identified in these contexts.

The higher terrain in the southern portion of the study area provides good views over sections of the surrounding area and is part of a series of high points bordering the Murrumbidgee River floodplain. East Bomen 1 is located in this area, demonstrating that there was exploitation of outcropping bedrock in upper slope and crest contexts. These higher landforms and associated slopes are likely to be moderately archaeologically sensitive, with the likelihood of certain landforms/contexts having high sensitivity, including East Bomen 1.

Statement of Significance

A full statement of significance for the Bomen IF1 stone artefact and the site around it is provided in Appendix D, in the Wagga Wagga Aboriginal Cultural Heritage Assessment report by Keller Nightingale 2008. In summary, the archaeological research potential of the surrounding site is assessed as being high. Its representativeness and rarity are assessed as moderate. The overall scientific significance of site Bomen IF1 is assessed as moderate. With further archaeological investigation, there is high potential for the site to provide more information on the nature and distribution of archaeological material in the area.

Conservation Management Recommendations

Kelleher Nightingale makes the following recommendations for the Bomen study area:-

- Management of the identified Aboriginal heritage features will require consideration during the strategic planning process of Bomen;
- Conservation should be the prime consideration when establishing Aboriginal heritage management strategies during the planning process;
- While rezoning may occur, it should be conditional upon further investigations being undertaken at development assessment stage to identify whether or not objects are, in fact, present within PADs and areas of high or moderate sensitivity. Such investigations may result in a requirement to ensure that sites and objects are considered;
- Identified sites, PADs or areas of high/ moderate sensitivity not possible to conserve may require section 90 consent and/ or section 87 permit for test/ salvage excavation; and,
- Consultation with the WWLALC is ongoing. This assessment will be finalised following input from the Land Council.

As indicated in the recommended structure plan (refer to section 13 of this report), it is proposed to preserve this site within a conservation zoning for East Bomen 1, the surficial hardstone basalt quarry (AHIMS # 56-1-0043).

10.11 Utilities

Electricity, Gas and Telecommunications

As stated in section 6.11, Country Energy has stated that in instances where investment cost would be greater than return, developers have funded the installation of gas infrastructure. Country Energy and Telstra are yet to provide comment on the provision of electricity and telecommunications to the study area.

Water

Riverina Water has indicated that development of industrial areas at Bomen would align well current plans for providing water. Bomen is the most appropriate area for the location of "large industry". Following rezoning, the provision of water to large industrial operations would require consideration on a case by case basis.

Sewage & Effluent Disposal

The site has been the subject of detailed sewer investigation as part of the LES process. A detailed report identifying catchments and recommendations is provided in Appendix E to the LES. It notes that the site is served by the Bomen Industrial Sewage Treatment Facility (BISTF), which partially treats industrial sewage prior to transfer to the Narrung Street Sewage Treatment Works. The BISTF has been designed to allow higher strength industrial wastes to be pre-treated locally to capture the benefits of pre-treatment and waste mixing at the same site.

The study area has been broken into four catchments which are well graded for sewage services, meaning that sewage servicing would not represent a significant limitation when considering lot density and layout.

Catchment BC01 is the most cost-effective development area in the short term, as the only infrastructure required consists of relatively minor mains extensions.

The Western catchment (BW11 to BW13) represents a higher investment risk than for catchment BC01, given additional infrastructure requirements. However once BW11 to 13 have been developed, the servicing cost of BW11 is comparable to that of BC01.

Once services have been provided for BW11, development can progress north to sub catchments BW12 and BW13 by providing a 225mm trunk main running approximately parallel to the Olympic Highway.

Eastern catchment (BE20, BE21, BE30) typically have higher servicing costs than for the equivalent stages in the central and western catchments, given additional infrastructure requirements.

Development would be most cost-effective if it were to proceed along East Bomen Road in a westward direction from the pump station towards Byrnes Road. Following the development of BE20 and BE30, the very large sub-catchment BE21 could be serviced from the pump station.

Southern catchment (BS40) is relatively small. Its size, combined with the need for a pump station contributes to the highest servicing cost for a first stage development. Wagga Wagga City Council would bear the costs of operating and replacing the pump station which would benefit a relatively small number of users.

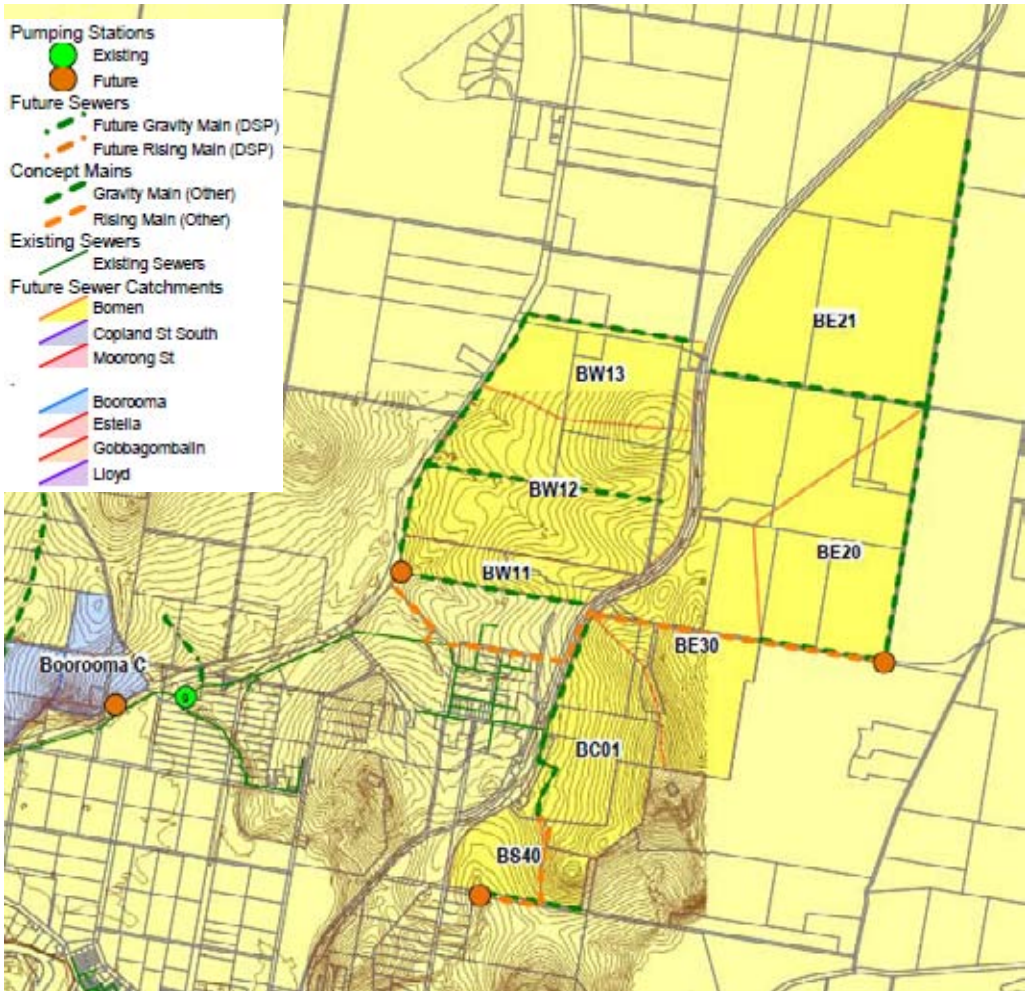


Figure 26: Recommended Bomen sewerage servicing.

Table 29 - Load and Estimated Costs of Waste Water Catchments in Bomen

Catchment	Sub-catchment	Full Load (Equivalent Tenements)	Estimated Cost $ per equivalent tenement)
Central	BC01	270	$4,800
Western	BW11	100	$4,900
	BW12	500	$5,500
	BW13	230	$6,300
	Overall Western[1]	810	$5,700
Eastern	BE20	350	$5,800
	BE30	330	$7,000
	BE21	900	$8,300
	Overall Eastern[2]	1570	$7,400
Southern	BS40	130	$7,400

The study by Michael Cuthbert Consulting recommends that the central and western catchments offer cost-effective servicing solutions for dry industry. The eastern catchment offers a very large developable area, which may prove useful in the long term. The southern catchment represents a high cost option which offers limited future development capability. The implementation of the technology to be implemented in sewer provision will be assessed by Council in its development service planning.

10.12 Transport Infrastructure

Existing Road Network

The existing road network comprises of:-

- Bomen Road is a two lane sealed road approved for use by B-doubles that is the primary access to Bomen. It carries a relatively high volume of traffic (approximately 1300 vpd).
- Olympic Way is a two-lane B-double classified route and forms the western boundary of the Bomen site
- Trahairs Road is a lightly trafficked unsealed road that provides access from Olympic Way to the less developed northern portion of the site. Council has received an application to close the level crossing on Trahairs Road. If approved, traffic on Byrnes Road would not have access to Olympic Way via Trahairs Road.

[1] Values do not total due to rounding

[2] Values do not total due to rounding

- Byrnes Road is a two lane sealed road approved for use by B-doubles that runs along the eastern side of the railway and provides access to the site.
- Hampden Avenue/Fitzmaurice Street/Baylis Street provides sealed road access across the river and is an important connection to the city centre.
- Olympic Way/Bomen Road is constructed as a CHR rural T-junction with lanes suitable for accommodating heavy vehicle turning movements.
- Olympic Way/Coolamon Road/Horseshoe Road intersection is a two-lane roundabout. All roads at this intersection are approved for use by B-doubles

Table 30 - Existing two way traffic volumes

Road	Current volume (vpd)
Olympic Way	3,700 (25% heavy or commercial vehicles)
Hampden Ave	6,500
Bomen Road	1,500 to 2,600
Horseshoe Road	1,200
Trehairs Road	150
Old Narrandera Road (near Olympic Highway Intersection)	2,500
Byrnes Road	2,750 to 3,100

Intersections and Access

The roads likely to be affected by short-term growth in Bomen include Hampden Avenue, Travers Street, Bomen Road and Byrnes Road. Bomen Road is the route most likely to attract traffic should development of Bomen spread northwards.

GHD recommends that Byrnes Road has the potential to be realigned further to the east on a more central route across Eunony Bridge Road to access Sturt Highway and the industrial areas to the south. An additional east-west link north of Bomen Road would be needed as development progresses northward.

Should the level crossing at Trahairs Road be closed, East Bomen Road could be extended via a bridge over the railway to connect to Olympic Highway. With the eventual closure of Dampier Street level crossing due to safety issues, Dampier Street could be extended to pass under the proposed East Bomen Road extension to provide connectivity between existing and new industrial lands.

Projected Traffic Conditions

GHD projects that by 2016, total vehicle movements generated by development at Bomen would be around 1,200 vpd. Bomen Road/Bomen Road East would carry around 50% of this volume, while Byrnes Road/Oura Road/Eunony Bridge Road/Sturt Highway would carry approximately 30%. Hampden Avenue and Travers Street towards the centre would receive around 20% of the volume.

None of the roads or intersections serving Bomen would suffer capacity constraints by 2016. Bomen Road will remain as the primary access route between the city centre and Bomen. The right turn out of Bomen Road onto Olympic Way would require upgrading to a seagull T-junction to allow heavy vehicles to merge with the northbound lane of the highway. Projected traffic volumes at the remaining intersections along Olympic Way and Bomen Road would perform satisfactorily with 2016 volumes.

Construction costs

The costs involved in providing the required works and upgrades are shown in Table 26**.**

Table 31 - Intersection works construction costs for Estella West.

Location	**Proposed Upgrade Works**	**Estimated Cost**
Olympic Way / Bomen Road	Seagull roundabout	$300,000

A copy of GHD's Traffic Management report for Bomen is located at Appendix C. Refer to *Figure 27: Bomen Post Development traffic infrastructure recommendations* below which illustrates the traffic infrastructure recommendations for Bomen post development.

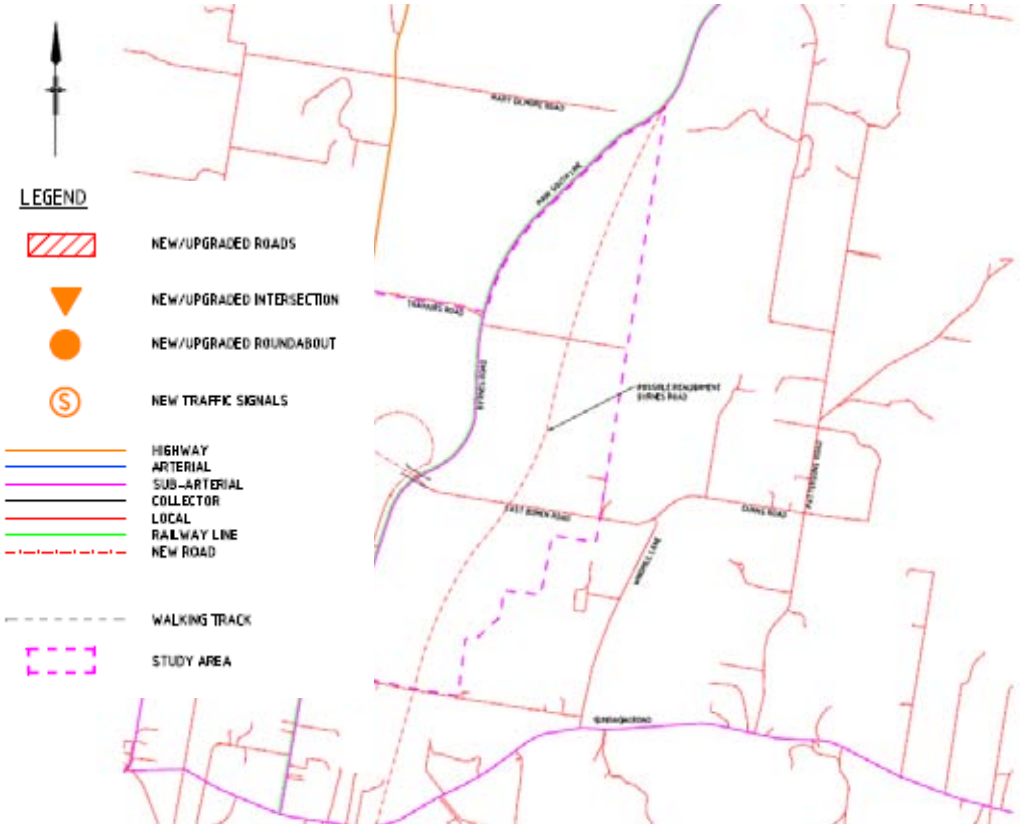


Figure 27: Bomen Post Development traffic infrastructure recommendations

10.13 Bushfire Risk Management

Risk Assessment

The study by Eco Logical Australia (Appendix H) concludes that bushfire hazard at Bomen is generally low, with areas of moderate risk to the north and south of East Bomen Road. The degree of hazard reflects the low gradient of the land and the vegetation with low fuel accumulation levels prevalent across the study area.

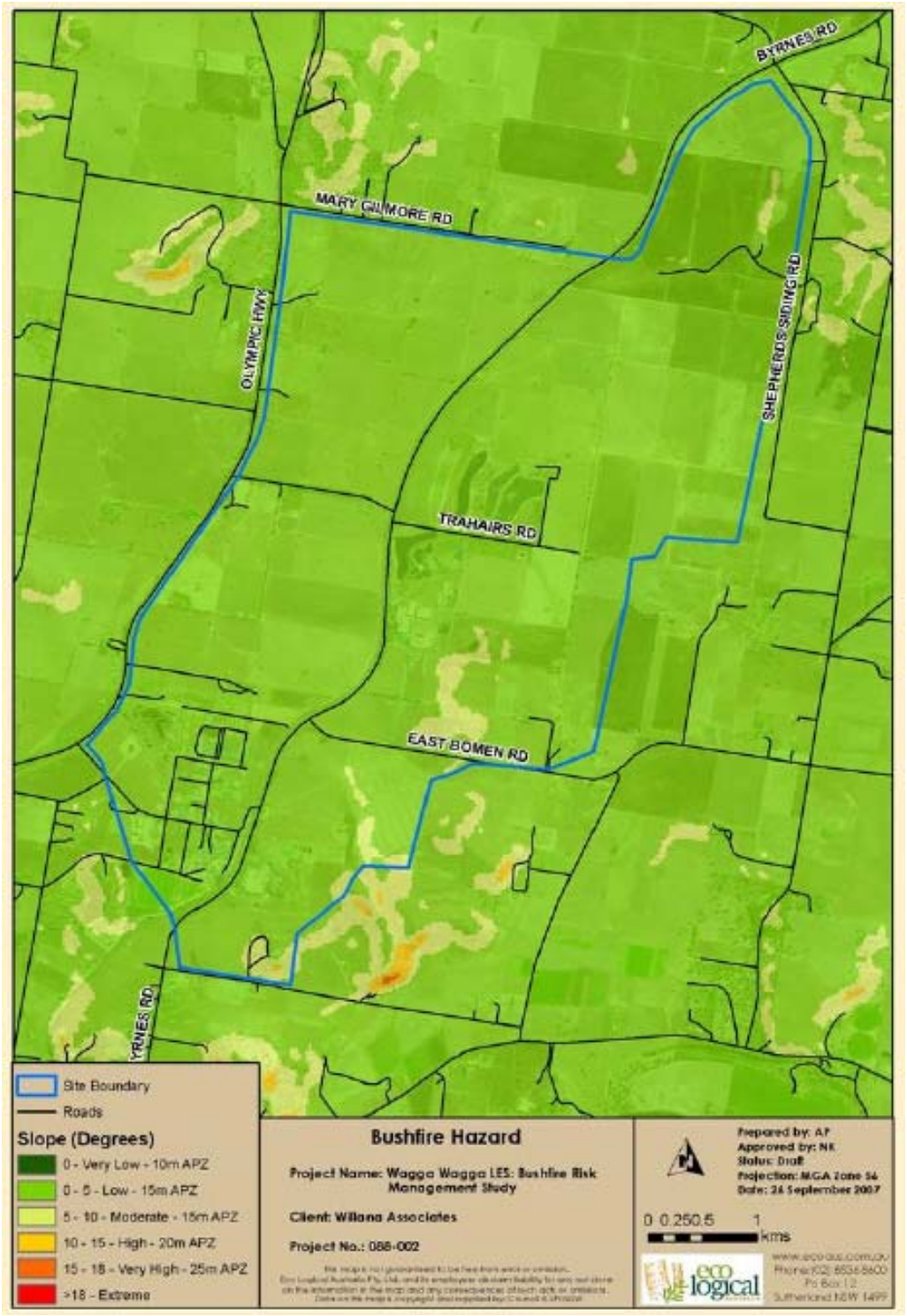


Figure 28: Bomen bushfire hazard assessment.

Risk Management Strategies

Eco Logical Australia concluded that the bushfire hazard has been assessed across the site and found to be low, based on the gentle slopes and low fuel accumulation of the vegetation present.

A number of strategies have been provided such that the risk from bushfire can be minimised and further that the approvals process can be streamlined. Further, it has been found that development is indeed possible at the subject site from a bushfire planning perspective.

The main strategies suggested include:

- Ensure adequate setback from bushfire prone vegetation;
- Integrate non combustible infrastructure within Asset Protection Zones (APZs) such as roads, easements and parking areas;
- Ensure adequate access and egress from the site;
- Consider the adequacy of water supply and delivery of other services (gas and electricity);
- Provide temporary APZs during any staged development; and
- Consider the requirements of ongoing APZ maintenance.

Further bushfire advice and input into the planning process can be provided through the rezoning process and when a development footprint is determined. Further, a formalised bushfire assessment will be required to facilitate the development approval process.

Infrastructure and Staging

It is recommended that water supply to the site is provided via a ring main system .

The Wagga Wagga NSW Fire Brigade would be likely to be the first station to reach the precinct. This station has easy access to Byrnes Road, which runs through the middle of the site from the south to the north. The distances between potential industrial precincts and the fire station combined with the scale of the study area suggest that a new station may be required to service development at the site. Consultation with the RFS and NSW Brigade is required to confirm this.

10.14 Regional Context and Urban Form

The presence of road and rail transport infrastructure give Bomen the potential to support heavy industrial uses in a location that provides linkages to cities, states and ports. Should the land be rezoned to allow a greater variety of industrial uses, the presence of existing industrial would promote the benefits of clustering. These benefits include the economical use of infrastructure through the location of industry in areas already served by the necessary infrastructure. Use of the land for industrial purposes would promote the growth of the economic base of Wagga Wagga.

10.15 Previous Studies

Urban Concepts / NSW Department of Business and Regional Development, *Wagga Wagga Industrial Sustainable Development Opportunities Model (WISDOM)* (1995)

Navin Officer, Archaeological Survey for Aboriginal Sites, Proposed Power Plant at Bomen (1998)

Habitat Planning, *Cartwright's Hill Future Use Study* (2003)

Kellogg Brown & Root Pty Ltd , *Environmental Impact Statement - Lead Battery Recycling Facility, Wagga Wagga* (2005)

Heggies Australia, *Noise Impact Assessment, Pioneer Asphalt Batch Plant, Bomen* (2006)

DS Thurley Pty Ltd, *Environmental Impact Statement - Austrack Pty Ltd Concrete Railway Sleeper Project*. (2006)

ENSR Australia, *Stage 1 Environmental Site Assessment Bomen Ridge N*orth *and Bomen Ridge South* (2008)

10.16 Key Implications – Bomen

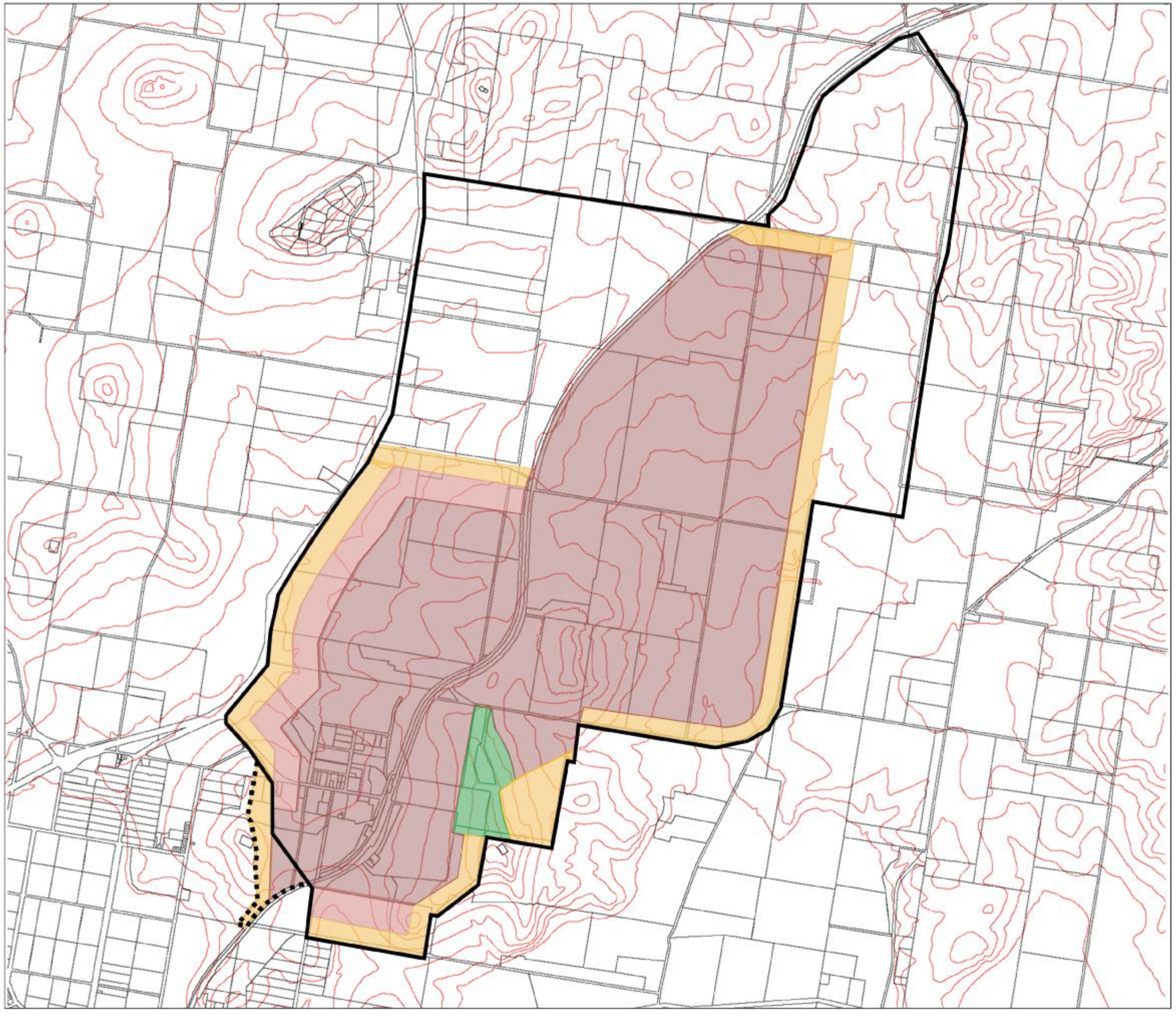
Issue	Response
1. Biodiversity conservation	
There is a need to conserve remnant vegetation of moderate condition. There is a need to retain 344 large trees, or provide offsets for their loss through retention of existing trees offsite.	Expert investigations conclude that the site has a considerable potential yield, while environmental assets can be maintained and improved. An appropriate response would include:- ▪ E2 Environmental Conservation zoning would provide for the conservation of remnant woodland. This might include areas of the Council owned land which contains a number of identified archaeological significance. ▪ Areas of moderate condition Box Gum Woodland should be transferred to public ownership. A conservation management plan which includes provision for offsetting the loss of paddock trees should form part of a DCP for the site. ▪ Areas of paddock with low conservation value should be available for development (mindful of offset opportunities). ▪ Offsets for established trees would need to be identified elsewhere. ▪ Buffer areas around the Industrial zoned land should be landscaped/revegetated with native species. ▪ Trahairs Road which forms a section of the northern boundary of the Bomen site should be relocated to allow for the conservation of the remnant bushland along the current road corridor. This may necessitate locating the new road south of the existing road. ▪ Vegetation in road reservations should be supplemented where possible.
2. Stormwater management and water sensitive design	
There need to manage potential	An initial stormwater management strategy

Issue	Response
impacts of increased stormwater runoff. The adoption of a multi-disciplinary approach to water cycle management within the site which links water infrastructure, landscape design, water re-use and riparian (environmental) corridor function. Existing environmental flows must be maintained.	has been prepared. It provides for stormwater quantity and quality management and indicates retention systems and stormwater corridor widths.
3. Bushfire	
The need for development to be responsive to the degree of threat posed to a future urban community. The distances between potential industrial precincts and the fire station combined with the scale of the study area suggest that a new station may be required to service development at the site.	Provision to be made for APZs (consistent with Planning for Bushfire Protection). There is sufficient perimeter clearing to avoid the need for removal of any native vegetation. APZ's can be provided within cleared land at the edge of the urban zoning. Any future plan for subdivision will require detailed APZ plans along with relevant consultation with the Rural Bushfire Service as part of the development approval process for Integrated Development.
4. Acoustic amenity	
Considering the findings of expert investigations to potential noise impacts.	A response has been formulated which utilises acoustic buffers around industrial areas combined with the regulation of industries so as to separate noise producing activities from conflicting land uses.
5. Indigenous cultural heritage	
Expert investigations have identified Aboriginal archaeological deposits and areas of high or moderate archaeological sensitivity.	Principles and management strategies have been formulated to ensure appropriate conservation of Aboriginal objects and sites that have been or may be identified in future. Conservation zoning to protect the quarry site (AHIMS ref. 56-1-0043) located to the west of the existing Bomen industrial precinct.

Issue	Response
	Recommendation that a principal LEP / DCP should contain provisions that will ensure other sites will be included in areas of open space where practical, or at least excluded from building envelopes for development sites. An approach is recommended whereby rezoning may take place on condition that further investigations are undertaken as part of the development assessment process. Such investigations would identify whether or not archaeological deposits are, in fact, present in areas of moderate or high archaeological sensitivity.
6. Physical Services	
Riverina Water has provided comment that the location of heavy industry in Bomen accords with their plans for the provision of water in the area.	Any rezoning would accord with Riverina Water's plans for servicing the Wagga Wagga area. Sewer is available to the site and is catered for by the Bomen STP.
7. European Heritage	
Need to conserve heritage significance of Bomen Station and associated Stationmaster's Residence.	Future principal LEP / DCP to contain provisions that will ensure heritage significance of Bomen Station is conserved.
8. Transport	
Effects of increased traffic volumes on the performance and function of the surrounding road and intersection network. The need for appropriate access to serve potential new industrial areas.	Expert investigation concludes:- ▪ Bomen Road would be the most appropriate principal link to Olympic Way for traffic generated by industrial development. ▪ Should industrial uses intensify and expand, Byrnes Road would be an appropriate supplementary route to the highway. ▪ The currently unsealed Trahairs Road could form an important link to central and north Bomen. Should the road be re-aligned so that its existing reserve

Issue	Response
	can accommodate conservation zoning, then a new, sealed road could be provided, resulting in more appropriate road access to Bomen. ▪ Trahairs Road would become an important alternative route to alleviate noise impacts as development intensified. ▪ Upgrades of and the introduction of controls at intersections along Olympic Way would be required.
9. Urban Form	
A need for separation between heavy industrial uses and surrounding residential areas to preserve amenity and avoid conflicting land uses.	Acoustic buffer 200m in width to be provided along the boundary of the study area. In addition to the buffer, the outer edge of the industrial area will comprise of a strip of approximately 300m in width. Zoning provisions shall apply to this strip that will restrict operational aspect of development but may also influence building design. This may include promoting development outcomes wherein industrial buildings become acoustic buffers by locating them in a manner which forms a barrier to noise escaping from the site. This might include restricting openings to building so that they face into the industrial development rather than facing adjoining rural dwellings.

BOMEN
LAND USE



Study Area
3402 ha
Contours 10 m

Rural Transition

Industrial 1

Industrial 2

Conservation 1

1000.0

Approximate
scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

11 Smaller Industrial Areas

11.1 General Description

The smaller industrial areas comprise of four sites within the urban area of Wagga Wagga and up to approximately 5km from the city centre. The four sites and their areas are indicated in **Table 32**. They are generally flat and accommodate agricultural uses or open space.

The three sites to the east of the city centre (Copland Street, Hammond Avenue and Edison Road) lie within or in proximity to an area of light industrial and commercial land uses that has developed over the past few decades. The area is in proximity to the Sturt Highway, which provides linkages with the city to the west and eastern NSW and Canberra to the east.

The Council's Wagga Wagga Spatial Plan 2007 recognises the potential for Copland Street and Hammond Avenue to meet demand for industrial development in the short to medium term. The plan recognized their status as potential extensions of existing industrial precinct and their proximity to the CBD as advantageous. On December 18 2006, Council resolved to advance planning which may allow industrial development at Copland Street, Hammond Avenue and Edison Road.

Each of the sites is subject to inundation at extreme flood events. We understand specialist studies have been prepared indicating that the sites can be satisfactorily developed in accordance with the NSW Government's Flood Prone Land Policy and the principles of the *Floodplain Development Manual 2005.*

Table 32 - Areas of smaller industrial sites

	Approximate Area (ha)
Copland Street	47
Hammond Avenue	16
Edison Road	23
Moorong Street	10

Edison Road

Edison Road (Figure 43) adjoins the smaller industrial precinct that lies between Copland Street and the Sturt Highway. It is served by Blaxland Road and Copland Street, is predominantly flat and covered in grassland with a few scattered trees. The southern portion is used for cropping and pasture, with a go kart track located to the north. Edison Road itself becomes an unsealed road that passes through the site east to west.

The Wagga Wagga Spatial Plan 2007recognized Edison Road's lack of gradient, proximity to the Sturt Highway its existing "small industrial centre and infrastructure" and its single ownership as being key advantages. Accordingly,

it too was recognized by the Spatial Plan for its potential to meet demand for industrial development in the short to medium term.

Copland Street

The Copland Street study area (Figure 44) is located immediately to the south of the recently upgraded Copland Street. The road upgrade was undertaken to service the group of industrial precinct to the north side of Copland Street. There is a clear benefit in extending the industrial zone to the south of Copland Street provided local flooding constraints can be addressed.

Hammond Avenue

The Hammond Avenue study area is a pocket of land surrounded by light industrial and commercial uses to the east of the city centre (Figure 44).

Moorong Street

The Moorong Street study area is approximately 2km west of the city centre and bound by the Sturt Highway to the south, Olympic Highway to the east, and the Wiradjuri walking track to the west (Figure 45). The site is currently zoned open space by WWLEP 1985. Flowerdale Lagoon occurs close to the site to the west. The site is predominantly flat with an elevation of 176 m AHD and is partially inundated by stormwater from surrounding urban areas during storm events.

11.2 Surrounding Land Uses

Hammond Avenue, Copland Street and Edison Road are surrounded by a mix of agricultural and industrial uses, with some large lot rural residential development. All three sites are located away from urban residential development. To the east of the Edison Road study area, there is a small industrial precinct on Edison Road itself, while to the north of the site is an area zoned as public open space. The EQUEX sports facility lies to the east of Copland Street. To the east of Moorong Street is the city's existing western industrial precinct.

11.3 Environment and Landform

All four sites are predominantly flat, with the exception of the flood levee on Moorong Street's eastern boundary. Moorong Street is visible from the Sturt Highway forms an important visual entry to the city for vehicles travelling from the east. The other three of the smaller industrial sites are not notable within the landscape and, as they have no vantages, views from the sites are of low significance.

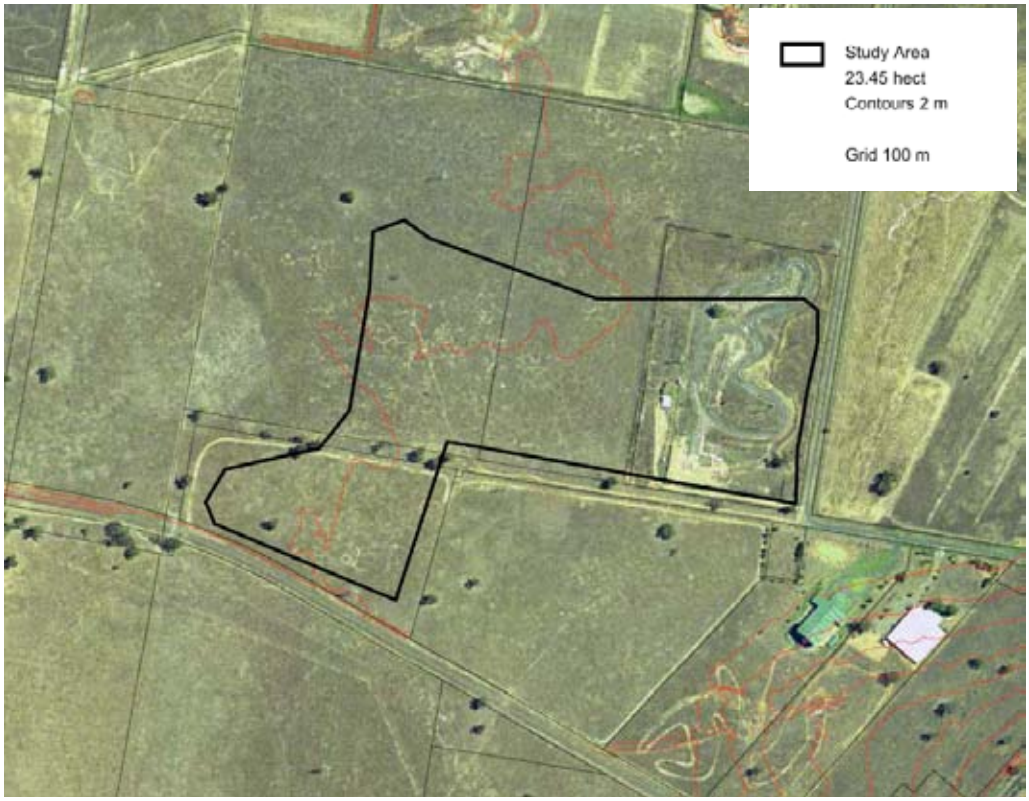


Figure 29: Edison Rd study area.

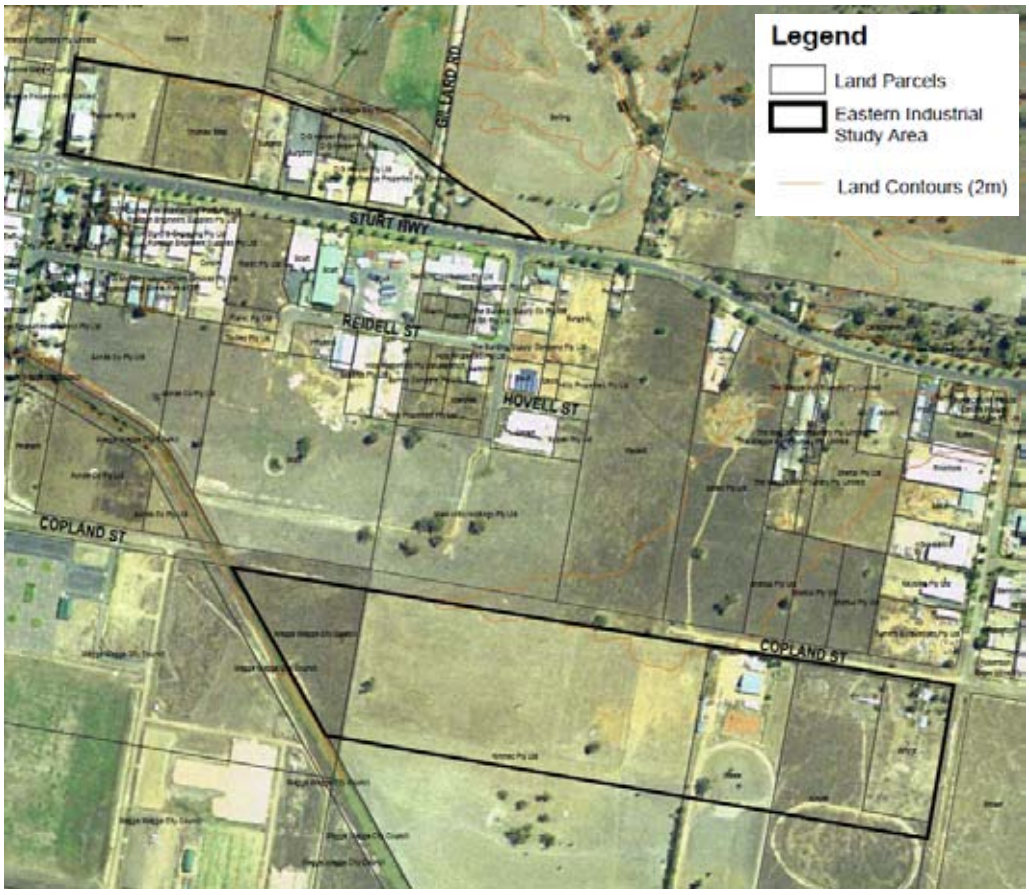


Figure 30: Copland Street and Hammond Ave study areas

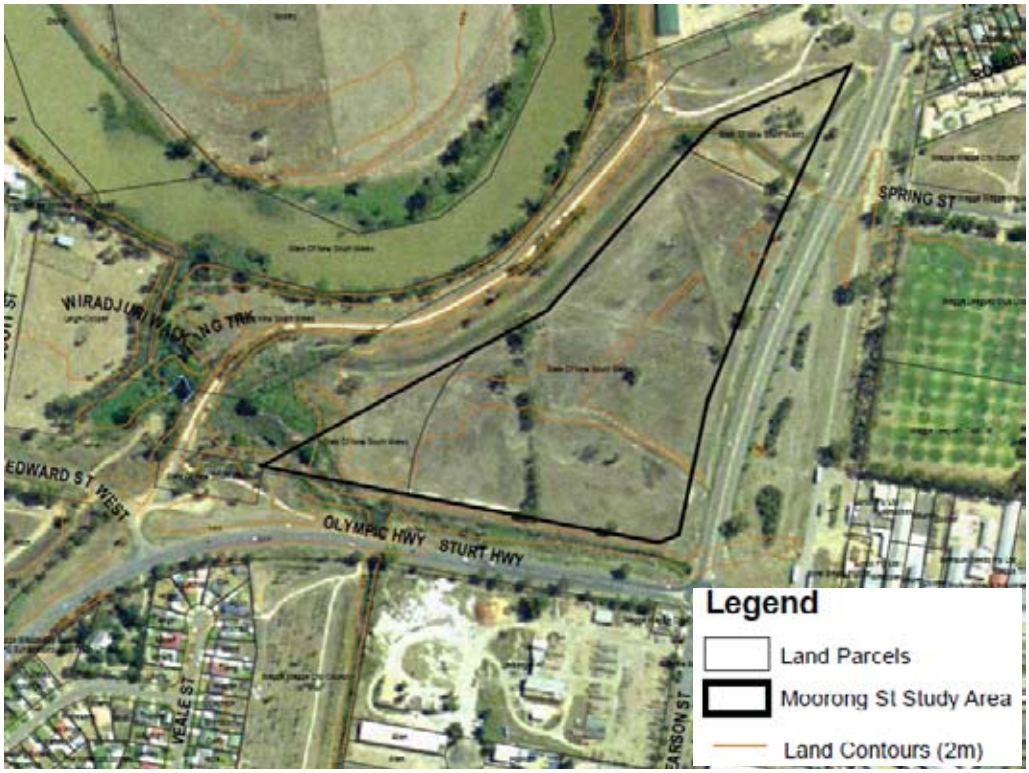


Figure 31: Moorong Street study area

Photo 17: Looking north across the Edison Rd study area

Photo 18: Looking east across the Hammond Avenue study area

Photo 19: Looking west across the Copland Street study area

Photo 20: Looking southwest across the Moorong Street study area towards the Sturt Highway

11.4 Flora and Fauna

Ecological Communities

The studies conducted by Eco Logical Australia (Appendix A) into the biodiversity values of the four study areas conclude that the study sites predominantly contain grassland used for pasture and scattered paddock trees of limited conservation value. Given this, they are potentially suitable for industrial development, provided that offsets can be found for the loss of native paddock trees.

Species and Habitat

No threatened flora or fauna species have been recorded on the sites and, should they be developed, the resultant loss of vegetation would result in no significant loss of habitat for such flora and fauna.

Mitigation Measures

Table 33 indicates the number of large or very large trees that would be removed in the development of the site and the numbers of trees that would need to be retained and conserved in other locations to offset such a loss. (based on offset rates recommended by the DECC).

Table 33 – Lost paddock trees and offsets for smaller industrial sites

	Trees removed	Trees required as offset
Copland Street	4	40
Hammond Avenue	0	0
Edison Road	12	120
Moorong Street	17	170

11.5 Soils and Erosion Hazard

Soils on the site are Kurrajong Plain soils described by (Chen and McKane 1997 in Eco Logical Australia). These soils are silty clays, quite fertile and have low erosion hazard.

11.6 Drainage and Hydrology

Northrop engineers have undertaken a comprehensive study of the stormwater requirements for the smaller industrial sites of Copland Street, Hammond Avenue, Edison Road and Moorong Street. A full copy of their report is included at Appendix B. Below provides a summary of the Northrop report.

Overland Catchments - Copland Street, Hammond Avenue and Edison Road

- The Copland Street, Hammond Avenue and Edison Road sites are predominantly flat and located on the Murrumbidgee River floodplain.
- Hammond Avenue cannot be readily identified as belonging to any specific catchment. The site is part of a larger catchment, being the floodplain, extending from Hammond Avenue to the Murrumbidgee River.
- The Copland Street site can be divided into two catchments. Catchment 1 drains to Marshalls Creek and Catchment 2 drains to the channel adjacent to the eastern boundary.
- The Edison Rd site is relatively flat which makes the definition of respective site catchments difficult. Typically the site falls to the north-west towards a tributary of Marshalls Creek. Several vegetated drainage channels (that appear to be constructed for agricultural purposes) receive runoff from the site.
- Runoff from lands outside the catchment may impact on the Edison Rd site. Future development shall maintain 1 in 100 year ARI flow paths of upstream areas.
- The three sites generally drain into adjacent drainage channels that connect to the Murrumbidgee River system.
- Hammond Avenue has been modified to create a platform elevated approximately 1.0m above the land to the north. The land is typically at the same level as the adjacent roadways.
- The Hammond Avenue and Copland Street sites have been identified as flood liable due to the Murrumbidgee River overtopping its banks., while Edison Road has not been identified as flood liable, investigation shave revealed that the site is located at the downstream end of a large undeveloped catchment to the south-east. As a result a flood study has

been undertaken by others to review the potential overland flow through the site from this catchment.

Figures 46 – 48 illustrate the extent of the sites and the key features for stormwater analysis.

Overland Catchments - Moorong Street

The Moorong Study Area is the lowest point of the Glenfield Carrier Catchment. The Glenfield Carrier Catchment is the largest stormwater catchment within the Wagga Wagga urban area (i.e. catchment area = 1830ha) – refer to Figure 43. Runoff from approximately 75% of the Wagga Wagga urban area drains to the Glenfield Carrier Study Area site.

The majority of the Glenfield Carrier catchment has been developed, except for a portion forming the (separate) Lloyd Study Area – at the top of the catchment. The total catchment includes old and new areas of Wagga Wagga. The newer portions (developed within the last 25 years) are predominant and are located directly south of the Study Area.

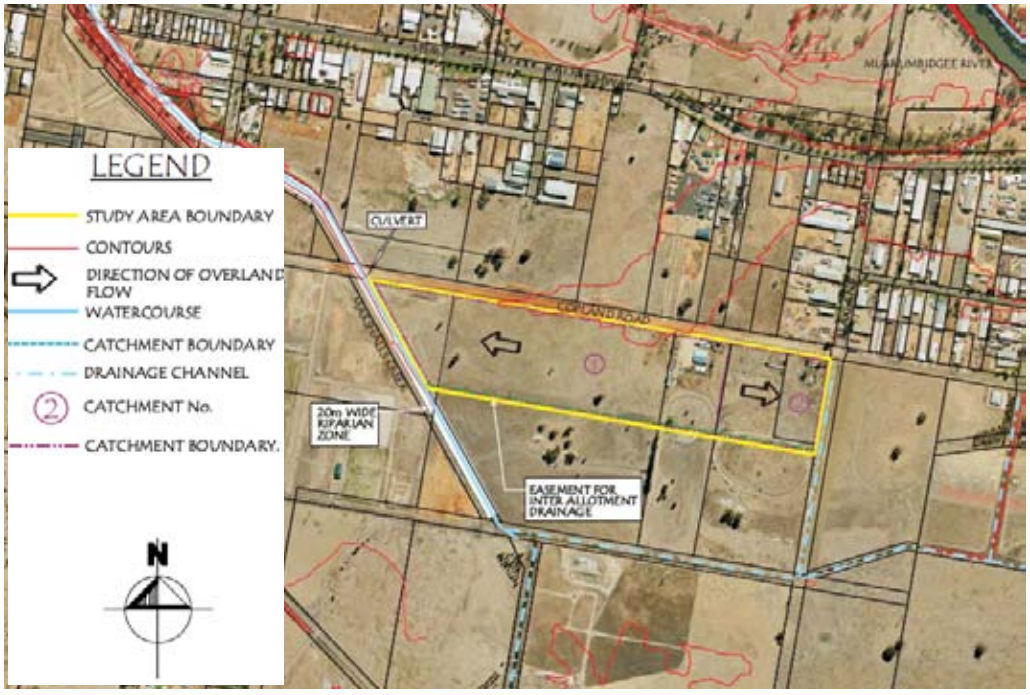


Figure 32: Copland Street drainage and hydrology

Figure 33: Hammond Avenue drainage and hydrology plan.

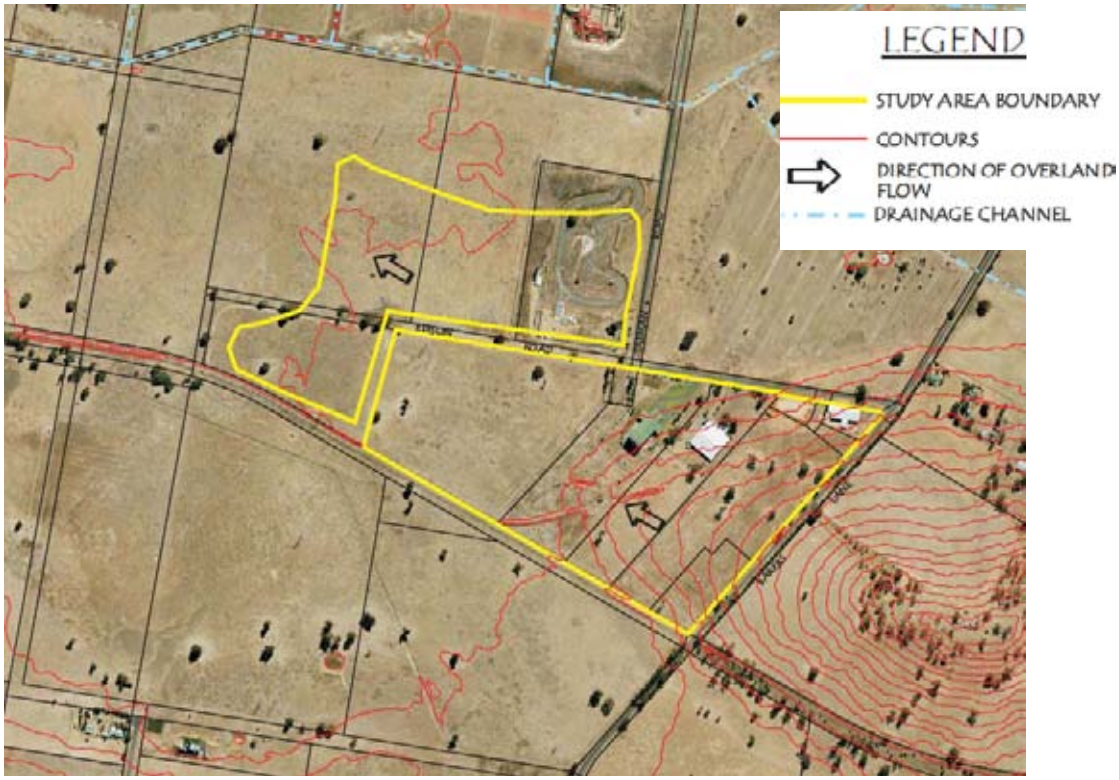


Figure 34: Edison Rd drainage and hydrology

Figure 35: Moorong Street drainage and hydrology

The design of stormwater drainage facilities servicing newer areas typically consists of a traditional pit and pipe system, with provision for overland flow paths and stormwater detention facilities. The desired outcome is that stormwater runoff is retarded so that flooding of the downstream portions of the Glenfield catchment is prevented. From Northrop's site inspections, and anecdotal information provided to Northrop by Wagga Wagga Council, indicate the existing on-site stormwater detention system within the newer areas has limited ability to reduce peak flows.

Older areas of the catchment, generally to the east of the study area, are not serviced by stormwater detention facilities, and therefore stormwater flows are uncontrolled. As a result, large flows can arrive quickly at the downstream portions of the site during rainfall events.

The Moorong Study Area is the last downstream node of the catchment. Therefore it receives all flow from the Glenfield Carrier Catchment prior to being discharged to the Murrumbidgee River. Figure 50 shows the extent of the Glenfield Carrier Catchment.

Potential Drainage Scenarios - Copland Street, Hammond Avenue and Edison Road

As Copland Street and Hammond Avenue are subject to inundation and located at the lower end of the catchment, it would be preferable to discharge all runoff as early in a storm event as possible. Should the sites be developed, detention would therefore not be preferable.

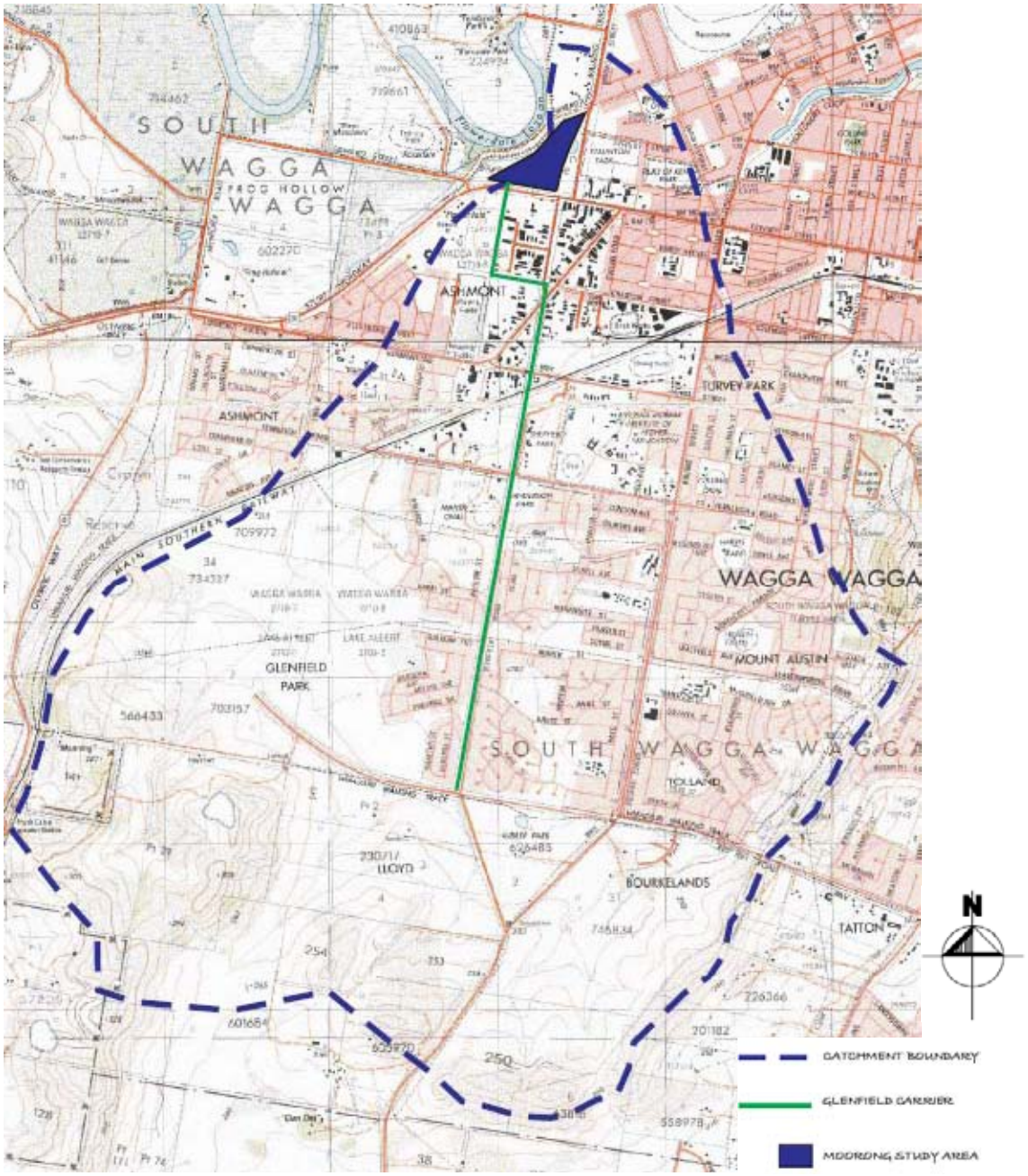


Figure 36: Moorong Street Upstream Catchment Plan.

The Edison Rd site has not been identified as flood liable but investigations revealed the site is located at the downstream end of large undeveloped catchment to the south east.

Industrial sites have high impervious area ratios which result in greater runoff volumes. Therefore, consideration is to be given to existing downstream drainage systems and their capacity to receive the changed runoff volumes and patterns from the site.

As stated in section 10.9 of this report, industrial development significantly increases the pollutant load of stormwater runoff. As it is impossible to predict the types of industry that may operate within the sites, it is impractical to provide communal water quality management facilities. Therefore, should the site be developed, stormwater quality management would be undertaken on an individual lot basis. The concepts, principles and controls specified in the report into stormwater included in Appendix B of this report are to be implemented.

Potential Drainage Scenarios - Moorong Street

Given the benefits of using the Moorong Street study area as a detention facility for the Glenfield Carrier catchment, the loss of flood storage volume that would result from development of the site must be considered.

Flooding of the site would occur due to the outlet capacity of the culvert through the flood levy being exceeded. A maximum flood level of approximately RL 180.5 has been calculated for the site, which would be reached if the Murrumbidgee River were in flood at the same time that a 100 year ARI storm event occurred within the Glenfield Carrier catchment. Although such a set of circumstances is unlikely, it must be considered in light of engineering best practice and the NSW Floodplain Management Manual.

Preliminary investigations have revealed that the flood levy protecting Wagga Wagga is rated to a 65 year ARI flood event and not a 100 year ARI event. This further increases the need to consider the combined event of the river flooding concurrently with major with storm events in the Glenfield Carrier Catchment.

Stormwater Management Recommendations - Copland Street, Hammond Avenue and Edison Road

Should rezoning take place, increased runoff volumes and pollutant loads due to development can be controlled to minimise impacts downstream. The following measures can implemented as part of an overall stormwater management system:-

- Lot based stormwater impact assessments should be provided at the development application phase for each lot. The impact assessment will demonstrate no adverse effects elsewhere in the catchment will be created due to development. Stormwater management strategies such as rainwater re-use, minimisation of impervious areas, permeable paving or on-site detention may be adopted to achieve this outcome.
- Rainwater Re-use should occur, where stormwater is collected to provide an alternative water source.
- Impervious areas should be minimized to reduce the volume and rate of stormwater runoff. Measures to assist with optimising

pervious/impervious ratios include limiting paved surfaces, incorporation of permeable paving and utilising grassed swales. This strategy should be incorporated with a vegetation management plan by where plant species are selected to contain water in the upper layers of the soil profile.

- Water Sensitive Urban Design (WSUD) principles should be applied on an individual lot basis to control the quality of stormwater discharged from the study (refer to Appendix D in Northrop's report for each of the sites – Hammond Ave, Copland Street and Edison Rd). Specific measures may include wetlands and bio-retention swales.
- Water quality targets shall be determined by the procedures identified in Appendix C of the Northrop reports. As a minimum pollutant levels for the post-development scenario shall not exceed pre-development levels.
- Provide inter-allotment drainage system within an easement (which drains to Council's stormwater system), allowing each newly formed lot to connect to a piped drainage system.
- As peak flows are likely to increase due to development, analysis of the Council's existing downstream drainage network to determine its ability to accommodate post development flows as part of any development application.
- All piped drainage systems within the sites shall be designed for the 1 in 20 year ARI storm.
- Provide overland flow paths for the 1 in 100 year ARI storm to prevent inundation and safe egress of proposed and existing buildings.
- Assessment of impacts any reduction flood storage (where flooding of the Murrumbidgee River inundates the site) due to development in accordance with the NSW Floodplain Manual if occurs.
- Adopt guidelines as stipulated in the NSW Floodplain Management Manual for development of flood liable land.

Design Principles - Moorong Street

Flooding of the Moorong Street site is caused when runoff from the Glenfield Carrier catchment exceeds the capacity of the culvert under the flood levy, or flood waters from the Murrumbidgee Flood Plain over topping the levy.

Furthermore, the capacity of the discharge structures directly relates to water levels within the floodplain. The flood storage provided by the site ultimately minimises expected flood levels throughout the Glenfield Carrier Catchment.

The increased peak runoff flows from the site that would result if it were developed, would have little or no impact on the Glenfield Carrier Catchment. Water quality could also be adequately managed through the development process. However, developing the site would reduce its flood storage capacity and may therefore result in a significant impact to the function of the catchment. The site's development would necessitate some filling of the basin formed by the study area. This would reduce the amount of available flood storage.

The reduction of the capacity of the culvert under the levy to drain the site, which is caused when water levels in the floodplain cause the culvert's flood gates to close, must be considered in any assessment of the site's suitability for development. The Northrop Engineering study concluded that the impact of developing the site cannot be accurately identified. Portions of the site, particularly the elevated area fronting Moorong Street may be suitable for development. However, should this be considered, Northrop Engineering recommends that more detailed analysis of the upstream catchment is undertaken to determine the minimum flood storage required to maintain or improve existing flood levels.

11.7 Heritage

There are no recorded items of European Heritage on the sites.

Aboriginal Heritage

As the four sites are at a low elevation, they offer no significant views over surrounding areas and have been inundated by flooding. These factors, combined with the disturbance of the land during its use result in the study areas having low or very low archaeological significance. The study by Kelleher Nightingale Consulting concludes that there are no archaeological constraints on the land (Appendix D).

11.8 Sewage & Effluent Disposal

Full copies of the Sewerage Management Reports undertaken by Michael Cuthbert, Engineering Consultant can be found at Appendix E.

Copland Street

While the sites are predominantly serviceable by conventional sewer infrastructure, implementation of low pressure sewer technology would deliver benefits including reduced cost.

Under a conventional sewage scenario, the cost of downstream infrastructure required (including a new sewage pumping station and rising main that would be required) would be in the order of $6,000 per equivalent tenement. Low pressure technology would reduce this cost to $4,700 per equivalent tenement.

Hammond Avenue

Some lots do not have a reticulated sewage connection. Some service could be provided to Lot 2 DP 542294 and Lot 2 DP 738461, although the shallow depth of main may limit the reach of sanitary drainage within the lots.

The portion of Lot 1 DP 152987 within the study area is partially serviceable by conventional sewer. However the easternmost portion would require a low pressure arrangement and would utilise downstream infrastructure valued at $3,400 per equivalent tenement.

Edison Road

Under the current configuration, the value of downstream infrastructure is $7,900 per equivalent tenement. The current configuration is relatively inefficient and constructing a new rising main would reduce downstream infrastructure costs to $4,800 per equivalent tenement under a conventionally sewered approach.

The key benefit of pressure sewage servicing in this area is the ability to connect premises directly to the rising main from SPS26 Kyeamba, slightly reducing the risk of pump station overflows and potentially avoiding or deferring a pump station upgrade. As pumps only need to be installed when a lot is developed, the investment risk is lower than for a development provided with conventional sewage.

Moorong Street

The area has a number of drains that would make the provision of conventional sewage difficult. The majority of the site would be best served via a connection to the Ashmont Carrier running along the southern side of the Sturt Highway. However this carrier discharges into a major overloaded pump station (SPS7 Flowerdale). The constrained nature of the site makes it difficult to upgrade this station, however the potential contribution of this area is quite small compared to its existing load. The development of this study area may lead to the earlier implementation of load diversion works required for development in Lloyd.

Internal reticulation could be constrained to some extent given the need to connect to the Ashmont Carrier. Downstream infrastructure has been valued at $2,700 per equivalent tenement.

This study area is well suited to servicing using low pressure sewage. The key benefit of pressure sewage servicing in this area is the ability to connect premises directly to the rising main from SPS7 Flowerdale, avoiding the overloaded pump station upstream. This approach also avoids the potential layout problems associated with the drains in the study area. As pumps only need to be installed when a lot is developed, the investment risk is lower than for a development provided with conventional sewage.

The implementation of the technology to be implemented in sewer provision will be assessed by Council in its development service planning.

11.9 Other Utilities

Electricity, Gas and Telecommunications

Written advice from utilities providers has been sought and comments from such providers are awaited. However, meetings between utilities providers and Council in 2007 indicated that servicing the sites should not be problematic.

Water

Riverina Water has indicated that Copland Street, Edison Road, Moorong Street and Hammond Avenue *"are already well supplied with water and future development could be accommodated in these areas provided they are not large users of water".*

11.10 Transport Infrastructure

Copies of the Traffic Management Reports for the Eastern Industrial and Moorong Street sites can be found at Appendix C.

Existing Road Network- Copland Street

Copland Street is an east-west collector road that connects Lake Albert Road to Tasman Street, crossing Kooringal Road at a two-lane roundabout, passing over the Marshalls Creek drainage channel and intersecting Blaxland Road where the intersection is a priority controlled junction. It carries a traffic volume on Copland Street is between 3,500 and 3,700 vpd.

Existing Road Network - Hammond Avenue

Hammond Avenue is a four lane undivided road that carries traffic volumes of around 16,000 vpd. Some properties have direct vehicle access to Hammond Avenue and others have their accesses onto Tarcoola Road. A two-lane roundabout regulates traffic flow at the intersection of Kooringal Road and Hammond Avenue.

Right turning vehicles entering properties via driveways or at Gillard Road have to cross two-lanes of traffic. There are no nearby traffic signals in either direction on Hammond Avenue and therefore few acceptably large gaps for right turning traffic, a situation which is considered to present significant safety issues.

Existing Road Network - Edison Road

Edison Road, east of Tasman Road is a two-lane sealed road with an estimated traffic flow of 400 vpd. Tasman Road is a two-lane sealed road

connecting the site to Sturt Highway. The intersection of Sturt Highway and Tasman Road/Eunony Bridge Road is currently stop sign controlled. It is understood that this intersection may be upgraded to a roundabout to provide safer and more efficient access to the highway.

Existing Road Network - Moorong

Moorong Street acts as a service road providing access to industrial developments to the west of Olympic Way. At the northern of the site, the intersection of Olympic Way and Kincaid Street is controlled by a two lane roundabout. Edward Street West is generally unsealed, except for its approach to the Sturt highway. The traffic volume of Olympic Highway in the vicinity of the site is about 13,000 vpd. The volume of Sturt Highway is about 10,000 vpd.

Road and Intersection Requirements - Copland Street

GHD projects that, if Copland Street were to be developed, it would generate around 400 vpd by 2016. Of this, 360 vpd would enter the site via the Copland Street/Kooringal Road roundabout. The remainder would use the Blaxland Street/Copland Street intersection and would include a high proportion of heavy vehicles. In the longer term, volumes generated by the site would reach around 1,250vpd.

A proposal by RTA to upgrade the intersection of Tasman Street and Sturt Highway may have an impact on traffic distribution. Right turning traffic may prefer to use the roundabout at Tasman Street rather than be delayed at Blaxland Road, thus reducing traffic flow on Blaxland Road and increasing flows on Copland Street.

It is expected that the two-lane roundabout at Kooringal Road would have sufficient capacity to accommodate traffic generated by development at Copland Street. As development increases, Blaxland Road would need to be extended to the south to form a four-way junction with Copland Street. This intersection would require a single lane roundabout to assist in reducing travel speeds and to accommodate the increasing volumes of turning traffic.

Potential Road and Intersection Requirements - Hammond Avenue

To provide safe and effective access GHD recommends and extension to Tarcoola Street and a roundabout at its intersection with Kooringal Road. As development increases, consideration should be given to restricting movements so that all right turns to and from Sturt Highway are made at the Kooringal Road roundabout. This could be achieved at a relatively low cost by constructing an island at the Gillard Road/Hammond Avenue intersection.

GHD anticipates that should Tarcoola Road be extended, the majority of vehicles generated by both existing and potential development would favour Kooringal Road over Gillard Road. Even if Hammond Avenue were developed to capacity, the resultant impact on the surrounding road network would be minor (approximately 250vpd).

Potential Road and Intersection Requirements - Edison Road

GHD estimates that developing Edison Road would result in the generation of around 100 vpd. Approximately 80% of this volume would be expected to travel along Tasman Road until the intersection with the Sturt Highway, where most vehicles will turn left into the city. Less than 10% of the site is anticipated to be developed by 2016 and so the road and intersection network would not suffer capacity constraints by that time.

Edison Road would need to be extended to the west of Tasman Street, along its reserve for a distance of about 700m in order to provide access. The T-junction formed by Tasman Street and Edison Road should be designed to accommodate the turning paths of large vehicles. The proposed development would contribute to traffic flows at the intersection of Sturt Highway and Tasman Road/Eunony Bridge Road and an upgrade to traffic signals or a roundabout would be required by 2016.

Potential Road and Intersection Requirements Moorong

The study by GHD concludes that access to development at the site is limited as the two roads along its southern and eastern edges are both highways and as such are not suitable for road accesses.

There are two potential locations for vehicular access, both of which provide access to high capacity roads. One location is the Moorong Street approach to the Kincaid Street roundabout. This would provide good access to the existing roundabout, which is capable of accommodating large turning vehicles. The other potential access is at Edward Street, where the existing intersection with the highway would need to be improved to provide turn lanes and channelisation to accommodate large vehicles.

Construction Costs

The costs involved in providing the required works are shown in **Table 34**.

Table 34 - Construction costs for smaller industrial sites

Location	Proposed Upgrade Works	Estimated Cost, ($)
Blaxland Road/ Copland Street	Two lane roundabout	500,000

Location	Proposed Upgrade Works	Estimated Cost, ($)
Extension of Tarcoola Road (excluding the cost of land acquisition)	300 metres of new two lane road to extend Tarcoola Road to Hammond Avenue	300,000
Kooringal Road/ Tarcoola Road	Single lane roundabout	300,000
Kooringal Road	Upgrade section between the roundabout and the Tarcoola Road extension	200,000
Hammond Avenue/ Tarcoola Road	Construct island and erect signs to prohibit right turns	50,000
Edison Road (including intersection and pavement strengthening works)	700 metres of new two lane road to extend Edison Road	1,000,000
Moorong Street leg of Olympic Way/Kincaid Street roundabout	Realignment of Moorong Street	100,000
Edward Street/ Sturt Highway	Intersection improvements (all movements accommodated)	1,000,000
Edward Street West/ Sturt Highway	Intersection improvements, (left in, left-out movements only)	$500,000

11.11 Bushfire Risk Management

Risk Assessment

The study by Eco Logical Australia (Appendix H) concludes that bushfire hazard across the smaller industrial sites is generally low, reflecting the almost flat land and vegetation with low fuel accumulation levels prevalent across the study area.

Regulatory Requirements

The performance criteria of Planning for Bushfire Protection may be met through risk management strategies. In the case of Moorong Street, the majority of the site is accessed by existing roads around the perimeter. However, access would be greatly improved if a perimeter road was established along the north-western boundary. This will also assist in providing a setback from grassy woodland vegetation surrounding Flowerdale Lagoon directly adjacent to the site.

Infrastructure and Staging

Water supply would be via a ring main system. Wagga Wagga NSW Fire Brigade is likely to be the first station to reach Copland Street, Hammond Avenue and Edison Road. In the case of Moorong Street, the NSW Fire Brigade stations at 36-38 The Esplanade and Turvey Park, as well as the RFS station at Fernleigh Road will be able to reach the site. The distances between fire stations and sites suggest that new stations may not be required to service potential development. In instances where there are no suitable access roads, into sites, access and egress will need to be reviewed at development application stage.

11.12 Site Potential and Regional Context

As outlined in Council's Spatial Plan 2007, Copland Street, Hammond Avenue and Edison Road have the potential to meet some of the demand for industrial land in the future and contribute to the growth of Wagga Wagga's industrial base. The sites' proximity to the Sturt Highway provides road transport connectivity that will support industrial uses on the site, promoting the economic use of infrastructure. Edison Road's location away from residential uses ensures that industrial uses at the site would not result in negative impact on residents. Proximity to the existing industrial area to the north between Copland Street and the Sturt Highway would promote the economic use of existing industrial infrastructure.

11.13 Key Implications – Small Industrial Sites

Issue	Response
1. Biodiversity Conservation	
The need to offset the loss of scattered paddock trees.	Sites do not have the potential to provide for offsets and recommend identification of offset areas elsewhere.
2. Stormwater management and water sensitive design	
Industrial development significantly increases the pollutant load to unpredictable levels. Development at Moorong Street would be affected by flooding during storm events. The function of the Glenfield drainage system would also be affected.	An initial stormwater management strategy is complete which provides that:- ▪ Stormwater quality management would be undertaken on an individual lot basis. ▪ Development at Moorong Street should only take place on the more elevated areas of land and be subject to more detailed investigations into the function of upstream drainage and detention systems.
3. Bushfire	
The need for development to be responsive to the degree of threat posed to a future urban community Limited access into sites.	Locations of APZs and perimeter roads (consistent with Planning for Bushfire Protection) are to be provided in accordance with recommendations in this LES. In instances where there are no suitable roads, access and egress will need to be reviewed at development application stage
4. Physical Services	
There is a need to ensure all sites are serviced economically and efficiently.	Riverina Water has indicated that infrastructure already exists to serve industrial operations which have relatively low water demands. Other relevant services can also be expected to be available at a reasonable cost.
5. Transport	
Need for safe access with sufficient capacity to meet demand.	Expert opinion concludes that the following would be provided to accommodate traffic resulting from the development:-

Issue	Response
	▪ An extension to Tarcoola Street and the construction of a roundabout at its intersection with Kooringal Road. ▪ Controls placed on surrounding road intersections / upgrades to controls. ▪ Edison Road to be extended to the west of Tasman Street, along its reserve for a distance of about 700m.

EDISON ROAD
LAND USE

Study Area
23 ha
Contours 2 m

Industrial

200.0

Approximate
scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

EASTERN INDUSTRIAL LAND USE

Study Area
Hammond St - 16 ha
Copland St - 47 ha

Contours 2 m

Industrial

200.0

Approximate scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

MOORONG
LAND USE

Study Area
10.0 ha
Contours 2 m

Open Space

100.0

Approximate
scale only

willana associates
urban planning and facilities management

WAGGA WAGGA

12 Land Use Strategy

The process behind determining the most appropriate land uses for the sites requires balancing potential land use outcomes against one another. These outcomes have to be considered against the non-negotiable environmental values such the retention of conservation of endangered habitats and the need for riparian corridors. The major implications arising from the key assessment areas of the LES, as identified in various sections of this report, have been reproduced below.

12.1 Strategic Framework

- Rezoning should recognise Wagga Wagga's increasing importance as a regional centre with a strong economic base in retail, government administration, defence, education, health and community services, transport, sports and value added agricultural industry and research sectors. The avoidance of land use conflicts that may compromise the expansion of these sectors should be a key planning outcome.
- The potential for the future development of an inter-modal freight interchange should be protected.
- Consideration should be given to the promotion of medium density residential developments in new and existing residential areas, to meet increasing demand driven by demographic change.
- While the tendency towards "sprawl" must be curtailed, the supply of land should exceed demand to ensure the orderly growth of the City and promote housing affordability.
- Strategies that promote the provision of affordable housing and land value differentials that promote a more compact urban form should be explored.
- Supply of industrial land should also exceed demand in order to promote the continued expansion of the City's industrial base through the ready availability of industrial lots at competitive prices.
- The potential for investors to take advantage of large industrial lots should be preserved and land use conflicts that may place constraints on areas suited to heavy industry avoided.
- Urban form and development controls should address the need to improve water and air quality and reduce soil salinity and car use, with subsequent release of greenhouse gases. The potential benefits of "offsetting" to preserve land of high environmental value should be given consideration.
- Rezoning should promote the provision of public facilities that facilitate community networking and a sense of place. Opportunities for active and passive recreation must be promoted throughout the City.
- Provision of open space should consider an appropriate ratio of recreation space to sporting facilities and the design and locational

recommendations of the Draft Wagga Wagga Recreation and Open Space Strategy 2004.

- Planning controls and development decisions should the integrity of habitat corridors and reflect regional biodiversity context.
- Cycle ways and pedestrian walkways should be integrated into the City's transport networks to meet community demand for such infrastructure and to reduce car use.

12.2 Statutory Framework

- Any development that might take place in the study area must meet the EP&A Act's objective for ESD.
- Regulations placed on altering the area, location and yield of industrial zonings by Section 117 (2A) Direction 1.1 must be considered.
- Re-zonings for new urban areas must be consistent with the relevant Department of Planning publications regarding the integration of land use and transport, unless doing so would run counter to land use strategies and studies approved by the Department of Planning.
- In accordance with SEPP 66, re-zoning must be consistent with the Integrated Land Use and Transport (ILUT) Strategy and must minimise demand for car use. It must also consider the access needs of inter-modal terminals.
- Pursuant to Section 117 (2A) Direction 3.1, re-zoning must allow an increase in density and a variety of housing forms.
- Rezoning must be undertaken through an LEP that reflects the Standard Instrument.
- Rezoning and master planning of new residential areas will need to consider the likely future development of Bourkelands and Hilltop Estate in order to promote spatial cohesiveness between all suburbs.
- Planning for new residential areas would have to consider the need for community centres at Lloyd and Estella and a sportsground at Boorooma East/ Estella West identified in Councils' Section 94 Contributions Plan 2006.
- Council and State controls and policies relating to planning for flood bushfire prone areas will have to be considered.
- Any possible rezoning of flood prone land must consider NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 and the provisions of Section 117 (2A) Direction 4.3.

12.3 The Community

- The population of Wagga Wagga had increased at a relatively rapid rate in the past five years and the LGA is projected to continue to expanding.

- Planning to accommodate the growth in population should consider trends towards smaller household size and a higher proportion of older people.
- Demand for medium density housing has increased and, given trends towards smaller household size, it is likely to continue increasing.
- The affordability of housing in Wagga Wagga for sale and rent has diminished at a relatively rapid rate in recent years. The decrease in affordability has seen a rise in the number of rental households in "housing stress".
- Planning for industrial and commercial land uses should acknowledge the needs of sectors that are contributing growth in the economic base of Wagga Wagga. The prevention of conflicting land uses that might hinder further growth in these sectors should be a priority.

12.4 General Land Use Outcome

- A variety of allotment sizes and dwelling densities should be provided to cater for greater housing choice in the southern suburbs of Wagga Wagga, in which choice is currently limited.
- Water courses and riparian areas should be retained to provide for stormwater drainage and to add value to open space networks. In some instances, riparian corridors provide links between vegetated areas surrounding the site. They may also have the potential to and separate new residential areas from development that may take place adjacent to them in future.
- Areas of moderate or good condition box gum woodland must be retained for conservation.
- All scarred trees and open camp sites should be conserved where possible.
- Retention of woodland should be achieved with the objectives of minimising edge effects currently experienced by native vegetation remnants and increasing connectivity between currently isolated woodland patches and with areas of remnant vegetation outside the site.
- Stormwater detention facilities should be incorporated into open space where ever practicable. Consideration should also be given to incorporating drainage corridors that do not form "blue line" watercourses into open space and/or riparian zones.
- With the exception of ground water recharge areas, impervious surfaces should be reduced and Water Sensitive Urban Design (WSUD) principles implemented to control the quantity, rate and quality of stormwater discharge. Specific measures may include wetlands, bio-retention swales and maintenance of environmental flows.
- Appropriate bushfire APZs should be incorporated into perimeter roads and residential setbacks. Perimeter road or trails must provide direct

access to the internal road system and be aligned adjacent to bushfire hazards.

- If possible, all Aboriginal sites, PADs and areas of high or moderate archaeological sensitivity should be conserved. This may be achieved by incorporating identified sites, PADs and areas of high/moderate sensitivity within conservation areas. The findings of the predictive model do not prevent the rezoning of any of the study areas. The model is a starting point for more rigorous investigation into whether PADs and areas of high or moderate sensitivity do, in fact, contain Aboriginal objects. Rezoning may occur on the condition that further investigations, which may involve techniques such as test pitting, will be required at development assessment stage. Should further investigations demonstrate the presence of objects, development designs and management practices will be required to ensure the conservation of objects and sites. Disturbed areas and areas of low archaeological sensitivity should not pose a constraint to future development.

12.5 Lloyd

- Urban design solutions should consider the potential of Lloyd to form a logical extension of the existing urban area.
- The hill tops and ridges with views of a very high significance should be maintained as open space or environmental protection area. This will provide for public access and opportunities for passive recreation with potential linkages with a citywide open space networks. The Wiradjuri Walking Track should be relocated to follow hilltops.
- Walking and bicycle tracks should connect with surrounding networks. Consideration should be given to the re-routing of the Wiradjuri walking track along ridge tops to provide more expansive views from the track.
- The value of ridge tops and high slopes as local landscape features should be preserved. Development should be setback below the ridge and of a form which will not impede views to or from these locations.
- Development of mid-slopes should be carefully planned to create vistas through street corridors and optimise views from structures. The lower slopes should have a street layout that maximises opportunity for vistas from public streets and parks.
- The western escarpment should maintain a rural character when viewed from Red Hill Road so that the urban area comes into view when travelling along the bend of the road.
- Street alignments and open space networks should preserve vistas down slopes and along visual catchments.
- The open space network should have high connectivity and extend through the site along drainage lines and be linked to roads and ridges.

- An open space corridor follows the transmission line easement through Glenfield Park up to Red Hill Road, west of Kirrang Avenue. The corridor should be extended into the site to create a continuous network providing access by walking and bicycle paths.
- Stormwater drainage infrastructure should minimise ground water recharge through technical measures such as the lining of stormwater detention basins and drainage corridors with impervious materials.
- Consent to development proposals at Lloyd must be conditional upon the demonstration that it will not result in soil salinity impacts in areas downslope of the site.
- Open space and recreation should consider the degree of provision of those facilities located in adjacent residential areas.
- The eastern and western areas of box gum forest that have identified as requiring preservation should be linked by a corridor that should be zoned to allow revegetation. The linkage will promote the environmental values and biodiversity and allow the provision of walking tracks through the site.
- Linkages with vegetation communities to the north and south of the site should be provided and planning for any potential new area should consider Lloyd's role in connecting the Murrumbidgee River and the Livingstone National Park.
- The main road connection point should be at Red Hill Road opposite Dalman Parkway. Another connection point should be provided with Red Hill Road further west between Dalman Parkway and Yentoo Drive. Roads within the site should also connect with Deakin Avenue, Hudson Drive and Hargrave Avenue to the east.
- The southern boundary is currently the least accessible to emergency vehicles and it is recommended that a road linkage providing direct access from the north to the south of the site be considered.
- Provision for off-road cycling should be made along main distributor roads to provide an off-road alternative for cyclists travelling on the relatively steep grades where the speed differential between bicycles and other vehicles is likely to be high.
- Residential development of the slopes surrounding the quarry should not occur until the quarry has ceased operation.
- Land adjacent to the existing reservoirs should be preserved for the potential additional water reservoirs.
- Residential development should not occur above the 270 contour where it can not be adequately serviced with town water.

12.6 Boorooma East

- Views of moderate to high significance to the south should be preserved. Public access should be allowed to land at higher elevations with

vantages to the south. Nearby development should be setback and of a form which would not impede views from these vantages.

- While views looking north, east and west down the slope from the centre of the site are of low to moderate significance, they are sufficient to contribute significantly to amenity. Street layout and built form should provide for vistas along streets and from public open space.
- Development on the escarpment should be carefully planned, so as to complement the visual qualities of a landscape likely to form a future gateway to Wagga Wagga city centre.
- A strip of woodland should connect the knoll at the centre of the site with Farrer Road. This strip of land would have the potential to create a gateway to a new residential area on the site in the form of a “tree-lined boulevard”.
- Retention of areas of low condition remnant woodland adjacent to roads in order to promote amenity through the aesthetic qualities of “tree-lined boulevards”.
- Consideration should also be given to the retention of low condition river redgum woodland to the southern boundary, so as to enhance the appearance of the site as a gateway to Wagga Wagga centre.
- Retention of woodland also has the potential to offset trees removed during development and provide connectivity with vegetation on surrounding properties.
- Higher areas of land with views of the Murrumbidgee Flood plain and granite outcrops should be conserved when possible as areas of high or moderate archaeological sensitivity. Several of these areas contain woodland that should be conserved and could therefore be incorporated into environmental protection areas.
- Residential development on the steeply sloping land to the south of the site should be restricted in density. Subdivision should only be permissible if it results in large lots, with built form concentrated to the top of the slope. This will preserve the rural character of the sloping land and its role in forming a visual gateway to the urban area of Wagga Wagga.
- The internal road system should incorporate east-west and north-south primary streets separating through-traffic and public transport from traffic on local streets. Roads should provide connectivity between any potential neighbourhood centre and the existing suburb of Estella.

12.7 Estella

- Urban design perspective, a new residential area at the site should be contiguous with the adjacent suburb of Estella and the Charles Sturt University campus at the north.

- The heritage significance of the Estella Homestead and its visual prominence from surrounding areas should be protected by providing separation between residential development and the homestead.
- Open space networks and areas of environmental protection should encompass hilltops in order to provide public access to views of moderate to high significance. Integration of open space with views and vistas is to take priority over aligning open space with drainage corridors.
- Conservation zoning is to be used to form vegetation corridors approximately 20m wide along Pine Gully Road and Harris Road. This will provide linkages between areas of vegetation surrounding the site, a flyway for Superb Parrots native to the area and promote visual amenity and consistency with surrounding rural character.
- Street layout and subdivision should provide for vistas along streets and from public open space.
- Old Narrandera Road and Pine Gully Road should be the main roads accessing the site. Harris Road would be absorbed within the site, as opposed to passing through it as is the present situation. Two collector roads would connect with Old Nanandera Road. Road connections should be mad with Estella Road and the exiting suburb of Estella.
- There are some off-road footpaths along the Cooramin Street reserve between Gunn Drive and Boorooma Street. The Cooramin Street reserve provides an opportunity to extend pedestrian links to Estella West along the Harris Road corridor.

12.8 Smaller Residential Sites

- It is anticipated that the smaller residential sites will present no significant issues in terms of servicing, given their size and location.
- Given their likely serviceability, their degree or disturbance and lack of natural bushland, rezoning may take place subject to statutory process to ensure that isolated trees or potential archaeological sites are protected. Detailed investigations can be undertaken at the development assessment stage, if required.

12.9 Bomen

- Land use zonings must consider the potential for industrial development at Bomen to result in acoustic and air quality impacts to adjacent land uses. A 200m acoustic buffer should be provided between industrial zonings likely to result in significant levels of noise and existing residential areas. Within the buffer should be a 200m wide area zoned for “light” industrial activities that do not take place at night.
- Given the anticipated future demand for land suitable for heavy industry, an acoustic buffer should consider existing activities that produce significant noise levels. This is particularly relevant to the railway line at

Bomen, along which frequent passenger and freight services travel between Sydney and Melbourne. The provision of a buffer adjacent to the railway line may not result in any significant amelioration of impacts, given the noise generated by trains.

- Rezoning should consider the conservation of sites of aboriginal heritage significance and the need to offset lost vegetation.
- Bomen Road should be adopted as the principle route to the study area, should rezoning take place. Byrnes Road could serve as a supplementary route to the highway for traffic travelling between Wagga Wagga and Junee.
- Staging and the location of dry and wet industry should consider the cost of sewage infrastructure.
- Wagga Wagga City Council and DECC have raised concern about the odour impact of existing industrial activity at Bomen on residents at nearby Cartwrights Hill. The LES specialist studies indicate that while mitigation measures such as buffer zones can be implemented for future industrial development to protect nearby residential areas from negative impacts, odour levels from the existing industry at Bomen are above DECC's criteria for the existing residential properties at Cartwrights Hill.
- Consequently and independent to this LES, the Council has undertaken investigations into the impact of the Bomen industrial area on the potential for expanded residential development at nearby Cartwrights Hill. As the outcomes of Council's study impacts on land that is part of this LES, Council's investigations have been included as an Annexure to this report. It is concluded from Council's investigations that further residential development at Cartwrights Hill would be likely to result in an increase in complaints about odour impacts from industry, and as a result planning controls should not encourage an increased population into the Cartwrights Hill area (refer to Annexure 1).

12.10 Smaller Industrial Sites

- The future use of Moorong Street must consider the site's inundation by stormwater and its key role in detaining runoff from the urban area of Wagga Wagga. Developing the site may reduce its capacity to detain runoff, with significant implications for upstream catchment. Further investigation is required in order for decisions to be made as to the future use of the site.
- At Copland Street, Hammond Avenue and Copland Road, lot based stormwater management should be implemented and be capable of demonstrating that no adverse effects elsewhere in the catchment will result from development. Impervious areas should be minimized to reduce the volume and rate of stormwater runoff.

12.11 Land Use Considerations

The process of determining appropriate land uses has involved two separate stages. The first stage being the collation of constraints maps identifying areas such as steeply sloping land; flood affected land; presence of threatened species and endangered Ecological communities.

After the compilation of a constraint map, the site the land best suited for urban development is identified. The outcomes of the environmental studies also help identify preferred land uses for each of the various sites. In considering these land uses, particular consideration has been given to the need for various forms of development, particularly housing and employment lands. The demand for these development outcomes has also been balanced by the identified environmental and cultural constraints to the land.

Environmental and Cultural Constraints

The environmental constraints for the site were mapped during the assessment of the natural environment. This resulted in an overlay process of such issues as slope, bushfire hazard, presence of threatened species or endangered Ecological communities, flood liability and Aboriginal archaeological.

The use of parts of the study area for open space would assist in meeting the need for various recreational facilities that support both housing and employment lands.

Riparian corridors serve a number of functions ranging from conserving remnant vegetation and species habitat, through to protection of potential archaeological sites. Riparian corridors also provide passive open space with high levels of visual amenity and form buffers between various forms of development. The amenity provided by these buffers will be significantly improved through further regeneration of natural vegetation.

Development of the sites would lead to increased stormwater runoff volumes and flow-rates as a result of an increase in impervious area. Runoff should be managed to minimise impacts on downstream waterways, property, habitats and landform. However, existing (environmental) stormwater flows must be maintained to support habitats. Stormwater management measures will incorporate:-

- Stormwater Collection: Capturing runoff to minimise the potential for overland flow to affect people and property (e.g. stormwater drainage pits).

- Stormwater Conveyance: Directing stormwater runoff to safe points of discharge, so as not to affect people and property (e.g. drainage pipes/culverts, open channels, swales).
- On-site Stormwater Detention (OSD): Allows for storage and controlled release of stormwater runoff. OSD facilities can be provided to service individual lots, or at a local catchment level. Facilities are best located toward the downstream end of sites, outside areas susceptible to flooding (up to 100-year ARI), and so that connections are not susceptible to backwater from downstream drainage systems.
- Stormwater Retention: Reduces runoff discharging to the downstream drainage system. Runoff is captured to provide an alternative water supply, thereby reducing potable water consumption. Retained stormwater can be consumed in the same manner as potable if it is subject to the required level of treatment.

Stormwater retention/re-use systems can be applied to individual lots or at a local level. The capacity of individual lot systems can vary depending on the land-use and application (e.g. irrigation, toilet flushing, car washing, potable uses etc). Typical residential lots would utilize rainwater storages up to $10m^3$ capacity.

Housing Demands

The appropriateness of housing on the site is not only determined by the local demand, but also the options for different land uses. The region is undergoing growth and consequently, there will always be some demand for housing.

Open Space and recreation

Planning for future urban development should also consider the community's concerns at a lack of recreational facilities in some suburbs (including Estella and Glenfield Park) and the demand for more multi-functional and non-formal recreation and sporting facilities.

Open space corridors, whether zoned conservation or recreation, provides connectivity between ridge tops and riparian corridors for wildlife as well as providing visual and acoustic buffers in various locations.

Structure Plan

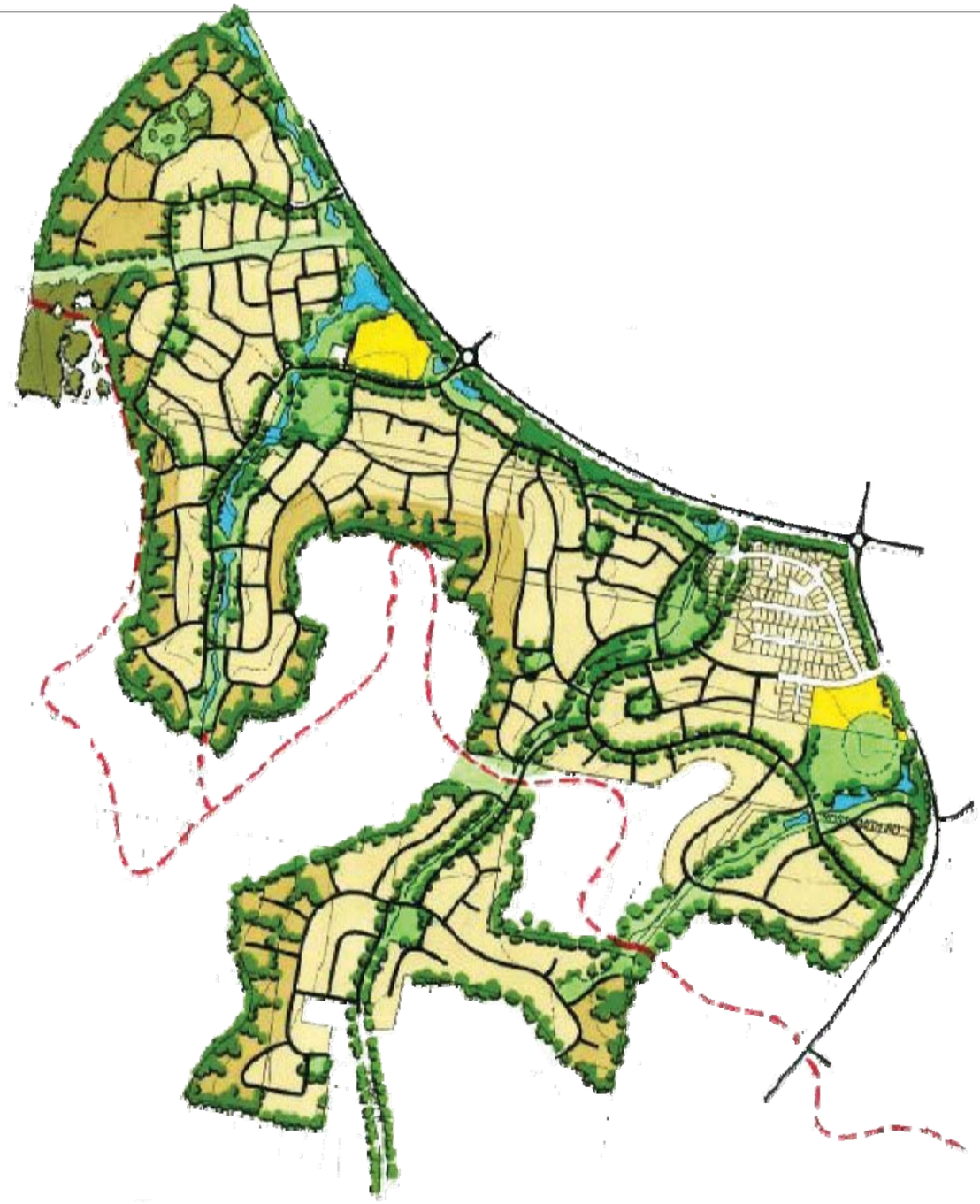
Structure plans are based on the recommendations and land use strategies in this report and reflect accepted contemporary urban design principles. Structure plans base urban form around an open space that integrates parks with riparian corridors, views and vistas and neighbourhood centres. Dwellings are to be no more than 400m from open space to promote "walkable neighbourhoods".

Location and scale of open space provides an appropriate balance of formal and casual recreation space in accordance with identified community needs. Open space also provides connectivity with surrounding areas to promote walking and cycling as forms of transport and recreation. Opportunities to incorporate stormwater detention basins as water feature in open space have been taken where practicable. Schools are located so as to be adjacent to areas of open space to promote the use of that space by schoolchildren.

Streets are aligned so as to provide pedestrian and visual links to parks. Street layouts are based predominantly on grid patterns to promote permeability. Layouts also take advantage of local and regional views along their alignments. New roads will promote improved connectivity between residential areas and existing neighbourhood centres.

New neighbourhoods comprise a range of housing types, including large lot residential housing that reflects the character of surrounding areas. Where appropriate, large lots residential and vegetation screening are located so as create a transition between rural and urban areas. Large lot zoning also promotes appropriate visual character for gateways into the city of Wagga Wagga.

Draft Structure Plan: Northern Wagga



13 Recommendations

Rezoning of Lloyd, Boorooma East, Estella West, Main Street and Plumpton Rd sites for residential development and rezoning of Bomen and the Eastern industrial sites for industrial development is supported by the LES, subject to various buffers and conservations areas being put in place. The land uses are defined in the various plans associated with each study area.

A summary of the generic recommendations for land use change within the study areas is provided. The list is not exhaustive, but serves as a starting point for matters that warrant inclusion in the preparation of the future Draft LEP for Wagga Wagga.

The land uses are defined in the various plans associated with each study area. These plans are provided at the end of each relevant chapter and assist in guiding future decisions for the strategic planning of Wagga Wagga.

There are a number of more general procedural processes which are important to supplement the land use decisions. Some of these are provided below:

- The development of land must include water quality treatment devices to minimise urban runoff impacts into the Murrumbidgee River. This includes particular care for ensuring that “first flush” material does not travel directly into the river system.
- It is recommended that a Conservation Management Plan (CMP) be prepared for land zoned for conservation. The CMP must include quantifiable objectives and performance criteria and be integrated with other management issues including bushfire and recreational open space. The CMP can be prepared prior to, or in parallel with, environmental impact assessments and development applications.
- Other management plans (e.g. soil and water management plans, vegetation management plans) will be required for land that is not zoned for conservation.
- Management Plans will be required by Council in accordance with the development approval process.
- The conservation areas should have adequate funding resources to provide for management of their values in-perpetuity. Options for funding include a sinking fund, Section 94 Developer Agreement, or community title. Funding and management through habitat offsetting should be considered.
- Responsibility for management and funding needs to be determined.
- Passive recreation is desirable within conservation areas to assist people in ‘connecting’ with their environment. However this must be managed to ensure public safety (e.g. near the ash dams) and maintain the environmental integrity of the site.

- Optimising biodiversity values within the development areas through maximising retention of existing trees and utilising local provenance, native species in any landscaping or revegetation works.

14 References

Australian Bureau of Statistics, 1996 and 2001 Census of Population and Housing

http://www.bom.gov.au/climate/averages/tables/cw_068188.shtml

NSW Government Documents

NSW Environment Protection Authority, 2000, Industrial Noise Policy.

NSW Environment Protection Authority, 1999, Environmental Criteria for Road Noise.