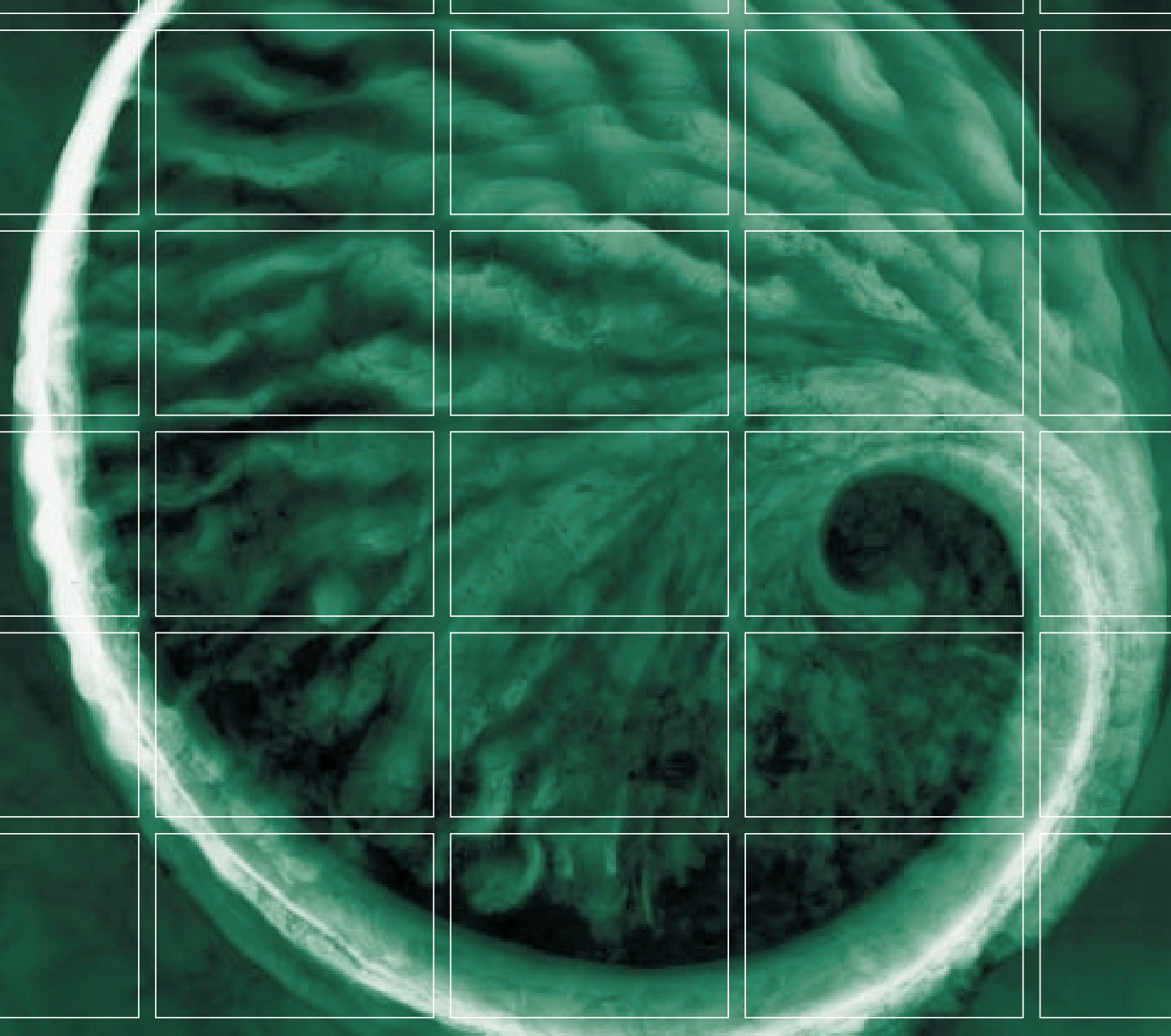




Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW DRAFT

Macquarie Bank Limited

August 2008

www.erm.com

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Constraints and
Opportunities Mapping for
the Wollondilly
Development Site, NSW
Draft

August 2008

**Environmental Resources Management
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Position:	<u>Partner</u>
Signed:	
Date:	<u>1 August 2008</u>

Environmental Resources Management Australia Pty Ltd Quality System

Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW - DRAFT

Macquarie Bank Limited

August 2008

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This report was prepared in accordance with the scope of services set out in the contract between Environmental Resources Management Australia Pty Ltd ABN 12 002 773 248 (ERM) and the Client. To the best of our knowledge, the proposal presented herein accurately reflects the Client's intentions when the report was printed. However, the application of conditions of approval or impacts of unanticipated future events could modify the outcomes described in this document. In preparing the report, ERM used data, surveys, analyses, designs, plans and other information provided by the individuals and organisations referenced herein. While checks were undertaken to ensure that such materials were the correct and current versions of the materials provided, except as otherwise stated, ERM did not independently verify the accuracy or completeness of these information sources

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Environmental Resources Management Pty Ltd Australia (ERM) was commissioned by Macquarie Bank Ltd (Macquarie Bank) to undertake a constraints and opportunities mapping study for the proposed Wollondilly development site (herein referred to as the study area), NSW.

Macquarie Bank, in association with the current site owners, is considering the study area for development as a business park/ employment centre, for south west Sydney. The development is likely to include distribution functions to take advantage of the road and rail connections offered by the location and will be an employment generator for the area.

*1.1**APPROACH*

To facilitate the proposed development, a constraints and opportunities mapping exercise has been undertaken to identify key issues regarding the study area.

Assessment criteria that may impact on the development potential of the study area include:

- the consistency of the project with the South West Regional Strategy;
- provision of a 50 m buffer from the top of the bank of major water courses, the provision of appropriate buffers to native habitats and the protection of sensitive areas within the riverine corridor;
- need for buffers to protect residential amenity;
- protection of critical habitat and significant tracts of remnant vegetation;
- exclusion of land affected by the 1% AEP event;
- exclusion of land having a slope of more than 1 in 10 (9%);
- impact on existing or future coal mining operations, including subsidence impacts;
- bushfire hazard;
- aboriginal and cultural heritage values;
- impact on visual catchments;
- impact on agricultural significance of the land and adjoining land;
- size and shape of land;
- access; and

- availability of infrastructure services.

Reflecting the above criteria, this assessment included: ecology, bushfire, Indigenous heritage, European heritage, contamination, flooding, noise, planning, and service infrastructure. The report steps through these technical disciplines individually and then concludes with a comprehensive assessment.

The assessments were undertaken utilising information obtained from:

- databases maintained by various regulatory agencies;
- previous studies (these have been referenced where applicable) ; and
- information from the Phase 1 Contamination Site Assessment undertaken by ERM late in 2007.

In addition, team members, including the Project Coordinator, ecologist and historic heritage specialist visited the study area on the 3 July 2008.

1.2

SITE DESCRIPTION

The study area is adjacent to the town of Menangle, NSW within the Wollondilly Shire Council, see *Figure 1.1*.

The study area is irregular in shape and consists of several properties, see *Table 1.1*. The Nepean River forms the eastern and northern side of the study area, with the Main Southern Railway the predominant west boundary feature apart from one property. The southern section of the study area terminates to the east at two southern property boundaries with the south west component terminating at the southern end of a separate property. The Hume Highway and the Moreton Park Road feature in a north-south direction within the study area.

The study area is approximately 580 ha in size and is predominantly used for farming and grazing with a small number of residential properties. Parts of the study area have been used for sand and gravel extraction.

The study area comprises the following properties:

Table 1.1 *Wollondilly lot and deposited plan numbers*

Colloquial name of parcel	Title Reference	Approximate Area	Current Land Usage
Hillcrest Park	1/248225	135.4 hectares	Farm land and abandoned piggery
	2/248225		
	8/248225		
	9/248225		
	1/550689		
	104/249189		
	10/248225		
	105/249189		
	106/249189		
El Bethel	201/590247	315.6 hectares	Farm land and rotolactor. Excavation of sand and soil restricted to the area up to 50m south of river
	202/590247		
	203/590247		
535 and 545 Moreton Park Road, Menangle	5/248225	28.6 hectares	Green houses
	6/248225		
	13/249218		
251 Menangle Road, Menangle	B/365733	0.24 hectares	Cottage
21 Station Street, Menangle	21/581462	10 hectares	Creamery - abandoned
775 Moreton Park Road, Menangle	1/802151	62.6 hectares	Residential and grassland
350 Moreton Park Road, Menangle	2/567913	26.3 hectares	Residential

Further information on each of these properties is provided below.

1.2.1 *Hillcrest Park*

The property comprises an abandoned piggery to the east of Moreton Park Road and farm land to the west of Moreton Park Road. All but one of the pig sheds have been demolished. Numerous small buildings, previously used for administration and other purposes remain.

An occupied house is present at the entrance to the west of the property. Four dams are present on site, three to the north of the piggery and one to the south. The southern section of the property is covered by windrows of pig manure.

To the west of Moreton Park Road is an abandoned house; a redundant farming and shed area with feed silo, one large and one small dam, two homesteads; and a second abandoned farming area with two large feed silos.

1.2.2 *El Bethel*

This property comprises three sections separated by roads. The section to the south east of the Hume Highway is a pasture used for cattle grazing. The section between the Hume Highway and Moreton Park Road contains pasture and residential buildings and is a working farm predominantly used for cattle grazing. The section to the east of the railway line contains the rotolactor site and a grassed area. The rotolactor site (a form of automated dairy) consists of the rotolactor shed and two larger sheds.

The area immediately south of the Nepean River, east of Menangle Road and west of the railway is occupied by the sand extraction and sales operations of Benedict Sand and Gravel.

1.2.3 *535 and 545 Moreton Park Road, Menangle*

This property contains green houses used for commercial tomato growing and a large shed.

1.2.4 *251 Menangle Road, Menangle*

Aerial photographs indicates that this property contains three residential or shed type buildings.

1.2.5 *21 Station Street, Menangle*

This property contains a former creamery and two buildings.

1.2.6 *775 Moreton Park Road, Menangle*

This property is a long thin strip of land containing two residential dwellings. The land is predominantly grassed.

1.2.7 *350 Moreton Park Road, Menangle*

This property contains a residential house, a dam and several small sheds.

1.3 *LIMITATIONS*

The report does not represent an exhaustive investigation into the study area. It is designed to be a first step in examining constraints to development. It is

anticipated that the findings may be used to assist with the formulation of development proposals for the study area.

1.4 *REPORT LAYOUT*

The report is presented as follows:

Chapter 1 presents the background and introduction to the study;

Chapter 2 sets out the Planning considerations for the study area;

Chapter 3 details the ecology components of the study area the present flora and fauna and the items to consider in examining site development;

Chapter 4 examines the bushfire considerations of the study area;

Chapter 5 outlines the Indigenous heritage of the study area using desktop analysis of databases and previous archaeological investigations to inform predictive modelling;

Chapter 6 details the European heritage of the study area viewing those sites and areas of significance of the area and how these are to be considered in potential developments;

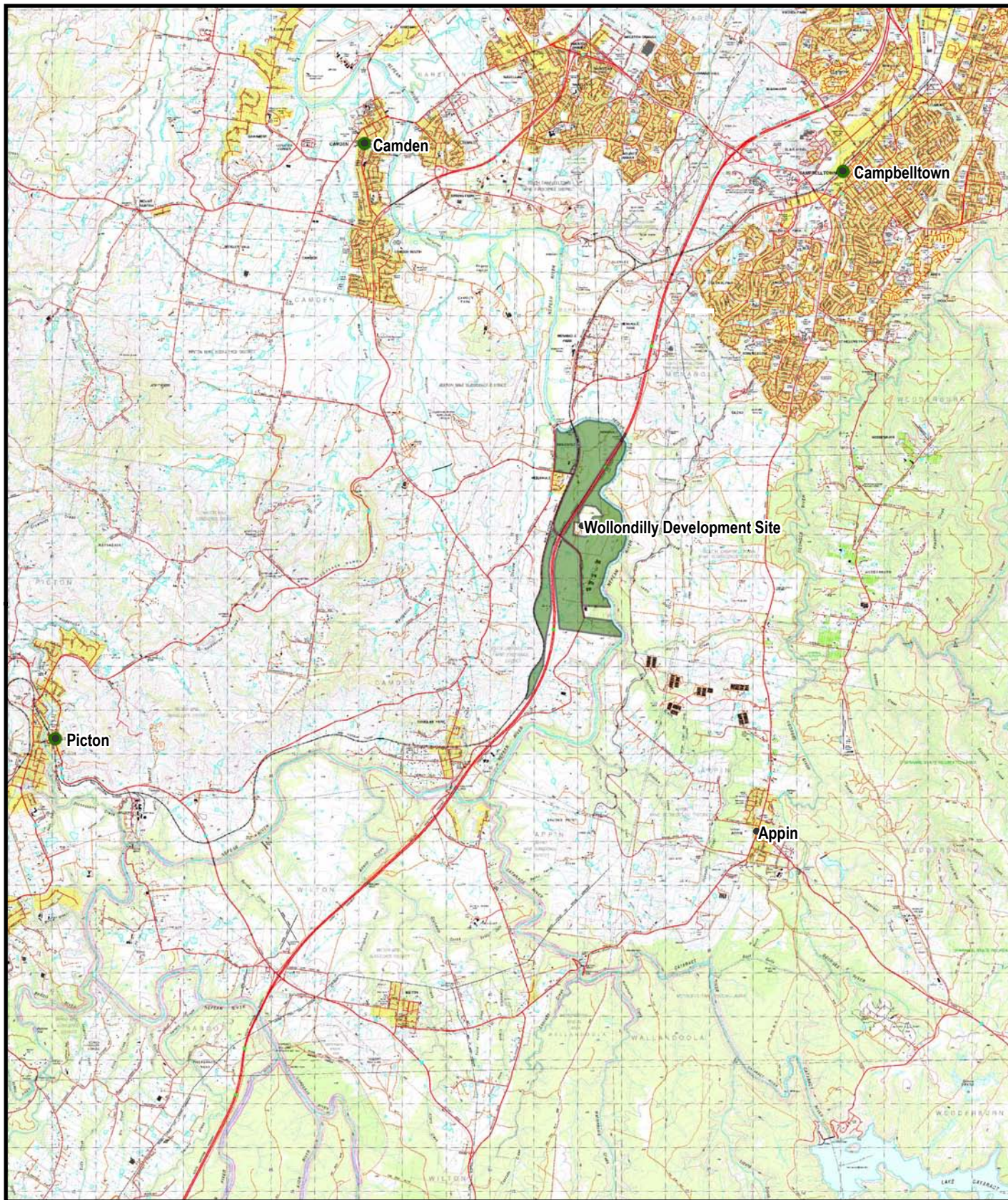
Chapter 7 sets out the contamination issues for the study area from the earlier Phase 1 Contamination Study;

Chapter 8 details the flooding issues of the study area and its constraints for development potential;

Chapter 9 outlines the noise consideration for the study area based on desktop study and contour data for the area;

Chapter 10 describes the service infrastructure currently available for the study area, and those that would require undertaking an applications processes; and

Chapter 11 details the overall constraints of the study area, summarising the technical areas examined and then considering them collectively.



Legend

 Wollondilly Development Site

Figure 1.1

Site Location

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS01	Suffix No:	R0
Date:	21/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	CA
Source:	NSW Dept. Lands		
Scale:	Refer to Scale Bar		



0 1,200 2,400 3,600m



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This chapter identifies the statutory planning controls that apply to the study area and considers the strategic planning framework at local, regional and state levels. Some conclusions are made in regards to the constraints and opportunities future planning and development of the study area.

2.1 METHODOLOGY

A desk top review of statutory and strategic planning documents was undertaken. This was supported by a brief site visit and a meeting with Council's Manager of Strategic Planning , Peter Wright.

2.2 KEY FINDINGS

The following section details the findings of the desktop planning assessment and includes statutory planning framework, Strategic Planning Documents and discussions with council.

2.2.1 Statutory Planning Framework

State Planning Policy

State Environmental Planning Policies (SEPP) that apply to the study area and may be relevant to the potential development of the site for employment generating uses include the following:

SEPP Major Projects.

Section 75B of the *Environmental Planning and Assessment (EPA) Act* enables a declaration to be made by a State Environmental Planning Policy or Ministerial Order that a project is a state significant development (Major Project) to which Part 3A of the EPA Act would apply. SEPP Major Projects nominates certain types of development as Major Projects These include uses such as distribution centres with a capital investment value exceeding \$30 million. There is also potential for a specific project or site to be nominated as a Major Project if it is of State or Regional significance.

SEPP 44 Koala Habitat

This Policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:

- (a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
- (b) by encouraging the identification of areas of core koala habitat, and
- (c) by encouraging the inclusion of areas of core koala habitat in environment protection zones.

The policy applies to land in the Wollondilly Shire. Given the presence of remnant native woodland and canopy trees, and the fact that Koalas have been recorded within the locality, there is the potential for Koala habitat to be present in the study area.

Regional Environmental Plans

Sydney Drinking Water Catchments (SDWC) Regional Environmental Plan (REP). Applies to land in the Wollondilly local government Area. The objectives of the SDWC are:

- (a) to create healthy water catchments that will deliver high quality water while sustaining diverse and prosperous communities, and
- (b) to provide the statutory components in Sustaining the Catchments that, together with the non-statutory components in Sustaining the Catchments, will achieve the aim set out in paragraph (a), and
- (c) to achieve the water quality management goals of:
 - (i) improving water quality in degraded areas and critical locations where water quality is not suitable for the relevant environmental values, and
 - (ii) maintaining or improving water quality where it is currently suitable for the relevant environmental values.

In preparing a Local Environmental Plan (LEP) Council must take into consideration the provisions of any strategic land and water capability assessment prepared by the Sydney Catchment Authority (SCA).

Development proposals undertaken within the hydrological catchment require the concurrence of the Chief Executive of the SCA unless the proposal has no identifiable potential impact on water quality or unless the Minister for Planning is the consent authority.

The development area is located within Sydney's drinking water catchment and therefore needs to meet the Sydney Catchment Authority requirements under the *Drinking Water Catchments Regional Environmental Plan (REP) No. 1*. The *Drinking Water Catchments REP* effectively replaces *SEPP No. 58 – Protecting Sydney's Water Supply* which was repealed at the commencement of the REP.

Any development or activity proposed to be carried out on land to which this plan applies should incorporate management procedures equal to or better

than SCA's current recommended practices and performance standards that relate to the protection of water quality.

A consent authority must not grant consent to the carrying out of development on land in the hydrological catchment unless:

- (a) it has considered whether the proposed development will have a neutral or beneficial effect on water quality, and
- (b) it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality.

As defined in *Sustaining the Catchments – the Regional Plan for the drinking water catchments of Sydney and adjacent regional centres*, a development or activity has a neutral or beneficial effect on water quality when it:

- has no identifiable water quality impact; or
- will transfer its potential water quality impacts for subsequent treatment and disposal; or can contain its potential water quality impacts on the study area of the development; or
- will lead to an improvement or retain the status quo in terms of water quality impacts leaving the study area.

Local Environmental Plans

Wollondilly Local Environmental Plan (LEP) 2002 applies to the study area.

The study area is zoned partly Rural (a1) and partly Rural (a3). These zones permit agriculture and a range of rural uses. Industries and commercial premises are prohibited (with the exception of rural and extractive industry).

Clause 31 refers to development in the vicinity of heritage items. This clause states:

The council must not grant consent to an application to carry out development on land in the vicinity of a heritage item unless it has made an assessment of the effect the carrying out of that development will have on the heritage significance of the item and its setting.

There are a number of European heritage items in the vicinity. These are identified in Chapter 6.

2.2.2 Strategic Planning Documents

Macarthur South Regional Environmental Study 1991

This study was prepared to examine the suitability of the McArthur South region for urban development. The Macarthur South region includes land in

both Wollondilly and Campbelltown LGAs. The objectives of the study included the identification of opportunities for industrial development.

The study recognised that there is land that is physically suitable for a range of employment generating activities but its location and high servicing costs could place it at a disadvantage in attracting major employment generating industry.

South West Sub Regional Strategy (Draft) 2007

The draft regional strategy has a number of key objectives including:

- the provision of employment lands in key areas;
- the protection and enhancement of employment lands in the M5 corridor ; and
- the protection and enhancement of employment lands with good access for freight and passengers to the south rail line.

The draft strategy requires the DoP and Council to identify areas for industrial activities requiring large sites.

The study area is identified as potential employment lands by the strategy which suggests it could be attractive to logistics, warehousing and manufacturing due to its exposure and access to both Sydney and Canberra, its proximity to the southern rail line and its ability to contribute to local employment opportunities.

The strategy also identifies that the study area is currently isolated from workforce and public transport.

Discussions with Council indicate that the strategy is unlikely to be finalised until 2009.

Wollondilly Vision 2025 (2004)

This document was prepared by Wollondilly Council. The objective of the document is to identify a vision and strategies for various towns and villages. For Menangle the vision and strategy were identified as:

Vision

A consolidated village centre and maintained rural setting.

Strategy

- maintain views to rural land and bushland at the end of new streets;
- strengthen road and rail infrastructure;
- nominate 1 in 100 flood zone as town edge;
- Create vibrant mixed use hub at rail station / interchange;
- create a town edge street to reinforce the town extents;
- maintain visual prominence of hilltop church and develop its curtilidge as a public park; and
- investigate opportunities for sporting fields and open space in 1 in 100 year flood zone.

Maps supporting the vision 2025 document indicated the investigation of possible future employment opportunities on land between Menangle and the freeway.

Wollondilly Economic Development Study (2007)

The economic development study was adopted by Council in April 2008. The goals of the strategy are to encourage increased business investment, good jobs and learning opportunities within a framework that improves the quality of life of residents and values the area's outstanding natural environment.

There are no specific recommendations in regards to the Menangle area.

Wollondilly Industrial Lands Assessment Criteria (March 2008)

Wollondilly Council has adopted a criteria from the assessment as to the suitability of the development of lands for industrial purposes. A copy is included as Annex A.

Assessment criteria that may impact on the development potential of the study area include:

- the consistency of the project with the South West Regional Strategy;
- provision of a 50 m buffer from the top of the bank of major water courses, the provision of appropriate buffers to native habitats and the protection of sensitive areas within the riverine corridor;
- need for buffers to protect residential amenity;

- protection of critical habitat and significant tracts of remnant vegetation;
- exclusion of land affected by the 1% AEP event;
- exclusion of land having a slope of more than 1 in 10 (9%)
- impact on existing or future coal mining operations, including subsidence impacts;
- bushfire hazard;
- aboriginal and cultural heritage values;
- impact on visual catchments;
- impact on agricultural significance of the land and adjoining land;
- size and shape of land;
- access; and
- availability of infrastructure services.

2.2.3 *Discussion with Council*

A meeting was held with Council's Strategic planning manager Peter Wright on 9 July 2008. The purpose of the meeting was to ascertain Council's position in regards to employment lands generally and discuss the potential for development of the study area.

The following points were raised:

- Council's economic development strategy recognises the need for increased employment opportunities in the LGA and the strategic importance of the freeway corridor;
- the Sydney Metro Strategy deferred development of McArthur South for 25 years. The recently exhibited South West Sydney Strategy identifies the study area as a potential employment site but without infrastructure and services;
- one of the problems of the McArthur South area is the lack of infrastructure and its relative isolation from the nominated growth centres. APP has been commissioned by the DoP to prepare an infrastructure analysis for the McArthur South area;
- Council is in two minds about employment generating uses at Menangle. On one hand it has the potential to increase employment opportunities but on the other it would have a major impact on the rural ambience which is valued by many residents;

- there is a concern that warehouse style uses of the study area would not deliver employment benefits. Any development would need to be designed to attract employment generating uses;
- the residents of Menangle are concerned about the nature of any future use of the study area and the potential hours of operation. The village is a conservation area with high amenity. It is important that any development retains the rural ambience of this village. A curtilage to the conservation area needs to be identified and retained;
- the Menangle community would be looking for community benefits such as access to the river, walking/cycle tracks along the top of the river bank;
- Campbelltown Council have prepared a draft LEP to allow residential development in the southern part of the LGA. Development of the study area for employment uses may complement this development in Campbelltown;
- employment uses may assist in providing a critical mass to extend the electrification of the railway;
- Wollondilly Council has supported a rezoning of land at Maldon for industrial use and a draft LEP is being prepared. Council has developed industrial lands assessment criteria;
- the study area is at the Gateway to the Wollondilly LGA, adjacent to the Nepean River. This would need to be respected in any design scenarios; and
- Council does not have information that suggests the land is of high agricultural value.

2.3 *CONCLUSION*

The planning and development strategy presents several opportunities and constraints to the development of the study area.

2.3.1 *Opportunities*

The study area has been recognised in a number of studies as a potential location for employment generating development.

The Part 3A legislation provides an opportunity to seek nomination of the study area as a State significant site so that the rezoning and development could be assessed concurrently by the Minister for Planning.

As the site has a large area it may be possible to accommodate recreation facilities including walking tracks and cycleways as identified by Council.

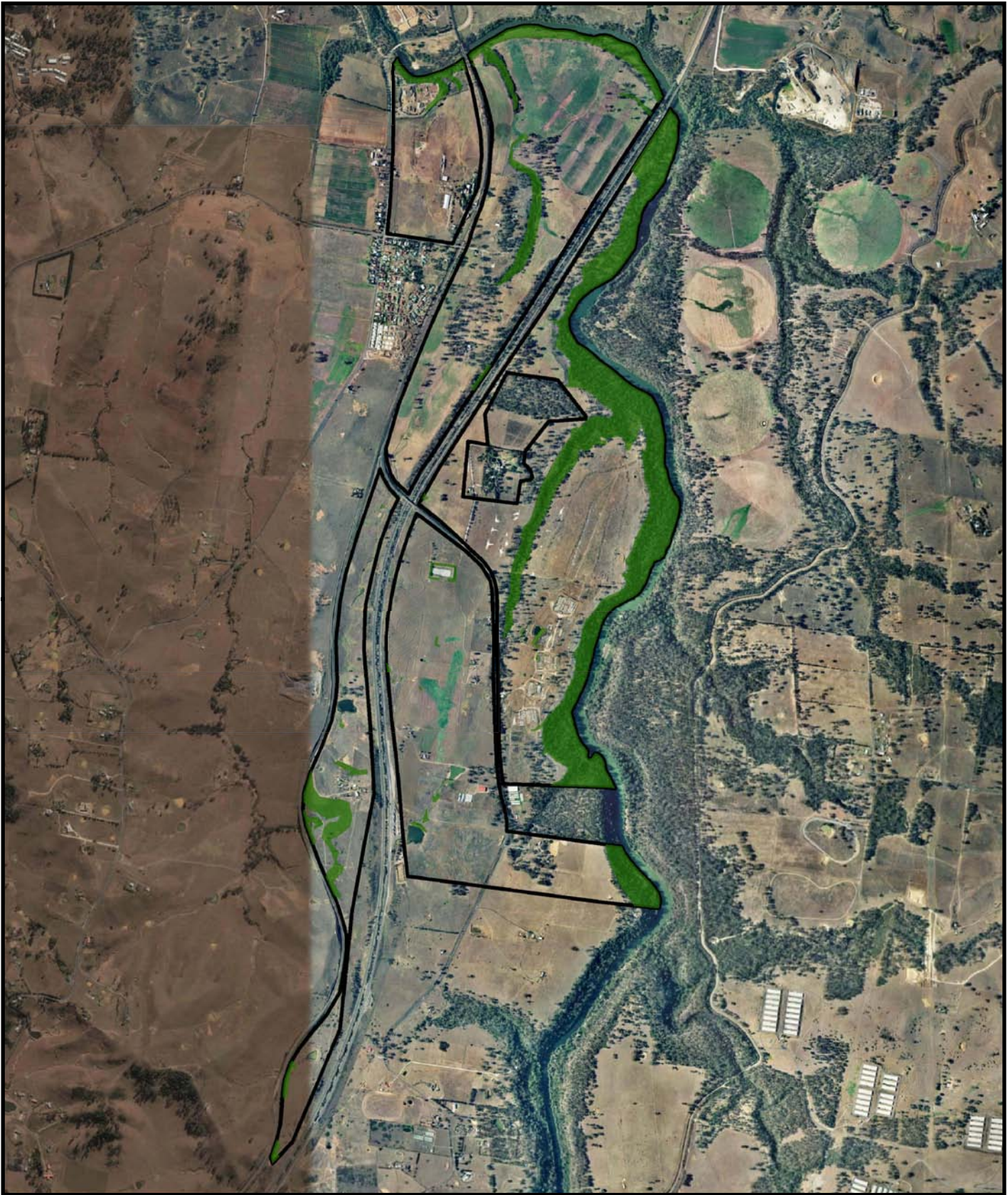
Slope in excess of 9% has been mapped (Figure 2.1). There are large areas of the study area that are not constrained by slope gradient.

2.3.2 *Constraints*

The lack of available infrastructure and the relative remote location are constraints to the development of the study area.

The study area is within a proposed mine subsidence area. It is understood that there are mining leases affecting the site and exploration drilling is currently occurring at the site. Further investigation is required to understand the likely timing of mining and potential impacts on the development of the site.

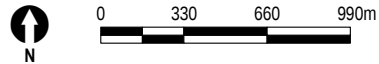
The study area is at the northern gateway to Wollondilly LGA, the visual amenity of any development will need to be considered in the design and siting of any future development.



Legend
 Wollondilly development site
 Slope > 10 degrees

Figure 2.1
Slope Constraints

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS06	Suffix No:	R0
Date:	31/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	CA
Source:	Wollondilly Shire Council		
Scale:	Refer to Scale Bar		



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This chapter contains information on the key ecological constraints of the study area. These are based on desktop analysis and a brief one-day site inspection to ground-truth the findings of the desktop assessment. The chapter identifies native vegetation communities occurring across the study area (*Figure 3.1*) which inform the ecological constraints mapping (*Figure 3.2*).

3.1

METHODOLOGY

Background literature reviews and database searches were undertaken to obtain information on flora and fauna species and vegetation communities likely to occur within the study area. This included searches for threatened species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) previously recorded within a 10 km radius of the study area. Sources of information included the following:

- Department of Environment and Climate Change (DECC) Wildlife Atlas Database for threatened species and endangered ecological communities previously recorded within a 10 km radius of the study area (the 'locality') with the potential to occur within the study area;
- Department of the Environment Water , Heritage and the Arts (DEWHA) online search for Matters of National Environmental Significance (NES);
- native vegetation maps of the Cumberland Plain Western Sydney (NPWS 2002) to determine the presence, condition and conservation significance of vegetation occurring across the study area, including any endangered ecological communities (EECs); and
- a review of aerial photography of the study area to examine the extent of native vegetation and the connectivity of vegetation to other areas within the locality and the wider Western Sydney region.

A site visit to ground-truth findings of the desktop assessment and refine the extent of any identified ecological constraints in the study area was undertaken on 3rd July 2008.

3.1.1

Legislative Requirements

Relevant legislation is outlined in the following section.

As part of any proposed development at the subject sites, an assessment of the likely occurrence of threatened species and endangered ecological communities (EECs) under both State and Commonwealth legislation would be required. This would include an assessment of threatened species recorded

on and with the potential to occur within the study area having regard to the availability of suitable habitat.

Where a development has the potential to impact on threatened species or an EEC, under the NSW *Environmental Planning & Assessment Act 1979* (EP&A Act), an impact assessment (Seven-part Test) would be required with any development application. If impacts to threatened species or EECs are found to be significant, then a Species Impact Statement (SIS) would be required.

Threatened ecological communities are also a matter of National Environmental Significance (NES) under the EPBC Act's assessment and approval provisions. Under the EPBC Act, any action that has, or is likely to have, a significant impact on a matter of NES may progress only with the approval of the Commonwealth Minister for the Environment.

Native Vegetation Act (NV Act) 2003 and Native Vegetation Regulation (NVR) 2005

The NV Act provides for the sustainable management and conservation of native vegetation. Any clearing of remnant native vegetation or protected regrowth requires approval under the NV Act unless the clearing is 'permitted' clearing or a result of a permitted activity.

Consent to carry out clearing of native vegetation that is not designated as 'permitted' clearing or the result of a 'permitted activity' must be sought from the local Catchment Management Authority (CMA).

Under the NV Act the local CMA can only approve the clearing of remnant vegetation or protected regrowth when the clearing will improve or maintain environmental outcomes. Where clearing requires approval, landholders may apply to their local CMA either to prepare a Property Vegetation Plan (PVP) or make an application for development consent.

State Environmental Planning Policy No. 44 (Sepp 44) – Koala Habitat Protection

The aim of SEPP 44 is "to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent, free-living populations over their present range and to reverse the current trend of population decline."

Wollondilly Shire Local Government Area (LGA) is listed in Schedule 1 of SEPP 44 and therefore provisions of this policy apply. SEPP 44 requires that the presence of "potential" and "core Koala habitat" are assessed where the site area is greater than one hectare.

3.2.1

Flora Habitat

Aerial photography (*Figure 3.1*) indicates that the majority of the study area is cleared, open grassland. Vegetation remnants in the study area include scattered remnant woodland and riparian habitat along two small creeks and along the Nepean River.

Figure 3.1 shows the type, condition and conservation significance of native vegetation communities occurring across the study area as mapped by NPWS (2002). NPWS (2002) has mapped three vegetation communities across the study area; Shale/Sandstone Transition Forest (SSTF), Cumberland Plain Woodland (CPW) and River-Flat Eucalypt Forest on Coastal Floodplains (RFEF). These vegetation communities are listed as endangered ecological communities under the *Threatened Species Conservation Act 1995* (TSC Act). CPW and SSTF are also listed as EEC's under the EPBC Act.

The RFEF community occurs as riparian vegetation along the Nepean River, bordering the east and north of the study area, and along other watercourses across the study area. Remnant CPW and SSTF predominantly occurs in the northern half of the study area to the west of the Hume Highway and to the east of the railway line.

Approximately half of the remnant vegetation occurring in the study area supports a relatively intact canopy (cover >10%). This is primarily confined to the RFEF community. The remainder of native vegetation mapped in the study area supports <10% canopy cover. This is primarily confined to the CPW and SSTF communities. The reduced canopy cover indicates these communities have been subject to previous disturbance and clearing.

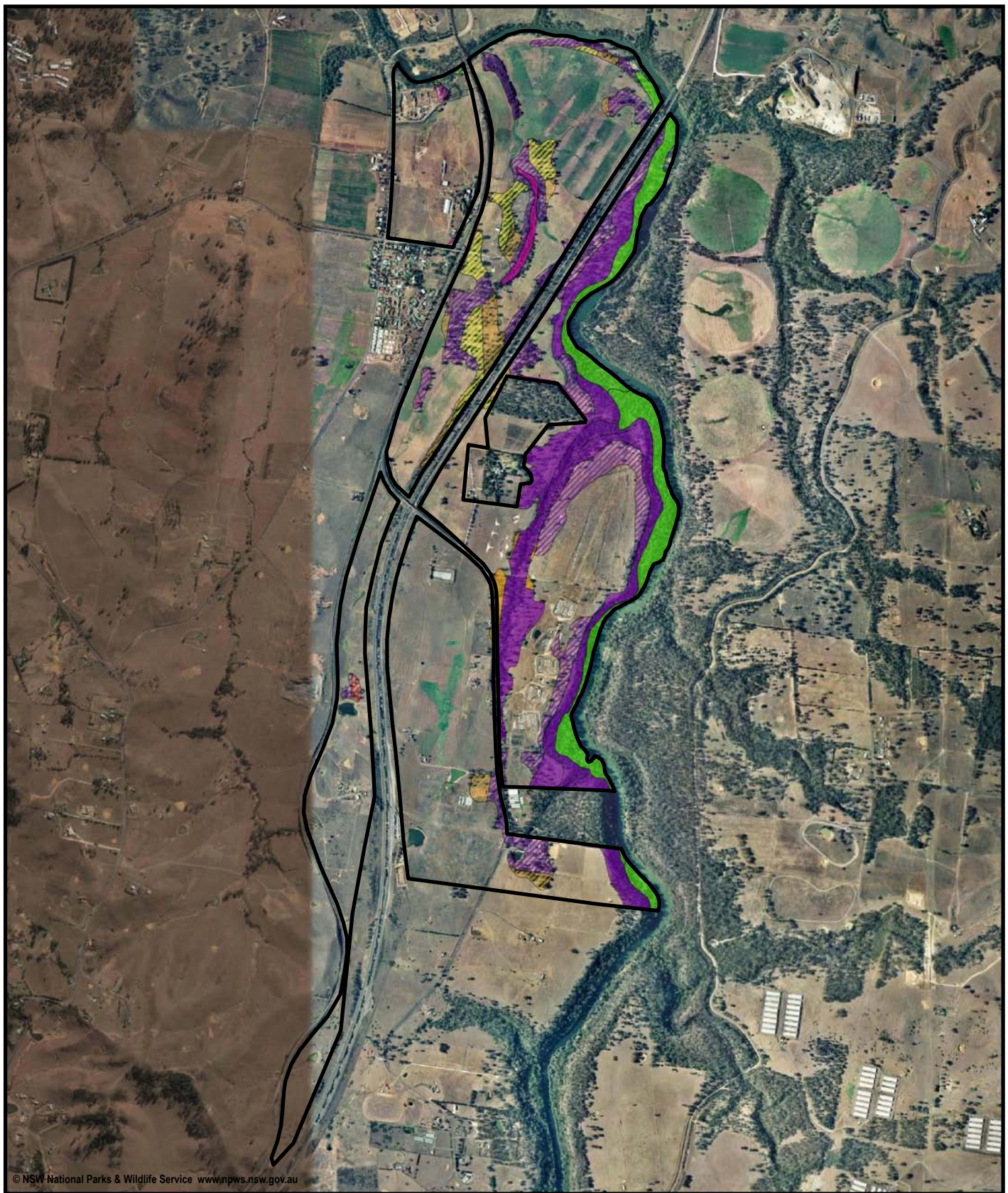
During the site inspection, the community mapped as RFEF was found to have the characteristic Eucalypt canopy species, such as Forest Red Gum (*Eucalyptus tereticornis*) and Rough-barked Apple (*Angophora floribunda*). Smaller trees species within the community include River Oak (*Casuarina cunninghamiana*) and Tea-tree (*Melaleuca* spp.) (see *Photograph A.1*). The characteristic understorey of the RFEF community typically includes abundant native forbs, grasses and scramblers. However, during the site inspection a substantial cover of exotic species in the understorey was observed including; Lantana (*Lantana camara*), Privet (*Ligustrum* spp.), Wild Tobacco (*Solanum mauritianum*) and Wandering Jew (*Tradescantia albiformis*) (see *Photograph A.2*). The composition and structure of the understorey of native vegetation communities is influenced by grazing and fire history, changes to hydrology and other disturbance, therefore the substantial cover of exotic species in the understorey of RFEF across the study area indicates this community has previously been disturbed.

The site inspection revealed that remnant woodland vegetation occurring across the study area included the canopy species; Forest Red Gum (*Eucalyptus tereticornis*), Grey Box (*E. moluccana*) and Thin-leaved Ironbark (*E.*

crebra). These species are diagnostic of the EECs; SSTF and CPW (Photograph A.3). The understorey of these mapped communities is also considered to be highly degraded, with significant infestations of African Boxthorn (*Lycium ferocissimum*), Blackberry (*Rubus fruticosus* agg. spp.), Scotch Thistle (*Onopordum acanthium*) and Kikuyu Grass (*Pennisetum clandestinum*) (Photograph A.4). The substantial cover of exotic species in the understorey of SSTF and CPW across the study area indicates these communities have previously been disturbed.

Livestock grazing continues to occur in the study area. This has resulted in significant disturbance to the native understorey of these EECs.

Apart from the communities mapped as EECs by NPWS, the majority of the study area has been cleared of native vegetation and supports open grassland dominated by exotic species and pasture grass (see Photograph A.5). Scattered *Eucalyptus* trees are present across the study area.



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Legend

Wollondilly development site

Ecological communities

- 1 - Shale Sandstone Transition Forest (Low Sandstone Influence)
- 2 - Shale Sandstone Transition Forest (High Sandstone Influence)
- 9 - Shale Hills Woodland
- 10 - Shale Plains Woodland
- 11 - Alluvial Woodland
- 12 - Riparian Forest

Vegetation Condition Classes

- canopy cover >10% (unless remnant where canopy cover >5%)
- canopy cover <10%

R0 Preliminary Issue 14-07-08 JF
 Suffix Revision Date Init

Client: Macquarie Group of Companies
 Project: Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.
 Drawing No: 0087207s_GIS11 Suffix No: R0
 Date: 14/07/2008 Drawing size: A4
 Drawn by: JF Reviewed by: RG
 Source: NSW NPWS
 Scale: Refer to Scale Bar



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Figure 3.1

Endangered Ecological Communities across the Wollondilly Development Area

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3.2.2

Fauna Habitat

Terrestrial fauna habitat observed across the study area included areas of native woodland and cleared, open grassland with patches of isolated trees. Aquatic habitat was present across the study area in the form of farm dams (see *Photograph A.6*), ephemeral water courses and the Nepean River. Several native water birds were observed on the dams, including the Black Swan (*Cygnus atratus*), the Hardhead (*Aythya australis*) and the Dusky Moorhen (*Gallinula tenebrosa*). In addition, some of the farm dams contained the bullrush *Typha* spp., which is known as preferred habitat for the Green and Gold Bell Frog (*Litoria aurea*), listed as endangered under the TSC Act and vulnerable under the EPBC Act, (NPWS 1999).

Hollow-bearing trees and stags (standing dead trees), which provide roosting/breeding habitat for birds, bats and arboreal mammals, including threatened species, were frequently observed across the study area (see *Photograph A.7*). Fallen logs and leaf litter were not significant features of the understorey of remnant woodland areas, which is likely to be a result of the ongoing disturbance of the understorey (see *Section 2.3.4*).

3.2.3

Threatened Species

Table 3.1 lists threatened species that have previously been recorded or have been identified as having the potential to occur in the locality (10 km radius of the study area).

Flora

No threatened flora species have previously been recorded in the study area. However, a total of 15 threatened flora species have been recorded within the locality of the study area. An additional four species have been identified as having the potential to occur.

Fauna

Four threatened fauna species have previously been recorded in the study area, including the Cumberland Plain Land Snail (*Meridolum corneovirens*), the Large-footed Myotis (*Myotis adversus*) (a microchiropteran bat), the Grey-headed Flying-fox (*Pteropus poliocephalus*) and the Glossy Black Cockatoo (*Calyptorhynchus lathami*). A total of 31 threatened fauna species have been recorded within the locality of the study area. An additional 11 species have been identified as having the potential to occur.

The species identified as having the potential to occur within the study area include 19 species of birds, eight species of bats, eight species of terrestrial mammals, five species of frogs, two species of reptiles and two species of fish.

Twelve EPBC listed migratory bird species also have the potential to occur in the study area (Table3.2).

Likelihood of Threatened Species at the Subject Sites

Given that the study area supports native woodland and riparian vegetation communities, with characteristic canopy species in relatively good condition and of relatively high conservation significance, the majority of the threatened flora and fauna species and migratory species noted above are considered to have the potential to occur in the study area.

The site inspection revealed the presence of aquatic habitat that may provide potential habitat for the threatened frog species. Habitat for the majority of the threatened species is most likely restricted to more the heavily vegetated, less disturbed areas of the study area. However, the occurrence of these threatened and migratory species on the subject site will depend on the presence and condition of suitable habitat and specific microhabitat requirements.

Targeted threatened species surveys in the appropriate season would be required to determine the likely presence of each of these species within the study area.

The study area is located within Wollondilly Shire Local Government Area which is listed in Schedule 1 of State Environmental Planning Policy 44 – Koala Habitat Protection. Given the presence of remnant native woodland and canopy trees, and that Koalas have been recorded within the locality, there is the potential for Koala habitat to be present in the study area.

Table3.1 *Threatened species recorded on site (x), in the locality (L) or has the potential (p) to occur in the locality of the study area*

Scientific Name	Common Name	Status		Record
		TSC	EPBC	
Flora				
<i>Thesium australe</i>	Austral Toadflax	Vu	Vu	L
<i>Genoplesium baueri</i>	Bauer's Midge Orchid	Vu	-	L
<i>Cynanchum elegans</i>	White-flowered Wax Plant	En	En	L
<i>Leucopogon exolasius</i>	Woronora Beard-heath	Vu	Vu	P
<i>Melaleuca deanei</i>	Deane's Maleluca/Paperback	Vu	Vu	L
<i>Eucalyptus benthamii</i>	Camden White Gum	Vu	Vu	L
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	En	En	L
<i>Grevillea parviflora subsp. parviflora</i>	Small-flower Grevillea	Vu	Vu	L
<i>Persoonia bargoensis</i>	Bargo Geebung	En	Vu	L
<i>Persoonia hirsuta</i>	Hairy Geebung	En	En	L
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Vu	Vu	L
<i>Pultenaea pedunculata</i>	Matted Bush-pea	En	-	L
<i>Pimelea spicata</i>	Spiked Rice-flower	En	En	L
<i>Pomaderris brunnea</i>	Brown Pomaderris	Vu	Vu	L
<i>Acacia bynoeana</i>	Bynoe's Wattle, Tiny Wattle	En	Vu	L
<i>Caladenia tessellata</i>	Thick-lipped Spider-orchid	En	Vu	P
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	Vu	Vu	P
<i>Persoonia nutans</i>	Nodding Geebung	En	En	L

Scientific Name	Common Name	Status		Record
<i>Pultenaea aristata</i>	Prickly Bush-pea	Vu	Vu	P
Fauna				
<u>Birds</u>				
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	En	-	L
<i>Stictonetta naevosa</i>	Freckled Duck	Vu	-	L
<i>Burhinus grallarius</i>	Bush Stone-curlew	En	-	L
<i>Sterna albifrons</i>	Little Tern	En	-	P
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Vu	-	L
<i>Calyptrorhynchus lathamii</i>	Glossy Black-Cockatoo	Vu	-	X
<i>Lathamus discolor</i>	Swift Parrot	En	En	L
<i>Neophema pulchella</i>	Turquoise Parrot	Vu	-	L
<i>Pachycephala olivacea</i>	Olive Whistler	Vu	-	P
<i>Ninox connivens</i>	Barking Owl	Vu	-	L
<i>Ninox strenua</i>	Powerful Owl	Vu	-	L
<i>Tyto novaehollandiae</i>	Masked Owl	Vu	-	P
<i>Climacteris picumnus</i>	Brown Treecreeper	Vu	-	L
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern sub-species)	Vu	-	L
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	Vu	-	L
<i>Rostratula australis</i>	Australian Painted Snipe	-	Vu	P
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	Vu	-	L
<i>Xanthomyza phrygia</i>	Regent Honeyeater	En	En, Mi	L
<i>Melanodryas cucullata</i>	Hooded Robin	Vu	-	L
<i>Stagonopleura guttata</i>	Diamond Firetail	Vu	-	L
<u>Mammals</u>				
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Vu	En	L
<i>Phascolarctos cinereus</i>	Koala	Vu	-	L
<i>Petaurus australis</i>	Yellow-bellied Glider	Vu	-	L
<i>Petaurus norfolcensis</i>	Squirrel Glider	Vu	-	L
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vu	Vu	X
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	Vu	-	L
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vu	Vu	L
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	Vu	-	L
<i>Myotis adonis</i>	Large-footed Myotis	Vu	-	X
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Vu	-	L
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vu	-	L
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Vu	-	L
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot	En	En	P
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	En	Vu	P
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	Vu	Vu	P
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Vu	-	L
<u>Frogs</u>				
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Vu	Vu	L
<i>Litoria aurea</i>	Green and Gold Bell Frog	En	Vu	P
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	Vu	Vu	P
<i>Mixophyes balbus</i>	Stuttering Frog	En	Vu	P
<i>Pseudophryne australis</i>	Red-crowned Toadlet	Vu	-	L
<u>Reptiles</u>				
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	En	Vu	L
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Vu	-	L

Scientific Name	Common Name	Status		Record
<u>Fishes</u>				
<i>Macquaria australasica</i>	Macquarie Perch	Vu	En	L
<i>Prototroctes maraena</i>	Australian Grayling	-	Vu	P
<u>Invertebrates</u>				
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	En	En	X

Table3.2 *EPBC listed migratory bird species potentially occurring in the study area*

Scientific Name	Common name	Record
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	P
<i>Hirundapus caudacutus</i>	White-throated Needletail	P
<i>Merops ornatus</i>	Rainbow-Bee-eater	P
<i>Monarcha melanopsis</i>	Black-faced Monarch	P
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	P
<i>Rhipidura rufifrons</i>	Rufous Fantail	P
<i>Ardea alba</i>	Great Egret, White Egret	P
<i>Ardea ibis</i>	Cattle Egret	P
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	P
<i>Sterna albifrons</i>	Little Tern	P
<i>Rostratula benghalensis s. lat.</i>	Painted Snipe	P
<i>Apus Pacificus</i>	Fork-tailed Swift	P

3.2.4 Constraints

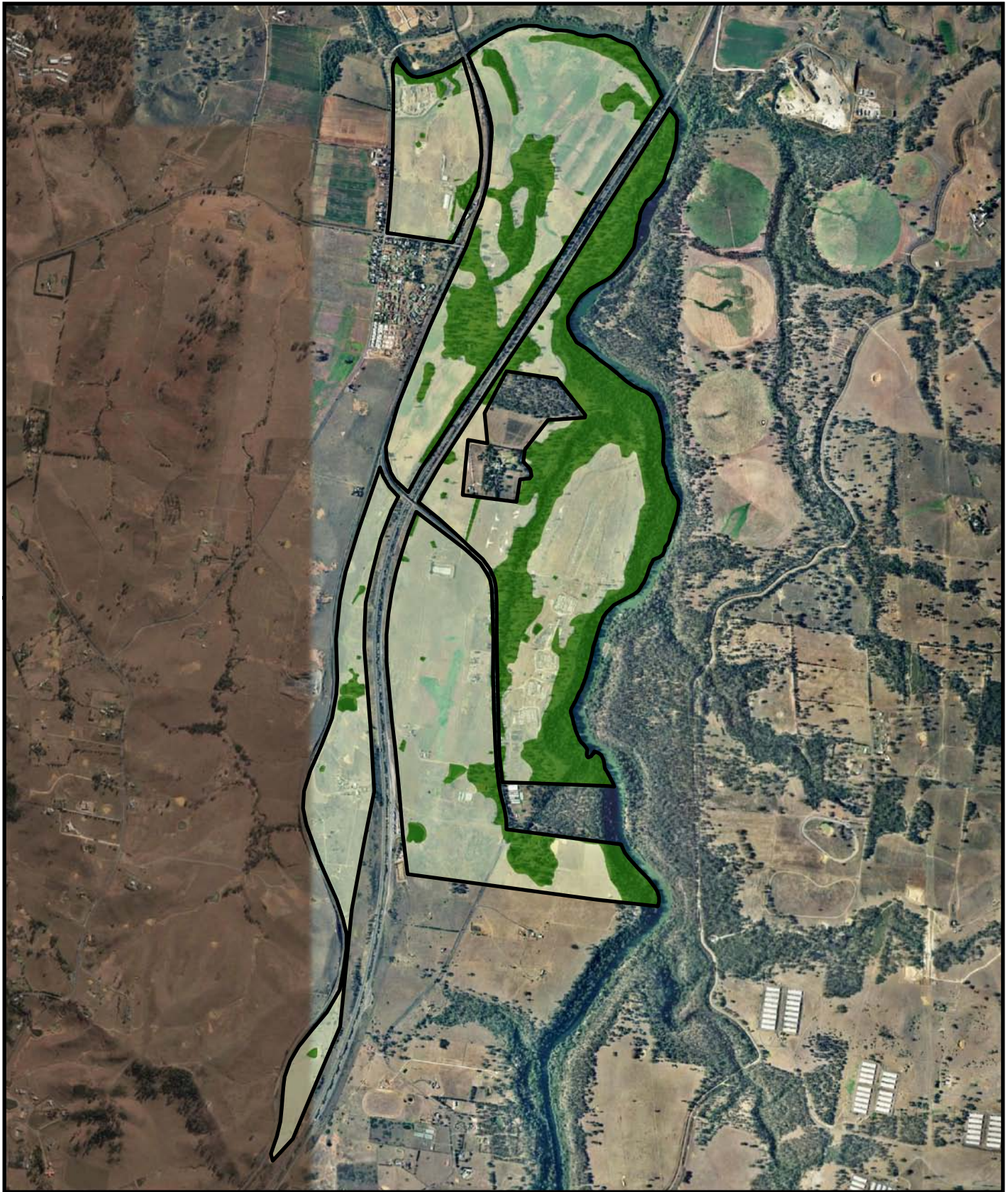
Figure 3.2 shows broad areas of ecological constraint in the study. Constraints have been classified as high, medium or low based on their recognised conservation value and the presence/potential presence of habitat/habitat features that may provide resources for threatened species.

High ecological constraints to development include the areas of remnant native vegetation identified as EECs, as mapped by NPWS. These areas also have the greatest potential to provide habitat for threatened (and non-threatened) flora and fauna. Riparian Corridors are presently mapped as an EEC; the RFEF, and are mapped as 'high' constraints to development. However, the protection of riparian corridors should be considered, regardless of the type of vegetation community present. Riparian corridors provide a protective barrier of vegetation, reducing the potential for contamination and sediment to enter water courses.

Other remnant vegetation, including scattered *Eucalyptus* trees that are not included in EECs as mapped by NPWS, are mapped as 'high' constraints to development. Large remnant *Eucalyptus* trees are a valuable resource for native fauna as they provide feeding and breeding resources for birds and mammals.

Aquatic habitat including creeks, watercourses and the Nepean River are also mapped as high constraint due to their potential to provide habitat for threatened frogs and the presence of remnant riparian vegetation.

For the purposes of this assessment the dams have also been mapped as high constraint due to their potential to provide habitat for threatened frogs and foraging habitat for threatened bats. Further assessment of the dams would be required to determine if they support suitable habitat for each of the threatened frog species. If no suitable habitat is present, the dams would present a moderate constraint to development. Areas identified as 'low' constraint include previously disturbed and cleared areas that are less likely to support suitable habitat for threatened species.



Legend

- Wollondilly development site
- Low constraints
- High constraints

R0	Preliminary Issue	10-07-08	JF
R1	Constraint Edits	20-07-08	JF
Suffix	Revision	Date	Init

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS08	Suffix No:	R1
Date:	20/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	RG
Source:	Google Earth Pro		
Scale:	Refer to Scale Bar		



0 300 600 900m

Figure 3.2

Ecological constraints within the Wollondilly Development Area

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Ecological constraints to development within the study area include the areas of remnant native vegetation identified as EECs and aquatic habitat including watercourses and dams. The remnant EECs are considered of high conservation value and the EECs and aquatic habitat have the potential to provide habitat for threatened and non-threatened flora and fauna. The classification of the dams as high constraint will depend on whether they support suitable habitat for the threatened frog species and foraging habitat for threatened bats. Further assessment of the habitat present at the dams would be required to determine this.

Recommended measures to mitigate potential impacts of development to native flora and fauna at the subject sites include;

- retention and protect EECs in 'high' constraint areas within conservation areas;
- provide a buffer for 'high' constraint areas (namely the EECs of high conservation value and the watercourses). The width of the buffer area will be determined upon the nature of the adjacent land use;
- retention and protect aquatic habitat and watercourses for native frogs and waterbirds;
- protect watercourses and associated riparian vegetation to maintain water quality and protect potential habitat for threatened and non-threatened native flora and fauna;
- retain hollow-bearing trees and stags (dead standing trees) wherever possible;
- undertake weed management during and after construction to minimise the incursion of weeds into the EECs and within the watercourses.

The significance of impacts to individual species and EECs will depend on the proposed extent of vegetation clearance in the study area and impacts to the aquatic habitat. Therefore, it is recommended that development in the study area be sited and designed in such a way as to minimise the potential for significant impacts to these areas (identified as 'high' constraint areas). A comprehensive impact assessment will be required once the master plan has been finalised.

This chapter contains a desktop analysis of bushfire constraints within the study area based on the requirements of *Planning for Bushfire Protection* (PBP) (RFS 2006).

Specifically, this report; identifies Bushfire Prone Land (BPL) occurring within the study area, provides an assessment of the risk of bushfire attack within the study area, and provides recommendations on likely Asset Protection Zone (APZ) requirements and construction standards, as per the requirements of PBP, based on the calculated risk of bushfire attack.

4.1

METHODOLOGY

The following information sources were reviewed:

- bushfire prone land mapping for the study area from the Wollondilly Shire Council;
- vegetation mapping (NPWS 2002);
- Department of Environment and Climate Change (DECC) Wildlife Atlas Database for threatened species and endangered ecological communities previously recorded within a 10 km radius of the study area (the 'locality') with the potential to occur within the study area;
- topographic maps and aerial photographs of the study area and region; and
- *Planning for Bushfire Protection* (RFS 2006).

Based on the above information sources, a map identifying Bushfire Prone Land (BPL), likely APZ requirements and resulting building envelopes was produced.

A site visit was undertaken by an ERM ecologist on 3rd July 2008 to assess vegetation type and slope of the land in the study area.

4.1.1

Statutory Context

Planning For Bushfire Protection 2006

Planning for Bushfire Protection (RFS 2006) provides the overall framework for protecting all classes of development on land that is classified as BPL and identified on a council's BPL map. BPL includes land within 100 m of medium and high hazard areas and within 30 m of low hazard areas.

The aims and objectives of BPL are to use the NSW development assessment system to provide for the protection of human life (including firefighters) and

to minimise impacts on property from the threat of bushfire, while having due regard to development potential, on-site amenity and protection of the environment. Specifically, the objectives are to:

- afford occupants of any building adequate protection from exposure to a bushfire;
- provide for a defensible space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;
- ensure that safe operational access and egress for emergency service personnel and residents is available;
- provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in APZ; and
- ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).

Applicants must demonstrate to the RFS or the consent authority that proposals satisfy the broad aim and objectives detailed above, the specific objectives for the development type, and performance criteria for the proposed bushfire protection measures.

The Building Code of Australia

Development on BPL also needs to meet any bushfire construction requirements under *Australian Standard 3959 - 1999 Construction of Buildings in Bushfire-prone Area* (AS 3959-1999) (Standards Australia 2007), which provides construction requirements for dwellings within bush fire prone lands.

The construction requirements of AS 3959-1999 are accepted by *Planning for Bushfire Protection 2006* as the construction standard for buildings in designated bushfire prone areas. In addition, AS 3959-1999 has been amended with a NSW specific variation to include a site assessment methodology (Appendix 3 of *Planning for Bushfire Protection 2006*), which replaces Section 2 of the AS 3959 - 1999 when determining bushfire attack and the construction levels required.

Development Assessment Framework and Structure

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) requires councils to map BPL. If any part of a development site is affected, this needs to be considered in determining the suitability of the land for the particular purpose at rezoning stage. Special submission and assessment requirements may apply to the development application (DA).

Section 79BA of the EP&A Act requires the consent authority to take *Planning for Bushfire Protection 2006* (RFS 2006) into consideration when determining a DA and, where 'acceptable solutions' cannot be achieved, requires, consultation by the consent authority with the RFS.

Advice to the consent authority from the RFS is intended to provide a performance-based assessment to assist the consent authority in arriving at a determination of the proposal.

TSC And EPBC Acts

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Threatened Species Conservation Act 1995* (TSC Act) provide for the protection of Commonwealth and NSW threatened flora and fauna species and endangered ecological communities. All fire mitigation activities (e.g creation and maintenance of APZs) must address the environmental consequences of the activity on threatened species within the area, or with the potential to occur in the area.

4.2 KEY FINDINGS

The following section present the findings from; the bushfire prone land mapping, bushfire risk and construction requirements, asset protection areas, threatened species and endangered ecological communities, and constraints mapping.

4.2.1 Bush Fire Prone Land Mapping

Bushfire prone land within the study area is shown in *Figure 4.1*.

The entire eastern and northern boundaries of the study area are mapped as BPL, due to the dense vegetation of the riparian zone along the Nepean River. In addition, the area between the Nepean River and the Hume Highway is also mapped as BPL, which is associated with another riparian zone.

Riparian vegetation in the study area comprises Vegetation Category 1 which represents a high/medium bush fire hazard. As a result, the land within 100 m of the bushfire hazard is also mapped as BPL.

For development sited on parts of the study area that have been identified as BPL, the risk of bushfire attack, construction requirements and APZs requirements need to be considered in the development design. The risk of bushfire attack and required APZs are dependant on the slope of the land, the type of vegetation present on and surrounding the study area and the type of development to be constructed.

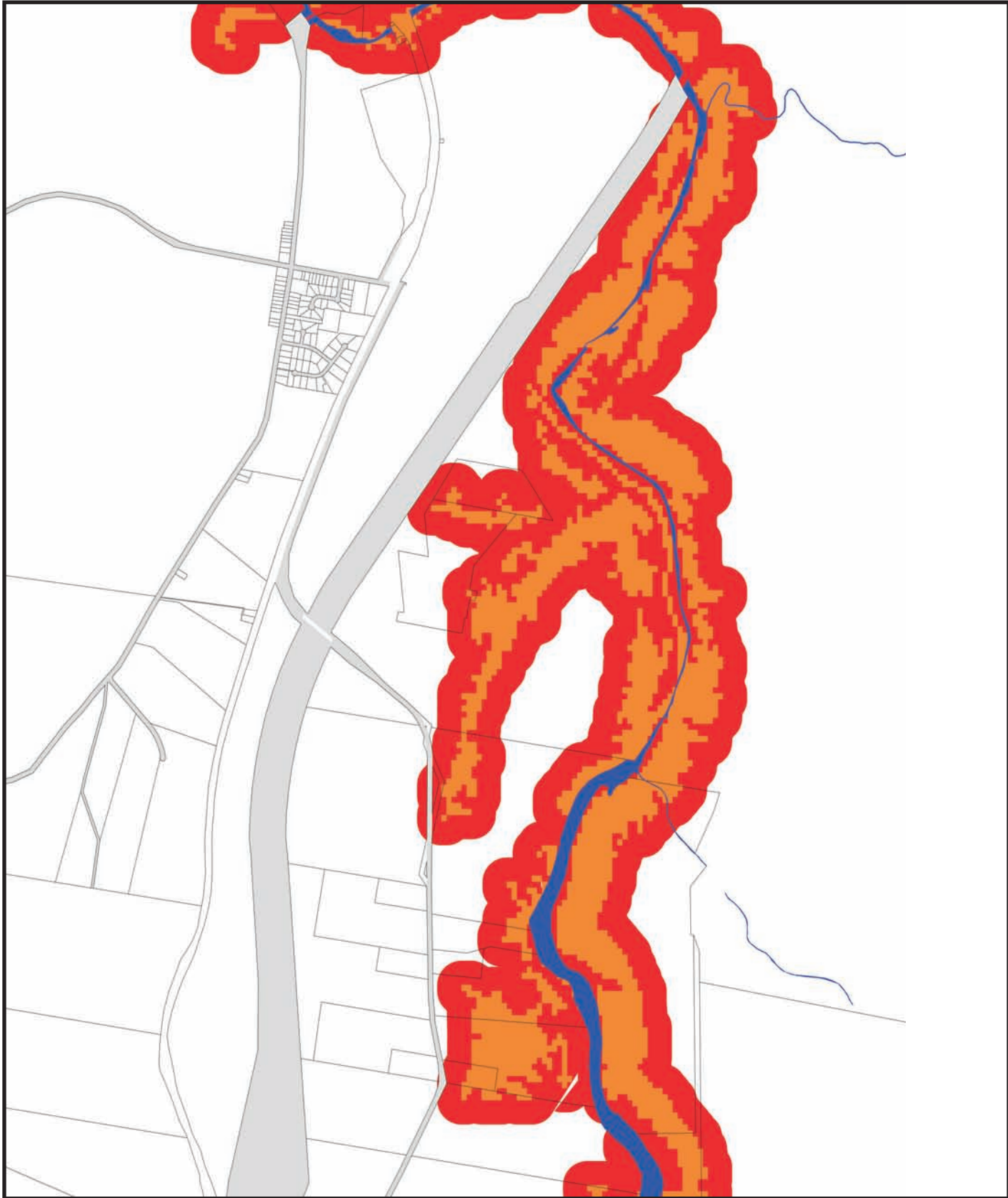


Figure 4.1

Bushfire Prone Land (BPL) within the Wollondilly Development Area

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Legend

- Bush Fire Prone Land - Vegetation Category 1
- Bush Fire Prone Land - Vegetation Buffer

Client:	Macquarie Group of Companies	
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW	
Drawing No:	0087207s_02	
Date:	21/07/2008	Drawing size: A4
Drawn by:	ML	Reviewed by: -
Source:	-	
Scale:	Not to Scale	



4.2.2

Asset Protection Zone

Asset Protection Zones (APZs) required by a development for either residential/rural residential subdivision purposes or Special Fire Protection Purposes (SFPP) on BPL within the study area have been determined based on the PBP guidelines (RFS 2006) (*Table 4.1*).

APZ requirements for certain types of industrial development (that do not accommodate any residential facilities) on BPL are not prescribed within PBP. However, development must satisfy the aims and objectives of PBP. Therefore, for the purposes of this preliminary assessment, the APZs specified for residential/rural residential subdivision have been used for industrial development.

A Fire Danger Index (FDI) rating has been determined by the NSW RFS for fire areas and council areas across NSW, assumed for a 1 in 50 year event (*Table A2.3*, RFS 2006). Wollondilly has been determined to have an FDI rating of 100 for a 1 in 50 year event. The minimum specifications for APZs are shown in *Table 4.1*.

Table 4.1 *Recommended specifications for APZs required for developments within the study area*

Vegetation Type	Type of Development	FDI	Effective Slope	
			5-10°	10-15°
Woodland	Residential/rural residential	100	20 m	25 m
Woodland	Industrial	100	20 m	25 m
Woodland	Special Fire Protection Purposes (SFPP)	BPL	60 m	70 m

Developments on grasslands or with grasslands within 100 m of any boundary (subdivision) or buildings (SFPPs) do not require construction requirements in conformity with PBP. However, the NSW Rural Fire Service supports a basic APZ of 10 m for these situations (RFS 2006).

4.2.3

Threatened Species and Endangered Ecological Communities

Fire mitigation activities (e.g creation and maintenance of APZs) must also address the environmental consequences of the activity on threatened species and endangered ecological communities (EECs).

Remnant native vegetation in the study area has previously been mapped and identified as containing a number of EECs of high conservation value (NPWS 2002) (Ecological Constraints assessment, see *Chapter 3, Figure 3.1*). These areas of remnant vegetation provide potential habitat for threatened flora and fauna that have previously been recorded within 10 km of the study area. The study area also supports riparian and aquatic habitats that may provide potential habitat for threatened flora and fauna.

Therefore, developments should be sited such that impacts from fire mitigation activities to EECs and any potential habitat for threatened flora and fauna are minimised.

Whilst the remnant woodland EEC is not mapped as bushfire prone land, these are areas of potential hazard and consideration should be given to providing for bushfire protection measures.

4.3 *CONCLUSION*

Parts of the study area are identified as BPL which poses a constraint to development. These are summarised below.

- BPL mapped within the study area includes vegetation considered to be medium/high hazard and thus includes land within 100 m of the hazard (buffer zone).
- Developments sited on land identified as BPL must be assessed under PBP. This includes an assessment of the risk of bushfire attack, relevant construction standards and specifications regarding APZs; the specifics of which will depend on the type and siting of the development.
- Clearing for APZs needs to consider the ecological value of the land (refer to Chapter 3).

This chapter contains information on the Indigenous heritage constraints and development opportunities at the study area. These constraints are based on desktop analysis of databases and previous archaeological investigations into the area which was used to prepare a predictive model.

5.1**METHODOLOGY**

This assessment identifies whether there are any potential Aboriginal heritage constraints associated with the proposed development. The following items were examined:

- the environmental context of the study area;
- the history of disturbance in the study area;
- searches for recorded Aboriginal sites in the local area; and
- results of previous relevant local archaeological studies.

This information was used to prepare a predictive Aboriginal heritage site model and identify potential areas of constraint within the study area.

5.1.1***Relevant Legislation***

Aboriginal cultural heritage in NSW is protected by the *National Parks and Wildlife Act 1974* (NPW Act). Land managers are required to consider the effects of their activities or proposed development on the environment under several pieces of legislation, principally the EP&A Act. Cultural heritage, which includes Aboriginal heritage, is subsumed within the definition of “environment”. Commonwealth legislation, the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*, may also apply to Aboriginal heritage places in NSW in certain circumstances. Key legislation is summarised below.

National Parks And Wildlife Act 1974 (NSW)

All Aboriginal objects within the state of New South Wales are protected under Section 90 of the NPW Act.

Under Section 5 of the NPW Act, “Aboriginal Object” means any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Sites of traditional significance that do not necessarily contain archaeological materials may be gazetted as “Aboriginal places” and are protected under

Section 84 of the NPW Act. This protection applies to all sites, regardless of their significance or land tenure. Under Section 90, a person who, without first obtaining the consent of the Director-General, knowingly destroys, defaces or damages, or knowingly causes or permits the destruction or defacement of or damage to, an Aboriginal object or Aboriginal place is guilty of an offence.

Amendments introduced by the *National Parks & Wildlife Amendment Act 2001* which strengthen the provisions of Section 90 have yet to commence.

The Department of Environment and Climate Change is the statutory authority for the protection of Aboriginal objects and places within NSW, with the Director-General of that department the consent authority.

Environmental Planning And Assessment Act 1979 (NSW)

The EP&A Act requires that environmental impacts are considered in land-use planning, including impacts on Aboriginal and historical heritage. Various planning instruments prepared under the Act identify permissible land use and development constraints.

The NSW DECCs provides guidelines for Aboriginal heritage assessment, including those conducted under the EP&A Act 1979. Where Aboriginal heritage assessment is conducted under the Integrated Development Approval process, a more detailed set of guidelines applies.

Where a development is approved under Part 3A of the Act, further approvals under the *National Parks & Wildlife Act 1974* and *Heritage Act 1977* are not required. In those instances management of heritage sites must follow the statement of commitments included in the Part 3A development approval.

Aboriginal And Torres Strait Islander Heritage Protection Act 1984 (Commonwealth)

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* protects areas and/or objects which are of significance to Aboriginal people and which are under threat of destruction. The Act can, in certain circumstances override state and territory provisions, or it can be implemented in circumstances where state or territory provisions are lacking or are not enforced. A significant area or object is defined as one that is of particular importance to Aboriginal people according to Aboriginal tradition. The Act must be invoked by or on behalf of an Aboriginal or Torres Strait Islander or organisation.

5.2 KEY FINDINGS

5.2.1 *Geology*

ERM (2007) report has provided a geological context of the study area:

“Reference to the 1:250 000 Wollongong Geological Series Sheet SI 56-9 (Second Edition), 1966 indicated the site is underlain by the Quaternary Alluvium including gravel, swamp deposits and sand dunes and the Liverpool Sub-Group and Hawkesbury Sandstone of the Wianamatta geological grouping. The Liverpool Sub-Group is characterised as shale with some sandstone beds, and Hawkesbury Sandstone consists of quartz sandstone with some shale”.

Stone materials suitable for the manufacture of Aboriginal objects such as chert, quartzite, quartz, injurated mudstone and basalt can be found in the nearby Nepean River and silcrete can be found on the Cumberland Plain (Corkill & Edgar 1991: 3).

Soils are generally clayey deposits created from the eroding shales and sandstone and are overlain with alluvium in low lying areas. As such, these areas could exhibit stratified soils.

5.2.2 *Landform & Water Sources*

The dominant landform of the study area is a flat plain with low hills. This is in contrast to the very steep banks of the Nepean River which are almost vertical along the north and east boundaries of the study area. The Nepean River is the major local water source. One small first order creek runs south to north along the western border of the study area and drains into the Nepean River.

5.2.3 *Fauna and Flora*

As discussed in *Chapter 3* three vegetation communities have been identified in the study area: Shale/Sandstone Transition Forest (SSTF), Cumberland Plain Woodland (CPW) and River-Flat Eucalypt Forest on Coastal Floodplains (RFEF). Flora observed during the ground truthing survey included Forest Red Gum, Rough-barked Apple River Oak, Grey Box and Thin-leaved Ironbark as well as abundant native forbs, grasses and scramblers.

The Nepean River would have supported a number of native aquatic species including water birds, fish, turtles and frogs. The surrounding woodlands would also have supported a number of mammalian species, reptiles and many bird species.

5.2.4

Previous Land Use

The study area has a history of farming which will have impacted on the integrity of the native flora and the condition of the soil surface. Much of the native vegetation in the study area has been cleared for farming. The impact on the Aboriginal archaeology is disturbance of the upper soil horizons as well as possible disturbance to the integrity of lower subsurface deposits. Historical land use such as the creation of land boundaries, buildings and rubbish dumps may also have impacted on the integrity of Aboriginal sites in the area.

Historic aerial photography, acquired for the Phase 1 Contamination Assessment for the years between 1966 and 2005, shows extensive clearing for farming and grazing on the northern and western areas of the study area evident in 1966 (ERM 2007). The main impact on the study area between 1966 and 2005 which could affect Aboriginal heritage sites appears to be clearing of the of remnant vegetation on the eastern side of the study area and construction of a piggery (now demolished).

Remnant vegetation in the study area along the banks of the Nepean appears to be the only part of the study area not impacted to some degree by European occupation.

5.2.5

Implication for Archaeology

The presence of sandstone in the local area may mean that any accessible outcrops could contain grinding grooves, resulting from the sharpening of stone tools, especially near water. The Nepean River on the northern and eastern borders of the study area would have been important as a drinking water source for people, as well as supporting numerous edible or otherwise useful species of fauna and flora. The Nepean has been identified as carrying raw stone materials like chert and quartz. It may have been used as a source of material for stone tool manufacturing.

Although a number of tree species such as eucalypts have the possibility of carrying evidence of Aboriginal cultural scars, extensive land clearing would suggest that the chance of any such trees still existing is low across the main body of the study area, but is possible along the river banks.

The majority of the land contained within the study area has been cleared and used for farming for a long period of time. Therefore, although Aboriginal occupation of the area may have been extensive, whatever remains exist in the study area are likely to be at least partially impacted, albeit at a low level in some areas.

The purpose of this section is to provide Aboriginal archaeological background information for use in developing a predictive model of Aboriginal site locations in the study area. *Table 5.1* defines the type Aboriginal sites which could be found in the study area.

Table 5.1 *Aboriginal Archaeological Site Types*

Site types	Definition
Lithic scatters	Lithic scatter sites, also known as open campsites or stone artefact scatters, are usually indicated by surface scatters of stone artefacts and sometimes fire blackened stones and charcoal. Where such sites are buried by sediment they may not be noticeable unless exposed by erosion or disturbed by modern activities. The term campsite is used as a convenient label which, in the case of open sites, does not necessarily imply that Aboriginal people camped on the sites; rather it indicates that some type of activity was carried out there.
Isolated finds	Sites consisting of only one identified stone artefact, isolated from any other artefacts or archaeological evidence. They are generally indicative of sporadic past Aboriginal use of an area.
Shelter sites	Sandstone shelters and overhangs were used by Aboriginal people to provide campsites sheltered from the rain and sun. The deposits in such sites are commonly very important because they often contain clearly stratified material in a good state of preservation.
Art sites	Aboriginal paintings, drawings and stencils are commonly to be found where suitable surfaces occur in sandstone shelters and overhangs. These sites are often referred to as rock shelters with painted art. Rock engravings, carvings or peckings are also to be found on sandstone surfaces both in the open and in shelters. These are referred to as rock engraving sites.
Scarred trees	Scarred trees bear the marks of bark and wood removal for utilisation as canoes, shelters, shields, boomerangs or containers. It is commonly very difficult to confidently distinguish between Aboriginal scars and natural scars or those made by Europeans.
Grinding grooves	Grooves resulting from the grinding of stone axes or other implements are found on flat areas of suitable sandstone. They are often located near waterholes or creek beds as water is necessary in the sharpening process. In areas where suitable outcrops of rock were not available, transportable pieces of sandstone were used.
Quarries	These are areas where stone was obtained for flaked artefacts or ground-edge artefacts, or where ochre was obtained for rock paintings, body decoration or decorating wooden artefacts.
Burial sites	Burials may be of isolated individuals, or they may form complex burial grounds.
Stone arrangements, carved trees and ceremonial grounds	These site types are often interrelated. Stone arrangements range from simple cairns or piles of rocks to more elaborate arrangements; patterns of stone laid out to form circles and other designs, or standing slabs of rock held upright by stones around the base.

Site types	Definition
	Carved trees are trees with intricate geometric or linear patterns or representations of animals carved into their trunks. Ceremonial grounds and graves were often marked by such trees. Bora grounds are a common type of ceremonial site and they are generally associated with initiation ceremonies. They comprise two circles, generally edged with low banks of earth but sometimes of stone, a short distance apart and connected by a path.

Regional Archaeological Studies

The area around Menangle Park has been subjected to a number of archaeological studies, though the scope of this investigation was limited to previous reports held within the ERM reports library. Listed in *Table 5.2* is a summary of previous archaeological studies in the close proximity to the study area.

Table 5.2 *Previous Archaeological Studies Summary Table*

Author of Report	Distance from study area	Type of archaeological work	Locality	Details of sites recorded/recommendations
Hagland, L. 1985	5.5 km N	Preliminary Archaeological Assessment	Mt. Annan	A surface survey in the area of the now Mt. Annan Botanical Gardens revealed one artefact scatter and six isolated finds of materials including chert, injurated mudstone, quartzite, ochre and silcrete.
Hagland, L. 1989	6 km N	Preliminary Archaeological Investigation	Narellan	Two sites discovered either side of Narellan Creek during previous survey were test excavated. Over two hundred stone artefacts made from silcrete, injurated mudstone and quartz were recovered.
Hanrahan, J. 1982	7 km N	Stage 2 Survey	Curran's Hill/Menangle Park	Eight sites were discovered with one being a major lithic scatter containing materials unusual to the region; five were minor lithics scatters; and two were isolated finds. All eight sites have subsequently been destroyed under section 90 permits.
McDonald, J. 1996.	3 km N	Survey	Camden	Two new lithic scatters discovered and three re-discovered. Artefacts were primarily made of injurated mudstone with a few silcrete artefacts.

Within the immediate region of Menangle Park, the Nepean River appeared to have been the focus of Aboriginal occupation. The predominant Aboriginal site types include artefact scatters and isolated finds, as well as rock shelters with art and occupation as well as scarred trees.

Grinding grooves and zones identified with PADs also exist in the area albeit in fewer numbers. One shelter site was recorded as containing a midden.

It is suggested that any Aboriginal use of the study area is likely to have been in the form of resources exploitation, focusing on the diversity of fauna and flora resources offered by the Nepean River and surrounding woodland. More permanent occupation with an abundance of various art and shelter sites (see *Table 5.1* for descriptions).

Local Aboriginal Pattern

A search of the Aboriginal Heritage Information Management Systems (AHIMS) sites database at the DECC was undertaken on 4 July 2008 for an area of 10 km by 10 km around the study area. This search identified 83 recorded sites. None of these sites are located within the study area, as no systematic survey of the study area has occurred.

The AHIMS database describes Aboriginal sites according to site feature rather than site type. Sites may include several different features, as shown in *Table 5.3*. The feature AFT (artefact) refers to the presence of artefactual material which may be stone, bone, shell, ceramic or metal. Sites assigned this feature are typically stone artefact scatters or isolated artefacts. The sites listed in *Table 5.3* can be grouped into twelve site types: art sites with artefacts (open sites with features ART and AFT); artefact scatter/isolated find (sites with the feature AFT); grinding grooves (sites with the feature GDG); potential archaeological deposits (sites with the feature PAD); scarred or carved trees (sites with the feature TRE); rock shelter with art (sites with the feature ART); shelters with art and deposit (sites with the features ART and AFT); shelters with art, deposit and grinding grooves (enclosed sites with the features ART, AFT and GDG); shelters with art and PAD (enclosed sites with the features ART and PAD); shelters with deposit (enclosed sites with the feature AFT); shelters with midden (enclosed sites with the features AFT, ETM and SHL); and shelters with potential archaeological deposits (enclosed sites with the feature PAD). The numbers of recorded sites by site type are shown in *Table 5.4*.

Table 5.3 **Results from AHIMS Search- Count by Site Features**

Site Feature	Number of Sites
AFT (Artefact)	43
AFT, ETM, SHL (Midden)	1
ART (Art)	11
ART, AFT (Art and Artefacts)	6
ART, AFT, GDG (Art, Artefacts and Grinding Grooves)	1
ART, PAD (Art and PAD)	1
GDG (Grinding Grooves)	4
PAD (Potential Archaeological Deposit)	7
TRE (Scarred or Carved Tree)	9
Total	83

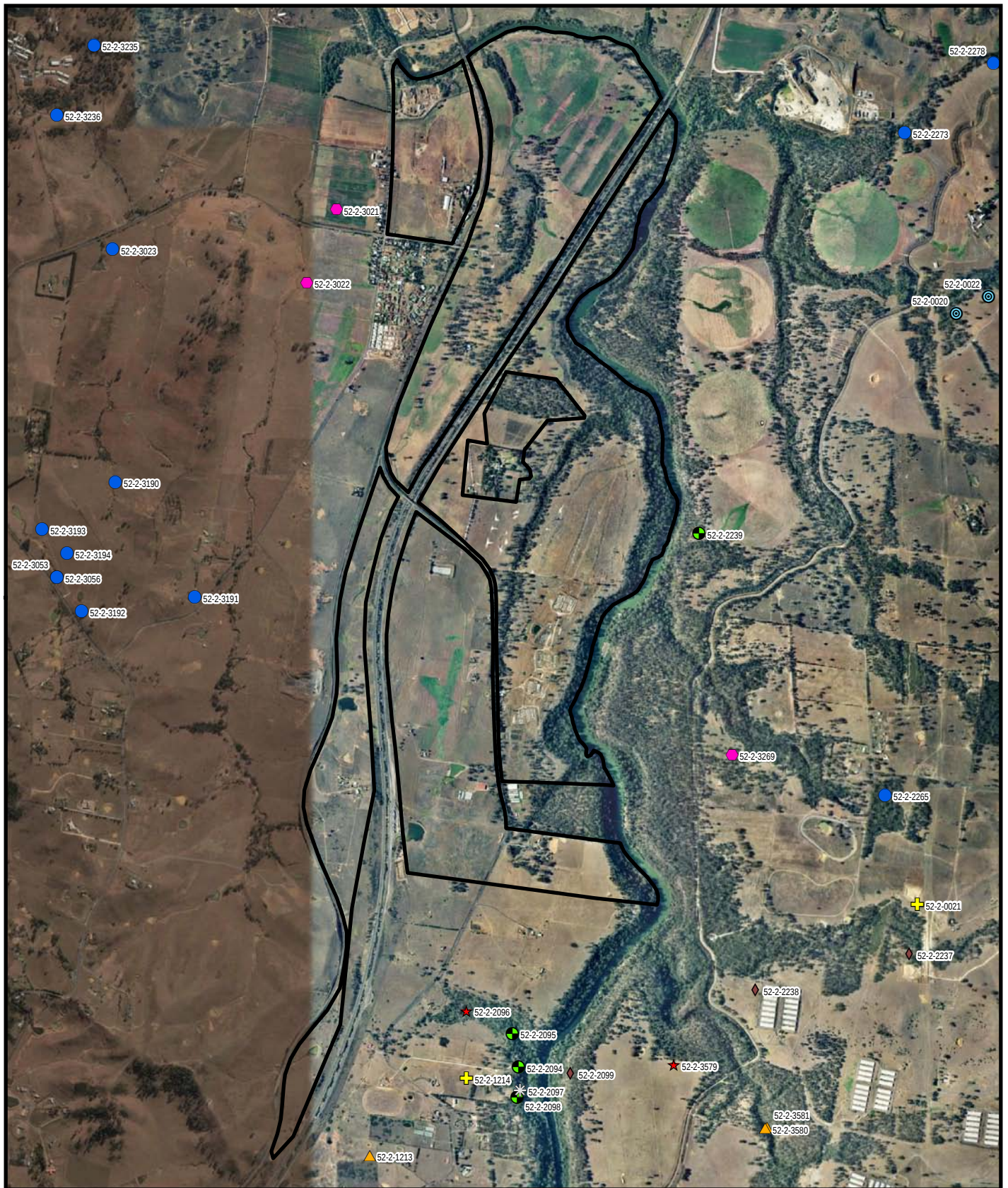
Table5.4 **Results from AHIMS Search- Count by Site Type**

Site Types	Number of Sites	% of Recorded Sites
Art with Artefacts	1	1.2%
Artefact Scatter/ Isolated Artefact	38	45.8%
Grinding Grooves	4	4.8%
Potential Archaeological Deposit	5	6%
Scarred Tree	9	10.8%
Shelter with Art	11	13.2%
Shelter with Art and Deposit	5	6%
Shelter with Art, Deposit and Grinding Grooves	1	1.2%
Shelter with Art and PAD	1	1.2%
Shelter with Deposit	5	6%
Shelter with Midden	1	1.2%
Shelter with PAD	2	2.4%
Total	83	

Although no Aboriginal sites have been recorded directly in the study area, see *Figure 5.1*, a number of different sites have been recorded in close proximity. Of particular interest is site 52-2-2239 which is a rock shelter with deposit. Archaeological deposits in rock shelters have particular significance as they have the potential to present high integrity evidence for long term occupation and may also provide insight into the people of that area. This site was recorded less than 100 m from the eastern boundary of the study area`.

Multiple other rock shelter sites, many containing art, deposits or other artefactual material were recorded within 1 km of the study area, generally within a few hundred meters of the Nepean River near the southern end of the study area. Also found in this area are a number of artefact scatters, grinding grooves and scarred trees indicating high intensity occupation around the Nepean River and its tributaries.

The majority of scarred trees recorded in the greater study area were found within 3 km of the study area to the north-west. Immediately to the west of the study area a number of lithic scatters, isolated finds and PADs, but no shelter sites, have been recorded.



Legend

- Wollondilly development site
- ▲ Grinding Groove
- Isolated Find
- + Lithics Scatter
- PAD
- ★ Scarred Tree
- ◎ Shelter with Art
- ◆ Shelter with Art and Deposit
- Shelter with Deposit
- ✿ Shelter with Midden

R0	Preliminary Issue	15-07-08	JF
Suffix	Revision	Date	Init

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS12	Suffix No:	R0
Date:	15/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JS
Source:	DECC		
Scale:	Refer to Scale Bar		



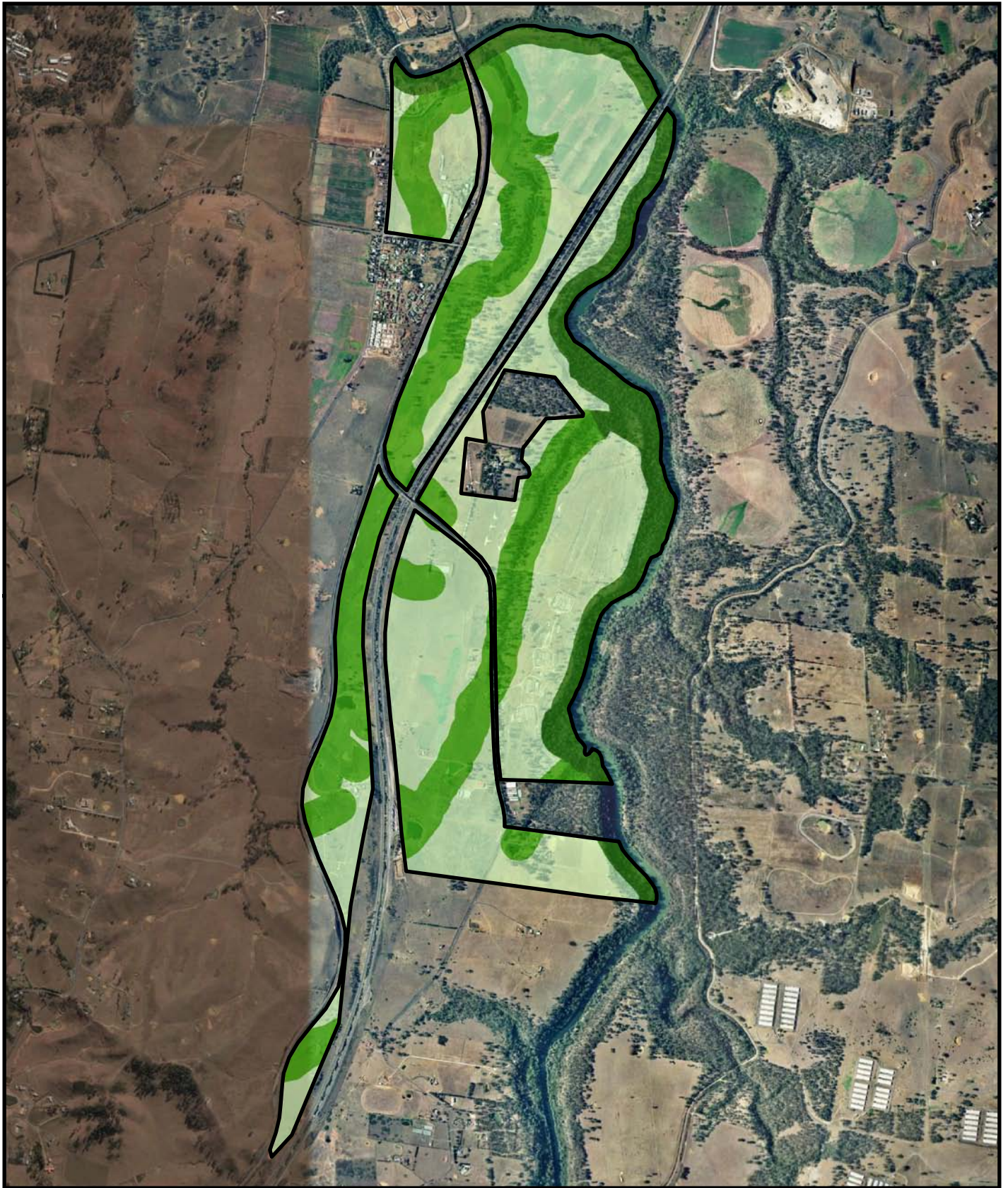
0 330 660 990m

Figure 5.1

AHIMS Search Results

Environmental Resources Management Australia Pty Ltd
Building C, 33 Saunders St, Pyrmont, NSW 2009
Telephone +61 2 8584 8888





Legend

- Wollondilly development site
- High potential
- Moderate potential
- Low potential

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS12	Suffix No:	R0
Date:	15/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JS
Source:	DECC		
Scale:	Refer to Scale Bar		



0 330 660 990m

Figure 5.2

Aboriginal Archaeological Potential Within the Study Area

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5.2.7

Implications for Study Area- Predictive Statement

As the study area has not been previously surveyed there is potential for unrecorded Aboriginal heritage sites to be present. Considering the regional and local site patterning there are several predictive statements that can be made about potential for Aboriginal heritage sites to occur.

Aboriginal sites that could occur in the study area are:

- shelter sites have been recorded close to the Nepean River and its tributaries, containing art, surface artefacts and archaeological deposits. It is therefore likely that other overhanging outcrops of rock along the river could have been used as a shelter site;
- scarred trees have been recorded in the area and thus some remnant trees of appropriate age and species have a potential to bear scars, though this is reasonably unlikely due to the extent of clearing in the area;
- where outcrops of sandstone occur along the river or its tributaries, grinding grooves may be found, though the ground truthing survey carried out by ERM indicated very few sandstone outcrops in the area;
- isolated finds and lithic scatters are also possible in the study area, especially on the banks of the river; and
- due to the impact of clearing and farming on the study area, it is likely that any Aboriginal sites that existed on the plains have either been destroyed or impacted. However, where remnant vegetation exists or close to tributaries of the Nepean River, Aboriginal heritage sites may still exist, with good condition and integrity.

5.3

ABORIGINAL HERITAGE CONCLUSION

The following conclusion is made in light of the findings of the, background research, predictive modelling, and the relevant legislation protecting historical and Aboriginal heritage in NSW.

Along the line of the Nepean River on the northern and eastern extents of the study area there is a high potential for Aboriginal heritage sites as demonstrated by the density of sites recorded further downstream. As it appears there has been little disturbance of these areas, any Aboriginal sites are likely to have high integrity. Land within 100m of the Nepean River is likely to have a high heritage potential. Survey of areas near the river which may be impacted by development are required to determine the presence of and assess any Aboriginal sites.

Other tributaries which run through the study area could also have been the focus for Aboriginal occupation and thus Aboriginal sites such as lithic

scatters may be found along their banks. These tributaries would likely have been eroded and have been partially impacted over the years by clearing and grazing and it is therefore suggested that the area around these creeks has a moderate level of archaeological potential.

Impact by farming on the majority of flat land within the study area has been widespread and will have impacted on any Aboriginal Heritage sites that exist in these areas. As Aboriginal sites tend to be closer to water sources, along ridges or in areas with particular resources, there is a lower likelihood for sites to exist in these areas. It is therefore suggested that these areas have low constraint potential. However, these zones could still contain isolated finds or low density artefact scatters which are protected under the *NPWS Act 1974*

Given the scope of this study as a preliminary, desktop investigation of constraints relating to Aboriginal heritage of the study area, the constraints outlined in the text and *Figure 5.2* below are considered to be potential only. If development was to proceed, it is recommended that further investigation and survey of the study area be undertaken in accordance with DECC guidelines and in conjunction with Aboriginal stakeholders.

For the purposes of this study, constraints have been simplified to the categories of high, moderate, low or none. In terms of Aboriginal heritage, these ratings are defined as:

- High – areas which have a high level of integrity with the soil horizons in good condition, are near environmental resources and are comparable to areas shown to contain Aboriginal heritage sites;
- Moderate – areas that have suffered some disturbance such as ploughing, grazing or low impact buildings (e.g. farm sheds without foundations) but are near resources, have intact landforms and are comparable to areas known to contain Aboriginal heritage sites;
- Low – landscape is impacted and/or is away from resources and/or no previously recorded sites exist in comparable landforms; and
- None – landscape has been heavily impacted by historic disturbance such as buildings, mining etc.

This chapter analyses the European heritage issues associated with the study area and, given its proximity, identifies both local and state significant heritage sites associated with the township of Menangle and its heritage. The study area is also located in the vicinity of heritage listed items.

The chapter provides an overview of the heritage sites and values within and affecting the study area, and identifies potential heritage constraints and opportunities associated with it.

6.1

METHODOLOGY

Preparation of the European heritage technical study has involved a review of site specific background information, including applicable legislative and regulatory frameworks, and a search of heritage registers and schedules.

A site visit to ground-truth findings of the desktop assessment and refine the extent of any identified European heritage constraints in the study area was undertaken on 3 July 2008. The site visit provided an insight into the potential heritage constraints that may affect development, and how the development site relates to the immediate surroundings. Key site elements were photographed during the site visit.

The following sources were used to undertake the desktop review:

- Wollondilly Shire Council Local Environmental Plan (LEP) 1991;
- Wollondilly Shire Council Development Control Plan (DCP) 1992;
- Wollondilly Shire Council Heritage Study 1993;
- NSW State Heritage Register; and
- The National Trust of Australia (NSW) Register.

This analysis has been prepared in accordance with the best practice guidelines established by the following references:

- NSW Heritage Branch, *Assessing Significance*, guideline;
- NSW Heritage Branch, *Statements of Heritage Impact*, guidelines; and
- The *Australia ICOMOS Burra Charter* 1999

Consistent with these guidelines, this analysis considers the curtilage of heritage sites, views to and from heritage sites, and how the heritage sites may relate to one another and their immediate surrounds.

The study area is situated adjacent to the township of Menangle. Menangle is an intact example of a rural service centre that has seen limited change since its establishment in the early 20th century. The township and surrounding area has heritage values associated with its farming and grazing history as well as an association with John Macarthur, a key figure in the establishment of the sheep farming industry in the early years of the colony of New South Wales. Menangle is listed as a *Heritage Conservation Area* under the Wollondilly Shire Council DCP 1992. The extent of this area is shown in *Figure 6.1*. The *Figure* indicates that the *Heritage Conservation Area* curtilage from Menangle Village DCP extends onto the study area.

Ten European heritage sites were identified and investigated as part of this technical review. Eight sites are listed on the Heritage Schedule of the Wollondilly LEP 1991, two of which are also listed on the NSW State Heritage Register as well as State government s170 Heritage and Conservation Registers. Of the eight sites, two are located within the study area. Two additional sites, an abandoned piggery and dairy farm, within the study area were inspected during the site visit but are not included in this analysis due to their very poor condition and lack of heritage listings.

The key findings of the desktop review and site inspection are summarised in *Table 6.1*

.

Table 6.1 *Key Heritage Findings Summary*

No.	Site	Within Wollondilly development site	LEP	S170	SHR	RNE
1	Menangle Rail Bridge	NO	YES	RIC	YES	YES
2	Menangle Railway Station	YES	YES	RailCorp	YES	NO
3	Camden Park Estate Central Creamery	YES	YES	NO	NO	NO
4	Camden Park Rotolactor	YES	YES	NO	NO	NO
5	St Patrick's Roman Catholic Church	NO	YES	NO	NO	NO
6	Menangle Store.	NO	YES	NO	NO	NO
7	Gilbulla (Anglican Conference Centre)	NO	YES	NO	NO	NO
8	St James Anglican Church	NO	YES	NO	NO	NO
9	Abandoned piggery site	YES	NO	NO	NO	NO
10	Abandoned dairy farm	YES	NO	NO	NO	NO

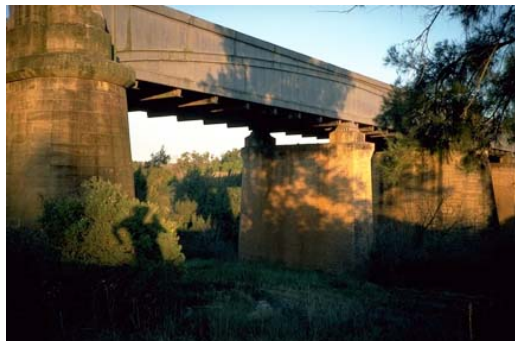
Abbreviations:

- **LEP** – *Local Environmental Plan*
- **S170** – *NSW State Government Agency Section 170 Heritage and Conservation Register*
- **SHR** – *NSW State Heritage Register*
- **RNE** – *Register of the National Estate*
- **RIC** – *Rail Infrastructure Corporation NSW*
- **RailCorp** – *Rail Corporation NSW*

6.2.1

Significant Heritage Sites

Menangle Rail Bridge



Description:

Rail bridge over Nepean River iron girder, 1863.

Significance: *State significant*

The Menangle rail bridge constructed in 1863 is the oldest surviving bridge on the State rail system and is of high significance in the development of railway technology in the State.

Menangle Railway Station



Description:

Railway station and residence (unoccupied).

Significance: *State significant*

Menangle station group is one of the earliest station complexes to survive in the state. It is a combination station building and residence which has had substantial additions, 1863.

Camden Park Estate Central Creamery



Description:

The creamery consists of two buildings connected to the main railway line by its own siding, 1898.

Significance: *Locally significant*

The Camden Park Estate Central Creamery is significant as evidence of the scale of dairying activities carried out to supply Sydney's needs in the latter part of the 19th century and in the 20th century. It has associations with the Camden Park Estate.

Camden Park Rotolactor



Description:

A rotating milking platform.

Significance: *State significant*

Evidence of the post WWII phase of dairying activity in the Sydney Region. It represents the final advance in the mechanisation of commercial dairy farming in Australia and was the second facility of this type and scale in the world. It has associations with the Camden Park Estate.

St Patrick's Roman Catholic Church



Description:

Simply detailed, Gothic Revival, red face brickwork church building with steeply gabled roof, 1895

Significance: *Locally significant*

St Patrick's Church has social and historic significance through its associations with the Roman Catholic community in the Menangle area since 1895. The church also contributes to the stock of late 19th and early 20th century buildings which give the present Menangle Village much of its character.

Menangle Store



Description:

Two storey, federation style, commercial building, 1905

Significance: *Locally significant*

It has been used by the Camden Park Estate up to the 1970s as its buying agent for all its provisions. The store has always had a licence and served the village and the rural hinterland.

Gilbulla (Anglican Conference Centre)



Description:

A large two storey Edwardian house with "Federation Arts & Crafts" detailing. The property extends over 54 acres consists of the Main House, the Long House, the Chapel, garden, and newer conference facilities, 1817-1899

Significance: *Locally significant*

The property was part of the Macarthur estates from the early years of the 19th century and became a significant property within the area.

St James Anglican Church

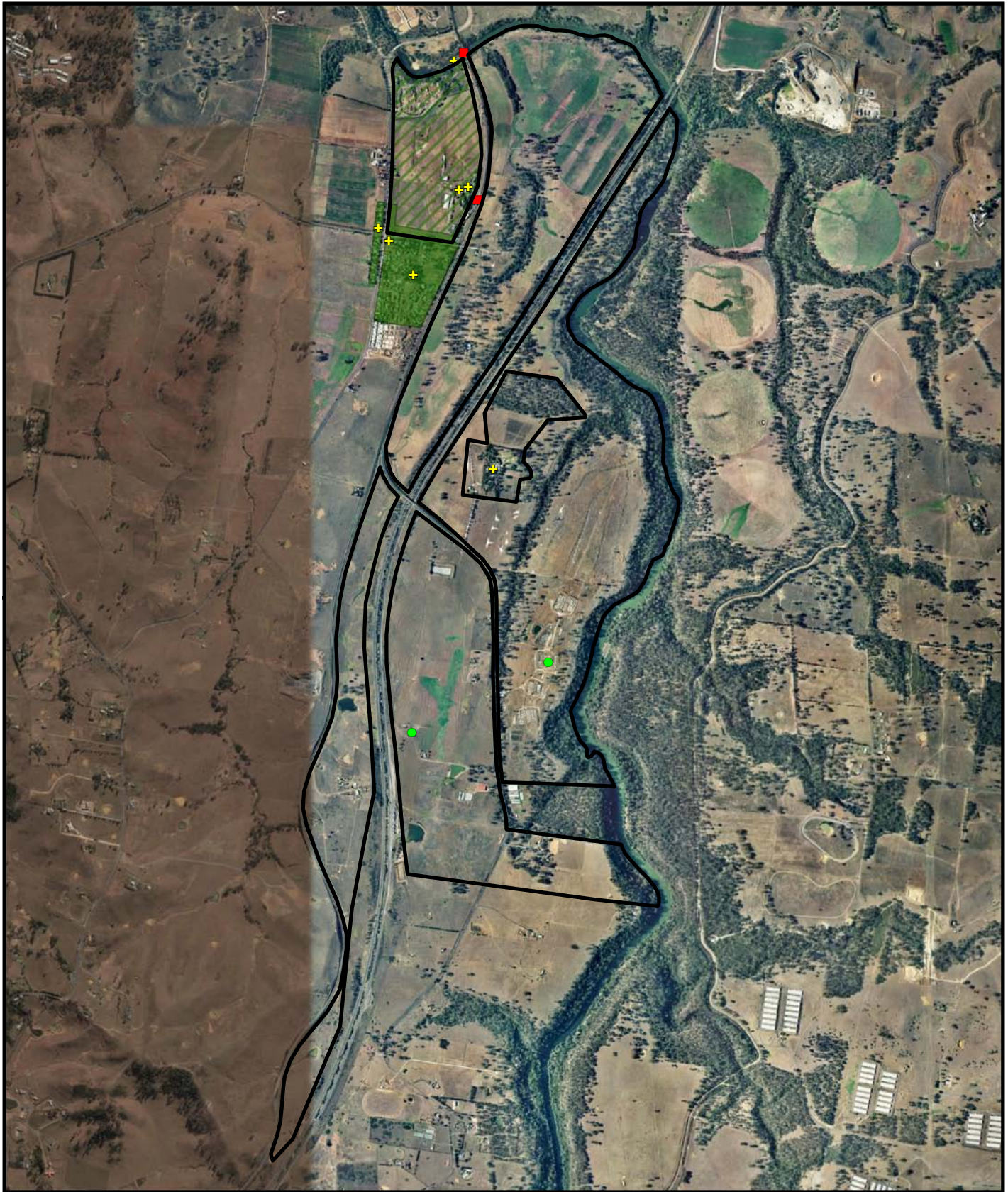


Description:

Unusual country church, facebrickwork, 1876-1896

Significance: *Locally significant*

Significant due to its links with the Macarthur-Onslow family of "Camden Park" and "Gilbulla"; associations with two leading architects, J Horbury Hunt and Sir John Sulman; and, its more general association with the life and development of Menangle Village.



Legend

- Wollondilly development site
- Potential development constraint relating to the Heritage Conservation zone of Menangle village
- Heritage Conservation Area - Wollondilly Shire Council DCP 1992
- Local Heritage sites – Wollondilly Shire Council Local Environmental Plan 1991
- State Heritage sites – NSW State Heritage Register
- Miscellaneous sites – not heritage listed

R0	Preliminary Issue	10-07-08	JF
R1	Title Block Edits	20-07-08	JF
Suffix	Revision	Date	Init

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS09	Suffix No:	R1
Date:	20/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JR
Source:	Google Earth Pro		
Scale:	Refer to Scale Bar		



0 300 600 900m

Figure 6.1

European Heritage Constraints

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6.2.2

Key Constraints

This section identifies the key European heritage constraints associated with the study area.

Local and state heritage frameworks require assessment of the following works where they potentially affect heritage items and sites (Heritage NSW 2008). These are:

1. full or partial demolition;
2. alterations;
3. extensions;
4. new structures;
5. change of use;
6. subdivision;
7. removal of significant vegetation;
8. disturbance to relics and historic landscapes;
9. interiors.

The following table highlights significant heritage sites, which may be impacted by development of the study area. *Figure 6.1* illustrates where constraints are present in and adjacent to the study area. These constraints include 'buffer areas' which requires consideration prior to development.

Table 6.2 *Wollondilly development site key constraints*

<i>Constraint</i>	<i>Trigger</i>	<i>Explanation</i>
Menangle Heritage Conservation Area	8	The Menangle Heritage Conservation Area, as identified in the Wollondilly Shire Council DCP, recognises Menangle as an intact example of a rural centre comprised of various elements each contributing to the historical heritage values of the area. The surrounding pastoral lands are part of the historic context and provide views to Menangle and Menangle, due to its elevation, is afforded views of the pastoral lands to the north of the village. Any development on this land (ie particularly to the north of the village and the west of the railway line) could potentially impact upon those values.
Camden Park Estate Creamery and Rotolactor	1-9	The Creamery and Rotolactor are significant local heritage sites, which directly contribute to the heritage of Menangle. The Rotolactor is in poor condition and works impacting upon the site may be mitigated by heritage interpretation. The Creamery and Rotolactor also have an important

<i>Constraint</i>	<i>Trigger</i>	<i>Explanation</i>
		link to the Railway Station, which should be considered in an impact assessment.
Gilbulla (Anglican Conference Centre)	8	This significant property is situated on private land adjoining the study area. The site was and is an extensive and impressive rural property. Development could impact upon the historically rural setting in which Gilbulla is located by introducing unsympathetic development within close proximity to the curtilage of the property. The risk is assessed as <i>LOW</i> as the site is somewhat shielded by trees and other vegetation. However, development proposal should consider a buffer around the curtilage of the site to mitigate any potential disturbance to the setting.
Menangle Railway Station	4 & 6	The Menangle Railway Station is listed on the SHR. Development would represent an issue only if it were to directly impact upon the site.

6.3

CONCLUSIONS

Development has the potential to impact upon the heritage listed sites and values both within and adjacent to the study area. Potential impacts may occur directly upon heritage sites or through developments which alter the context and setting that contribute to the heritage values of a site or the conservation zone.

A Heritage Impact Assessment would be required as part of the approval process. The detailed impacts analysis would need to consider options to avoid and minimise adverse heritage impacts, including visual as well as physical impacts. These mitigation measures may include 'buffer zones' around heritage sites and conservation areas, and interpretation strategies.

This chapter analyses the contamination issues identified in the Phase 1 Contamination Assessment undertaken by ERM in September 2007.

7.1 METHODOLOGY

The methodology undertaken for the assessment comprised a desktop survey and limited site inspection. Details of each of these components are discussed below.

7.1.1 Background database review

ERM undertook a review of publicly available information on the study area, which included the following:

- a search and summary of historical Land Titles;
- a review and summary of available historical aerial photographs to identify past operations, developments, or other areas of concern;
- a review of the NSW Department of Environment and Climate Change Contaminated Lands Register;
- a review of the NSW Department of Environment and Climate Change groundwater bore register; and
- a review of the NSW Department of Environment and Climate Change Public Environmental Permit Register.

7.1.2 Site inspection

The inspection comprised a limited site walkover, covering the Hillcrest Park and El Bethel sections of the study area and included an inspection of the buildings located on these parts of the study area. Other sections of the study area were viewed from the adjacent roadways.

In terms of soil, groundwater and surface water contamination issues at the study area, the scope of work included:

- evaluation of current and past activities and related practices at the study area to establish known or potential sources of material soil, groundwater and/or surface water impacts; and
- evaluation of the environmental sensitivity of the area, groundwater and surface water usage, and historical site operations, through a review of

publicly available information on the environmental performance of the study area and neighbouring facilities.

The issues addressed by the assessment are ;

- surface water and groundwater discharge;
- hazardous & non-hazardous waste management;
- chemical management;
- aboveground and underground storage tanks;
- hazardous materials (polychlorinated biphenyls (PCBs) and asbestos);
- ozone depleting substances (ODS); and
- soil and groundwater contamination.

7.1.3 *Background to Contaminated Land Regulation in NSW*

Contaminated land is predominantly controlled by two mechanisms in NSW; these comprise the planning process and the *Contaminated Land Management Act 1997* (CLM Act). Under State Environmental Planning Policy 55 (Remediation of Land) a consent authority is required to give consideration to questions of contamination prior to rezoning a site or when considering a development application (DA). If a potentially contaminating operation has occurred on the site then a preliminary and then often a detailed assessment is required possibly followed by remediation. The authority can give consent if it feels it has been provided with enough information at that stage, however, they often require this work to be audited by a NSW DECC accredited contaminated sites auditor which can be an onerous process. Furthermore, if remediation is required then under certain circumstances this can require a separate DA.

7.2 *KEY FINDINGS*

The following key findings step through the results of the regulatory searches, followed by findings of the site inspections and historical information of the properties; Hillcrest Park, El Bethel, 535 and 545 Park Road, 251 Menangle Road, 21 Station Street Menangle, 775 Moreton Park Road, and 350 Moreton Park Road.

7.2.1 *Regulatory Agency Record Search*

A search of the NSW Environment Protection Authority (EPA) Licensing Database revealed the following:

- Hillcrest Park Piggery previously held a pig production licence surrendered on the 26 July 2004. A Section 91 Clean-Up Notice was issued by the EPA on the 22 July 2003 (ERM 2007) following an inspection of the premises which revealed solid organic waste stored in an unbunded yard which drains to the Nepean River.
- Menangle Soil and Sand hold a land based extraction licence to extract sand within the north western area of the El Bethel portion of the site. Non-compliance was recorded in 2004 referring to “Inert waste received at the premises that was generated outside the premises.” A S91 Clean-Up Notice was issued by the EPA on the 23 October 2003 related to the above non compliance and revoked on 5 July 2004.

7.2.2 *Potential Contamination Sources*

Hillcrest Park

The area comprises the abandoned piggery to the east of Moreton Park Road and farm land to the west of Moreton Park Road (*Figure 1.1*). The piggery contains pig sheds, all but one of which have been demolished. The sheds were steel framed, concrete floor slabs and were clad with aluminum. Numerous small buildings of timber and fibrous cement sheeting (potentially asbestos containing), previously used for administration still remain on site along with scattered tin sheds of unknown purpose. Four dams are present on site (three to the north of the piggery and one to the south). An occupied house is present at the entrance of the site, as is a fuel bowser and associated underground storage tank (UST). The southern section of the site is covered by windrows of pig manure. The farm land to the west of Moreton Park Road contains:

- an abandoned house;
- a disused farming and shed area with feed silo;
- one large and one small dam;
- two residential properties; and
- a second abandoned farming area with two large feed silos.

Key contamination issues in this section of the site were:

- A potential contamination risk associated with piggery activities, predominantly associated with inappropriate waste disposal, use of veterinary medicines and use and the storage of fuels.

- On the Hillcrest Park site, large amounts of possible Asbestos Containing Materials (ACM) were observed in the administration buildings still remaining on Piggery property, and in the abandoned farm house to the west of the property. It is also possible that ACM are present in waste materials buried on the site.
- A substation, still in use by the nearby residence, was observed on the piggery site during the site inspection and electrical switch boards and equipment were observed on both the piggery and rotolactor site. No obvious evidence of staining or leakage was noted during the site visit but potential for Polychlorinated biphenyls (PCBs) in the equipment can not be discounted.
- Wastewater generated on the former piggery site from piggery and domestic activities appears to have been held in septic tanks or below ground pits prior to treatment in the waste water treatment ponds. Waste water remaining in these areas may contain elevated concentrations of nitrogen and phosphate compounds encouraging algal growth, nitrate contamination and potentially the spread of microorganisms and parasites.
- General waste materials from historical operations were observed on the piggery site. Following decommissioning, piggery sheds were demolished and waste materials left in-situ. A stockpile of general waste was observed on site as was evidence of waste burial. ERM was informed that an on site excavator was utilised to bury the waste; and it is therefore assumed that buried waste may be present to a depth of approximately 2 m.
- Veterinary chemicals and syringes were observed within two of the former administration buildings on the piggery site and within the silo on the farming site to the west of the piggery.
- Numerous drums were observed on-site marked "Chemical Industries High Security Explosives, Rafaela Factory (Argentina), Aqueous solution of Monomethylamine Nitrate (14%water)". This is a hydro-gel explosive typically used in mining. During the site visit ERM were informed by a site contact, Mr Ernest Dupere, that these drums were historically used to store pig feed. The origin of the drums and whether the original contents were used on-site is unknown.
- During the site walkover, used oil drums, an underground storage tank (UST) and associated fuel bowser were observed on the piggery site.
- Mr Dupere provided further anecdotal information regarding the UST. Reportedly the UST held diesel and has not been used for at least ten years, integrity testing has not been conducted.

Based on the above land use, ERM considers the risk of significant historical on-site contamination to be high.

This area comprises three sections separated by roads. The section to the south east of the Hume Highway is a pasture used for cattle grazing. The section between the Hume Highway and Moreton Park Road contains pasture and residential buildings and is a working farm predominantly used for cattle grazing. The section to the east of the railway line contains the rotolactor site and a grassed area (*Figure 1.1*). The rotolactor site consists of the rotolactor shed as well as two larger sheds. All sheds are of steel construction and contain farming equipment. The area immediately south of the Nepean River, east of Menangle Road and west of the railway is occupied by the sand extraction and sales operations of Benedict Sand and Gravel.

The excavation of these operations is relatively shallow and occupies an area of approximately 0.5 ha. No water was visible in the base of the excavation. A development application (DA) to extract sand and gravel was approved by the Minister for Planning on 15 March 1989. The consent enables a series of 'stages' for excavation. Stage 7 appears to be adjacent to the current area east of Menangle Road and west of the Hume Highway. The status of operations on this site is unclear i.e. it is not known whether operations have been completed or are yet to begin. The status of operations on the current excavation are also unclear.

Key contamination issues in this section of the site were:

- A potential contamination risk associated with rotolactor operations exists on site, predominantly arising from the use and storage of fuels.
- Evidence of the use of possible ACM is present on a number of properties. On the El Bethel property potential exists for the presence of ACM on the Rotolactor site, primarily within the rotolactor building and boiler area. It is also possible that ACM may be present in waste materials deposited and buried about the site.
- Waste materials remaining from historical operations on the rotolactor site including used oil drums were observed throughout the site. An above ground storage tank (AST) was observed adjacent to the rotolactor building within the former rotolactor site. The AST appeared empty, was rusted and in poor condition. Although there was no visible evidence of leaks or spills, due to the age, lack of integrity testing and the poor condition of the observed AST, leakage and or spillage of product from these tanks is considered likely.
- Chemical storage within the Benedict occupied area of the El Bethel site was noted to take place on a sealed, bunded surface.

Based on the above land use, ERM considers the risk of significant historical on-site contamination to be high.

535 and 545 Moreton Park Road, Menangle

These two lots contain green houses used for commercial tomato growing and a large shed. The green houses were approximately 20m by 50m and orientated with the longitudinal axis approximately north-south. Prior to this the land was primarily owned by various farmers and graziers.

Based on the above land use and prolonged use of the site for farming and grazing and the likely use of pesticides and herbicides, ERM considers the risk of significant historical on-site contamination is considered to be low to moderate.

251 Menangle Road, Menangle

This property was not observed during the site inspection. Aerial photographs of the location indicate a small property containing three residential or shed type buildings. Historical land titles list the current proprietors of the land to be El Bethel Pty Limited and Moreton Park Pty Limited who acquired the land from Henry Ainscough and Sheila Mary Ainscough in 2005. Prior to this the land was owned by a blacksmith, coal miner and a farmer.

Based on the above land use as well as the prolonged use of the site for farming and grazing and the associated possible use of pesticides and herbicides, the risk of significant historical on-site contamination is considered to be low to moderate.

21 Station Street, Menangle

This area contains the locally heritage significant former creamery and consists of two buildings, one two storey brick building painted white with a terracotta tiled roof and one single storey building with corrugated iron walls and roof.

Two ASTs are reportedly located on the creamery site, although due to site access restrictions these were not observed.

Based on the above land use, the presence of AST's as well as the prolonged use of the site for farming and grazing, ERM considers the risk of significant historical on-site contamination is considered to be moderate to high.

775 Moreton Park Road, Menangle

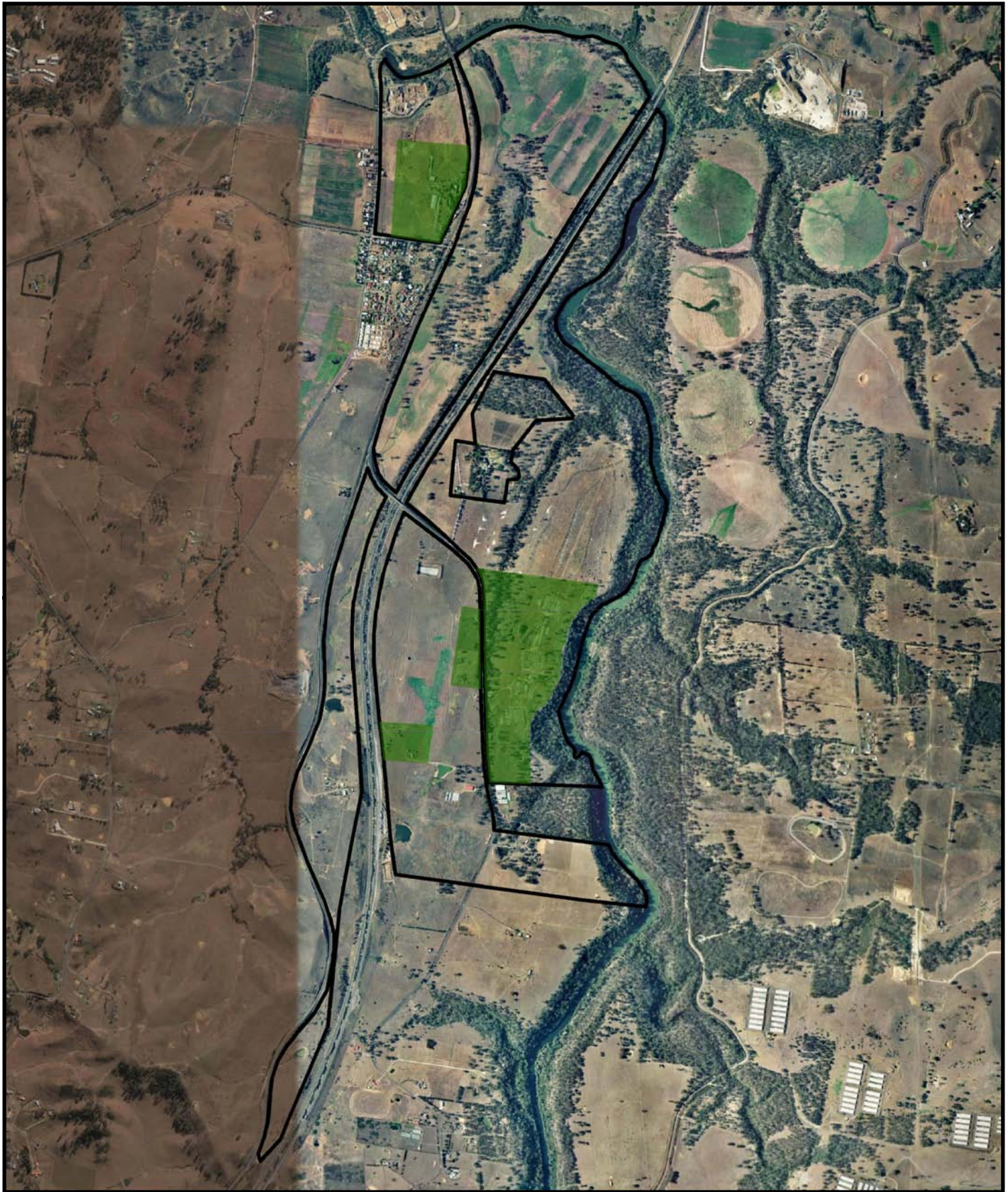
This area is a long thin strip of land containing two residential dwellings. The land is predominantly grassed.

Based on the above land use as well as the prolonged use of the site for farming and grazing and the associated possible use of pesticides and herbicides, ERM considers the risk of significant historical on-site contamination to be low to moderate.

350 Moreton Park Road, Menangle

This area contains residential houses, possibly constructed of fibrous cement, a dam and a few small sheds. According to land title searches, the majority of the site was primarily used for farming and grazing with little potential for historical onsite contamination.

Based on the above land use as well as the prolonged use of the site for farming and grazing and the associated possible use of pesticides and herbicides, the risk of significant historical on-site contamination is considered to be low to moderate.



Legend

- Wollondilly development site
- Contamination constraints

Figure 7.1

Contamination Constraints

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS07	Suffix No:	R0
Date:	10/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	MC
Source:	Google Earth Pro		
Scale:	Refer to Scale Bar		



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R0	Preliminary Issue	10-07-08	JF
Suffix	Revision	Date	Init

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A number of issues were identified through preliminary assessment of potential contamination of the study area, these included:

- Potentially significant quantities of waste material were identified, including demolition wastes potentially containing asbestos and unknown materials. These materials have been deposited both onto the ground surface and buried beneath it.
- Piggery waste was found present on the ground surface in windrows and within underground concrete structures. These materials are likely to be high in nutrients, veterinary medicines, bacteria, viruses and micro-organisms generally.
- Many structures containing asbestos were observed in varying states of repair on the Hillcrest Park and El Bethel sites. It is likely that limited contamination of soil with ACM has occurred.
- A number of issues that may give rise to contamination were observed associated with materials storage and handling on the Hillcrest Park and El Bethel sites. These included the presence of ASTs and USTs on-site and the observation of used drums of oil and explosives although it is unclear if these were used on site.
- There is a history of sand and gravel extraction in the area. This requires further investigation to more accurately delineate the areas of excavation and more importantly the nature of backfilled material.

Whilst it is not possible to accurately quantify the potential cost of resolving these contamination issues until a more detailed physical investigation has been undertaken, it is considered that the contamination identified within this assessment does not represent an absolute constraint on commercial development for the study area.

Should Macquarie wish to more accurately quantify these investigations, management and subsequent costs then ERM recommends that a limited Phase II investigation is undertaken to collect this data.

The following chapter details the findings of the flooding desktop assessment. The chapter steps through the methodology, key findings of the assessment and describes the constraints in considering the study area for development potential.

8.1**METHODOLOGY**

Wollondilly Shire Council (WSC) does not have specific local guidelines for flood issues in Menangle and therefore refers to Picton's *Local Flood Policy* (May, 2000). Picton's *Local Flood Policy* provides guidelines for development and construction which are compatible with the defined flood hazard for a given area.

A first step in the floodplain management is the selection of a flood level known as the designated flood, which determines the area of land that should be subject to flood related development and building control. Wollondilly Shire Council has adopted the 1 in 100 (1%) AEP (Annual Exceedance Probability) flood as the designated flood, which is equivalent to a flood that has a 1 in 100 chance of occurring or being exceeded in any year.

The 1% flood levels for three cross sections have been obtained from Wollondilly Council (derived from the Upper Nepean River Flood Study) and presented in *Figure 8.1*. These cross sections provide flood levels in the immediate vicinity of the study area. The cross sections are only available for the downstream parts of the study area, so the 1% flood levels have been interpolated along the length of the study area with cross sections B19 and B20 as start points.

Based on this interpolation, the 1 in 100 AEP flood event is defined and presented in *Figure 8.2* on a 2 m contour map.

8.2**KEY FINDINGS**

Subdivision of land within the extent of the 1% flood level is generally not favoured by Wollondilly Shire Council because of the likelihood of increasing the future potential for flood damage. Effluent treatment areas are also to be located outside the land within 1% flood levels.

According to these requirements, development is recommended to occur outside the 1% flood level presented in *Figure 8.2*.

This is supported by Council's Industrial Land Assessment Criteria (Annex ?) which also identifies the 1% AEP flood as an industrial development constraint.

The Local Flood Policy for Picton divides flood liable land into four categories:

- High hazard floodway: these are areas of deep, fast flowing water. Council will only consider development in this area that does not alter flood behaviour.
- High hazard flood fringe: floodwaters in High Hazard Flood Fringe may be over *one metre deep* and slowly moving. In considering applications for development in these areas Council requires that the development be designed to minimise flood damage and allow easy evacuation.
- Low hazard floodway: Low hazard Floodways contain flow paths where a significant volume of water flows during floods. In considering applications for development in these areas Council requires that the development be designed to maintain the operation of these flow paths.
- Low hazard flood fringe: Low hazard Flood Fringe areas are subject to only allow inundation and development is unlikely to alter flow paths. In consideration applications for development in these areas Council requires that the development be designed to minimise flood damage.

Subdivision of land which is classified Flood Fringe may be permitted provided the applicant satisfies Council that the proposed subdivision:

- Fully complies with all relevant provisions of the Local Flood Guidelines;
- Contains permanent maintenance free and fail free provision for evacuation such as continuously rising roads linking with high ground; and
- Does not incorporate proposals for high-risk land uses such as hospitals, nursing homes or aged accommodation.

Accurate determination of the areas for the study area that are below the 1% AEP flood level and classified as flood fringe requires detailed information on ground levels and a flood simulation with a suitable software model.

Flood modelling and detailed survey would be required to justify any development below the 1% AEP flood level. However, *Figure 8.2* is indicative of areas of flood fringe (less than 1 m inundation) based on the 2 m contour mapping.

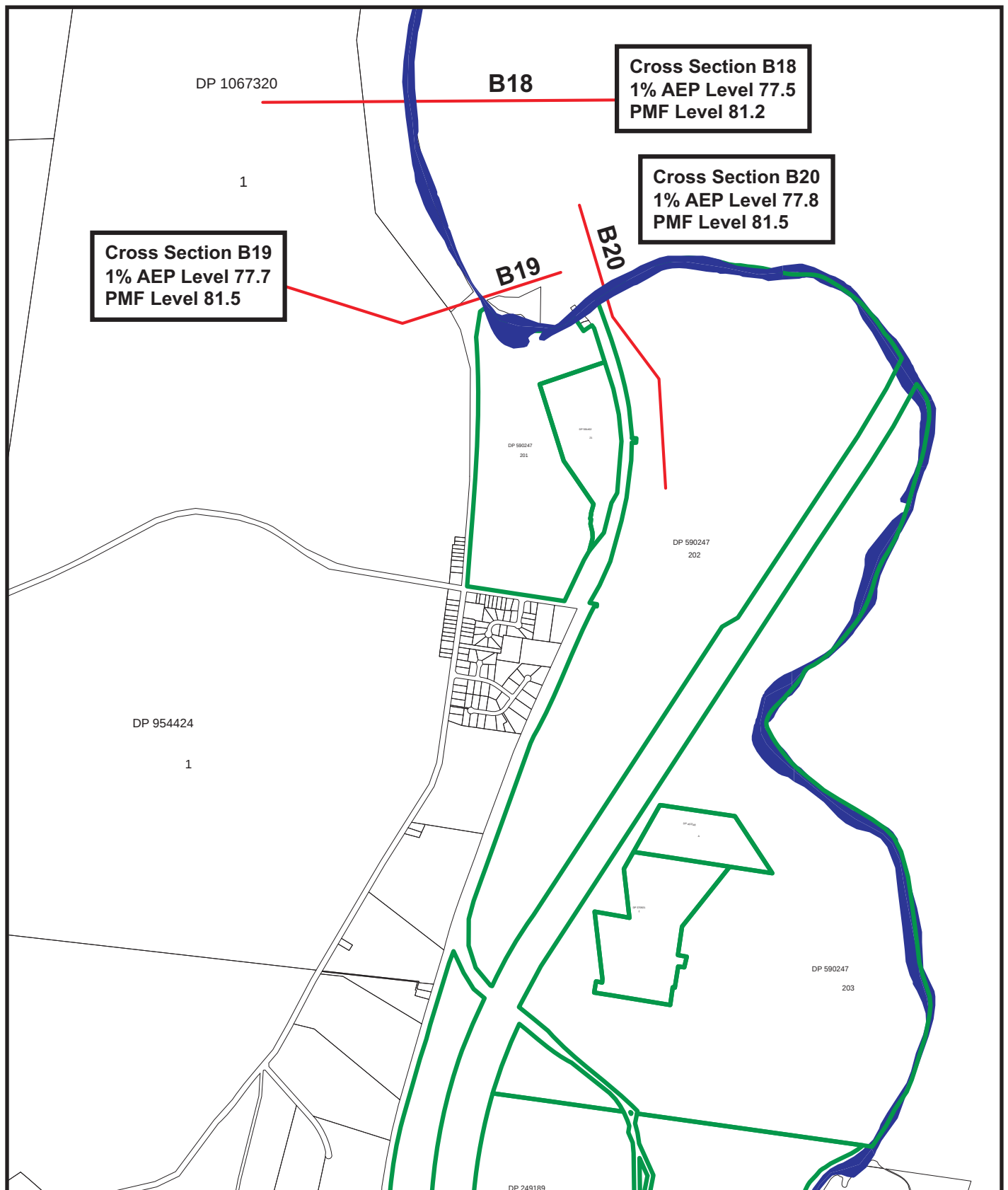


Figure 8.1

Cross Sections 1% AEP Flood Levels

Legend

- Nepean River
- Cross Section
- Subject Site

Notes:

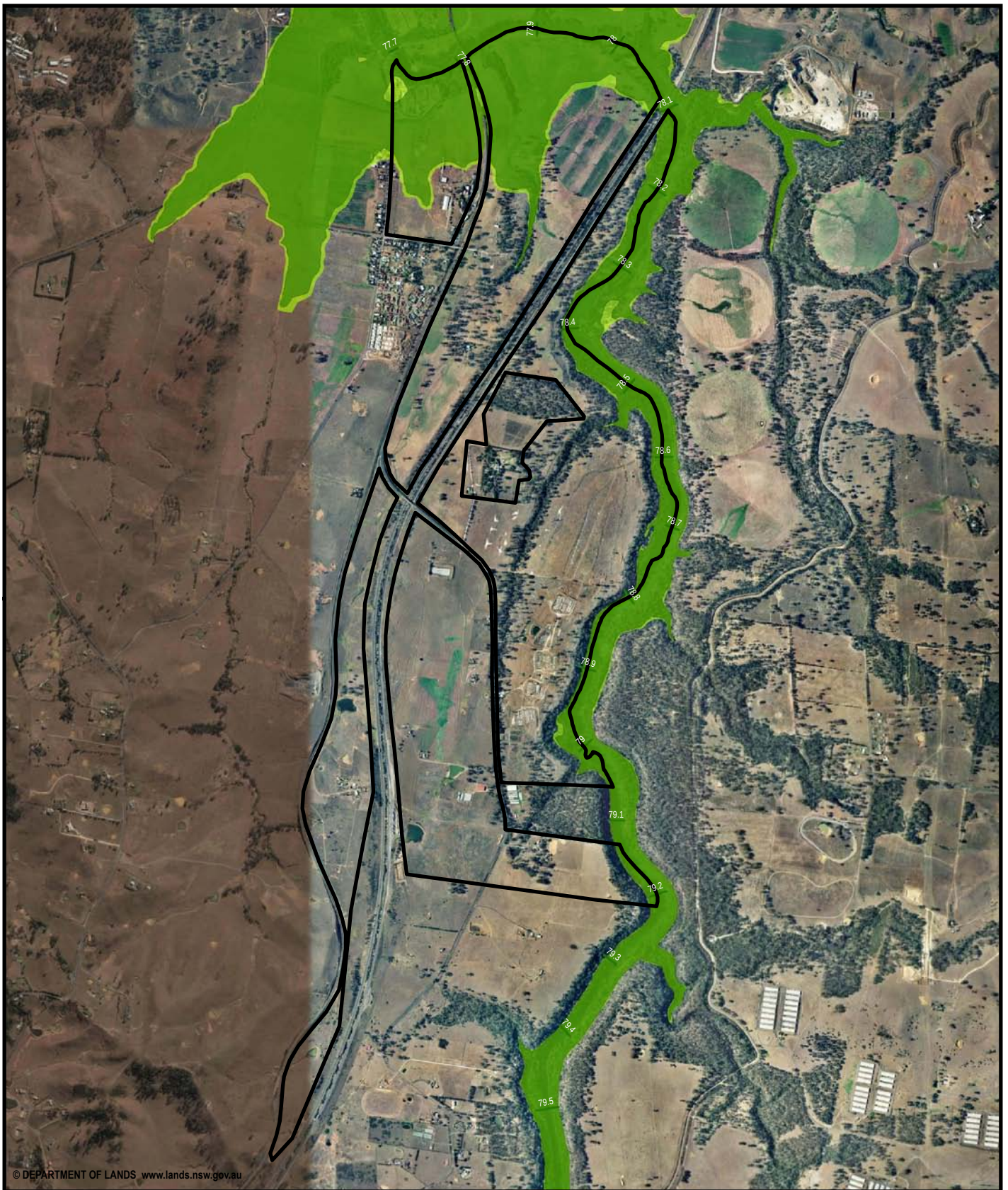
1. All levels are shown to Australian Height Datum.
2. AEP refers to Annual Exceedance Probability.
3. The 1% AEP Flood was previously known as the 1 in 100 year flood.
4. The PMF refers to the Probable Maximum Flood.
5. Information shown is based on the Upper Nepean River Flood Study, 1995.
6. The determination of the extent of each flood requires the comparison of flood levels to actual ground levels.

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW		
Drawing No:	0087207s_01		
Date:	14/07/2008	Drawing size:	A4
Drawn by:	ML	Reviewed by:	-
Source:	-		
Scale:	Not to Scale		



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Legend

- Wollondilly development site
- 79.5 1% AEP flood level

High Constraints

- 1% AEP flood depth > 1 m
- 1% AEP flood depth < 1 m

Figure 8.2

1% AEP flood event

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS18	Suffix No:	R0
Date:	18/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	DM
Source:	Dept. of Lands		
Scale:	Refer to Scale Bar		



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11-07-08 JF
Date Init

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- Subdivision and development of land within the extent of the 1% flood level is not favoured by Wollondilly Shire Council because of the likelihood of increasing the future potential for flood damage;
- the northern side of the study area is affected by flooding. The flood levels are between 77.7 and 78.0 AHD, based on the cross sections derived from the Upper Nepean River Flood study;
- development in Floodway areas is only allowed if the development does not alter flood behaviour;
- subdivision and development in the "Flood Fringe" may be permitted if it complies with Picton's Local Flood Policy, has a fail free evacuation route linked with high ground levels, and is not considered a high risk activity e.g. hospitals etc;
- if development of flood affected land is proposed, it will be necessary to conduct a detailed flood study to define the boundaries at the following flood liable land categories:
 - o High Hazard Floodway;
 - o High Hazard Flood Fringe;
 - o Low Hazard Floodway;
 - o Low Hazard Flood Fringe; and
 - o effluent treatment areas must be located outside the land within 1:100 flood or stormwater level.

This chapter analyses the potential for existing residential receivers to impact on the potential commercial development of the study area. This is based on desktop study of available topography of the study area and previous noise level assessments and typical sound power levels associated with various industrial activities.

9.1

METHODOLOGY

Representative noise levels typically associated with a range of industries and other land uses have been defined to determine areas where nominated industries may operate without exceeding acceptable noise limits (noise criteria) at identified nearest residences. Noise criteria applicable at these residences have been derived from long term logging conducted in 2003 at several locations relevant to this study. The potential for weather affects on noise levels is discussed but has not been factored into the assessment.

9.1.1

Noise Criteria

Applicable background noise criteria are based on long term logging data from the 2003 gas pipeline study. The DECC specifies criteria for industrial noise emissions in the Industrial Noise Policy (INP) (EPA, 2000). This policy sets out two separate noise criteria designed to ensure that developments meet environmental noise objectives; the first criteria accounts for intrusive noise and the other applies to the protection of amenity of particular land uses.

The 'intrusiveness' criteria essentially means that the equivalent continuous sound pressure level (Leq) of a noise source should not be more than 5 dB above the RBL, or background noise level, at the affected residential receptor location(s). This criterion applies to developments that may have an impact on nearby residential developments.

The amenity criterion is important if an assessment is required of the cumulative impact of a proposal in conjunction with other proposed or existing industrial noise sources. For rural areas the amenity targets are 50dB(A)Leq, day, 45dB(A)Leq, evening and 40dB(A)Leq, night. For places of worship the acceptable internal noise levels are set at 40dB(A) Leq, when in use. This will typically translate to an external noise level of 50dB(A) Leq, when in use and allowing for a window partly opened. This special criterion will be applied for the Gilbulla religious retreat. In the absence of industrial noise sources in the area no adjustment is necessary to these targets in accordance with the INP.

Both the intrusiveness and amenity criteria should be met (this is a guideline but may become legally binding if and when it is included in a consent

condition for development), and the more limiting target becomes the applicable noise criteria. The intrusiveness and amenity noise level criteria are applicable at the most affected point on or within the nearest residential property boundary(s) – or, if that is more than 30 m from the residence, at the most affected point within 30 m of the residence.

To assess the level of noise emission that would be received at the nearest residential receptors in accordance with the INP, the intrusive noise is represented as an equivalent continuous (L_{eq}) noise level over a period of 15 minutes.

9.1.2 *Sleep Disturbance*

The DECC's current night-time sleep disturbance criteria requires that the L_{max} of an industrial noise source should not be more than 15 dB(A) above the RBL, or background noise level, at the affected dwelling facade.

9.2 *KEY FINDINGS*

The following section describes the existing environment and the results of the predictive modelling undertaken and the effect the weather conditions of the area would have on the modelling undertaken.

9.2.1 *Existing Acoustical Environment*

The acoustical environment of the study area and surrounds are generally rural in character. Noise levels from a quarry just north of the study area was reported in a 2003 gas pipeline assessment to be significantly shielded to its nearest residence due to local topography and industrial noise is not considered a characteristic of the area. The acoustic environment of Menangle includes farming activities, some road traffic noise from Menangle Road, the Hume Highway and trains travelling on the main Southern Railway Line.

9.2.2 *Predicted Noise levels*

A summary of applicable noise criteria at nearest residences is shown in the following table.

Table 9.1 *Applicable Noise Criteria*

Location	Period	RBL, dB(A)	Leq, 15 min Noise Criteria, dB(A)		Leq Noise Criteria (Site Contribution Only), dB(A)	Lmax Sleep Disturbance Criteria, dB(A)
			Intrusiveness	Amenity		
Rural residences	Day	32	37	50	37	N/A
	Evening	34	39	45	37**	N/A
	Night	30	35	40	35	45
Menangle Residences	Day	37	42	55	42	N/A
	Evening	42	47	45	42**	N/A
	Night	35	39	40	39	50
Hume Hwy Residences	Day	49	54	60	54	N/A
	Evening	48	53	50	50	N/A
	Night	42	47	45	45	57
Gilbulla	When in use	n/a	n/a	50*	50*	N/A

Note: * Equivalent acceptable external noise level.

** Reduced to day criteria as per DECC INP guidance notes.

Table 9.2 shows land uses grouped by a range of noise levels typical of each.

Table 9.2 *Industrial Noise Levels*

Example Developments		Typical Representative Leq Sound Power Level (Lw), dB(A)
No.	Type	
1	Contained operations with no or silenced external sources (e.g. Storage, warehouse, offices, retail, shops etc.).	65 - 75
2	Business Park (e.g. commercial offices to retailers)	65 – 85
3	Recreation centre (e.g. Indoor Gym & sports)	85 – 90
4	Retail (e.g. shopping complex)	85 – 90
5	Commercial accommodation (high density)	85 – 90
6	Equipment Sales and Hire	85 – 90
7	Machinery Sales and Hire	85 – 90
8	Mechanical Servicing and Repairs	90 – 95
9	Train station and car parking	90 – 95
10	Warehouses (Storage and distribution)	90 – 95
11	Pharmaceutical	90 – 95
12	Food processing	90 – 95

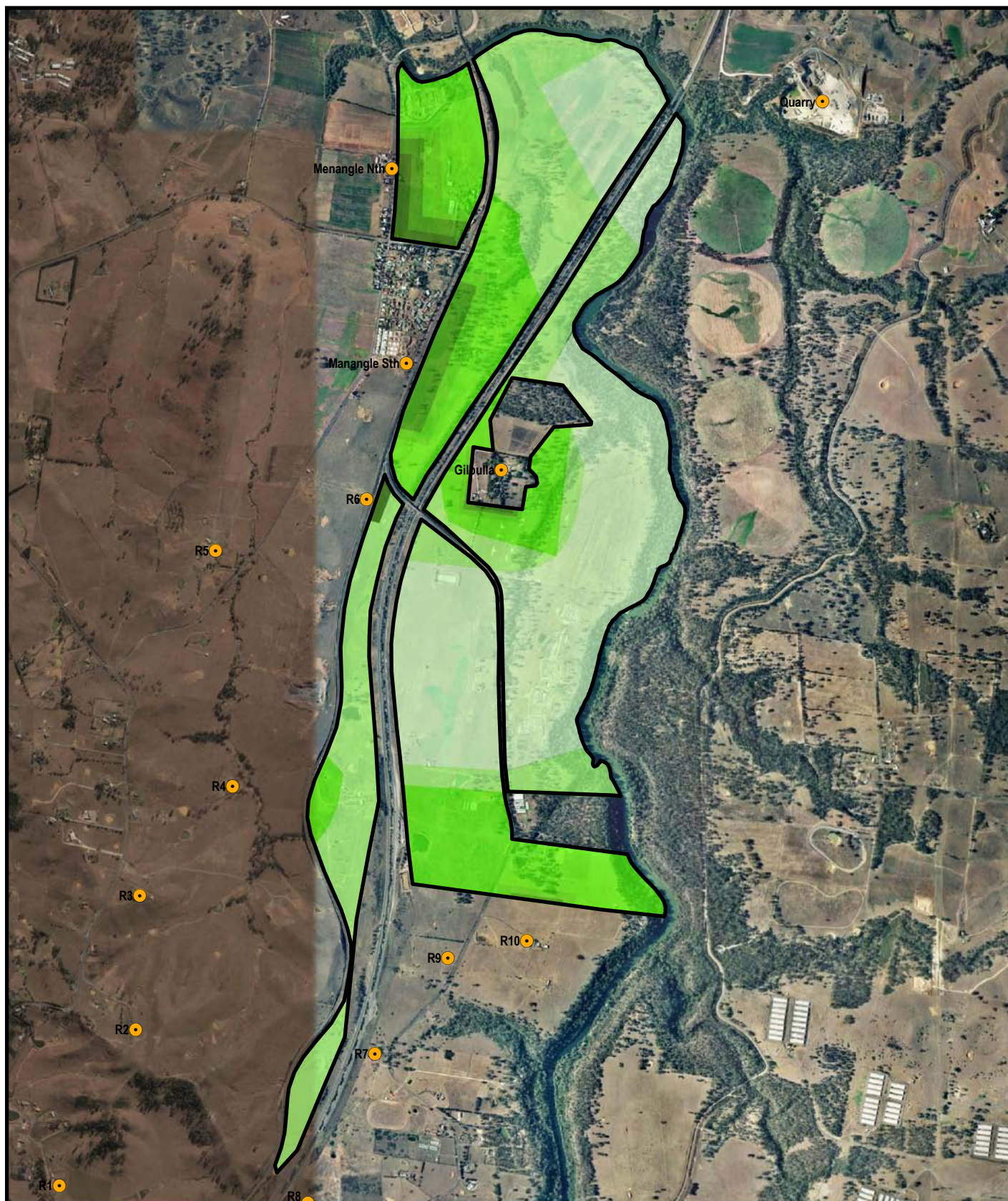
Example Developments		Typical Representative Leq Sound Power Level (Lw), dB(A)
No.	Type	
13	Light Manufacturing Activities (e.g. Technology)	90 – 95 (contained within building(s))
14	Waste Management (e.g. transfer stations)	95 (indoor)
15	Printers, freight forwarders	95 (indoor)
16	Landscape and Rural Supplies	100 – 105
17	Metal fabrication	105 – 110
18	Bulky goods retail	105 – 110

Source: ERM files obtained through on-site noise measurements.

9.2.3

Weather conditions

Weather conditions such as wind and temperature inversions have a bearing on the efficiency of noise transmission over distances. The effect of a weather event on noise levels will be dependant amongst other factors on the relative position of the noise source and the receiver in question. Temperature inversions will typically occur at night. Night time southerly winds are a feature of the area all year round. In this case the potential for adverse acoustical effects due to weather conditions only need to be considered at night for 24 hour operations.



Legend

Wollondilly development site

Nearest residences

Indicative SWL Levels dB(A)

65-75	Development Class
65-85	Light commercial
85-90	↓
90-95	Light/Medium commercial
100-105	↓
105-110	Medium commercial

R0	Preliminary Issue	15-07-08	JF
Suffix	Revision	Date	Init

Figure 9.1

Acceptable Commercial Use Based on Indicative Sound Power Levels (SWL) - Day

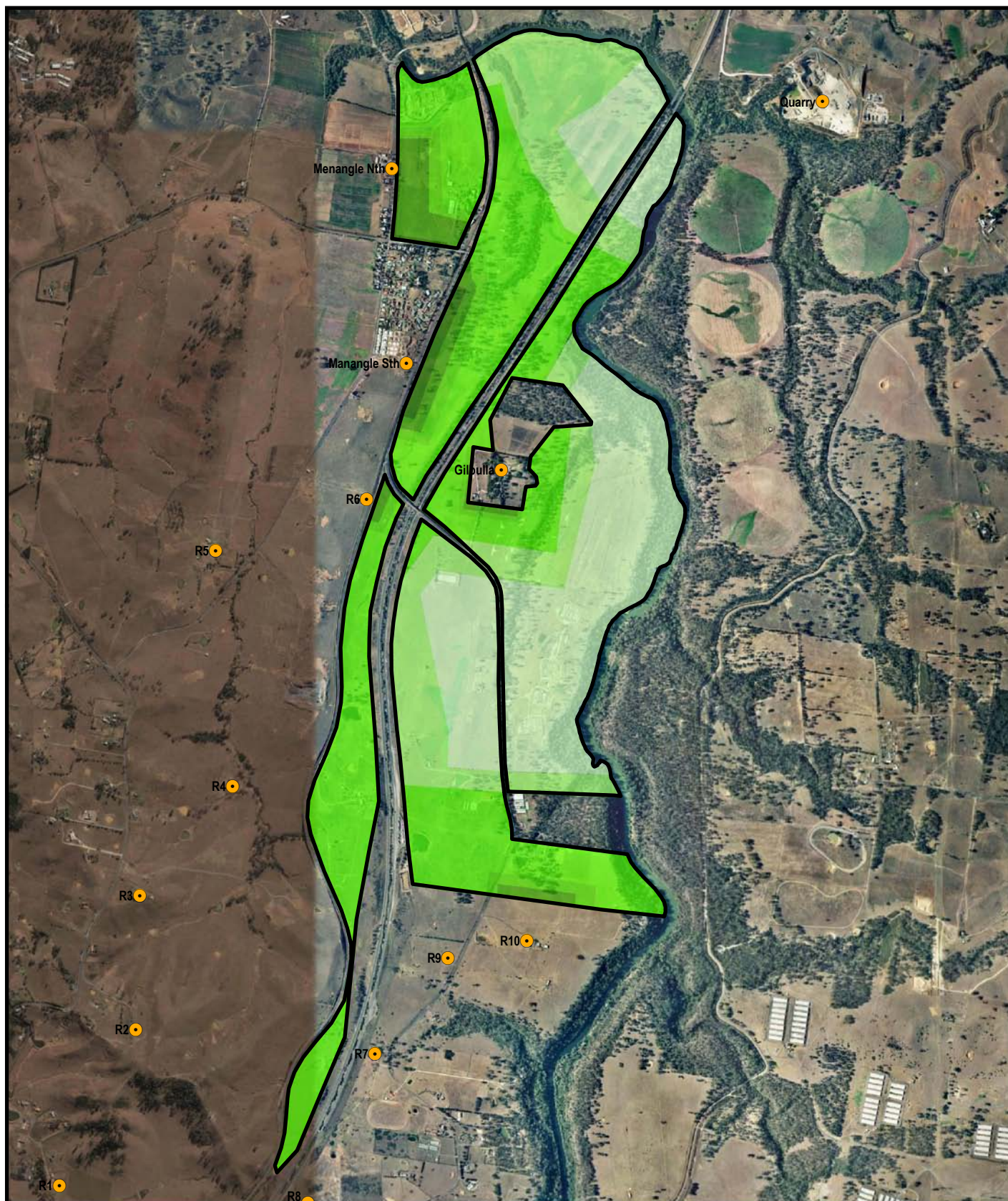
Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS14	Suffix No:	R0
Date:	15/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JB
Source:	Google Earth Pro		
Scale:	Refer to Scale Bar		



0 300 600 900m

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Legend

Wollondilly development site

Nearest residences

Indicative SWL Levels dB(A)

65-75	Development Class
65-85	Light commercial
85-90	↓
90-95	Light/Medium commercial
100-105	↓
105-110	Medium commercial

R0 Preliminary Issue
Suffix Revision

15-07-08 JF
Date Init

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS13	Suffix No:	R0
Date:	15/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	JB
Source:	Google Earth Pro		
Scale:	Refer to Scale Bar		



0 310 620 930m

Figure 9.2

Acceptable Commercial Use Based on Indicative Sound Power Levels (SWL) - Night

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Conclusion

Figure 9.1 shows the daytime zones and *Figure 9.2* shows the night time zones within which the land use groups identified in *Table 9.2* can be expected to operate without exceeding acceptable noise limits at the identified residences.

The proximity of the residential receivers to the study area places some limitations on the use of the site for industrial purposes. Areas immediately adjacent to Menangle would have limited potential for industrial use and similarly the potential for specific land use types on other parts of the site are limited.

The following chapter details the findings of the service infrastructure desktop assessment. The chapter steps through the methodology and key findings of the assessment.

10.1

METHODOLOGY

The availability of service infrastructure to the study area was investigated and service providers for water and energy were contacted. The possibility for energy and water provision to the study area and the wastewater treatment options for the site have been considered.

10.2

KEY FINDINGS

10.2.1

Electricity and Gas Utility: Integral Energy and AGL

Integral Energy requires that an application form to assess the possibility to connect to their electricity network. This procedure takes 2-4 weeks.

AGL states that there is no infrastructure for the provision of mains gas near the study area. Electricity provision is possible (existing connection in Menangle Rd) after applying to AGL with the connection address.

10.2.2

Water and Wastewater

Wollondilly Shire Council and Menangle Park are part of Sydney Waters' service area. However, liaison with Sydney Water (09/07/2008) indicates there is no infrastructure to deliver drinking water or provision of reticulated sewerage to the study area.

Drinking water in Menangle Park is currently provided by water tanks. The proposed development would need to incorporate water tanks or potentially extraction from the Nepean River which will be subject to strict licensing and water sharing agreements under the *Water Management Act* and may not be feasible. For further information see Section 9.2.1 for further information on the Regional Environmental Plan.

There are no known plans for the provision of a centralised sewerage system by Sydney Water to the study area. Any development must therefore consider on-site management options equal to or better than SCA's current recommended practices and performance standards that relate to the protection of water quality.

The Environment and Health Protection Guidelines known commonly as "The Silver Book" On-site sewage management for Single Households provides

guidance on the establishment of On-site or partial On-site systems that are considered by SCA to be current recommended practice.

A range of potential wastewater treatment options are available with the suitability dependent upon a range of factors including:

- suitability of soils for absorption / irrigation;
- potential reuse opportunities;
- size of the proposed sub-division and style of development ie residential / commercial etc.

The defining factor in the implementation of the wastewater system is the management of the discharges and ensuring that the proposal is considered to have a neutral or beneficial impact.

Traditional on-site sewage management systems such as septic tanks and absorption trenches, have been found to have a high failure rate throughout the state. According to the NSW Department of Local Government (2004), there are approximately 300,000 on-site sewage management systems across NSW and the cumulative impact of effluent, sometimes from thousands of systems, is a critical problem. The DECC and SCA generally do not favour septic tanks in areas which have soils which do not absorb water readily or are prone to waterlogging.

Pump-out systems involves a collection well that receives water from a septic system that is regularly pumped out by a road tanker. Pump out systems are used throughout NSW but are not considered best practice and are unlikely to be acceptable to support a new development or subdivision.

Aerated wastewater treatment systems (eg: 'enviro-cycle' and 'clearwater') use sensitive biological agents, mechanical systems and chemical processes to produce a higher quality effluent than a standard septic tank. They often meet DECC guidelines for Suspended Solids (SS), Biochemical Oxygen Demand (BOD) and faecal coliforms, however, levels of Nitrogen (N) and Phosphorus (P) greatly exceed irrigation guidelines (Charles, 2004). Aerated systems must be carefully managed and serviced to maintain their performance.

Unlike standard septic systems, aerated systems often discharge effluent above ground where it can easily run off into adjoining land and waterways. NSW Health guidelines require a minimum size irrigation area of 200 m² be set aside for spray irrigation, which is not suitable for active recreation or typical residential sized blocks.

Common effluent systems removes the need for on-site land application as it typically requires primary treatment on-site, for example in a septic tank, followed by collection and transfer to a centralised treatment facility. This can be achieved either by gravity or under pressure via small diameter pipes (ie pressure sewerage or vacuum).

Various options for package treatment plants exist based upon a range of technologies and the level of treatment required for reuse or disposal. Examples of providers who service similar developments include EcoNova, Innoflow, Biolytix.

Ecomax is a passive treatment system that accepts effluent from a septic tank treats contaminants and removes nutrients and pathogens at a high efficiency. Effluent from a septic

All treatment systems needs to be located above the 100 year ARI flood level and be able to demonstrate a neutral or beneficial effect. A more detailed options assessment for various treatment technologies should be undertaken as part of the planning process.

10.3 CONCLUSION

The service infrastructure conclusion details the electricity and gas utility findings and waste and wastewater findings.

10.3.1 *Electricity and Gas Utility*

- There is no infrastructure for the provision of mains gas near the study area.
- Electricity provision is possible (existing connection in Menangle Rd) after applying to AGL with the connection address.

10.3.2 *Water and Wastewater*

- There is no infrastructure to deliver drinking water or provision of reticulated sewerage to the study area. The development area is located within Sydney's drinking water catchment and therefore needs to meet the Sydney Catchment Authority (SCA) requirements under the *Drinking Water Catchments Regional Environmental Plan (REP) No. 1*. Any development or activity proposed to be carried out on land to which this plan applies should incorporate management procedures equal to or better than SCA's current recommended practices and performance standards that relate to the protection of water quality.
- There are no known plans for the provision of a centralised sewerage system by Sydney Water to the development area. The development must therefore develop on-site management options equal to or better than SCA's current recommended practices and performance standards that relate to the protection of water quality.
- All treatment systems need to be located above the 100 year ARI flood level.

The following Chapter provides a summary of the development constraints relating to the site and makes conclusions in regards to the suitability of the study area for employment generating development, as illustrated in *Figure 11.1*.

11.1 SUMMARY OF ASSESSMENTS

11.1.1 Planning

Planning and development strategies present several opportunities and constraints to the development of the study area.

The study area has been recognised in a number of studies as a potential location for employment generating development. However, the lack of available infrastructure and the relative remote location are constraints to the development of the study area in the short term.

Employment generating development would require rezoning of the study area and the Part 3A legislation provides an opportunity to seek nomination of the study area as a State significant site so that the rezoning and development could be assessed concurrently by the Minister for Planning.

The potential to accommodate recreation facilities including walking tracks and cycleways is identified. Council has undertaken a number of strategic planning assessments that have implications for development of the site. Specifically: as study area is at the northern gateway to Wollondilly LGA, the visual amenity of any development will need to be considered in the design and siting of any future development.

Slope in excess of 9% has been mapped with large areas of the study area identified as not constrained by slope gradient.

The study area is within a proposed mine subsidence area. It is understood that there are mining leases affecting the site and exploration drilling is currently occurring at the site. Further investigation is required to understand the likely timing of mining and potential impacts on the development of the site.

11.1.2 Ecology

Key ecological constraints to development within the study area include the retention and protection of remnant native vegetation identified as EECs and aquatic habitat including watercourses and dams. The provision of buffer areas for those areas of high constraint (width of the buffer area will be determined upon the nature of the adjacent land use). The EECs and aquatic

habitat have the potential to provide habitat for threatened and non-threatened flora and fauna. The dams will require further investigation to determine whether they support suitable habitat for the threatened frog species and foraging habitat for threatened bats.

The significance of impacts to individual species and EECs will depend on the proposed extent of vegetation clearance in the study area and impacts to the aquatic habitat. It is recommended that development in the study area be sited and designed in such a way as to minimise the potential for significant impacts to these areas (identified as 'high' constraint areas). A comprehensive impact assessment will be required once the master plan has been finalised.

11.1.3 *Fire*

Parts of the study area are identified as BPL which poses a constraint to development. BPL mapped within the study area includes vegetation considered to be medium/high hazard and the land within 100 m of the hazard (buffer zone).

Developments sited on land identified as BPL will be subject to assessment under PBP. This includes an assessment of the risk of bushfire attack, relevant construction standards and specifications regarding APZs; the specifics of which will depend on the type and siting of the development. Clearing for APZ would need to consider the ecological value of the land.

11.1.4 *Indigenous Heritage*

There is a high potential for Aboriginal heritage sites along the banks of the Nepean River. There appears to be little disturbance of these areas and any Aboriginal sites are likely to have high integrity. Land within 100 m of the Nepean River is likely to have a high heritage potential. Survey of areas near the river which may be impacted by development are required to determine the presence of and assess any Aboriginal sites.

Other tributaries which run through the study area could also have been the focus for Aboriginal occupation. These tributaries are likely to have been eroded and impacted by clearing and grazing and it is therefore considered that the area around these creeks has a moderate level of archaeological potential.

The majority of flat land within the study area has been impacted by farming activities which will have impacted on any Aboriginal Heritage sites that exist in these areas. As Aboriginal sites tend to be closer to water sources, along ridges or in areas with particular resources, there is a lower likelihood for sites to exist in these areas. However, these areas may contain isolated finds or low density artefact scatters which are protected under the *NPWS Act 1974*.

Further investigation and survey of the areas to be developed will be required in accordance with DECC guidelines and in conjunction with Aboriginal stakeholders.

11.1.5 *European Heritage*

Potential impacts may occur directly upon heritage sites or through developments which alter the context and setting that contribute to the heritage values of a site or the conservation zone. A Heritage Impact Assessment would be required as part of the approval process as development has the potential to impact upon the heritage listed sites and values both within and adjacent to the study area.

The detailed impacts assessment would consider options to avoid and minimise heritage impacts, including visual as well as physical impacts. These mitigation measures may include 'buffer zones' around heritage sites and conservation areas, and interpretation strategies.

11.1.6 *Contamination*

Several potential contamination issues were identified within the study area.

Quantities of waste material were identified, including demolition wastes that may contain asbestos and unknown materials. Piggery waste was found present on the ground surface in windrows and within underground concrete structures, these materials are likely to be high in nutrients, veterinary medicines, bacteria, viruses and micro-organisms generally.

Many structures containing asbestos were observed in varying states of disrepair on the Hillcrest Park and El Bethel sites. It is likely that limited contamination of soil with ACM has occurred. Further potential contamination issues were observed associated with materials storage and handling on the Hillcrest Park and El Bethel sites. These included the presence of ASTs and USTs on-site and the observation of used drums of oil and explosives.

Lastly, there is a history of sand and gravel extraction in the area. This requires further investigation to more accurately delineate the areas of excavation and more importantly the nature of backfilled material.

It is unlikely that site contamination is a factor that will preclude development however, it is not possible to accurately quantify the potential cost of resolving these contamination issues until a more detailed physical investigation has been undertaken. Should Macquarie wish to more accurately quantify these investigations, management and subsequent costs it is recommended that a limited Phase II investigation is undertaken to collect this data.

11.1.7 Flood

Subdivision and development of land within the extent of the 1% flood level is not favoured by Wollondilly Shire Council.

The northern side of the study area is affected by flooding. The flood levels are between 77.7 m and 78.0 m AHD, based on the cross sections derived from the Upper Nepean River Flood study. Development in Floodway areas is only allowed if the development does not alter flood behaviour.

Flood prone land can be divided into floodway and floodfringe. Subdivision and development in the "Flood Fringe" may be permitted if it complies with Picton's Local Flood Policy, has a fail free evacuation route linked with high ground levels, and is not considered a high risk activity. If development of flood affected land is proposed, it will be necessary to conduct a detailed flood study to investigate the impacts. Effluent treatment areas must be located outside the land within 1:100 flood or stormwater level.

11.1.8 Noise

The proximity of the residential receivers to the study area places some limitations on the use of the site for industrial purposes. Areas immediately adjacent to Menangle and other residencies would have limited potential for industrial use.

11.1.9 Service Infrastructure

There is no infrastructure for the provision of mains gas near the study area. Electricity provision is possible (existing connection in Menangle Rd) after applying to AGL with the connection address.

There is no infrastructure to deliver drinking water or provision of reticulated sewerage to the study area. The study area is located within Sydney's drinking water catchment and therefore any development or activity proposed to be carried out on land to which this plan applies should incorporate management procedures equal to or better than SCA's current recommended practices and performance standards that relate to the protection of water quality.

There are no known plans for the provision of a centralised sewerage system by Sydney Water to the development area. The development must therefore develop on-site management options equal to or better than SCA's current recommended practices and performance standards that relate to the protection of water quality.

The constraints identified in the preceding pages are designated as high, medium and low for the purposes of assessing the suitability of the study area for employment generating development. Land within a *high* constraint is considered unsuitable for development as it is either precluded by law or by the likely cost/feasibility of the measures necessary to enable it to be developed, *low* constraint land is considered generally developable with 'standard' environmental mitigation measures and *medium* constraint areas are those that have constraints flagged but with further investigation and/or management may be suitable for types of employment lands development.

11.2.1

High constraints

A key area of high constraint identified was in the land immediately skirting the Nepean River. This land was considered high for its slope in excess of 9%, ecological value, fire risk, Aboriginal heritage potential, and flooding below the 1% flood level. At the northern part of the study area, El Bethel, the 1% flood level extends south in an irregular shape, constraining over half of the parcel of land, see *Figure 11.1*. El Bethel also has an area of high constraint to the immediate north of the township, due the European heritage constraints.

In addition to this predominant high constraint area, there are discrete pockets identified across the study area.

An area of high constraint was identified on land west of the Hume Highway on 775 Moreton Park Road, for its ecological value of Shale Sandstone Transition Forest and Shale Hills Woodland. In addition, several small areas further south of these ecological areas, were identified as unsuitable due to it featuring some sections of slope in excess of 9%.

Further, a band positioned north to south of high potential was identified on the land to the east of the Hume Highway and east of 251 Menangle Road on El Bethel. This was determined to be high based on; ecological value as it features Shale Sandstone Transition Forest, fire risk, and Aboriginal Heritage potential.

11.2.2

Medium Constraints

Planning elements have not been included in the overall constraints map as they apply across the whole site. Any management measures necessary for planning controls can be developed as part of the input of the development design.

A key area of constraint will be those buffer areas associated with those ECCs indentified as high constraint. The width of the buffer area will be determined upon the nature of the adjacent land use and as this is no yet known, will be formulated as part of the development design.

Another key technical area identified as a medium constraint is noise, as some limitations to industrial development has been identified. Any management measures necessary for noise control can be developed as part of the input of the development design.

775 Moreton Park Road

775 Moreton Park Road is constrained as it has the potential for Aboriginal Heritage. It is recommended that this area be subject to an Aboriginal heritage site survey to further verify its potential. This survey may confirm that the site has Aboriginal potential or alternatively, may establish that the site has a low potential.

El Bethel

El Bethel contains areas of constraint due to its ecology values of alluvial woodland and riparian forest, moderate Aboriginal potential, European heritage development constraints, contamination and flood. It is suggested this land be subject to further ecology, aboriginal and contamination (as part of a Phase 2 Assessment) survey. These further studies would establish if these items are a confirmed constraint or whether these would be reconsidered at a lower significance. In addition once development proposals are known it is suggested a heritage consultant assess the plans for their sympathetic value to the nearby Conservation Area.

A band of constraint situated north to south was identified to the east of the Hume Highway for its ecological, Aboriginal heritage and flooding (below the 1% flood level) which tapers further south into this area. Further ecology and Aboriginal surveys are recommended to establish if these items are a confirmed constraint or whether these would be reconsidered at a lower significance.

Hillcrest Park

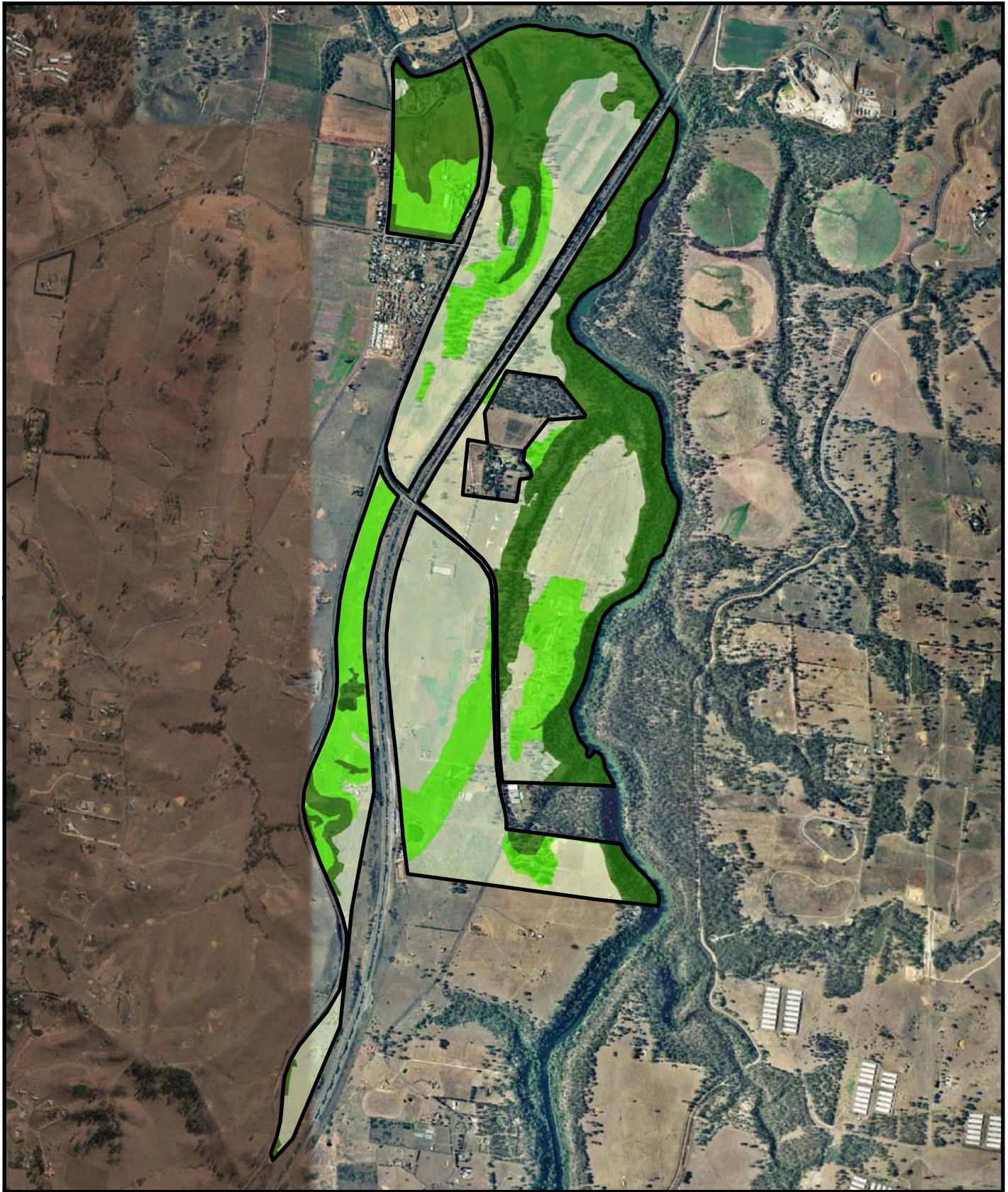
Hillcrest Park, the site of the former piggery, is considered constrained due to its contamination potential. As described earlier in the report there are a number of contamination issues identified and raised in the Phase 1 Assessment which will need to be further investigated in a Phase 2 Assessment to obtain what management options are available to remediate this land so it is suitable for employment lands development.

Land further south of the piggery was identified as constrained for its ecology (Shale Sandstone Transition Forest, Shale Hills Woodland and Riparian Forest features) and location within BPL area.

A further band, situated north to south, of constraint was identified between the Hume Highway and Moreton Road, due to its Aboriginal Heritage constraints.

11.2.3 *Low Constraints*

Areas of low constraint are considered in general suitable for employment lands development.



Legend

- Wollondilly development site
- Level of Constraint
- High
- Low
- Moderate

Client:	Macquarie Group of Companies		
Project:	Constraints and Opportunities Mapping for the Wollondilly Development Site, NSW.		
Drawing No:	0087207s_GIS21	Suffix No:	R0
Date:	31/07/2008	Drawing size:	A4
Drawn by:	JF	Reviewed by:	CA
Source:	Wollondilly Shire Council		
Scale:	Refer to Scale Bar		



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Figure 11.1

Summary of Constraints

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Annex A

Wollondilly Council Criteria

WOLLONDILLY SHIRE COUNCIL

TRIM 3751

Industrial Lands Assessment Criteria was adopted by Wollondilly Shire Council at Ordinary Council Meeting 17 March 2008 Resolution 41/2008.

The assessment was prepared by TCG Planning and is a tool to assist in the identification and assessment of future industrial rezoning proposals.

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WOLLONDILLY SHIRE COUNCIL

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Land parcel size based on land use

Land use type	Land parcel size
Commercial/retail activities	1 hectare
Industrial/business park	1-10 hectares
Large industrial activities	10 hectares
Special large scale uses	50 hectares

Attributes of Proposed Industrial Land

Criteria	Comment
Land use characteristics	
Land values	
Ownership details	
Transport linkages	
Access availability	
Topography	
Proximity of Residential Development	

Criteria A – Strategic Validity

1. Regional Strategy Directions

No.	Criteria	
1a	Will the industrial land rezoning meet the objectives and strategies contained in the South West Subregional Strategy?	
1b	Is the land to be rezoned located within a strategic centre or corridor nominated within the subregional strategy?	

2. Policy Directions

No.	Criteria	
2a	Is the proposed rezoning of the land consistent with state, regional and local planning strategies and environmental planning instruments?	

3. LEP Framework

No.	Criteria	
3a	Does the draft LEP provide for zones and zones objectives which meet the provisions of Draft Wollondilly Local Environmental Plan 2008?	

4. Spot Rezoning

No.	Criteria	
4a	Does the Draft LEP address the Department of Planning's requirements for spot rezoning identified in Circular PS 06-005 (Local Environmental Plan Review Panel) and PS 06-105 (Spot Rezoning)?	
4b	Will the draft LEP address Circular PS 06-006 and PS 06-105 by	

	implementing studies and strategic work consistent with State and regional policies?	
4c	Will the draft LEP implement studies and strategic work consistent with ministerial directions	
4d	Is the LEP location in a global/regional city, strategic centre or corridor nominated within the Metropolitan Strategy or other regional/subregional strategies?	
4e	Will the LEP facilitate a permanent employment generating activity or result in a loss of employment lands?	
4f	Will the LEP be compatible/complementary with surrounding uses?	
4g	Is the LEP likely to create an undesirable precedent or create or change the expectations of the landowner or other landholders?	
4h	Will the LEP deal with a deferred matter in an existing LEP?	
4i	Have the cumulative effects of other spot rezoning proposal in the locality been considered? What was the outcome of these considerations?	

5. Industrial Lands Supply

No.	Criteria	
5a	Will the rezoning complement existing zone industrial land within Wollondilly?	
5b	Will the rezoning permanently displace or change other landuses within and beyond the site and if so, what are the consequences?	

6. Employment Targets

No.	Criteria	
6a	Will the rezoning accommodate industries which will provide local employment growth or will it provide for expanded skill opportunities?	
6b	Will the rezoning result in an overall net gain in employment lands through the provision of a permanent employment generating use?	

7. Regional Open Space

No.	Criteria	
7a	Is the land to be rezoned located outside of the boundaries reserved for: - regional open space purposes under Sydney Regional Environmental Plan No. 20 – Wollondilly Regional Open Space; or - RE1 Public Recreation purposes under the Standard Instrument Order 2007 to be included in Draft Wollondilly LEP 2008?	

Criteria B – Environmental Sustainability

8. Water Quality

No.	Criteria	
8a	Does the Draft LEP ensure that buffer zones can be in place to protect Wollondilly's rivers, tributaries and natural habitats? Is a 50m riparian corridor	

	provided from the top of the bank of major watercourses including the Nepean and Georges Rivers and their tributaries, with a lesser setback accepted for watercourses having a lower environmental and scenic significance?	
8b	Will future development facilitate protection of environmentally sensitive areas within the riverine corridor?	
8c	Will future industrial development of the land address catchment management principles, with specific reference to downstream impacts?	
8d	Will future development have minimal impact on water quality, with specific reference to impacts such as nutrient loading and pollutants?	
8e	Will the proposed rezoning significantly alter: - demand for water to the site - opportunities to collect water on site - opportunities to reuse water on site - production of wastewater and how this is to be treated and disposed of ?	

9. Flora and Fauna

No.	Criteria	
9a	Will future development allow for the protection of threatened species, populations or ecological communities or their habitats under the Threatened Species	

	Conservation Act 1995?	
9b	Will future development allow for the protection of the critical habitat of those threatened species, populations and ecological communities that are endangered, as defined by the Threatened Species Conservation Act 1997?	
9c	Can the land be redevelopment for industrial purposes without necessitating the removal of significant tracts of remnant vegetation?	
9d	Will the rezoning result allow for the retention of wildlife, recreational and scenic corridors?	

10. Flood Hazard

No.	Criteria	
10a	Is the land to be rezoned for industrial purposes located outside of an area potentially affected by flooding in the event of 1% AEP event?	

11. Air Quality

No.	Criteria	
11a	Will the draft LEP allow for the appropriate siting of industrial development having regard to the air quality levels, when considering local wind patterns and cumulative impacts?	

12. Slope Characteristics

No.	Criteria	
12a	Does the land to be rezoned have a slope of less than 1 in 10, which	

	renders it suitable for industrial development?	
--	---	--

13. Geology/Contamination/Subsidence

No.	Criteria	
13a	Is the site located in an area of low or medium risk of slope instability, which will allow for its future development for industrial purposes?	
13b	Is the site identified as contaminated land in accordance with State Environmental Planning Policy No. 55 – Remediation of Land and, if so can be remediated to a standard suitable for industrial use?	
13c	Is the site located outside of a Mine Subsidence area or have coal resources already been extracted and the impacts of subsidence completed?	
13d	Will the proposal allow for continued coalmining operations, where located in the vicinity of the site?	
13e	Will rezoning of the land sterilise access to coal resources or access to existing infrastructure associated with mining uses?	

14. Buffers and Spatial Separation

No.	Criteria	
14a	Can appropriate buffer zones be provided within the site to provide separation between the development and surrounding natural habitats for the purpose of native plant regeneration areas?	

14b	Can adequate separation be provided between future industrial uses and adjacent residential and rural residential development to avoid acoustic, dust and odour impacts to the surrounding area?	
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15. Bushfire hazard

No.	Criteria	
15a	Where the site is identified as Bushfire Prone land in Council's records can the site provide appropriate protection and evacuation measures, including Asset Protection Zones, to avoid risk to human life?	
15b	Is the site of sufficient area to accommodate the require bushfire management measures such as Asset Protection Zones and perimeter roads, whilst still providing sufficient developable land?	

16. Heritage Significance

No.	Criteria	
16a	Can the land be development for industrial purposes without impacting on any item of Aboriginal archaeological significance?	
16b	Can the land be developed for industrial purposes without impacting on any heritage item or heritage conservation area, which is listed in the Wollondilly LEP 191 or which is identified by Council as	

	having historical or cultural significance?	
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17. Sustainability

No.	Criteria	
17a	Will there be any opportunities for energy efficiency and generation, such as solar technology?	
17b	Is the proposal a sustainable use of the land? Is the proposed use a suitable choice in comparison to other potential uses or if the site was to remain unchanged?	

Criteria C – Existing and Desired Future Character

18. Rural Character

No.	Criteria	
18a	Will development occur in accordance with the Wollondilly 2025 Vision? - preserving separation between the shire's towns and villages - protecting the rural lifestyle enjoyed by residents - providing design standards for development which will achieve a high environmental quality and minimise impacts on surrounding areas; and - complementing the rural character of the region?	

19. Urban Area Integration

No.	Criteria	
19a	Is the site able to aid in clustering industrial lands or preserve large sized industrial areas?	
19b	Will the rezoned lands integrate with adjacent urban lands and will the draft LEP provide opportunity for strong linkages to adjacent commercial or industrial employment lands or make efficient use of existing or new infrastructure and services?	

20. Visual Analysis

No.	Criteria	
20a	Does the Draft LEP maintain existing visual catchment boundaries which define the entrance to towns within the Wollondilly Shire, when viewed from major roads and railways accessing the urban area?	
20b	Will future industrial development be located in a position that does not impact on visually sensitive ridgelines or areas of topographical or visual significance?	
20c	Will future development of the land have a minimal impact on riverine scenic quality where is subject land is located adjacent to a watercourse?	
20d	Will the draft LEP allow for the siting of future industrial development in a location which will not significantly impact on long distance significant view corridors from	

	ridgelines, open space areas, or other vantage points?	
20e	Does the site have low aesthetic appeal or is the immediate area already impacted by visually significantly industrial development?	

21. Land Use Conflict

No.	Criteria	
21a	Is the industrial zoning of the land consistent with the zoning of land immediately adjoining the site on at least one boundary (but for the absence of a public road), to provide for continuity of zones?	
21b	Will the draft LEP exclude the future development of offensive or hazardous industries?	

22. Rural and Resource Lands

No.	Criteria	
22a	Does the proposal demonstrate the most suitable use of the land?	
22b	Does the land which is the subject of the rezoning proposal exhibit a low production potential in regard to agricultural resource quality?	
22c	Will the rezoning proposal allow for the ongoing operation and continued viability of adjacent substantial agricultural land holdings, by minimising land use conflicts?	

Criteria D – Infrastructure Availability

23. Site Area and Dimensions

No.	Criteria	
23a	Will the land to be rezoned for industrial purposes be of sufficient area to accommodate a range of future industrial land uses and the anticipated circulation movements?	
23b	Is the site of insufficient depth to accommodate the required 30m setback from arterial roads for industrial development (as contained in clause 28 of the Wollondilly LEP 1991)	
23c	Is the site of a shape and area which will accommodate the anticipated operational, manoeuvring, waste management, landscaping, car parking and building envelope requirements for a range of industrial uses?	

24. Access and Road Capacity

No.	Criteria	
24a	Is the site located in proximity to adequate road and rail infrastructure? Is the provision of infrastructure feasible and consistent with local and regional strategic policies and directions?	
24b	Will the draft LEP allow the acquisition, dedication and/or construction of future local or regional road or rail links as identified in state or local environmental planning instruments?	
24c	Is the local road network	

	capable of catering for future industrial development, both in terms of road capacity and construction?	
24d	Can the land accommodate access which does not lead directly to a major regional or arterial road?	
24e	Can access to the site be provided without the need to enter established residential areas?	
24f	Is the location potentially capable of being serviced by public transport and other alternatives to public transport?	

25. Infrastructure Capabilities

No.	Criteria	
25a	Is the site adequately serviced or has the potential to be serviced by all utilities including water, sewer, electricity and gas?	
25b	Can such services be provided to the site whereby future industrial development can proceed without constraint and with minimal environmental impacts?	
25c	Where the site is located in an areas which is currently not connected to reticulation sewer, is the subject land located in an area which is scheduled for servicing under the Priority Sewerage Program and will reticulated sewer be provided for the subject site, prior to the rezoning of the land?	

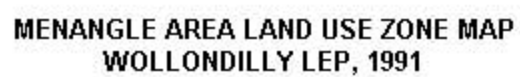
Criteria E – Public Benefit

26. Demographic Characteristics and Social Considerations

No.	Criteria	
26a	Is the proposed land use compatible with the long term employment needs of the community through the provision of local and regional employment opportunities?	
26b	Will the proposed rezoning provide for an accessible workplace suitably connected to residential facilities?	
26c	Are there appropriate transport options for employees from residential centres? Or can the provision of such transport options be provided and supported by local and regional planning policies?	
26d	Will the proposed development encourage residents to seek employment within the Shire and will the rezoning therefore contribute to decreased commuter rates for the Wollondilly Shire.	

27. Innovation

No.	Criteria	
27a	Will the draft LEP and the proposed zones support diversification and expansion of Wollondilly's industrial base, through the provision of a broader range of industries such as high technology enterprises or information based industries?	



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Wollondilly Shire Council accepts no responsibility for any injury, loss or damage arising from the use of this plan or errors or omissions therein.

Annex B

Photographs Of The Subject Sites

Photograph B.1 River-Flat Eucalypt Forest on Coastal Floodplains community along the Nepean River



Photograph B.2 Exotic species cover in the understorey of the River-Flat Eucalypt Forest on Coastal Floodplains community



Photograph B.3 Remnant woodland vegetation mapped as Shale/Sandstone Transition Forest and Cumberland Plain Woodland.



Photograph B.4 Exotic species cover in the understorey of the Shale/Sandstone Transition Forest and Cumberland Plain Woodland communities.



Photograph B.5 Cleared areas dominated by exotic species and pasture grass



Photograph B.6 Farm dams represent aquatic habitat



Photograph B.7 Hollow-bearing trees/stags



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