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Landcom

Report on Menangle Park

Offsetting Strategy

May 2010

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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GHD Pty Ltd (GHD) has been engaged by Landcom to prepare a vegetation 'Offset Strategy' associated with the proposed development at Menangle Park in Sydney's southwest. Implementation of the proposed development will impact on 25.4 ha of native vegetation. Vegetation communities to be impacted include River-flat Eucalypt Forest on Coastal Floodplains (RFEF) and Shale Plains Woodland (SPW), a sub-community of Cumberland Plain Woodland (CPW).

The proposed offset strategy has considered ecological principles and biodiversity values during the design and planning of the project.

The objectives of the offset strategy for Menangle Park are:

- To improve biodiversity values, time, throughout the Menangle Park precinct;
- To maintain, through time, a 'no net loss' of native vegetation cover;
- To place conservation security over a high percentage of existing vegetation on-site;
- Invest in improving the condition of conserved vegetation through a structured bush regeneration program;
- Ensure examples of all vegetation communities found on site are included in the open space network (which includes the proposed offset areas under E2 zoning); and
- Conserve all 'high value' ecological features in the open space network.

As such, implementation of the offset will conserve 47.2 ha of remnant vegetation on site, (including 20.5 ha outside of designated riparian corridors) rehabilitation of 47.2 ha of existing conserved vegetation through a structured bush regeneration program and revegetation of 51.2 ha on site.

The strategy has been prepared to outline the principles and objectives of the offset actions proposed as applicable for the rezoning phase. The document promotes a 'balanced' outcome between the sites ecological values and the need to deliver the nominated yield (as determined by the Department of Planning) of residential properties to the market. It is anticipated however, that this document will be used to assist council make determinations regarding potential impacts to vegetation and threatened species when considering future development applications (DA's) for the site. The offset strategy has considered the sites ecological values in detail when determining an appropriate suite of offset actions for known impacts. As such, the strategy delivers outcomes, when implemented, to suitably mitigate these impacts.

1. Introduction

1.1 Background

GHD Pty Ltd (GHD) has been engaged by Landcom to prepare a vegetation 'Offset Strategy' associated with the proposed development at Menangle Park in Sydney's southwest. Implementation of the proposed development will impact on 25.4 ha of native vegetation. Vegetation communities to be impacted include River-flat Eucalypt Forest on Coastal Floodplains (RFEF) and Shale Plains Woodland (SPW), a sub-community of Cumberland Plain Woodland (CPW). RFEF is listed as an endangered ecological community (EEC) under the *Threatened Species Conservation (TSC) Act 1995*. Prior to January 2009, CPW was listed as an EEC under this Act, however, since this time, the Scientific Committee of the TSC Act has made a Preliminary Determination to support a proposal to list the Cumberland Plain Woodland in the Sydney Basin Bioregion as a Critically Endangered Community on Part 2 of Schedule 1A of the Act and therefore until a final a determination is made, this community is classified as a critically endangered community. CPW is also being listed as an EEC under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.*

Landcom has commissioned this Offset Strategy to gain approval from the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) and the NSW Department of Environment, Climate Change and Water (DECCW) for the proposed development footprint. The Offset Strategy is also to be submitted with a referral to DEWHA for approval of the development footprint in accordance with the EPBC Act 1999. As such, the offset strategy has been prepared in consultation with DECCW and DEWHA. In particularly, DECCW have been engaged through site visits and regular meetings. This consultation has allowed DECCW to assist in determining offset ratios, locations for offsetting actions, preferred conservation mechanism and the nature of proposed works.

The proposal has followed the principles of *avoid, mitigate and offset,* where possible, when dealing with ecological constraints while considering the need to meet government yield targets for the precinct. Similarly, the Offset Strategy has embraced the principle of *maintain and improve* in terms of delivering a long term ecological outcome.

GHD has reviewed the ecological assessment (Eco Logical 2009) to ascertain vegetation characteristics, such as type and condition, to set the proposed offset. Additionally, GHD has completed targeted surveys on the site for the threatened herb *Pimelea spicata* (GHD, 2009). It is recommended that the ecological assessment and *P. spicata* targeted survey results be read in conjunction with this Offset Strategy.

Details of the development and conservation outcomes are included as Appendix A.

The proposed impacts and offset area calculations are shown in Section 4 of this report.

The strategy has been prepared to outline the principles and objectives of the offset actions proposed as applicable for the rezoning phase. The document promotes a 'balanced' outcome between the sites ecological values and the need to deliver residential properties to the market. It is anticipated however, that this document will be used to assist council make determinations regarding potential impacts to vegetation and threatened species when considering future development applications (DA's) for the site. The offset strategy has considered the sites

ecological values in detail when determining an appropriate suite of offset actions for known impacts. As such, the strategy delivers outcomes, when implemented, to suitably mitigate these impacts.

1.2 Biodiversity and Conservation Principles

1.2.1 Avoid – Mitigate – Offset

The Menangle Park Development has considered ecological principles and biodiversity values during the design and planning of the project. Initiatives embraced include:

- The development footprint, and therefore potential yield, has been modified on numerous occasions to better protect biodiversity values;
- Conservation of vegetation, where possible, throughout the development footprint. This includes vegetation outside DECCW's required riparian corridors in accordance with the *Water Management Act (WMA) 2000;*
- Conserved vegetation protected in perpetuity through the provision of environmental zonings (refer to Section 4.3.7 for further detail);
- Implementation of an offset strategy delivering the following outcomes:
  - Conservation of a large contiguous patch of vegetation adjoining the Nepean River;
  - Conservation of 'high value' biodiversity including vegetation communities similar to those being impacted by the proposal (including EEC's);
  - Condition improvement of the conservation lands through appropriate rehabilitation and land management practices (an appropriate management plan will be prepared for the conservation lands as a condition of the projects approval and when details of rehabilitation and management actions required are known);
  - Conservation of important habitat features suitable to the same suite of species being impacted by the proposal; and
  - Long term security over lands for conservation purposes.

1.3 Aims and Objectives

This Offset Strategy has been prepared in accordance with the relevant legislation, policies and documentation outlined in Sections 1.3 and 3.2.1, below. The Offset Strategy describes the impact of the proposed development on native vegetation and mitigation actions to 'offset' this impact. The Offset Strategy provides clear, concise direction and a practical framework for implementation of the offset.

The aim of the Offset Strategy is to:

- Describe the impact on existing native vegetation and conservation outcomes associated with the proposed development;
- Provide relevant information on offsetting and the development site;
- Set appropriate rehabilitation and revegetation ratios and planting locations to suitably compensate for the impact; and

- Clearly define the program and management framework required to implement the 'offset'.

1.4 Relationship with Existing Reports

This Offset Strategy has been prepared giving consideration to information contained in a variety of reports and documentation pertaining to the site. Those reports of particular importance include:

- Eco Logical Pty Ltd, Menangle Park Flora, Fauna & Aquatic Assessment, March 2009;
- GHD Pty Ltd, Riparian Corridor Assessment, December 2007; and
- GHD Pty Ltd, Menangle Park Rezoning *Pimelea spicata* Survey and Results, October 2009.
- NPWS National Parks and Wildlife Service, Vegetation of the Cumberland Plain, 2002.

1.5 List of Abbreviations

AHD	Australian Height Datum
APZ	Asset Protection Zone (firebreak)
CAA	Controlled Activity Approval
CCC	Campbelltown City Council
CPW	Cumberland Plain Woodland
DECCW	NSW Department of Environment, Climate Change and Water (formerly NSW Department of Environment, Climate Change (DECC) and NSW Department of Water and Energy (DWE))
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts
DoP	NSW Department of Planning
EEC's	Endangered Ecological Communities
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act, 1999
Ha	Hectares
LEP	Local Environment Plan
LGA	Local Government Area (Campbelltown City Council)
RFEF	River Flat Eucalypt Forest
SFW	Sydney Freshwater Wetlands
SPW	Shale Plains Woodland
TSC Act	NSW Threatened Species Conservation Act, 1995
VMP	Vegetation Management Plan
WMA	Water Management Act 2000

2. Site Context

2.1 Study Area

The study area is located at Menangle Park in Sydney's southwest in the Campbelltown City Council (CCC) local government area (LGA). Menangle Park is situated between the suburbs of Campbelltown and Camden and abuts the north-eastern boundary of Wollondilly Shire.

The study area is primarily undulating hills to the north, south and east, and levels out towards the centre. Elevation ranges from 60 to 128 metres AHD (Australian Height Datum).

A map of study area is included in Appendix A.

2.2 Surrounding Land Uses

The study area is bordered to the west and south by the Nepean River and to the east by Menangle Road. Extraction operations, including a coal washing plant occur to the northwest corner of the site with Mount Annan Botanical Gardens being located immediately to the site's north. The main southern railway line bisects the site in the west.

2.3 Climate

The Commonwealth Bureau of Meteorology website provides the following climatic information taken from the Campbelltown weather station. Mean rainfall peaks in summer and mean annual rainfall is 960.3 mm per year. Mean daily maximum temperatures range from 28.4°C in summer to 17.1°C in winter.

2.4 Relevant Legislation

The following information summarises the most relevant environmental legislation associated with determining a suitable 'offset' for the Menangle Park. This list, by no means, covers all relevant legislation pertaining to the site.

2.4.1 Threatened Species Conservation Act 1995

The objectives of the NSW TSC Act are:

- To conserve biological diversity and promote ecologically sustainable development;
- To prevent the extinction and promote the recovery of threatened species, populations and ecological communities;
- To protect the critical habitat of those threatened species, populations and ecological communities that are endangered;
- To eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities;
- To ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed; and

- To encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

The TSC Act includes schedules that list threatened species, populations and ecological communities and key threatening processes.

The Biodiversity Banking and Offsets Scheme (or BioBanking) has been established under Part 7A of the TSC Act. To complete the legal framework, the proposed Threatened Species Conservation (Biodiversity Banking) Regulation 2007 establishes specific aspects of the scheme which are important for its operation.

The four key elements of the BioBanking Scheme are:

- Establishing biobank sites on land through biobanking agreements between the Minister for Climate Change, Environment and Water and the landowners;
- Creating biodiversity credits for management actions that are carried out, or proposed to be carried out, to improve or maintain biodiversity values on biobank sites. The biobanking assessment methodology will be the tool used to determine the number of biodiversity credits that may be created for these management actions;
- The trading of credits, once they are created and registered; and
- Enabling the credits to be used to offset the impact of development on biodiversity values. The methodology will be the tool that is used to determine the number and class of credits that must be retired to offset the impact of a development and ensure that the development improves or maintains biodiversity values.

2.4.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act makes it an offence for a person to undertake an action that has the potential to significantly impact on a matter of 'national environmental significance' without first obtaining a permit from the Commonwealth Minister for Environment and Heritage. Matters of national environmental significance include: declared World Heritage areas; declared Ramsar wetlands; listed threatened species and ecological communities; listed migratory species; listed marine species; nuclear actions; and the environment of Commonwealth marine areas.

2.4.3 Water Management Act 2000

The *Rivers and Foreshores Improvement Act 1948* was been repealed and replaced by the Water Management Act 2000 (WMA) as of 4th February 2008. A Controlled Activity Approval (CAA) is required under the WMA for certain types of developments and activities that are carried out in or near a river, lake or estuary.

Under the WMA, a controlled activity means:

- The erection of a building or the carrying out of a work (within the meaning of the EP&A Act), or
- The removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or

- The deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- The carrying out of any other activity that affects the quantity or flow of water in a water source.

A CAA confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land.

3. Offsetting

3.1 Why Offsetting

A history of vegetation clearing throughout NSW has led to the State Government adopting a 'no net loss' policy in terms of vegetation management. Where clearing has occurred, to a level threatening the integrity of entire vegetation communities or where the landscape is becoming unsustainable due to vegetation decline, a net increase in vegetation cover may be required.

The Cumberland Plain of Western Sydney is an area identified by the DECCW as requiring a net gain in vegetation cover in order to sustain the landscape. The draft Cumberland Plain Recovery Plan identifies that only 13% of the Cumberland Plain is covered with native vegetation, in varying condition, and describes the necessary actions to halt further losses and achieve a net gain. This approach needs to be balanced with the need to deliver sustainable land for housing to meet the rapidly expanding population of Western Sydney.

Vegetation offsets are therefore a way of having both economic development and environmental protection.

3.2 The Current Framework of Offsetting

The use of offsetting as a mechanism to mitigate impacts of development on natural resources throughout Western Sydney has gained momentum over the last 2 to 3 years. In particular, projects such as Second Ponds Creek Residential Development, Erskine Park Release Area and Ropes Crossing have raised the 'benchmark' in terms of determining and implementing suitable offset programs, particularly at or before the rezoning stage. Each was negotiated on a 'case by case' basis between the proponent/developer, the DECCW and relevant local government. The DECCW is the lead government agency in negotiating suitable offsets but does not necessarily give final approval to such proposals. Approval usually rests with relevant local government agency through the NSW regulatory planning system administered by the Department of Planning (DoP).

The design and approval of suitable offsets is still negotiated under the same framework, however, the NSW Government has recognised the need to formalise a process for assessing appropriate offsets and has gazetted Biodiversity Banking and Offsets Scheme (BioBanking) (DECC, 2006) to address the loss of biodiversity and threatened species via a standardised approach. The scheme creates a market framework for participating landholders and development sites, allowing for both the conservation of biodiversity values in certain sites and also offsetting impacts in other areas.

BioBanking statements can be issued when it is determined that the proposed development will maintain or improve biodiversity values. Development within a red flag area (i.e. an area of land where proposed impact from development would not meet the 'maintain or improve' test - usually associated when impact occurs on an EEC or listed threatened species) is only permitted if the Director General of the DECCW makes a determination on the proposed development.

Participation in the BioBanking scheme is currently voluntary and the program wasn't approved when preparation of the Menangle Park Master Plan and associated offset strategy commenced.

In some cases it may be prudent to negotiate the impact of the development under the original offsetting process and utilise the BioBanking model to assess the adequacy of on site conservation outcomes and the offset only.

GHD has referenced several guidelines and policies in calculating the offset and these are listed below.

3.2.1 Legislation

The following legislation has been considered in determining an appropriate offset strategy for the site:

- BioBanking Regulation 2006;
- Environment Protection and Biodiversity Conservation Act 1999;
- Threatened Species Conservation Act 1995;
- Water Management Act 2000;
- Native Vegetation Act 1997;
- Environmental Planning and Assessment Act 1979;
- Sydney Harbour and Hawkesbury Nepean Catchment Blue Prints 2002;
- Draft Cumberland Plain Recovery Plan, 2002;
- Offsetting Principles and Guidelines DEC, 2005; and
- Local Government Act 1993 and Local Government Amendment (Community Land Management) Act 1998.

3.2.2 Policies and Guidelines

The following polices have been considered in determining the appropriate offset strategy for the site:

- BioBanking Scheme DECC, 2006;
- Offsetting Principles and Guidelines DECC, 2006;
- Draft Cumberland Plain Recovery Plan, 2002; and
- GCC Offset Strategy 2007.

All works to implement the proposed offset will be delivered in accordance with the following rehabilitation guidelines:

- DECC's *Bringing Back the Bush* – Best Practice Guidelines for Restoration on the Cumberland Plain, 2005
- DIPNR's Best Practice Guidelines for Bush Regeneration on the Cumberland Plain, 2004;
- Florabank Seed Collection and Management Guidelines, updated 2007; and
- GANSW Best Practice Revegetation Guidelines, 1999.

The above list has been identified as being highly relevant to the offset strategy proposed for the development at Menangle Park. However, this list by no means covers all relevant legislation pertaining to the site.

3.2.3 Relevant Projects

The following development projects have delivered offset packages utilising a range of different offset actions. GHD has assessed each offset and the outcomes achieved in each to guide the Offset Strategy at Menangle Park. There are many other examples of offsets associated with development in Western Sydney, however, GHD determined these projects to be of most relevance due to the nature of their impacts, and the associated offsets, being of a similar nature of works to that proposed at Menangle Park.

- **Erskine Park Release Area** – Developed a Biodiversity Offset Strategy to compensate for the impact to 'support for core' (DEC, 2006) vegetation during development. Offset actions included:
  - Gazettal of 126 ha of private lands as conservation and placed under the management of the state government;
  - Rehabilitation of conservation lands;
  - Investment in the rehabilitation of surrounding public open space network; and
  - Achieved a net gain of 3.2:1 for every hectare cleared. (Vegetation was classified 'support for core' whereas vegetation at Menangle Park is classified as 'Core', 'Support' and 'Other Remnant Trees').
- **Bungarribee Residential Development, Doonside** – The biodiversity offset included a variety of actions to compensate for impact on 12.54 hectares; including
  - An overall offset of 27.88 hectares, made up of (2.1:1) Shale Plains Woodland (High 3:1-Medium 2: 1), Swamp Oak Floodplain Forest (High 3:1-Medium 2: 1), and Grassland (1:1);
  - Actions include revegetation, regeneration, restoration and enhancement of surrounding public open space network;
  - Three year establishment period and a two year monitoring period;
  - A contribution to a sinking fund for the on-going maintenance of established bushland areas; and
  - Achieved a net gain, in terms of vegetation cover through time, of 2.2:1 for every hectare cleared.
- **Timbertop Residential Development** – The biodiversity offset strategy included the following actions to compensate for the loss of 2.7 hectares of SPW (this project gained approval through the Land and Environment Court with the case setting a 'bench mark' for offsetting actions and ratios in Western Sydney):
  - The dedication of lands on-site for conservation under community title;
  - Investment in the improvement of vegetation condition on those lands;
  - Revegetation of lands in the Western Sydney Parklands at a ratio of approx 4:1;

– A financial contribution to the Western Sydney Parklands Trust to assist in long term management; and
– Appropriate insurance to 'cover' for the possibility of events such as bushfire during the establishment of planted vegetation.

3.2.4 Comparison of Offset Policies and Plans

Due to the variety of different guidelines available relating to offsetting, GHD compared the projected outcomes from three relevant strategies, to use as baseline information to set the preferred offset for Menangle Park. The variation in promoted offsets is shown in Table 1 attached.

Table 1 Biodiversity Offset Strategies

Offset Policy	Conservation	Revegetation/Restoration	Comments
DECC Offsetting Guidelines 2006	Operates on a 'maintain and improve' vegetation outcome	1:2 through to 1:20	Ratios dependant on the conservation value of vegetation cleared
Liverpool City Council Biodiversity Strategy (Eco logical, 2003)	1:1 (based on a 'like for like' vegetation principle)	1:8	Ratios quoted refer to vegetation classified as 'support for core'. Appears excessive given scale of clearing and low value of vegetation
Growth Centres Commission Conservation Plan	Loss of 2:1 (i.e. reduction in high value vegetation cover of 48%)	1:2.3	Ratios quoted for vegetation within precinct boundaries classified as high and medium value vegetation Revegetation/Restoration to be achieved from a variety of offset mechanisms most of which are outside the GCC precincts and not necessarily in Western Sydney. Leads to net loss in the locality

The information in Table 1 highlights the significant variations in current offsetting policies, ratios and frameworks. GHD undertook an analysis of these policies, in order to assist in determining an appropriate offset for Menangle Park.

4. Offset Strategy for Menangle Park Development

The following offset provisions have been developed for the impacts associated with the Menangle Park Development.

In regards to the possible future impacts of climate change, GHD notes that this is an emerging issue and the effects are, at this stage, unknown and unquantifiable, but reasonable assumptions have been made as set out in this document. The underlying principle of the vegetation distribution across the site is to create a 'connected' system, thereby allowing flora and fauna to move and adapt to changing conditions through time.

All impacts and proposed actions have not included the following:

- The possible impact to vegetation along Middle Creek for the reach referred to as M3d (see Appendix A). This location has been identified as a possible sand mining location and will be subjected to its own approval process; and
- The area in the north of the site under the management of Transgrid as this location already has approval for works that include, as conditions of consent, its own offset provisions.

4.1 Objectives

The objectives of the offset strategy for Menangle Park are:

- To improve biodiversity values, time, throughout the Menangle Park precinct;
- To maintain, through time, a 'no net loss' of native vegetation cover;
- To place conservation security over a high percentage of existing vegetation on-site;
- Invest in improving the condition of conserved vegetation through a structured bush regeneration program;
- Ensure examples of all vegetation communities found on site are included in the open space network (which includes the offset areas zoned as E2); and
- Conserve 'high value' ecological features in the open space network (and offset areas under E2 zoning).

4.2 Summary of Vegetation Distribution at Menangle Park

The majority of the study site has been cleared and converted to grassland for agricultural purposes. Remnant vegetation, listed as EECs and including CPW, RFEF and Sydney Freshwater Wetlands (SFW), occurs on the site. Detailed descriptions of vegetation communities and their condition are included in the flora and fauna assessment (Eco Logical 2009).

In determining the breakdown of figures, GHD has made the following assumptions:

- Vegetation associated with the Harness Racing site and private landholders outside of the village area have not been included in this assessment;

- For this draft report, the four ‘pockets’ of remnant vegetation (near the town centre and immediately south of Menangle Road) have been down graded from ‘high’ to ‘medium’ constraint. Eco Logical listed these remnants as ‘high’ constraint due to the potential presence of *Pimilea spicata.* Targeted surveys by GHD have determined that all four of these remnants do not contain this species;
- The condition of the three small remnant vegetation ‘pockets’, located to the north of Menangle Road, are moderate in condition;
- Impacts associated with the proposed sand mining activities have not been included as it is anticipated these impacts would be assessed under a different approval process;
- The Transgrid holding, in the north of the site, has not been included in calculations as GHD understand a separate offset has already been negotiated; and
- The rehabilitated lands associated with proposed sand mining activities would be available for offset plantings.

4.3 Menangle Park Offset Strategy

Table 2 below, summarises all components of the proposed offset. Details are outlined in more detail in Sections 4.3.1, 4.3.2 and 4.3.3 below.

Table 2 Menangle Park Offset Strategy Summary

Vegetation Condition	Pre Development Total Vegetation (ha)	Vegetation Impact (ha)	Revegetation Compensation Ratio (impact: offset)	Revegetation (ha)	(Post Development) Conservation outside of DECCW riparian corridors (ha)	(Post Development) Conservation inside of DECCW riparian corridors (ha)	Restoration (ha)
High	46	1.5	1:3	4.5	18.8	25.3	44.1
Moderate	26.1	22.8	1:2	45.6	0.3	0.9	1.2
Low	3.9	1.1	1:1	1.1	1.4	0.51	1.9
TOTAL	**76.0**	**25.4**		**51.2**	**20.5**	**26.7**	**47.2**

The Offset Strategy will be implemented on the development site over a staged period in accordance with the development program (current estimates are between 15 – 20 years). The Offset Strategy includes three distinct management actions to offset the impact of vegetation clearing for the development.

- Conservation;
- Rehabilitation; and
- Revegetation.

4.3.1 Conservation Outcomes within the Offset Strategy

Implementation of the offset will conserve 20.5 ha of remnant vegetation on site outside the riparian corridors (as determined by the DECCW in accordance with the WMA).

4.3.2 Rehabilitation Outcomes within the Offset Strategy

Rehabilitation of 47.2 ha of existing conserved vegetation through a structured bush regeneration program. See Section 5 for detailed descriptions of the implementation and management activities proposed.

4.3.3 Revegetation Outcomes within the Offset Strategy

Revegetation of 51.2 ha. This approach will also lead to a 'no net loss' outcome for the site, through time, in terms of vegetation cover.

The Menangle Park development site contains a significant area of floodplain between the development and the Nepean River that will potentially be utilised to receive the RFEF and SFW revegetation program. A portion of land outside the 1:100 year flood line is anticipated to receive the CPW revegetation plantings. Passive recreation infrastructure and community engagement activities will encourage residents to embrace this open space. Delivering the revegetation aspect of the offset program largely in this area will increase the size and condition of the Nepean River corridor and provides certainty of management in the long-term (further details in regards to the offset delivery are provided in Section 5).

The balance of the revegetation works will be undertaken on-site in lands under control of Landcom or CCC. Internal corridor areas and large, contiguous areas have been chosen where they will provide 'links' to existing areas of remnant vegetation. This approach will assist in providing vegetated connections through to the north and east and subject these areas to less 'edge effects'. The proposed locations are shown in Appendix B. This corridor network will allow for vegetation communities to move and adapt to possible future changes in flooding regime and temperature.

4.3.4 Impacts to Native Vegetation Associated with the Development

The approach to determining an appropriate development footprint for Menangle Park has been to protect, mitigate and then offset against necessary impacts. The total impact to native vegetation from clearing is 25.4 ha.

4.3.5 Offset Ratios

1. Conserved 20.5 ha outside the designated DECCW riparian corridors;
2. Condition improvement of 47.2 ha or a ratio of approximately 1.86 ha for every 1 ha of impact; and
3. Revegetation of 51.2 ha of native vegetation based on the following compensation ratio's:

- 1:3 for high condition vegetation;
- 1:2 for medium condition vegetation; and

- 1:1 for low condition vegetation.

Such a planting ratio is considered adequate given the amount of conservation (particularly outside the riparian zones) and the investment in condition improvement associated with the Offset Strategy.

4.3.6 Offset Lands

Sufficient land has been identified as available for offsetting the impacts of the Proposal within the Menangle Park Precinct. The offsets are proposed to be located as shown in Appendix B.

Appendix B shows that the total area potentially available for offsetting the Menangle Park Precinct is approximately 92.0 ha.

4.3.7 Offset Security

A key principle of DECCW's Offsetting Guidelines is to provide security in perpetuity for the offset outcomes. In this regard, the majority of conservation and offset actions proposed at Menangle Park will be protected through the use of an E2 zone. Where an E2 zone can not be applied, conservation and offset actions will be protected under a conservation covenant or equivalent as agreed with DECCW. Revegetation and rehabilitation works will be implemented by both Landcom and CCC with CCC maintaining management control through their obligation to manage the gazetted open space.

4.4 Justification for Proposed Offset Strategy

The offset policies outlined in Section 3.2.3, show there is significant variability between offset approaches and outcomes previously approved. GHD has reviewed these in detail and justifies the proposed offset for Menangle Park due to:

- The large percentage of remnant vegetation being conserved within the open space network (the highest percentage of the reviewed projects and policies);
- Willingness to offset clearing impacts to ensure a 'net gain' in terms of vegetation cover through time;
- Impacts being restricted to small isolated 'pockets' of vegetation;
- Impacts being restricted to vegetation with little or no ability to be included in a corridor network (either on-site or within the surrounding locality);
- Revegetation targeting large areas of land adjoining and/or connecting with identified open space corridors (inclusive of proposed offset areas under E2 zoning);
- Revegetation activities improving connectivity, through time, of existing remnant vegetation;
- The commitment to invest in the condition improvement of all retained vegetation;
- The approach taken follows DECC Offsetting Guidelines; and
- The security placed over conserved vegetation and revegetation works through the use of the E2 zone and a conservation covenant or equivalent.

4.5 Summary of Proposed Offset Strategy

The outcomes of the offset strategy can be summarised as follows:

- Conservation of 20.5 ha of vegetation, listed as EEC's, in a landscape currently impacted by agricultural activities;
- Rehabilitation of all conserved vegetation, which equates to condition improvement of 47.2 ha; and
- No net loss in terms of vegetation cover, through the inclusion of 51.2 ha of revegetation activities in the offset strategy.

5. Restoration Program to Implement Offset Strategy

It is recommended that the offset program be implemented over a staged period in line with the development program (current estimates are between 15 - 20 years). The following information describes the framework and responsibilities for the delivery of the offset. It is anticipated that a detailed Vegetation Management Plan (VMP) will be prepared before construction activities can commence to clearly describe all rehabilitation components of the offset, performance objectives, implementation frame work and monitoring and reporting requirements. The following information provides descriptions of activities required to implement the objectives of the offset and would form the basis of content required in the VMP.

5.1 Description of Key Terms

The following key terms are used throughout the description of the proposed restoration program in the Draft VMP and included in the following information.

- ***Regeneration*** - Refers to natural regeneration of the vegetation community;
- ***Bush regeneration*** - Refers to techniques used to assist and promote natural regeneration without utilising plant material propagated in nurseries;
- ***Revegetation*** - Refers to the planting of tube stock or similar grown from local provenance seed to re-establish vegetation;
- ***Restoration*** - Refers to a combination of restoration activities and management techniques to restore native vegetation; and
- ***Establishment*** - Refers to the minimum three year maintenance program applied to revegetation work to ensure plant establishment.

5.2 Description of Offset Zones

There are two distinct zones throughout the proposed Menangle Park development site, which make up the offset area. These are shown on the map included as Appendix A.

Conservation Areas ("Vegetation to be retained")

- 20.5 ha of vegetation (including 18.8 ha of high quality remnant vegetation) will be conserved outside the designated DECCW corridors;
- Rehabilitation, through targeted weed control and bush regeneration, of all areas of conserved vegetation; and
- Installation of appropriate fencing/bollards to ensure conservation in perpetuity.

This zone would be broken down into smaller management units during preparation of the detailed VMP.

Revegetation Areas ("Areas to be replanted")

- All areas revegetated will be protected in the public open space network under an E2 zone. The total area of additional plantings is 51.2 ha;
- All patches of cleared open space will be planted with species propagated from local provenance material;
- Large trees removed will be used to provide habitat in conserved locations with branches and other smaller material shredded and reused in the revegetation areas as mulch or brush matting;
- Revegetation will be subjected to an initial three-year maintenance period to ensure establishment; and
- The remaining maintenance requirements will be included in the overall maintenance program.

5.3 Site Preparation

5.3.1 Habitat Assessment and Management (all zones)

An assessment of available habitat, including the use of woody weeds by native species, will occur before rehabilitation works commence. Results will be summarised in a simple report. This will establish baseline reference data for the proposed monitoring program in order to effectively assess if objectives of the works program are being achieved.

In areas of disturbed bush land for example, the Cumberland Plain Land Snail can utilise the introduced species *Tradescantia fluminensis* as suitable habitat (Williams *pers com* 2008). Consideration of such ecological features will be considered when preparing the recommended rehabilitation and management actions in the VMP. Large logs and other debris resultant from clearing works would be utilised, where possible, to improve habitat values in conservation areas.

5.3.2 Rubbish Removal

Any items of rubbish will be removed. Small items need to be removed by hand prior to any restoration activities. The larger items will need to be assessed to ensure they do not provide habitat for native fauna and then carefully removed utilising methods that minimise damage to existing vegetation.

Any contaminates located will need to be dealt with in accordance with the *Contaminated Land Management Act 2007*.

5.3.3 Application for Section 132C Licence

If any revegetation, seed collection or weed control works are undertaken in an EEC, a Section 132C licence is required under the provisions of the TSC Act. As the restoration of CPW and RFEF is proposed for the development site, a Section 132C licence will be required. Generally speaking, this licence is readily granted by the DECCW if they are satisfied that the proponents undertaking the works comply with all of the requirements under the licence.

5.3.4 Seed Collection

All activities will utilise local provenance seed, collected from within a 5 km radius of the planting sites, with works being undertaken in accordance with the DEC's *Restoring the Bush – Best Practice Restoration Guidelines for the Cumberland Plain*, 2005 and Florabank *Seed Collection and Management Guidelines*, July 2007.

A targeted seed collection program should begin before the commencement of development to achieve provenance seed targets and required species diversity.

5.3.5 Initial Weed control

Initial herbicide spraying will be undertaken in order to prepare areas of the site for revegetation.

5.3.6 Revegetation

Revegetation will be limited to hand plantings in 'bare' areas, within mulched areas or to add biodiversity. These activities can be undertaken with involvement from the local community. As mentioned above, the exact locations for these works will be outlined in the detailed implementation plan.

5.3.7 Maintenance

These visits will involve herbicide spraying, additional follow-up watering and general weeding of revegetation. These tasks will assist establishment and reduce competition by non-native species.

5.4 Regeneration

5.4.1 Target Weed Control

GHD recommends a targeted weed control program to treat noxious and large woody weeds. These works require the use of mechanical tools such as chainsaws and 'high cutters' as well as the use of a variety of herbicides. As such, suitably qualified and experienced contractors only will complete these works. Follow-up weed control would be included in the bush regeneration program.

5.4.2 Bush Regeneration

GHD recommends a comprehensive bush regeneration to improve the condition of existing remnant vegetation throughout the proposed conservation zones. Bush regeneration activities will occur over an extended period (up to twenty years in accordance with the staging of the development) and will be undertaken by appropriately qualified and experienced contractors. The community may be engaged in bush regeneration activities under appropriate supervision. Primary bush regeneration activities will focus on noxious weeds, woody weeds and ground covers such as *Tradescantia*. Follow-up bush regeneration activities will focus on small perennials, annuals and introduced grasses.

5.4.3 Weed Waste

It is recommended that weed material from bush regeneration works is piled and left in situ to break down. All weeds propagules will be collected and 'bagged' on site and disposed of at a suitable waste facility

5.4.4 Broadcasting of Native Seed

To supplement rehabilitation activities, GHD recommends pre-treated acacias, peas and native grass seed be broadcast throughout rehabilitation zones. This will increase diversity to the site, particularly ground covers, and help improve native plant colonisation.

5.4.5 Recommendations for Future Management

Management of the open space (inclusive of E2 zoned offset areas) will be the responsibility of the development organisation for the initial five-ten years (to be determined through consultation with Landcom/CCC and relevant government agencies) via the rehabilitation program.

Initiatives embraced by the development will seek to leave the site in such a condition that costs associated with vegetation management in perpetuity be minimal. The development will fund the implementation of the works described in this offset and the detailed VMP (when completed) and encourage community engagement in activities that assist with vegetation management in perpetuity.

An appropriate monitoring and review program will also be included in the rehabilitation program. Again, details would be included in the VMP.

6. Conclusion

Implementation of the proposed Offset Strategy will allow for a 'balanced' development to be delivered at Menangle Park. Impacts to existing vegetation will be comprised of a total of 25.4 ha disturbed. To compensate for this, a total of 47.2 ha of remnant vegetation will be retained and rehabilitated on site and 51.2 ha replanted. This will provide a net increase in vegetation condition of existing remnant vegetation and 'no net loss' in terms of vegetation distribution.

The key benefits of implementing the proposed Offset Strategy include:

- Significant 'net gain' in terms of vegetation cover across the site;
- Providing important 'links' to surrounding remnant vegetation and public open space;
- Providing security for retained remnant vegetation and offset plantings through the use of E2 zone and conservation covenants;
- Improving habitat values through bush regeneration and providing additional habitat through revegetation; and
- Minimising edge effects by rehabilitating large contiguous areas.

7. References and Recommended Reading

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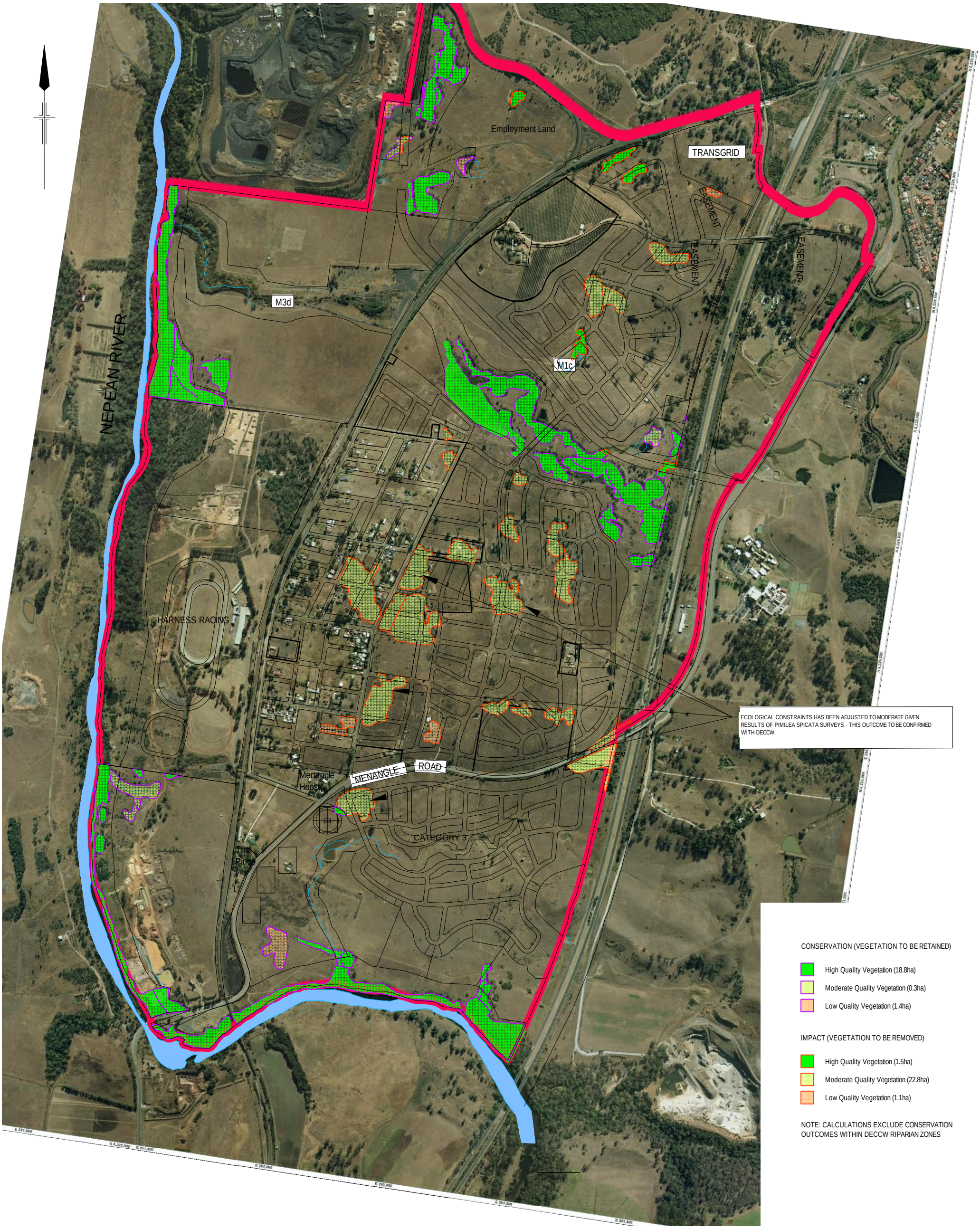
Appendix A

Menangle Park Conservation Outcomes



CONSERVATION (VEGETATION TO BE RETAINED)

- High Quality Vegetation (18.8ha)
- Moderate Quality Vegetation (0.3ha)
- Low Quality Vegetation (1.4ha)

IMPACT (VEGETATION TO BE REMOVED)

- High Quality Vegetation (1.5ha)
- Moderate Quality Vegetation (22.8ha)
- Low Quality Vegetation (1.1ha)

NOTE: CALCULATIONS EXCLUDE CONSERVATION OUTCOMES WITHIN DECCW RIPARIAN ZONES

menanglepark

1:7500 on A1	GHD	MENANGLE PARK
APPENDIX A	MARCH 2010	STRUCTURE PLAN: CONSERVATION OUTCOMES

PROJECT PARTNERS

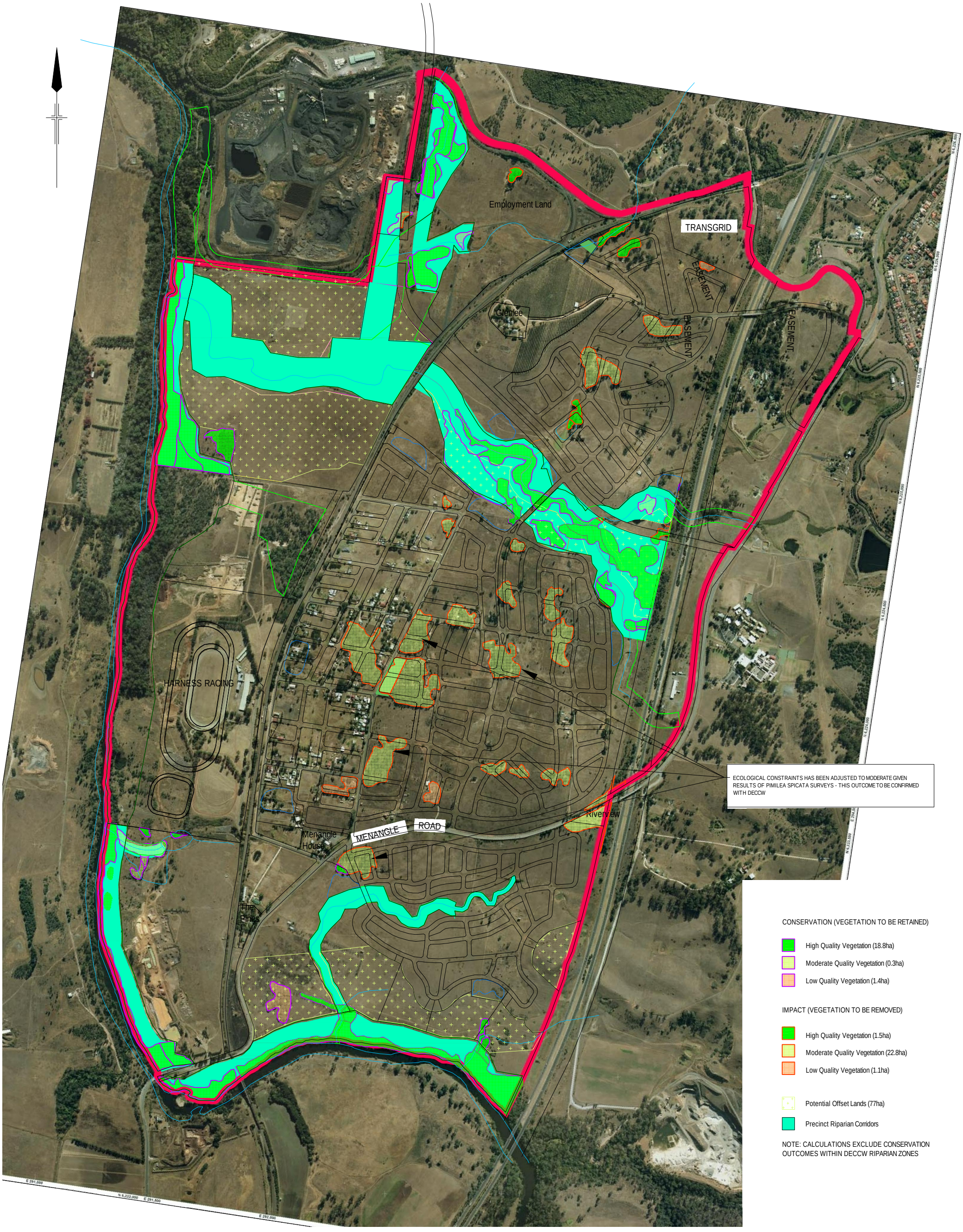
campbelltown city council · LANDCOM

JOB NO: 22-14198

0 100 500 1000

Appendix B

Offset Revegetation Locations



menanglepark

1:7500 on A1	GHD	MENANGLE PARK	PROJECT PARTNERS
APPENDIX B	MAY 2010	REVEGETATION LOCATIONS AND DECCW RIPARIAN CORRIDORS	

JOB NO: 22-14198

0 100 500 1000

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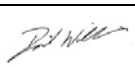
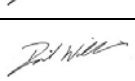
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A Fletcher	D Williams		Rainer Berg	*Rainer Berg*	10/11/09
1.	J Walker	D Williams		Rainer Berg	*Rainer Berg*	12/02/10
2	J Walker	D Williams		Rainer Berg		24/03/10
3	J Walker	D Williams		Rainer Berg		01/04/2010
4	J Walker	D Williams		Rainer Berg		26/05/2010