NSW PLANNING ASSESSMENT COMMISSION

The Proposed Riverside Development at Tea Gardens

Concept Plan and Project Applications

Review Report

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July 2009

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Executive Summary

The Riverside site is a large landholding of 229ha. It was rezoned in 2000 to 2(f) Mixed Residential/Commercial, 7(a) Wetlands and Littoral Rainforest and 7(b) Conservation under the Great Lakes Local Environmental Plan 1996. Since 2000 there have been a number of proposals and suggested amendments to those proposals for development of the site. There have also been significant changes in the statutory and policy frameworks for protection of ecological values and in the statutory framework for applications and decision-making under the *Environmental Planning and Assessment Act 1979* (the Act). The most significant of these statutory changes has resulted in the current proposals for the concept plan and project applications being considered under Part 3A of the Act.

The Minister issued a request in March 2009 for the Planning Assessment Commission to undertake an expert review of the proposed development including a request to conduct public hearings. The Minister nominated three members of the review panel (Ms Barbara Crossley, Mr Peter Dundon and Dr Judy Smith) with the chair (Dr Neil Shepherd AM) being a member of the Planning Assessment Commission. The terms of reference focused the review on two main areas: the ecological constraints of the site and the hydrological issues associated with groundwater, the SEPP14 wetland and flooding.

The Commission proceeded by way of meetings, examination of submissions and other records and documents, field inspections, requests for information, public hearings and examination of officers from government agencies.

Despite substantial attempts to reach a unanimous view on recommendations concerning the ecological constraints of the site, the Commission was unable to do so. The majority of Commission members have taken the view that it is entirely reasonable within the context of Part 3A to give firm guidance as to what the Commission may consider a reasonable approach to the ecological constraints of the site for any revised project proposal. The majority are of the view that this approach is both consistent with the Commission's task under Part 3A and is likely to lead to the best outcome for the site. Consequently there are two reports, one (this report), being the report of three of the four members (the majority report) and the other (the minority report) being the report of a single member (Dr Smith). Most of the material is common to both reports, with the key difference being the recommendations concerning the approach to managing the ecological constraints of the site.

The potential adverse environmental impacts of the proposals were the subject of strong concerns from multiple government agencies, council officers, community groups and members of the public. These concerns related to a wide range of impacts including risk to the SEPP14 wetland, risk to other groundwater dependent ecosystems including endangered ecological communities and threatened species habitat, direct impact (clearing) on endangered ecological communities and threatened species habitat, degradation of endangered ecological communities and threatened species habitat from edge effects (inadequate buffers) and the effects of altered water regimes, loss of koala habitat and inadequate corridors for wildlife movement.

Proper assessment of ecological impact requires adequate information about the flora and fauna on the site. The Commission considers the relevant information in the EAR, and the vegetation mapping produced from it, to be grossly deficient. It is therefore not possible to define the boundaries of endangered ecological communities and threatened species habitat with certainty and there is a real possibility that areas of significant habitat remain unidentified. Because of the variable quality of the fauna survey work, it is equally possible

that the presence of threatened species has been missed in some parts of the site, or they are not recorded as being present at all.

The Commission considers that the site is substantially more 'ecologically constrained' than the EAR would suggest and that the potential impacts of the proposals in both the concept plan and the project application should be regarded as unacceptable. Based on this conclusion the Commission considered the options open to it in providing advice on the ecological impacts. The first was to recommend that the applications be refused. The second was to recommend that the Proponent be given the option of revising the proposals with a view to providing a properly supported preferred project report at a later date that addresses the ecological impacts adequately.

The majority view is that the second option is more likely to lead to an optimal outcome for the site provided the guidance given becomes the basis for a revised proposal. Whilst there are some obvious risks in giving firm guidance on information that all members of the Commission view as inadequate, these risks are mitigated by requiring the Proponent to establish an adequate information base as part of any revised proposal and then requiring appropriate protection or offsets for any significant habitats identified in the area marked as developable in Figure 2 (page 54). It should also be noted that the currently identified areas of significant habitat are predominantly located in the eastern portion of the site which is marked as non-developable in Figure 2.

The main reasons the majority report has opted for the configuration in Figure 2 are:

(i) it is consistent with the regional planning strategy which identifies a surplus total development capacity to allow for the fact that many individual sites proposed for development will have significant ecological constraints that prevent achievement of their notional yields;

(ii) it protects a significantly greater proportion of the endangered ecological communities (particularly swamp sclerophyll forest) and threatened species habitat (e.g. Barking owl and Squirrel glider) without sterilizing the site for residential development;

(iii) it directly protects most of the identified hollow-bearing trees on the site by including them in the non-developable area;

(iv) it provides consolidated areas of significant habitats which reduce edge effects and reduce the overall impact of development on the site;

(v) it provides a buffer to most of the major areas of significant habitat including the SEPP14 wetland;

(vi) depending on the final configuration of the stormwater management system, the reduced development footprint and the larger consolidated protected areas on the eastern portion of the site should reduce any potential impacts on groundwater dependent ecosystems; and

(vii) it provides wildlife corridors that are likely to be functional in both local and regional contexts.

The term of reference on hydrological impacts of the project posed difficulties for the Commission's review on three counts.

First, the information on which to base a robust assessment of the potential impacts of the proposals on groundwater was simply not available in the EAR or in response to Commission enquiries. This has implications not only for assessment of potential impacts on groundwater itself, but also for assessment of potential impacts on groundwater dependent ecosystems. Several of the key ecosystems on the site fall into this category (eg

SEPP14 wetland, the endangered swamp sclerophyll forest community, and Wallum Froglet habitat).

Second, the proposed stormwater management approach is strongly opposed by all key government agencies, council officers and members of the public. While the specific objections vary, the principal areas of concern are the proposed extensive interception of groundwater aquifers by stormwater management infrastructure, direct injection of stormwater into the aquifer, extension of the artificial saline lake and expansion of its access to the Myall River, and potential impacts on the SEPP14 wetland and its adjacent buffer (itself an endangered ecological community).

Third, the issue of flooding under climate change scenarios other than 'minor' has not been addressed in the EAR. Until the implications of this position are fully understood it would be unwise to accept a proposal based only on protection from flooding to the 'minor' level.

The Commission has indicated the information that would be required to support any future stormwater management scheme as part of a revised proposal.

The Commission noted that if all consent, regulatory and servicing authorities (Department of Planning, Department of Water and Energy, Department of Environment and Climate Change, MidCoast Water, Council, etc) adopted independent approaches to this site it could easily create a situation where no development was feasible. It is the Commission's view that even if limited development is to occur, some compromise will be required between the various agency policies, objectives, guidelines, etc. This is particularly true for the interaction between ecological constraints and stormwater management. The Commission recommends that an integrated approach be taken to consideration of any revised proposals and that, for this site, the ecological constraints be determined as the first priority. Stormwater management schemes could then be considered in the context of maximising the opportunities for development on the non-ecologically constrained areas subject to the stormwater management scheme having adequate capacity to capture and treat stormwater and the impacts on groundwater and groundwater dependent ecosystems being acceptable.

Other matters of significance arising from submissions and the public hearings included acid sulphate soils (ASS), sewage treatment capacity, Aboriginal archaeology, proposed expansion of the commercial and retail centre and the capacity of the proposed community title arrangements to meet future infrastructure maintenance and repair requirements. Of these, acid sulphate soils require more work but are likely to be manageable, Aboriginal archaeology requires some clarification of management details, the proposed expansion of the retail and commercial centre is not justifiable on current population projections and in the absence of a total retail strategy for Tea Gardens and Hawks Nest, and the community title arrangements will need strengthening to maximise their potential to provide for infrastructure needs for the life of the development. The Commission also notes that the capacity of the Hawks Nest Sewage Treatment Plant is a serious constraint to development in this area and warrants further consideration in relation to the staging of this proposal.

The overall recommendations of the majority report are:

(i) The proposals are not considered acceptable in their current form. They should either be refused or the Proponent be requested to review the proposals with a view to submitting a preferred project report consistent with the content of this report.

(ii) That the Proponent be requested to take particular note of the numerous deficiencies identified in both the accuracy and adequacy of the information presented in the EAR and supporting documents and also note the guidance

provided by the Commission as to the nature and standard of information that will be required for adequate assessment of any future proposal or preferred project report for this site.

(iii) That the relevant government agencies be requested to take an integrated approach to considering the various aspects of development of this site. The Commission recommends that the ecological constraints be considered as the highest priority and that stormwater management and groundwater management be approached with a view to maximizing the residual area available for development without compromising key aspects of stormwater management or impacting groundwater dependent ecosystems.

Finally, the Commission notes that throughout this report there are serious criticisms of the accuracy and/or adequacy of the information provided by the Proponent. The Commission also notes that many of these issues were raised by the various government agencies on multiple occasions prior to this review.

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Abbreviations used in this Report

AHD	Australian Height Datum
ARI	Average Recurrence Interval
ASS	Acid Sulphate Soils
ASSMAC	Acid Sulphate Soil Management Advisory Committee
CMA	Catchment Management Authority
DCP	Development Control Plan
DECC	Department of Environment and Climate Change
DIPNR	former Department of Infrastructure, Planning and Natural Resources
DoP	Department of Planning
DGRs	Director General's Requirements
DWE	Department of Water and Energy
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EAR	Environmental Assessment Report
FSR	Floor space ratio
GDE	Groundwater Dependent Ecosystem
KLALC	Karuah Local Aboriginal Land Council
LES	Local Environmental Study
LGA	Local Government Area
NAGP	Net acid generating potential
PAC	Planning Assessment Commission
PASS	Potential acid sulphate soils
POSA	peroxide oxidisable sulphuric acidity
SEPP	State Environmental Planning Policy
SRMS	Scaled root mean square
STP	Sewage treatment plant
ROTAP	Rare or Threatened Australian Plants
TG/HN	Tea Gardens and Hawks Nest
ToR	Terms of Reference
WA	*Water Act 1912*
WMA	*Water Management Act 2000*
WSUD	Water sensitive urban design

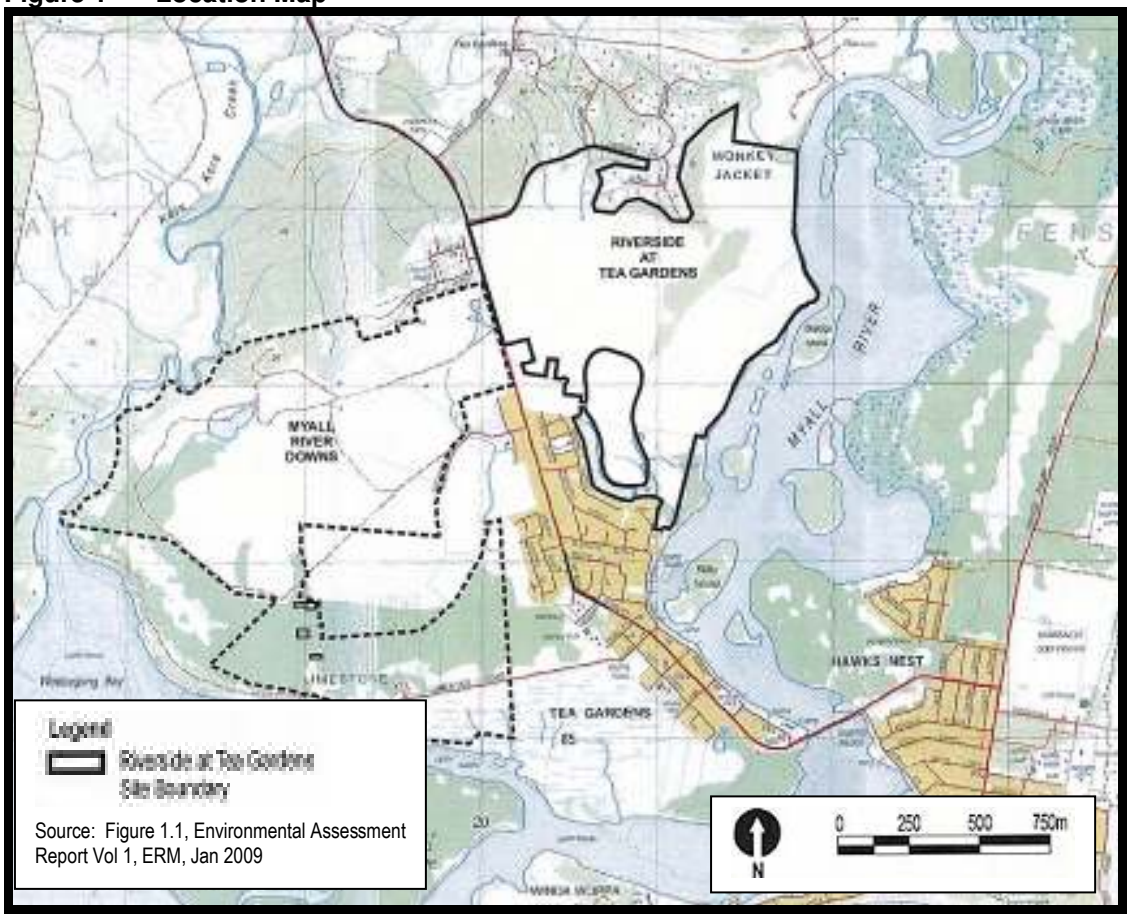
Contents

1. INTRODUCTION

1.1 BACKGROUND

Crighton Properties Pty Limited (the Proponent) is a substantial landowner in the Tea Gardens area. The Riverside site has been part of its land holding since 1991. It consists of Lots 1, 10, 19, 30 and 38 DP270100 Myall Street at Tea Gardens and is approximately 229 ha in area. It is bounded by the Myall River to the east, Myall Street to the west, the Shearwater rural development to the north, and the Myall Quays development to the south (Figure 1).

Figure 1 Location Map



In 2000, the site was rezoned to 2(f) Mixed Residential-Commercial, 7(a) Wetlands and Littoral Rainforest and 7(b) Conservation under the Great Lakes Local Environmental Plan 1996.

In 2002, the Proponent began the process of seeking approval to develop the site for residential purposes with a nine-hole golf course and tourist facilities. The relevant DGR was issued in January 2004. Since the issuing of the DGR, the EP&A Act has been amended to include provisions for major projects (Part 3A).

In July 2008, the Proponent wrote to the Department of Planning requesting the Riverside proposal be confirmed as a major project under Part 3A. On 4 September 2008, the former Minister for Planning formed the opinion that the proposal is a project to which Part 3A applies and authorised submission of a concept plan. He also directed that an Independent

Hearing and Assessment Panel (IHAP) be constituted to assess the ecological and hydrological aspects of the proposal (s75(g) of the *Environmental Planning and Assessment Act 1979*).

The DGRs for the concept plan and stage 1 project application was subsequently issued on 16 September 2008.

The Environmental Assessment Report (EAR) and supporting technical appendices were accepted by the Department of Planning in February 2009 for public exhibition.

1.2 THE PLANNING ASSESSMENT COMMISSION

Since the issuing of the September 2008 Ministerial Direction, the EP&A Act has been amended and the Planning Assessment Commission (PAC) was established in November 2008. Following the exhibition of the EAR, the Minister considered it appropriate to revoke the previous Ministerial Direction and issued a request to the PAC for an expert review of the proposed development. (Appendix 1)

The March 2009 Ministerial direction requests:

- The Commission be constituted by a member of the Planning Assessment Commission (to be determined by the Chairperson of the PAC), Ms Barbara Crossley, Mr Peter Dundon and Dr Judy Smith.
- The Commission to conduct public hearings as part of the review.
- The terms of reference for the Commission (refer to Section 1.5).

Dr Neil Shepherd AM, a member of the PAC, was nominated to chair the expert review.

1.3 THE PROPOSAL

The Proponent seeks approval for concept plan and stage 1 project application for a mixed residential, commercial and tourist development at the Riverside site.

The concept plan seeks approval for:

- An extension of the existing Myall Quays shopping centre (about 4ha in area) to accommodate a range of uses (which will be subject to future applications) including additional retail and commercial uses;
- About 84 ha for residential development to accommodate about 1045 dwellings in various lot sizes;
- An internal road network, upgrading of intersections and associated road works along Myall Street and other construction works, such as cycleways, external to the site;
- A 2ha extension of the existing lake and creation of three new freshwater detention basins and numerous additional ponds and an additional channel connecting to the Myall River to enhance water quality management;
- An open space network comprising about 127ha of land providing for public recreation, stormwater management, wildlife corridor, conservation areas and community facilities;
- An 8ha tourist/residential development including a conference centre and accommodation; and
- Associated landscaping, infrastructure, community and recreation facilities.

The project application seeks approval for:

- The creation of 348 residential lots (for 381 dwellings) including 108 lots for home based business;
- Roadways and associated infrastructure in the proposed commercial area;
- Extension of the lake, creation of new freshwater detention basins and ponds and a new drainage channel to Myall River;
- Construction of a new vehicular access to Myall Street and internal roads and cycleways;
- Construction of community and recreational facilities;
- Landscaping and other infrastructure works; and
- Retention of wetlands and provision of a buffer to wetlands.

1.4 REGIONAL CONTEXT

The Mid North Coast Regional Strategy is a 25-year land use planning strategy to guide future development in the region. It is to ensure that adequate land is available and appropriately located to accommodate the projected housing and employment needs of the region. The Strategy applies to eight local government areas including Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Port Macquarie-Hastings, Greater Taree and Great Lakes.

These eight local government areas are divided into 4 subregions: Clarence, Coffs Coast, Hastings-Macleay Valley and Manning Valley-Great Lakes. The latter one includes the Greater Taree and Great Lakes local government areas.

The Regional Strategy expects a minimum of 15,000 dwellings to be developed in the Manning Valley-Great Lakes sub-region to cater for the projected population growth. The Department of Planning (DoP) advised that of these, about 7500 to 8000 dwellings are expected to be developed in the Great Lakes Local Government Area.

Growth areas have been identified in each local government area to accommodate the expected population growth and employment demand. They include both existing urban areas and potential future urban release areas. In nominating the growth areas, the Strategy acknowledges that

> "not all land identified within the growth areas or local growth management strategies will be developed for urban uses. The rezoning of land or the development of existing zoned land within the growth areas for urban, commercial or industrial uses will be subject to more detailed investigations to determine capability and future yield. Land that is subject to significant natural hazards and/or environmental constraints will be excluded from development."

The Riverside site is included in the existing urban area in the Regional Strategy.

1.5 COMMISSION'S TERMS OF REFERENCE

The Terms of Reference (ToR) for the review are:

1. Consider and advise on the:
   a) Ecological impacts of the project including impacts on the SEPP14 wetland, Myall River and the removal of vegetation and its location within a regionally significant habitat corridor;

b) Hydrological impacts of the project including:
   i) whether the proposed water sensitive urban design measures will result in adverse impacts on groundwater and local surface hydrology, particularly on the SEPP14 wetland and the Myall River; and
   ii) whether the proposed water sensitive urban design measures will result in adverse impacts on flooding for the subject site and surrounding properties.
c) relevant issues raised in submissions in regard to the above impacts; and
d) adequacy of the Proponent's response to the issues raised in submissions.

2. Identify and comment on any other related significant issues raised in submissions or during the Commission hearings.

1.6 THE REVIEW PROCESS

The Environmental Assessment Report (EAR) and its associated technical appendices were placed on public exhibition between 19 February 2009 and 20 March 2009. Notice of the Commission's public hearing was placed in the Great Lakes Advocate on 11 March 2009 and the Myall Coast NOTA on 12 March 2009. Written submissions to the Commission were received until 1 July 2009.

1.6.1 Meetings with DoP, Proponent and public agencies

The Commission was briefed by the Department of Planning (DoP) and the Proponent and its consultants on 25 March 2009. Following the meeting a joint site visit was also undertaken on 6 April 2009 prior to the public hearing.

The Commission also met with several public agencies to consider issues raised in their submissions including MidCoast Water on 7 April 2009 and Department of Environment and Climate Change (DECC) and Department of Water and Energy (DWE) on 8 April 2009.

1.6.2 Public Hearing

The Minister's request for the Commission review also includes a request "to conduct public hearings as part of the review in the Hawks Nest area". The Commission held a public hearing on 7 April 2009 at the Hawks Nest Golf Club, Hawks Nest. A total of 7 parties made presentations to the Commission at the hearing, 6 individuals and 1 community group. The issues raised by presenters were similar to those summarised in Section 1.6.4 below.

1.6.3 Documentation

In conducting the review, the Commission has considered a significant number of documents including:

- the EAR and its associated technical appendices (4 volumes);
- additional information provided by the Proponent in response to DoP and the Commission's requests;
- written submissions from the public and government agencies to DoP and the Commission;
- additional information provided by government agencies in response to the Commission's requests; and
- historic aerial photographs of the site.

1.6.4 Summary of issues raised in submissions

A total of 28 submissions were referred to the Commission by DoP. The Commission also invited written submissions through notices of the public hearing independent of the DoP's exhibition notice. As a result of the public notices, the Commission received submissions from 19 parties. Appendix 2 summarises these submissions.

The following is a brief summary of issues raised in submissions to DoP and the Commission.

- Ecological issues including impacts on flora and fauna, SEPP14 wetland, width and connectivity of wildlife corridors, weed invasion, clearing of native vegetation, introduction of exotic trees and shrubs, incompatibility of a wildlife corridor next to a road, impact of domestic animals on native fauna, availability of hollow-bearing trees, biodiversity offsets, inadequate survey data and threatened species assessment;
- Issues relating to flooding including inadequate assessment of floodplain management;
- Issues relating to built form and development controls including lot size;
- Impact on visual amenity;
- Inadequate physical and social infrastructure to support the additional population;
- Source of fills;
- Acid sulphate soils;
- Suitability of Toonang Drive as a major access to the site;
- Present demographic balance should be maintained;
- Impact on water quality, particularly hydraulic connection between the detention ponds and ground water;
- The need for a comprehensive hydrostatic engineering study;
- Capacity of water and sewerage infrastructure to cope with increased demand;
- Issues relating to effluent volumes, effluent management capacity and water recycling;
- Inadequate traffic impact assessment, particularly trip generation, current and future background intersection volumes, intersection analysis, State road infrastructure and the relationship between the Riverside site and Myall River Downs site in terms of intersection capacities, treatments and traffic strategies;
- Need to conduct a mosquito risk assessment;
- The proposed road network and bus route plan is unsuitable and inadequate for effective bus services; and
- Inadequate Aboriginal cultural heritage assessment and consultation.

1.6.5 Focus of the Commission's Review

The Commission's ToR require it to focus on issues relating to ecological impacts and hydrological impacts of the proposal as well as identify and comment on any other related significant issues raised in submissions or during the public hearings. This report is structured to address the Commission's ToR.

Section 1	introduces the background to the proposal, the Commission's terms of reference and the review process
Section 2	addresses ecological issues
Section 3	deals with hydrological considerations
Section 4	discusses other relevant issues including acid sulphate soils, Aboriginal heritage matters, proposed additional commercial and retail floorspace adjacent to the Myall Quays Shopping Centre, community title and sewage treatment capacity
Section 5	provides the Commission's findings and recommendations.

2. ECOLOGICAL CONSIDERATIONS

2.1 INTRODUCTION

This section addresses part 1(a) of the Ministerial Terms of Reference for the Planning Assessment Commission, that being to consider and advise on the:

> "Ecological impacts of the project including impacts on the SEPP14 wetland, Myall River and the removal of vegetation and its location within a regionally significant habitat corridor;"

In considering the ecological impacts of the project, this report takes into account the relevant issues raised in submissions in regard to the above impacts and any relevant parts of the Proponent's responses to these issues.

Section 9 of the Director-General's Environmental Assessment Requirements relate to flora and fauna. These include a requirement to:

- Outline measures for the conservation of existing wildlife corridor values and/or connective importance of any vegetation on the subject land;
- Outline measures for the conservation of flora and fauna and their habitats within the meaning of the Threatened Species Conservation Act 1995, Native Vegetation Act 2003, and the Fisheries Management Act 1994 including, but not limited to Koala populations, and other Endangered Ecological Communities; and
- The EA must consider how the proposal has been managed to conserve flora and fauna habitats on the subject site and subject area. The measures proposed to mitigate any effects of the proposal must be provided, including any long term strategies to protect areas within the study area with threatened species. This may include elements that restore or improve habitats. Pre-construction monitoring plans or on-going monitoring of the effectiveness of the mitigation measures must be outlined in detail.

The EAR, in response to these requirements, provides an Ecological Site Assessment (Threatened Species Assessment) including a Koala Management Strategy and an Ecological Site Management Strategy prepared by Conacher Environmental Group and a Wetlands Assessment prepared by Hunter Wetlands Research (Volume 3B of the EAR; ERM 2009).

The Riverside site at Tea Gardens (the site) contains a large number of significant ecological constraints, as outlined in Section 2.2 below. Government agency and community submissions have raised significant concerns in regard to the adequacy of ecological assessment; the nature and extent of ecological impacts; and the need for reconsideration of the ecological mitigation measures including wildlife corridors; retention of individual feed, nest and roost trees; and offsets (see Section 2.4).

The Commission has reviewed all available data provided by the Proponent and has conducted a site inspection with the Proponent's experts, and confirms that there are substantial issues in regard to the adequacy and accuracy of baseline ecological data provided in the EAR (see Section 2.5).

The current development proposal entails the direct removal or modification of 126 ha of native or modified native vegetation. Approximately 70% of the site outside of the established conservation zones 'Zone 7(a) – Wetlands and Littoral Rainforest' and 'Zone 7(b) – Conservation' will be cleared. Additional areas of native vegetation will be designated

as open space and drainage corridors and will thus also be modified by the proposed development.

There are likely to be substantial impacts on the ecological values of the site. The EAR notes (Page 17, Ecological Site Assessment) that the proposed removal and modification of vegetation is likely to result in the following impacts on the biodiversity of the site and its immediate adjoining areas:

(i) removal of native vegetation;
(ii) removal and modification of fauna habitat;
(iii) fragmentation of habitat;
(iv) direct loss of flora and fauna species during site development stages through loss of habitat;
(v) ongoing disturbance to fauna species during site occupation; and
(vi) increased edge effects to adjoining vegetation (e.g. increased light penetration, changes to soil nutrient levels, changed hydrology of surface water flows, weed invasion and fauna predation etc.).

2.2 KNOWN ECOLOGICAL CONSTRAINTS OF RIVERSIDE, TEA GARDENS SITE

The EAR identifies a large number of ecological constraints associated with the site including:

2.2.1 High biodiversity values and Key Habitat

The EAR indicates that the site supports 16 native plant communities. It lists a total of 375 native flora taxa and 190 native fauna species (20 frog, 15 reptile, 122 bird and 33 mammal species) that have been recorded on the site during the current or previous surveys. The site is within an area mapped by the former NSW Department of Environment and Conservation as an area of Key Habitat (Scotts 2003). Key habitats are areas of predicted high conservation value for fauna. Predictions are based on modelled fauna distributions that were developed for 122 identified priority fauna species in north-east New South Wales. The models employed have been derived and refined using data from extensive field surveys within north-east New South Wales (Scotts and Drielsma 2003). The large number of fauna species together with the high number of threatened fauna species recorded on the site confirms the identification of the site as an area of Key Habitat.

2.2.2 Matters of National Environmental Significance listed in the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*

Relevant matters identified at the site are:

- Nationally listed threatened species and ecological communities - Grey-headed Flying-fox *Pteropus poliocephalus*
- Nationally listed migratory species
- Wetlands of international significance (Ramsar sites) – 'Myall Lakes' Ramsar wetland includes Corrie Island Nature Reserve which is located approximately 4 km downstream of the site.

2.2.3 Threatened species listed under the *NSW Threatened Species Conservation Act 1995*

Three endangered ecological communities, one endangered population and twelve threatened (vulnerable) species have been recorded on the site:

- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (listed in the NSW *Threatened Species Conservation 1995* in 2005)
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions (listed in the NSW *Threatened Species Conservation 1995* in 2004)
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (listed in the NSW *Threatened Species Conservation 1995* in 2005)
- Hawks Nest and Tea Gardens Population of the Koala *Phascolarctos cinereus*
- Wallum Froglet *Crinia tinnula*
- Squirrel Glider *Petaurus norfolcensis*
- Koala *Phascolarctos cinereus*
- Osprey *Pandion haliaetus*
- Barking Owl *Ninox connivens*
- Little Bentwing Bat *Miniopterus australis*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Eastern Freetail Bat *Mormopterus norfolkensis*
- Common Blossom Bat *Syconycteris australis*
- Large-footed Myotis *Myotis adversus*
- Greater Broad-nosed Bat *Scoteanax ruepellii*
- Eastern Bentwing Bat *Miniopterus schreibersii oceanensis*

2.2.4 Species for which a preliminary determination to list as a threatened species in the NSW *Threatened Species Conservation Act 1995* has been made

The precautionary principle, as adopted by the EAR, dictates that species for which a preliminary determination to list as a threatened species has been made need also be considered. The Little Lorikeet has been recorded on site. In August 2008, prior to completion of the EAR, a preliminary determination was made under the NSW *Threatened Species Conservation Act 1995* to list this species as a vulnerable species (NSW Scientific Committee 2008a). Since preparation of the EAR, the Little Eagle, which has also been recorded at the site, has also been proposed for listing as a vulnerable species (NSW Scientific Committee 2009).

2.2.5 Potential habitat for additional threatened fauna species

Potential habitat has been recorded nearby (within 10 km) during recent local surveys for a number of additional threatened fauna species. These include, but are not limited to:

- Powerful Owl *Ninox strenua*
- Masked Owl *Tyto novaehollandiae*
- Eastern Chestnut Mouse *Pseudomys gracilicaudatus*
- Eastern Pygmy-possum *Cercatetus nanus*

2.2.6 Species listed on the national list of Rare or Threatened Australian Plants (ROTAP)

One species at the site, *Eucalyptus fergussonii* ssp. *fergussonii*, is a ROTAP species with a coding of 3KC (Briggs and Leigh 1996).

2.2.7 SEPP14 – Coastal Wetlands

Wetland No. 746 is located in the eastern portion of the site.

2.2.8 SEPP 71 - Coastal Protection

The site is within the Coastal Zone and contains "sensitive coastal locations" including land within 100 m of the SEPP14 Wetland and within 100m of the Myall River. Parts of the proposed development fall within 'sensitive coastal locations'.

2.2.9 Marine Parks

Port Stephens/Great Lakes Marine Park includes the Myall River immediately to the east of the site.

2.2.10 National Parks

The site is approximately two kilometres downstream of the Myall Lakes National Park. Some areas of the Myall Lakes National Park are also located along the eastern shoreline areas of the Myall River within two kilometres of the site.

2.2.11 Regional Wildlife Corridor

The site is within an area mapped by the former NSW Department of Environment and Conservation as a regional wildlife corridor. Regional corridors are primary landscape links designed to provide potential residential and dispersal habitat for certain species, and supplementary habitat for wide-ranging species. Corridors are not necessarily continuous; they may be broken by currently degraded or cleared areas but must contribute to overall landscape connectivity, or have the potential to do so given restoration. The derivation and mapping of corridors has been undertaken as a desk top study. However, the models employed have taken account of the results of extensive field surveys in north-east New South Wales and the guidelines and principles which are currently available to assist with planning corridor networks (Scotts 2003, Scotts and Drielsma 2003). This regional corridor connects Nerong and Pindimar and incorporates the Key Habitat area identified on the site.

2.2.12 Regionally significant vegetation communities

These include:

- *Corymbia gummifera* open forest
- *Eucalyptus resinifera* woodland
- Eucalyptus signata woodland

2.3 REVIEW OF HISTORICAL AERIAL PHOTOGRAPHS

The Commission has examined photocopies of the following aerial photographs of the Riverside site which were provided by the Department of Planning (DoP):

Date of photograph	Colour
1963	Black & white
1971	Black & white
1972	Black & white
1974	Black & white
1976	Black & white
1979	Black & white
1984	Black & white
1993	Colour
1996	Colour
1998	Colour
2001	Colour
2003	Colour

The Commission has also examined the originals of the following aerial photographs. Apart from the 2003 photo the original photos were examined stereoscopically using a 4X hand held stereoscope:

Date	Run no.	Photo no. (s)	Scale	Colour
August 1963	4P	5118-5119	Not stated	Black & white
September 1971	3	5121-5123	Not stated	Black & white
June 1979	3	106-108	1:40 000	Black & white
May 1984	3	99-100	1:40 000	Black & white
October 1998	2	98-100	1:50 000	Colour
January 2001	4	142-143	1:25 000	Colour
September 2003	4	146	1:25 000	Colour

Photos or photocopies of photographs varied considerably in quality. Photos or photocopies from the 1971, 1976 and 1993 years are particularly poor.

The photographs indicate that the site has suffered various disturbances since 1963. There is a pattern of tracks and drains across the site which varies between photo years. Some disturbance may be due to fire. In 1963 the site appears to be vegetated but with some partial clearing in the north-west of the site and recently cleared areas outside of the site to the north-east and the south-west. Since 1963 the density of vegetation at the site appears to have fluctuated. Over the years parts of the site appear to have been thinned and to have regenerated. There is no evidence in the photos of large scale clearing of vegetation on the site since 1963 but pines may have been present in small areas and as scattered individuals. Areas within the site may have been planted to pines prior to 1963 but this cannot be confirmed from the available photographs.

However, since 1963 the site has supported predominantly native vegetation in the tree and shrub layer. None of the photos since 1963 indicate a widespread and established pine forest on the site. The Riverside site was acquired by the Proponent in 1991. A vegetation map prepared by Roger Lembit Environmental Consultant (Lembit 1992) for Great Lakes Shire Council in 1992 indicates that there were no mappable areas of pines on the site at this time. Lembit (1992) stated that much of the site was previously cleared for pine plantation but does not indicate when this may have occurred. Lembit further states that in July 1992 “the natural vegetation has since recovered to the extent where it is essentially composed of natural plant communities in an advanced state of regeneration”.

Pines appear to grow quickly in the area and the area of pines to the immediate south-west of the site has grown up since the 2001 photo was taken. Observations on site indicate that the pines self seed readily and that the pine is now an invasive weed in the area.

When assessing the vegetation of a site the history of disturbance helps to interpret the patterns in the vegetation. When assessing the conservation significance of the site the Commission is of the opinion that the assemblage of plant species currently present on the site, either as above ground individuals or represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers, is of prime importance.

2.4 KEY ECOLOGICAL ISSUES RAISED IN SUBMISSIONS

2.4.1 Government Agencies

A number of government agency submissions have raised concerns with the adequacy of the ecological assessment included in the EAR and the likely impacts of the proposed

development on the ecological values of the site. An overview of the key issues raised is provided below:

2.4.1.1 Department of Environment and Climate Change

The Department of Environment and Climate Change (DECC) has provided detailed comments with respect to the proposal and has raised concerns regarding the adequacy of the submitted EAR dated November 2007 and November 2008 on a number of occasions including in February 2008, December 2008, March 2009 and April 2009.

DECC notes that the current EAR fails to address its concerns about survey data and threatened species assessment adequately. DECC considers the flora survey component of the current EAR to be inadequate and not in accordance with DECC guidelines "Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities" (Department of Environment and Conservation 2004). DECC raises concerns in relation to the ability of the Proponent's ecologists to accurately map and describe vegetation given that, on site visits in February and December 2008, the site had been disturbed through slashing/mowing. DECC indicates that surveys should be conducted in conditions and during appropriate seasons when vegetation species can be readily identified and detected. DECC acknowledges that the Proponent's consultants may have conducted part of the required methodology, such as quadrat sampling and to some level a stratification to inform the sampling intensity and location. However, DECC indicates that this must be supplemented by adequate ground truthing, remote sensing (e.g. aerial photographs) and quadrat analysis to ensure that all vegetation communities, their boundaries and structure, and their inherent characteristics are adequately sampled, delineated and described. DECC does not believe the current EA achieves this. As such DECC is unable to provide an appraisal of the proposal and accurately assess the likely impacts to threatened species, their habitats, population and / or ecological communities, given that the baseline data is poor and inaccurate.

DECC does not concur with the Proponent's conclusions from the Ecological Site Assessment that the remedial measures proposed will mitigate against the loss of habitat features, including land clearance, indirect impacts due to changes in hydrology, and the removal of individual feed, nest or roost trees or other specific habitat components. DECC considers that the proposed vegetation clearing, including loss of hollow bearing trees, will likely significantly impact upon the movement, foraging and resident habitat of threatened species.

DECC notes a number of discrepancies within the Ecological Assessment and Ecological Site Assessment regarding the area of vegetation to be removed which needs to be clarified, particularly for the loss of vegetation identified as commensurate with any of the three endangered ecological communities on the site.

DECC notes that important issues concerning regional corridors and the provision of adequate biodiversity offsets remain outstanding. DECC has requested on a number of occasions, and still requires, that a suitable offset measure or compensatory habitat package be offered which compensates against the loss of biodiversity values, endangered ecological communities and native vegetation, as well as the potential impacts upon SEPP14 wetlands and regional corridor linkages. DECC requires that offsets should take account of the DECC guidelines 'Principles for the use of biodiversity offsets in NSW' (DECC 2008). DECC indicates that it is likely to suggest, if it supports future re-iterations of the proposal, the use of the Bio-banking Tool to determine the adequate level of offset / compensatory habitat required.

2.4.1.2 Department of Water and Energy

The Department of Water and Energy (DWE) has maintained consistent objection (memoranda and letters dated December 2003, September 2004, August 2006 and December 2007and submissions to DoP and the Planning Assessment Commission dated March 2009 and April 2009) to extension of the existing lake/waterbody and/or other excavations that intercept the groundwater table and provide for permanent connection to the aquifer.

Grounds for DWE's objection to the above components of the project proposal include inconsistency with principles of the NSW Groundwater Policy Framework Document – General (1997), the NSW Groundwater Quality Protection Policy (1998), and the NSW Groundwater Dependent Ecosystems Policy (2002). In regards to ecological values of the site DWE has concerns that the current proposal provides no protection of the existing groundwater dependent ecosystems which include the SEPP14 Wetland.

2.4.1.3 Hunter-Central Rivers Catchment Management Authority

The Hunter-Central Rivers Catchment Management Authority (CMA) has raised concerns regarding the extent of removal of the endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplains (21 ha to be removed according to the current EAR) and of other native vegetation (approximately 100 ha to be removed) from the site. The CMA does not consider the 78 ha proposed conservation area will adequately offset this loss. The CMA recommends that a suitable offset be established to compensate for the loss of native vegetation, consistent with the improve or maintain environmental outcomes principle, which also underpins the Hunter-Central Rivers Catchment Action Plan. The CMA notes that the assertion in the EAR that, at this stage (October 2008), there are no formal or established quantification methods or procedures to measure prospective gains and losses in biodiversity values is incorrect. The CMA points out that the Environmental Outcomes Assessment Methodology, as set out in the *Native Vegetation Regulation 2005,* and DECC's BioBanking Assessment Methodology are both available to the Proponent. It recommends that either of these methodologies could be employed. The CMA has additional concerns with the narrowness and lack of continuity of proposed wildlife corridors. It notes that the relatively large area in the north-east of the site which is nominated for future development would form a significant barrier to the proposed corridors. The CMA recommends that this area should be considered for conservation as part of enhancement of the proposed offset for the current proposal. The CMA has further concerns regarding the loss of hollow bearing trees from the site. These trees are particularly important given the relatively low numbers of hollow bearing trees on the site.

2.4.1.4 Report to Great Lakes Council

The report to Great Lakes Council from Council's Ecologist (dated 19 March 2009) notes a number of previous communications including memos of July 2007, December 2007 and December 2008 in regards to concerns with the adequacy of the ecological assessment for this development proposal.

The March 2009 report raises a wide range of concerns in regards to ecological impacts of the proposal. Particular concerns include the depletion of foraging habitat for the nationally threatened Grey-headed Flying-fox; clearing within the Coastal Saltmarsh and Swamp Sclerophyll Forest on Coastal Floodplains endangered ecological communities; depletion of potential habitat for the endangered Koala population of Hawks Nest/Tea Gardens; loss of habitat for threatened species at the site including the Squirrel Glider, Eastern Freetail Bat, Greater Broad-nosed Bat, Large-footed Myotis, Little Bentwing Bat and Eastern Bentwing Bat; impacts on lands within the 7(a) and 7 (b) zones; significant undersizing of proposed wildlife movement corridors which are affected by their multi-use status; depletion and loss

of regionally significant vegetation types; lack of conservation and management of ROTAP species; and potential impacts on the SEPP14 wetland, Port Stephens/ Great Lakes Marine Park and SEPP71 native coastal vegetation.

Concerns are raised in regard to the depletion of threatened species habitats, endangered ecological communities and regionally significant vegetation types in a manner that is not mitigated or compensated to the manner in which effects are benign. In the view of the Council Senior Ecologist the EAR understates the magnitude, significance and implications of the actual impacts on the endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplain; the Koala Management Strategy is inadequate and ineffective; the EAR understates the magnitude, significance and implications of the development on the local Squirrel Glider population and does not deliver the outcomes and knowledge learned from the Squirrel Glider management program on nearby Myall Downs.

The report recommends a number of ecological conditions for consideration by the DoP and Commission for inclusion within the range of ecological conditions imposed should the development proposal be positively determined.

There has been ongoing debate between the Council and the Proponent about the ecological constraints of the site during the course of the Commission's review. Copies of some of the reports of meetings, etc have been provided to the Commission by both the Proponent and the Council. The Commission's view of this material is that it does not affect the substance of the concerns about the ecological constraints and it does not introduce new evidence concerning those constraints.

2.4.1.5 Community Submissions

A total of some 30 submissions from members of the community or community organisations were received by the Commission. Ten of these submissions supported the proposal and 20 objected to the proposal. Eighteen of the objectors raised concerns in respect to the ecological values of the site. These community concerns include and relate to removal of vegetation including endangered ecological communities, trees and native vegetation; adequacy of wildlife corridors in relation to size, edge effects, habitat quality, multi-use functions and location; adequacy of fauna surveys; fragmentation of habitats; impacts on the Koala, other threatened species and other wildlife; SEPP14 wetland; adequacy of identification of wetland; suitability of site due to its location in a wetland/ swamp; impacts on Myall Lakes National Park; activation of acid sulphate soils; pollution and nutrification of waterways; impacts on fish and oysters in Myall River; lack of mitigation measures; weed invasion; requirements for landfill; flooding; climate change; edge effects; inadequate proposed planting list; destruction of part of the riverine corridor; increases in exotic bird species at the expense of smaller vulnerable species; Mosquito Fish; and domestic animals.

2.5 RESPONSE OF PROPONENT TO SUBMISSIONS

The Proponent has provided a number of responses to issues raised in submissions. Such responses which deal with ecological issues include:

Coffey Geotechnics Riverside Estate Project Groundwater Response Summary – Draft for Comment dated 19 March 2009.

This document deals with groundwater dependent ecosystems included in SEPP14 Wetland areas. It does not address issues related to other groundwater dependent ecosystems on the site which include, but are not limited to, the endangered Swamp Sclerophyll Forest and the threatened Wallum Froglet habitat. This document relies on the provision of a buffer to protect adjacent SEPP14 wetlands from impacts from the development but does not take

into account the fact that much of the proposed buffer is itself an Endangered Ecological Community.

Coffey Geotechnics Proposed Subdivision – Riverside Estate Project Application and Concept Plan Area, Tea Gardens Acid Sulfate Soil Management Plan dated 26 March 2009

This document does not include an assessment of the direct and indirect impacts of proposed acid sulfate soil management measures on ecological values of the site.

Hunter Wetlands Research Wetlands Management Plan for Riverside, Tea Gardens dated March 2009

This report has been prepared by Geoff Winning and covers only wetland-specific matters and applies only to the areas of land identified as the 'wetland precinct' and the 'habitat conservation precinct' in Great Lakes Council's Development Control Plan No. 22 – Myall Quays Estate. Measures proposed to protect these wetlands from indirect impacts of the proposed development include a buffer between the wetlands and residential areas and also a permanent fence at the wetland boundary.

The mapped SEPP14 wetlands do not include wet heaths and *Eucalyptus robusta* communities. Winning (1991) has noted that both of these would be considered to be wetlands by most Australian scientists. Winning, in his mapping of the site's wetland has included *Eucalyptus robusta* open woodland/Leptospermum scrub and *Eucalyptus robusta* forest communities. While these communities may not be included in the SEPP14 wetland they do fall within the Swamp Sclerophyll Forest endangered ecological community. The proposed management measures take insufficient account of the fact that significant areas of wetland vegetation on the site adjoin and extend beyond the identified 'wetland precinct' and 'habitat conservation precinct'. The proposed buffer, which would be expected to degrade over time, would be composed of *Eucalyptus robusta* woodland/open forest, which as stated above, is within the Swamp Sclerophyll Forest endangered ecological community. The proposed fence would divide this endangered ecological community. The proposed measures disregard the ecological values of a sizeable portion of the wetland. Winning (1991) has argued that "The exclusion of wet heaths and Swamp Mahogany (*Eucalyptus robusta*) communities from SEPP14 has particular significance for coastal wetland conservation. Both wetland types typically occur in coastal sand dunes, often as part of a complex mosaic with other wetland communities. Separation of wet heaths and Swamp Mahogany communities from other adjacent wetland communities can result in an artificial division of an integrated wetland system. Extension of SEPP14 to cover these wetland types would greatly enhance the effectiveness of the policy in conserving wetlands."

Conacher Environmental Group Response to DECC Review Comments dated April 2009

This response includes a discussion of offsets which provides only a superficial level of detail and does not demonstrate that ecological values will be 'improved or maintained'. The response does not provide substantial new data. The response includes a series of "7 Part Tests" which are lengthy but lack substantive detail. In the opinion of the Commission they do not take proper account of the DECC (2007) Threatened Species Assessment Guidelines.

2.6 REQUIREMENT FOR ACCURATE AND COMPREHENSIVE BASELINE ECOLOGICAL DATA

Accurate and comprehensive baseline ecological data is required in order to properly assess matters including, but not limited to:

- The likely extent of direct and indirect impacts on matters of national environmental significance;
- The likely extent of direct and indirect impacts on threatened ecological communities, threatened populations and their habitat, and threatened species and their habitats;
- The likely extent of direct and indirect impacts on the mapped Nerong-Pindimar regional wildlife corridor;
- The likely extent of direct and indirect impacts on groundwater ecosystems as described in the NSW State Groundwater Dependent Ecosystems Policy prepared by Department of Land and Water Conservation (2002). Groundwater dependent ecosystems on the site include the SEPP14 wetland as well as other vegetation communities and habitats in low lying areas, for example the endangered Swamp Sclerophyll Forest on Coastal Floodplains and the habitat of the Wallum Froglet;
- Relevant final and draft threatened species recovery plans including those for the Wallum Froglet (Meyer *et al*. 2006); Hawks Nest and Tea Gardens Endangered Koala (*Phascolarctos cinereus*) Population (NSW National Parks and Wildlife Service 2003a); and Barking Owl (NSW National Parks and Wildlife Service 2003b);
- Relevant NSW Priority Action Statements;
- Key Threatening Processes including 'Loss of Hollow-bearing Trees' (NSW Scientific Committee 2008b), 'Clearing of Native Vegetation' (NSW Scientific Committee 2001), 'Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands' (NSW Scientific Committee 2002) and 'Predation by *Gambusia holbrooki* (Plague Minnow)' (NSW Scientific Committee 1999);
- The nature, extent, and adequacy of any wildlife corridors proposed;
- The nature, extent and adequacy of any buffers proposed to protect endangered ecological communities, threatened species and their habitats, SEPP14 wetland, SEPP71 "sensitive coastal locations" and wildlife corridors ;
- The likely extent of direct and indirect impacts on matters of regional conservation significance;
- The degree to which ecological impacts are avoided by using prevention and mitigation measures; and
- The extent to which biodiversity values are improved or maintained and therefore the adequacy of any offsets proposed.

2.7 ACCURACY AND ADEQUACY OF ECOLOGICAL ASSESSMENT

The Commission has reviewed the EAR and subsequent submissions provided by the Proponent. There are numerous outstanding issues in relation to the adequacy of the assessment, as outlined below.

2.7.1 Adequacy of vegetation community mapping

An accurate appraisal of the current vegetation on site is essential to allow for a proper assessment of ecological values and potential impacts. The appraisal must accurately document the vegetation communities present and their inherent condition. The Riverside site was inspected by the Commission on 6 April 2009. As a part of this site visit one Commission member, Dr Judy Smith, DoP Senior Environmental Planner Mr Stuart Withington, and two ecologists for the Proponent, Mr Phil Conacher and Mr Paul Shelley,

inspected selected locations on the site. Dr Judy Smith also inspected vegetation on the site on 28 March 2009.

Concerns are raised by the Commission in respect to the adequacy and accuracy of the identification of vegetation communities, vegetation community mapping (Figure 2.1 *Vegetation Communities and Flora Survey Locations* of Appendix 1 Flora and Fauna Survey Report Riverside Tea Gardens) and groundcover vegetation mapping (Figure 2.1 *Proposed Development and Groundcover Vegetation Disturbances* in the Ecological Site Assessment – Riverside, Tea Gardens) which are contained in the EAR. As discussed in Section 2.4.1.1, similar concerns have been raised by officers of the DECC.

These concerns include:

2.7.1.1 Identification of vegetation communities based on vegetation structure

The EAR states that descriptions of vegetation structure on the site are according to Specht (1995). The details of the Specht (1995) reference are not provided but presumably this refers to Specht *et al.* (1995). The identifications of woodland/forest vegetation communities based on vegetation structure are generally not according to Specht *et al.* (1995). For example, Vegetation Community 6 Open Forest (*Eucalyptus pilularis*) has a projected foliage cover which ranges from 10 - 65%. According to Specht *et al.* (1995) such a community includes woodland (projected foliage cover 10 – 30%) and open-forest (projected foliage cover 30 - 70%). Vegetation Community 3 Open Forest (*Corymbia gummifera*) has a projected foliage cover of 6 – 60%. According to Specht *et al.* (1995) such a community includes open-woodland, woodland and open-forest. Vegetation Community 1 Pasture with Scattered Trees has a projected foliage cover which ranges from 6 to 45%. According to Specht *et al.* (1995) such a community includes open-woodland (projected foliage cover < 10 %) woodland (projected foliage cover 10 – 30%) and open-forest (projected foliage cover 30 - 70%). Similar concerns apply to a total of seven vegetation communities. These discrepancies in vegetation structure classification raise concerns regarding the accuracy of vegetation community definitions and consequent vegetation mapping. These are further addressed below.

2.7.1.2 Accuracy of vegetation community mapping

There are considerable discrepancies between mapped vegetation communities (Figure 2.1 Vegetation Communities and Flora Survey Locations in Appendix 1. Flora and Fauna Survey Report Riverside Tea Gardens) and vegetation as observed on the ground during the site visits of 28 March 2009 and 6 April 2009. Examples of such discrepancies which were inspected by Dr Judy Smith, Mr Phil Conacher, Mr Paul Shelley and Mr Stuart Withington on 6 April 2009 include:

i. Areas to the north and south of the access track to the existing on site dwelling which have been mapped as Vegetation Community 1 Pasture with Scattered Trees. These areas contain stands of mature trees of woodland to open-forest density. Vegetation quadrats 4 and 5 were undertaken in this area. Quadrat 4 contains the trees *Endiandra sieberi* (projected foliage cover 5-25%), *Angophora costata* (25-50%) and *Eucalyptus microcorys* (5-25%). Quadrat 5 contains the trees *Angophora costata* (25-50%), *Corymbia gummifera* (<5%, common), *Eucalyptus robusta* (25-50%) and *Eucalyptus umbra* (<5%, uncommon). Quadrat 4 contains 33 native understorey/ground layer species and Quadrat 5 24 such species. Clearly not all of the area mapped here as Vegetation Community 1 constitutes “pasture with scattered trees”.

ii. Areas in the northern central portion of the site in the vicinity of Quadrat 15 which have been mapped as Vegetation Community 1 Pasture with Scattered Trees. Inspection of the aerial photograph in the EAR and tree densities observed on site indicates that not all of this area is "pasture with scattered trees". Quadrat 15 contains 37 species of which 34 species are native. The trees *Angophora costata* (25-50%) and *Corymbia gummifera* (5-25%) in the quadrat indicate open-forest density. Clearly not all of the area mapped here as Vegetation Community 1 constitutes "pasture with scattered trees".

iii. Treeless areas in the south and central west of the site which have been mapped as Vegetation Community 7 Woodland (*Eucalyptus resinifera*). The EAR describes this area as a low-lying area with several indistinct drainage lines where sedges constitute 60-70% of the ground layer and trees are lacking. The vegetation in this area lacks trees and does not constitute Woodland (*Eucalyptus resinifera*). Quadrat 20 is located in this treeless area. The occurrence of species such as *Leptospermum liversidgei, Callistemon pachyphyllus, Isolepis nodosa, Drosera peltata, Fimbristylis dichotoma* and *Hemarthria uncinata* in Quadrat 20 indicate swampy conditions.

    It is noted that Lembit (1992) mapped this area as Paperbark Low Forest Swamp (which is included within the endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions). At the time of inspection this area had been recently slashed and vegetation consisted of regenerating wet heath. The adjacent native vegetation within the Myall Road verge (which was not inspected in detail during the combined site visit) has not been recently slashed and provides an indication of what the adjacent vegetation on site would be like if left unslashed and allowed to regenerate further. Along Myall Road, from approximately 150 m south of Toonang Road to the gated access track into the site, the adjacent roadside vegetation consists of dense Melaleuca (Paperbark) scrub with a ground layer dominated by sedges. Melaleucas present in this scrub include mainly *Melaleuca sieberi and M. nodosa* and also *M. quinquenervia*, *M. ericifolia, M. styphelioides* and *M. thymifolia*. Occasional *Casuarina glauca* and a variety of Callistemons and Leptospermums are also present. The adjacent slashed vegetation along the site's fenceline and on site is regenerating. Some weed species, particularly grasses, are present in the slightly elevated areas of ground but appear to be largely absent from wetter, lower lying areas where sedges are dominant. This area currently supports the threatened Wallum Froglet.

iv. Areas in the south-west of the site which are south-west of Quadrat 18 and have been mapped as Vegetation Community 7 Woodland (*Eucalyptus resinifera*). Some relatively low lying areas in this portion of the site support stands of *Eucalyptus robusta*. These stands constitute Vegetation Community 8 Woodland/Open Forest (*Eucalyptus robusta*) rather than Vegetation Community 7 Woodland (*Eucalyptus resinifera*). As such, they correspond to the endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions.

v. The EAR notes an area 36.9 ha which has been mapped as Open Forest (*Angophora costata/Corymbia gummifera*). This community is not depicted in the EAR vegetation map and was not located during the site visit.

The above mentioned discrepancies were verified by inspection together with the Proponent's ecological consultants, who concurred with these points made by the Commission member.

Examples of discrepancies which were not inspected during the combined site visit due to time constraints include, but are not limited to:

i. Area in the south-east of the site on the western perimeter of existing development which is mapped as Open forest (*Corymbia gummifera*). The more southerly portion (extending for approximately 300 m) of this vegetation lacks *Corymbia gummifera* trees and is dominated by *Eucalyptus robusta* trees. This area is not Open forest (*Corymbia gummifera*) as mapped but corresponds to the endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. This vegetation is proposed to be removed to allow for construction of detention ponds. In May 2009 *Eucalyptus robusta* trees were flowering and providing a source of food for species such as the Musk Lorikeet.

ii. Areas in the south-west of the site which are north-west of Quadrat 18 and have been mapped as Vegetation Community 7 Woodland (*Eucalyptus resinifera*). Some relatively low lying areas in this portion of the site support stands of *Eucalyptus robusta* and *Melaleuca quinquenervia*. When flowering both *Eucalyptus robusta* and *Melaleuca quinquenervia* are readily distinguished from other nearby trees. These stands constitute Vegetation Community 8 Woodland/Open Forest (*Eucalyptus robusta*) rather than Vegetation Community 7 Woodland (*Eucalyptus resinifera*). As such, they correspond to the endangered ecological community Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions.

These examples demonstrate inaccuracies in the vegetation mapping in the EAR, including significant misrepresentation of the identification and extent of particular woodland/open forest communities, including endangered ecological communities.

2.7.2 Minimum vegetation mapping unit

Vegetation mapping in the eastern portion of the site appears to have been undertaken at a much finer scale than that in the west of the site. The size of the minimum mapping unit employed is not stated in the EAR. This is required in order to assess the adequacy of vegetation mapping across the site.

2.7.3 Accuracy of groundcover vegetation mapping

The groundcover vegetation mapping understates the quality of ground cover vegetation on site.

During the site visit of 28 March 2009 the site was being slashed. Inspection of areas in the central and north-western parts of the site which had not yet been slashed and which are mapped as supporting “improved ground cover” were found to support a suite of native ground and shrub layer plants as well as eucalypt and shrub seedlings. Data from a number of quadrats undertaken in areas of “improved pasture groundcover” do not support the groundcover vegetation mapping. For example in the central-southern portion of the site, quadrat 19, which is in an area of Woodland/Open Forest (*Eucalyptus robusta*), is mapped as containing “improved pasture groundcover”. This quadrat contains 42 native ground or shrub layer species and only four exotic ground or shrub layer species. The quadrat data indicates that this area of Woodland/Open Forest (*Eucalyptus robusta*), which corresponds to the endangered ecological community, Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions, is in good condition.

The EAR contains no explanation as to how the condition of the ground layer vegetation was assessed or mapped. The timing of the ground layer survey in relation to the slashing cycle

at the site is not stated. The draft DECC 'Threatened Biodiversity Survey and Assessment Guidelines' state, at 3.1.13, that potential constraints to the study should be recognised and dealt with by appropriate sampling design where possible. It is difficult, if not impossible, to reliably assess ground layer vegetation condition when the vegetation has been recently slashed. The site should have been surveyed when slashed areas had been allowed to regenerate.

2.7.4 Adequacy of aerial photograph interpretation details

The EAR indicates that aerial photograph interpretation was used, in part, to prepare the vegetation map. The date of the aerial photography used in the aerial photograph interpretation is not recorded in the EAR. Without this information it is not possible to fully assess the adequacy of the aerial photograph interpretation.

2.7.5 Adequacy of vegetation stratification details

The EAR indicates that the vegetation mapping was undertaken using stratification units based on vegetation structure and floristic diversity. Details of the stratification units are not provided. It is not possible to assess the adequacy of stratification without this information.

2.7.6 Adequacy of flora species data

The EAR lists a total of 375 native flora taxa (41 tree, 100 shrub, 208 ground layer, two epiphytes and 24 climbers). The EAR does not indicate which species were recorded in the current survey and which species were recorded in earlier surveys. A comprehensive list of the plant species recorded in each vegetation community is not provided. In accordance with the precautionary principle, as advocated in the EAR, it must be assumed that all listed taxa are present on the site. Species additional to those listed in the EAR Table 3.1 *Flora Species Observed on the Subject Site* may also be present on the site. It is noted that in the EAR tree hollows were recorded in *Eucalyptus fibrosa* which is not included in Table 3.1 of the EAR.

2.7.7 Adequacy of assessment of 'Matters of National Environmental Significance' listed in the Commonwealth *Environment and Protection Biodiversity Conservation Act 1999 (*EPBC Act).

The Grey-headed Flying-fox has been recorded on the site. This species is listed as a vulnerable species in the EPBC Act and hence is a 'matter of national environmental significance'.

Under the EPBC Act an action will require approval from the Minister for Environment, Water, Heritage and Arts if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. Criteria to assess the likelihood of an action having a significant impact on a vulnerable species are contained in the former Department of Environment and Heritage's *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment and Heritage 2006). An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The EAR states that the Grey-headed Flying-fox will also forage beyond the site and that "it is expected that the proposed development will not have a significant impact on the Grey-headed Flying Foxes foraging habitat within the local area". This expectation is not substantiated by any data. According to the EAR, 125.7 ha of feeding habitat, including areas of winter flowering *Eucalyptus robusta* trees, for the Grey-headed Flying-fox is proposed to be removed. Given that decline in the Grey-headed Flying-fox population has

been primarily attributed to the loss of feeding habitat (Tidemann *et al*. 1999; Dickman & Fleming 2002) a significant impact is possible.

The matter of referral to the Commonwealth was the subject of a specific request for information from the Commission to the Proponent. The Proponent's position is inconsistent with the view taken by the Commission that removal of a substantial amount of feeding habitat would be likely to constitute a significant impact. It is the Commission's view that, should the current proposal remain on foot, referral to the Commonwealth is required.

2.7.8 Adequacy of fauna survey

The EAR indicates that the fauna survey was undertaken sporadically between 2004 and 2009. There is no evidence of systematic seasonal surveys. In 2008, for example, the "winter bird survey" was undertaken on one day in May. As is the case with all such limited fauna surveys, it cannot be assumed that all fauna species that use the site, on a regular or occasional basis, have been detected. It must be assumed that the site contains potential habitat for all species that have been recorded on the site in previous surveys. The EAR documents fauna species known to occur locally and for which suitable habitat is present on the site. It must be assumed that the site may be utilised, at least occasionally, by these species.

2.7.9 Adequacy of fauna habitat assessment and mapping

It is impossible to assess and map areas of potential suitable fauna habitat accurately if the baseline vegetation communities and baseline groundlayer vegetation condition are not accurately described and accurately mapped.

The EAR does not contain fauna habitat mapping for all threatened fauna species that are known or likely to use the site on a regular or occasional basis. For example, there is no fauna habitat mapping for the Osprey, Eastern Chestnut Mouse or Regent Honeyeater.

The existing fauna habitat mapping underestimates or misrepresents the extent of fauna habitat for some threatened species, for example the Squirrel Glider, the Koala and the Wallum Froglet. Mapped Squirrel Glider habitat includes areas of *Melaleuca ericifolia* scrub. *Melaleuca ericifolia* scrub does not constitute Squirrel Glider habitat in the Tea Gardens area (Smith 2003). During the site visit on 6 April 2009 it was agreed with the Proponent's ecologists that areas of wooded habitat in the north-east of the site which have not been mapped as Squirrel Glider habitat do in fact comprise suitable Squirrel Glider habitat. Mapped Koala habitat does not include favoured food trees in the western portion of the site. For the Koala the most important factor influencing Koala occurrence in an area is the suite of tree species available as habitat. Of primary importance in the Hawks Nest/Tea Gardens area are *Eucalyptus robusta* and *Eucalyptus microcorys*, both of which are relatively common on the site. Also important and on the site are *Melaleuca quinquenervia, Eucalyptus pilularis, Corymbia gummifera, Angophora costata* and *Eucalyptus tereticornis* (NSW National Parks and Wildlife Service 2003a). Schedule 2 of SEPP 44 - Koala Habitat Protection lists two additional eucalypts which occur on the site, *Eucalyptus punctata* and *Eucalyptus signata,* as Koala feed trees. These important Koala feed trees extend across the site well beyond the areas mapped as Koala habitat in the EAR. The Koala Management Strategy provided lists the vegetation communities mapped on site which contain Koala feed trees. The listed communities do not include Woodland (*Eucalyptus* resinifera), Woodland (*Eucalyptus* signata) and Open Forest (*Eucalyptus* umbra), all of which contain important Koala feed trees. All Koala feed trees on the site need to be documented and mapped as potential Koala habitat. The area of Wallum Froglet habitat in the south-west of the site extends much further north than is mapped in the EAR. All of the "low-lying area with several indistinct drainage lines where sedges constitute 60-70% of the ground layer and trees are lacking" constitutes Wallum Froglet habitat. On 27 May 2009

Wallum Froglets could be heard calling by Commission member Dr Judy Smith inside the site and over 130 m to the north of the nearest mapped Wallum Froglet habitat.

The existing threatened fauna habitat mapping does not differentiate between areas of low and high habitat value. It does not indicate which areas of mapped habitat are used for movement and which are used for feeding, nesting etc. In general, the value of fauna habitat across such a large site is not uniform. For example, in the Tea Gardens area, *Corymbia gummifera* trees provide high value habitat for Squirrel Gliders since they are a source of sap which is a critical food resource in the periodic short times when nectar is unavailable (Smith 2003, Goldingay and Sharpe 2006). In the current proposal all of Vegetation Community 3 Open Forest (*Corymbia gummifera*), which provides high quality potential Squirrel Glider habitat, will be cleared. Without a proper appraisal of the value of threatened fauna habitat it must be assumed that all fauna habitat is of high quality.

2.7.10 Adequacy of proposed wildlife corridors

The proposed development will result in habitat loss and fragmentation and thus reduced habitat connectivity. One species of particular concern is the endangered Koala. The Koala appears not to have been recorded on the site since 1995 but may still utilise or move across the site occasionally. The Koala has been recorded more recently about Tea Gardens and to the south of the site and in the Shearwater area to the north of the site. The site is a potential movement corridor for this species.

The proposal has incorporated wildlife corridors within the site to facilitate possible movement of biodiversity to and from areas of retained habitat both within and external to the site. The proposed wildlife corridors consist of a north-west running corridor in the north of the site and an east-west running corridor at the northern boundary of the site. No east-west corridors will be provided in the south of the site. The connectivity of the low lying habitats on the site, including the endangered Swamp Sclerophyll Forest, with other low lying habitats to the south-west of the site will be greatly reduced. The EAR does not demonstrate that the proposed corridors are of sufficient quality and width to cater for a range of species movement and dispersal. Proposed corridors are narrow and vary in width from 60 to 120 m. The impacts of edge effects coupled with a lack of buffers on such narrow linear strips of vegetation have not been assessed. Edge effects to a distance of 60 m are not uncommon (Smith and Smith 2009 in prep.). The effects of the proximity of a busy road (Toonang Drive) have not been assessed. Corridors should retain vegetation cover and structure including groundcovers, shrub layer and canopy species (Department of Environment and Conservation 2004). A number of the proposed wildlife corridors will contain water management structures, including bodies of open water, and are also expected to provide open space and recreational opportunities. The EAR does not demonstrate that the corridors can effectively provide for the long term movement of the range of species that are likely to need to move through the site in order to maintain or recover their populations.

The issue of the proximity of the corridor to Toonang Drive was raised strongly in the public submissions and at the public hearings. The Commission's view is that it makes little sense to have a major wildlife corridor designed to cross a major site access road and, with that in mind, the site access should be reconsidered with a view to making Myall Street the access point for all but the north eastern corner of the site. This rearrangement could be implemented in conjunction with the Commission's recommendations for the majority of the residential development to be confined to the western portion of the site.

2.7.11 Adequacy of description of proposal in the EAR

A number of aspects of the proposed development are dealt with in insufficient detail to allow proper assessment of their impacts on ecological values of the site. For example:

- Asset protection zones – the EAR does not provide details of vegetation management regimes that will be implemented in proposed Asset Protection Zones.
- Areas of cut and fill –the site cut-fill plan in the EAR contains the categories "-1m to 0m" and "0m to 0.5m". It is unclear which, if any areas of the site, will not be subject to cut or fill, that is support a "0" value. The impacts of extensive areas of cut and fill on the site's flora and fauna have not been adequately assessed.
- Construction of a 770 m long swale along the eastern edge of the proposed development to distribute runoff from the north to areas currently zoned 7(a) and 7(b). The potential impact of this construction on the 7(a) and 7(b) lands is far from clear.
- Construction of footpaths is proposed adjacent to the wetland buffer land. These will be within the endangered Swamp Sclerophyll Forest community and their impact is unclear.
- Treatment of Acid Sulphate Soils – it is understood that acid sulphate soils will be treated on site. Sandy soils are to be spread and limed and clayey soils buried. The EAR does not provide sufficient details of where these activities will be located and the likely impacts on flora and fauna (refer to Section 4.1).
- Impacts on groundwater dependent ecosystems are not supported by adequate groundwater monitoring data (refer to Section 3.5).

2.8 REQUIREMENTS TO ALLOW FOR PROPER ASSESSMENT OF THE PROPOSAL

In order to allow proper assessment of the proposal accurate baseline ecological data is required. In particular, the following are required:

- Accurate identification of all vegetation communities on the site. Identification of communities should be based on floristics and structure of the vegetation. Assessment of structural values should take proper account of Specht *et al.* (1995).
- Accurate identification of all endangered ecological communities on site. In determining the extent of the endangered Swamp Sclerophyll Forest community on site regard needs to be given to the NSW Scientific Committee's (2005) Final Determination for this community. The Final Determination notes that "The structure of the community is typically open forest, although partial clearing may have reduced the canopy to scattered trees. In some areas the tree stratum is low and dense, so that the community takes on the structure of scrub. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent". Further, "(t)he species composition of a site will be influenced by the size of the site, recent rainfall or drought conditions and by its disturbance (including fire, grazing, flooding and land clearing) history. The number and relative abundance of species will change with time since fire, flooding or significant rainfall, and may also change in response to changes in grazing regimes" and "(t)he composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic grasses, vines and forbs".
- Accurate mapping of all vegetation communities identified on the site. It is expected that the existing vegetation mapping would be revised. Any new mapping should be undertaken in accordance with guidelines contained within the DECC publication 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (DEC – November 2004). The size of the minimum mapping unit should be

stated and should be consistent across the site. The minimum mapping unit achieved in the existing mapping in the east of the site should be considered as a guide. The date of all aerial photography used needs to be stated. The original field data sheets filled out by the botanist who undertook the original quadrat and transect surveys on site should be provided. Field data sheets for any additional quadrats or transects deemed necessary should also be provided.

- Accurate and comprehensive descriptions of all mapped vegetation communities.
- Detailed, accurate and concise description of methods used to achieve the vegetation community map.
- Accurate assessment and mapping of groundlayer vegetation condition. Since a large portion of the site has been recently slashed (the site was being extensively slashed on 28 March 2009) it is likely that any full reassessment of ground and shrub layer vegetation could not be undertaken effectively until after the vegetation has been allowed to regenerate (which is unlikely to be before late Spring). If it is not possible to accurately assess ground layer condition across the site then the precautionary principle, as advocated in the EAR, dictates that unless shown otherwise, the ground layer vegetation must be assumed to be in good condition.
- Detailed, accurate and concise description of methods and criteria used to achieve the groundlayer vegetation map.
- Accurate mapping of habitats, including movement habitat, of all threatened fauna species known or likely to use the site. Unless shown otherwise it must be assumed that all mapped habitat is of high quality.
- Detailed, accurate and concise description of criteria used to determine suitable threatened fauna habitat. Assessments of habitat quality in the EAR are subjective. Data are required to substantiate statements such as “It is considered that the retained vegetation and habitats are of sufficient size and quality to support the long term viability of threatened species and endangered ecological communities known to occur within the site” (p. 58 Ecological Site Assessment – Riverside, Tea Gardens).
- Accurate assessment of corridor values on the site. The criteria used to determine suitable corridor locations, widths and habitat types need to be documented. The long term viability of proposed corridors must also be demonstrated.
- Losses of biodiversity must be offset in accordance with the DECC ‘Principles for the use of biodiversity offsets in NSW’.

2.9 PROPOSED OFFSETS

Conservation offsets are proposed in the EAR, however, details of the proposed offsets are consistently scanty and the effectiveness of the proposed offsets is not substantiated. There is insufficient evidence in the EAR to indicate that proposed conservation measures will compensate for the direct loss of biodiversity and increased pressures (edge effects) on the ecological values of the site as a consequence of the proposed development. The EAR states that the development will result in the retention of 23% of the terrestrial communities, 55% of the wetland fringing communities and 99% of the wetland communities. However, the threatened fauna habitat maps in the EAR indicate that the only threatened fauna that the wetland communities provide habitat for are the microbats. There is insufficient evidence in the EAR to demonstrate that the retained wetlands are providing prime habitat for the range of threatened fauna species known from the site. There is insufficient evidence in the EAR to indicate that the area of the endangered Swamp Sclerophyll Forest to be removed is degraded and has low habitat value. It is also unlikely that the proposed wildlife corridors will be of sufficient width and quality to allow for the safe dispersal of species such as the Squirrel glider.

The assertion in the EAR that, at this stage (October 2008), there are no formal or established quantification methods or procedures to measure prospective gains and losses in biodiversity values is incorrect. As pointed out by theCMA, the Environmental Outcomes Assessment Methodology, as set out in the *Native Vegetation Regulation 2005,* and DECC's BioBanking Assessment Methodology are both available to the Proponent but have not been utilised.
The EAR does not demonstrate that biodiversity values meet the current standard of being 'improved or maintained'. Similar concerns have been raised by DECC, CMA and Great Lakes Council's senior ecologist.

The scale of the potential impacts from the proposal also needs to be considered in the context of offset approaches.

The proposal will result in the direct removal or modification of native vegetation from approximately 126 ha of land. According to the EAR impacts on certain vegetation communities will be substantial, for example, all of the *Corymbia gummifera* Open Forest and *Eucalyptus signata* Woodland and 94 % of the *Eucalyptus resinifera* Woodland, all of which are regionally significant communities, will be removed. According to the EAR 21 ha, or 56%, of the endangered *Eucalyptus robusta* Woodland/Open Forest, will be removed or modified. The EAR does not define "modified" but in areas subject to cut and fill modifications are likely to be substantial. Impacts on fauna habitats are also likely to be substantial, for example, 126 ha of feeding habitat of the nationally threatened Grey-headed Flying-fox will be developed. Decline in the Grey-headed Flying-fox population has been primarily attributed to the loss of feeding habitat (Tidemann *et al*. 1999; Dickman & Fleming 2002). Such an amount of habitat is likely to be significant to the Grey-headed Flying-fox in the region. Over one half of the mapped habitat of the threatened Swift Parrot, Barking Owl, Powerful Owl, Masked Owl, Koala, Grey-headed Flying-fox and microchiropteran bat species will be removed. The Barking Owl has been identified by the DECC in their BioBanking Threatened Species Database as one of six species which, in the the area of the Hunter/Central Rivers CMA, cannot withstand the loss of any individuals. Any loss of Barking Owl habitat from the site is thus of particular concern. The value of the site as a movement corridor for fauna will be greatly reduced. The area is currently identified as a part of a regional corridor, an area capable of providing potential residential and dispersal habitat for certain species, and supplementary habitat for wide-ranging species.

The Commission considers that the offset proposals as presented are grossly inadequate, but also makes the point that offsets are not appropriate for some of the ecological values of this site and that development should be precluded in some areas to ensure that values are protected.

2.10 CONCLUSION

At present the baseline ecological data in the EAR contains substantial inaccuracies and underestimates the ecological constraints of the site. Without accurate baseline data it is not possible for the Commission to fully assess the extent of direct and indirect impacts of the proposal on the biodiversity values of the site and provide advice on specific approval conditions.

The baseline data in the EAR underestimates the ecological constraints of the site. However, even basing consideration on the current information would lead the Commission to conclude that the potential impacts from the proposals are unacceptable. Large areas of endangered ecological communities and threatened species habitat will be destroyed outright and other areas will be subject to indirect impacts that have not been adequately assessed. Offsets are mentioned, but lack substance. In any event offsets are unlikely to

compensate adequately for some ecological values such as key habitat values, corridor functionality, edge effects on retained protected areas including threatened fauna habitats, endangered ecological communities and areas zoned 7(a) and 7(b), and indirect effects on the substantial groundwater-dependent ecosystems from possible variations in groundwater levels and/or quality.

The Commission recommends that any revision of the proposals will need to take account of the objectives for improvement or maintenance of biodiversity values on this site. Where these cannot be achieved, provision of reasonable and well-justified offsets will need to be considered.

The Commission recommends that any future redesign of the project needs to give careful consideration to the nationally listed Grey-headed Flying Fox. If the possibility of a significant adverse impact on the species remains, then the matter may require approval from the Minister for Environment, Water, Heritage and Arts.

The Commission recommends that the baseline ecological data to support any revised proposals be of sufficient quality to enable the accurate assessment of the potential ecological impacts of any future proposed developments on the site. In this regard the deficiencies raised in 2.7 above concerning the information for the current proposals, and the suggestions in 2.8 concerning the standards required for information in any future revision of those proposals, will need to be addressed.

3. HYDROLOGICAL CONSIDERATIONS

3.1 INTRODUCTION

The Terms of Reference require the Commission to consider and advise on the:

b) Hydrological impacts of the project, including:-
   i) whether the proposed water sensitive urban design measures will result in adverse impacts on groundwater and local surface hydrology, particularly on the SEPP14 wetland and the Myall River; and
   ii) whether the proposed water sensitive urban design measures will result in adverse impacts on flooding for the subject site and surrounding properties.
c) relevant issues raised in submissions in regard to the above impacts; and
d) adequacy of the Proponent's response to the issues raised in submissions.

In considering the hydrological impacts of the proposeddevelopment this report takes into account the relevant issues raised in submissions and responses of the Proponent to these issues.

The Director-General's requirements for the EAR relating to the water cycle management system are detailed in Section 7 of the DGRs for the concept plan application and in Section 3 for the project plan application.

With respect to the concept plan, Section 7 of the DGRs includes the following:

7.1 Assess the impacts of the proposal on surface and groundwater hydrology and quality during both construction and occupation of the site;

7.2 Address potential impacts on the water quality of surface and groundwater, having regards to the relevant State Groundwater, Rivers, Wetlands and Estuary Policies. Consideration must be made for water impacts to the Myall River and identified SEPP14 wetlands. Particular regard must be given to how the proposal will minimise altered salinity, pH, litter, weeds, exotic fauna, gross disturbance of these wetlands, and nutrient intake to receiving water bodies;

7.3 An integrated Water Cycle Management (IWCM) Plan based on Water Sensitive Urban Design principles is required. This must address the requirements of the NSW Floodplain Management Manual;

7.4 Demonstrate the suitability of using the lake to be a receiving body for stormwater runoff;

7.5 Demonstrate and justify the proposed widening and deepening of a channel connecting the existing lake with the Myall River, particularly in relation to the removal of vegetation from the SEPP14 wetland and an Endangered Ecological Community;

7.6 Address the aims, objectives and requirements (particularly Clause 7) of State Environmental Planning Policy No 14 – Coastal Wetlands (SEPP14), particularly in relation to the proposed removal of vegetation from the wetland for the proposed channel works;

7.7 Stormwater management should be designed to ensure ongoing protection of the groundwater aquifer in accordance with the principles of ANZECC & ARMCANZ: Guidelines for Groundwater Protection in Australia, National Water Quality Management Strategy, Commonwealth of Australia, 1995. Ensure there is no impact on the existing groundwater aquifer and existing groundwater quality resulting from the proposal. Suitably justify the stormwater treatment measures to be used (amended by DGRs – 28/12/06) in the proposal;

7.8 A Wetland Management Plan is required to guide the rational conservation, management and restoration of the wetland habitats and their buffers; and

7.9 Details of any proposed dredging and reclamation activities including methods, uses, timing, extent and duration of works, nature of sediment to be dredged, etc. Specific details must be provided to outline any activities that may harm marine vegetation, or block the passage of aquatic fauna.

In relation to the project application, Section 3 of the DGRs includes the following:

3.1 Provide a detailed Construction Management Plan which mitigates the impacts of the proposal on surface and groundwater hydrology and quality on the site;

3.2 Provide a detailed Integrated Water Cycle Management (IWCM) Plan based upon Water Sensitive Urban Design Principles; and

3.3 Provide a detailed Stormwater Management Plan in accordance with the Environmental Assessment requirements for the Concept Plan application.

Further requirements relating to flooding were detailed under Section 6 of the DGRs (Hazard Management and Mitigation), viz:

6.5 Provide an assessment of any flood risk on the site (for the full range of floods including events greater than the design flood, up to probable maximum flood; and from coastal inundation, catchment based flooding or a combination of the two) and having consideration of any relevant provisions of the NSW Floodplain Development Manual 2005. The assessment should determine: the flood hazard in the area; address the impact of flooding on the proposed development, address the impact of development (including filling) on flood behaviour of the site and adjacent lands; and address adequate egress and safety in a flood event; and

6.6 Assess the potential impacts of sea level rise and an increase in rainfall intensity on the flood regime of the site and adjacent lands with consideration of Practical Considerations of Climate Change – Floodplain Risk Management Guideline (DECC, October 2007).

3.1.1 Site Context

The Riverside site at Tea Gardens is underlain by unconsolidated sands containing groundwater in a shallow unconfined aquifer that forms part of the NSW coastal sand aquifer system. The water table occurs at shallow depth below the natural ground surface, at a depth of a few metres or less. The elevation of the water table is highest in the northern and western parts of the site, and lowest along the eastern side.

This aquifer is recharged by direct infiltration of rainfall and local runoff, and it discharges primarily by flow down-gradient in a generally easterly or south-easterly direction to the wetlands fringing the Myall River. Additional recharge probably occurs from infiltration of stormwater flowing onto the site from more elevated neighbouring areas to the north.

The stormwater management system for the existing Myall Quays residential development to the south of the Riverside site includes a detention lake that was excavated into the groundwater. The detention lake is the final stage in the stormwater treatment train, which also includes a combination of other detention basins (also excavated into the water table) and dry swales (above the water table). An intrinsic part of the treatment process involves periodic flushing of the detention lake by means of an overflow channel connecting the lake to the SEPP14 wetland adjacent to the Myall River east of the Myall Quays site, with the channel invert set at a height designed to allow flushing from only the highest 10% of high tides. The detention lake is therefore referred to as a “saline detention lake”. Other groundwater-connected basins are described as “freshwater detention basins”.

The Riverside proposal seeks to extend this existing saline detention lake by 2ha, and to construct a second channel connection to the SEPP14 wetland, to provide additional flushing. The proposal also seeks to construct further freshwater detention basins and other ponds as part of an extended stormwater management system.

There has been some confusion among the government agencies as to whether the saline detention lake should be considered as a receiving water or part of the stormwater treatment system. This applies both to the existing stormwater treatment system for the Myall Quays development, and the proposed extension for the Riversidesite. The DGRs for the Riverside site (requirement 7.4) require the Proponent to demonstrate "… *the suitability of using the lake to be a receiving body for stormwater runoff"*, implying that the lake may be the receiving water body.

There is also a lack of consistency in documentation prepared by the Proponent and its consultants. The Great Lakes Council considered that their approval of the Myall Quays Development was on the basis that the detention lake was the receiving water body, and that all stormwater should achieve water quality objectives prior to entering the lake. Cardno Willing (Crighton Properties' water consultant) disputes this, claiming in their letter dated 19 March 2009 that the following statement in the Myall Quays Estate DCP No 22, Section 2.4.1:

> the standard of water **from the site to the Myall River** is to meet primary contact recreation requirements

indicates that Council's intent was that the water quality objective applied to discharges from the site to the Myall River, and that the Myall River is the receiving body. However, in the same letter, Cardno states that both the existing outlet channel and the proposed second channel *"... are not directly connected to the Myall River. The existing outlet discharges into the (SEPP14) wetland zone. The proposed additional outlet discharges into the Conservation Zone."* It could be construed that the receiving waters should therefore be the SEPP14 wetland and the Conservation Zone.

It is the Commission's view that the existing saline detention lake should be considered as part of the stormwater treatment system, and not a receiving water body. Likewise, any extension of the lake should also be considered to be part of the stormwater treatment system. For the sake of consistency, it is considered that the Myall River should be considered the receiving water.

3.2 APPLICATION OF SEPP50

There is a strongly held view among the government agencies that the existing lake contravenes State Environmental Planning Policy No 50 Canal Estate Development (SEPP50), i.e. that it is, in fact, a canal estate. This is rejected by the Proponent who has tendered legal advice to support its position (Appendix G Vol 1 EAR). A key element in that advice is that the size of the lake is the minimum necessary to manage stormwater from the site.

The same issue arises with the proposed extension of the lake, since on all other counts the proposed extension would appear to be caught by SEPP50. The original extension proposed was an 11ha extension which, in order to meet the requirements of SEPP50, was said to be the minimum to meet the requirements for stormwater management from the proposal as it then was. This has been reduced to a proposed extension of 2ha (supported by 3 separate freshwater detention ponds) for the current proposals.

The Commission has raised this issue because the nature of both the existing lake and the proposed extension remain contentious. The Commission wishes to make it clear that any proposed extension to the existing lake will need to meet the test in SEPP50 that the works are the minimum required to fulfill the purpose. Given the history of varying sized lakes being proposed as 'fit for the purpose', and the existence of alternatives to the lake extension for the purposes of treating stormwater, it may be difficult to meet the test in SEPP50.

The Commission does not need to reach a concluded view on the issue, nor does it oppose in-principle an extension of the existing lake if that is the only efficient and effective way to treat stormwater from a revised proposal. However, the Proponent should expect that any such proposal would receive very close scrutiny.

3.3 HYDROLOGICAL ISSUES

The major hydrological issues of concern arising from the Proponent's EAR and associated documents, submissions and issues raised at the Commission's public hearing are discussed under the following headings:

- The groundwater system;
- The importance of groundwater to the SEPP14 wetland and other groundwater dependent ecosystems (GDEs);
- Stormwater management; and
- Flooding.

3.4 THE GROUNDWATER SYSTEM

3.4.1 Groundwater Assessment

The groundwater underlying the site has been the subject of investigation at various times in relation to development proposals for the site. The investigations carried out in support of the current proposal were documented in the Coffey Geotechnics report "Groundwater Assessment – Riverside Development, Tea Gardens" (Coffey, 2007), which is included in the EAR as Appendix G. The Coffey report references an earlier Coffey report (Coffey, 1996) and also relies on investigations carried out in 2004 in relation to a previous development proposal for the same approximate area as the Riverside site (Coffey, 2004), which is not documented or referenced in the EAR.

The groundwater investigations as reported in the EAR are considered by the Commission to be inadequate to permit the Commission to make a proper assessment of the potential impacts of the proposal. The groundwater investigations are based on a series of sixteen bores on the site, twelve of which were installed by Douglas Partners in 1994, and four by Coffey in 2004. Groundwater monitoring data from these bores is sparse, and covers only short periods in 2004 and 2007. No time-varying information on either groundwater levels or groundwater quality has been presented, and there are significant parts of the site for which groundwater information is lacking. Most importantly, it is not possible to assess impacts from the existing saline detention lake, as there are no bores located close to the existing saline detention lake, in the areas where impacts from the lake were predicted to occur.

Additional information relating to groundwater was requested by the Commission by letter to Crichton Properties dated 22 April 2009. This information included:

- Groundwater quality monitoring data to support the Proponent's contention that the existing saline detention lake has had no detrimental impact on groundwater quality;
- Transient groundwater level data to demonstrate seasonal and tidal influences on groundwater levels; and

- Concurrent water quality and water level monitoring in the lake and adjacent groundwater to assess impacts of the lake on groundwater.

The Commission has been advised that further information is being collected in response to this request, but it has not been received at the time of finalising this report.

The Commission considers that there are a number of deficiencies with the groundwater modelling undertaken to assess the potential impacts of the scheme:

- Firstly, steady state modelling was used. Because of seasonal fluctuations in groundwater levels, and possibly also tidal influences, it is considered that transient modelling should have been used, so that the impacts of the proposal on groundwater levels and groundwater flux to the wetlands can be assessed under the full range of expected tidal and seasonal groundwater level fluctuations.
- Secondly, by reference to the best practice groundwater flow modelling guideline (MDBC, 2000), the groundwater model is not well calibrated to the available data. The standard statistical measure for model calibration (the scaled root mean square of differences between measured and predicted water levels – the SRMS value) has a value of 17%, well above the appropriate guideline target value of 10%, indicating that the model is poorly calibrated. Being poorly calibrated, predicted impacts based on the model are less reliable.
- Thirdly, groundwater models do not provide a unique solution, and this is particularly so for a shoreline environment. By assigning constant head cells to the model boundary coinciding with the shoreline, the model is not able to predict changes to groundwater levels close to the shore, as the groundwater levels are constrained by the constant heads at the boundary. It would be more helpful to assess changes in groundwater flux towards the shoreline to assess potential impacts. Small changes in flux may be more significant for the tidal wetland ecosystem than changes in water level.
- The Commission also notes that there are some inconsistencies in the reporting of groundwater data in the EAR and other documents. For example, the "measured range of groundwater levels for the period April-May 2004" listed in Table 7 of Coffey's 2007 report differs from the ranges of groundwater levels plotted on hydrographs in Coffey's 2004 report, covering the period April to June 2004. In most cases, the hydrographs (Coffey, 2004) show a larger range than Table 7 in Coffey (2007).

The Commission considers that improved groundwater monitoring and modelling should be undertaken to allow a proper assessment of the current groundwater conditions and the potential impacts of the proposal on the groundwater.

3.4.2 Beneficial Use Value of the Groundwater

The EAR has assessed the beneficial use value of the groundwater only as a potable water source. Coffey (2007) advised that the value of the resource for this purpose is limited, from considerations of quality and yield potential. Firstly, yield would need to be constrained to avoid saline intrusion and impacts on the wetland areas, and secondly the water would need to be treated to be suitable for potable use.

The water quality parameters of concern are generally only marginally in excess of drinking water criteria, and the water would clearly be suitable for a number of local non-potable uses, such as watering of parks and gardens, as suggested by Department of Water and Energy. DWE considers the coastal sand aquifer system to be an important resource which should be protected for potential future use during extended drought periods.

The Commission considers that the beneficial use value of the groundwater beneath the site has not been properly recognised by the Proponent. The groundwater clearly has value as a local source for non-potable use, and it should be protected from adverse impacts from the stormwater management system and other site activities. That said, the Commission considers that on-site stormwater management involving contact with the groundwater is not necessarily incompatible with protecting the beneficial use value of the groundwater resource. Subject to appropriate assessment of impacts, it may still be possible to make use of the groundwater for local non-potable purposes provided that recirculation does not lead to an unacceptable build-up in salinity or nutrient levels and the groundwater does not become contaminated in other ways by operation of the stormwater management system. This is discussed further in relation to the stormwater management system in Section 3.6 below.

3. 5 IMPORTANCE OF SAND AQUIFER TO GROUNDWATER DEPENDENT ECOSYSTEMS

The role of groundwater in supporting the wetlands and other groundwater dependent ecosystems (GDEs) has not been assessed in detail in the EAR. In particular, the EAR acknowledges only the SEPP14 Wetland as a GDE; however other GDEs are present on the site. Areas outside of the SEPP14 Wetland which support GDEs with particularly high conservation significance include the areas of endangered Swamp Sclerophyll Forest and other habitat areas of the Wallum Froglet.

As indicated elsewhere, the Commission considers that the presence of GDEs on the site has not been properly assessed. Nor has the groundwater assessment considered the potential impact of the proposal on all GDEs. This assessment needs to be undertaken by the Proponent.

In particular, the Wallum Froglet habitat located on the western side of the property is clearly associated with and dependent on shallow groundwater, and would be expected to be sensitive to changes in groundwater levels. Additional Wallum Froglet habitat is understood to occur on other parts of the site. The groundwater impact assessment has not addressed the potential impact of the proposed stormwater treatment system on groundwater levels in the Wallum Froglet habitat areas.

3.5.1 Downstream Impacts on SEPP14 Wetlands and the Myall River

The Commission is not satisfied that the groundwater investigations or the groundwater modelling carried out have been sufficient to properly assess the effects that potential contamination of the groundwater from pollutants and nutrients in stormwater and from saline intrusion may have on the Myall River, the SEPP14 wetland and other GDEs on the site and downstream.

The importance of groundwater discharging to the tidal mixing zone occupied by the SEPP14 Wetland in supporting that ecosystem is not well understood. Investigations to evaluate the distribution of water quality (surface and groundwater) and the changes in that distribution under varying climatic, seasonal and tidal conditions have not been carried out. Without this detailed assessment, it is not possible to properly assess the impacts of the proposal on the SEPP14 Wetlands GDE, and the endangered ecological community occupying the Conservation Zone.

Further, the groundwater modelling should also assess potential impacts of the proposal on fluxes to the SEPP14 Wetland, as well as groundwater levels in the wetland area. These impacts should be assessed in relation to natural variability in both groundwater levels and fluxes.

3.6 STORMWATER MANAGEMENT

3.6.1 DGRs Relating to Stormwater Management

Section 7 of the DGRs outlined the requirements for the water cycle management system. These include a requirement to protect in particular the water quality of the groundwater, the Myall River and the SEPP14 wetlands. Section 7.7 of the DGRs specifically requires the proposal to *"ensure there is no impact on the existing groundwater aquifer and existing groundwater quality resulting from the proposal".*

3.6.2 Proposed Stormwater Treatment System

The proposed stormwater treatment system is described in summary in Section 1.3 Concept Plan Description on page 4 of Volume 1 of the EAR (ERM, 2009):

> "Water sensitive urban design (WSUD) measures including a 2 hectare extension of the existing detention lake and the creation of three new freshwater detention basins and numerous additional ponds surrounded by parklands and extension of an existing channel which is connected to the Myall River to link the detention lake to the Myall River to enhance water quality management"

Subsequent amendments to the Proponent's proposal include excavation of a second channel approximately 80m north of the existing channel to connect with the remnant of an old drain within the SEPP14 wetland, to provide a second connection to the Myall River, instead of extending the existing channel (Cardno, 2009).

Detailed reports on the integrated water management strategy are presented in Volume 3A of the EAR (ERM, 2009), comprising the main report "Integrated Water Management", by the Proponent's consultant Cardno Willing (NSW) Pty Ltd, dated November 2008 (Cardno, 2008b), and three supplementary reports on assessment of water management options, groundwater and climate change.

The proposed scheme is one of two preferred options studied in detail for the current proposal by Cardno Willing (Cardno, 2008b). These preferred options were identified from a comparative options study carried out by Cardno in September 2004 (Cardno, 2004), and presents an assessment of seven alternative water management options, based on various extensions to the existing lake, tidal flushing and introduction of new wetlands, including one option of no change to the existing lake or tidal flushing arrangement. Cardno concluded that *"attempting to implement a water management scheme without extending the existing detention lake is not viable and would deliver sub-optimal water quality and environmental outcomes. In particular a scheme based on swales that discharge into the existing detention lake (Scheme 7) would require the importation of massive quantities of fill material to establish even minimal grades on the swales and floodways and to fill residential lots to the required level above 100 year ARI flood levels."*

Cardno (2008b) also state that despite the development concept being significantly changed since September 2004, their conclusions are still valid. They considered that only two schemes merited consideration, viz:

- Extending the existing detention lake (with increased tidal flushing) and constructing additional ponds and/or wetlands, swales and a biofilter as appropriate (Scheme 3); or
- Partially extending the existing detention lake (with increased flushing) and construction of additional freshwater lakes, ponds and/or wetlands, swales and a biofilter as appropriate (Scheme 5).

The water management scheme proposed is based on the Scheme 5 option.

It is noted by the Commission that the proposal for the second channel involves an invert level 0.10m lower than the invert for the existing channel. The impact of the second channel appears to have been assessed by modelling with a single channel assumed to have double the width of the existing channel, and an invert level intermediate between the two inverts. The Commission is not satisfied that this is an appropriate representation of the revised proposal.

3.6.3 Concerns Raised in Submissions

Concerns were raised about the proposed stormwater treatment proposal in several submissions received either by DoP or by theCommission. Concerns were raised by both Government agencies and the public.

The DWE has on numerous occasions stated its objection to extension of the existing lake and other excavations that intercept the water table and provide for permanent connection to the aquifer. DWE outlines numerous areas of non-compliance of the proposal with aspects of the *Water Act 1912* (WA) and The *Water Management Act 2000* (WMA), and inconsistencies with the NSW Groundwater Policy Framework (Framework). The DWE specifically refers to unacceptable risks to the SEPP14 Wetland and other GDEs, and the potential for future eutrophication of the lake, the rectification of which may involve an unacceptable cost burden to the public, and could even lead to the need to widen the channel connections to the Myall River for flushing.

Similar objections were raised by Department of Environment and Climate Change and in the staff report to Great Lakes Council.

Both DECC and DWE were also concerned at the potential risks to groundwater and surface water quality from interception of acid sulphate soils during excavation of the lake extension and other basins (refer Section 4.1).

The Proponent and its consultants provided supplementary information in response to the submissions, which has been taken into consideration by the Commission in its assessment.

3.6.4 Groundwater Impacts from the Existing Stormwater Management System

Cardno and others (Cardno, 2009; Martens, 2009; Coffey, 2009) have stated that there is no evidence that the existing stormwater management scheme has caused any adverse impacts on surface water or groundwater, and rely upon this assertion to support their proposed extension of the existing detention lake and the construction of new freshwater lakes that would also intersect the water table.

However, there are no groundwater data, either levels or quality, in the areas where groundwater impacts would be expected to have occurred, ie near the detention lake. Coffey (2007) stated that localised groundwater levels are expected to be lowered by around 0.75m near the north-western extremity of the lake, and possibly raised by a smaller amount (0.1m) near the south-eastern end of the lake, within the wetland area fringing the Myall River. All the groundwater monitoring bores are located in areas where no impact was expected to occur.

In order to enable proper assessment of the potential impacts of the proposed water management scheme on the groundwater and in turn the wetlands to the east of the site, additional monitoring data are required. Data are required in additional locations, and transient (time-varying) data are also required across the site in order to assess the range of groundwater conditions both seasonally and diurnally.

Further, it does not appear that the operation of the proposed stormwater treatment system has been assessed with consideration of climate change, especially the potential rise in sea level that would result in more frequent flushing of the saline detention lake. This would presumably lead to an increased potential for saline water intrusion into the aquifer system. The impacts of this on the groundwater resource and the ecosystems which it supports are not presented in the EAR and need to be assessed.

3.6.5 Long Term Nutrient Impacts

MidCoast Water indicated in its submission that there is insufficient sewage treatment plant capacity (including proposed capacity expansion) to accommodate the effluent to be generated by the proposed concept plan without incorporating the use of recycled water. The Proponent has (subsequent to preparation of the EAR) committed to installing a dual reticulation system to permit the use of recycled wastewater, to reduce net effluent loads to the sewage treatment plant (STP).

The use of recycled water has been assessed by the Proponent, using the design nitrogen concentration of discharge from the STP for the input quality of recycled water. However, currently, the outflow from the Hawks Nest STP regularly exceeds the design maximum nitrogen concentration.

The Commission considers that the proposal's reliance on the use of recycled water from the STP has not adequately addressed effluent management in terms of the potential for excess build-up of nitrogen and other nutrients in the groundwater beneath the site, in the stormwater detention lake and in the proposed detention ponds.

Should nutrient loads increase to unacceptable levels in the groundwater, it could lead to eutrophication problems in the detention lake or in the wetland. Although the risk of eutrophication may or may not be high, the consequence of such an event would be severe.

The Commission therefore considers that a precautionary approach should be followed in relation to the proposed use of recycled water. Modelling should assume higher nutrient loadings consistent with the STP's current actual performance rather than design performance. Modelling should also consider the potential for use of fertilizers in addition to recycled water by some residents.

3.6.6 Conclusions Concerning Stormwater Management

The main findings are:

1 The Commission acknowledges that a scheme involving no extension to the existing lake and no new excavation below the water table would require a large importation of fill material. The Commission also acknowledges that a stormwater treatment scheme that involved a predominance of swales could lead to invasion by mosquitoes, snakes and other fauna undesirable in a residential development. Nevertheless, the Commission considers that the proposed scheme has the potential for unacceptable impacts on the groundwater which have not been properly assessed.

2 The proposed extension of the existing lake and excavation of new ponds into the water table is not consistent with the principles of the groundwater protection policies embodied in the State Groundwater Policy Framework.

3 The "no-change" option (involving no extension to the existing lake and no excavation of additional ponds or basins below the water table) has not been evaluated for the current proposed development. The options study was based on a prior development proposal that incorporated a 9-hole golf course and a significantly different number of dwellings, as well as a different development layout.

4 The Commission considers that stormwater runoff from the proposed commercial area warrants specific attention. There is real potential for higher levels of contamination and less control over the quality of runoff from that area. There is also a short distance between the commercial area and the final component of the treatment system, the saline detention lake, in which to effect adequate treatment. The Commission considers that this has not been adequately addressed in the EAR.

5 The Commission also considers that there is insufficient baseline groundwater information to allow it to properly assess the proposed water management scheme (see Section 3.6.2 above). There has been no groundwater monitoring in the vicinity of the existing lake, which is the area where the EAR indicates that adverse impacts are most likely to have occurred. Likewise there has been no groundwater monitoring in the area of the proposed lake extension.

Regular monitoring of the groundwater close to the existing detention lake, near both the up-gradient (north-western) end and the down-gradient (south-eastern) end would be required to establish whether the existing lake has or has not impacted the groundwater, and to verify the Proponent's claim that no detrimental impact has occurred. This monitoring would need to include both groundwater levels and groundwater quality, and would need to extend over a sufficient period of time to establish groundwater conditions across the full seasonal and tidal range.

6 The Commission considers that the potential impacts of a second channel connecting the detention lake to the SEPP14 wetland have not been adequately assessed, nor has the effectiveness of the stormwater management system been assessed adequately with consideration of a potential sea level rise due to climate change.

7 The Commission considers that the use of recycled effluent has not been adequately assessed for the proposal, particularly in relation to a potential increase in the nutrient concentrations in either the groundwater, or the detention lake or other excavated ponds.

For any revised proposal the Proponent should include assessment of the option that involves no extension to the existing detention lake and no other excavation into the water table. The assessment should include consideration of the use of recycled water, using nutrient loads based on actual discharges from the Hawks Nest STP, and a worst case assumption of some level of fertilizer use by residents in addition to recycled water.

3.7 FLOODING ISSUES

The requirement to assess flooding issues is contained in Sections 6.5 and 6.6 of the Director-General's Requirements for the Concept Plan Application. It requires the Proponent to assess flood risks up to the Probable Maximum Flood (PMF) level and coastal inundation, to consider the impacts of the development on flooding, to address safety concerns, and to assess the potential impacts of climate change, including both sea level rise and increase in rainfall intensity.

The above issues have been addressed by the Proponent's consultants Cardno (2008a, 2008b and 2008c). Cardno indicated that their assessment has been completed with reference to DECC's floodplain risk management guideline with practical consideration of climate change (DECC, 2007). Cardno's recommendation from these studies was to adopt a minimum floor level of 2.9m AHD in areas subject to inundation by the Myall River, and a minimum floor level of 0.5m above the local 100 year ARI flood level (under no climate change conditions) for other areas within the development.

The EAR states that runoff up to the 100 year ARI event from upslope areas is to be accommodated by drainage along the wildlife corridor zone across the northern site boundary, and then to a swale along the western margin of the conservation zone (ie the

7(b) buffer zone) between the development and the SEPP14 wetlands. Runoff would be distributed from this swale eastwards onto the conservation zone area. Within the development area, drainage would be conveyed south to the extended detention lake via the local basins.

The EAR states that a minimum floor level of 2.9m AHD provides a 0.3m freeboard above the Council's adopted minimum floor level of 2.6m AHD for areas subject to inundation from the Myall River. The estimated flood level for the PMF has been determined by Cardno to be in the range 2.82–2.93m AHD, and that this is more than 0.9m higher than the local 100 year ARI level.

The assessment of the impacts of climate change has been undertaken by sensitivity modelling of flooding under conditions of various sea level rises up to 0.91m, and various increases in rainfall intensity up to 30%. These sensitivity runs are reported to increase potential 100 year ARI flood levels up to a maximum of 0.3m above Council's 2.6m AHD floor level for the areas subject to inundation from the Myall River.

The recommended floor levels are sufficient to meet the DECC guideline provided the climate change ramifications can be considered "minor", but that an additional freeboard (up to 0.5m) may have to be provided if the climate change ramifications are considered "significant". The process for deciding whether the ramifications of climate change should be considered "minor" or "significant" is to some extent subjective, and needs to be based on a rigorous health and safety risk and economic cost analysis. Until this is done a precautionary approach would be appropriate, with the ramifications of climate change on this site being set at significant.

3.8 NON-COMPLIANCE WITH GROUNDWATER LEGISLATION AND POLICIES

The Commission considers that the proposal does not comply with several aspects of the water legislation and State Groundwater Policy Framework documents.

DWE indicated numerous areas of non-compliance in their submission to DoP dated 19 March 2009. DWE has on many occasions since December 2003 stated a strong objection to the proposed extension of the existing stormwater detention lake, and other proposed excavations beneath the water table. DWE has indicated that all ponds and basins which form part of a stormwater treatment system on the site must be lined, to prevent contamination of the underlying groundwater.

The Commission considers that many of the DWE concerns apply equally to the existing approved detention lake, which may have already led to adverse impacts on the groundwater system and the GDEs within and down-gradient from the site. The magnitude of adverse impacts from the existing system cannot be assessed due to the absence of groundwater monitoring data from the areas where impacts would have occurred. Accordingly, the Commission is unable to assess the magnitude of potential additional adverse impact that may occur from the proposal.

The Commission acknowledges that the existing detention lake has been in operation for some years. Superficially it appears to be functioning satisfactorily as part of the treatment system. However, the location, nature and magnitude of any impacts on the groundwater are unknown. The Commission acknowledges that extension of the existing lake and construction of new freshwater ponds into the water table may be found to have only a small incremental impact, subject to satisfactory assessment and verification by the Proponent. However, even if any additional impact may be demonstrated to be small, this is not sufficient justification for any further excavation into the water table, if alternative approaches to stormwater treatment are available and viable for the site.

DWE has provided advice that a number of development applications for other coastal sand projects involving proposed stormwater treatment in ponds or basins intersecting the water table have been refused, or granted conditional approval requiring ponds and basins to be lined and located above the water table.

The Commission considers that the Proponent should fully evaluate alternative stormwater treatment options that do not involve any further excavation into the water table, for any revised proposal.

It is also noted that any excavation into the water table will require a groundwater licence under Part 5 of the *Water Act (*WA*)*. Repeal of the WA and replacement by the *Water Management Act (*WMA*)* is proposed to occur in 2009. Part 5 water licences will be transitioned to water access licences under the WMA. It is also noted that the WA and water licences under the WMA are not excluded under Section 75U of the *Environmental Planning and Assessment Act 1979*.

Accordingly, it appears likely that the proposed extension of the existing detention lake and any other excavation that intersects the groundwater may not proceed unless it is licensed by the DWE.

4. OTHER ISSUES

4.1 ACID SULPHATE SOILS

4.1.1 Government Agency Submissions

Issues relating to acid sulphate soils (ASS) have been raised by Department of Water and Energy (DWE), formerly DIPNR, and Department of Environment and Climate Change (DECC) since early consultation on the proposal in 2003. Most recently, in submissions on the EAR, these agencies raised the following concerns:

- High probability of potential acid sulphate soils (PASS) and acidification of the freshwater aquifer;
- Insufficient sampling and testing;
- No measure of the potential scale of the ASS problem or how it will be overcome; and
- No proposal to prevent oxidation of *in situ* ASS caused by lowering of the water table associated with construction of detention basins.

Both DWE and DECC have stated that an Acid Sulphate Soil Assessment and Management Plan must be produced in accordance with the Acid Sulphate Soil Management Advisory Committee (ASSMAC) Manual 1998 (hereafter referred to as the ASSMAC Manual).

In correspondence to the Proponent dated 16 February 2009, Department of Planning (DoP) attached detailed comments from DECC (dated 19/12/2008) and reiterated that notwithstanding the acceptance of the EAR for exhibition, there was a need for further investigation of ASS during the assessment process. Specifically issues were raised in relation to the need for further analysis and discussion; testing of the widening of the channel through the wetland; clear analysis of all samples submitted; specific site locations outlined for 8 metres sewerage pump wells; and detailed analysis of the potential impacts of de-watering, identifying management strategies and liming rates.

4.1.2 Status of Investigation

4.1.2.1 Environmental Assessment

The ERM (2009) EAR refers to the potential for acid sulphate soil on site, as investigated by Coffey Geotechnics Pty Ltd (2008) (Coffey 2008) as part of the geotechnical assessment in relation only to the land subject to the project application. The EAR relies on land in the remaining part of the site being similar to the area investigated by Coffey 2008. Assessment of the land to the north and northwest was proposed to be subject to further detailed investigation as part of the future project application process.

The EAR refers to the Acid Sulphate Soils Risk Map for Port Stephens and concludes that the site is located in an area where there is low probability of acid materials occurring between one and three metres below the ground surface. Occurrence of ASS materials, if present in this area, are indicated to be irregular and may be buried by alluvium or windblown sediments.

The Coffey 2008 laboratory tests reported in the EAR indicated that 19 of the 28 samples tested exceeded the Acid Sulphate Soil Management Advisory Committee action criteria. An Acid Sulphate Soils Management Plan was reportedly prepared as part of the Coffey (2008) investigation, however, no details were provided in the EAR. The EAR indicated that as the

majority of the area would be subject to fill activities, with the exception of the construction of the water detention basins and ponds, there 'is limited potential for the exposure of acid sulphate soils in these areas'. No further assessment or management of PASS was proposed for the noted risk area of construction of the water detention basins and ponds.

4.1.2.2 Further Information Provided – Post EA Exhibition

In March 2009, the Proponent submitted an Acid Sulphate Soil Management Plan for the proposed subdivision – project application and concept plan area, dated 26 March 2009 (Coffey Geotechnics Pty Ltd, 2009a). This report relied upon laboratory and test results reported in a separate Coffey report, dated 13 March 2009 (Coffey Geotechnics, 2009b). A copy of this earlier report was provided at the request of the Commission.

The Coffey 2009b report compiles and assesses earlier investigations, including the soil sampling and testing arising from 40 test pits and six boreholes completed from 4 April to 5 June 2007. The Coffey 2009b report notes that test pit and borehole locations were pegged by the client prior to investigation. There is no specific rationale noted for sampling locations, however, review of the mapping provided indicates a broad spread of sample locations across the site, with a particular focus on the project application area and a lower density in the concept plan area. The location of sample sites does not appear to have specifically targeted the potential risk areas associated with construction of detention basins, particularly in the concept plan area.

Coffey 2009b reports the testing results that appear to have been relied upon in the EAR, indicating low ASS potential from both sand and clay layers, in sporadic occurrences at variable depths across the site. Testing criteria are in accordance with the ASSMAC Manual but it is not stated whether sampling and analysis procedures were conducted in accordance with these guidelines.

4.1.2.3 PAC Assessment

The Commission assessment of the acid sulphate soil assessment and management for the proposal is provided below in reference to the relevant requirements of the ASSMAC Manual.

<u>Geomorphic Information</u>

- The ASSMAC Manual refers to specific geomorphic criteria to determine whether acid sulphate soils are likely to be present.

The EAR provides no geomorphic context for the acid sulphate soil assessment. The Coffey 2009 reports note that the site is probably of Pleistocene age but do not outline the implications of this context.

The preliminary acid sulphate soil assessment for the Local Environmental Study (LES) and Supplementary Report (Gardner Browne Planning Consultants (1991,1992)) provides considerable geomorphic context. In considering the potential for occurrence of acid sulphate soils on the site, this earlier reporting notes that the site is part of the Inner Barrier sequence of beach ridges deposited in the Pleistocene Age (ie prior to the Holocene geological period). This earlier study accords with the current ASSMAC Manual guidance when considering the geological age of sediments. That is, the low sea levels associated with the Ice Age occurred before the Holocene geological period, resulting in drainage, aeration, pyrite oxidation and leaching of acid products from estuarine sediments. As a result, it was concluded in the LES that 'there is little or no possibility that potential acid sulphate soils occur within the area. Despite this, other site characteristics such as low site

elevation and locality of the site within the estuarine system warranted investigation of potential acid sulphate soils.'

The AASMAC Manual also refers to the Department of Land and Water Conservation maps of coastal areas that identify areas where ASS may be found with high, low or zero probability. As noted in the EAR, the site has been mapped as having low probability of occurrence of ASS.

Soil and Water Analysis

The ASSMAC Manual requires soil and water analysis in circumstances where soil maps and desktop assessment suggest ASS are likely to occur on the site. As noted above, the desktop studies and soil mapping suggest low potential for ASS, and low to very low potential was suggested in the preliminary sampling conducted for the LES. Nevertheless, this LES did acknowledge that further testing of soils proposed for excavation was warranted to clarify the potential for ASS and appropriate management.

The ASSMAC Manual suggests that the level of investigation will depend on the characteristics of the site, the type of disturbance proposed and the sensitivity of the surrounding environment. Comments on the adequacy of the ASS assessment and management plan for the proposal (Coffey (2009a, 2009b)) in relation to the ASSMAC Manual requirements are noted below:

- The distribution of sample locations with potential ASS are noted on a plan, but this is not correlated to soil distribution. The sampling strategy appears random and does not sample all risk areas associated with excavation for drainage/ponds. Soil analysis is thorough and detailed soil profile details are provided for all sampling locations.
- The ASS assessment and management plan does not reference or consider the outcomes of a systematic groundwater sampling strategy. Records include the depth at which groundwater inflows were noted at each sampling location and reference is made to groundwater or groundwater inflows being encountered at depths between 0.3m to 2.3m.
- No integrated consideration of surface water is provided.
- No consideration of existing surface and groundwater quality is provided in the ASS assessment and management plan. The monitoring requirements as part of the management plan appropriately identify the relevant water quality indicators as part of the monitoring regime during and post excavation.

As noted above, localised intensive sampling has not been conducted to focus on areas of proposed excavation and water table lowering associated with the drainage system and ponds. The test pit locations were randomly scattered across the site and were generally limited to a depth of 2m. Generally these test pits were terminated due to pit collapse due to water inflow and only had one sample beneath the noted water table level. Samples were generally taken at one metre intervals but covered all noted soil horizons below the topsoil. Four boreholes were located in the area of the proposed extension to the pond in the southern portion of the site and two were located in the northeast margin of the site. These boreholes generally sampled to depths of 7–8m and up to 10.45 m. Samples were taken at 1-1.5m intervals and covered all noted soil horizons in the test profile. The borehole process enabled a number of samples to be taken below the noted water table level.

Three out of the four boreholes in the pond area had test results exceeding the ASS action criteria, within clay, sand and indurated sand horizons at variable depths ranging from 0.5 to 7m. Test results in the pits scattered across the site also included potential ASS in sand and

clay layers, at variable depths from 0.5 to 2.0m. None of the samples tested as actual ASS and test results confirm those that triggered the action criteria had low ASS potential. Considering the sporadic occurrence across the site, Coffey recommend that all the clay and sand soil units from below the water table (ie this is all material below the water table) should be treated as potential ASS.

ASS Management Plan

As noted above, the ASS management plan does not consider the water characteristics of the site, apart from fundamental consideration of water table depth. In addition, no soil or water assessment has been conducted of the proposed widening of the channel through the wetland and this is noted in the management plan as being 'minor in nature compared to the existing saline lake that was previously excavated as part of the adjoining Myall Quays Estate development.'

The ASS management strategies described essentially involve focus on treatment of all sand and clay excavated below the water table, primarily anticipated to be required in excavations up to 5m deep for the lake extension and ponds in the main drainage reserves throughout the proposed subdivision. The more readily neutralised potential ASS sands will be limed and reused, whilst the clays will be disposed onsite beneath the water table in borrow pits, conceptually located in proposed drainage reserve areas.

A management process is identified for potential temporary stockpiles, involving full bunding and leachate control and treatment in 'specific approved areas'. The potential for exposure of potential ASS in the excavation face of the drainage ponds is proposed to be dealt with by on-site monitoring and liming the face as required. Leachate and excavation water is proposed to be collected and pumped to treatment ponds and treated with lime slurry or lime spreading. No details are provided on the location or nature of these treatment ponds and further background water analysis is acknowledged to be required to determine the preferred method/rate of liming to attain appropriate water quality for this treated water to meet 'appropriate guidelines for release to the wetland. These guidelines should be based on statistical evaluation of background water quality data.'

No specific treatment is proposed for other potential ASS located within the dewatering zones. Coffey (2009b) noted that these zones 'would be overlain by at least 0.5m of soil cover and are considered unlikely to oxidise to a degree that would produce acid sulphate conditions within the proposed construction timeframe.' The risk is proposed to be managed by monitoring of groundwater and surface water pH during construction. This issue warrants further consideration of the potential drawdown effect and consequent potential influence on the quality of groundwater inflow into excavated ponds during construction. A monitoring program is established for soil and water entering and leaving the treatment process. No specifications are provided for groundwater monitoring around the proposed excavations.

4.1.3 Conclusion and Recommendations

Sampling conducted to date has confirmed the occurrence of low potential ASS below the water table in sporadic locations across the site, including within three of the four test locations in the proposed lake extension. Whilst assessment to date indicates that this issue is likely to be manageable, further investigation is required, in accordance with the ASSMAC Manual, in order to fully understand the potential impacts associated with the disturbance and treatment of these potential ASS. Following further investigation, the ASS management plan should be revised to consider:

- The likely volume of material and extent of treatment required for excavations below the water table for drainage ponds and specific infrastructure such as the sewage

wells. The location of borrow pits to bury excavated clay material should be established and the treatment areas for liming of sand material should be specified. These treatment areas should be located outside any areas that are set aside for habitat corridors or vegetation offsets. The location, nature and operation of treatment ponds required to treat leachate and water pumped from excavations also needs to be established;

- The potential occurrence of potential ASS and treatment required for establishment of the channel through the wetland;
- Background surface and groundwater water quality, and potential interactions associated with the excavation, dewatering and treatment of potential ASS; and
- Potential impacts, groundwater monitoring and contingency measures for dewatering effects on potential ASS adjacent to the lake extension and drainage pond excavations;
- The potential effects of lime treated sand on vegetation growth also needs to be established and considered in the placement of this material.

4.2 ABORIGINAL ARCHAEOLOGY

4.2.1 Government Agency Submissions

4.2.1.1 Department of Environment and Climate Change

In correspondence of 19 March 2009, the DECC note that issues identified by DECC in earlier drafts of the EAR relating to limited survey coverage and Aboriginal community consultation have not been addressed. DECC specifically identify the following issues as outstanding:

- Three Aboriginal groups were registered, but only one commented on the EAR. DECC requires evidence that the three Aboriginal groups were consulted during the assessment process;
- Survey area limited to an area already surveyed. DECC strongly recommends additional survey, including all three of the registered Aboriginal groups;
- Revisit the newly recorded and existing known sites to ensure they are not the same site;
- DECC has not been formally notified of a new site, 'Riverside_01', identified on 21 April 2008; and
- The area of the midden site, 38-5-148, located in a SEPP14 wetland needs to be clearly defined, so the proposed 10 metre buffer can be implemented. Need to demonstrate how the midden and associated buffer will be provided with legally binding in perpetuity protection.

4.2.2 Status of Investigation

4.2.2.1 Environmental Assessment

The Riverside site had previously been surveyed by Brayshaw (1988), who was reported to have traversed the entire area on foot, focusing on areas of ground surface exposure, mature trees and environmental features which may have formed a focus for Aboriginal occupation. A shell midden site (NPWS 38-5-148) was located on the bank of the Myall River, opposite the southern part of Dredge Island, within the area now protected as SEPP14 wetland.

The current assessment (ERM 2008) was conducted in consultation with the registered stakeholders, that is, Karuah Local Aboriginal Land Council (KLALC), Jan Webb and the

Interim Board of Management for Worimi Conservation Lands. A single day of field survey was conducted on 21 April 2008. The survey strategy was designed to target the area of previously recorded midden and to sample areas of archaeological sensitivity and ground exposure. Three transects were covered, sampling wetland, sand dune and flat landforms. The visibility of the study area was noted to be very low and the area surrounding the previously recorded midden site was inaccessible due to inundation.

This most recent survey identified an additional midden site (referred to as Riverside_01) located on a sand dune in close proximity to the SEPP14 wetland and wetland buffer on the southern boundary of the proposed tourist precinct. This site was considered to be of moderate significance and the ERM (2008) report notes that concept plan was modified to place the identified surface exposure of this site in protection. It was noted that further investigations would be required to confirm the extent, depth and contents of this site should development be proposed within 10 metres of its current extent.

Management actions proposed in the EAR to be implemented on site include:

- Protection of Riverside_01 by a 10 metre buffer, with no construction/excavation works (including storage of machinery) to impinge on this buffer;
- Development of a management plan in consultation with the local Aboriginal community to ensure long term protection of the middens. The management plan is to consider the use of fencing, designated walkways and interpretive signage at Riverside_01 as an educational resource. The management plan is to be finalised and approved by Karuah LALC and DECC prior to development or excavation works within the tourist precinct;
- No further protection measures are proposed for the location of site 38-05-0148 based on its location within the protected SEPP14 wetland and associated buffer zones;
- Monitoring of clearing and initial excavation works has been recommended by KLALC. The EAR notes this would not be undertaken as an archaeological activity but does not clarify whether the monitoring by the KLALC is a management commitment by the Proponent; and
- A 'keeping place' for any cultural heritage material is noted as being required if any cultural heritage material is uncovered during the construction works. Such a keeping place is stated as being under the care and control of the local Aboriginal community, but no mechanism for achieving such care and control is noted in the EAR.

The Aboriginal Assessment Report (ERM 2008) further recommends:

- if the Concept Plan is amended, subsurface investigation may be required to assess the significance of the recorded sites;
- if during clearing or construction works Aboriginal artefacts are recovered, a qualified archaeologist should be contacted and the site recorded in consultation with the Aboriginal community. Once recorded, salvaged artefacts would be managed under a Care and Control Permit approved under Section 85a of the National Parks and Wildlife Act, if required; and
- appropriate procedures in the event skeletal material is discovered during construction activities.

4.2.2.2 Further Information Provided – Post EAR Exhibition

During the site visit, the Proponent indicated that additional survey and definition of the Riverside _01 midden site has been conducted. No report of this investigation has been provided to the Commission to date.

4.2.2.3 Commission Assessment

The detailed consultation log provided in Annex B of the Aboriginal Heritage Assessment (Volume 3B of the EA) outlines the consultation process undertaken with the three registered stakeholders. The KLALC participated in the entire process, including fieldwork and comment on the draft assessment report. The other two stakeholders engaged during the early part of the process but did not participate in the fieldwork or provide comment on the draft assessment report. It is not clear whether there was any follow up in relation to seeking feedback on the draft report which was provided to Jan Webb and the Interim Board of Management for Worimi Conservation Lands. However, it is noted that:

- The stakeholders were provided with an appropriate period to comment, in accordance with the DECC Interim Consultation Guidelines;
- Jan Webb had noted in earlier consultation that she was also a member of KLALC; and
- the Worimi LALC had acknowledged in earlier consultation that the site is not in their LALC area.

Further it is noted that the DECC Cultural and Heritage Division Northern, Aboriginal Liaison Officer provided feedback (email of 5 August 2008) which focused on the KLALC role in the assessment and management process and made no comment on the need for further consultation with other stakeholders.

The Aboriginal Assessment notes survey limitations that did not allow for complete survey of the development area. These include a long period of rain resulting in areas of the site being inundated, vegetation being 'extremely dense' in portions of the site, and electric fences precluding access to some areas. Whilst the electric fences and level of inundation could have been rectified by additional survey at different times, it is acknowledged that the limited visibility due to dense ground cover would severely limit the potential for further identification of Aboriginal archaeology in the areas for which access was restricted on the day of the survey. Nevertheless, it is uncertain whether the survey strategy adequately sampled all available areas of potential visibility and this warrants further clarification by the Proponent.

Given the nature of the site and dense vegetation cover, further survey is unlikely to yield significant further sites. There is potential for subsurface deposits to occur in these Pleistocene deposits. The Aboriginal Assessment notes that predictive modelling and survey confirmed that the wetland and sand dune landforms in the eastern portion are likely to have a consistent low density scatter of midden material and should be considered as potential archaeological deposits, and that these landscapes will be protected within the SEPP14 wetland and associated buffer. The Commission further notes that a substantial portion of any potential associated archaeological deposit associated with the remainder of the site will not be disturbed (ie will either be filled or placed in protection due to ecological constraints) and therefore concurs with the Aboriginal Assessment conclusion that extensive subsurface investigation is not warranted.

In relation to Aboriginal Assessment, the Commission recommends that:

- the Proponent be requested to provide further details to confirm the adequacy of the survey sampling in relation to available areas of potential visibility and to further define the extent of Riverside_01;
- the additional definition of the extent of Riverside_01 and the adequacy of the buffer area to be protect this site must be considered prior to approval of the concept plan;

- the proposed management plan in relation to Riverside_01 must consider the potential for impacts to this site as a result of signage and interpretation for use as an educational resource, in consultation with DECC and the KLALC; and
- the Proponent clarify the commitment or otherwise for KLALC to monitor construction activities and the mechanism to achieve long term protection of any keeping place established as part of this process.

4.3 PROPOSED EXPANSION OF COMMERCIAL & RETAIL CENTRE

The concept plan seeks approval for an extension of the existing Myall Quays shopping centre (approximately 4ha) to accommodate a range of uses (which will be subject to future applications) including additional retail and commercial uses. The Stage 1 project application seeks approval for roadways and associated infrastructure for the proposed retail/commercial area (no buildings are proposed in the precinct as part of the Project Application).

The applications did not specify the amount of floorspace sought. Instead, the proposed 4ha extension area is said to be capable of providing a total GFA between 10000m^2 (FSR 0.25:1) and 16000m^2 (FSR of 0.4:1) depending on the FSR adopted.

The EAR includes the following reasons to support the proposed expansion:

- In the 1990s, the plan was to develop major commercial and retail facilities in the North Hawks Nest future urban release area resulting in the restriction of similar development in Tea Gardens to 3000m^2 at the Myall Quays Shopping Centre.
- Future development in North Hawks Nest was subsequently found to be limited due to ecological and servicing constraints.
- Riverside and Myall River Downs have been identified as major future growth areas. Hence it is logical to locate major retail and commercial centre in the vicinity.
- Floorspace greater than the existing 3000m^2 is likely to be required based on Council's adopted long term population projections.
- The proposed expansion adjacent to the existing Myall Quays Shopping Centre will assist in consolidating the commercial retail centre to serve existing and future population and is consistent with the principle set out in the Tea Gardens Hawks Nest Housing Strategy (2006 Housing Strategy).
- There is a high demand for the proposed commercial development of the Riverside site.
- The proposed expansion area will provide for the Tea Gardens and Hawks Nest area well beyond 2016.
- Tea Gardens and Hawks Nest are geographically isolated from other existing high order retail and commercial developments. The closest retail centre is Raymond Terrace which is 52km from the Riverside site.

The Commission notes that assessing retail floorspace requirement is largely dependent upon population projections. Other key factors that need to be taken into consideration include retail centre strategy and potential economic impact on existing centres.

4.3.1 Population projection

To support the proposed 4ha of land for retail and commercial uses, the applications rely on two retail studies to justify the floorspace proposal, the 2000 IBECON report and the 2007 Wakefield report. In considering these two reports, the Commission has also reviewed the population projections contained in the Council's Conservation and Development Strategy for Tea Gardens and Hawks Nest (2003 CDS) and the 2006 Housing Strategy as well as advice from the DoP on recent population projections.

2000 IBECON report

This report is titled *Tea Gardens Retail Study* dated 10 August 2000 and was prepared by IBECON Pty Limited. The report was commissioned to assess the market potential for retail facilities in the Tea Gardens region and potential impacts of the then proposed Myall Quays shopping centre. Its assessment was based on the then DUAP medium growth population projections with adjustment to reflect IBECON's "most likely" population projections.

2007 Wakefield report

This report is titled *Tea Gardens Retail Study Update report – IBECON Study of* 2000 dated 30 July 2007 and was prepared by Wakefield Planning for Crighton Properties Pty Ltd. The report provides an update to the 2000 IBECON report. However, it only updated the population projections based on the 2005 Planning Workshop report (2005 PWA) and retail floorspace developed since 2000 for its estimate of future retail floorspace requirement. As the IBECON calculations were only up to 2016, the Wakefield report adopted a similar timeline.

The 2005 PWA projections provided a range of growth rates ranging from 3.25% to 7.45% and the preferred projection was the one with the highest growth rate.

The Wakefield report noted the IBECON report overestimated the 2006 population by 13% in the Great Lakes LGA when compared with the 2006 Census.

Although the Wakefield report noted the "over-optimistic" projections in the IBECON report for 2006 and 2011, the conclusion was by 2016 there should be a reasonably close correlation between the IBECON floorspace estimate and its estimate based on PWA projections.

Population projections by Council and Department of Planning

The 2003 CDS included population estimates for the Tea Gardens and Hawks Nest areas based on lot supply. Three growth scenarios were presented, low, medium and high. The medium growth scenario anticipated population increase from 1372 in 2001 to 6606 in 2031 for Tea Gardens and from 1173 in 2001 to 1997 in 2031 for Hawks Nest. The population increase for the two areas combined would be from 2545 in 2001 to 8603 in 2031.

The 2006 Housing Strategy was based on the 2004 population projection released by the then DIPNR and the 2003 CDS. It adopted the DIPNR (2004 release) population projections from 2000 to 2031 for the whole LGA. In 2001, the LGA had a population of 32,200 and the expected population in 2031 was 50,220. It adopted the Tea Gardens and Hawks Nest population projection presented in the 2003 CDS.

In 2008, the DoP updated its population project (2008 DoP release). According to the release, the Great Lakes LGA population would grow from 34,200 in 2006 to 48,100 in 2031.

The Commission notes the growth rates applied by Council in its projections for Tea Gardens and Hawks Nest range from 2.9% (2026) to a high of 4% (2011). The DoP considers the rates are on the high side having regard to information available since the completion of the projections in 2003.

Commission's Comment

The Commission notes:

1. Population projections are based on lot supply and the application of a number of factors including household size and occupancy rate, hence they are very sensitive to data inputs.
2. The population projections prepared by the then DUAP in 1996 were on the high side when compared with the 1996, 2001 and 2006 Census results. Again, the projections in the DIPNR 2004 release have been revised downward in the DoP 2008 release.
3. The 2000 IBECON's population projections are highly optimistic.
4. The high growth rate scenario in the 2005 PWA projections is also highly optimistic, particularly for 2031 with a projected population of 19500 for the TG/HN region. Its low growth rate scenario appears to be within the same range of Council's medium growth rate scenario.
5. Council's medium projection for 2006 for Tea Gardens and Hawks Nest was 12% higher than the 2006 census.

The Commission considers there is a need for Council, with assistance from the DoP, to update its population projections for Tea Gardens and Hawks Nest, particularly given the 2006 census result, the 2008 DoP release and the adopted DCP 52 which encourages high density residential development in the town centres. In the absence of such update, it is appropriate to use the Council's medium growth scenario projections to assess retail floorspace requirement for the Tea Gardens and Hawks Nest area noting that they should be treated as the upper range of assessed requirement.

4.3.2 Retail Centre Strategy

In the Hawks Nest Tea Gardens area, there are 3 shopping centres. They are the Hawks Nest town centre, Tea Gardens town centre and Myall Quays shopping centre. Both the 2003 CDS and the 2006 Housing Strategy considered there is a need to prepare a commercial/retail strategy to investigate the future roles and character of the 3 centres and develop guidelines so that each centre can evolve its own identity.

The 2006 Housing Strategy noted that each centre appears to have different characters and roles in the local economy that can be further built upon, without necessarily being in direct competition. Hawks Nest is developing a more holiday-maker focus. The Tea Gardens town centre has 2 distinct parts. The river-front sub centre appears to focus on the tourist market while the Myall Street sub centre caters for the daily needs of residents. Myall Quays shopping centre seems to be catering for a more everyday service role with its supermarket and specialty shops.

The Tea Gardens/Hawks Nest Town Centres DCP No 52 provides some guidelines on future development within the two town centres. But its focus is on urban design and environmental sustainability in medium density residential and mixed-use development in the two town centres. It does not address commercial or retail development which does not contain any residential component. There is a lack of information on the potential retail/commercial floorspace that can be accommodated and types of retail/commercial developments that would be targeted for the two town centres, and their relationship with the Myall Quays shopping centre.

The Commission is of the view that there is a need to prepare a retail centre strategy to define the role and functions of each of the 3 centres to enable consideration of the proposed extension of the Myall Quays shopping centre in a strategic context.

4.3.3 Potential economic impact on existing shops

It is a concern to the Commission that the proposed expansion of Myall Quays shopping centre may have negative economic impact on retail developments along Myall Street in Tea Gardens, (the North Central and South Central precincts identified in the Tea Gardens/Hawks Nest Town Centres DCP No 52). These two precincts are said to provide day to day convenience goods to residents.

The 2003 CDS Background Report acknowledged that "the development of a shopping facility in Myall Quays will affect existing shops. The existing shops may not be able to effectively compete and could be forced to relocate to the larger facility. Relocation of shops from Hawks Nest and Tea Gardens would reduce amenity now afforded by conveniently located neighbourhood shops." This appears to be confirmed by the Urban Design and Density Review report by City Plan Urban Design (2008 UDDR) as a follow on from the Housing Strategy. The report concluded that the Myall Quays shopping mall has "duplicated most of the retail functions of the old town centre and has since seen the closure of many shops".

The observation of the 2008 UDDR raises doubt about the conclusion of the 2007 Wakefield report that there would be a deficit of retail floorspace in 2011 and beyond if no new floorspace is provided.

The Commission also notes that one of the objectives of DCP52 is to promote higher density residential development within the town centres so as to support a more vibrant community and diverse local economy. The planned population increase in the town centre may assist the survival of existing shops. However, the potential impact from an expanded Myall Quays shopping centre on these shops is yet to be assessed.

4.3.4 Facilities and services to be provided in the proposed retail/commercial centre

The concept plan and project applications are for a 4ha retail/commercial centre adjacent to the existing Myall Quays shopping centre, hence it can be considered as an extension to the Myall Quays shopping centre. The indicative GFA ranges from 10,000m^2 to 16000m^2 depending on the applicable FSR. In support of the proposed expansion, attention is drawn to the isolation of Tea Gardens and Hawks Nest from other higher order shopping centre. It is therefore considered appropriate to provide retail capacity in Tea Gardens/Hawks Nest at a higher level than might otherwise be expected. Notwithstanding such view, the EAR did not provide details as to what facilities or services will be provided in the extension area or the proportion of GFA for retail or commercial or other uses as they will be subject to future applications.

The Commission notes in the Proponent's consultant letter dated 7 July 2008 to the Director General seeking permission to lodge the concept plan and Stage 1 project applications under Part 3A, in page 8 it referred to "the expansion of the existing commercial centre to accommodate a range of uses including additional retail and commercial uses, a child care centre and a motel". The Wakefield report concluded that the proposed floorspace for retail use would be sufficient to cater for the demand beyond 2016.

The Commission finds the application to seek approval for the extension "to accommodate a range of uses including additional retail and commercial uses" is too general and there is insufficient information to assess potential social, economic and environmental impacts of the proposed extension.

4.3.5 Conclusion

Given there is doubt about the need for a major expansion of the Myall Quays shopping centre having regard to the Council's population projections and the more recent DoP population update, the lack of a retail strategy, the potential economic and social impacts on the existing shops along Myall Street if the shopping centre is expanded, and the uncertainty as to the facilities and services that will be provided in the proposed extension area, the Commission considers it premature to recommend approval for the proposed retail/commercial centre expansion.

4.4 COMMUNITY TITLE

Concerns were raised by government agencies and in submissions that the proposed arrangements for ownership and operation of the stormwater management infrastructure would not be sufficiently robust to provide for essential maintenance or repairs in the event of a significant system failure.

The proposal involves the utilisation of a new community scheme and new precinct schemes within an existing community scheme under the Community Land Development Act 1989 (NSW). These schemes specify development requirements and establish the ongoing maintenance and management of community land within the proposed subdivision, including the water management structures. Consequently the effective implementation of the new community and precinct schemes is critical to long term, adequate water quality management, amongst many other functions of these schemes. Given the criticality of this issue in terms of providing certainty of long term management, the Commission requested the Department of Planning to seek legal advice on the adequacy of the current terms of the Community Management Statements included in the EAR. This review was completed by Holding Redlich Lawyers, and recommended a number of improvements to the detail of the Community Management Schemes to avoid ambiguity in the multiple schemes; ensure consistency with the detail of the concept and project application; and to clarify ongoing responsibility, rigor and review of community land management and maintenance.

The Commission recommends that the DoP consider this legal advice in providing further guidance to the Proponent in relation to community title matters to be clarified in any Preferred Project report or further proposal in relation to the site.

4.5 SEWAGE TREATMENT CAPACITY

As noted in Section 3.6.5, MidCoast Water indicated in its submission that the current development projections for the proposal exceed the capacity allocated for this development within their current servicing strategy. MidCoast Water advise that the current capacity of the Hawks Nest STP is 10000 equivalent persons (EP), with planned capacity to expand to 15000 EP. Capacity beyond 15000 EP is yet to be identified and MidCoast Water advise that limited opportunities exist. During the hearing process, DECC raised concerns about the ability of the current dune based exfiltration system to cater for even the planned capacity expansion to 15000EP. MidCoast Water also identify the need to cater for tourist and holiday home owners in infrastructure demand calculations in coastal towns, with demand increasing by 1.5 to 3 times the base demand during peak holiday periods. Considering current and projected demand, MidCoast Water raised the need for further consideration of capacity and infrastructure staging.

The Proponent has (subsequent to preparation of the EAR) committed to installing a dual reticulation system to permit the use of recycled wastewater, to reduce net effluent loads to the STP. Obviously, this goes some way to addressing the capacity issue, but the ultimate capacity of the sewage treatment system at Hawks Nest is a serious issue that requires

further consideration in the staging of this project in relation to the cumulative demand in this STP catchment.

MidCoast Water has been requesting the preparation of an Integrated Water Cycle Management Plan (IWCMP) for this proposal since July 2006, and the Commission supports the need for this work to be completed prior to approval. The IWCMP needs to address water supply, stormwater, sewage, recycling of effluent in an integrated manner, together with further consideration of STP capacity and consequent infrastructure staging considerations, in consultation with MidCoast Water and DECC.

5. CONCLUSIONS AND RECOMMENDATIONS

This chapter sets out the main findings and conclusions from the review and, where appropriate, makes recommendations in relation to them.

5.1 SITE HISTORY AND STATUTORY POLICY FRAMEWORK

The site has been owned by the Proponent since 1991. Between 1991 and the present there have been several proposals for development of part or all of the site. In the same period there have been substantial changes to the statutory and policy frameworks affecting development on the site, including those relating to protection of ecological values, water management and planning itself.

While the history is both complex and informative, the Commission has taken the view that it must focus on the current attributes of the site and the current statutory and policy frameworks in providing advice. In doing so, the Commission notes that the current context is entirely different to the one prevailing when the site was purchased and also different to the one prevailing when the site was rezoned in 2000.

5.2 ECOLOGICAL IMPACTS

Strong concerns were raised about the potential environmental impacts of the proposals by multiple government agencies, council officers, community groups and members of the public. These concerns related to a wide range of impacts including risk to the SEPP14 wetland, risk to other groundwater dependent ecosystems including endangered ecological communities and threatened species habitat, direct impact (clearing) on endangered ecological communities and threatened species habitat, degradation of endangered ecological communities and threatened species habitat from edge effects (inadequate buffers) and the effects of altered water regimes, loss of koala habitat and inadequate corridors for wildlife movement.

Proper assessment of ecological impact requires adequate information about the flora and fauna on the site. As indicated in Chapter 2 the Commission considers this information, and the vegetation mapping produced from it, to be deficient. As a consequence it is not possible to define the boundaries of known significant habitats[1] with certainty and there is a real possibility that areas of significant habitat remain unidentified. Because of the variable quality of the fauna survey work, it is equally possible that the presence of threatened species has been missed in some parts of the site, or they are not recorded as being present at all.

The view of the Commission is that the site is substantially more 'ecologically constrained' than the EAR would suggest and that the potential impacts of the proposals in both the concept plan and the project application as presented in the EAR should be regarded as unacceptable.

The Commission considered that it had two courses open to it in providing advice on the ecological impacts. The first was to recommend that the applications be refused. The second was to recommend that the Proponent be given the option of revising the proposals with a view to providing a properly supported preferred project report at a later date that addresses the ecological impacts adequately.

[1] 'significant habitats' is used here to cover endangered ecological communities and threatened species habitat.

Pursuing the second option a little further, the Commission would have liked to be able to give unequivocal advice as to what specific changes might have made it possible for the Commission to advise that the ecological impacts were acceptable. The Commission is unable to give unequivocal advice because deficiencies in the baseline information mean that any consideration of possible tradeoffs across the site is confounded by the inability to determine the relative values (i.e. priorities for protection) of the multiple areas of endangered ecological communities and threatened species habitats present on the site.

The majority of Commission members have taken the view that, whilst it would not be desirable to specify approval conditions based on the quality of information in the EAR, it is entirely reasonable within the context of Part 3A to give firm guidance as to what the Commission may consider a reasonable approach to the ecological constraints of the site for any revised project proposal. The majority are of the view that this approach is both consistent with the Commission's task under Part 3A and likely to lead to the best outcome for the site.

Figure 2 (page 54) provides general guidance as to the areas that the majority of Commission considers should not be subject to development and those it considers may be able to be developed subject to satisfactory arrangements for dealing with any endangered ecological communities or areas of threatened species habitat present. Figure 3 (page 55) shows the main known ecological constraints on the site. Figure 2 is provided with the following caveats:

(i) There will undoubtedly be some variations to the indicative areas suggested as being available for development because they are based on the maps in the EAR and it is the Commission's view that these maps understate the areas of significant habitat;

(ii) The Commission notes that there are some areas containing endangered ecological communities and threatened species habitat within the area marked for potential development. The Proponent will need to address these either by protecting them or providing suitable offsets;

(iii) Given the poor baseline information it is not possible to assess whether there are options for improvements within the non-developable area that might contribute to any offsets required under (ii); and

(iv) That substantial further work is required to provide accurate information on which a proper assessment of potential ecological impacts can be based. Some guidance on what is required is set out at 2.7, 2.8 and 2.9 in Chapter 2 of this report.

The reasons the majority of the Commission has opted for the configuration proposed in Figure 2 are:

(i) it is consistent with the regional planning strategy which identifies a surplus total development capacity to allow for the fact that many individual sites proposed for development will have significant ecological constraints that prevent achievement of their notional yields;

(ii) it protects a significantly greater proportion of the endangered ecological communities (particularly swamp sclerophyll forest) and threatened species habitat (e.g. Barking owl and Squirrel glider) without sterilizing the site for residential development;

(iii) it directly protects most of the identified hollow-bearing trees on the site by including them in the non-developable area. Those hollow-bearing trees remaining in the developable area will require specific attention;

(iv) it provides consolidated areas of significant habitats which reduce edge effects and go some way toward reducing the overall impact of development on the site;

(v) it provides a buffer to most, but not all, of the major areas of significant vegetation and habitat including the SEPP14 wetland;

(vi) depending on the final configuration of the stormwater management system, the reduced development footprint and the larger consolidated protected areas on the eastern portion of the site should reduce any potential impacts on groundwater dependent ecosystems; and

(vii) it provides wildlife corridors that are likely to be functional in both local and regional contexts.

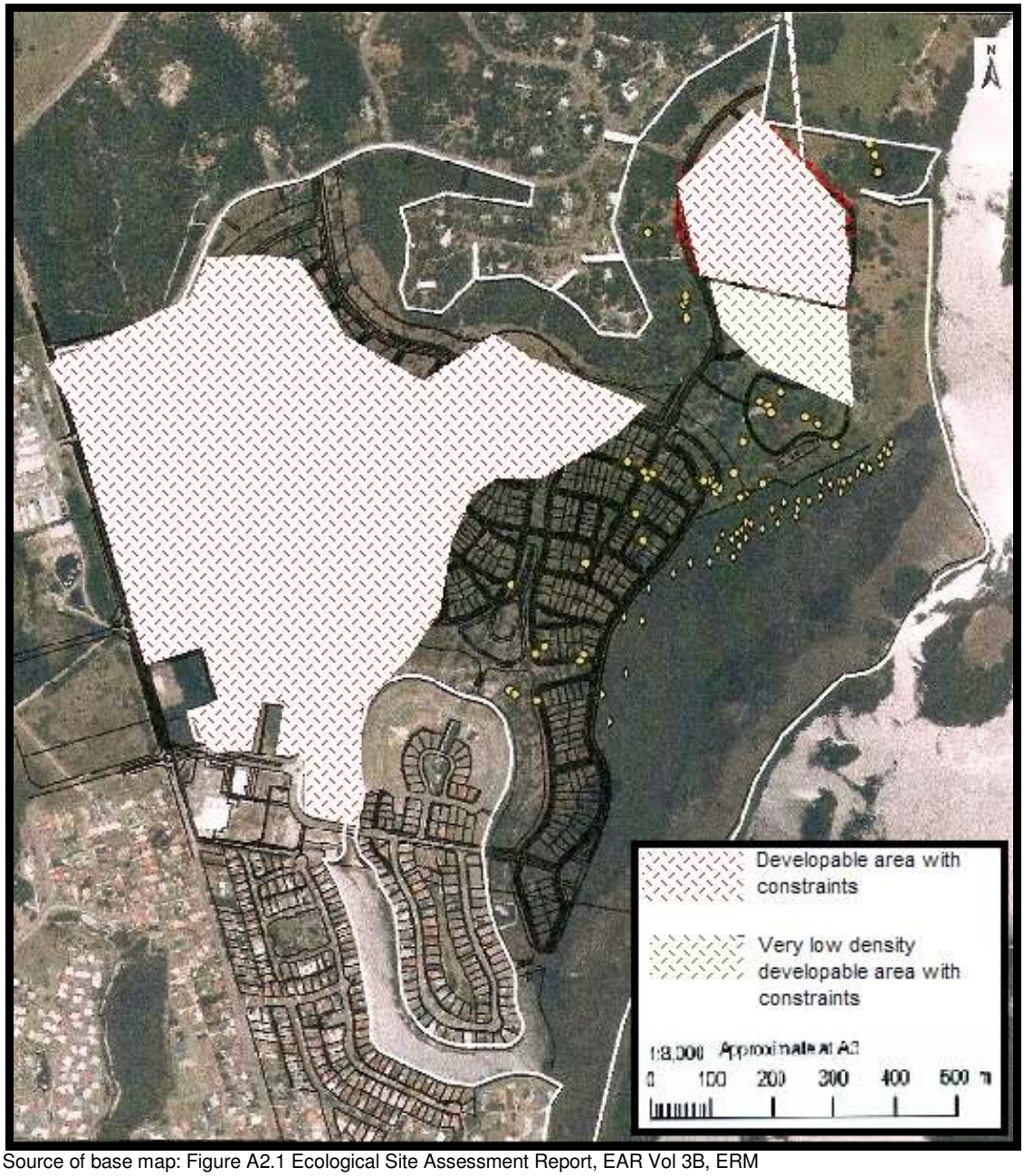
The Proponent has asserted on a number of occasions that the site was previously a pine plantation and that the plantation was largely destroyed by fire in 1979. The Proponent has supplied a letter from Australian Pines & Products Pty Limited in support of this position. The inference is that the site is heavily modified and cannot be regarded as providing high quality native habitat.

As a result, the Commission has examined a series of aerial photographs of the site dating back to 1963 (see Chapter 2). The Commission's conclusion is that since 1963 the site has supported predominantly native vegetation in the tree and shrub layer and that none of the photos since 1963 indicate a widespread or established pine forest on the site.

However, the Commission notes that pines appear to grow quickly in the area (the dense area of pines to the south-west of the site has grown up since the 2001 photo was taken) and observations on-site indicate that the pines self-seed readily and that the pine is now an invasive weed in the area.

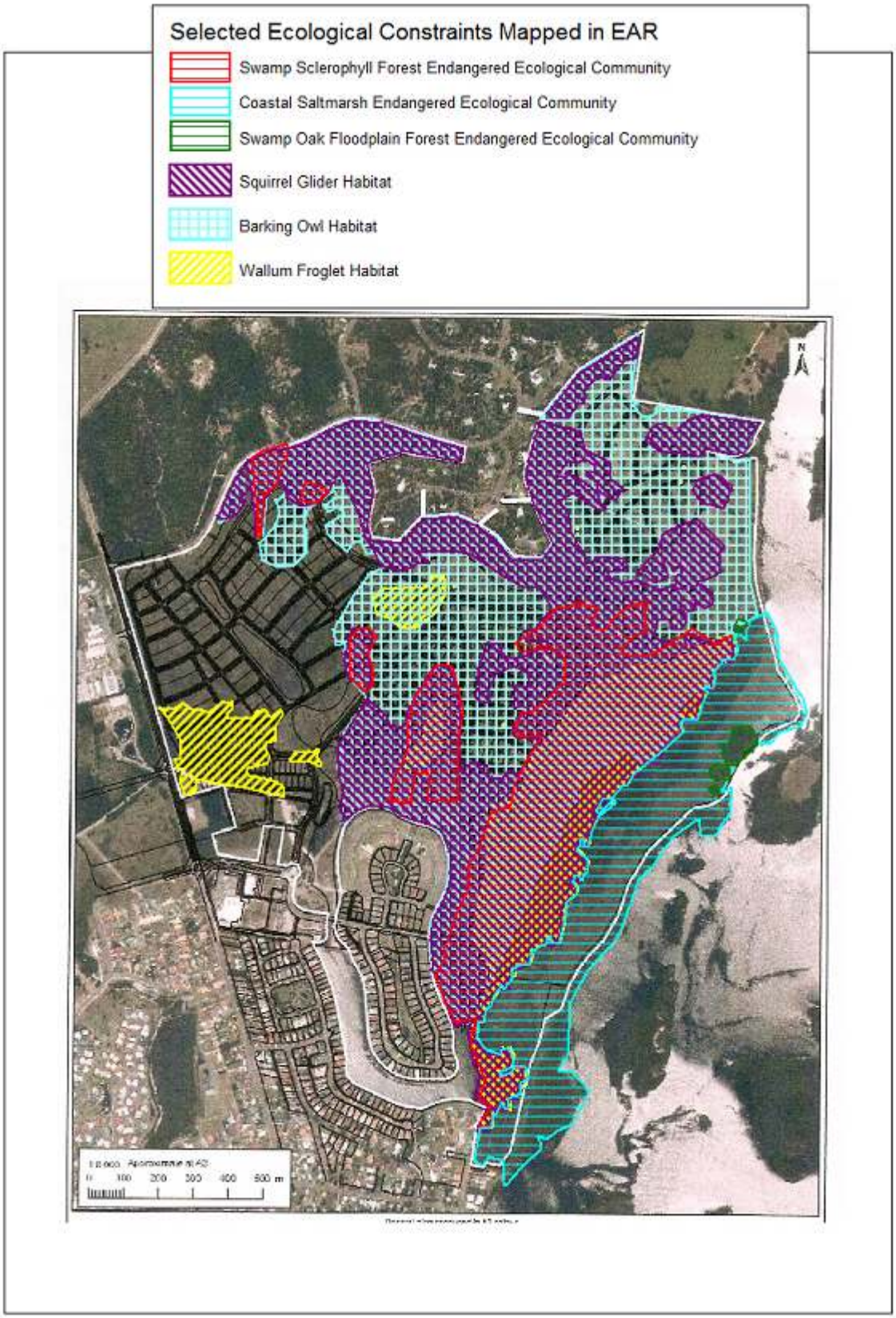
The Commission is of the view that, apart from future management of self-seeding pines as a pest species on the site, no further regard to pines or the pine plantation debate is warranted. The site should be assessed on its current environmental attributes.

Figure 2 Potential Developable Area with Constraints



Source of base map: Figure A2.1 Ecological Site Assessment Report, EAR Vol 3B, ERM

Figure 3 Ecological Constraints as Mapped in the EAR



Source of map: Riverside at Tea Gardens Concept Plan and Project Application Environmental Assessment Report
Note: According to the EAR, the site contains approximately 186ha of suitable habitat for the Grey-headed Flying-fox which is not highlighted in the map above.

5.3 POTENTIAL IMPACTS ON GROUNDWATER

Strong concerns were raised in submissions from multiple government agencies and by council officers about the potential effects of the proposals on groundwater. These concerns related to:

(i) beneficial value of the groundwater aquifer;

(ii) the importance of the aquifer to groundwater dependent ecosystems (eg the SEPP14 wetland, the swamp sclerophyll forest EEC and other Wallum Froglet habitats); and

(iii) the potential contamination of the aquifer from pollutants and nutrients in stormwater and from saline intrusion associated with the existing lake and its proposed extension.

The Commission has concluded that the data supplied in the EAR and in response to enquiries are incapable of resolving concerns under (ii) and (iii) above. Until this is rectified the Commission's advice is that the risks are unacceptable. The information required to make the assessment is outlined in Chapter 3.

The Commission notes the strong objections from Department of Water and Energy based on conflict of the proposals with groundwater protection policies and the assertion that a water access licence would not be granted for the permanent interception of groundwater under Part 5 of the Water Act 1912. Should this latter issue become critical in considering approval of the proposals, specific legal advice will need to be obtained concerning the relationship between the groundwater interception activities proposed, the licensing powers of DWE and the operation of Part 3A.

Beneficial use of the aquifer has been raised based on the fact that the water quality falls just short of the potable water criteria and would thus be suitable for a range of non-potable uses - particularly as a reserve in drought. The potential exists for contamination with pollutants or salinity, but there are no data available that allow these risks to be quantified. The Commission notes that the aquifer is considered to be relatively small and that much of any beneficial use would probably accrue to users on Riverside. The relative weight to be given to future beneficial use should be viewed in this context.

The Commission concludes that the major issues to be addressed are:

(i) what has been the impact of the existing lake on groundwater and what are the potential consequences of that impact on groundwater-dependent ecosystems, future beneficial use of the aquifer, and any potential receiving waters; and

(ii) for each stormwater management configuration proposed in a future proposal or a preferred project report, what are the possible impacts on groundwater and the potential consequential impacts on groundwater dependent ecosystems, beneficial use and receiving waters.

5.4 STORMWATER MANAGEMENT

There has been substantial opposition expressed to the Proponent's preferred scheme by multiple government agencies and by council officers. The basis of the opposition varies, but the following are consistent themes:

(i) the existing lake is in reality a canal estate and any expansion of the lake will simply increase the size of this arrangement;

(ii) interception of groundwater is neither necessary nor desirable for stormwater management (i.e. there should be no direct hydraulic connection between stormwater management infrastructure and groundwater). This precludes

extension of the existing lake and construction of unlined freshwater detention ponds;

(iii) no expansion of the connection between the existing lake and the Myall River should be allowed;

(iv) the relationship between use of recycled effluent, use of fertilisers, the nutrient content of stormwater and potential impacts on the existing lake, groundwater and the receiving waters has not been explored adequately in the water cycle management plan;

(v) the run-off from the commercial area may need special attention if any expansion is approved;

(vi) the potential for flooding has not been adequately addressed; and

(vii) the proposed institutional structures (community title arrangements) may not be sufficiently robust to cope with major failure or essential modification to key stormwater management infrastructure.

In the face of this sustained opposition, the Proponent has maintained that the preferred stormwater management scheme is the only viable scheme and that it will work effectively. Unfortunately, the Commission considers that the Proponent has failed to provide the evidence necessary to support this position. However, the Commission is not opposed in principle to the Proponent's preferred scheme provided it can be demonstrated conclusively that it is the most efficient and effective way to manage stormwater on the site, the potential impacts on groundwater and receiving surface waters are acceptable, and there are no significant consequential impacts on groundwater dependent ecosystems.

For each stormwater management scheme in a future proposal or a preferred project report, the Proponent should address the following points comprehensively:

- Whether the proposal is consistent with SEPP50.
- Whether the proposal has adequate capacity to deal with the maximum predicted volumes of stormwater entering the site or generated on the site, including consideration of the use of recycled wastewater.
- Whether the proposal will treat the runoff from the commercial area adequately.
- What are the possible impacts on groundwater, groundwater dependent ecosystems, beneficial use of groundwater and receiving waters.
- Whether there are any risks of pollution or eutrophication of the existing lake or any proposed extension of that lake.

The issue of flooding was raised consistently in the public submissions and also by council officers. There are three aspects: stormwater, climate change and the possible interaction between them.

The proposed method for handling floodwaters in the absence of climate change involves structures that are unlikely to be acceptable in terms of the ecological constraints (eg the proposed swale along the western margin of the 7(b) conservation zone) or are part of the current stormwater management scheme which involves interception of the groundwater. The adequacy of floodwater management will need to be reassessed once revised proposals are available.

The issue of climate change has not been adequately addressed. Whilst the recommended floor levels are adequate if the climate change ramifications are 'minor', they are not adequate if the climate change ramifications are greater than this. There is no information on which to base a rational recommendation on this issue and the implications of an error could be significant.

As a minimum the decision-maker would need to understand the implications of climate change scenarios above 'minor', the steps necessary to avoid impacts at these levels (including any implications for other key aspects of the site such as safety concerns, ecological values and groundwater) and the costs and benefits of the proposed approach.

5.5 THE NEED FOR AN INTEGRATED APPROACH TO ECOLOGICAL CONSTRAINTS AND STORMWATER MANAGEMENT

The Commission is of the view that the logical sequence for approaching any reconfiguration of the proposals is to:

(i) settle the indicative boundaries of the area(s) available for development based on the ecological constraints and determine the approach to be taken to any remaining areas of significant habitat within the area proposed for development; and

(ii) assess the options for stormwater management for the revised development footprint in the context of addressing the ecological constraints as the highest priority and recognising that this may mean some compromises are required concerning stormwater management options, but noting that such compromises do not extend to:

- the capacity of the system to handle predicted stormwater flows on the site;
- the water quality requirements to be met at the receiving waters; or
- impacts on groundwater that would compromise the functioning of the groundwater dependent ecosystems in the parts of the site marked as not developable in Figure 2.

This *may* mean that unlined ponds that intercept groundwater need to be re-considered by the relevant government agencies in the interests of a 'best total outcome' for the site. A series of 'best individual outcomes' for the individual responsibilities of each agency would appear to result in very little or no development on the site at all. Again, the Commission offers no concluded view on whether unlined ponds are acceptable or not. Before that can be considered properly, a substantial amount of information must be produced on the potential impacts on groundwater and consequential impacts on groundwater dependent ecosystems.

5.6 ACID SULPHATE SOILS (ASS)

The Commission considers that the evidence presented to date indicates that the risks posed by ASS could be managed. However, there are multiple deficiencies in the information including assessment of risk and proposed management. These deficiencies are set out in detail in 4.1.2 of this review report. They would need to be addressed in any subsequent proposal or preferred project report and include a properly prepared strategy that ensures the consequential risks associated with disposal are properly evaluated and managed to minimize water quality impacts and ensure no detrimental impact occurs on the parts of the site protected due to biodiversity values.

5.7 ABORIGINAL ARCHAEOLOGY

Concerns were raised by Department of Environment and Climate Change on the adequacy of both the survey work and the consultation process. The Commission's initial review indicated that the consultation had been adequate and that some survey work was ongoing. Subject to the clarification of any further survey outcomes and adequate protection being provided for the major midden site (Riverside _ 01), the Commission is of the view that further work is not required.

5.8 PROPOSED EXPANSION OF THE COMMERCIAL AND RETAIL CENTRE

The proposed expansion is based on population projections that are substantially higher than projections from both DoP and council. The Commission recommends that until such time as new projections have been developed, the Council's medium growth projections be used as an upper bound for assessing commercial and retail floorspace requirements. Based on these projections it is not necessary to expand the commercial and retail areas in the foreseeable future. In any event, it would be desirable if Council developed a strategy to define the relative roles and functions of the three retail centers (Myall Quays, Hawks Nest town centre and Tea Gardens town centre) before any decision was made on expansion of Myall Quays.

5.9 SEWAGE TREATMENT CAPACITY

The ultimate capacity of the sewage treatment system at Hawks Nest is a serious issue that requires further consideration in the staging of this project in relation to the cumulative demand in this STP catchment. An Integrated Water Cycle Management Plan (IWCMP) needs be prepared to address water supply, stormwater, sewage, recycling of effluent in an integrated manner, together with further consideration of STP capacity and consequent infrastructure staging considerations, in consultation with MidCoast Water and DECC.

5.10 ACCURACY AND ADEQUACY OF INFORMATION PROVIDED IN THE EAR

The Commission notes that throughout this report there are serious criticisms of the accuracy and/or adequacy of the information provided by the Proponent. The Commission also notes that many of these issues were raised by the various government agencies on multiple occasions prior to this review.

5.11 RECOMMENDATIONS

(i) The proposals are not considered acceptable in their current form. They should either be refused or the Proponent be requested to review the proposals with a view to submitting a preferred project report consistent with the content of this report.

(ii) That the Proponent be requested to take particular note of the numerous deficiencies identified in both the accuracy and adequacy of the information presented in the EAR and supporting documents and also note the guidance provided in this review report as to the nature and standard of information that will be required for adequate assessment of any future proposal or preferred project report for this site.

(iii) That the relevant government agencies be requested to take an integrated approach to considering the various aspects of development of this site. The Commission recommends that the ecological constraints be considered as the highest priority and that stormwater management and groundwater management be approached with a view to maximizing the residual area available for development without compromising key aspects of stormwater management or impacting groundwater dependent ecosystems.

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Appointment, Request and Direction Planning Assessment Commission

Riverside at Tea Gardens Project

Section 23D(1)(b)(ii) and Schedule 3 of the *Environmental Planning and Assessment Act 1979* and Part 16B of the *Environmental Planning and Assessment Regulation 2000*

I, the Minister for Planning:

1. Appoint those persons numbered 2, 3 and 4 in Schedule 2 as additional casual members of the Planning Assessment Commission (the Commission); and

2. Request that the Commission carry out a review of certain aspects of the Riverside at Tea Gardens Concept plan application and Project application as set out by the terms of reference in Schedule 1 ("the Review") and to provide its final report in relation to the Review to the Minister for Planning by 29 May 2009; and

3. Direct that for the purposes of carrying out the Review, the Commission is to be constituted by 4 Members, being those Members specified in Schedule 2; and

4. Request the Commission to conduct public hearings as part of the Review in the Hawks Nest area.

The Hon Kristina Keneally MP
Minister for Planning

Sydney 9 March 2009

SCHEDULE 1

1. Consider and advise on the:
   a) Ecological impacts of the project including impacts on the SEPP 14 wetland, Myall River and the removal of vegetation and its location within a regionally significant habitat corridor;
   b) Hydrological impacts of the project including:-
      (i) Whether the proposed water sensitive urban design measures will result in adverse impacts on groundwater and local surface hydrology, particularly on the SEPP 14 wetland and the Myall River; and
      (ii) Whether the proposed water sensitive urban design measures will result in adverse impacts on flooding for the subject site and surrounding properties.
   c) relevant issues raised in submissions in regard to the above impacts; and
   d) adequacy of the proponent's response to the issues raised in submissions
2. Identify and comment on any other related significant issues raised in submissions or during the panel hearings.

SCHEDULE 2

1. A Member of the Commission as determined by the Chairperson of the Commission;
2. *Ms Barbara Crossley,*
3. *Mr Peter Dundon*; and,
4. *Dr Judy Smith.*

APPENDIX 2

Summary of Submissions

The following is a brief summary of submissions received by the Commission. A list of issues raised in submissions referred to the Commission by the Department of Planning is also included. The key issues are discussed in various sections of the Commission's report.

COMMUNITY GROUP AND RESIDENTS

The Myall Koala & Environmental Support Group Inc does not support either the concept plan or the project application in their present form. The group believes substantial changes are required and further independent investigations are necessary to ensure any development is appropriate to the sensitivities of the site and the future overall development of Tea Gardens. The key areas of concern are:

- Ecological impacts relating to fauna protection and movement, particularly the inadequacy of the wildlife movement and water management corridor;
- The lack of active measures in the proposed Koala Management Strategy;
- Potential adverse impacts on the SEPP14 wetland and Myall River;
- Issues relating to the proposal to restore 7(b) zoned land and the proposed planting list;
- Issues relating to flooding;
- Issues relating to built form and controls in the existing DCP for Myall Quays; and
- Impact on visual amenity of the area.

Mr David Bruce believes the proposed development is inappropriate as it is in wetlands/swamp and the proposed development blocks are too small. The claim that 55.7% of land will be used as open space is misleading as more than 25% of these lands are inaccessible being wetlands, buffer zones, detention lakes and drainage corridors. Mr Bruce provided about 40 photographs to illustrate the low lying nature of the site and the flooding and drainage problems of the site following heavy rains. His other concerns include source of fill materials, the existing conditions of the Highway and Toonang Drive, potential climate change resulting in rising tidal levels and increase in cyclones and storm surges frequency and severity. He also questioned the likelihood of the current proposal and promises being materialised given the deletion of the golf course previously proposed on the site. Mr Bruce also questioned the nature and permanency of the claimed job creation and asked where are the infrastructures that would be needed to cater for the projected population increase.

Mrs Lee and Mr Rob Anderson believe the proposed development should be considered in the context of the whole North Shearwater/Dourness and Myall River Downs areas. Similarly, its impacts should be considered cumulatively with impacts from other developments in the area. Their concerns include potential impact on existing wildlife; the incompatibility of a wildlife corridor adjacent to a road; the restrictive size of the proposed wildlife corridor; impact from the proposed development density on wildlife and vegetation; native vegetation will unlikely survive in residential areas; the source of fills as the site will require extensive filling to ensure it is not flood prone; the suitability of Toonang Drive as an access point to the new estate; and further information is required for the area designated for rental and affordable housing.

If the development is to proceed, they recommend a smaller residential development (ie a reduction in number of lots); access via Myall Way only; wider wildlife corridor; no road adjacent to the wildlife corridor and a buffer between the two; strict control on domestic animals; ongoing monitoring of wildlife and retaining more native vegetation on site.

Mr Ross & Mrs Denise Jacks are very concerned about the proposal to use Toonang Drive as a main access point to the proposed Riverside Development. Of particular concern are the issues of safety and road conditions. Myall Way should be the main access to the site. Other concerns are the proposed lot sizes and the area designated for rental and affordable housing. A great proportion of the lots are in the range between 450m^2 to 650m^2. In their view, such density will have a detrimental effect on the environment in terms of increase rainfall runoff and adverse impact on flora and fauna. They questioned whether the area defined for rental and affordable housing will be for low-income

and unemployed residents and where are the social infrastructures to support these residents. They recommend the present demographic balance be maintained.

Mrs Ronnie Nichols objects to the proposed development. Her main concern is the fragility of the environment and its ability to withstand the amount of development proposed. Mrs Nichols highlighted the threats to coastal floodplains including increasing clearing for urban development, fragmentation, flood mitigation and drainage works, land filling, changes in water quality, activation of acid sulphate soils, and weed invasion. She noted that infrastructures proposed for the development ignore real needs such as police, schools, general medical services, dentists, church facility and youth services. She questioned whether:

- a larger area should be left intact to avoid fragmentation and loss of biodiversity?
- the area is a remnant wetland?
- the area is capable of absorbing the population projection estimated by the Council and the Department of Planning?
- the Tea Gardens/Hawks Nest area is too fragile to withstand the cumulative effect of not one (Riverside) but four developments currently in the pipeline?
- the close proximity of the marine park, Myall River, NL National Park, Mungo Brush and agricultural potential of rural lands has been taken into account when considering the area is available for housing developments, or has it been judged primarily on the grounds of "developer availability".

Professor and Mrs DJ Drinkwater object to the proposal to use Toonang Drive as a major access road to Riverside. Their concerns include traffic hazards, potential flooding problem, sever danger to the wildlife corridor and unnecessary disturbance to the lifestyle of current residents of Shearwater Estate.

Mr Alan B Mitchell believes the proposed development is environmentally undesirable. The development of Tea Gardens wetlands will have major consequences for wildlife populations in the adjacent National Park particularly impact from domestic animals and escape of exotic garden plants. Development in the north eastern part of the site is another concern as the vegetations there are important koala habitat and feed trees. The proposal will also have significant visual impact. If the proposal is allowed, restrictions on the use of exotic trees and shrubs and the exclusion of domestic animals should be considered and development in the north eastern area should be restricted.

Mr Larry Tofler submitted that the locals and most of the visitors do not want a big town. He understands one cannot stop progress, but believes it can be defined. Progress does not mean expansion. This is an opportunity to be innovative and visionary. The town should be protected and a population limit set. The Riverside proposal should be rejected.

Ms Helen Jones supports the proposal in principle. But she believes:

- The intensity of the proposal should be reduced as there are several other proposals in the region that would meet the community's future needs. Also reducing development footprint will retain more existing bushland to protect local wildlife and the existing corridors.
- A comprehensive hydrostatic engineering study is required to protect water runoff into the Myall River from the site and North Shearwater which is earmarked for future development.
- Information should be available as to whether there are any commitments to provide local infrastructure such as schools, youth facilities to cater for the increase population.
- Excluding the concurrent exhibition of the Myall Downs development limits the ability to determine the assessment of cumulative impact from both developments.

BUSINESSES

Tattersall Surveyors Pty Ltd supports the proposed development. The design is both innovative and appropriate to the site. The company has been working in Tea Gardens on the Riverside/Myall Quays site for 18 years. Mr Lander provided a brief description of the water management regime that has been implemented in Myall Quays. The existing approach includes water quality testing in the lake and basins, piezeometers at the Hermitage and sediment testing. Anecdotal evidence indicates a thriving SEPP14 wetlands and Wallum Froglet colony. Water quality testing showed water quality is better than in the river. There is also an increase in fish diversity and population in the main lake. The results indicate the current approach is achieving superior water quality results.

Australian Pines & Products Pty Ltd advised that the company purchased the #1 plantation in the area and management control of #2 to #5 in 1976. #2 is the area extending from Shearwater Estate to the outskirts of Tea Gardens township. In Dec 1979, the wildfire resulted in the loss of 81.4% of the entire afforested areas including a major portion of the Riverside and Myall River Downs sites. Since then, natural re-growth has occurred amongst some remnants of the Pinus plantings, particularly the area around the "pony club".

PUBLIC AUTHORITIES

Hunter Central Rivers Catchment Management Authority's comments focused on:

- The impacts on native vegetation - the proposed offset is considered inadequate and a suitable offset be established to compensate for the loss of native vegetation.
- The width and connectivity of the proposed wildlife corridor - corridor width be a minimum of 100m as well as connection to the north-south corridor. The area in the north eastern part of the site should be considered for conservation to enhance the proposed offset and connectivity to the north-south corridor.
- Availability of hollow bearing trees - the limited number of hollow bearing trees on the site should be protected in the vegetation management plan.
- Consultation - the CMA had not been consulted during the assessment preparation.

Midcoast Water is concerned that the proposed development exceeds the capacity allocated for the site within Midcoast Water's current servicing strategies. Further that the future development yields for the combined Tea Gardens & Hawks Nest areas also exceed the identified ultimate capacities for water and sewerage infrastructure. Given such concern, Midcoast Water has requested the Proponent to prepare an Integrated Water Cycle Management Plan since July 2006. Until a solution is agreed upon for the 'surplus effluent' problem, there is insufficient planned capacity in Midcoast Water's sewerage infrastructure to service the Riverside development. If approval is to be issued, Midcoast Water requested its standard conditions of approval be placed upon each and every stage of the development. However, it advises that it would not be in a position to issue the appropriate approvals and certificates of compliance for all of the proposed development in the absence of a scheme which satisfactorily resolves the constraints to disposal of treated effluent at North Hawks Nest.

At its meeting with the Commission, Midcoast Water raised its objection to the proposed concept plan and project application as they do not meet the environmental assessment requirements and the issues raised by Midcoast Water during the consultation period has not been addressed. The key issues are effluent volumes generated, effluent management capacity and water recycling.

- Inadequate consideration of reducing effluent generation or recycle effluent;
- The proposal does not meet the Sustainability criteria of the Mid North Coast Regional Strategy;
- Availability of effluent management capacity is yet to be ascertain;
- The capacity and staging of the sewerage treatment facility at Hawks Nest to accommodate the proposal have not been adequately considered.
- The Integrated Water Cycle Management Plan is incomplete.

Great Lakes Council's Assessment Manager prepared a report to the Council detailing comments and recommended conditions of consent if the proposal is to be approved from staff ecologist, engineer and natural systems. On 21 April 2009 Council resolved to defer consideration of the proposal pending a meeting between the Proponent and council staff to resolve issues and a presentation to Council.

The following is a brief summary of recommendations contained in the staff report to Council.

- An instrument to effect adequate protection and conservation of high ecological value area;
- Amend the proposal to provide a wider, functional and effective wildlife corridor;
- Increase usage of native flora in the landscape schedule;
- Protecting wetland habitats from drainage-related works;
- Prepare and implement a satisfactory and appropriate Habitat Management Plan for the conservation area and a revised and expanded "Ecological Site management Strategy";

- RTA's concern relating to inadequate traffic impact assessment, particularly trip generation, current and future background intersection volumes, intersection analysis, State Road infrastructure, and the relationship between the proposal and the proposed Myall River Downs development in terms of intersection capacities, treatments and traffic strategies;
- Having regard to Council's draft policy allowing for a sea level rise of 0.91m to year 2100, the minimum fill level should be RL3.01mAHD.
- MUSIC modelling needs to be verify through peer review;
- Adopt a no net increase water quality objective;
- Not support additional connection to Myall River for tidal flushing;
- EAR is not conclusive in its assessment of water quality impacts;
- Water quality protection is required for the extended detention lake.
- Lining of all lakes, ponds and constructed wetlands that are open to groundwater.

On 26 May 2009, Council considered the staff report and resolved to hear submissions from the Proponent. Following presentation by the Proponent, Council resolved to delegate authority to the Mayor and General Manager to advise the Commission with strong emphasis on council's policy of allowing development only if water quality can be maintained or improved.

Cr Jan McWilliams, Mayor of Great Lakes Council wrote to the Commission on 1 July 2009 advising the Commission the outcome of Council's negotiation with the proponent. Some ecological and water quality issues are yet to be resolved.

Department of Environment and Climate Change is concerned that the issues of concern raised by the Department previously have not been adequately addressed by the Proponent. Key issues include:

- regional wildlife corridors;
- provision of adequate biodiversity offsets;
- inadequate survey data and threatened species assessment;
- limited Aboriginal cultural heritage survey coverage and Aboriginal community consultation;
- capacity of existing sewer services to treat and dispose effluent generated without causing unacceptable environmental impacts;
- impacts on water quality;
- the ASS assessment and management plan has not been prepared in accordance with the NSW ASS Manual; and
- inadequate assessment of floodplain management;

Department of Water and Energy does not object to the proposed residential development but cannot support the proposal until the Department's concern has been satisfactorily addressed. The Department key concern is the proposed extension of the existing lake will intercept the groundwater table and there should be no permanent connection to the aquifer. The Department is of the view that any water bodies/detention ponds should be lined with an impervious material in order to avoid any hydraulic connection between the detention ponds and the underlying freshwater aquifer. The proposal is said to be inconsistent with the NSW Groundwater Policy Framework (1997), the NSW Groundwater Quality Protection Policy (1998) and the NSW Groundwater Dependent Ecosystems Policy (2002). It is also noted that the expert consultant engaged by the DoP to review the integrated water management options found that the proposed freshwater lakes do not achieve the best management targets for water quality before discharging into the brackish lake.

ISSUES RAISED IN SUBMISSIONS TO THE DEPARTMENT OF PLANNING

Hunter New England Area Health Service

- The proposal will have significant impact on demand for, availability and access to public health services including aged card beds, health related transport and private healthcare providers. Any expansion in services is dependent on additional funding, new infrastructure and workforce availability.
- Lack of public transport to service the development.
- Provision of a reticulated water and sewerage supply.
- The need to conduct a mosquito risk assessment by a qualified entomologist.

- A risk assessment of re-use of reclaimed water for irrigation of open spaces should be prepared and reviewed by the Hunter New England Population Health.
- Safe pedestrian and cycling crossings be provided across Myall Road including traffic lights and traffic calming measures.
- Encourage the provision of affordable housing that maximises access to public transport and community services.
- Community parks and facilities, walkways and cycleways should be freely accessible to residents as well as the public.
- Retail outlets to provide affordable healthy food options.
- Ongoing community consultation should continue and include Aboriginal and Torres Strait Islander people within the area.

NSW Rural Fire Service

- The proposed widths of all 'laneway' and 'access way' roads are inconsistent with the NSW Rural Fire Service guidelines.
- The proposed asset protection zone in the proposed Tourist Lodgings Precinct should be sufficient to minimise the impact of radiant heat and direct flame contact.

Roads and Traffic Authority objects to the proposal as the EAR is deficient in assessing the potential traffic impacts, particularly in the trip generation rate, trip distribution, current and future background intersection volumes and intersection analysis. Another concern is the cumulative impact from various developments in the area. The RTA will not fund any road infrastructure upgrades as a direct result of cumulative development in the area. Hence it will require the developer to enter into a Voluntary Planning Agreement or Deed Containing Agreement for contribution towards State road infrastructure prior to any development/subdivision proceeding on the site.

Busways Group Pty Ltd supports the proposal as it will potentially add the 'critical mass' necessary to trigger local and sub-regional route bus services. However, the proposed road network and bus route plan is unsuitable and inadequate for effective bus services. An alternative plan is proposed with the spine roads of a minimum of 11m and bisect the residential pockets equally. All roundabouts should be suitably dimensioned and be incorporated into the road network at strategic locations.

Residents, Community Groups and Businesses

Positives of the proposal

- The proposal will bring economic benefits to the town.
- The Proponent has a strong track record of development excellence as evidenced by developments at Myall Quays, Myall River Downs, the Grange and the Hermitage.
- The proposal is well thought out, provides 55% of development area for open space, sensitive to the environment, provides a range of housing alternatives, introduce cycleways, and create new jobs.
- The proposal represents a responsible and aesthetically appealing housing project and offers multifaceted benefit to the region in terms of business opportunities and affordable housing alternatives.
- Notwithstanding there may be issues that will require resolution such as traffic management, the proposal is well planned and will be an asset not just to Tea Gardens but the whole of the Great Lakes area.

Issues of concern and objection

- The site is located on Inner Barrier Pleistocene sand field, which is known to have high potential for archaeology. This has not been addressed in the EAR. Well targeted sub surface testing should be carried out.
- The proposal is on wetlands and it is flood prone especially after heavy rain.
- The site is abundant with wildlife. The proposed wildlife corridor is inadequate and does not complement the length of the area.
- The proposal will destroy the unique character of the area.
- The proposal is an overdevelopment.

- Insufficient community infrastructures to support existing community, questions how the additional population be provided for.
- How the new community will blend in with the existing community when the existing two retirement villages owned by the Proponent do not allow each other to use its facilities, let alone the public.
- Question the benefit of job creation as the Proponent never used local builders, plumbers and electricians before.
- Question the need for additional houses when there are many empty houses in the area already.
- The existing medical centre was built by the Proponent. Since it's sold off, it has not lived up to expectations due to inadequate provision of medical services.
- Inadequate bus services.
- The road system, parking facilities and boat moorings are at a premium already.
- The proposed lake system will deliver warmer and nutrient rich water to the Myall River. This will adversely affect fish, oysters and tourism. Blue green algae and high salinity are already problems in the Myall River system.
- Native vegetation has re-colonised the area after the previous pine plantation development. The existing vegetation slow infiltration and runoff. Clearing of the site for urban development will increase runoff into the Myall River.
- Filling the land for development will force stormwater across the main road into other lower sections of Tea Gardens.
- The proposed use of mosquito fish in mosquito control is inconsistent with the CSIRO policy. There are natural fish species to eat the mosquitoes.
- Proposed excavation will damage the coffee rock layer draining the soils and changing the habitat from "wet heath" to "dry open forest".
- Concern about the proposed main access from Toonang Drive and potential significant traffic increase.
- Wildlife corridor and road are incompatible uses and should not be located next to each other.
- The proposed density is too high to be described as 'low density' development. This will detrimentally change the current environment and places great pressure on flora and fauna as well as increase runoff.
- Although the proposal to remove fencing is welcome, it will increase the risk of wildlife injury by traffic.
- The proposed development will further increase the numbers of larger species of birds such as magpies, noisy miners, Indian mynahs at the expense of the smaller vulnerable species.
- Although the design allowance is said to be sufficient to protect the lots, notwithstanding the roadways could be inundated by flood water, there is a need to review the design level given the recent information about the rate of climate change is faster than previously anticipated.
- The proposed water management system should be reviewed by an independent organisation appointed by the Department of Planning.
- Recent heavy rain experiences in the existing development raises question about the adequacy of the capacity of the proposed drainage system to handle present and future run-offs.
- Where are the fills to come from?
- The capability of Toonang Drive in respect of road conditions and safety to serve as a main access point to the proposed development is questioned.
- Needs definition on area designated for rental & affordable housing.
- Needs a better balance of development to nature and effective protection of the local wildlife from losing their natural habitat.
- The proposed drainage reserves and parks are scattered throughout the developed area thus limiting their effectiveness as providing natural habitat to wildlife.

- A comprehensive hydrostatic engineering study is required.
- No information is provided on future infrastructure needs over and above the Proponent's contribution.