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Moorland to Herons Creek Additional Assessment

September 2006

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Natural & Cultural Heritage Consultants 15-17 Henrietta St Chippendale NSW 2008

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Report for

Acacia Environmental Planning Pty Ltd

September 2006

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ACKNOWLEDGMENTS

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- Robert Suansri (Biosis Research Pty Ltd)
- James Whitford (RTA)

ABBREVIATIONS

DEC	NSW Department of Environment and Conservation
DEH	Commonwealth Department of the Environment and Heritage
DIPNR	Department of Infrastructure, Planning and Natural Resources
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act* 1979
EPBC Act	*Environment Protection and Biodiversity Conservation Act* 1999
KTP	Key Threatening Process
LGA	Local Government Area
RTA	NSW Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
Study area	10km radius of the subject site
Subject site	development/site footprint
TSC Act	*Threatened Species Conservation Act* 1995
sp.	species (singular)
spp.	species (plural)
ssp.	subspecies
var.	variety

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1.0 SUMMARY

Biosis Research Pty. Ltd. was commissioned by Acacia Environmental Planning Pty Ltd to undertake an assessment of for the Giant Barred Frog *Mixophyes iteratus,* Wallum Froglet *Crinia tinnula* and Freshwater Wetlands was undertaken for the proposed Pacific Highway Upgrade from Moorland to Herons Creek (the Upgrade). This report should be considered as an addendum to the ecology working paper (Harrington *et al*. 2005) and will form part of an addendum to the RTA's Submissions Report.

The Upgrade described in the EIS (Arup 2005) would result in the clearing of the Freshwater Wetlands on Coastal Floodplains EEC on both sides of the Pacific Highway. Based on the Assessment of Significance it is unlikely that the proposed road Upgrade would have a significant impact on this EEC.

Based on the Assessment of Significance it is unlikely that the proposed Upgrade would have a significant impact on the Giant Barred Frog and/or Wallum Froglet. The Upgrade would remove or modify potential habitat for the Wallum Froglet and would remove or modify habitat that could be used by the Giant Barred Frog within the Lakes section of the study area. With suitable mitigation measures implemented during the construction and operational phases, such as those discussed in the EIS and this report, it is unlikely that the proposed road Upgrade would have a significant impact on these species. Furthermore, habitat for the Giant Barred Frog is considered to be poorly suited to this species. Prime habitat for this species within the study area is more likely to occur further upstream within Middle Brother State Forest, and it is unlikely that the road Upgrade would have a significant impact on upstream habitat.

A Referral to the minister if not recommended for the Giant Barred Frog. The tests of significance under Section 5A of the EP&A Act are not required for a Part 3A project. However, if the Upgrade were being considered under Part 5, it is our view that a Species Impact Statement would not have been recommended for the impact of the Upgrade on the Wallum Froglet, the Giant Barred Frog, or for the loss of Freshwater Wetland vegetation north of the Camden Haven River.

2.0 INTRODUCTION

2.1 Background

Biosis Research Pty. Ltd. was commissioned by Acacia Environmental Planning Pty Ltd to undertake an assessment of for the Giant Barred Frog *Mixophyes iteratus,* Wallum Froglet *Crinia tinnula* and Freshwater Wetlands was undertaken for the proposed Pacific Highway Upgrade from Moorland to Herons Creek (the Upgrade). This report should be considered as an addendum to the ecology working paper (Harrington *et al*. 2005) and will form part of an addendum to the RTA's Submissions Report.

The assessment involved an inspection of the potential habitat within the road corridor and the preparation of Assessments of Significance (Seven Part Tests; TSC Act) and significant impact criteria (EPBC Act) for Endangered Ecological Communities (EEC) and the two threatened frog species with potential habitat within the study area.

2.2 Background

During recent (August 2006) geotechnical investigations for the Moorland to Herons Creek Upgrade, Wallum Froglet *Crinia tinnula* was detected from the isolated *Lepironia* sedgeland on the west side of the existing Pacific Highway, north of the Camden Haven River. This sedgeland is mostly on private land and has become a sedgeland following the construction of bunds on adjoining land. It was recommended that the geotechnical drill crew not enter the edges of the sedgeland until more consideration could be given to managing the impacts to the Wallum Froglet. It was also suggested that Stony Creek represented potential habitat for the Giant Barred Frog *Mixophyes iteratus* and recommended that drill crews use an alternative access to the bridge abutments for geotechnical investigations.

Separately to this, The Ecology Lab Pty. Ltd. had previously identified wetland areas on both sides of the Pacific Highway, north of the Camden Haven River as a Coastal Saltmarsh (Section 4.3.2 of Working Paper 6 of the Arup EIS), which is listed as an EEC on Schedule 3 of the TSC Act. The wetland to the east of the Pacific Highway was previously identified as Freshwater Wetland on Coastal Floodplains of the NSW North Coast (also an EEC) by Harrington *et al*. (2005). This wetland, and the triangular sedgeland to the west of the Pacific Highway, were confirmed as Freshwater Wetlands by Biosis Research during a recent survey conducted in early September, 2006.

2.3 Reason for this Report

The concept design for the Moorland to Herons Creek Upgrade described in the EIS (Arup 2005) has not changed since it was exhibited. The recent confirmation of the presence of the Wallum Froglet north of the Camden Haven River, and the possible presence of habitat for the Giant Barred Frog at Stony Creek, provides data that was not previously considered in the ecology working paper (Harrington *et al*. 2005).

The RTA has requested Biosis Research to assess the potential impacts from constructing and operating the Moorland to Herons Creek Upgrade described in the EIS on the Wallum Froglet and Giant Barred Frog, and to consider if the area of Freshwater Wetland (Sedgeland) north of the Camden Haven River, on the west side of the Pacific Highway, is consistent with the Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community.

2.4 Description of Study Area and the Proposed Upgrade

The study area is located in the vicinity of the existing Pacific Highway between Moorland and Herons Creek, south of Port Macquarie NSW and within the Greater Taree and Port Macquarie-Hastings Local Government Areas (LGAs) (Figure 1). The area is situated within the NSW North Coast Bioregion as described by Thackway and Cresswell (1995). The study area contains several habitat types and vegetation communities, including open forest, creek and drainage lines, swamps and SEPP 14 wetlands. The study area lies near to Johns River State Forest and Dooragan and Crowdy Bay National Parks and is adjacent to Middle Brother National Park (Yoorigan National Park) and Middle Brother State Forest.

The study area consists of the area of earthworks for the proposed Highway Upgrade, the proposed road reserve and a zone of likely impact of approximately 50 m on either side of the road. A distance of 50 m was chosen because this is the average distance that edge effects are likely to be seen and recorded from the edge of the road (Bali 2005). The local area has been defined as a 10 km radius from the study area.

2.5 Aims

The general aims of this report are:

1. Determine if the vegetation community north of the Camden Haven River, on the west side of the Pacific Highway, is consistent with the

EEC -Freshwater Wetlands on Coastal Floodplains of the NSW North Coast and assess potential impacts of the proposed road Upgrade on this EEC;

2. Assess the assess the potential impacts from proposed road Upgrade described in the EIS on the Wallum Froglet and Giant Barred Frog and or their habitats; and,

3. Recommend suitable mitigation measures to minimise the impacts of the proposed road Upgrade on the Freshwater Wetlands on Coastal Floodplains, Wallum Froglet and Giant Barred Frog.

3.0 METHODS

This study was a habitat-based assessment as opposed to a detailed ecological survey (as detailed below). In this respect, no trapping, spotlighting, or vegetation quadrat sampling was carried out.

The habitat assessments for the Giant Barred Frog and Wallum Froglet were undertaken on the 29th and 30th of August 2006, and the Freshwater Wetland vegetation on both sides of the Pacific Highway, north of the Camden Haven River, was inspected on the 5th of September, 2006. The general condition of each site was assessed and observations of flora, fauna, vegetation communities and land use patterns were made. The weather conditions varied during the two site inspections and are detailed below:

- 29th and 30th August 2006- warm, raining with moderate wind;
- 5th September 2006 warm and clear.

Personnel involved

Table 1: Personnel involved in the preparation of this report

Name	Qualifications	Position	Role
Dr Rhidian Harrington	PhD, MSc, BSc (Hons)	Sydney Resource Group Manager	Project Manager/Reporting
Mathew Richardson	BSc (Hons)	Senior Botanist	Botanical Advice
Glenn Muir	BSc	Ecologist	Zoological Advice
Terri-Ann English	BAppSc	Zoologist	Frog Surveys/Reporting
Brendan Smith	BSc. Env. Bio., Assoc. Dip Hort.	Botanist	Freshwater Wetlands Survey/Reporting
Katie Cartner	BSc	Zoologist	Frog Surveys/Reporting
Robert Suansri	BSc, BEc	GIS Officer	GIS/Mapping

Full Curriculum Vitae's of Biosis Research staff members are available on request.

3.1 Taxonomy

The plant taxonomy (method of classification) used in this report follows Harden (1990, 1992, 1993, 2002) and subsequent advice from the National Herbarium of NSW. In the body of this report plants are referred to by their scientific names only. Common names where available have been included in the Appendices.

Names of vertebrates follow the Census of Australian Vertebrates (CAVs) maintained by Department of Environment and Heritage (DEH). In the body of this report Vertebrates are referred to by both their common and scientific names when first mentioned. Subsequent references to these species cite the common name only. Common and scientific names are included in the Appendices.

3.2 Legislation

The Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 applies to the study area with regard to terrestrial flora and fauna. The Moorland to Herons Creek Upgrade benefits from transitional arrangements under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

3.3 Literature and Database Review

This report was based on a review of existing literature including the EIS, mapping, aerial photography, relevant database searches, site inspection and information provided by Acacia Environmental Planning and the RTA (Harrington *et al.* 2004). A list of documents used to prepare this report is located in References.

Records of threatened species, populations and communities listed on the TSC Act were obtained from the Department of Environment and Conservation (DEC) Atlas of NSW Wildlife (DEC 2005) within a 10 km radius of the study area. Records for threatened species, populations and communities listed on the EPBC Act were obtained from the EPBC Protected Matters Search Tool (DEH 2005a) within a 10 km radius of the study area. Database searches were conducted in September 2006.

3.4 Consultation

The following specialists were consulted about the threatened frog species known from or potentially occurring in the study area:

- Ben Lewis- Lewis Ecological Services;
- Frank Lemckert-NSW Department of Primary Industries (Forest);
- Arthur White- Biosphere Environmental Consultants Pty Ltd.

3.5 Flora Survey

Species of plant growing in the study area were surveyed by undertaking a general habitat assessment as well as targeted searches for habitat of threatened species.

3.5.1 Flora Habitat Assessment

The condition of the vegetation was assessed according to the degree to which it resembled relatively natural, undisturbed vegetation using the following criteria:

- species composition (species richness, degree of weed invasion); and,
- vegetation structure (representation of each of the original layers of vegetation).

The three categories used to evaluate general habitat value were Good, Moderate or Poor, as detailed below:

Good: containing a high number of indigenous species; no weeds present or weed invasion restricted to edges and track margins; vegetation community contains original layers of vegetation; vegetation layers (ground, shrub, canopy etc) are intact.

Moderate: containing a moderate number of indigenous species; moderate level of weed invasion; weeds occurring in isolated patches or scattered throughout; one or more of original layers of vegetation are modified; vegetation layers (ground, shrub, canopy etc) are largely intact.

Poor: containing a low number of indigenous species; high level of weed invasion; weeds occurring in dense patches or scattered throughout; one or more of the original layers of vegetation are highly modified; one or more original vegetation layers (ground, shrub, canopy etc) are modified or missing.

3.6 Fauna Survey

3.6.1 Fauna Habitat Assessment

The three categories used to evaluate habitat value were Good, Moderate or Poor, as detailed below:

Good: ground flora containing a high number of indigenous species; vegetation community structure, ground, log and litter layer intact and undisturbed; a high level of breeding, nesting, feeding and roosting resources available; a high richness and diversity of native animal species.

Moderate: ground flora containing a moderate number of indigenous species; vegetation community structure, ground log and litter layer moderately intact and undisturbed; a moderate level of breeding, nesting, feeding and roosting resources available; a moderate richness and diversity of native animal species.

Poor: ground flora containing a low number of indigenous species, vegetation community structure, ground log and litter layer disturbed and modified; a low level of breeding, nesting, feeding and roosting resources available; a low richness and diversity of native animal species.

Other habitat features such the value of the study area as a habitat corridor, the presence of remnant communities or unusual ecological vegetation community structure were also used to assess habitat quality.

3.6.2 Frog Surveys

Frogs were surveyed in areas previously identified as potential habitat. Active searching, listening for frog advertisement calls and call playback methods were used.

Active searching for the Wallum Froglet included searching potential habitat areas and listening for the advertisement call. The Giant Barred Frog surveys included active searching of potential habitat and surrounding areas and call playback. Call playback is a technique that relies on behavioural responses associated with territory and threat, whereby emitted calls may induce a defending response (either call or display) from individuals of the same species. A MP3 player attached to a loudspeaker was used to play the Giant Barred Frog call for five minutes to prompt a response call; this was followed by a five minute period of quiet listening, followed by active searching.

3.7 Limitations

As the Moorland to Herons Creek Upgrade benefits from transitional arrangements under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), Assessment of Significance under Section 5A of the EP&A Act are not required. This habitat assessment is based on the presence/absence of potential habitat within the study area and was conducted as if Section 5A of the EP&A Act applied to assist in understanding likely impacts. Such techniques are conservative by nature and therefore do not require the confirmation of a species presence or absence for consideration in the assessment. As such trapping, spotlighting, or vegetation quadrat sampling techniques are considered unnecessary and were not employed in this assessment.

The close proximity of the Pacific Highway to areas of potential frog habitat may have resulted in some frogs calls being undetected (traffic noise). The survey is

conducted in winter and unlikely to be peak activity time for the Giant Barred Frog as males call in spring and summer from the banks of streams.

4.0 RESULTS

4.1 Vegetation Community

The presence of the previously identified Freshwater Wetlands to the east of the Pacific Highway (Harrington *et al*. 2005) was again assessed during the current survey, with extant vegetation on both sides of the Pacific Highway just north of the Camden Haven River being surveyed. The dominant plant community was identified as Freshwater Wetlands (Sedgeland) and is consistent with the EEC Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions. This community is dominated by a monoculture of *Lepironia articulata,* a species that is typical of freshwater wetlands that are subject to regular inundation and drying (NSW Scientific Committee, 2004). Although this community is dominated by *L. articulata* other wetland species were also recorded, including *Gahnia sp.*, *Leptospermum juniperinum* and *Callistemon rigidus.*

In the study area Freshwater Wetlands on Coastal Plains occupies approximately 130 ha including SEPP 14 Coastal Wetland on the eastern side of the Pacific Highway and the smaller area immediately to the west of the highway, north of the Camden Haven River. Previous surveys of the study site were carried out by Biosis Research (Harrington *et al*. 2005). During the current survey, both portions of this community (east and west of the Pacific Highway) were assessed as being in good condition, with weeds and disturbances largely confined to areas within 5 m of disturbed edges. Further description of this EEC is provided below along with an Assessment of Significance (TSC Act) regarding the impacts of the proposed Upgrade (Appendix 1).

4.2 Fauna

Three frog species (Striped Marsh Frog *Limnodynastes peronii*, Eastern Common Froglet *Crinia Signifera* and the Wallum Froglet) were recorded within the road corridor during the current assessment. Limited potential habitat for one other threatened frog species (Giant Barred Frog) was also recorded within the road corridor.

The Wallum Froglet is listed as Vulnerable on Schedule 2 of the TSC Act and was heard calling within SEPP 14 Coastal Wetland east of the Pacific Highway, from the *Lepironia* sedgeland on the west side of the Pacific Highway, north of the Camden Haven River, and immediately south of the Camden Haven River on the west side of the Pacific Highway (Figure 4). These three areas are considered

to be two different populations as they are separated by the Camden Haven River.

Wallum Froglet is known to occur in wallum country, sedgelands and swamps in low-lying areas dominated by Melaleucas and/ or Casuarinas. In these areas the water is shallow with a pH range of 4.3 to 7.2. Theses habitat features are often associated with very gradual grades to steep banks such as channels or natural and man-made rises (eg. Swamps adjacent to dunes or levies).

Potential habitat within the study area is considered to be in moderate condition, although previously disturbed by rural residential development and associated infrastructure including roads and powerlines. The habitat is a mixture of open sedgelands and swamp forest with Casuarina and/or Melaleucas dominating the canopy (Plate 1 to 3). Both of these habitats are currently inundated with water, providing potential breeding habitat for the Wallum Froglet. An Assessment of Significance has been prepared in Appendix 1 for the Wallum Froglet.

The study area also contains habitat that could be used by the Giant Barred Frog. The Giant Barred Frog is listed as Endangered on Schedule 1 of the TSC Act and as Endangered on the EPBC Act. This species is associated with permanent flowing drainages, from shallow rocky rainforest streams to slow-moving rivers in lowland open forest (Ehmann 1997). Habitat that could be used by this species occurs within the vicinity of Stony Creek and is considered to be poorly-suited to the Frog's requirements (Plates 4 to 6). The habitat has been previously disturbed by grazing, rural residential development and associated infrastructure including power lines, roads and railway. The riparian corridor is approximately 1 m wide and contains a mixture of native and exotic species. The groundcover is predominately dominated by *Lomandra longifolia* with a moderate cover of leaf litter. The surrounding vegetation has been cleared for grazing and largely consists of pasture. Although the habitat is considered to be in poor condition, the Giant Barred Frog has been previously recorded from similar degraded habitats. The proposed Upgrade could modify or remove habitat that could be used by the, and as such, TSC Assessment of Significance (Appendix1) and EPBC Significant Impact Criteria (Appendix 2) have been prepared for this species

5.0 IMPACT ASSESSMENT

Moorland to Herons Creek Upgrade benefits from transitional arrangements under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), Assessment of Significance under Section 5A of the EP&A Act are not required. This habitat assessment is based on the presence/absence of potential habitat within the study area and was conducted as if Section 5A of the EP&A Act applied to assist in understanding likely impacts.

The Assessment of Significance is a statutory mechanism under Section 5A of the EP&A Act, as amended by the *Threatened species Conservation Amendment Act* 2002, for assessing whether a proposed development activity may have a significant impact on threatened species, populations or ecological communities or their habitats. The results of this test are used to determine if a Species Impact Statement is required for each species potentially occurring within the study area.

When a threatened species known to occur within the vicinity of a study area is not recorded during a survey, the presence of potential habitat for this species is used to determine the need to undertake an Assessment of Significance. Where there is no potential habitat in the study area for threatened species, there is unlikely to be any impact on these species and therefore Assessments of Significance are not required.

5.1 Assessment of Significance

5.1.1 Flora

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions was identified in areas on both the east and west sides of the Pacific Highway north of the Camden Haven River. Freshwater Wetlands on Coastal Floodplains is listed as an Endangered Ecological Community on Schedule 1 (Part 3) of the TSC Act and as such an Assessment of Significance was prepared for this community in Appendix 2.

The proposal would involve clearing of approximately 0.8 ha of Freshwater Wetlands on Coastal Floodplains. Given the relatively small area of Freshwater Wetlands on Coastal Floodplains to be cleared, the fact that the proposed Upgrade is confined to pre-existing edges and the extent of the community outside the area of impact it is not considered that the development would result in a significant impact to this community. Mitigation measures have been recommended in this report in order to minimise the impact of the proposed upgrade on this endangered ecological community.

Fauna

Potential habitat for the two threatened frog species (Giant barred Frog and Wallum Froglet occurs within the road corridor as such an Assessment of Significance was prepared for these frog species in Appendix 2.

Based on the Assessment of Significance it is unlikely that the proposed Upgrade would have a significant impact on the Giant Barred Frog and/or Wallum Froglet. The Upgrade would also remove or modify potential habitat for the Wallum Froglet and would remove or modify habitat that could be used by the Giant Barred Frog within the Lakes section of the study area. However with suitable mitigation measures implemented during the construction and operations phases, such as those discussed in the EIS and this report, it is unlikely that the proposed road Upgrade would have a significant impact on this species. Furthermore habitat for the Giant Barred Frog is considered to be poorly suited to this species'. Prime habitat for this species within the study area is more likely to occur further upstream within Middle Brother State Forest, and it is unlikely that the road Upgrade would have a significant impact on upstream habitat.

5.2 Environment Protection and Biodiversity Conservation Act (1999)

5.2.1 Significance Guidelines

The EPBC Act Principal Significant Impact Guidelines (DEH 2005b) list Significant Impact Criteria for matters of national environmental significance that should be taken into consideration to determine whether a proposed development is likely to have a significance impact on threatened species, populations or ecological communities that are known to occur or potentially occur in the study area.

Under the EPBC Act, if the proposed development has the potential to have an adverse impact on a threatened species, population or ecological community listed on the Act, the proposal must be referred to the Federal Minister for the Environment for further consideration.

No threatened or migratory species were recorded during the current survey however, potential habitat for one frog threatened species (Giant barred Frog) occurs within the riparian habitat. It is unlikely that the proposed development would:

- lead to a long-term decrease in the size of any populations;
- reduce the area of occupancy of any species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of any species;
- disrupt the breeding cycle of any populations;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that any species is likely to decline;
- result in invasive species that are harmful to a critically endangered, endangered or vulnerable species becoming established in the endangered, critically endangered or vulnerable species' habitat; or,
- interfere with the recovery of any species.

Therefore Significant Impact Criteria have not been assessed for this species and a Referral is not recommended.

6.0 PROPOSED MITIGATION MEASURES

Where possible, important ecological features have been avoided during the initial route selection stage, for example, the mapped SEPP 14 wetlands located north of the Camden Haven River and east of the Pacific Highway would not be directly impacted by the Upgrade. In addition, the preferred route has been designed, where possible, to minimise impacts on habitat. The EIS (Arup 2005) recommends extensive measures to mitigate impacts on flora and fauna. To minimise impacts on the Wallum Froglet, the following additional mitigation measures would be employed during the construction and operation phase of the Upgrade.

Minimising impacts on the Freshwater Wetland EEC

- If possible, relocate the two proposed water quality control ponds so that they do not affect the existing areas of Freshwater Wetlands on Coastal Plains on both sides of the Pacific Highway. The relocation would be discussed during detailed design with the Department of Conservation (DEC).
- During construction, avoid stockpiling materials on the Freshwater Wetlands to prevent dispersal of weed species into the wetlands.
- Avoid locating construction sites or ancillary construction areas outside the road reserve if they would require clearing of Freshwater Wetland vegetation north of the Camden Haven River.

Minimising impacts on Wallum Froglet habitat during construction

- During geotechnical surveys, stockpile native shrubs, logs or bush-rock that are removed from Freshwater Wetland vegetation on the side of the proposed temporary access tracks and rake them back over the site following completion of the geotechnical surveys.
- Prior to initial clearing works in or near the three Freshwater Wetland areas shown in Figure 4, the contractor's ecologist would survey the three areas and if Wallum Froglet is present, the ecologist would develop and implement procedures to minimise harm.
- Provide a frog-proof barrier on either side of the culverts at Chainage 13070 and continue the barrier to the end of the Freshwater Wetlands shown in Figure 4 on the east and west side of the Pacific Highway.
- Provide frog-friendly habitat features at the entrances to the culvert at Chainage 13070, including a pool with suitable fringing and emergent vegetation and refuge structures.

- Monitor the pH of stormwater discharges into the three Freshwater Wetlands and avoid actions that could increase alkaline conditions where pH is greater than 7.

Minimising impacts on Giant Barred Frog habitat within the Lakes section during construction

- Minimise disturbance to native riparian flora or instream sheltering habitat and quickly rehabilitate disturbed areas.

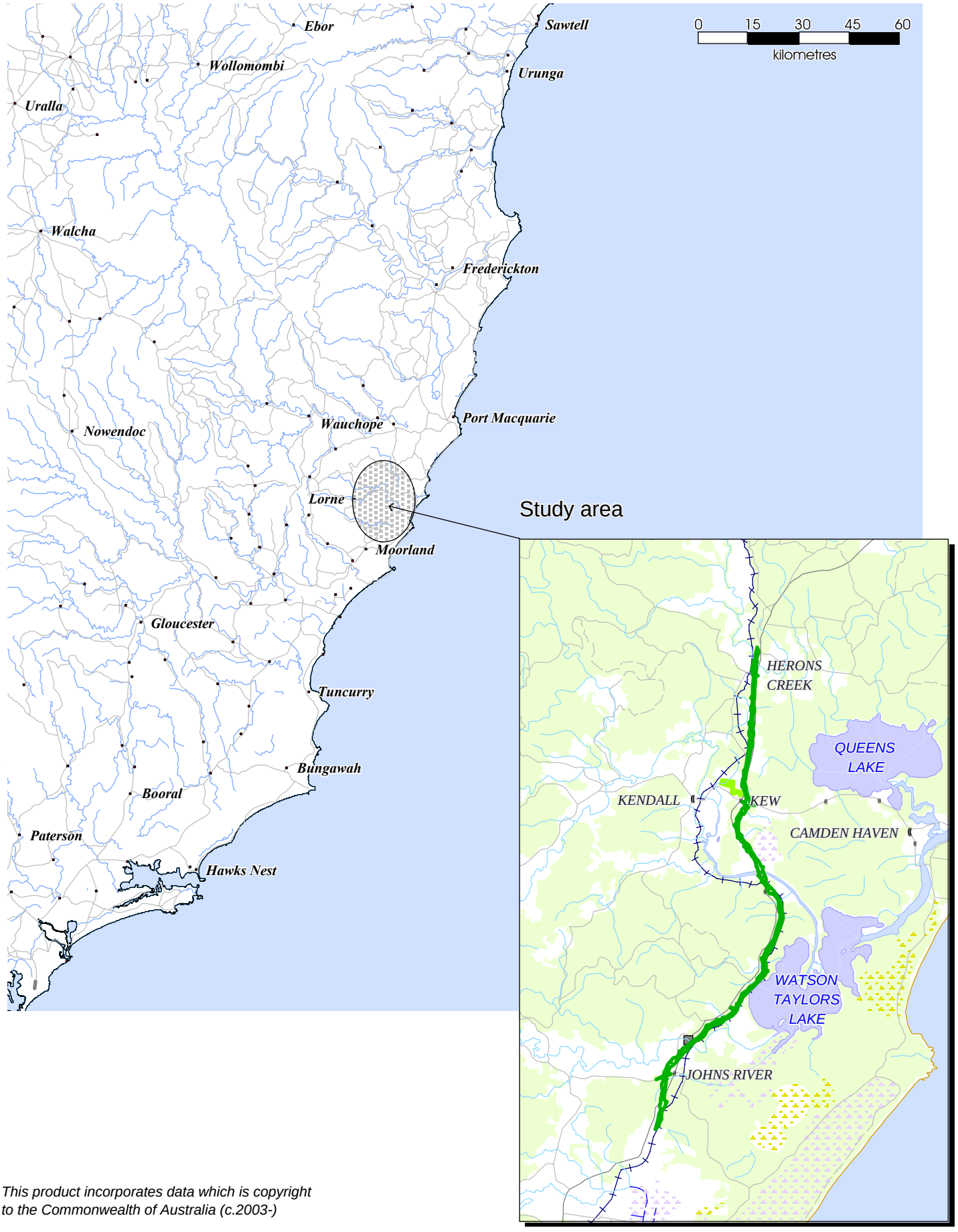
7.0 CONCLUSION

The Upgrade described in the EIS (Arup 2005) would result in the clearing of the Freshwater Wetlands on Coastal Floodplains EEC north of the Camden Haven River, on the both side of the Pacific Highway. A key mitigation measure recommended in this report is to relocate the two proposed water quality control ponds (East and West of the Pacific Highway) away from the Freshwater Wetland vegetation north of the Camden Haven River. This would greatly reduce the amount of clearing required within this recently-identified EEC.

The Upgrade would also remove or modify potential habitat for the Wallum Froglet and would remove or modify habitat that could be used by the Giant Barred Frog within the Lakes section of the study area. Based on the Significance Assessments (Assessment of Significance and Significant Impact Criteria) presented in this report, it is unlikely that the proposed Upgrade would have a significant impact on either of these species. Although individuals may be impacted, it is unlikely that a viable population of any of these species would be placed at risk of extinction, provided the recommended mitigation measures are implemented.

The tests of significance under Section 5A of the EP&A Act are not required for a Part 3A project. However, if the Upgrade were being considered under Part 5, it is our view that a Species Impact Statement would not have been recommended for the impact of the Upgrade on the Wallum Froglet, the Giant Barred Frog, or for the loss of Freshwater Wetland vegetation north of the Camden Haven River. A Referral to the minister if not recommended for the Giant Barred Frog.

FIGURES



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NEW SOUTH WALES 2008

Figure 1: Location of the Study Area in a regional context.

DATE: 6 September 2006

Checked by:

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Location:-...4000\4500s\4541\Mapping\S4541 F1_locality.WOR

Scale: 0 2 4 6 8 kilometres

PLATES

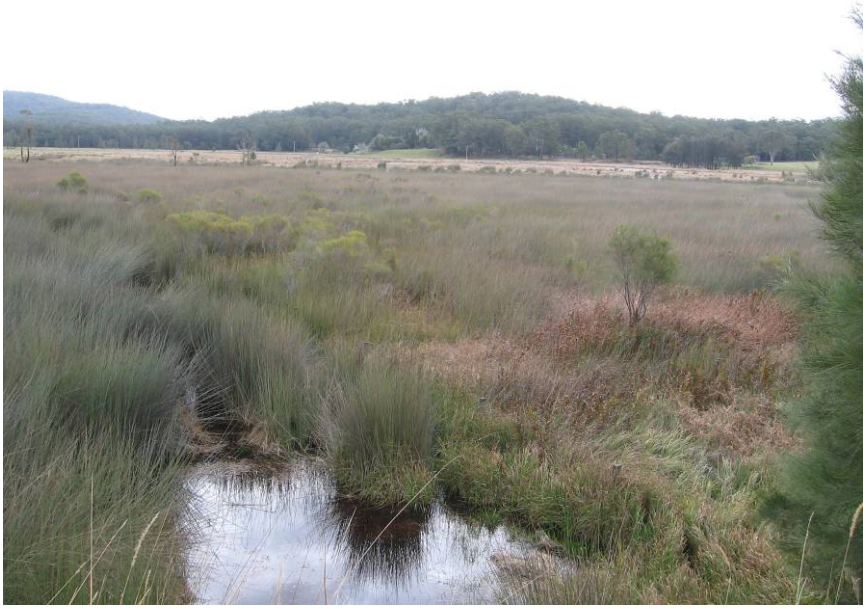

Plate 1: Wallum Froglet habitat and Freshwater Wetlands on Coastal Floodplains on the western side of the Pacific Highway

Plate 2: Wallum Froglet habitat in *Lepironia* sedgeland (SEPP 14 Wetland 544c).

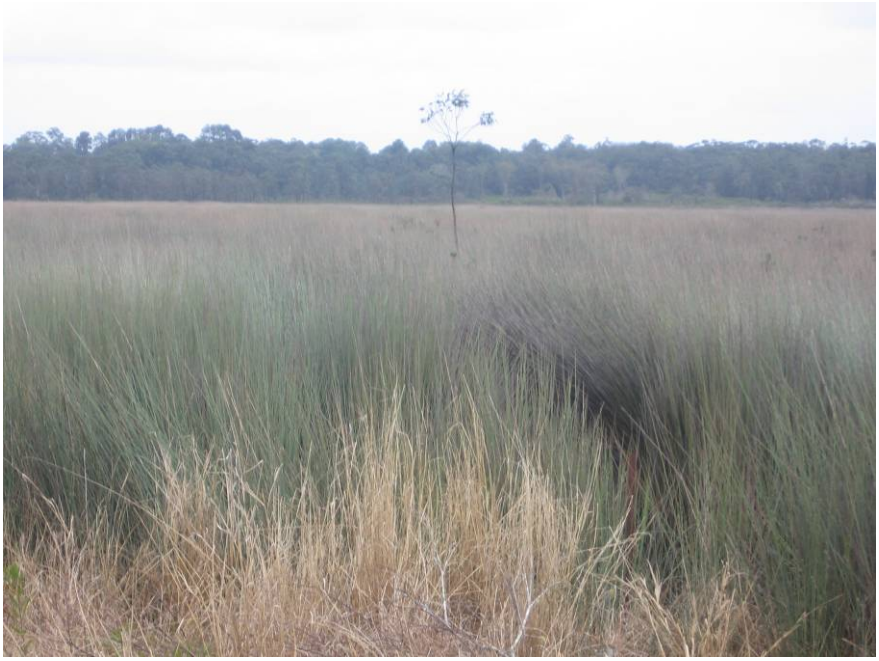

Plate 3: Wallum Froglet habitat in SEPP 14 Wetland 544c

Plate 4: Stony Creek

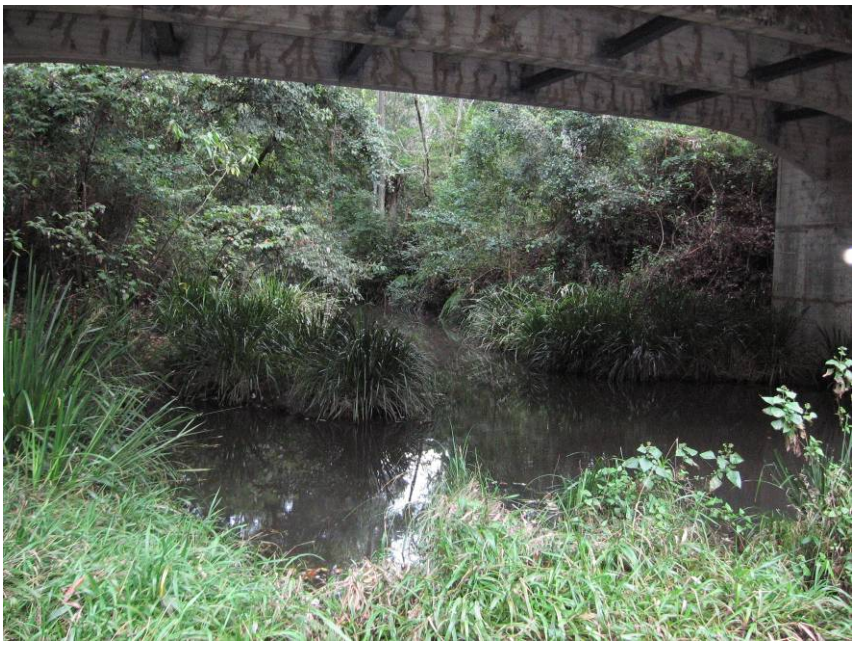

Plate 5: Stony Creek under existing Pacific Highway

Plate 6: Vegetation adjacent to Stony Creek

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APPENDICES

APPENDIX 1

TSC Act Assessments of Significance

Freshwater Wetlands on Coastal Floodplains

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions is listed as an Endangered Ecological Community on Schedule 1 (Part 3) of the TSC Act.

The final determination (NSW Scientific Committee, 2004) describes this community as occurring in areas periodically or semi-permanently inundated by freshwater, with minor influence in some wetlands. Typically the community occurs on silts, muds or humic loams in depressions, flats, drainage lines, lagoons and lakes of coastal floodplains.

Where they are subject to regular inundation and drying the vegetation in Freshwater Wetlands may include large emergent sedges over 1 m tall, such as *Baumea articulata, Eleocharis equisetina* and *Lepironia articulata*, as well as floating and submerged aquatic herbs (NSW Scientific Committee, 2004). As standing water becomes deeper or more permanent, amphibious wetlands that lack standing water are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants.

Characteristic plant species described in the final determination (NSW Scientific Committee, 2004) for parts of Freshwater Wetlands subject to regular inundation and drying include large emergent sedges over 1 metre tall, such as *Lepironia articulata* and *Baumea articulata*.

The Freshwater Wetland (Sedgeland) that occurs in the study area is consistent with the EEC Freshwater Wetlands on Coastal Floodplains. The majority of this community was identified as a monoculture of *Lepironia articulata.* In the study area Freshwater Wetlands on Coastal Floodplains occupy approximately 130 ha of SEPP 14 Coastal Wetlands to the north of the Camden River, and areas on both the east and west sides of the Pacific Highway north of the Camden Haven River. Previous surveys of the study site were carried out by Biosis Research in November, 2001 (Harrington *et al*. 2005). During the current survey conducted in September 2006, both portions of the Freshwater Wetlands (East and West of the Pacific Highway) were assessed as being in good condition.

The study area consists of the area of earthworks (including water quality control ponds) for the proposed Highway Upgrade, the proposed road reserve and a zone of potential indirect impact of approximately 50 m on either side of the road. A distance of 50 m was chosen because this is the average distance that edge effects are likely to be seen and recorded from the edge of the road (Bali 2005). On the

basis that no additional edge effects would be created by the proposed Upgrade, no indirect impacts are likely to occur. Based on the current extent and condition of the Freshwater Wetlands on Coastal Floodplains, the impacts of previous disturbance on this community (including the existing road infrastructure) appear to be confined to within 5 m of edges.

The likely impact of the proposed Upgrade of the Pacific Highway on the Freshwater Wetlands on Coastal Floodplains in the study area is assessed in the following Seven Part Test.

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable to Endangered Ecological Communities.

In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable to Endangered Ecological Communities.

In the case of a critically endangered or endangered ecological community, whether the action proposed:

i. **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
ii. **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

The Port Macquarie-Hastings LGA, in which the study area occurs, is in the NSW North Coast Bioregions. Habitat for Freshwater Wetlands on Coastal Floodplains is widespread in coastal areas within the region but has been poorly recorded within the locality due to a lack of regional vegetation mapping. It is stated in the final determination that Freshwater Wetlands on Coastal Floodplains are known to occur in the Kempsey LGA to the north of the study area and Greater Taree LGA to the south of the study area.

The proposal would result in direct impacts to Freshwater Wetlands on Coastal Floodplains with removal of approximately 0.8 ha within the study area, with 129.2 ha remaining outside the area of direct impact. The 129.2 ha remaining in the study area is likely to be viable in the long term because disturbances are

likely to be confined to the edges of the wetland. Disturbances are not likely to affect the species composition, structure or condition of the community, providing the proposed water quality control ponds do not impede drainage within the wetland.

The proposed Upgrade is unlikely to adversely affect the extent or composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction. Mitigation measures would be implemented to prevent modification of the Freshwater Wetlands on Coastal Floodplains through indirect impacts. Mitigation measures included in this report (e.g. relocation of the proposed water quality control ponds) would alleviate the majority of the potential impacts on this community.

Therefore, the proposal would not result in the modification or removal of a significant area of the Freshwater Wetlands on Coastal Floodplains.

In relation to the habitat of a threatened species, population or ecological community:

i. **the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
ii. **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
iii. **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

This community is known to occur in the Kempsey LGA to the north of the site and Greater Taree LGA to the south of the site (NSW Scientific Committee, 2004). The extent of Freshwater Wetlands on Coastal Floodplains within a 10 km radius of the study area has not been mapped. Based on aerial photographs and the mapped extent of the SEPP 14 wetland in the study area, the extent of Freshwater Wetlands on Coastal Floodplains (including SEPP 14 Wetland 544c and the triangular area on west side of road) within the study area is approximately 130 ha. Forty eight additional SEPP 14 wetlands are known to occur within the locality (10 km radius), but have not been confirmed as Freshwater Wetlands on Coastal Floodplains as described in the NSW Scientific Committee Determination (NSW Scientific Committee, 2004) and could represent other communities such as Swamp Sclerophyll Forest. For the purpose of this assessment all SEPP 14 Wetlands within a 10 km radius have been considered as potential habitat within the locality.

There are areas of potential and known habitat for Freshwater Wetlands on Coastal Floodplains in the local area, with:

- 48 recordings of SEPP 14 wetlands within a 10 km radius of the study area;
- Approximately 12,202 ha of potential habitat (SEPP 14 wetland) within the locality;
- Approximately 130 ha of known Freshwater Wetlands on Coastal Floodplains in good condition within the study area.

Approximately 0.8 ha of the habitat in the study area would be impacted by the proposed Upgrade. No additional indirect impacts are likely as the proposed Upgrade does not create any new edges. The area of Freshwater Wetlands on Coastal Floodplains to be impacted in the study area by the proposed Upgrade equates to 0.6 % of habitat in the study area and 0.006 % of known potential habitat within the locality.

The habitat to be affected in the study area was considered to be in good condition despite disturbance from the immediately adjacent roads and cleared farmland. On this basis, the habitat that will remain on site is likely to remain in good condition provided suitable mitigation measures are implemented.

The proposed Upgrade would not result in the isolation or further fragmentation of any areas of potential or known habitat, as the development would take place along existing edges of this community.

Although the proposed water quality control ponds that drain to the existing culvert at Chainate 13070 are unlikely to affect the drainage of water, they should be relocated to an area outside the current extent of the Freshwater Wetlands on Coastal Floodplains.

Given the area of the Freshwater Wetlands on Coastal Floodplains to be removed, and the fact that impacts are likely to be confined to existing edges, the area of impact is not considered to be vital to the long term survival of the community in this locality.

Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

Under the TSC Act, the Director-General of Department of Environment and Conservation maintains a Register of Critical Habitat. To date, no critical habitat has been declared for the EEC, Freshwater Wetlands on Coastal Floodplains.

Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

To date no threat abatement plan has been prepared for Freshwater Wetlands on Coastal Floodplains. DEC has identified five priority actions to help recover the Freshwater Wetlands on Coastal Floodplains in New South Wales, these include:

- Community and land-holder liaison/ awareness and/or education;
- Habitat management: Ongoing EIA - Advice to consent and planning authorities;
- Habitat Protection (inc vca/ jma/ critical habitat nomination etc);
- Enhance the capacity of persons involved in the assessment of impacts on this EEC to ensure the best informed decisions are made; and,
- Collate existing information on vegetation mapping and associated data for this EEC and identify gaps in knowledge. Conduct targeted field surveys and ground truthing to fill data gaps and clarify condition of remnants.

The proposed Upgrade is not considered to be inconsistent with the above priority actions provided the recommended mitigation measures are implemented.

Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Clearing of native vegetation is listed as a Key Threatening Process (KTP). The proposal would involve clearing of approximately 0.8 ha of Freshwater Wetlands on Coastal Floodplains.

The construction of the proposed water quality control basins adjacent to the existing culvert at Chainage 13070 between the two wetlands would remove Freshwater Wetland vegetation. Recommendations included in this report include the relocation of the proposed water quality control ponds away from the culvert to an area outside the current extent of the freshwater wetlands.

Conclusion:

Given the relatively small area of Freshwater Wetlands on Coastal Floodplains to be cleared, the fact that the proposed Upgrade is confined to pre-existing edges and the extent of the community outside the area of impact it is not considered that the development would result in a significant impact to this community. The EIS (Harrington *et al.* 2004) assessed the likely impacts of the Upgrade and recommended mitigation measures to reduce or avoid adverse impacts on threatened species. With suitable mitigation measures implemented during the construction and operations phases, such as those discussed in the EIS and this

report, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

The tests of significance under Section 5A of the EP&A Act are not required for a Part 3A project. However, if the Upgrade were being considered under Part 5, it is our view that a Species Impact Statement would not have been required for the loss of Freshwater Wetland vegetation north of the Camden Haven River caused by the Upgrade.

Giant Barred Frog (*Mixophyes iteratus*)

Giant Barred Frog *Mixophyes iteratus* occurs amongst deep, damp leaf litter and along shallow rocky streams in rainforests, moist eucalypt forest or deep, slow moving streams with steep banks in lowland areas, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer (Ehmann 1997). A short term study of the patterns of daily movement of this species during the breeding season showed that individuals moved up to 100 m in a night, but not more than 20 m from the stream (Lemckert and Brassil 2000).

Giant Barred Frog was not recorded during the surveys for this report. An area of potential habitat for this species within the road corridor has been identified at Stony Creek, near Middle Brother State Forest in the Lakes section. The proposed road Upgrade is likely to remove or modify approximately 5.7 ha of habitat that could be used by the Giant Barred Frog within the Lakes section of the study area resulting in a loss of potential breeding and foraging resources for this species. However, the vegetation within and surrounding the Stony Creek consists of Dry Tallowood Forest and is not considered dense or wide enough to be considered prime habitat for this species (Frank Lemkert, *pers com*, 2006). It is therefore unlikely that road corridor at Stony Creek provides suitable habitat for the Giant Barred Frog. Given that a broad range of flora and fauna mitigation measures would be implemented during the construction and operational phases, including those presented in the EIS (Harrington *et al.* 2004), it is unlikely that the proposed road Upgrade would have a significant impact on this species.

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The most recent record of the Giant Barred Frog occurs approximately 8 km from the proposed road corridor (DEC Atlas of NSW Wildlife). The proposed Upgrade would remove approximately 5.7 ha of potential habitat for this species. While the habitat removed may provide limited foraging and breeding habitat it is unlikely to be prime or core habitat. Thus, the removal of 5.7 ha of habitat is not considered to be significant given the local distribution of similar habitat

types (approximately 136.7 ha within the study area and 5,857 ha within the local area; EBDB 2006). It is unlikely that this species would be disrupted such that a viable local population would be at risk of extinction.

In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

An endangered population is defined under the TSC Act as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of this species listed under the Act.

In the case of a critically endangered or endangered ecological community, whether the action proposed:

iii. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

iv. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to threatened species.

In relation to the habitat of a threatened species, population or ecological community:

iv. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

v. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

vi. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed road Upgrade would remove approximately 5.7 ha of habitat that could be used by this species within the Lakes section of the study area. The habitat to be removed represents approximately 4 % of the potential habitat within the study area.

The habitat that could be used by this species within the road side corridor is currently surrounded by rural residential land and associated infrastructures including roads, power lines and railway line. The area has been previously disturbed by farming practices and is currently fragmented. The Upgrade would result in further fragmentation of potential habitat for this species within the local

area. Hence, no known habitat for the species would become isolated as a result of the proposed road Upgrade.

The proposed Upgrade is likely to remove approximately 5.7 ha of the Dry Tallowwood Forest habitat within the Lakes section of the study area. This habitat is not considered dense or wide enough to be considered prime habitat for this species (Frank Lemkert, *pers com*, 2006). The loss of this habitat is unlikely to have long-term negative consequences for the species local occurrence.

Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations or ecological communities. Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for this species (DEC Threatened Species Unit).

Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

To date, there is no NSW recovery plan or threat abatement plan for the Giant barred Frog (http://www.nationalparks.nsw.gov.au/npws.nsf/content/recovery+plans). However there is a Recovery Plan for Stream Frogs of South-east Queensland (2001-2005), which includes objectives and actions for the Giant Barred Frog. The proposed road Upgrade is likely to remove potential habitat for this species, however, as per the Recovery Plan for Stream Frogs of South-east Queensland (2001-2005), the area would be rehabilitated post works.

Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes are defined under Schedule 3 of the TSC Act. The proposed Upgrade would include the clearing of native vegetation which is listed as a KTP. Infection of frogs by amphibian chytrid causing the disease chytridiomycosis as also listed as a KTP. The construction of the proposed road Upgrade could inadvertently transport infected material between frog habitats thus promoting the disease's spread. If construction vehicles are moving between different catchments suitable hygiene procedures should be implemented, such as washing down of vehicles tyres with disinfecting solution.

Additionally, a number of other activities are recognised as contributing to this species decline including direct human impact/urbanisation/tourism, inappropriate catchment management, including degraded water quality, exotic

predators (e.g. trout, Gambusia) and habitat modification (e.g. invasive weeds). Providing that mitigation measures presented in the EIS (Harrington *et al.* 2004) and this report are implemented during the construction phase of the road Upgrade it is unlikely that the proposed Upgrade would further increase the existing effects of these KTPs.

Conclusion

It is unlikely that the proposed road Upgrade would have a significant impact on the Giant Barred Frog. The proposed road Upgrade would remove approximately 5.7 ha of habitat that is poorly suited to this species'. Prime habitat for this species within the study area is more likely to occur further upstream within Middle Brother State Forest, and it is unlikely that the road Upgrade would have a significant impact on upstream habitat.

The EIS (Harrington *et al.* 2004) assessed the likely impacts of the Upgrade and recommended mitigation measures to reduce or avoid adverse impacts on threatened species. With suitable mitigation measures implemented during the construction and operations phases, such as those discussed in the EIS and this report, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

The tests of significance under Section 5A of the EP&A Act are not required for a Part 3A project. However, if the Upgrade were being considered under Part 5, it is our view that a Species Impact Statement would not have been required for the impact of the Upgrade on the Giant Barred Frog.

Wallum Froglet (*Crinia tinnula*)

Wallum Froglet *Crinia tinnula* are found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country (Robinson 1993, Ehmann 1997). The species is a late winter breeder, males call in choruses from within sedge tussocks or at the water edge (Robinson 1993, Ehmann 1997). Current research on the movement patterns of this species shows that individuals moved up to 150 m in a night. They have also been recorded moving into forest habitats during dry periods when in ephemeral habitats, moving back into these areas when inundated, often during the breeding season. (Arthur White, *pers com*, 2006).

Potential habitat for this species within the road corridor occurs in Freshwater Wetlands and the *Lepironia* sedgeland in the Kew Bypass and Lakes section of the study area. The proposed Upgrade would modify and/or remove approximately 2.3 ha of habitat within the study area resulting in a loss of potential breeding and foraging resources for this species. In order to reduce the

impacts on this species it is recommended that prior to initial clearing, the contractor's ecologist should survey the three areas and if Wallum Froglet is present, the ecologist should develop and implement procedures to minimise harm (such as clearing during periods when the ground is dry.

Other mitigation measures that should be implemented during the construction and operations phases include:

- During construction, avoid stockpiling materials on the Freshwater Wetlands;
- Avoid locating construction sites or ancillary construction areas outside the road reserve if they would require clearing of Freshwater Wetland vegetation north of the Camden Haven River.;
- Provide a frog-proof barrier on either side of the culverts at Chainage 13070 and continue the barrier to the end of the Freshwater Wetlands shown in Figure 4 on the east and west side of the Pacific Highway;
- Provide frog-friendly habitat features at the entrances to the culvert at Chainage 13070, including a pool with suitable fringing and emergent vegetation and refuge structures;
- Monitor the pH of stormwater discharges into the three Freshwater Wetlands and avoid actions that could increase alkaline conditions where pH is greater than 7.

It is unlikely that the proposed road Upgrade would have a significant impact on this species.

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Two separate Wallum Froglet populations were recorded within the study area; the northern population was heard calling within the SEPP 14 wetlands on the east side of the Pacific Highway and in the *Lepironia* sedgeland on the western side of the Pacific Highway north of the Camden Haven River; the southern population was recorded south of the Camden Haven River on the western side of the Pacific Highway (Figure 4).

The proposed road Upgrade would remove approximately 2.3 ha of the potential habitat for the Wallum Froglet within the Kew Bypass and Lakes section of the study area. It is likely that this would impact individuals, however, given the extent of potential habitat within northern section of the study area it is unlikely that the northern population would placed at risk of extinction. Furthermore, with suitable mitigation measures presented in the EIS (Harrington *et al.* 2004) and this report, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

Little is know about the extent of potential habitat south of the Camden Haven River. It is likely that individual within this southern population would be impacted by the proposed road Upgrade. This habitat is considered to be ephemeral, and therefore, with suitable mitigation measures presented in the EIS (Harrington *et al.* 2004) and this report, it is unlikely that the Southern population would placed at risk of extinction.

In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

An endangered population is defined under the TSC Act as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of this species listed under the Act.

In the case of a critically endangered or endangered ecological community, whether the action proposed:

- **v. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- **vi. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.**

Not applicable to threatened species.

In relation to the habitat of a threatened species, population or ecological community:

- **vii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- **viii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- **ix. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.**

The proposed Upgrade would remove approximately 2.3 ha of the potential habitat for the Wallum Froglet. This habitat represents approximately 6% of the available habitat within the study area and 0.03% of the habitat within the local area (within the area of the EBDB vegetation mapping). The proposed works would not impact on the SEPP 14 wetland, which contains one of the largest areas of potential habitat for this species within the road corridor. Furthermore, with suitable mitigation measures presented in the EIS (Harrington *et al.* 2004)

and this report, it is unlikely that the proposed road Upgrade would have any long-term impacts on habitat for this species.

Potential habitat within the roadside corridor is currently surrounded by rural residential land and associated infrastructures including roads, powerlines and a railway line. The area has been previously disturbed by farming practices and is currently fragmented. The proposed road Upgrade would not result in further fragmentation of potential habitat for this species within the local area, hence no known habitat for the species will become isolated as a result of the proposed road Upgrade. Furthermore the proposed Upgrade maintains the existing culvert at Chainage 13070 which may facilitate frog movements between the Freshwater Wetlands either side of the Pacific Highway.

Providing that the recommended mitigation measures are implemented it unlikely that the proposed Upgrade would to have long-term negative consequences for the species local occurrence.

Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations or ecological communities. Under the TSC Act, the Director-General maintains a register of critical habitat. To date, no critical habitat has been declared for this species (DEC Threatened Species Unit).

Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

To date, there is no recovery plan or threat abatement plan for the Wallum Froglet (http://www.nationalparks.nsw.gov.au/npws.nsf/content/recovery+plans).

Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes are defined under Schedule 3 of the TSC Act. The proposed Upgrade would include the clearing of native vegetation which is listed as a KTP. Infection of frogs by amphibian chytrid, causing the disease chytridiomycosis is also listed as KTP. The construction of the proposed road Upgrade could inadvertently transport infected material between frog habitats thus promoting the disease's spread. If construction vehicles are moving between different catchments suitable hygiene procedures should be implemented, such as washing down of vehicles tyres with disinfecting solution.

In addition to the KTPs, other threats to the Wallum Froglet include habitat fragmentation and deterioration of water quality. Providing that mitigation

measures presented in the EIS and this report are implemented during the construction phase of the road Upgrade it is unlikely that the proposed Upgrade would further increase the existing effects of these KTPs.

Conclusion

The proposed road Upgrade would remove approximately 2.3 ha of potential habitat for this species and is likely to impact individuals. The EIS (Harrington *et al.* 2004) assessed the likely impacts of the Upgrade and recommended mitigation measures to reduce or avoid adverse impacts on threatened species. With suitable mitigation measures implemented during the construction and operations phases, such as those discussed in the EIS and in this report, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

The tests of significance under Section 5A of the EP&A Act are not required for a Part 3A project. However, if the Upgrade were being considered under Part 5, it is our view that a Species Impact Statement would not have been required for the impact of the Upgrade on the Wallum Froglet.

APPENDIX 2

EPBC Act Significant Impact Criteria

Under the EPBC Act, if the proposed Upgrade has the potential to have an adverse impact on a threatened species, population or ecological community listed on the Act, the proposal must be referred to the Federal Minister for the Environment for further consideration.

An Assessment of Significance is carried out in order to determine if a Referral is required.

FAUNA

Critically Endangered and Endangered Animal Species

Potential habitat for one fauna species listed as Endangered under the EPBC Act occurs in the study area:

- Giant Barred Frog (*Mixophyes iteratus*)

Mixophyes iteratus was not recorded in the study area during the current survey.

Giant Barred Frog (*Mixophyes iteratus*)

Habitat occurs within the study area that could be used by the Giant Barred Frog *Mixophyes iteratus*, which is listed on the EPBC Act as Endangered.

Giant Barred Frog was not recorded within the study area during the current survey. Habitat that could be used by this species within the road corridor has been identified at Stony Creek, near Middle Brother State Forest in the Lakes section. The vegetation within and surrounding Stony Creek consists of Dry Tallowood Forest and is not considered dense or wide enough to be considered prime habitat for this species (Frank Lemkert, *pers com*, 2006). It is therefore unlikely that road corridor at Stony Creek provides suitable habitat for the Giant Barred Frog. Furthermore, given that a broad range of flora and fauna mitigation measures would be implemented during the construction and operational phases, including those presented in the EIS, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

Is the action likely to lead to a long-term decrease in the size of an important population of a species?

Giant Barred Frog was not recorded within the study area during the current or previous surveys. The most recent record of the Giant Barred Frog occurs approximately 8 km from the proposed road corridor (DEC Atlas of NSW Wildlife).The proposed Upgrade would remove approximately 0.39 ha of potential habitat for this species within Stony Creek. While the habitat removed may provide limited foraging and breeding habitat it is unlikely to be prime or core habitat. . Furthermore, given that a broad range of flora and fauna mitigation measures would be implemented during the construction and operational phases, including those presented in the EIS, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

Is the action likely to reduce the area of occupancy of the species?

The Giant Barred Frog has not been previously recorded within the study area. The proposed road Upgrade would remove approximately 0.39 ha of potential habitat for this species within Stony Creek. The vegetation within and surrounding Stony Creek consists of Dry Tallowood Forest and is not considered dense or wide enough to be considered prime habitat for this species (Frank Lemkert, *pers com*, 2006) and therefore unlikely that road corridor at Stony Creek provides suitable habitat for the Giant Barred Frog.

It is unlikely that the proposed road Upgrade would result in a significant decrease in the area of occupancy for this species. Furthermore, the most recent record of the Giant Barred Frog occurs approximately 8 km from the proposed road corridor (DEC Atlas of NSW Wildlife).

Is the action likely to fragment an existing population into two or more populations?

The potential habitat within the road corridor is currently surrounded by rural residential land and associated infrastructures including roads, power lines and a railway line. The area has been previously disturbed by farming practices and is currently fragmented. It is unlikely that the proposed road Upgrade would result in the further fragmentation for this species within the local area. Hence, it is unlikely that any known habitat for the species will become isolated as a result of the proposed road Upgrade.

Is the action likely to adversely affect habitat critical to the survival of a species?

The proposed road Upgrade would remove approximately 0.39 ha of potential habitat for this species. Potential habitat for this species within the road corridor has been identified at Stony Creek, near Middle Brother State Forest. The vegetation within and surrounding Stony Creek consists of Dry Tallowood Forest and is not considered dense or wide enough to be considered prime habitat for this species (Frank Lemkert, *pers com*, 2006). Therefore, this habitat is not considered critical to the survival of this species.

Is the action likely to disrupt the breeding cycle of a population?

Giant Barred Frog was not recorded within the study area during the current survey. The most recent record of the Giant Barred Frog occurs approximately 8 km from the proposed road corridor (DEC Atlas of NSW Wildlife). This species breeds around shallow, flowing rocky streams from late spring to summer (Ehmann 1997). The proposed Upgrade would remove approximately 0.39 ha of limited potential habitat for this species within Stony Creek. However, the vegetation is not considered dense or wide enough to represent prime or core habitat for the Giant Barred Frog (Frank Lemkert, *pers com*, 2006). Thus, the

removal of 0.39 ha of habitat is not considered to be significant given the distribution of similar habitat types. It is unlikely that the proposed work would disrupt the breeding cycle of the Giant Barred Frog.

Is the action likely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Potential habitat for this species occurs within the road corridor has been identified at Stony Creek, near Middle Brother State Forest in the Lakes section. The vegetation within and surrounding the Stony Creek consists of Dry Tallowood Forest and is not considered dense or wide enough to represent prime habitat for this species (Frank Lemkert, *pers com*, 2006). The proposed road Upgrade is likely to modify or remove 0.39 ha of limited potential habitat. As this habitat is not considered to be prime habitat and the development is unlikely to increase fragmentation it is unlikely that the proposed road Upgrade would result in the decline of this species. Given that a broad range of flora and fauna mitigation measures would be implemented during the construction and operational phases, including those presented in the EIS, it is unlikely that the proposed road Upgrade would have a significant impact on this species.

Is the action likely to result in invasive species that are harmful to a critically endangered or endangered/vulnerable species becoming established in the endangered or critically endangered species/vulnerable habitat?

The action is unlikely to increase the extent and distribution of invasive weeds in the region. Although road works are a known vector for weeds and feral animals, these are already recorded throughout the study corridor and the proposed Upgrade of the existing Pacific Highway would not increase their effects. Given that a broad range of flora and fauna mitigation measures would be implemented during the construction and operational phases, including those presented in the EIS, it is unlikely that the proposed road Upgrade would result in an increase of invasive species.

Is the action likely to interfere with the recovery of the species?

Giant Barred Frog was not recorded within the study area during the current survey. The closest record of the Giant Barred Frog occurs approximately 8 km from the proposed road corridor (DEC Atlas of NSW Wildlife). Potential habitat within the study area is not considered dense or wide enough to represent prime habitat for this species (Frank Lemkert, *pers com*, 2006). Given that a broad range of flora and fauna mitigation measures would be implemented during the construction and operational phases, including those presented in the EIS, it is unlikely that the proposed road Upgrade would interfere with the recovery of this species.

Conclusion

Based on the above assessment the Giant Barred Frog is unlikely to be significantly impacted by the proposed Upgrade, and as such, a referral under the provisions of the EPBC Act is not recommended for this species.

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