Submissions Report / Supplement to the draft Environmental Impact Statement

Tugun Bypass

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Prepared by:
RTA Environmental Technology
Level 5, Octagon Building
99 Phillip Street
PARRAMATTA NSW 2150
T 02 8837 0580
F 02 8837 0053

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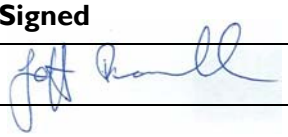
Approving Manager	Jeff Parnell		07/10/05

Person(s) managing this document	**Person(s) writing this document**
Andrew Cook	Andrew Cook

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Declaration	**Signed**
This Report was prepared under the supervision of: Wesley Stevenson Route Development Officer Pacific Highway Services NSW RTA Motorways Directorate Grafton, NSW Lydia Czosnowska Manager (Approvals & Delivery) Major Projects Unit Queensland Department of Main Roads Nerang, Queensland	 

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List of Abbreviations and Units of Measurement

Acronym	Definition
AASS	Actual Acid Sulphate Soils
AMG/MGA	Australian Map Grid / Map Grid of Australia
AADT	Annual Average Daily Traffic
ANZECC	Australian and New Zealand Environment and Conservation Council
ARI	Average Recurrence Interval
BAAM	Biodiversity Assessment and Management Pty Ltd
BACI	Before-after Control-Impact
CAMBA	China-Australia Migratory Bird Agreement
CBR	Cost Benefit Ratio
CFG	Community Focus Group
CHMP	Cultural Heritage Management Plan
CO_2	Carbon dioxide
CSI	Contaminated Site Investigation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
dBA	Decibels using the 'A' weighted scale, measured according to the frequency of the human ear
DDT	Dichloro–Diphenyl–Trichloroethane
DEC	NSW Department of Environment and Conservation
DEH	Commonwealth Department of Environment and Heritage
DIPNR	NSW Department of Infrastructure Planning and Natural Resources
DoP	NSW Department of Planning
DoTARS	Commonwealth Department of Transport and Regional Services
DP	Development Permit
DPI	NSW Department of Primary Industries

Acronym	Definition
ESD	Ecologically Sustainable Development
ECRTN	Environmental Criteria for Road Traffic Noise
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EMR	Environmental Management Representative
EMP	Environmental Management Plan
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPA	Queensland Environmental Protection Agency
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activity
ERG	Environmental Review Group
ESCP	Erosion and Sediment Control Plan
GCAL	Gold Coast Airport Limited
GCCNCS	Gold Coast City Nature Conservation Strategy
GECKO	Gold Coast & Hinterland Environment Council
ha	hectare
HDPE	High Density Polyethylene
hr	hour
JAMBA	Japan-Australia Migratory Bird Agreement
km	kilometre
LALC	Local Aboriginal Land Council
L	litre
LAeq	The Leq represents the average noise energy level during the measurement period. When the energy level is A weighted, it may be written Laeq
LEP	Local Environmental Plan
LGA	Local Government Area
m	metre
M	informal abbreviation for million
MDP	Major Development Plan
MEK	Methyl Ethyl Ketone
mg	milligram
mS/cm	milli-Siemens per centimetre; measure of conductivity

Acronym	Definition
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
OLS	Obstacle Limitation Surface
PAHs	Polycyclic aromatic hydrocarbons
PASS	Potential Acid Sulphate Soils
pH	Measurement for acidity or alkalinity of a solution
ppm	parts per million
PVC	Polyvinyl chloride
QDMR	Queensland Department of Main Roads
RE	Regional Ecosystem
RNE	Register of the National Estate
ROTAP	Rare or Threatened Australian Plants
RTA	NSW Roads and Traffic Authority
SEPP	State Environmental Planning Policy
SOLAH	Save Our Lakes and Heritage
SIS	Species Impact Statement
SWMP	Soil and Water Management Plan
TBT	Tributyl-tin
TPH	Total Petroleum Hydrocarbons
TSC Act	NSW *Threatened Species Conservation Act 1995*
2-4D	2, 4–Dichlorophenoxyacetic Acid
µg	microgram

1 Introduction

1.1 Introduction and Background

This is the Submissions Report for the proposed Tugun Bypass between Currumbin, Queensland and Tweed Heads, NSW. The route of the Tugun Bypass also includes Commonwealth land at Gold Coast Airport. The NSW Roads and Traffic Authority (RTA) and the Queensland Department of Main Roads (QDMR) are the joint proponents for the Proposal. QDMR is the proponent for the Queensland section of the Proposal and the rail roof slab within the Commonwealth Airport land, and the RTA is the proponent for the NSW section of the Proposal as well as for the road proposed within Commonwealth Airport land.

The RTA and QDMR are proposing to construct a new motorway between Stewart Road, Currumbin and Kennedy Drive, Tweed Heads (refer to Figure 1.1). The proposed 7km long route would predominantly follow an alignment to the west of the existing Gold Coast Airport main runway, and would consist of a four-lane restricted access motorway with a central median to separate north-south traffic flows at a posted speed of 100km/h. The median would be wide enough to allow future upgrading to six lanes. Grade-separated interchanges would be provided at Stewart Road and at the Tweed Heads Bypass (around 1km north of Kennedy Drive) in NSW and would provide for all traffic movements and connections to the local road network. At the southern end of the proposed route, the alignment crosses an area covered by the obstacle limitation surface (OLS) of the Gold Coast Airport and in complying with the requirements of the OLS, a tunnel up to 400m long would be constructed. Protection works for a future rail line are also proposed within the airport where the rail would intersect an approved runway extension.

An Environmental Impact Statement (EIS) for the Proposal (dated December 2004) was prepared on behalf of the RTA and QDMR by Parsons Brinckerhoff to meet Commonwealth and State legislation. A Species Impact Statement (SIS) was prepared as part of the EIS and to satisfy the requirements of the NSW and Commonwealth legislation. In addition to the EIS and SIS, a draft Major Development Plan (MDP) was prepared on behalf of Gold Coast Airport Ltd by Maunsell Australia for the section of the proposed Tugun Bypass which passes through the Gold Coast Airport. The MDP addresses the requirements of the Commonwealth *Airports Act 1996*. The EIS, SIS and MDP were all placed on public exhibition from 13 December 2004 to 14 March 2005. However, as a result of a subsequent listing of three Endangered Ecological Communities and an Endangered Population under the *Threatened Species Conservation Act 1995* (TSC Act) during December 2004, an SIS Addendum was prepared and released on the 12 February 2005 which extended the exhibition period to 15 March 2005.

The EIS has referred to the Proposal as a key component of the Pacific Motorway and NSW Pacific Highway Upgrading Program and it has been recognised as a priority for improvement in the Australian Government's AusLink National Network. The Pacific Highway between Newcastle and Brisbane forms part of the Australian Government's AusLink National Network. That network is based on national, regional and urban transport corridors, links to ports and airports, and intermodal connections between road and rail. Combined with other Pacific Motorway and Pacific Highway upgrade projects, the Proposal would reduce overall journey times between Sydney and Brisbane, reduce vehicle operating costs, improve the regional and inter-regional function of the road corridor as the major transport link and support regional economic development and tourism. Potential adverse ecological, social, indigenous archaeological and cultural, visual and water quality and hydrology impacts were identified in submissions received in response to the exhibited EIS and SIS.

Figure 1.1: Proposed Tugun Bypass

The EIS indicated that the construction and operation of the Tugun Bypass would provide an alternative corridor for heavy vehicles and would also separate interstate traffic from local traffic resulting in lower traffic volumes on the Gold Coast Highway. The benefits of this to the local community would include improvements in amenity with reduced noise levels, improvements in access, better air quality, and improved safety and reduced travel times from the border to Stewart Road.

The draft MDP contained findings and conclusions, regarding impacts of the proposal within the Airport lands, consistent with those in the EIS.

1.2 Purpose of the Submissions Report

This Submissions Report has been prepared to satisfy the requirements of the EP&A Act. The Report indicates that the RTA has fully considered all submissions made during the exhibition period. The Report will also assist the Director-General of the Department of Planning in the further consideration of the project.

In addition, to satisfy the requirements of the EPBC Act, the RTA and QDMR as designated proponents were required to publish a draft version of the EIS, invite public comments on the draft, consider those comments in finalising the EIS and provide the Commonwealth Minister for Environment and Heritage with both the final EIS and the public comments. Following consultation with the Commonwealth Department of Environment and Heritage (DEH) and with the aim of providing a streamlined approvals process, it has been agreed that the exhibited EIS constitutes a 'draft EIS' in accordance with the requirements of the EPBC Act and the Submissions Report (in conjunction with the exhibited 'draft' EIS) will constitute the final EIS. If the Proposal receives the necessary approvals under NSW legislation, the Submissions Report (in conjunction with the exhibited 'draft EIS') will be provided to the Commonwealth Minister for the Environment and Heritage to allow consideration under the EPBC Act.

The Submissions Report would not be used for the approval process as described under the *Airports Act 1996*. A final MDP would be submitted to the Commonwealth Minister for Transport and Regional Services for approval following consideration of the submissions and it is anticipated that this process would be undertaken concurrently with that described above. However, the Submissions Report has considered all submissions received following the completion of the exhibition period, whether they were received specifically for the EIS and SIS or for the MDP.

For further information regarding the approval and determination process please refer to Section 1.6 of this report.

This Submissions Report is structured as follows:

Chapter 1 – Introduction: An introduction to the Proposal, the consultation program and environmental impact assessment process.
Chapter 2 – Consideration of the EIS: A consideration of the Proposal as described in the EIS, including development of the Proposal, concept design, consideration of the environmental impacts and the statutory compliance.
Chapter 3 – Consideration of the SIS: A consideration of the SIS, including compliance with statutory requirements and a summary of the assessment of impacted species of flora and fauna and ecological communities as a result of the Proposal.

Chapter 4 – Consideration of the Submissions: A consideration of submissions made in response to the EIS, SIS and MDP, and the response to issues raised in the submissions.
Chapter 5 – Correspondence: A review of correspondence received from Government Agencies during and after exhibition.
Chapter 6 – Additional Investigations: A summary of additional investigations and studies undertaken since exhibition.
Chapter 7 – Preferred Project and Statement of Commitments: The RTA and QDMR would proceed with the Proposal as presented in the EIS with no design modifications. A statement of the commitments directed at ensuring environmental impacts are minimised concludes this Chapter.
Chapter 8 – Conclusion
Chapter 9 – References

1.3 Statutory Framework

1.3.1 Environment Protection and Biodiversity Conservation Act 1999

The Tugun Bypass EIS addressed Commonwealth requirements in accordance with the EPBC Act in Section 2.2.1 of the EIS. A proposed action that may have significant impacts on Commonwealth land or on a matter of national environmental significance is required to be referred to the Commonwealth Minister for the Environment and Heritage. The Minister then determines whether the action requires approval and, if so, under which provisions of the EPBC Act.

The RTA and QDMR referred the Proposal to the Minister, as separate proponents for those parts of the action to be undertaken in their respective States (except for the rail protection works which are within the NSW section of the airport, but proposed by QDMR), and on 11 August 2003, the Minister determined the action requires approval under the following provisions of the EPBC Act:

- Sections 18 and 18A (Listed threatened species and ecological communities)
- Sections 26 and 27A (Protection of the environment from actions involving Commonwealth land).

1.3.2 Airports Act 1996

It is proposed to construct that section of the Tugun Bypass within Gold Coast Airport by way of sub-lease. Upon completion and prior to operation the land would then be transferred from the Commonwealth to QDMR and then RTA. As such, the construction of the Tugun Bypass through the Gold Coast Airport would be classified as a major airport development under the *Airports Act 1996*, being development carried out at an airport site that is likely to have a significant environmental impact. Therefore, approval of a MDP by the Commonwealth Minister for Transport and Regional Services under the *Airports Act 1996* is required for the section of the proposed Tugun Bypass which passes through the Gold Coast Airport. In addition, Section 160 of the EPBC Act requires that the Minister for Transport and Regional Services obtain and consider advice from the Commonwealth Minister of Environment and Heritage in any decision relating to the adoption or implementation of a MDP. Further information regarding the approval under the *Airports Act 1996* can be found in Section 2.2.1 of the EIS.

1.3.3 Environmental Planning and Assessment Act 1979

The EP&A Act controls development within NSW and environmental planning instruments under the EP&A Act (such as those discussed below and described in detail in Section 2.2.2

of the EIS) impose restrictions on the types of development that may be undertaken on land to which a planning instrument applies.

Tweed Local Environmental Plan 2000

The Proposal would pass through land that is variously zoned under the *Tweed Local Environmental Plan 2000*. Some of these zones would require development consent for the construction of the Proposal from Tweed Shire Council. Within the 7 (a) Environmental Protection Zone it is considered that road development would be prohibited. However, with the inclusion of the Proposal within State Environmental Planning Policy (SEPP) 63, consent requirements and prohibitions imposed by the Tweed LEP would no longer apply to the Proposal. SEPP 63 is discussed further below.

State Environmental Planning Policy 63 – Major Transport Projects

SEPP 63 allows certain major transport projects and their ancillary activities to be undertaken without development consent.

The RTA requested that the NSW Minister for Infrastructure and Planning amend SEPP 63 so that it also applies to the Tugun Bypass proposal. The amendment was gazetted on 2 September 2005 clarifying that the Proposal is to be assessed under Part 5 of the EP&A Act.

Part 3A of the EP&A Act 1979

The environmental assessment and public exhibition processes were undertaken in accordance with Part 5 of the EP&A Act. Under Part 5 the Proposal required the approval of the Minister for Planning and the concurrence of the Director-General of the DEC.

However, on 1 August 2005 Part 3A of the EP&A Act commenced thereby introducing a new system for the assessment of major infrastructure in NSW. Part 3A applies to the Proposal because it required an EIS under Part 5 but was not sufficiently advanced to continue under Part 5 via transitional provisions in the new legislation.

Approval for undertaking the Proposal within NSW was sought under Part 3A of the EP&A Act on 19 September 2005. At that time the RTA also requested that the Director-General of DoP adopt the environmental assessment requirements previously issued for the Proposal and accept the EIS and public exhibition for the purposes of Part 3A in accordance with the EP&A (Infrastructure and Planning Reform) Regulation 2005.

Under Part 3A, the concurrence of the Director-General of the DEC is not required. Further, if the Proposal is approved certain other statutory approvals would not be required including section 87 permits and section 90 consents under the National Parks and Wildlife Act, 1974.

1.3.4 Transport Infrastructure Act 1994

Queensland's *Transport Infrastructure Act 1994* allows for and encourages effective integrated planning and efficient management of a system of transport infrastructure, which includes roads of National and State significance. The Queensland Minister for Transport and Main Roads has decided that the Queensland section of the Bypass would be constructed, maintained and operated under Section 29 of the *Transport Infrastructure Act 1994*. This means that approval is required from the District-Director of QDMR following environmental impact assessment of the Proposal. Further information on the *Transport Infrastructure Act 1994* and other Queensland legislation is provided in Section 2.2.3 of the EIS.

1.4 Preparation of the EIS, SIS and MDP

In accordance with the requirements of the various State and Commonwealth legislation as described above, an EIS and SIS were prepared for the Proposal by Parsons Brinckerhoff in conjunction with a number of specialist sub-consultants. Requirements and guidelines for the preparation of the EIS were provided by both the then Director-General of DIPNR (in accordance with Clause 231 of the EP&A Regulation) and the Commonwealth Minister for Environment and Heritage in November 2004. These requirements were addressed in preparing the EIS. Compliance with these requirements is outlined in Appendix B of the EIS.

The Director-General of DEC provided requirements concerning the form and content of the SIS. The compliance with these requirements is outlined in Appendix A of the SIS.

As has been noted an MDP was prepared for the section of the proposed Tugun Bypass which passes through the Gold Coast Airport by Maunsell Australia. The particular aspects that must be included in a MDP are prescribed by the *Airports Act 1996* and the level of environmental assessment that is required is decided through consultation with the Commonwealth Minister for Environment and Heritage. The Minister for Environment and Heritage determined that an EIS and an SIS should be prepared. The majority of the information in the MDP was therefore derived from the Tugun Bypass EIS and SIS, including the technical papers, prepared by Parsons Brinckerhoff.

1.5 The Determination Process

The determination process for this Proposal following the exhibition of the EIS and SIS under NSW and Commonwealth legislation is described below. Regarding Queensland legislation, the approval of the District-Director of QDMR for the Queensland section of the Proposal would be sought by QDMR. It is anticipated that this process would be undertaken concurrently with the determination process under the NSW and Commonwealth legislation.

1. **Submissions Report is prepared:** This report covers certain matters relevant to the decision in (2) below, including issues raised in submissions received following the EIS and SIS exhibition.

2. **RTA decides whether to seek approval to the Proposal:** The RTA considers the EIS and SIS, all the submissions received during exhibition, and the proposed mitigation of the environmental impacts of the Proposal. The RTA then decides whether to seek approval for the Proposal under Part 3A of the EP&A Act.

3. **Submissions report forwarded to NSW Minister for Planning:** A copy of the Submissions Report is forwarded to the Department of Planning (DoP). Copies of all submissions were previously sent to the then DIPNR.

4. **DoP prepares report to NSW Minister for Planning:** The Director-General of the DoP considers the Submissions Report and all other relevant material, consults relevant agencies, assesses the Proposal and prepares an Assessment Report for the Minister for Planning to assist the decision as to whether to grant approval and, if so, on what terms and conditions.

5. **NSW Minister for Planning grants approval:** After considering the Assessment Report and all other matters, and following consultation with the Minister for Roads, the Minister for Planning decides whether to grant approval and, if approval is granted,

determines the conditions or modifications to impose on the carrying out of the Proposal.

6a. Approval of Commonwealth Minister for Environment and Heritage: After the approval from the NSW Minister for Planning is granted, approval from the Commonwealth Minister for Environment and Heritage is formally sought. Copies of the Submissions Report and the approval from the Minister for Planning are forwarded to DEH.

6b. Finalisation of the MDP and Approval of Commonwealth Minister for Transport and Regional Services: GCAL finalises the MDP having regard to any comments received and then submits the MDP and the Submissions Report to the Minister for Transport and Regional Services.

7. DEH prepares report to Commonwealth Minister for Environment and Heritage: An Assessment Report is prepared by DEH after consideration of the 'draft EIS' and the Submissions Report (together constituting the final EIS) and other relevant material. The Assessment Report prepared by DEH is provided to the Minister as one component of the package of matters to be considered in making an approval decision.

8. Final Commonwealth EIS is made public: The final EIS, which is made up of the EIS, SIS, SIS addendum and the Submissions Report is made public.

9a. Commonwealth Minister for Environment and Heritage grants approval: After considering the Assessment Report and all other matters, and following consultation with other relevant Commonwealth Ministers, the Minister for Environment and Heritage decides whether to grant approval and, if approval is granted, determines the conditions to impose on the carrying out of the Proposal.

9b. Commonwealth Minister for Transport and Regional Services grants approval: The Minister decides whether to grant approval after seeking and considering advice of the Minister for Environment and Heritage.

10. Determination: The Chief Executive of the RTA considers the terms of the approval of the NSW Minister for Planning and Commonwealth Minister for Environment and Heritage and determines whether to proceed with the Proposal.

11. Release of documents: Both Ministers' approvals, the Assessment Reports prepared by DoP and DEH to their respective Minsters, the Chief Executive's determination and the RTA's Submissions Report are all made public.

1.6 The Consultation Program

Consultation with the community and stakeholders has been an important part of the environmental impact assessment process for the Proposal. Below is a summary of the consultation undertaken for the Proposal to date with further details provided in Chapter 3 and Technical Paper 1of the EIS.

1.6.1 Community and Stakeholder Consultation prior to the EIS

A number of strategic planning and route selection studies were undertaken before selection of the preferred route. These studies consisted of the *Southern Gold Coast – Tweed*

Corridor Study (undertaken from June 1997 and June 1998) and the *Pacific Highway at Tugun – Route Selection Report* (prepared in 1999) and involved consultation with:

- Local residents and community groups;
- Local government, including Tweed Shire and Gold Coast City Councils;
- Agencies from the NSW, Queensland and Commonwealth governments; and
- Aboriginal organisations in NSW and Queensland.

1.6.2 Community and Stakeholder Consultation during the EIS

The community consultation process for the Tugun Bypass EIS began in May 2000 with the development of the *Public Consultation and Community Development Plan*. The key objectives of the consultation plan were to inform the community about the Proposal, and to provide the local and broader community with opportunities to provide input into the EIS. The plan was also developed to incorporate the requirements of advisory and government bodies, and to keep them informed on the progress of the EIS. To address changes that have occurred in the community over the past two years, the plan was revised and renamed the *Tugun Bypass Engagement Strategy* in June 2004. The main components of the community and stakeholder consultation program are described in Table 1.1.

Table 1.1: Community and Stakeholder Consultation Program

Component	Consultation Tool
Informing the Community	• Public information meeting • Information Sheets • Advertisements and Media Releases • Web page • Freecall 1800 number • Stakeholder and agency briefings • Static displays
Consulting the Community	• One-on-one meetings with affected land owners • Community focus meetings (including the formation of a community focus group to represent the wider community) • Community and special interest group meetings • Stakeholder and agency briefings (including the planning focus meeting and separate meetings with local council and individual agencies) • Business perception survey • Freecall 1800 number • Information sheet reply-paid coupons • Community attitude survey
Managing Issues	• Communication plan • Community database and issues register • Web page • Monitoring media • Fortnightly issues reports

Some specific concerns were raised related to environmental impacts, such as impacts on flora and fauna, the route alignment near the Cobaki Broadwater area, cultural heritage

concerns and disturbance to the Tugun Landfill. Comments received from government agencies and regulators focused on issues relating to the design requirements for the alignment, and impacts on the environment. Issues raised during the consultation process were used in the refinement of the alignment and the identification of mitigation strategies. The issues raised have been addressed in relevant parts of the EIS and SIS.

1.6.3 Exhibition of the Environmental Impact Assessments

The EIS, SIS (including SIS Addendum) and MDP documents were placed on exhibition at various locations in NSW, Queensland and the Australian Capital Territory between Monday 13 December 2004 and Tuesday 15 March 2005. Submissions in response to these documents were officially received up until 20 June 2005. During the exhibition period, staffed displays were also provided at four locations within the southern Gold Coast and Tweed Heads (Tugun Village Community Centre, Tweed Shire Council Civic Centre, The Pines Shopping Centre and Tweed City Shopping Centre). At these displays, project staff from the RTA, QDMR and GCAL were available to answer questions from the community. Dates and the times of the displays (both static and staffed) were advertised via project newsletters, media advertisements in both local and State newspapers, on the RTA, QDMR and Gold Coast Airport Limited websites. Further details on the exhibition period and the deadline for consideration of submissions are contained in Section 2.1 of this Submissions Report.

2 Consideration of the EIS

This Chapter presents the consideration of the EIS, both in terms of its compliance with statutory requirements and in terms of its environmental assessment and mitigation measures. The RTA and QDMR intend to proceed with the Proposal as presented in the EIS without modifications.

2.1 Statutory Compliance

An EIS for the Proposal was prepared on behalf of the RTA and QDMR by Parsons Brinckerhoff in conjunction with a number of specialist sub-consultants. The statutory compliance of the EIS to both Commonwealth and NSW Legislation is provided below.

2.1.1 Commonwealth Legislation

The Proposal was examined in relation to Sections 12, 15B, 16, 18, 20, 21, 23 and 25 of the EPBC Act and it was determined by the Minister for the Environment and Heritage that the Proposal was a controlled action which required approval under the provisions of the EPBC Act. Under Section 87 of the EPBC Act the Minister also determined that the assessment of the relevant impacts of the Proposal would be through the preparation of an EIS.

The draft EIS addresses all relevant statutory requirements under the EPBC Act and was prepared in accordance with the prescribed form and manner set out in Sections 102 and 103 of the EPBC Act, which is described below.

Section 102 of the EPBC Act

This Section requires that the Minster for the Environment and Heritage must prepare written guidelines for the content of a draft EIS. The Minster was consulted before the commencement of the EIS and provided a number of requirements (November 2004). The correspondence from the Minister can be found in Appendix A of the EIS.

Appendix B of the EIS sets out the compliance with the Minister's requirements. Each of the Minster's requirements was addressed in the EIS.

Section 103 of the EPBC Act

This Section requires that the designated proponent must invite comment on the draft EIS. Following the preparation of the draft EIS, approval from the Minister for the publication of the draft EIS was granted on 8 December 2004. Accordingly a draft EIS and an invitation for comment was published.

The draft EIS was exhibited from 13 December 2004 until 15 March 2005 which complies with the statutory requirement to exhibit the EIS for a period of no less than 20 business days. Furthermore, the representations received during the exhibition period were provided to the Minister in accordance of Section 102(1)(d) of the EPBC Act.

2.1.2 NSW Legislation

The following is a summary of compliance with the relevant provisions of the EP&A Act applicable at the time the environmental assessment and public exhibition were undertaken. As already noted the RTA has asked the Director-General of DoP to adopt the Director-

General's requirements issued on 22 September 2004 and to accept the environmental assessment and public exhibition for the Proposal which was completed in accordance with Part 5 of the EP&A Act (see Section 1.3.3).

The EIS addressed all relevant statutory requirements under the EP&A Act applicable at the time and took into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity as per Section 111 of the EP&A Act. The EIS was prepared in accordance with the prescribed form and manner set out in Section 112(1)(a) of the EP&A Act. The EIS also complied with Clause 228 of the EP&A Regulation. Table 2.1 sets out the NSW statutory requirements relevant at the time the EIS was prepared and exhibited.

Table 2.1: NSW statutory requirement checklist

Reference	Requirement
Section 111 of the EP&A Act	Requires the RTA to examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the Activity
Section 112(1)(a) of the EP&A Act	Relates to the preparation and consideration of an EIS in accordance with the prescribed form and manner
Clause 228 of the EP&A Regulation	Compliance with Section 111 and 112 of the EP&A Act
Clause 230 of the EP&A Regulation	Content of the EIS
Clause 231 of the EP&A Regulation	Content of the EIS – Requirements of the Director-General of DIPNR
Clause 234 of the EP&A Regulation 2000; Section 113 of the EP&A Act	The notification and exhibition of the EIS
Section 113(3), 112(1)(c) of the EP&A Act	Providing the Director-General of DIPNR with all representations made during the EIS exhibition
Section 113(2), 112(1)(b) of the EP&A Act	Receipt and consideration of representations made to the RTA or any other determining authority during the statutory exhibition period

These requirements are covered in the EIS and summarised in this Chapter of the Submissions Report.

Clause 230 of the EP&A Regulation

The EIS was prepared to comply with Clause 230 of the EP&A Regulation. This Clause requires that (where no other guidelines are in force) an EIS comply with Schedule 2 of the Regulation. Sections 1.3.5 and 2.2.2 of the EIS and Appendices B and C of the EIS describe the compliance with Schedule 2 of the EP&A Regulation.

Clause 231 of the EP&A Regulation

The EIS was prepared to comply with Clause 231 of the EP&A Regulation. This Clause requires that the Director-General of DIPNR must be consulted concerning the form and content of any EIS. The Director-General was consulted before the commencement of the EIS and provided a number of requirements (November 2004). The correspondence from the Director-General can be found in Appendix A of the EIS.

Appendix B of the EIS sets out the compliance with the Director-General's requirements. Each of the Director-General's requirements was addressed in the EIS.

Clause 234 of the EP&A Regulation

The EIS was exhibited from 13 December 2004 until 15 March 2005. This complies with the statutory requirement to exhibit the EIS for 30 days from the last date of the first round of advertisements.

First and second round of statutory advertisements for the exhibition were published as follows:

Newspapers: The Daily Telegraph (NSW), Tweed Daily News (NSW), Gold Coast Bulletin (Queensland), The Courier-Mail (Queensland), The Australian (National)
Dates: Saturday 11 and Wednesday 15 December 2004

The advertisements identified the display locations and times, where to purchase copies of the EIS, and the date until which representations would be received. The locations of where the EIS was exhibited are provided in Table 2.2.

Table 2.2: Exhibition locations for the EIS

Location
Australian Capital Territory • DEH, John Gorton Building, Parkes
New South Wales • RTA, Prince Street, Grafton • RTA, Centennial Plaza, Surry Hills • RTA Motor Registry, Greenway Drive, Tweed Heads • Tweed Shire Council, Civic Centre, Murwillumbah • State Library of NSW, Macquarie Street, Sydney • Tweed Heads Branch Public Library, Civic Centre, Tweed Heads • Kingscliff Branch Public Library, Turnock Street, Kingscliff • Murwillumbah Area Public Library, Civic Centre, Murwillumbah • NSW Government Information Centre, Goodsell Building, Sydney • Nature Conservation Centre, Kent Street, Sydney • DIPNR Planning Centre, Henry Deane Building, Haymarket
Queensland • QDMR, Cotton Street, Nerang • Queensland Transport, Spring Hill Office Complex, Spring Hill • State Library of Queensland, Montague Road, West End • Elanora Library, The Pines Shopping Centre, Elanora • Robina Library, Cnr Robina Town Centre Drive & San Antonio Boulevard, Robina • Coolangatta Library, Griffith Street, Coolangatta • Gold Coast City Council, Surfers Paradise

A subsequent advertisement was placed to advertise the extension of period for receipt of representations to the EIS as a result of the advertisement of the SIS Addendum. The advertisements were published as follows:

Newspapers: The Daily Telegraph (NSW), Tweed Daily News (NSW), Gold Coast Bulletin (Queensland), The Courier-Mail (Queensland), The Australian (National)
Dates: Saturday 12 February 2005, Wednesday 16 February 2005 (Tweed Daily News only)

Provision of Representations

Eighty-eight representations were received in response to the exhibition of the EIS. In compliance with the requirements of Section 112(1)(c), and 113(3) of the EP&A Act, these representations were provided to the Director-General of the then DIPNR. Consideration of these representations in compliance with the requirements of Section 113(2), 112(1)(b) of the EP&A Act is provided in Chapter 4 of this Submissions Report.

2.2 Development of the Proposal in the EIS

The EIS established the need for the Proposal, considered options for satisfying that need, and outlined the concept design development process and urban design principles. A summary of these aspects is presented below.

2.2.1 Need for the Proposal

The Gold Coast Highway is a major cross-border route for interstate traffic including heavy vehicles. Over the last 30 years there has been considerable urban development along the Gold Coast and in Tweed Shire. This development has been accompanied by increased population densities and increased traffic demands, particularly during peak hours and school holiday periods, with significant delays. Travel efficiency and reliability indicators of the existing road network in the Tugun area point towards a deteriorating traffic situation. An alternative transport corridor was first identified in 1982 and the Tugun Bypass, a variation on that early alignment has been proposed to;

- Relieve this traffic congestion; and
- Provide a high standard motorway consistent with the Pacific Highway to the north and south (in conjunction with the proposed Banora Point improvements in NSW).

There are a number of national and regional planning and transport strategies that support an alternative transport corridor between the Gold Coast and Tweed Heads, such as *AusLink White Paper* (Commonwealth Department of Transport and Regional Services, 2004), and the *Transport 2007 – An Action Plan for South East Queensland* (Queensland Transport, 2001). Although not formally part of the NSW *Pacific Highway Upgrading Program,* it is consistent with the objectives of that program. Further consideration of the national and regional planning and transport strategies is provided in Chapter 4 of EIS.

The project specific objectives of the Tugun Bypass were established and described in Chapter 1 of the EIS, and are as follows:

- To provide an efficient, high-speed link for freight and other regional and interstate traffic between Queensland and NSW; and
- To separate heavy vehicles and interstate traffic from local and tourist traffic in the Tugun area.

2.2.2 Options Considered

The corridor available to accommodate major transport proposals south of Currumbin is narrow with significant natural and built constraints, which include Cobaki Broadwater and Gold Coast Airport. In 1998, Queensland Transport commissioned the *Southern Gold Coast – Tweed Corridor Study* (SGCTCS) to identify potential solutions to the transport issues facing the southern Gold Coast and Tweed area. Three broad options were identified consisting of:

- Option A: Upgrade of the existing Pacific Motorway – Gold Coast Highway alignment with two sub-options A1 and A2
- Option B: Partial bypass running along the western side of Tugun Hill to near Boyd Street and eastwards to join the Gold Coast Highway with three sub-options B1, B2 and B3 (a B4 option was also developed subsequent to the SGCTCS).
- Option C: Full bypass of the Gold Coast Highway with three sub-options C1, C2 and C3. C1 was located to the west of Gold Coast Airport. C2 was largely within the airport boundary, crossing the line of the airport runway just beyond its southern end. C3 crossed the existing airport runway approximately midway along its current alignment.

Each set of alignment options has different social, economic and environmental considerations. The A options are the most expensive and would result in significant social impacts including community severance and would also include significant visual impacts with the introduction of elevated structures. The B options would also have significant social impacts with impacts on recreational facilities and residential areas, and would also involve environmental impacts in the Hidden Valley area. While the B options cost less than the A options, the B options do not provide any opportunities for future upgrades. The C options remove the impacts on the community and provide a number of social benefits, however the C options do have the largest impact on the natural environment. The C options are also comparable in cost to the B options however the C options offer the opportunities for future upgrades.

The outcome of the Value Management Workshop undertaken for Tugun Bypass in 1999 was that Option C4 (a combination of options C1 and C2) was the highest ranking option in terms of the agreed evaluation criteria and the weightings assigned by the workshop participants to those criteria. Following further detailed environmental studies and engineering design, the alignment for Option C4 was refined to avoid or minimise impacts on a number of areas of ecological importance. Accordingly, Option C4 provides the economic and social benefits associated with removing traffic from the existing corridor combined with the lowest level of impacts of the C options on the environmental values around the Cobaki Broadwater.

In 2002, the Tugun Bypass Project Working Party was formed by agreement between the Commonwealth Minister for Transport and Regional Services and Deputy Prime Minister, the Honourable John Anderson MP, the New South Wales Minister for Transport and Roads, the Honourable Carl Scully MP and the Queensland Minister for Transport and Minister for Main Roads, the Honourable Steve Bredhauer MP. The functions of the Working Party included:

- Review of the route selection process and the environmental impact assessment previously undertaken to satisfy all key stakeholders of the relative merit of Queenslands preferred C4 option against the other route options which had been investigated;
- Resolving the complex planning and environmental approval process; and
- Obtaining common agreement on the scope, cost, timing and related funding arrangements for the overall Tugun Bypass proposal.

At its first meeting, the Working Party formed a technical sub group which subsequently reviewed all options previously considered and from the engineering, economic, social and environmental perspectives. In late 2002, the Working Party agreed to Queensland seeking approval for the C4 option and the undertaking of associated planning studies. At this time it was also agreed that the B routes would be used as references for comparison.

Further detail on the options considered and the selection of the C4 route as the preferred option is provided in Chapter 5 of the EIS.

2.2.3 Concept Design Development

The choice of a preferred design is made on the basis of engineering, environmental and community considerations in meeting the proposal objectives. The main transport consideration that has been addressed in the development of the preferred design for the proposal is the improvement of safety and efficiency of traffic movement along the Gold Coast Highway by:

- Providing the missing link in the high speed interstate highway between Stewart Road and Tweed Heads Bypass; and
- Separating through and local movement functions to improve both the safety and efficiency of these movements.

The main environmental considerations that have been addressed in the development of a preferred design for the Proposal include:

- Those related to the natural environment through which the Proposal would pass; and
- Those resulting from human impacts on the area, including major structures and facilities, and sources of potential contamination.

During the development of a preferred design for the Proposal the primary urban design principle adopted was to develop landscape and urban design treatments to integrate the Proposal with the landscape and reduce its visual impact.

Further detail on the use of urban design principles regarding the Proposal is provided in Chapter 6 of the EIS.

2.3 General Description of the EIS Design

The Proposal's design has been described in detail in Chapter 6 of EIS, and a general description is provided below.

The Tugun Bypass would be approximately 7km in length and involve the construction and operation of a four-lane restricted-access motorway with a central median to separate north–south traffic flows at a posted speed of 100 km/h. The median would generally be a minimum of 10.1m wide which would allow for the future upgrading to six lanes, with narrowing of the median in the tunnel and its ramps. A 3m wide outer shoulder would also be included to operate as an emergency vehicle and vehicle breakdown lane. There would also be sufficient space within the road corridor to accommodate appropriate services, landscaping, noise-reduction measures, water-quality-control measures, fencing and other environmental mitigation works. Refer to Figure 2.1 and 2.2 for typical Bypass cross-sections.

Grade-separated interchanges would be provided at Stewart Road in Queensland and at the Tweed Heads Bypass in NSW. These would provide for all traffic movements and provide connections to the local road network. The existing Kennedy Drive interchange would also require re-configuration with the existing north facing ramps being replaced by two service roads which would connect between the realigned north-eastern section of the Tweed Heads Bypass and the Kennedy Drive roundabouts. The Tweed Heads Bypass interchange

and Stewart Road interchange would also be designed to accommodate cyclists and pedestrians with links to the existing cycleways on Kennedy Drive and Ducat Street, Tweed Heads, and adjacent to the Pacific Motorway at Currumbin.

As a part of the Tugun Bypass, five bridges would be constructed in the following locations:

- Twin motorway bridges over Hidden Valley;
- A property access bridge adjacent to the John Flynn Hospital and Medical Centre;
- An access bridge west of the alignment adjacent the environmental precinct of Gold Coast Airport Limited; and
- Tweed Heads Bypass interchange.

The other major feature of the Bypass would be a road tunnel up to 400m in length within Gold Coast Airport which would carry the road beneath the proposed extension of the Gold Coast Airport main runway and the OLS. Please refer to Figure 2.3 for a typical cross-section of the road tunnel.

Other features of Tugun Bypass would include flood mitigation works such as flood walls for the tunnel approaches and the construction of the road on an embankment at a gradient of 2:1. Construction of the road would also include reinstating or diverting existing surface drainage through channels and culverts, and installing underground drains to allow for groundwater flows across the alignment. The Bypass design has also included provision for fauna habitat and movement through underpasses and frog ponds.

2.4 Environmental Impacts of the EIS Proposal

As noted in Section 2.2.2, the C options avoid or minimise impacts on the community but have the larger impact on the natural environment. The preferred C4 option was refined to avoid or minimise impacts on a number of areas of ecological importance. The following summary needs to be read in cognisance of this prior consideration of environmental impacts in the option selection stage.

In accordance with the statutory requirements, the EIS addressed the environmental impacts of the Proposal and outlined mitigation measures to reduce the impacts. A summary of each of these aspects is presented below. This summary does not include additional studies undertaken since the exhibition of the EIS. These additional studies are described in Chapter 6 of this report.

2.4.1 Planning and Landuse

The route of the Proposal has been aligned to minimise environmental impact on the study area and would pass through land zoned for Special Uses (Airport), Residential, Environmental Protection, Rural and Open Space purposes under the *Tweed Heads Local Environmental Plan 2000*. The Tugun Bypass is broadly consistent with local planning documents and development strategies in the Gold Coast and Tweed Shire LGAs. Further consideration to planning and landuse issues is provided in Chapter 12 of the EIS.

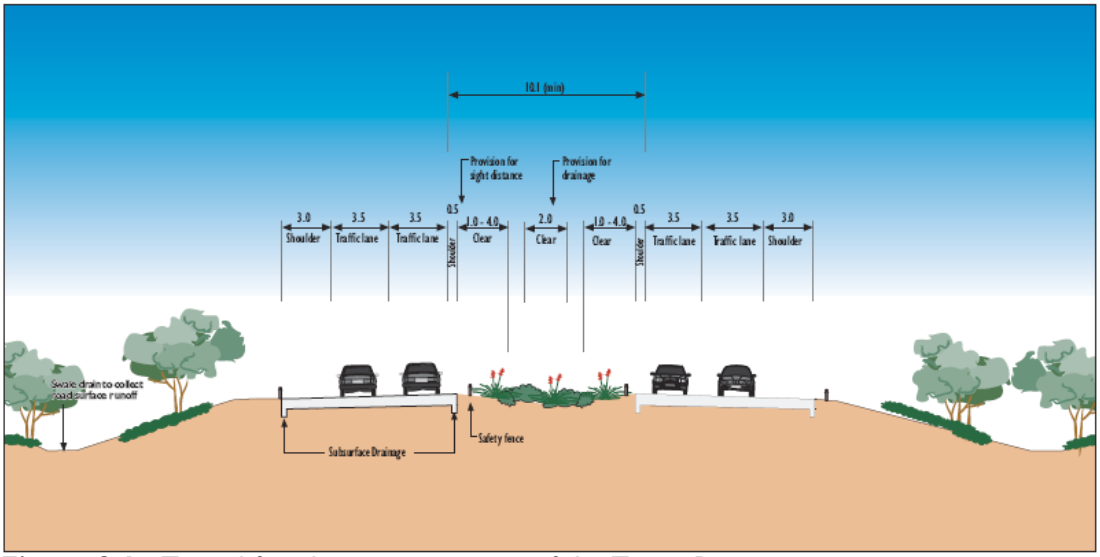

Figure 2.1: Typical four lane cross-section of the Tugun Bypass

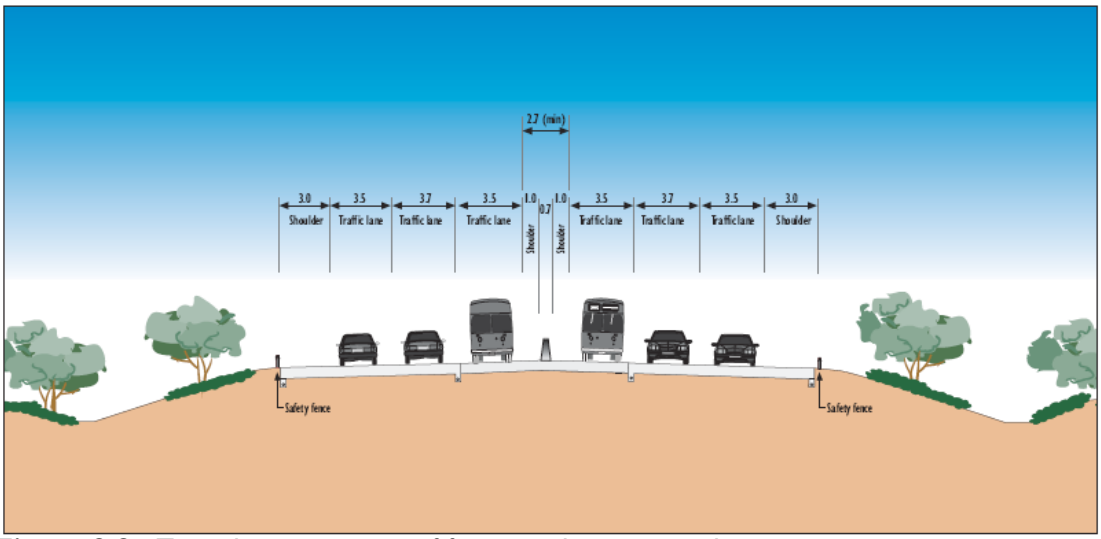

Figure 2.2: Typical cross-section of future widening to six lanes

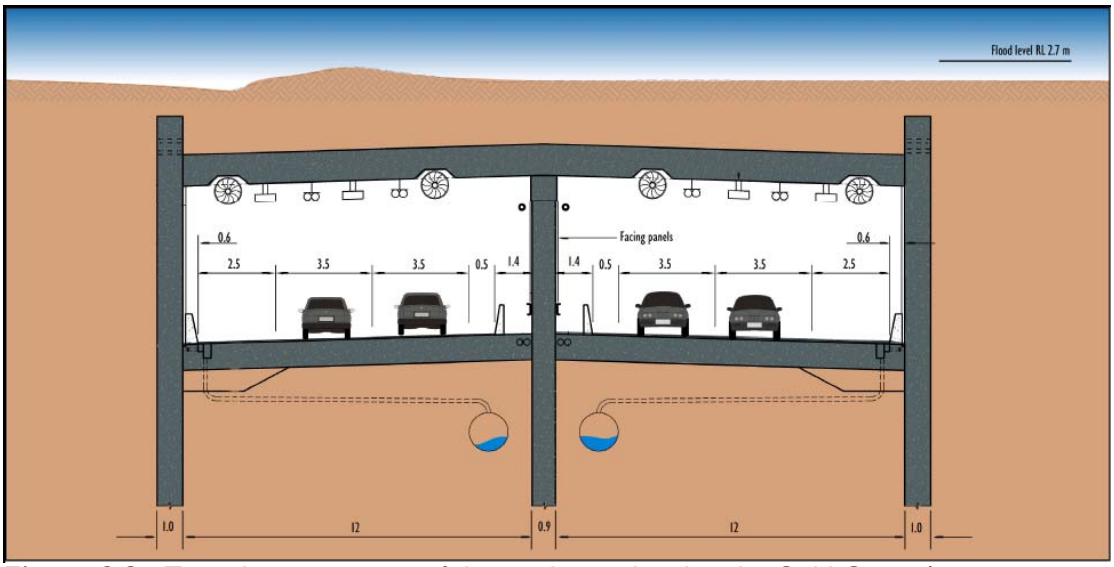

Figure 2.3: Typical cross-section of the road tunnel within the Gold Coast Airport

2.4.2 Traffic and Transport

Once operational the Tugun Bypass would alleviate a significant proportion of traffic from the Gold Coast Highway. However during the construction of the Tugun Bypass there may be some short-term disruption to property access in West Tweed Heads and some disruption to traffic, pedestrians and cyclists during construction at the Tweed Heads Bypass interchange. Further consideration to traffic and transport issues is provided in Chapter 12 of the EIS.

2.4.3 Noise

The Tugun Bypass would alter traffic flows and the distribution of road noise. Noise reductions along the Gold Coast Highway through Tugun and Bilinga would result in considerable improvements for local residents and visitors. At the southern end of the Bypass residential areas are currently subject to existing traffic noise. Once operational, local traffic would continue to use the Gold Coast Highway corridor, however the northern end of the Bypass route is close to residential areas, previously unaffected by traffic noise. This has been assessed as part of the Proposal assessment process and mitigation measures have been proposed, however this issue would be further studied during the detailed design stage. Determination of suitable noise attenuation measures would give consideration to technical feasibility, cost effectiveness, aesthetics, equity, community consultation and practicality. Further consideration of noise impacts is provided in Chapter 14 of the EIS.

2.4.4 Air Quality

The Tugun Bypass, once operational is expected to result in a decrease in greenhouse gas emissions by 2017. During the construction of the Bypass there is the potential for short-term dust impacts on exposed areas. Mitigation measures to stabilise exposed areas and the use of dust suppression methods would minimise impacts on air quality and surrounding residences. Further consideration of air quality impacts is provided in Chapter 9 of the EIS.

2.4.5 Cultural Heritage

The proposed road corridor for and areas adjacent to the Tugun Bypass alignment have experienced a high degree of disturbance and a number of items have been destroyed by previous construction activities. Nevertheless, important indigenous relics and artefacts are located within an area of National Estate area, west of the proposed alignment. A midden complex within the area is of significant cultural heritage and maintains much of its former environmental context. The proposed alignment would intrude into a section of the National Estate boundary, however this would be within a previously disturbed area, and no other known sites of cultural significance would be disturbed in the area. Reports of burials in this area cannot be discounted and testing for sub-surface deposits would be undertaken prior to the start of construction. A cultural heritage management plan / assessment report would be developed in consultation with traditional owners and regulatory agencies to manage any material that may be discovered during additional sub-surface testing or construction. Further consideration of impacts on cultural heritage is provided in Chapter 15 of the EIS.

2.4.6 Water Quality and Flooding

The construction of the Proposal could potentially impact on water quality. In order to prevent impacts on water quality, a soil and water management plan would be prepared for the Tugun Bypass to minimise water quality impacts. There is concern that the Bypass would decrease the storage capacity on the Tweed River floodplain. Flood modelling has

indicated that the fill required for the road embankments would result in increases in levels of less than 5mm for the 100 year flood. Further consideration of impacts on water quality and flooding is provided in Chapter 8 of the EIS.

2.4.7 Groundwater

The tunnel section of the Tugun Bypass has the potential to impact on groundwater during construction, as groundwater would need to be temporarily lowered. This lowering could reduce flows to the Cobaki Broadwater and its wetlands. There could also be the intrusion of saline water from the estuary into the sand aquifer as a result of dewatering. During construction groundwater would be required to be pumped across the tunnel obstruction and re-injected into the sand aquifer to maintain groundwater levels at or close to natural conditions. The temporary lowering of the water table is an additional issue that could impact on the groundwater during construction, because it could result in oxidation of acid sulphate soils which could lead to acidic groundwater. Once the tunnel is operational it would form an impermeable barrier to groundwater flows, up to a depth of 20m. Groundwater would be able to flow across the roof of the tunnel through the replaced sand, but this is unlikely to be sufficient to prevent mounding of groundwater on the up-gradient side, and reducing groundwater levels and flows to the wetlands on the down-gradient side. Mitigation during operation would be in the form of drains connecting both sides of the tunnel to equalise groundwater levels. Monitoring of groundwater levels would be required both during construction and once operational. Further consideration of issues relating to groundwater is provided in Chapter 8 of the EIS.

2.4.8 Flora and Fauna

The study area for the Tugun Bypass contains a high number of flora and fauna species including many threatened species listed under State and Commonwealth legislation. Other notable values of the study area include a high diversity of vegetation communities and bird, amphibian and bat species, habitat for a number of threatened and protected flora and fauna species and the Cobaki Broadwater. The alignment of the Tugun Bypass has been developed to avoid ecologically sensitive areas including the Swamp Orchid habitat, the Long-nosed Potoroo habitat and the Wallum Sedge Frog breeding ponds. However, the Bypass would result in the removal of 45 hectares of native vegetation communities, and impact on the remaining areas by increasing edge effects, totalling 26 hectares. A compensatory habitat package has been developed, totalling 76 hectares with management measures to offset the residual impacts. Further consideration of threatened species is provided in Chapter 3 of this Representations Report and further details regarding the impacts on flora and fauna is provided in Chapter 10 of the EIS.

2.4.9 Social and Economic Effects

During the construction of the Proposal there would be temporary short-term impacts on the general amenity of residents adjacent to the construction activities and adjoining the proposed access routes. Once operational the Tugun Bypass would only affect those that are close to the Tweed Heads Bypass. However extensive planting and noise barriers would minimise the visual and noise impacts. Furthermore the removal of a significant proportion of traffic from the existing route would improve local amenity and produce benefits for the community including improved accessibility and increased economic activity. Further consideration of social and economic effects is provided in Chapter 13 of the EIS.

2.4.10 Visual Quality and Landscape Character

The Tugun Bypass would result in a visual change to the existing landscape character however there would be extensive plantings which would soften the impact as it matures. A landscape strategy has been developed to mitigate the visual impacts using treatments that are consistent and appropriate for the unique location. Further detail regarding impacts to visual quality and landscape character is provided in Chapter 16 of the EIS.

2.4.11 Hazard and Risk

Once the Bypass is operational the potential hazards include the transportation of dangerous goods and the spills of hazardous chemicals. The proposed construction of swales and wetlands would prevent these substances entering local waterways. The transportation of explosives and explosive gases would pose a serious risk of major damage, in the event of an accident in the road tunnel. In response to this risk, vehicles carrying these goods would not be permitted to use the tunnel. The proposed lighting of the Bypass could also interfere with airspace requirements under the *Airports (Protection of Airspace) Regulations 1996*. The lighting would therefore be approved by Airport operators. Further consideration of hazards and risks is provided in Chapter 11 of the EIS.

2.4.12 Cumulative Impacts

Other known developments or proposed activities that could lead to cumulative impacts in the vicinity of the study area include: two major residential developments on either side of the NSW-Queensland border; the Robina to Coolangatta rail link; the proposed upgrade of the Pacific Motorway from Nerang to Tugun; the proposed upgrade of the Pacific Highway in NSW and in particular those improvements at Banora Point; the development of commercial precincts at the Gold Coast Airport and the extension of the main runway at the Gold Coast Airport. The package of mitigation measures for the Tugun Bypass has commitments to work with the surrounding developments to improve the management of conservation issues in the area. Further consideration of cumulative impacts is provided in Chapter 17 of the EIS.

2.5 Conclusion

The EIS was prepared in accordance with relevant Commonwealth and NSW statutory requirements. The EIS also established the need for the Proposal, considered options for satisfying that need, and outlined the concept design development process and urban design principles. The potential impacts of the Proposal have been comprehensively assessed using current best available information. This task has been approached in an analytical manner, and substantial effort and resources have been directed towards preparing specialist studies and utilising local knowledge of the study area. A comprehensive range of mitigation measures has also been proposed to reduce the negative impacts of the Proposal. These measures comprise current best practice in the field of environmental management. They are incorporated in the Statement of Commitments in Chapter 7 of this Submissions Report. Consideration was given at the concept design stage to minimise impacts and reduce the need for mitigation and it is anticipated that further improvements would occur at detailed design stage. No modifications to the concept design of the Proposal as presented in the EIS are proposed, however changes have been made to the package of mitigation measures and compensatory habitat. These changes would either be neutral or would minimise the environmental effects of the Proposal.

3 Consideration of the SIS

This Chapter presents the consideration of the SIS, both in terms of its compliance with statutory requirements and in terms of its environmental assessment and mitigation measures.

3.1 Background

An SIS was prepared by EcoPro Pty Ltd on behalf of the RTA and QDMR following preliminary EIS investigations. The SIS sought to further assess the impacts of the Proposal on threatened flora, fauna and ecological communities identified within the study area and were prepared to comply with both Commonwealth and NSW legislation. Prior to the SIS being placed on exhibition three ecological communities along the Bypass alignment were the subjects of preliminary determinations by the Scientific Committee under the TSC Act. Those communities are Swamp Oak Floodplain Forest on the NSW North Coast Bioregion; Swamp Sclerophyll Forest on Coastal Floodplains in the NSW North Coast Bioregion and Freshwater Wetlands on Coastal Floodplains in the NSW North Coast Bioregion. The Long-nosed Potoroo, Cobaki Lakes and Tweed Heads West population in the area was also the subject of a preliminarily determination.

On the 3rd December 2004 (during the printing of the SIS) a notice was published in the NSW Government Gazette of the Scientific Committee's decision to list the Cobaki Lakes and Tweed Heads West population of the Long-nosed Potoroo in the Tweed Local Government Area as an Endangered Population. On the 17th December 2004 (4 days after the SIS had been placed on exhibition), notice was published in the NSW Government Gazette of the Scientific Committee's decisions to list each of the three communities referred to above as Endangered Ecological Communities. As a result, an SIS Addendum was prepared to consider the impacts of the Bypass on these new listings. The SIS Addendum forms part of the SIS and EIS for the Tugun Bypass and for the purposes of this Chapter any reference to the SIS includes the SIS Addendum unless specified otherwise.

3.2 Statutory Compliance

3.2.1 Commonwealth Legislation

As discussed previously in Chapter 2 of this report, the Minster for the Environment and Heritage determined that the Proposal was a controlled action which required approval under the provisions of the EPBC Act. This was due to the anticipated significant impacts from the Proposal on nationally threatened and migratory species.

In complying with Section 102 of the EPBC Act, the Minister determined that where it is found that there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats, the assessment should include the preparation of an SIS pursuant to the TSC Act. The correspondence from the Minister can be found in Appendix A of the EIS and the compliance with this requirement is described in Section 3.2.2 below.

3.2.2 NSW Legislation

The following is a summary of compliance with the relevant provisions of the EP&A Act applicable at the time the environmental assessment and public exhibition were undertaken. As already noted the RTA has requested that Director-General of DoP accept the environmental assessment and public exhibition for the Proposal which was completed in accordance with Part 5 of the EP&A Act (see Section 1.3.3).

As the Proposal is now subject to the provisions of Part 3A of the EP&A Act, the concurrence of the Director-General DEC is no longer required under 112C of the EP&A Act (however, it is anticipated that the DoP would consult the DEC in preparing its assessment report on the Proposal).

Section 112 of the EP&A Act

Section 112 of the EP&A Act provides that, where an activity is likely to significantly affect threatened species, populations, ecological communities or their habitats, a determining authority must not carry out or approve the activity unless a SIS has been prepared. Following preliminary environmental investigations which included consideration of the factors outlined in Section 5A of the EP&A Act (eight-part tests of significance) it was determined that a SIS for the Proposal was required. Appendix G of the SIS provides the eight-part tests.

Division 2 of Part 6 of the TSC Act

The SIS was prepared to satisfy the requirements of Sections 109, 110 and 111 of the TSC Act. Section 109 and 110 of the TSC Act relates to the content of SIS and Section 111 of the TSC Act relates to consultation with the Director-General of DEC regarding the form and content of the SIS.

Appendix A of the SIS sets out the compliance with the Director-General's requirements. Each of the Director-General's requirements was addressed in the SIS.

3.3 Species Considered within the SIS

The SIS was structured so that the assessment for threatened and endangered species was consistent across all three jurisdictions. Species regarded as being of conservation significance in Queensland and on Commonwealth land have been given the same level of assessment as those recorded from NSW. Accordingly, consideration of the factors outlined in Section 5A of the EP&A Act have been undertaken for all relevant species irrespective of jurisdiction. In addition, if the Bypass was considered likely to result in a significant effect on a species, irrespective of jurisdiction, a comprehensive assessment equivalent to that undertaken for a SIS was undertaken.

Information regarding the methodology of surveys employed for both flora and fauna within the study area, including the limitations of survey techniques, is provided in Chapter 3 of SIS (and Section 1.2 of SIS Addendum).

3.3.1 Flora Species

A total of 596 plant species was recorded in the study area, including 489 being native species and 107 introduced. Of these, 15 flora species of legislative significance and eight species of regional or other significance were recorded. The distribution, habitat requirements and likelihood of impact on all of these 23 significant species was examined and an eight-part test of significance was also undertaken. In addition to the 23 significant plant

species recorded from the study area a further 56 significant species have been recorded within 20km of the site. An assessment of the likelihood of these species occurring on the study area was undertaken and an eight-part test of significance was also undertaken for 26 of these species. Further detail regarding the recorded flora species, the species considered for further assessment, including those identified by the Director-General of DEC, and the impact assessment of those species is found in Chapter 4, Chapter 7 and Appendix F of the SIS respectively.

As a result of the further assessment and undertaking the eight-part tests of significance, it was determined that there would likely be a significant effect on nine significant flora species. These species were all assessed within the SIS and are included in Table 3.1.

Table 3.1: Significant flora species considered within the SIS

Species Name	Legislative status / significance	Chapter where addressed in SIS
Little Wattle (*Acacia baueri* subsp. *baueri*)	NCR (V); ROTAP	Chapter 18
Chinese Burr (*Triumfetta rhomboidea*)	Regionally significant	Chapter 8
Swamp Orchid (*Phaius australis*)	TSC (E); NCR (E); EPBC (E); ROTAP	Appendix J (confidential)
Coast Palm Lily (*Cordyline congesta*)	Regionally significant	Chapter 17
Stinking Cryptocarya (*Cryptocarya foetida*)	TSC (V); NCR (V); EPBC (V); ROTAP	Chapter 20
Long-leaved Tuckeroo (*Cupaniopsis newmanii*)	NCR (R); ROTAP	Chapter 21
Black Walnut (*Endiandra globosa*)	NCR (R); ROTAP	Chapter 22
Fine-leaved Tuckeroo (*Lepiderema pulchella*)	NCR (R); TSC (V); ROTAP	Chapter 23
Match Sticks (*Comesperma ericinum*)	Regionally significant	Chapter 19

Note: NCR – Queensland *Nature Conservation (Wildlife) Regulation 1994*
TSC – NSW *Threatened Species Conservation Act 1995*
EPBC – Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ROTAP – Rare or Threatened Australian Plants (Briggs and Leigh, 1996)
E – Endangered
V – Vulnerable
R – Rare

3.3.2 Vegetation Communities

Thirty-seven vegetation communities have been identified from the study area. In identifying these vegetation communities, their structural and floristic aspect was described which was then used to determine whether they met the classification of an Endangered Ecological Community (EEC) as listed under the TSC Act. As a result, it was found that five EECs would be significantly effected by the Proposal and should be assessed within the SIS (refer to Table 3.2). Chapter 4 of SIS provides detail on the structural and floristic aspects of the vegetation communities.

Table 3.2: Significant vegetation communities considered in the SIS

Vegetation Community Name	Chapter where addressed in SIS
Littoral Rainforest in the NSW North Coast Bioregion	Chapter 16
Saltmarsh in the NSW North Coast Bioregion	Chapter 27
Swamp Oak Flood Plain Forest in the NSW North Coast Bioregion	Chapter 2 (SIS Addendum)
Swamp Sclerophyll Forest on Coastal Floodplains in the NSW North Coast Bioregion	Chapter 3 (SIS Addendum)
Freshwater Wetlands on Coastal Floodplains in the NSW North Coast Bioregion	Chapter 4 (SIS Addendum)

3.3.3 Fauna Species

A total of 269 fauna species was recorded from the study area which included 14 aquatic fauna species (including one introduced fish), eight invertebrates, 17 amphibians (including one introduced species), 20 reptiles, 31 mammals (including six introduced species) and 179 birds (including four introduced species). Of these, 40 fauna species of legislative significance and 12 species of local or regional significance were recorded during the surveys of the SIS. A further 12 species of legislative significance have also been recorded from the study area during previous surveys. The distribution, habitat requirements and likelihood of impact on all of these significant species was examined and an eight-part test of significance was also undertaken. In addition to the above, a further 57 threatened or migratory fauna species not recorded from the study area have been detected within 20 kilometres of the site. An assessment of the likelihood of these species occurring in the study area was undertaken. Further detail regarding the recorded fauna species, the species considered for further assessment, including those identified by the Director-General of DEC, and the impact assessment of those species is found in Chapter 4, Chapter 7 and Appendix F of the SIS respectively.

As a result of the further assessment and undertaking the eight-part tests of significance, it was determined that there would be a likely significant effect on 13 listed fauna species as a result of the Bypass. These species were all assessed within the SIS and are included in Table 3.3.

Table 3.3: Significant fauna species considered within the SIS

Species Name	Legislative status / significance	Chapter where addressed in SIS
Bush Hen (*Amauronis olivaceus*)	TSC (V)	Chapter 9
Masked Owl (*Tyto novaehollandiae*)	TSC (V)	Chapter 10
Eastern Grass Owl (*Tyto capensis*)	TSC (V)	Chapter 30
Brahminy Kite (*Haliastur indus*)	Regionally Significant	Chapter 11
Eastern Long-eared Bat (*Nyctophilus bifax*)	TSC (V)	Chapter 12
Long-nosed Potoroo (*Potorous tridactylus*)	TSC (V); NCR (V); EPBC (V); Local population listed as Endangered (TSC)	Chapter 13; Chapter 5 (SIS Addendum)
Wallum Froglet (*Crinia tinnula*)	TSC (V); NCR (V)	Chapter 14
Lewins Rail (*Rallus pectoralis*)	NCR (R)	Chapter 24
Grey-headed Flying-fox (*Pteropus poliocephalus*)	TSC (V); EPBC (V)	Chapter 25
Common Planigale (*Planigale maculata*)	TSC (V)	Chapter 28

Species Name	Legislative status / significance	Chapter where addressed in SIS
Wallum Sedge Frog (*Litoria olongburensis*)	TSC (V); NCR (V); EPBC (V)	Chapter 29
Swordgrass Brown Butterfly (*Tisiphone aberona morrisi*)	Regionally Significant	Chapter 15
Giant Dragonflies (*Petalura spp.*)	Regionally Significant	Chapter 26

Note: NCR – Queensland *Nature Conservation (Wildlife) Regulation 1994*
TSC – NSW *Threatened Species Conservation Act 1995*
EPBC – Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
V – Vulnerable
R – Rare

3.4 Impacts on Species Considered

In accordance with the statutory requirements, the SIS addressed the environmental impacts of the Proposal on threatened species, populations and ecological communities and their habitats and outlined mitigation measures to reduce these impacts. A summary of these impacts is presented below and further detail is provided in Chapter 5 and in Parts B, C and D of the SIS. This summary does not include information from additional studies undertaken since the exhibition of the EIS. Results of the additional studies are described in Chapter 6 of this Submissions Report.

The Bypass has been aligned to avoid as many identified environmental constraints as was practical and to minimise habitat fragmentation by keeping the alignment as close as possible to the edge of disturbed land. However, the Bypass would still result in the removal of some species of conservation significance and their habitat. Impacts from the Bypass would occur predominantly during construction, but may also occur when the Bypass is in operation. Table 3.4 summarises the result of the impacts of the Bypass on the species and vegetation communities of conservation significance.

Table 3.4: Impacts from the Proposal on the species and vegetation communities of conservation significance

Species / Community Name	Impact from the Proposal
Little Wattle	The removal of some individuals and their habitat, however the effect is likely to be regional in Queensland due to the removal of the southernmost population of this species.
Chinese Burr	A large proportion of the existing Chinese Burr population would be removed with the remaining population being permanently fragmented. The effect on the population is likely to be high local.
Swamp Orchid	Discussion of the Swamp Orchid is restricted to a confidential appendix (Appendix J), due to the sensitive nature of this species.
Coast Palm Lily	The removal of one individual of this species and a small amount of habitat in Queensland. It is likely to have a local effect on the population.
Stinking Cryptocarya	The removal of two individuals and a small amount of habitat for this species. It is likely to have a local effect on this species.
Long-leaved Tuckeroo	The removal of one individual and a small amount of habitat for this species. It is likely to have a local effect on the population.
Black Walnut	The removal of one individual and a small amount of habitat for this species. It is likely to only have a local effect on this species.
Fine-leaved Tuckeroo	The removal of one individual and a small amount of habitat for this

Species / Community Name	Impact from the Proposal
	species. It is likely to only have a local effect on this species.
Match Sticks	The removal of some individuals of this species and up to 45% of habitat in Queensland. The Proposal is likely to have a State effect on the population in Queensland and a regional effect on the population in NSW.
Littoral Rainforest in the NSW North Coast Bioregion	The removal or disturbance to about 0.6ha of Littoral Rainforest habitat in Queensland. This small loss is considered likely to only have a local effect on the community.
Saltmarsh in the NSW North Coast Bioregion	The removal of approximately 0.57ha of this community with possible secondary impacts. It is considered that the Proposal would only have a local effect on the community.
Swamp Oak Flood Plain Forest in the NSW North Coast Bioregion	The removal of approximately 1.5ha of this community. This loss would occur in all jurisdictions, with about 0.9ha affected in NSW (including Airport land). The Proposal would have a local effect on the community.
Swamp Sclerophyll Forest on Coastal Floodplains in the NSW North Coast Bioregion	The removal of approximately 19.6ha of this community which would mostly occur in NSW. The loss of this community's habitat represents only 1% of its distribution within the Tweed LGA and it is considered that the Proposal would have a local effect.
Freshwater Wetlands on Coastal Floodplains in the NSW North Coast Bioregion	The removal of approximately 1.8ha of this community which would occur in NSW (including Airport land). The loss of this community's habitat represents approximately 0.5% of its distribution within the Tweed LGA. It is considered that the Proposal would have a local effect.
Bush Hen	The removal of a small amount of habitat in Queensland and the possible disturbance of breeding habitat in Hidden Valley. It is likely to have a high local effect on this species.
Masked Owl	The Bypass would increase the risk of road mortality for individuals, which has the potential to have a high local effect.
Eastern Grass Owl	The removal of some habitat and the partial fragmentation of remaining habitat for this species. It would have a high local effect on this species.
Brahminy Kite	The removal of at least one nest site, active at the time of the survey, from the southern end of the study area would be required. The effect on this species is considered to only be local.
Eastern Long-eared Bat	Approximately 1.5ha of habitat potentially used for roosting would be removed from the study area in NSW. The effect on this species is considered to be high local.
Long-nosed Potoroo	The removal of approximately 0.5ha along the eastern edge of known habitat with a larger area potentially being modified through edge effects and pollution. Despite the mitigating and compensatory measures associated with the Bypass, there is still a risk that the small disjunct population may become extinct as a result of cumulative impacts.
Wallum Froglet	The loss of individuals and the loss and fragmentation of known and potential habitat in NSW. There is potential for gene flow to cease and the two separated populations would diverge genetically with the likely regional effects.
Lewins Rail	May result in the removal of some marginal habitat and have some barrier effects with a likely local effect.

Species / Community Name	Impact from the Proposal
Grey-headed Flying-fox	The removal of a small amount of roosting and foraging habitat. The effect on this species is likely to be local.
Common Planigale	The fragmentation and removal of a large proportion of the existing main population on Commonwealth land to such an extent that it is likely to become extinct. While, the other population on Commonwealth land and in Queensland would be unaffected by the Proposal, their long-term survival potential is unknown.
Wallum Sedge Frog	The removal of one subpopulation of Wallum Sedge Frog and fragmentation of the meta-population which may result in this population becoming extinct resulting in a regional effect.
Swordgrass Brown Butterfly	The removal of some habitat for this subspecies, however the effect is likely to be local only.
Giant Dragonflies	May result in direct or indirect impacts to habitat for these species. The effect is likely to be no more than local for these species.

3.5 Mitigation Measures

A comprehensive range of mitigation measures has also been proposed to reduce the negative impacts of the Proposal. Consideration was given at the concept design stage to minimise impacts and reduce the need for mitigation and it is anticipated that further improvements would occur at detailed design stage. Long-term management and monitoring was also proposed for the majority of populations where it was determined that the Bypass would result in a regional impact or greater. A summary of the mitigation measures and the long-term management proposed is provided below and further detail is provided in Part E of the SIS (and Chapters 2 to 5 of the SIS Addendum).

The mitigation measures proposed can be classified as general and species-specific and separated into the pre-construction, construction and operation phases of the Proposal. These include both physical provisions, such as fauna-exclusion fencing and culverts, and management measures, such as those to limit the potential impacts of acid sulphate soils. Long-term monitoring programs have been proposed to assess the effectiveness of a number of the proposed mitigation measures, including the translocation of significant flora species and the use of frog culverts. The period and the requirements of monitoring would vary depending on the mitigation measure however a practical and integrated approach to the management and monitoring would be adopted. A compensatory package was also developed to offset impacts of the Proposal which could not be mitigated, such as the removal of key habitat. In addition, an Environmental Review Group would be established to discuss issues associated with the Proposal, assist in the design of appropriate mitigation measures and the design of effective monitoring systems.

3.6 Conclusion

The SIS and SIS Addendum were prepared in accordance with relevant Commonwealth and NSW statutory requirements applicable at the time. The RTA has requested that the SIS (as part of the EIS) be accepted for the purposes of Part 3A of the EP&A Act.

The SIS was structured so that the assessment for threatened and endangered species was consistent across all three jurisdictions and if a species was considered likely to be affected by the Bypass, irrespective of jurisdiction, a comprehensive assessment equivalent to a SIS

was undertaken. The potential impacts of the Proposal have been comprehensively assessed using current best available information. This task has been approached in an analytical manner, and substantial effort and resources have been directed towards preparing specialist studies and utilising local knowledge of the study area. A range of measures has also been proposed including mitigation and compensation to minimise the negative impacts of the Proposal.

The development and actions regarding the finalisation of the compensatory habitat package are discussed in Chapters 5 and 6 of this Submissions Report. These chapters explain how the package was refined following initial evaluation of adequacy.

4 Consideration of Submissions

Submissions received during public display of the EIS and SIS (and MDP) were logged and subsequently considered. An overview of this process is as follows:

1. The details of each respondent were entered into a database and allocated a representation number.
2. Each issue raised within a representation was identified as a Broad Issue (for example, Biodiversity, Air Quality, Heritage, etc…) then broken down into a more detailed Specific Issue (for example, Compensatory Habitat, Construction, Archaeological and Cultural Significance, etc…)
3. Consideration of each Specific Issue was undertaken by the proponents in consultation with their specialist consultants, including those commissioned to prepare the EIS and SIS. Written responses to each Specific Issue have been included in this Report. Appendix A provides a detailed description of the individual issues raised in each respondent's submission.

Table 4.1: List of Respondents

Surname	First Name	Organisation	Submission Number	Section Where Issues are Addressed
Adams	Rose	Gold Coast & Hinterland Environment Council (GECKO)	74	4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.3.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1, 4.5.2, 4.5.3, 4.6.1, 4.6.2, 4.6.3, 4.7.4, 4.8.3, 4.9.1, 4.9.2, 4.9.3, 4.9.6, 4.9.7, 4.10.1, 4.11.2, 4.11.3, 4.12.1, 4.12.2, 4.12.4, 4.14.1, 4.15.1
Aird	Wesley	Eastern Yugambeh Limited	11	4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.14.1, 4.16.1, 4.16.2
Alletson	Tom	Individual	41	4.1.2, 4.1.3, 4.3.2, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.5.2
Allison	Denis Lloyd	Individual	1	4.13.2
Not provided	Not provided	Caldera Environmental Centre Inc.	57	4.1.1, 4.1.2, 4.1.3, 4.3.2, 4.4.2, 4.4.3, 4.4.4, 4.5.2, 4.6.3, 4.9.3, 4.11.2, 4.12.1, 4.14.1, 4.18.1
Atkin	Tom	Individual	60	4.1.1, 4.1.2, 4.1.3, 4.9.7, 4.11.3, 4.12.3, 4.18.1
Barnard	Max	Individual	47	4.1.1, 4.1.3, 4.3.2, 4.4.1, 4.4.3, 4.4.4, 4.4.6, 4.5.2
Bevis	Les	Environment Protection Authority	69	4.1.1, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.4.7, 4.6.1, 4.6.2, 4.7.2, 4.8.2, 4.9.4, 4.10.2, 4.15.1, 4.16.1, 4.16.2
Bluden	Brenda	Individual	51	4.1.2, 4.1.3, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.6, 4.11.3, 4.18.1
Bolster	Paul	Bolster &Co. Solicitors	64	4.1.4, 4.3.1, 4.9.4, 4.12.4, 4.14.1
Bourne	Stephen	Individual	81	4.2.1, 4.9.4
Boyle	Janine	Individual	40	4.1.2, 4.1.3, 4.4.1, 4.4.3, 4.4.4, 4.5.2, 4.11.2, 4.12.3
Brambleby	Ted	Adventure Education	46	4.1.3, 4.4.2, 4.4.3, 4.6.2, 4.6.3, 4.15.1, 4.17.1
Carmody	Linda	Bicycle Gold Coast	2	4.13.1, 4.13.2
Christie	Dorothy	Individual	43	4.1.3, 4.4.1, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.2
Counter	Gretta	Individual	35	4.1.3, 4.3.2, 4.4.2, 4.5.2
Daffy	Carol	Individual	8	4.2.1
Davey	Gary	Department of Environment and Conservation	52	4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1, 4.5.2, 4.5.3, 4.6.1, 4.6.2, 4.6.3, 4.7.1, 4.7.2, 4.8.1, 4.8.2, 4.9.1, 4.9.6, 4.10.1, 4.10.3, 4.16.1, 4.16.2, 4.17.1, 4.17.2
Davey	Greg	Department of Primary Industries (Fisheries)	58	4.4.1, 4.9.1, 4.16.1
Davidson	Andrew	Individual	49	4.2.1, 4.9.4, 4.10.4
Dawney	Carol	Tweed Wollumbin Aboriginal Education Consultative Group	42	4.1.3, 4.5.1, 4.5.2, 4.5.3
Day	Jessica	Gold Coast Institute of TAFE	5	4.2.1, 4.11.1
Dickson	Dale	Gold Coast City Council	61	4.1.1, 4.2.1, 4.4.4, 4.6.2, 4.9.4, 4.15.1
Doyle	Fran	Individual	86	4.1.3, 4.4.1, 4.4.3, 4.4.4, 4.4.5,

Surname	First Name	Organisation	Submission Number	Section Where Issues are Addressed
				4.5.2, 4.6.3, 4.12.1
Driftwood	Thomas	Individual	21	4.3.2, 4.4.4, 4.5.2
Edge	May E	Individual	34	4.1.3, 4.4.2, 4.4.4, 4.5.2
Faehrmann	Cate	Nature Conservation Council of NSW	88	4.4.1, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.6.2, 4.6.3, 4.15.1
Fox	Ian	Individual	53	4.1.3, 4.3.2, 4.4.2, 4.5.1, 4.6.2, 4.6.3, 4.17.1
Goodwin	Kevin Patrick	AFABA	87	4.5.2, 4.18.1
Green	Royce	Individual	68	4.1.3, 4.2.1, 4.4.1, 4.4.6, 4.12.3
Hamilton	Richard	HW Litigation	54	4.1.3, 4.4.4, 4.7.4, 4.12.4
Harrison	Valeree	Individual	33	4.1.3, 4.4.1, 4.4.2, 4.4.4, 4.5.1, 4.5.2, 4.6.2
Hayes	Thomas	Coolangatta & Environs Heritage Group	15	4.2.1, 4.4.2, 4.10.4
Heggarty	Len	Individual	76	4.1.3, 4.1.4, 4.3.2, 4.6.1, 4.6.3, 4.11.2
Henderson	Peter	Individual	50	4.2.1, 4.9.4, 4.12.3, 4.14.1
Hero	Jean-Marc	Griffith University	59	4.1.1, 4.1.3, 4.4.1, 4.4.4, 4.4.5, 4.4.6, 4.6.1, 4.15.1
Heywood	Les	Individual	39	4.1.3
Hill	Lloyd	John Flynn Gold Coast Private Hospital	78	4.2.1, 4.9.4
Hoskisson	Ronni	Tweed District Residents and Rate Payers Association	62	4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.3.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1, 4.5.2, 4.6.2, 4.6.3, 4.7.1, 4.7.4, 4.8.1, 4.8.3, 4.9.1, 4.9.2, 4.9.3, 4.9.4, 4.9.7, 4.11.1, 4.11.2, 4.11.3, 4.11.4, 4.12.1, 4.12.2, 4.12.3, 4.12.4, 4.13.2, 4.14.1, 4.18.1
Howard	Les	Individual	17	4.1.1
Howarth	Ben	Individual	24	4.2.1, 4.9.4
Hutley	Lesley	Individual	82	4.1.3, 4.4.4
Jack	Elizabeth	Individual	56	4.4.5, 4.5.2
James	Henry	Individual	75	4.1.3, 4.3.2, 4.4.6, 4.9.4
Latham	Carolyn	Individual	63	4.1.3, 4.3.2, 4.4.2, 4.4.4, 4.4.5, 4.4.6, 4.5.2, 4.6.1, 4.6.3, 4.11.4, 4.18.1
Leiper	Glenn	Individual	19	4.1.3, 4.3.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.2
Logan	Russel	Tweed Byron Local Aboriginal Land Council	28	4.3.2, 4.3.2, 4.5.1, 4.5.2, 4.5.3
Lyngsted	Ole C.L.	Individual	70	4.1.3, 4.2.1, 4.4.1, 4.4.2, 4.4.3, 4.4.4
Maclennan	Gloria	Individual	44	4.1.3, 4.4.1, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.2
McCosh	Wendy Elizabeth	Individual	48	4.9.4
McCoy	Gary	Tugun Heights Residents' Action Group	22	4.4.7, 4.13.1
McDonald	Jackie	Individual	32	4.1.3, 4.5.1, 4.5.2, 4.5.3

Surname	First Name	Organisation	Submission Number	Section Where Issues are Addressed
McIntosh	Robyn	Individual	25	4.1.3, 4.3.2, 4.4.1, 4.4.2, 4.4.4, 4.4.5, 4.4.6, 4.5.2, 4.6.1, 4.6.2, 4.6.3, 4.8.3, 4.9.1, 4.9.6, 4.11.4, 4.12.4, 4.16.2, 4.17.1
Moon	Bruce	Friends of Currumbin	6	4.2.1, 4.4.7, 4.13.1, 4.13.2
Munro	Ian	Individual	26	4.2.1, 4.9.4
Murphy	Anne	Individual	85	4.9.4, 4.10.4, 4.12.3
Murphy	E.	Individual	16	4.4.1, 4.4.2, 4.4.3, 4.4.5, 4.4.6, 4.5.2
Murray	Richard W.	Tweed Heads Environment Group	72	4.1.3, 4.1.4, 4.3.2, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1, 4.5.2, 4.5.3, 4.6.1, 4.6.2, 4.6.3, 4.7.2, 4.7.4, 4.8.2, 4.8.3, 4.9.1, 4.9.2, 4.9.4, 4.9.5, 4.9.6, 4.9.7, 4.10.2, 4.11.1, 4.11.2, 4.11.4, 4.12.3, 4.12.4, 4.14.1, 4.15.1, 4.18.1
Murray	Richard W.	Save Our Lakes and Heritage (SOLAH)	71	4.1.3, 4.1.4, 4.3.2, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1, 4.5.2, 4.5.3, 4.6.1, 4.6.2, 4.7.2, 4.7.4, 4.8.2,4.8.3, 4.9.2, 4.9.4, 4.9.5, 4.9.6, 4.9.7, 4.10.2, 4.11.2, 4.11.4, 4.12.3, 4.12.4, 4.14.1, 4.15.1, 4.18.1
Parkington	Roger	Individual	77	4.9.4
Partridge	C.J.	Individual	13	4.10.4, 4.12.3
Pickwick	C.	Individual	55	4.1.3, 4.4.2, 4.14.1
Pierpoint	Hugh	Individual	37	4.1.3, 4.12.3
Rayner	Michael	Tweed Shire Council	20	4.3.1, 4.9.4
Read	Wouldiam	Individual	4	4.2.1
Reynolds	Andrew	Bendigo Bank, Tugun Branch	10	4.2.1, 4.9.1, 4.10.4, 4.12.2
Reynolds	Andrew	Andrew Reynolds Realty	7	4.2.1, 4.9.1, 4.12.2
Roberts	Roseanne	Bundjalung Nation Aboriginal Cultural Heritage Natural Resource Environment Management Committee/ Reference Group (Jugan Yubay)	29	4.1.3, 4.3.2, 4.5.2
Ryan	Joan	Individual	30	4.2.1
Schiller	Margaret	Individual	14	4.2.1, 4.4.6, 4.10.4
Shardlow	Warren	Individual	3	4.1.1, 4.1.2, 4.1.3, 4.4.1, 4.5.1, 4.7.4, 4.8.3, 4.11.3, 4.11.4, 4.12.1, 4.12.3, 4.14.1, 4.18.1
Smith	Lindy	Individual	79	4.1.2, 4.1.3, 4.1.4, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.6, 4.4.7, 4.6.1, 4.9.3, 4.9.7, 4.11.4, 4.12.1, 4.12.3, 4.12.4, 4.14.1, 4.15.1, 4.17.1
Spragg	Jennifer E.	Individual	31	4.1.1, 4.1.2, 4.1.3, 4.4.2, 4.5.2, 4.6.3, 4.9.3, 4.9.7, 4.10.1, 4.10.4, 4.11.2, 4.11.3, 4.12.1, 4.12.3, 4.12.4, 4.18.1

Surname	First Name	Organisation	Submission Number	Section Where Issues are Addressed
Spragg	R.	Northern Rivers Trains for the Future Inc.	27	4.1.1, 4.1.2, 4.1.3, 4.4.3, 4.4.4, 4.5.2, 4.7.4, 4.8.3, 4.18.1
Stephenson	Colin	Tugun Progress Association Inc.	9	4.1.1, 4.9.1, 4.9.3, 4.11.2, 4.11.4, 4.12.2, 4.14.1
Stevens	Arron	Upper North Coast Aboriginal Education Consultative Group	23	4.3.2
Summers	Joyce	Tweed Aboriginal Cultural Advisory Committee	45	4.1.3, 4.3.2, 4.5.1, 4.5.2, 4.5.3
Sweeney	John	Individual	67	4.3.2, 4.4.2, 4.5.1, 4.5.2, 4.6.1, 4.6.2, 4.7.1, 4.7.4, 4.9.3, 4.11.3, 4.12.1, 4.17.1
Thompson	David	Department of Infrastructure, Planning and Natural Resources (North Coast Region)	83	4.6.1, 4.6.3, 4.16.1, 4.16.2
Thompson	Valerie	Total Environment Centre Inc.	73	4.3.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.5.1, 4.5.2, 4.6.2, 4.14.1
Thornton	Barry	Price & Roobottom Solicitors	38	4.1.3, 4.3.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.7, 4.7.4, 4.9.1, 4.9.2, 4.9.3, 4.9.6, 4.9.7, 4.10.1, 4.12.1, 4.12.4
Townsend	Janet	Individual	80	4.1.1, 4.1.3, 4.3.2, 4.4.1, 4.4.4, 4.4.5, 4.5.2, 4.11.2
van Rij	Reg	Leda Manorsted Pty Ltd	65	4.3.1,
Watt	Margaret	Individual	66	4.1.3, 4.4.3, 4.4.4, 4.4.6, 4.5.2, 4.11.2
Wheildon	Stella	Ngarakwal Peoples	84	4.1.4, 4.5.1, 4.5.2, 4.5.3, 4.5.4, 4.6.2, 4.9.4, 4.14.1, 4.18.1
Whiffin	M.R.	Individual	12	4.10.4
White	Damian	Individual	36	4.1.3, 4.3.2, 4.4.1, 4.4.2, 4.4.4, 4.4.6, 4.15.1, 4.17.1
Williams	Garry T	Individual	18	4.1.2, 4.1.3, 4.3.2

4.1 Planning Process, Justification and Statutory Position

4.1.1 Planning Process

In summary, the respondents to the EIS raised the following issues:

- The Bypass would not provide a long-term solution, the EIS states that the current level of vehicle use of the Gold Coast Highway would return resulting in the same socio-economic problems.
- The Bypass would not help the existing traffic problems at Banora Point / Tweed Heads South or Sextons Hill. It is considered that the Bypass facilitates the need for the Banora Point deviation.
- There has been a lack of initiative and co-operation shown by all Governments involved in the Proposal regarding the utilisation of Lot 319 to allow for the re-alignment of the Bypass.
- The planning process for the Proposal has been inadequate. Prompt action by the State and Federal Governments to consider and implement an emergency route for interstate traffic to bypass the Gold Coast Highway at Tugun is required.
- The decommissioning of the rail corridor to Tugun did not make adequate provision for alternative transport infrastructure. The initial construction of the rail link to Coolangatta would significantly reduce traffic levels and would enable a better assessment as to whether additional road capacity is required. Additionally, there would be significant environmental and economic benefits in managing the impacts of the Proposal and the rail link simultaneously should they both be required.
- The planning for the Bypass has become complicated as a result of the number of stakeholders involved. A holistic strategic re-think is needed with the input of all the stakeholders and government agencies to devise a comprehensive transport strategy.
- The planning for the Bypass has not followed due process and in achieving the objectives, this Proposal would not respect the existing State and Federal legislation.
- A long-term study into the overall direct, indirect and cumulative impacts stemming from the road corridor and associated infrastructure is recommended, so that results can be used to inform future road design and construction activities.
- To solve the existing traffic problems, there needs to be a joint Government approach to effective public transport, a far western bypass for interstate traffic and an upgrade of existing roads. This 'three-pronged' approach would have major environmental and social benefits.
- Local Council is not working with the State Government to upgrade Kennedy Drive which is considered to be a major problem for residents and the overall amenity of the area.
- There is no strategy for demand management to prevent the ever-increasing use of motor vehicles and invest in improved public transport.

Submission Numbers:
3, 9, 17, 27, 31, 47, 57, 59, 60, 61, 62, 69, 74, 80

Response:
The EIS acknowledges that traffic numbers on the Gold Coast Highway would return to levels similar to current flows in around 2027. In the interim there would be a significant reduction in traffic movements that would improve amenity and present opportunities for improvements to public transport. The 20 year life of the Bypass is considered to be acceptable practise in transport planning.

Traffic modelling undertaken as part of the impact assessment shows that the Tugun Bypass would not have an impact on traffic movements at Banora Point. The RTA is currently investigating the upgrade of Sextons Hill and Banora Point which began in 2004. The

cumulative impacts of the Proposal and its interactions with other proposed road upgrades, such as the upgrade of Sextons Hill and Banora Point are discussed in Chapter 17 of the EIS.

Alternative routes which did not require (or substantially minimised) acquisition from Lot 319 were investigated during the route selection process. This included Options A, B1, B2, C2 and C4. Subsequent evaluation (1999) indicated that the C4 option achieved an optimum balance between engineering, environmental and social factors. Following the adoption of C4 detailed environmental studies were commissioned and the initial engineering design work refined. The results of these studies identified a number of matters that required the modification of the C4 alignment. This included airport operational matters and flora of national significance. Constraints to the West (Cobaki Broadwater) subsequently required that the C4 option be re-aligned through a portion of Lot 319.

The roles and responsibilities of the Commonwealth, Queensland and NSW Governments and their agencies are set out in Chapter 2 of the EIS. The display of the EIS and the subsequent preparation of this Submissions Report is part of a statutory process necessary to seek approval for a Bypass of the Gold Coast Highway at Tugun. The EIS has been prepared in accordance with the requirements of Commonwealth, NSW and Queensland legislation. Chapter 2 of the EIS details the approval processes that are required for the Proposal.

The Bypass would provide an alternative high speed route. In the event of an accident traffic would be diverted to the Highway.

The construction of the rail link to Coolangatta would not provide an alternative for the road users on interstate and through journeys as it terminates at the Gold Coast Airport. The Tugun to Coolangatta rail link is planned at some time in the future and the combined impacts of the road and rail have been considered in Chapter 17 of the EIS.

The Proposal has been developed within the framework of transport planning policies developed by existing Commonwealth, State and local governments which are described in Chapter 4 of the EIS. The *Southern Gold Coast – Tweed Corridor Study* identified the need for road and rail improvements in the area, of which the Tugun Bypass is one component.

The requirement for a long-term study into the overall direct, indirect and cumulative impacts is noted. The EIS contains an extensive range of mitigation and monitoring commitments that would fulfil the requirements of the suggested study. Chapter 18 of the EIS provides summaries of these, while Chapter 17 discusses the cumulative impacts.

It is beyond the scope of the EIS to initiate a joint Government approach to effective public transport. The 'far western' options for a bypass such as the one previously investigated by QDMR but they were ruled out because of predicted limited usage, the impact on homes and the environment and high cost. The need for the Tugun Bypass is driven mainly by the growth in local and intra-regional traffic. Traffic figures show that a bypass built further inland would not solve this local traffic congestion as it would only divert a small percentage of the current traffic travelling between Tweed Heads and Currumbin. Even assuming that most of the current 15,000 vehicles per day at Chinderah would be attracted to an inland bypass, this represents less than 25% of the current traffic demand at Tugun, which is 65,000 – 70,000 vehicles per day. Preliminary costing for a dual carriageway road would be approximately $1 billion which is more than twice the funds already allocated for the C4 route. Its comparatively high cost and relatively low traffic demand mean that a major inland bypass is not economically justifiable at this stage.

The upgrading of Kennedy Drive is outside the scope of the EIS.

The primary purpose of the Tugun Bypass is to provide a high speed transport corridor that separates commercial vehicles from local traffic. The need for such a link is acknowledged by local, state and commonwealth governments and has been documented since 1969. The development of this bypass is anticipated to reduce traffic along the existing Gold Coast Highway by 55%. This would reduce congestion and present a number of opportunities which would improve the local system of public transport. The design of the Tugun Bypass also allows for a rail corridor along its length to Gold Coast Airport.

4.1.2 Justification

In summary, the respondents to the EIS raised the following issues:

- The Proposal cannot be justified on an outdated report on environmental values, which only provides suggested solutions to certain problems and has subsequently been superseded by research of higher quality.
- Any belief that residents could be encouraged to use public transport to ease traffic conditions is totally unrealistic.
- The Proposal is not justified in the long-term and fails to consider the long-term transport needs of the region.
- The Bypass would not provide for a sustainable mode of transport, and would lead to an increase in car dependence. The rail extension would be a more sustainable transport facility and is a more cost-effective option.
- There are currently three major traffic corridors between the coast and the Gold Coast Airport. There is no justification to providing another traffic corridor which would increase the amount of traffic as the majority of traffic would continue to use the existing corridor because it has a local origin or destination.
- The Bypass would not be a true bypass as heavy vehicles with dangerous goods would not be able to use it.
- The Bypass route is primarily to service residential, industrial and Airport development and has more to do with facilitating Airport developments and suffers from a number of conflicts of interest.
- The justification for Proposal has been driven by political and commercial interests. The Government has refused to explore the traffic problems at Tugun in an objective and meaningful manner.
- The major factors when considering the need for the Tugun Bypass are the safety of road users and the concerns of local residents; then the economics of inter-city and interstate trade; and then the ecological values.
- To spend over $60 million (compared with $11.7 for Chinderah to Yelgun) on each kilometre of Highway for the Proposal is not justified, especially when there are many other black spots around the region and State that require urgent attention.
- There has been a failure to upgrade the existing Highway which has exacerbated the situation and has encouraged a belief in the public that the congestion at Tugun is the worst on the Gold Coast and can only be fixed by developing the Bypass.
- The congestion and delays of the existing Highway are no worse than elsewhere on the Gold Coast or indeed in most coastal towns and tourist destinations. The congestion and delays cannot be considered a justification for the Proposal.
- Local residents who frequently travel on the Gold Coast Highway at Tugun dispute that there are traffic delays of 'up to an hour or more'. It is stated that travel times from Stewart Road to Kennedy Drive would increase without the Bypass, but nothing is said about a reduction of this increase if an effective public transport system was initiated, or if the existing Highway was modified.

Submission Numbers:
3, 18, 27, 31, 40, 41, 51, 57, 60, 62, 74, 79

Response:
The environmental impact assessment process that was undertaken to produce the EIS began in 2000 and continued with the SIS Addendum and additional assessments being undertaken during the preparation of this Submissions Report. The results of the earlier studies were used to refine the concept design for the Proposal. Further studies were also commissioned to ensure that all aspects of the various environmental issues were fully understood. The content of the EIS was therefore based on the preceding four years of research, survey and studies. It is understood that the research referred to is the work undertaken by Hero and Philips which is included in the appendices of Technical Paper 12. This research formed the basis of further studies that have been undertaken since 2000.

A number of State and local government planning and transport strategies have set targets for utilisation of public transport.

The Queensland State government has committed $123M to update the rail network, including

- A new railway station at Reedy Creek and link it to Robina by laying a 4.1km extension of the Gold Coast line. This is due for completion in mid-2009, at a total cost of $35 million;
- Duplication of the 15.9 km railway line between Helensvale and Robina, creating more capacity for increased Gold Coast rail services. This is due for completion by late 2008 at a cost of $88 million;
- Building 300m of rail tunnel, eight new rail bridges, four new road bridges, 460m of new road, about 600 car spaces, five bus bays and a kiss-and-ride; and
- Building a new transit interchange at Reedy Creek, to link trains with bus and taxi services to the coastal strip and the Tweed.

The expected life of the Bypass is approximately 20 years, which is the required timeframe to be assessed under RTA road transport planning guidelines. Beyond the 20 year horizon other alternatives would need to be considered. The *Southern Gold Coast – Tweed Corridor Study* identified the upgrading of the Gold Coast Highway to six lanes as one option.

The objectives of the Bypass are to separate through traffic from local traffic and to provide a motorway standard link between the existing Pacific Motorway in Queensland and the Pacific Highway in NSW. It is considered that the Proposal would not be a direct contributor to car dependence in the Tweeds Head / Gold Coast Region. Additionally, the Proposal would create opportunities to improve public transport on the existing Gold Coast Highway. Land is reserved in Queensland for the provision of a rail link to the Gold Coast Airport in the future. This rail link was also identified in the *Southern Gold Coast – Tweed Corridor Study* as one of the required road and rail improvements for the corridor.

There are not three separate corridors, there is a single corridor consisting of a major carriageway and service roads. Traffic surveys undertaken in Queensland and NSW show that 55% of vehicle movements between Terranora Creek and Currumbin Creek are through movements. The majority of these vehicles would use the Bypass once constructed resulting in a corresponding decrease in traffic on the existing corridor.

The diversion of 55% of existing traffic to the Bypass would have a significant effect on traffic flows along the existing corridor and so can be considered to function as a Bypass. The barring of vehicles carrying Type I and IIa dangerous goods from the tunnel would require

them to continue to use the existing route, but as they only make up one percent of all vehicles this would not result is any significant change to the number of such vehicles using the existing corridor. This issue is discussed in Chapter 11 of the EIS.

There is no direct connection from the Bypass to the Gold Coast Airport, future residential developments or to the Gold Coast Airport's proposed western industrial precinct. Existing access to the area of Airport land that would be to the west of the Bypass would be maintained with the construction of an access overbridge. Access to future industrial land at the southern interchange was at the request of Tweed Shire Council to reduce traffic on Kennedy Drive.

The existing road corridor suffers from excessive traffic volumes causing travel time delays and increasing driver frustration. Increasing population growth in the area has resulted in increased vehicle movements that compound the existing situation. The development of the Bypass has been driven by the existing traffic problems and planning and transport strategies that have identified its need. The community consultation process undertaken has shown that 80% of the community support a route to the west of the Airport. The safety of road users, the concerns of local residents, the economics of inter-city and interstate trade and the area's ecological values were all included in the assessment of the need for the Bypass. These are discussed in Chapters 4 and 5 of the EIS.

Different physical and environmental conditions are found along the Yelgun to Chinderah Bypass when compared with the Tugun Bypass. The different conditions mean that it is not possible to directly compare the costs of the two projects as very different methods of construction are required for each. The cost-benefit analysis for the Bypass shows that road user benefits, such as reduced accidents and shorter travel times, outweigh the costs.

A number of options for managing the interchanges and lights of the existing Gold Coast Highway have been assessed by QDMR. Some options provide some short-term improvement but none provide a solution that would have life of more than five years. The Proposal presents a long-term, 20 year solution to the existing problems.

The Pacific Motorway in Queensland provides a high standard route, in conjunction with viable alternative arterials for local traffic, along its entire length. Tugun is the only remaining location within the Gold Coast where there is a low standard highway, and no viable alternative. In NSW, all remaining low standard sections of the Pacific Highway between Newcastle and the Queensland border are planned to be upgraded to high standard dual carriageways, including bypasses of most coastal towns.

The travel times presented in the EIS have been derived from recorded travel times along the existing Gold Coast Highway. Travel times vary at different times of the day and year with peak hour journeys and journeys during peak holiday periods taking considerably longer than those undertaken during the mid-morning and mid-afternoon.

4.1.3 Route Selection

In summary, the respondents to the EIS raised the following issues:

- The Tweed Heads / Gold Coast section of the National Highway is a strategically important section and should be totally re-routed, so as to benefit residents of both States.
- A far western route should be considered and it is supported by more than 90% of the community. The far western route is justified as a result of the combination of a number of impacts that the C4 route would have on the community, ecology and the cultural heritage of the area.

- The C4 route is an unsatisfactory option and as a result of the ecological, social, economic, and cultural impacts, is not justifiable. The impacts from this route would be far-reaching and in addition to the direct impacts the route would indirectly impact on the remainder of the other sensitive areas which are not impacted through construction. There are much more effective, sustainable and economically viable alternatives that would support the objectives of the Proposal.
- The C4 route does not solve the existing traffic issues that would continue for the existing Highway or provide for future generations. The option would not constitute any improvement on the existing situation and should not be the preferred option.
- An alternative and viable route to C4 would involve modifying the existing Highway with over / underpasses at the northern end of the existing Pacific Motorway junction, at the Boyd Street intersection and at the Airport entrance.
- The existing Highway can be improved sooner with less damage to the environment and would be relatively inexpensive. Existing adjacent landuses are already adapted to a highway and residents have deliberately chosen to live there irrespective of the probable noise levels.
- Visual impacts would be worse for routes A and B3 than for C1 and C4, but this appears to be mainly because of their impacts on populated areas along the existing Highway, rather than their impacts on natural landform. From other viewpoints, for example, from the air, the C options would have a greater negative visual impact than the A or B Options.
- The adoption of either the Al or A2 route with the addition of a covered tunnel would eliminate the need for the C4 route. The use of tunnelling in association with the A options would significantly enhance the ranking afforded to some of the criteria and therefore enhance their desirability.
- It appears that matters of safety, efficiency, social impacts and land use have been regarded as more important than visual, ecological and Airport impacts, but this is not explicitly stated nor have any weighting been made transparent for the route selection process. It is not clear how mitigation / compensation potential have been taken into account in assessing relative merits of the route alternatives.
- The route selection process is significantly flawed and the alternatives that are currently proposed have not been explored in an objective and meaningful manner. The ranking of alternatives is subjective and there is no weighting of the various criteria.
- Alternatives of a tunnel beneath the existing Highway, or at least below Tugun Heights provide potential benefits to the public. However, they were not considered or subject to any evaluation, despite their obvious advantages in meeting environmental, visual impact and urban design objectives of the route selection and design processes.
- It would be wrong to discount the A options if it is purely because of potential disruption to traffic in the short-term. Advice from consulting engineers maintains that there would not to be any significant disruption to traffic during the construction phase.
- A number of combined options should be considered. These include upgrading the existing Highway, providing alternative or improved public transport options, investigating a far western route option and upgrading Mt Lindsay Highway and / or upgrading the route between Beaudesert and Kyogle (estimated at $100M).

- One of the criteria used for comparison between the various options was the comparative costs. However, this did not take into account changes to the *Gold Coast City Council Planning Scheme* in August 2003. The Planning Scheme as allowed a greater density of development on the Pacific Beach estate and accordingly, the resumption costs of Stages 3 and 4 of Precinct C of the Pacific Beach development have increased by over $10M. The costs of C4 are no longer accurate and fail to take into account important cost criteria which heavily favour the consideration of the Q94 route option.
- The value management study undertaken did not consider the Q94 route option despite it being the intended route in 1994. The Q94 route meets the objectives of the Proposal and would rate very favourably against the other options on all evaluation criteria.
- The adoption of the Q94 route would not significantly affect the Cobaki Long-nosed Potoroo population despite it resulting in a small loss of habitat. There is no basis to preclude the Q94 route for consideration on environmental grounds.
- The alternative route options considered are too restrictive and the comparison of A options with the other options was unclear.
- The C4 route was a predetermined option which was motivated by political factors, commercial and residential development considerations. Disregard to due process has resulted in a route selection process which was flawed and has invalidated the whole EIS process.
- The capability of the existing Highway corridor to be widened to eight lanes with retention of service roads and landscaping has not been acknowledged. Why have the upgrade of the Gold Coast Highway and the resumption of residential properties to build an alternate M1 / Gold Coast Highway interchange at Boyd Street been rejected even though there is open space and recreation grounds and reserves available?
- Consideration of the rail corridor in the route selection process has resulted in a number of conflicting arguments. Claims are made that a rail corridor along the A route options would require major earthworks, but this is exactly what is required for a rail corridor along the C4 route. Why it is feasible to construct a rail corridor through wetlands and under runways, but it is not possible to do so in a tunnel under / alongside the existing Gold Coast Highway?
- Both A1 and A2 are viable route options which offer similar features to those offered by the C4 route regarding the separation of traffic types and reduced travel times. The C4 route also offers a reduced accident rate and accident severity along the existing Highway, however in comparison to the A2 route, the C4 route does not provide any overpasses or tunnels at intersections along the existing Highway to the benefit of the local traffic.
- A number of alternative route options were considered but eliminated because they were either prohibitively expensive and / or they did not meet the primary objectives of the Proposal. As far as the issue of cost is concerned, this argument is unacceptable.
- An alternative to the A2 route option which includes a combination of overpasses and short tunnels plus extra lanes on the existing Gold Coast Highway should be considered.
- The B1 route option should be seen in conjunction with the alternatives A1 and A2 rather than in separation. There are a number of advantages presented by the A1, A2 or B1 alternatives over the preferred C4 route, which include timing, costs environmental impacts.

- As a short-tem solution to traffic delays at Tugun, an updated A option should be considered which allows the free traffic flow by bypassing traffic lights. In acknowledging this short-term solution, there is still the need to upgrade the traffic corridor that exists between Tugun and Bilinga, as local traffic would increase to 50,000 vehicles in 2017.
- When the Stewart Road to Gold Coast Airport rail link impact assessment study is completed it is anticipated that a better value option in comparison to the C4 route would be determined in regards to cost and the level of environmental impacts.

Submission Numbers:
3, 18, 19, 25, 27, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 51, 53, 54, 55, 57, 59, 60, 62, 63, 66, 68, 70, 71, 72, 74, 75, 76, 79, 80, 82, 86

Responses:
The construction of the Bypass would result in a new route for interstate traffic travelling between NSW and Queensland and replace a lower standard road between two higher standard sections (once the Banora Point Deviation is completed).

There have been no reports or survey data provided to support the suggestion that more than 90% of the community support a far western route. Community consultation undertaken as part of the *Southern Gold Coast – Tweed Corridor Study* showed that 80% of community supported a route to the west of the Airport.

The far western route was not considered during the route selection process and has not been subject to detailed assessment. However, initial feasibility studies undertaken for the far western route show the cost would be $1 billion. In addition, traffic counts undertaken at the northern end of the Yelgun to Chinderah Bypass show that 14,000 vehicles per day are currently using the road. The number of vehicles north of Terranora Creek rises to 51000 vehicles per day and 70000 vehicles per day use the Gold Coast Highway at Tugun. The increase in vehicles per day north from Yelgun to Chinderah to the southern Gold Coast shows that there is significant demand for a coastal route to service local through trips that originate or terminate between Chinderah and Burleigh Heads. The far western route would provide an alternative for some of the interstate traffic but would not provide an alternative for the 50,000 or so vehicles per day that travel the coastal strip. Patronage of the far western route would then be in the order of 10-15,000 vehicles per day. The far western route was discounted as a viable alternative as it is double the cost and would only attract half the traffic that would use the Bypass. Other disadvantages of a far western route include:

- A 20km long route versus 7km for the C4 route;
- Up to several kilometres of tunnels under the border ranges;
- Bridges to cross several major waterways including the Tweed River and its floodplain;
- Seven interchanges versus two for the C4 route;
- Resumption of up to 70 residences versus two unit blocks for the C4 route acquired in 2002; and
- Inability to provide staged construction, so a bypass would not be achieved until construction was complete.

The route selection process which followed the *Southern Gold Coast – Tweed Corridor Study* assessed the options and considered a range of economic, social and environmental issues. The C4 route was chosen as the preferred route to remove negative environmental impacts from the communities of Tugun and Bilinga, while recognising that it had other environmental impacts. The EIS addresses these impacts and has provided a range of mitigation measures.

An Intergovernmental Working Party was formed in August 2002 comprising senior representatives of the Commonwealth, NSW and Queensland governments. The working party noted that while the scope of Option C4 had undergone considerable refinement since the route selection process in 1999, comparable refinement of the rejected options had not been undertaken. The working party felt that the lack of refinement could lead to the view that the options assessment process was biased towards the western options. In order to address this, the working party undertook a review of the options. The working party adopted a phased approach to the review of options. The first stage determined the better of the eastern routes by comparing the A options to the B options. A number of revised or refined options were also considered where appropriate. The conclusion of this review, the working party endorsed the decision to proceed with obtaining planning and environmental approvals for the preferred C4 option for the Tugun Bypass. Further information regarding the outcomes of the review is provided in Chapter 5 of the EIS.

Additionally, it should be noted that the C4 route was refined to avoid or minimise impacts on known areas of ecological importance. This included refining the alignment through Hidden Valley and development of a launched bridge design, alterations of the alignment to avoid populations of Swamp Orchids and optimising the alignment to reduce the road corridor impact on habitat of threatened frog species and the Long-nosed Potoroo.

Traffic studies undertaken for the EIS show that there would be a reduction of 55% in the number of vehicles travelling along the existing Gold Coast Highway if the Bypass is built. The Proponents consider that this would be a significant improvement over the existing situation.

In reference to more effective, sustainable and economically viable alternatives that would support the objectives of the Proposal, the operation and maintenance costs for the C4 tunnel are no more expensive than other similar tunnels. The operation and maintenance costs were included in the economic analysis set out in Chapter 19 of the EIS.

Possible upgrades to the existing Highway were considered as the A route options during the route selection process. The options included;

- A1: 6 lane at-grade widening (upgradeable to 8), 80km/h, all grade separated interchanges. This option has limited life (10-15 years) and does not achieve 100 km/hr speed criterion.
- A2: Separate 6 lane elevated roadway south of Pacific Highway/Gold Coast Highway intersection adjacent to or over the existing Gold Coast Highway, 80km/h north through Tugun Hill, 100km/h to south, grade-separated interchanges.
- A (new) a new alignment developed to try and meet the primary objectives. 100km/h through Tugun and Currumbin Hill, grade separated interchanges, separate corridor beside existing Gold Coast Highway south from Boyd Street.
- PPK 'A'*: 90km/h through Tugun and Currumbin Hill, grade separated interchanges, 4.0km elevated road over existing Gold Coast Highway south from Toolona Street.
- GECKO 'A' **: 80km/hr 4.2km 'cut and cover' tunnel including 3 lanes each direction for Pacific Highway. Gold Coast Highway constructed over tunnel. Interchanges at Stewart Road and Gold Coast Airport.

* PPK Environment and Infrastructure (now Parsons Brinckerhoff) – independent consultants engaged by QDMR to undertake detailed environmental assessment for the Tugun Bypass:
**GECKO – Gold Coast & Hinterland Environment Council – local environmental group.

The existing road (Gold Coast Highway) follows an alignment that is unacceptable for rail. This combined with the steep terrain meant 'A' rail route options were cost prohibitive.

The A options were discarded for the following reasons:

- The cost of providing a 100km/hr alignment is excessively more than the other B or C route options, with greater impacts on adjoining residents;
- Fail to fully satisfy any of the functional or strategic objectives;
- Impact heavily on the community, motorists, and amenity of the Tugun and Bilinga area;
- A rail link proposed to the Gold Coast Airport is unable to follow the A options. The rail link would therefore need a separate corridor similar to the B or C options which creates a double impact on the community; and
- The provision of a separate road corridor for interstate movements along the A options would need significant above or below ground structures. This is expensive, difficult to build without disruption, may be regarded as visually unacceptable, would lead to an increased level of community severance and would not allow for future upgrades.

Further information regarding the A options and the elimination of A options from the route selection process is provided in Chapter 5 of the EIS and *Southern Gold Coast – Tweed Corridor Study* and *Pacific Highway at Tugun Route Selection Report*.

The adoption of either the Al or A2 route with the addition of a covered tunnel was investigated by the Proponents in 2003 and considered as a variation of the A options. It was not considered further due to an excessive cost of $485M (in 2003 dollars).

There is a difference in the construction techniques for road tunnels versus rail tunnels due to the existing geotechnical environment in the area. The rail tunnels are relatively narrow and the clearance envelope for the carriages can be contained within a standard boring machines dimensions and then reinforced as the machines continues into the cutting face. The road tunnels clearance envelope is rectangular in shape and not conducive to a boring machines excavation capability. The existing geotechnical material is not self supporting after excavation and would require the tunnel to be constructed as an open cut, construct, and cover approach. This creates a substantial impact on the environment, and is expensive to construct.

Upgrades to the existing corridor have the lowest overall level of environmental impacts when assessed against the other options. However, the costs of the above or below ground structures make this the most expensive of the options. The comments that this is an inexpensive option are not supported by assessments undertaken for the EIS, which have been subject to independent review. In addition, the Proponents have received complaints from residents along the existing route about the levels of traffic noise resulting from increases in vehicle numbers.

An aerial perspective of visual impacts is one that would be viewed by a very small proportion of people. The assessment of visual impacts has focused on those areas where views of the Proposal would be seen by the majority of the population, such as local residents and the road users on the Bypass, as opposed to a very small number of airline passengers who would only have fleeting glimpses of the road from one side of the aircraft.

The route selection process and accompanying value management workshop were conducted in accordance with accepted practise for such activities. As with any issue there is a spectrum of opinions within the community which results in differing views on the suitability of various options. The outcome of the evaluation of options by all the stakeholder representatives at the workshop was that C4 was the highest ranked option. Details of the process and outcomes of the route selection workshop are presented in

Appendix E of the EIS. The workshop ranked the criteria in the following order of descending importance:

- Safety;
- Natural environment;
- Transport efficiency;
- Social impact;
- Airport impact;
- Land use planning; and
- Visual impact.

A full description of the ranking of the criteria and the process of paired comparisons is presented in Appendix E of the EIS. Mitigation measures and compensatory packages are typically developed after the preferred route has been chosen and are a result of the refinement to the initial design that takes place as detailed studies provide more information about the study area.

The route options were reassessed during the impact assessment process, with the review undertaken by an intergovernmental working party consisting of representatives from the RTA, QDMR and the Commonwealth Department of Transport and Regional Services (DoTARS). The reassessment of options discarded the A options and endorsed the decision to proceed with obtaining planning and environmental approvals for the C4 route, while retaining the B options as a fall back position if approvals were not obtained for C4. However, none of the impacts identified during the assessment process were considered to justify revaluation of the route selection process.

A number of the suggestions regarding a 'combined options' approach are outside the scope of this Proposal. These include public transport options for northern NSW and the upgrade of the Mt Lindsay Highway. Additionally, the route selection process was confined to the study area described in the route selection report. The suggestion that a far western route between Beaudesert and Kyogle would cost $100M has not been assessed by the proponents.

The estimated cost of all the options is for comparative purposes and is not one of the selection criteria in the Route Selection or the Value Management Study. Contingency amounts are included in all estimate options for known and unknown cost increases. The $10M extra value for the Pacific Beach estate lands quoted as the extra cost following approval of Gold Coast City Council's Planning Scheme is not based on a standard valuation procedure, and is not considered to substantially influence the decision to proceed with the current Proposal. Avoiding this property and using the Q94 route would impact further on the environment (namely the endangered Cobaki Potoroo population, and an endangered orchid).

The Q94 route was identified in the early 1980s with acquisition for land for that corridor being completed on the Queensland portion of the corridor in the late 1980s. However, the C4 route has been chosen for the Proposal in place of the Q94 route. The Q94 route does not satisfy the requirements for the functionality of the Proposal as a result of the following:

- The Q94 route did not incorporate a rail corridor which was later identified as part of the *Integrated Regional Transport Plan for South East Queensland* (1997). To provide for a rail alignment on the Q94 route would result in further property acquisition costs.
- The Q94 route in the 1980s was based entirely on geometric, constructability, and cost considerations. The selection of the alignment at that time did not consider in great detail the natural environmental aspects of the area. With the introduction of

legislation to protect known and unknown environmentally sensitive components of significance, QDMR was required to undertake extensive analysis and assessment of the natural, social, and economic environment of the area around the Q94 route. This environmental impact assessment identified a number of constraints that required amendment of the Q94 alignment.

The C4 route identified in the value management workshop in 1999, on the Queensland portion of the Proposal, was very similar to the Q94 route. However, due to the geometric constraints of rail (horizontal and vertical alignment requirements for rail and their interface with the road geometry at the rail tunnel portal), and the environmental aspects in the area, the C4 alignment deviated from the Q94 alignment to move eastwards against the rail alignment to form a combined road and rail corridor and provide an appropriate interface between road and rail at the tunnel portal. Further information on the realignment of the C4 route is provided in Section 5.6 of EIS.

The view that the construction of the Bypass through the centre of the remaining habitat for the Cobaki Long-nosed Potoroo would not result in a significant impact is not supported by the team of ecologists used by the Proponents, DEC, and DEH. The sensitivity of the remaining population to further disturbance and habitat loss is evidenced by its listing as an Endangered Population under the TSC Act and the inclusion of the species under the EPBC Act. The Proponents view is that the adoption of the Q94 route would result in the extinction of the population.

The route selection process was confined to a study area defined by the approval agencies, as defined in other transport network strategies since 1966. Transport planning over a much larger area is undertaken through the development of local, regional and national transport strategies and so is beyond the scope of a single project. The A options were compared against both the B and C options during the route selection process. Full details of the comparison of the various options are provided in Chapter 5 of the EIS.

The community in Tugun and Bilinga expressed to QDMR that they do not want the Bypass in or near their community. This was tested when QDMR tried to develop a staged approach to the Proposal by constructing the northern section on the C4 alignment and then connecting to the Gold Coast Highway adjacent to Boyd Street, using the open playing fields, and resuming a number of properties. QDMR also consulted the community on a Proposal known as B4 which followed the C4 route from Stewart Road to Boyd Street, then went along the northern end of the Airport and then on the eastern side of the Airport adjacent to Adina Avenue. In addition to the community response on these proposals, it was difficult and therefore expensive for either the B4 or temporary link options to fully satisfy the objectives of providing a Bypass. The three key objectives that were difficult to meet were, separating interstate traffic from local and tourist trips, providing for a high speed alignment (100km/hr), and providing for future rail.

Regarding the comparison of the A1 and A2 route options with the C4 route, a full description of the Route Selection process is included in Appendix E of the EIS. Additionally, it is considered that the 55% reduction in vehicles using the Gold Coast Highway (as provided by the C4 route) would result in a proportionate decrease in accident rates.

An alternative to the A2 route option which includes a combination of overpasses and short tunnels plus extra lanes on the existing Gold Coast Highway was considered early in the concept phase of the Proposal. However it was not considered further due to the following reasons:

- It would be difficult to provide for a 100km/hr design speed;

- It would be unsafe to introduce weaving movements between the interstate traffic and the local traffic;
- There were considerable reconstruction works required at each of the overpass / interchange points associated with the service roads, and subsequent impacts on residential and business properties;
- It was difficult to construct under traffic;
- There would have been considerable impact on the community during the construction phase; and
- It did not provide for rail as well as other options.

It is acknowledged that construction along the existing Highway corridor could be initiated quickly, but the works would not solve the traffic problems in the Tugun and Bilinga area. To provide a Bypass along the A option that achieved the objectives of the Proposal would result in a higher construction cost and a similar maintenance cost to the C4 route. There is minimal impact on structures along the C4 route, however there would be a number of impacts on structures along the A and B routes if those routes were designed to achieve the objectives.

The combined impacts of the Bypass and the rail link are assessed in Chapter 17of the EIS. The preparation of the EIS has involved detailed assessment of all environmental issues associated with the study area. The assessment adopted a 2km wide study area to ensure that impacts away from the immediate footprint of the Proposal were also considered. The results from the studies provided a framework for assessing the impacts of the Proposal and those of associated Proposals and activities. At the start of the process, the study area was known to have a number of high environmental values, particularly those associated with flora and fauna. The studies have confirmed this and have also provided additional data and information which has greatly increased knowledge of the environment of the study area.

Other known or proposed activities or developments that could lead to cumulative impacts have been assessed. The two residential developments proposed either side of the Bypass, close to the NSW-Queensland border, could lead to significant cumulative impacts on the high ecological values of the area if they were to proceed without any mitigation measures. The Cobaki Long-nosed Potoroo population would be most at risk from these developments, with or without the Proposal. Mitigation measures have been identified for possible inclusion in a Potoroo Management Plan. Further consideration of measures identified in the EIS (fencing, predator control and mosaic burning) would be included in development of the Plan along with actions already required as conditions of approval for the Cobaki Lakes development. Development of the plan would also involve relevant agencies (NSW Department of Lands, Department of Environment and Conservation and the Rural Lands Protection Board) and the developers of the Cobaki Lakes area. It would be integrated with GCAL's vegetation management plan for the southern end of the obstacle limitation surface. It would help to secure the ecological values of the area for the future by dedicating a substantial area to conservation purposes.

4.1.4 Statutory Position

In summary, the respondents to the EIS raised the following issues:

- There has been a disregard by all Governments to adhere to the legislation that protects natural and cultural heritage and the Proposal's approval would be seen to undermine the conservation objectives of this legislation. It is essential that the Proposal be assessed against the relevant environmental planning instruments.

- The deletion of the Boyd Street interchange shows a disregard for the rights of the Proponents of the Cobaki Lakes Development and the residents of NSW. This action would appear to represent a clear breach of Section 117 of the Australian Constitution.
- The EIS for the Bypass is flawed, and contravenes NSW and Commonwealth legislation due to conflicts of interest and therefore requires further investigation.
- Is Commonwealth owned Airport land, which covers parts of Cobaki Broadwater, a Commonwealth Marine Area? New requirements would see that monitoring and measuring of the surface and groundwater is undertaken before these waters mix with the road drainage that enters into Cobaki Broadwater should this be the case.
- It has been determined that the Proposal is considered to be a controlled action under the EPBC Act and would require the approval from the Commonwealth Minister for the Environment and Heritage. Adjacent landuse development facilitated by the Bypass should be included in this process.
- The application of SEPP 63 to the Proposal is of concern, as it would allow a number of planning instruments designed to protect the environment to be overridden.
- What legal requirements are in place, that the people of one State cannot take class action against another State for pollution of the Tweed River?
- It is considered that the *Human Rights Bill 2005* would help to solve the issues associated with Aboriginal cultural heritage significance and consultation with the Traditional Owners.

Submission Numbers:
62, 64, 71, 72, 74, 76, 79, 84

Responses:
The Director-General of DIPNR, the Director-General of DEC and the Commonwealth Minister of Environment and Heritage have issued their requirements for the assessment of the Proposal. These are included in the EIS as Appendices A and B and as Appendix A of the SIS. The EIS and SIS have been prepared in accordance with these requirements. Approvals for the Proposal are being sought under the relevant State and Commonwealth legislation that deals with the protection of natural and cultural heritage. Chapter 2 of the EIS details the approvals being sought for the Proposal which include approval from the Commonwealth Minister for Environment and Heritage. The application of local environmental plans and State Environment Planning Policies is covered in Chapter 2 of the EIS. In addition, Chapters 2 and 3 of this Submissions Report details the compliance of the EIS and SIS with NSW and Commonwealth legislation.

The impacts associated with the inclusion of an overpass for Boyd Street have been assessed and are presented in Chapter 6 and Appendix B of this Submissions Report. The deletion of the Boyd Street interchange from the Proposal as shown in the route selection report (1999) was to better address the objectives of separating through and local traffic.

The part of Cobaki Broadwater which is covered by the Commonwealth owned Airport land is not considered to be a Commonwealth Marine Area as the waters described are classified as being within the coastal zone under the NSW *Coastal Protection Act 1979*. Therefore they are not classified as a Commonwealth Marine Area as described in Section 24 of the EPBC Act 1999. Surface water run off from the Bypass would be subject to treatment before entering the Cobaki Broadwater to ensure that there is no negative impact on the water quality in the Broadwater.

The Proposal has been listed as a controlled action under the EPBC Act. Although addressed in Chapter 17 of the EIS, adjacent landuse developments were not included in the referral to DEH as the Proponents are not seeking permission for these developments. Any

future adjacent landuse developments which could potentially impact on nationally threatened and migratory species and on issues of significant cultural heritage would be the subject of their own referral to DEH and environmental impact assessment.

SEPP 63 is an enabling instrument, ensuring that a single comprehensive environmental impact assessment is undertaken for a complex proposal such as the Tugun Bypass. The Proponents have recognised the importance of the study area and have provided an extensive range of mitigation measures and management strategies to offset impacts of the Proposal. A summary of the mitigation measures and management strategies is provided in Chapter 18 of the EIS.

Surface water runoff from the Bypass would be subject to treatment prior to discharge to ensure that there is minimal negative impact to the quality of the receiving water. A Soil and water Management Plan would be prepared which would aim to address the risk of polluting the surrounding Cobaki Broadwater and Tweed River.

The utilisation of the *Human Rights Bill 2005* to resolve issues with the Traditional Owners are noted. Since the exhibition of the EIS, two additional cultural heritage assessments have been undertaken on behalf of the Proponents by Eastern Yugambeh Limited and Turnix Pty Limited and Ngarang-Wal Culutral Heritage Management Group (provided in Appendices C and D respectively and summarised in Chapter 6 of this Submissions Report). Additionally, it is anticipated that ongoing communication with Traditional Owners would be undertaken to help refine where subsurface investigation is required and to help in the development of a Cultural Heritage Management Plan.

4.2 Support for the Proposal

4.2.1 Support for the Proposal

In summary, respondents to the EIS raised the following issues:

- Expression of general support for the Proposal.

Submission Numbers:
4, 5, 6, 7, 8, 10, 14, 15, 24, 26, 30, 49, 50, 61, 62, 68, 70, 78, 81

Response:
The support for the Proposal contained in the submissions has been noted.

4.3 Objection to the Proposal

4.3.1 Objection to a component of the Proposal

In summary, respondents to the EIS raised the following issues:

- There is objection to the deletion of the Boyd Street interchange from the Proposal.

Submission Numbers:
20, 64, 65

Response:
The deletion of the Boyd Street interchange from the Proposal as shown in the route selection report (1999) was to better address the objectives of separating through and local traffic. In consultation with Tweed Shire Council it has been agreed that the Boyd Street overpass would not be included in this Proposal.

4.3.2 Objection to the Proposal

In summary, the respondents to the EIS raised the following issues:

- Objection to the Proposal on the basis of major ecological impacts.
- Objection to the Proposal on the basis of social and economic impacts.
- Objection to the Proposal on the basis of Indigenous cultural heritage and education impacts.

Submission Numbers:
18, 19, 21, 23, 25, 28, 29, 35, 36, 38, 41, 45, 47, 53, 57, 62, 63, 67, 71, 72, 73, 74, 75, 76, 80

Response:
The issues of objection are noted. The issues raised in each objection are addressed elsewhere in this Chapter under Biodiversity, Community Impacts and Heritage broad issue types.

Additional information pertaining to the environment has been supplied as part of the Submissions Report. This additional information includes an 8 Part Test of Significance for two species, further information regarding compensatory habitat and threatened species monitoring.

Technical Paper 15 discusses land use planning and socio-economic issues with regards to the Bypass. Additionally, a thorough community consultation process was put in place for the Proposal which provided the local community opportunities to discuss issues regarding social and economic impacts of the Bypass. Details of this can be found Technical Paper 1 of the EIS.

Technical Paper 14 discusses Cultural Heritage, including legislation, results of surveys, conclusions and recommendations and comments from Traditional Owners. Since the exhibition of the EIS, two additional cultural heritage assessments have been undertaken on behalf of the Proponents by Eastern Yugambeh Limited and Turnix Pty Limited and Ngarang-Wal Cultural Heritage Management Group (provided in Appendices C and D respectively and summarised in Chapter 6 of this Submissions Report).

4.4 Biodiversity

4.4.1 Assessment Methodology and Documentation

In summary, the respondents to the EIS raised the following issues:

- The EIS and related documents contradict the views publicly expressed by well-known biologists and botanists and fails to make reference to two major studies by Benwell and Olsen.
- The mitigation measures proposed would not provide for or conserve flora or fauna and would become ineffective should the rail link be constructed. In addition, the EIS makes broad assumptions regarding the effectiveness of proposed mitigation measures considering they have not been scientifically tested.
- The public's confidence in any attempt at mitigation would be reduced if the operation of SEPP 63 prevails.
- It is stated that a 10-year weed management plan would need to be developed and implemented for the Pony Club land, but no mention is made of a similar requirement for GCAL or the State Government owned vegetation communities similarly affected by the Proposal.

- It is assumed that the drainage ponds would be drained to the groundwater to prevent Mosquito Fish migrating, but frogs need to breed at all times and not just after rainfall so draining the basin serves no purpose. There should be no introduction of Mosquito Fish unless they are introduced on purpose and according to Section 29.6 of SIS 'any sediment basins constructed as part of the Proposal would not provide habitat for this introduced species'.
- Toe clipping of translocated frogs should be re-considered. Works undertaken by Dr Michael Mahony, where a transponder is planted under the skin of the species (Passive Integrated Transponder tagging), may provide other opportunities rather than toe clipping. Handling of frogs should also be avoided and it is suggested that recording of numbers and photographic records would be more appropriate.
- Is the statement 'where this is not possible, then areas that are already relatively disturbed would be used for added works' an excuse for mosaic burning? The areas that are already relatively disturbed should be defined.
- Survey areas for the ecology assessments are not appropriate and do not cover key habitat areas. In addition, more recent data should be used or further surveys should be undertaken, particularly for significant fauna and flora species and populations which can change dramatically in five years.
- The Pony Club land is not included in Figures 3.1, 3.2 or 3.3 of the SIS Volume 1. Figure 3.1 also does not include large tracts of land to the north of Cobaki Broadwater.
- In reference to Section 2.6.3 in the EIS Vol. 4, Swamp Mahogany is not suitable Koala habitat and the Koala habitat 'atlas' is incorrect and the recorders are not aware of the preferred food trees for Koalas.
- What type of chain link fencing would be used for the fauna exclusion fencing? It should also be noted that frog exclusion fencing is no deterrent to frogs that are known to climb.
- Remote sensing cameras should be used within the wet / dry culverts to provide valuable scientific data.
- The EIS has not addressed the maintenance of habitat of common or locally significant species, for example *Rattus lutreolus* and *Antechinus flavipes*.
- There is concern for the use of fauna underpasses as they could potentially attract predators of the species that could potential utilise them and they would need to be lengthy which may result in avoidance. It is recommended that reference be made to the Australian Museum Business Services report undertaken in 1997 for the RTA.
- Following a revision of the associated EIS Technical Papers and the SIS, it was apparent that there are a number of inconsistencies within and between these documents. It has been assumed that the SIS contains all information relevant to the flora and fauna assessment process.
- Any flora translocation proposal should be developed using the Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia, 2nd edition, 2004.
- The details of all survey methods should be updated to take into consideration any new surveys undertaken.
- Clarification is required of the ability to undertake acoustic surveys for frog species, particularly given the proximity to the Bypass to known habitat.
- It should be acknowledged that even though cleared land typically does not represent suitable habitat for terrestrial fauna it often becomes important in areas which are subject to disturbance. This is also evident by the apparent identification of some species within the study area being identified in cleared areas.
- It is unclear if any mitigation measures are proposed for estuarine birds.

- Clarification on the distance used for edge effects is required. In general, potential impacts associated with roads generally extend at least 50m from the edge of the road, while some impacts (such as noise) may extend further.
- Habitat pollution has the potential to have a significant impact on flora and fauna species and tight mitigation measures would need to be developed and implemented to ensure that these potential impacts are prevented.
- Figure 6.1 of the SIS is missing the key for fauna movement corridors. It is also noted that no fauna fencing is proposed from the wet / dry culvert to the tunnel, however Section 6.5.5 of SIS indicates that fauna exclusion fencing would be installed within this area.
- Clarification on whether the habitat rehabilitation referred to in Section 6.3 of the SIS is proposed to be undertaken on the existing frog pond(s) is required.
- There are concerns regarding the long-term security of revegetation works associated with the tunnel.
- The actual location of the 33 hollow-bearing trees to be removed should be used in the development of the detailed design as this would enable a clear indication of the actual trees proposed for removal and their location.
- There is some concern about the ability to install the frog exclusion fencing in the most ideal location prior to any clearing operations. Instead of initial permanent fencing, temporary fauna fencing could be considered prior to the finalisation of the fencing.
- A number of mitigation measures are proposed to ensure the maintenance of water quality however, the compatibility for local species within the constructed wetlands should be demonstrated.
- A ratio should be defined for hollow log replacement. Recent construction projects have used, as a minimum, a hollow log / box replacement of 1:1.
- It should be noted that the NSW NPWS did not solely rely on aerial photographs to map regionally significant habitat areas and corridors as suggested. These were only used as part of the refinement process. The information presented on the landscape framework for regional conservation planning should be correctly described.
- It is noted that 'no-go' areas would be identified early. It is recommended that opportunities must be available to identify 'no-go' areas in consultation with relevant conservation agencies.
- It is understood that the development of the rehabilitation and weed management for the Pony Club land is being undertaken in conjunction with the Management Plan to be prepared as part of the Airport runway extension. To avoid potential confusion over the various commitments forming part of the Management Plan, clearer details should be provided on what level of work or commitment is proposed to be undertaken as well as compensatory measures.
- It is noted that after construction of the Airport runway extension there would be an approximately 100m wide corridor which would be revegetated (with suitable vegetation) to allow passage for fauna. The proposal to revegetate this area needs to be clarified with any specific requirements that GCAL may have over this area and the long-term protection of this vegetation.
- A number of mitigation measures refer to the translocation of individual fauna species from the Proposal footprint into suitable surrounding habitat, however there has been no indication on the location of 'suitable habitat'. There has also been a failure to recognise that translocation of fauna species to suitable habitat is likely to impinge upon existing fauna and resources in these areas. Translocation should be not be used as a substitute for the protection of high quality natural areas and the conservation of wild populations in situ.
- It is noted that a box culvert up to 100m long is proposed for a waterway crossing. It is requested that consideration be given to ensure that there are provisions in the

culvert design for light penetration, such as light wells, to assist fish passage through a long culvert.

- The proposal to create artificial ponds is commendable but the ease with which the EIS perceives this to be feasible is not supported. To date, artificial pond construction has not been successful. Any proposal to create artificial ponds must be initiated at least 3 years before construction, and must be proven to be viable for reproduction before construction works commence.
- It is considered that any proposal to translocate flora species would fail as few suitable habitats and weed free areas remain within the Tweed / Gold Coast Region. In addition, plant translocations should not be permissible in 'no-go' areas, as this could disturb surrounding habitat and ecology.
- The habitat fragmentation of the frog sub-population referred to in the EIS is actually severance of a significant breeding population by the extension of the Airport runway.
- The EIS refers to the construction of a launched bridge over Hidden Valley in order to protect ecological values of this area, however no discussion of these values appears in the EIS.
- Some frog sub-populations occur in the area earmarked by GCAL as a future Western Enterprise precinct. Responses provided by GCAL regarding this have been such that it would be addressed in the future as part of another MDP.
- It is acknowledged that 100m of the tunnel surface would be revegetated providing a linkage between the eastern and western sides of the Airport. This corridor would be reduced to 20m if the runway was to be extended to 2858m as is the stated intention of GCAL. It is highly unlikely that this strip could provide any kind of fauna movement corridor.
- The 2002 EIS for the Tugun Bypass included the report 'Amelioration and monitoring measures for the conservation of herpetofauna along the proposed Tugun Bypass' (Hero, Shoo and Phillips, 2001). In the report it states 'we know of no example where the effectiveness of pond creation and under-road culverts has been assessed for any species of reptile or amphibian in Australia'. The current EIS does not include this statement and offers no more up to date information.
- The realignment of the Bypass route to the west reduces the size of the Airport's Environmental Precinct and increases the area identified as the Western Enterprise precinct. This realignment has resulted in the vegetation falling into the Western Enterprise precinct which is assigned for commercial development. In the addition, of the possible sites identified for the location of artificial frog ponds, only four are within the Environmental Precinct and one of these, the single artificial pond that has been trialled, has been a failure. The remaining sites all fall within the Western Enterprise precinct, the development of which would not be compatible with the ongoing protection of frog ponds and associated required habitat.
- The EIS fails to adequately document the ecologically significant environment, including the identification of EPBC Act listed species or to assess the many direct and indirect impacts on matters of National Environmental Significance.
- The SIS fails to recognise that translocation of fauna species to suitable habitat is likely to impinge upon existing fauna and resources in these suitable areas.
- The SIS Addendum states that the Swamp Sclerophyll Forest located on the Pony Club land is currently infested with weeds and degraded. Table 3.1 of the SIS Addendum lists the species identified in the area including 33 weed species, but an examination of the data clearly indicates low cover abundance for weeds. This is also the case in other sections of SIS Addendum. A previous survey of this area reported most of the vegetation to be in excellent condition with stands that are structurally mature with very minor weed infestation (Benwell, 2001).

Submission Numbers:
3, 16, 19, 25, 33, 36, 38, 40, 43, 44, 47, 51, 52, 58, 59, 62, 68, 70, 73, 74, 79, 80, 86, 88

Response:
The results of vegetation surveys conducted by Benwell and Olsen form the basis of the flora impact assessment for the study area. They are referenced on page 10-2 of the EIS. The high conservation values of the study area are recognised in the EIS and mitigation and management measures suggested are included. The measures utilise recognised scientific methodology. Please refer to Appendix A and B of the EIS for the DIPNR guidelines and Appendix A of the SIS regarding the requirements for the assessment.

The proposed mitigation strategies aim to ameliorate the impacts of the Proposal during both the construction and operation phases. A compensatory habitat package has been proposed where residual impacts remain. The proposed package is recognised as providing roosts and foraging areas for estuarine birds. Monitoring of the effectiveness of certain measures such as wet / dry culverts for this Proposal could be a valuable tool for others when assessing and proposing mitigation strategies for future developments in the study area such as the proposed Robina to Coolangatta rail extension. The impact of the proposed railway on mitigation measures proposed for the Bypass would be addressed in assessment documents for the rail proposal.

The Proposal has been included under Schedule 1 of SEPP 63. This inclusion removes any prohibitions and development consent requirements under the applicable planning instruments thereby permitting assessment of the Tugun Bypass as a whole. Mitigation strategies and their effectiveness to mitigate impacts on threatened species for example, would be developed in consultation with the DEC.

The defined study area for the flora and fauna investigations included an area 2 km wide (1km each side of the centre line) of the proposed route from Stewart Road to Kennedy Drive and is shown diagrammatically in Figure 10.1 of the EIS Main Volume. The broad dimensions for the study area were chosen so both direct and indirect impacts could be considered. Field studies for species, communities, and habitat values within this study area were augmented by desktop reviews of ecological databases and past literature to provide a comprehensive assessment of the existing biological environment for the Proposal. Technical Paper 12 of the EIS provides the methodology of assessment. In addition, ongoing monitoring of cryptic species such as the Common Planigale and monitoring for species influenced by seasonality cues has continued throughout the EIS exhibition and approval process. Chapter 6 of the Submissions Report provides a list of additional investigations undertaken since EIS exhibition.

Gold Coast Airport Limited manages the Airport environment in accordance with the requirements of the *Airports Act 1996* and the Gold Coast Airport Environment Strategy. The Environment Strategy identifies areas of conservation significance within the Airport and presents strategies for management while recognising that there are also management requirements for ensuring safe operation of the Airport. For areas outside the Airport, Chapter 18 of the EIS identifies that a 10-year landscape maintenance program would be required. Improvements in weed control have been proposed as part of the mitigation measures and these would compliment the existing plan of management that is in place.

A ten year maintenance program would be developed to manage prescribed weeds in the road corridor. The area of land encompassing the roof of the tunnel and the Pony Club would be subject to a separate, more detailed plan of management that would focus on the re-establishment of a vegetated corridor over the tunnel and improving the quality of remnant areas of native vegetation. Long term weed management on Pony Club land would

remain subject to agreements between the Lands Department, Tweed Shire Council and the Pony Club.

Sediment basins and artificial frog ponds would be designed to not permanently hold water. The primary purpose of sediment basins is for the management of stormwater, however the SIS acknowledges that the Wallum Sedge Frog (and other frog species) may inhabit these structures once constructed. The SIS also documents the prevalence of Mosquito Fish within some water bodies of the study area and the threat this species may pose to acid frogs. Section 29.5 of the SIS thereby recommends one option to manage this threat, namely the manual draining of sediment basins. Other options that would also be considered during detailed design include the provision of permeable rock overflows. Such features would allow the gradual release of stormwater after the event and thereby limit the period of water retention. This is anticipated to reduce the ponds suitability for Mosquito Fish.

The concerns regarding toe clipping of amphibians and direct handling of individuals is acknowledged. A relocation plan is proposed to be developed as a component of the Flora and Fauna Management Plan; a sub-plan of the Construction Environmental Management Plan (refer Table 18.1 EIS Main Volume). Protocols for translocation, handling and monitoring of species would be written into this plan through consultation with the Queensland EPA, DEC and DEH.

The statement 'where this is not possible, then areas that are already relatively disturbed would be used for added works' (Section 6.2.1 of the SIS) is proposing that where direct disturbance cannot be limited to the actual road footprint for example, an access road to reach a construction area, then this disturbance would target previously disturbed areas such as cleared land. The location of these areas would be determined during the detailed design phase of the Proposal. Additional clearing for compounds and other ancillary uses would be subject to future environmental assessment.

Figures 3.1 to 3.6 of the SIS Volume 1 (and SIS Addendum) show the various biological assessments undertaken to describe the existing environment for the study area. Within the figures mentioned above, the vegetation distribution is shown as pale green (refer to legend). The area of land known as the Tweed Heads Pony and Hack Club lies immediately south of the Gold Coast Airport boundary. Cross reference of Figure 4.1b and Table 4.1 of Technical Paper 15 would help identify the location of Pony Club. The large tracts of land to the north of the Cobaki Broadwater are depicted in pale green to represent vegetation distribution. Technical Paper 15 provides further information on these land parcels where they are impacted by the Proposal.

Schedule 2 of SEPP 44 – Koala Habitat Protection identifies 10 eucalyptus species as being Koala feed trees, one of which is Swamp Mahogany (*Eucalyptus robusta*). Koala habitat mapping for the Tweed Shire by Phillips and Callaghan (1996) found that Koala habitat use within the Shire is based primarily on the presence of three eucalypt species (Section 2.6.3 of Technical Paper 12). All three species are identified as Koala feed trees under SEPP 44. These species can occur either as dominant or co-dominant within the canopy.

The exact diameter of chain link fencing has not been nominated at this stage of the Proposal. However, it is designed to exclude larger ground fauna species and is similar to that used on other RTA projects on the Pacific Highway (although without the floppy-top, as species identified do not warrant its use).

Consideration has been given to the climbing ability of some amphibian species and it is important that vegetation be kept away from both sides of any constructed frog fences to

ensure that individual frogs do not climb the vegetation to navigate the fence. The concern about the ability to install the frog exclusion fencing in the most ideal location prior to any clearing operations has also been noted. During the detailed design phase of the Proposal temporary fauna fencing would be considered prior to the finalisation of the fencing.

Section 33.5.1 (Frog Culverts) of the SIS Volume 1, proposes a number of monitoring strategies to monitor frog and other fauna movement in culverts including remote sensing cameras. Guidelines for this monitoring would be finalised through consultation with DEC.

The EIS addressed the maintenance of habitat of common or locally significant species through general and specific mitigation measures and long-term management and monitoring strategies in accordance with the broad management aims. The specific mitigation measures and long-term management and monitoring strategies would form the basis of the detailed Construction and Operation Environmental Management Plan which is outlined in Section 33.1.1 of the SIS.

The proposed underpasses would need to be monitored, although with more projects incorporating these fauna movement features, some evidence is suggesting that they are proving effective in facilitating movement for some native species. The risk of predation has been considered especially for Long-nosed Potoroo populations and predator control and predator exclusion fencing has been recommended in combination with underpasses. The reference to studies undertaken by the Australian Museum Business Services into fauna underpass usage and monitoring is noted.

The SIS is based upon the background studies provided within Technical Paper 12. Supplementary surveys have been commissioned and are appended to this Submissions Report with summaries being provided in Chapter 6. The long time period of the assessment has meant that the content of some of the earlier reports has been superseded by more recent work. Changes to the design of the Bypass have also been introduced to take account of these studies. In the event of an inconsistency between the SIS and the Technical Paper 12, the SIS is to be considered the most current document. The various management and mitigation measures are still being refined as a result of continuing studies. Furthermore, the inconsistencies within the document regarding formatting and inaccurate references are noted.

A description of the methodology employed during subsequent surveys since the exhibition of the EIS and associated documents are presented within the respective studies and appended to this Submission Report. Chapter 6 of this Submissions Report provides a summary of these surveys and lists in which Appendix they can be found.

Appendix B, SIS Volume 2, summarises survey methodology for amphibians. Survey methodology for individual studies is explained within Technical Paper 12. In brief, acoustic surveys for amphibians involved listening for the characteristic audible calls of vocalising individuals (male biased) whilst undertaking active searches. This would be only one of a range of techniques used for detecting amphibians during the operational phase of the Bypass.

It is acknowledged that even though cleared land typically does not represent suitable habitat for terrestrial fauna it often becomes important in areas which are subject to disturbance. This was evident by the identification of some species within the study area being located in the cleared areas.

The proposed alignment is closest to estuarine birds and habitats in the vicinity of the Tweed Heads Pony and Hack Club. In this area, mangroves and sandflats are used for

foraging by shorebirds and are less than 70m from the Bypass alignment. The Impact assessment undertaken for the Proposal indicates that significant direct effects would not occur on the high tide roosts or intertidal foraging areas of estuarine birds. However, mitigation measures are proposed to prevent hydrological impacts on the vegetation and waters of the Cobaki Broadwater. A monitoring program is proposed to begin prior to road construction to monitor the use of roost sites on the Cobaki Broadwater. The program would continue during the construction and early operational phases to determine if there is any evidence of changes in usage attributable to disturbance from the Proposal. (Rehabilitation of weed infested areas would be undertaken within the Saltmarsh community on the Pony and Hack club land. Longer term weed management in this area is subject to agreements between the Lands Department, Tweed Shire Council and the Pony Club. In Section 10.6.6 of the EIS, a Water Quality Monitoring program is proposed to be implemented prior to the start of construction and would measure environmental attributes such as:

- The health of wetland communities that may be affected by altered groundwater levels;
- The flora and fauna of the waterways adjacent to the corridor;
- Flora and fauna (macroinvertebrates, fish, wetland plant species) that serve as indicators of water quality would be monitored; and
- Saltmarsh, Sedgeland and Mangrove Forest communities would be monitored during construction and operation until all water quality management measures are established and stabilised.

The distances over which disturbance from road corridors can occur varies with different species. The use of 30 metres relates to the calculation of compensatory habitat for areas of habitat edge affected by the Proposal and is derived from work on edge effects commissioned by the RTA (Bali 2000). This work is based on ecological principles derived from the literature and tested on several recent Pacific Highway upgrade projects. It recommends that an additional 30 metre strip be calculated to compensate for edge effects on key habitat along newly-created corridors. Subsequently, this distance was used in determination of edge effects and the potential area of compensatory habitat required.

The concerns regarding the formulation and implementation of appropriate mitigation measures for the potential impacts of habitat pollution are noted. Mitigation measures would be developed and implemented to ensure that these potential impacts are minimised and the Proponents would work with DEC and other agencies to continue to refine and monitor the implementation of these mitigation measures.

It is acknowledged that the fauna movement corridors and fauna exclusion fencing north of the tunnel was inadvertently omitted from Figure 6.1 of the SIS Volume 1. Figure 10.8 of the EIS Main Volume presents this information in relation to the major mitigation structures and compensatory measures.

Table 18.1 of the EIS Main Volume explains that the existing frog pond to the west of the alignment is only sparsely vegetated and would be enhanced by supplementary planting of appropriate vegetation, predominantly rushes such as *Restio* and *Baumea* species. Planting would be done by hand to minimise damage to the existing pond.

An assessment of hollow trees during July 2004 was undertaken and confirmed the presence of 33 hollow bearing trees within the road footprint and an additional 14 hollow bearing trees outside the footprint but within the road corridor. The locations of these hollows have been mapped and would be detailed within Detailed Design drawings. Hollows to be disturbed would be re-instated within adjacent areas during the construction phase. In addition, the suggestion to identify a ratio for hollow log replacement based on similar road

projects is noted. It would be a requirement of the Construction Environmental Management Plan that replacement of hollow logs is undertaken on at least a 1:1 basis.

The objective of the constructed wetlands is for water quality treatment. To facilitate this objective, constructed wetlands would be densely revegetated with native sedges and grasses characteristic of similar habitats in the area to ensure compatibility with local species. Where possible these would be sourced from locally occurring species.

It is acknowledged that the NSW NPWS did not solely rely on aerial photographs to map regionally significant habitat areas and corridors, rather these were only used as part of the refinement process. The landscape framework approach is that which is described in Scotts, D. and Drielsma, M. 2003 '*Developing landscape frameworks for regional conservation planning: an approach integrating fauna spatial distributions and ecological principles*', Pacific Conservation Biology 8(4), pp 235-254.

As outlined with section 32.1.1 of the SIS Volume 1, no-go areas would be identified prior to construction in the Construction EMP and in consultation with the appropriate regulatory authorities. This commitment has been reiterated in Section 18 of the EIS.

Rehabilitation over the tunnel would integrate safety and environmental objectives. Due to the OLS restrictions, vegetation rehabilitation over the tunnel would need to conform to height requirements, therefore requiring on-going maintenance by GCAL. This would require that the plant species used in the revegetation do not grow to height of above 2m and intrude into the OLS. However, it would be possible to successfully revegetate the area with plants that would not intrude into the OLS with shrubs and grasses common to wallum heathland that do not grow to height of more than 2m. The revegetation plan for the tunnel would be developed in consultation with GCAL and DEC.

Once the 100m of the tunnel surface is revegetated, the types of species potentially utilising the fauna corridor would be restricted to those adapted to open habitats, aerial species and species capable of negotiating security fencing where this occurs in the area. It should be noted that a large proportion of land intersected by the tunnel occurs on vegetation maintained to meet the Airport's OLS requirements. Consequently, the corridor values presently existing in the area have been compromised by past disturbance.

The impact of the reduction of the vegetated strip over the tunnel would be assessed should the proposal to extend the runway proceed.

The environmental impact assessment has identified known and potential habitat for prescribed species. Specific areas for the translocation of prescribed species would be identified during application for the necessary operational work authority. As suggested, translocation has not been used as a substitute for the protection of high quality natural areas. The alignment of the Bypass has been refined to minimise impacts on areas of native vegetation and habitat. However, there are some areas where it has not been possible to avoid such areas and it is here that the translocation of native flora and fauna is proposed. In addition, preventative measures and programmed maintenance would also be undertaken as part of the translocation process for native flora to minimise problems with weeds.

The translocation of flora would be undertaken in prior consultation with State and Commonwealth agencies and their associated guidelines. Additionally, the *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia*, 2nd edition, 2004 would be used when developing the flora translocation components of the Construction Environmental Management Plan.

Regarding the design of the box culvert proposed for the waterway crossing, consideration would be given for light penetration to assist fish passage during the detailed design phase of the Proposal. The fish habitat of this waterway could be classified as class 3 or 4 habitat under the DPI (Fisheries) classification and therefore a culvert would be considered as acceptable for fish passage. Further consultation would be undertaken with the DPI (Fisheries) to determine what is appropriate for the Proposal.

Potential locations for Wallum Sedge Frog ponds are identified in Section 10 of the EIS, Section 29 of the SIS and Appendix F of Technical Paper 12. As indicated in the SIS, proposed areas within Commonwealth land may not be feasible due to jurisdiction. Prior planning and commercial matters are also expected to complicate this matter. Acid frogs in general are known to inhabit areas that have been disturbed by anthropogenic activity. Similarly, many of these areas have not been the subject of targeted remediation. Additional work by Glen Ingram (2005) (BAAM; refer to Chapter 6 and Appendix E of the Submissions Report) supports the construction of artificial frog ponds in suitable habitat. This work re-iterates the importance of selecting suitable sites and suggests areas east and south of the Airport, as identified within the EIS and SIS. The suitability, location and the number of frog ponds would be determined in consultation with the DEC. It is considered that the creation of artificial frog ponds three years prior to the construction of the proposed Bypass is not practical. However, trials of frog ponds are proposed to begin in 2005 and would be monitored in the long-term. If such measures do not prove to be viable, other alternative options would then be considered in consultation with the DEC.

The Bypass alignment has been designed to minimise impacts on flora and fauna habitat by negotiating sensitive environmental areas wherever possible, proposing mitigation strategies, and a compensatory habitat package, where residual impacts remain. An assessment of the impacts of the Proposal on the Wallum Sedge Frog population within the study area is presented in the SIS, Technical Paper 12 and the EIS. Mitigation measures proposed for the Wallum Sedge Frog to ameliorate severance of known habitat include (dual purpose drainage and frog access) culverts aimed to connect areas of known habitat to the east and west, utilising fencing to minimise road mortality and guide frogs into culverts. The provision of artificial breeding ponds is proposed and supported during recent studies by Glen Ingram (2005) who has identified potential sites for ponds within the area. The suitability, location and number of frog ponds would be determined in consultation with DEC.

Reports by Hero, Shoo and Phillips are provided in Appendix C, D, E and F of Technical Paper 5. Sections 10.5 of the EIS Main Volume outline that the effectiveness of the ponds, culverts and frog exclusion fencing would be monitored during construction and continue into the operational phase of the Bypass until results show that the area has stabilised.

Ecological values within the Hidden Valley area have been identified in a number of Chapters within the EIS Main Volume including Chapter 5, 6, 7 and 10 in the context of changes to the Proposal design to avoid or minimise impacts on a number of significant rare and threatened species in the area. The conservation significance of these species is discussed in further detail within Chapter 10 of the EIS and the SIS. The overall ecological significance of the study area, including Hidden Valley, is presented in Chapter 4.4.10 of Technical Paper 12.

As described in Section 17.3.4 of the EIS Main Volume, the master plan for the Gold Coast Airport includes a land use plan that divides the site into a number of precincts. No firm development proposals are included in the Master Plan, but it provides a framework only for possible future development until 2020.

Minor realignment of the Bypass has occurred within the Gold Coast Airport. In 2002 the road corridor bordered the boundary between the Airport's environmental and enterprise

precincts, and was contained predominantly within the enterprise precinct. The current alignment still borders this boundary but is now positioned (predominantly) within the environmental precinct. This is due to a number of factors, including road design, air safety and environmental matters, such as minimising impacts on threatened flora and fauna. Boundaries of the Western Enterprise and Environmental Precincts have not changed and are as detailed within Gold Coast Airport Master Plan.

4.4.2 General Flora and Fauna

In summary, the respondents to the EIS raised the following issues:

- The area adjoining Cobaki Broadwater has been historically mined for fill soil, and is not considered pristine. Similarly, Hidden Valley is neither pristine nor hidden, if previous land uses are considered.
- Significant impacts to dragonfly and butterfly habitats would occur if the watertable and swamp habitat is altered, drainage impacts go uncontrolled during construction and water flows are not re-established.
- The encroachment on wetlands within the East Australian Coast Migratory Flyway is unacceptable. Constructed wetlands cannot take the place of natural wetlands. Areas within the Cobaki Broadwater have been listed for future inclusion in the Tweed Estuary Nature Reserve and a range of conservation options available to best protect the wetlands within the Cobaki Broadwater area are being considered.
- The liming rate required to reduce impacts from acid sulphate soils could impact upon plants and animals that require a higher acidity to survive.
- In addition to the immediate impacts of the Proposal, local wildlife communities would become isolated, then untraceable and ultimately may become extinct.
- The references to weed invasion at the Pony Club is only one small aspect of the vegetation issues and does not detract from the conservation values of this land. The vegetation is in good condition with high biodiversity and a substantial population of significant and endangered flora.
- There is a high diversity and number of flora species, vertebrate species, and although largely unsurveyed, invertebrate species, that would be affected by the Proposal. These considerations and the current lack of management of these unique natural values should also be viewed in the context of future generations.
- If water is required to be injected into the watertable to support the tunnel under the Airport runway, it is not clear what effect would this have on the ecology of the Cobaki Broadwater.
- After construction of the Bypass, there is concern that weeds would spread through the Bypass route and invade the remaining natural vegetation areas reducing the diversity of native plants in the long-term.
- A large population of Swamp Wallaby (*Wallabia bicolour*) including the golden form would suffer significantly due to habitat destruction, fragmentation and construction noise.
- The impact of edge effects on sensitive species not directly impacted by the road construction has not been addressed.
- Appropriate fauna fencing would be required to ensure that local fauna do not enter the Bypass carriageway and are funnelled into an underpass. It would be essential to construct this fencing across the width of the known movement corridors connecting to the fauna underpass on both the north and southbound carriageways.

- The Hidden Valley Bridge has merit in protecting existing vegetation however this would create an environment that is not conducive to plant growth, and would result in plant mortality resulting from hydrology and sunlight changes, for example, moisture loving plants such as the rare Coast Palm Lily would be impacted. Management of stormwater and high density tubestock planting would also be required to limit the introduction of exotic species. The opportunity to preserve the environmental and ecological significance of the Hidden Valley area should be taken to prevent the significant impact on the flora and fauna of the area.
- The rainforest in Hidden Valley is not all regrowth and to imply this is inappropriate. The small size of the rainforest, its isolation from similar remnants and its importance to species of conservation significance makes it highly significant to nature conservation and therefore it should not be impacted on at all.
- A large population of Bush Rat has been recorded in Hidden Valley which is considered to be the core population from which peripheral populations are established.
- Although Koalas may pass through the Bypass route and surrounds, the population is receding and considered not viable. The presence of scats and runs however indicates that other macropod species are still active in the area. Fauna underpasses need to be designed to cater for the fauna likely to use them.
- The Blackbutt community within Hidden Valley is represented by a number of 20-30 year old canopy trees with a few scattered older specimens. The substantial loss of this community is of major concern.
- The runoff from the Hidden Valley Bridge would be high in both pollutants and weed propagules which would alter plant assemblages. It is therefore anticipated that there would be an increase in weed growth that would destroy the integrity of Hidden Valley.
- The Bypass would provide another entry point into the last remaining remnant habitat within the Tweed / Gold Coast region for feral predators and competitors.
- There has been disregard and disrespect for the sensitivity and significance of the Cobaki Broadwater ecosystem and mitigation measures are of no value.
- Caution should be used over the current status of the roosts and opportunities for creating additional roosting habitat should be considered.
- There is concern over the potential impacts the Proposal (and a number of other cumulative impacts) may have on a number of threatened species and their habitats within the study area. The environment should be managed to protect species from the risk of becoming threatened, rather than compromising habitats.
- There is no certainty of protection or conservation while lands remain in any Government custodianship. The Pony Club members have weeded and revegetated most of the leased Pony Club. The reduction of weeds and the regrowth of endemic vegetation is a credit to their commitment and should be rewarded by retention of this land.
- It is concerning that having discovered that the Bypass route has significant ecological values, the Queensland and NSW Governments persist with the destruction of these values simply to allow people to drive to and from NSW five minutes faster.
- Threatening processes including construction noise, vibration and the presence of humans would take place over several years during the construction phase and this cannot be mitigated against.
- Construction of the Hidden Valley Bridge would have significant impacts on both the flora and fauna present in this regenerating remnant vine forest, however, there is no discussion of the ecological significance of the site.

Submission Numbers:
15, 16, 19, 25, 31, 33, 34, 35, 36, 38, 41, 46, 51, 52, 53, 55, 57, 62, 63, 67, 70, 71, 72, 73, 74, 79

Responses:
The observations regarding the area adjoining Cobaki Broadwater being historically mined for fill and not being considered pristine and Hidden Valley neither being pristine nor hidden, if previous land uses are considered is noted.

Modification of groundwater characteristics in known areas of habitat for the Swordgrass Brown Butterfly and the two species of Giant Dragonfly is not anticipated. Known habitat of these species is not within the area where groundwater management is required.

Major impacts as a result of the Bypass on migratory birds are not anticipated. The construction of artificial wetlands for migratory birds is also not proposed. It is proposed to construct wetlands for the treatment of runoff for water quality. Vegetating these areas with native wetland species could provide additional habitat values for wetland fauna species in the area. It is also acknowledged that areas within the Cobaki Broadwater have been listed for future inclusion in the Tweed Estuary Nature Reserve and the subsequent consideration of a range of conservation options available to best protect the wetlands within the Cobaki Broadwater has been noted.

As discussed in Chapter 8 of the EIS Main Volume, liming rates would be based on the results of the testing programs and naturally low pH conditions in the south of the Airport would be maintained. Water quality monitoring would be a requirement of the Construction Environmental Management Plan. Timing would be progressed in consultation with the appropriate government agencies.

The Proposal aims to limit habitat fragmentation and barrier effects through the incorporation of bridge, tunnel and culvert structures. Fauna fencing would also be used at the required locations, and designed for specific target species. The Proposal also offers a compensatory habitat package. Blocks A and E of this package form an integral link in a 'buffer zone' around the Cobaki Broadwater.

The ecological values within the Tweed Heads Pony and Hack Club leased land have been identified within the EIS. These values include significant vegetation communities and habitats for significant species. However, some values have been compromised through weed invasion, and past vegetation clearing and disturbance. Nonetheless, ecological values remain and would benefit from rehabilitation works proposed within the Saltmarsh community in this area. (Ongoing weed management will remain covered in agreements between the Lands Department, Tweed Shire Council and the Pony Club).

The Bypass alignment has been designed to minimise impacts on flora and fauna habitat. Management measures are proposed to ameliorate potential impacts and include the revegetation of disturbed areas with endemic species. Management measures are detailed within the EIS, SIS and MDP for all environmental impacts identified. These measures are recognised and have been undertaken, with success as part of other major infrastructure projects. A compensatory habitat package is also proposed. Discussion on intergenerational equity is provided in Chapter 20 of the EIS.

Groundwater is proposed to be pumped across the tunnel obstruction for re-injection into the sand aquifer to maintain groundwater levels at or close to natural conditions during the time it takes to build it. Mitigation during the operation of the Bypass would consist of a network of cross-alignment drains which would equalise groundwater levels on either side of

the obstruction. This would allow unhindered groundwater movement, reinstating flows across the barrier provided by the tunnel and its access ramps. Management during both construction and operation would comprise monitoring of water levels and pumped water quality. The quality of groundwater would be closely monitored and would only be re-injected if there was no evidence of excess acidity or precipitation of iron hydroxide. If the groundwater does not meet the required quality standards it would be treated prior to re-injection.

The concern that weeds would spread through the Bypass route after construction and invade the remaining natural vegetation areas reducing the diversity of native plants in the long-term is noted. In addition to measures to be incorporated in the Construction Environmental Management Plan, standard maintenance activities include the management of prescribed weed species within the road reserve. This would be conducted on a regular basis during the operation of the Bypass.

Five of the six sites identified by Hero, et al. (2000) in Technical Paper 12 where the Swamp Wallaby was either seen or recorded from evidence are situated west of the alignment and the other site is located in the south east of the study area on GCAL managed land. Given this species preference for habitats to the west of the alignment, these areas would remain largely unaffected by the Proposal. In addition, recent surveys within compensatory habitat Blocks A and E revealed a resident population of this species suggesting the Swamp Wallaby is broadly distributed through the bordering vegetation communities adjacent the Cobaki Broadwater. Significant noise impacts on the Swamp Wallaby were not indicated during environmental impact assessment. Construction noise would be minimised and management measures detailed within the Construction Environmental Management Plan.

The implications of edge effects were considered for a number of species and habitats including the Common Planigale and the Long-nosed Potoroo (refer Section 10.5.5 EIS Main Volume) and consequently, mitigation measures have taken into account those impacts that are a result of these edge effects. The draft RTA policy, *Road Impacts and Habitat Amelioration Measures. Compensatory Habitat Draft 6,* NSW Roads and Traffic Authority (1998) states that, wherever possible, compensatory habitat should be equal or greater in area to the key habitat lost; however, this is not a legal requirement. Key habitat areas are those that support flora and fauna species of legislative and/or conservation significance. In developing this compensatory land package, compensation of edge effects was also included.

Fauna exclusion fencing is proposed within the EIS Main volume and would be integrated with wildlife underpasses. Additional fauna fencing is proposed for predator control for the Cobaki Lake Long-nosed Potoroo population. Predator management strategies are proposed within Section 10.5.5 and Section 17.4.1 of the EIS Main Volume for the long term conservation of this population in the study area. Fauna underpasses have been proposed at a number of locations along the Bypass alignment in addition to facilitating movement by utilising bridge structures and revegetating over the tunnel area (refer to Figure 10.8 of the EIS). Final design of the underpasses structures would be determined during the detailed design phase in consultation with the relevant scientific community and government agencies.

With respect to Hidden Valleys' remnant vegetation it is recognised that significant plant species currently occur within this area. However it is noted that prior clearing within this area has occurred. Significant effects on the moisture and light regime below the bridge would be limited to the abutment areas. In these areas shading would occur and moisture levels potentially increased (piping and subsequent discharge of stormwater) during larger rainfall events. It is anticipated that controls would be employed in these areas to minimise the potential for erosion. Many species comprising the Littoral Rainforest community are

considered shade tolerant. As such, significant effects are not anticipated on the Littoral Rainforest community and significant plant species outside of the abutment areas. Additionally, individual Coast Palm Lilly plants were not identified below the proposed location of the Hidden Valley Bridge. Impacted plants in the area of the cut could be translocated to more suitable areas within the valley if recommended.

Ecological values of Hidden Valley are detailed within the EIS and SIS and Chapter 5 of Technical Paper 12 provides specific comment. Vegetation within Hidden Valley is described as regenerating vine forest due to past disturbance, however the EIS and associated documents emphasise the ecological values of this community (refer Chapter 10 EIS Main Volume, SIS and Technical Paper 12). Additionally, the location and significance of the Bush Rat population of Hidden Valley is also identified in Technical Paper 12.

Dry Blackbutt forest in the Hidden Valley area occupies 50.9 hectares of land, with the Bypass resulting in the removal of 3.5 hectares of this community in Queensland. The age class of trees indicates that historically, tree clearing disturbance has occurred with this area. The understorey in this community is dominated by *Lantana* spp. further indicating past disturbance impacts. Revegetation would occur as soon as possible following construction.

Runoff from the bridge and road would be collected by a system of drains and directed to a wetland treatment system that would ensure that operational surface water run off would be treated before discharge to the receiving water. Weed management of the road corridor during and post construction is proposed. This commitment would be detailed in the Construction Environmental Management Plan.

The RTA is committed to ensuring that major road proposals address the principles of Ecologically Sustainable Development (ESD) and that sufficient and unambiguous scientific information is provided in its environmental impact assessments to allow the performance of proposals to be assessed against the adopted principles. The requirements for addressing ESD in NSW environmental assessments are documented in Schedule 2 of the EP&A Regulation. Ecological sustainability has been considered at all stages of the Tugun Bypass proposal, including the development of the Proposal, during the detailed environmental impact assessments, and in preparing the main volume of the EIS. Such consideration has included both short-term and long-term economic, environmental, social and equity issues, as set out in Table 1.1, Section 1.3.5. The preparation of the EIS itself contributes to ensuring that the development and operation of the Bypass address with the principles of ESD. The EIS provides detailed information about the Proposal including the significance of ecosystems which could be potentially impacted and allows public discussion on whether it should proceed, and if so, subject to what mitigation measures and conditions of approval to limit environmental impacts.

The current status of the roosts within and surrounding the Bypass route would be considered through the detailed design phase and development of the Construction Environmental Management Plan. This would also include the opportunities for creating additional roosting habitat.

The EIS describes the loss of around 45 hectares of vegetation to accommodate the proposed Tugun Bypass alignment. The C4 option was subject to considerable refinement from its original configuration to avoid or minimise impacts on matters protected and a comprehensive compensatory habitat package developed to offset any residual impacts. The compensatory habitat package is strategic and aims to provide key environmental outcomes from a local, regional and national perspective. The most significant of which are:

- The proximity to the study area of land purchased to provide compensatory habitat;

- It compensates for key habitat that would be lost and edge-affected as a result of the Proposal;
- It forms a strategically located link connecting habitat areas around the Cobaki Broadwater for flora and fauna; and
- It provides an opportunity for the establishment of a continuous area of land with environmental protection around the Cobaki Broadwater.

Where possible, the fragmentation of flora and fauna habitat has been avoided. Re-alignment of the original road corridor has occurred in a number of areas due to environmental matters. Subsequently, some land already developed or planned for development has been acquired in preference to land planned for environmental purposes. Environmental impact assessment has not identified that populations of many local plant and animal species would become extinct.

It is acknowledged that there is an existing weed management plan for the Pony Club Land. However, the Proponents propose to undertake rehabilitation work in this area in accordance with commitments made in the EIS and SIS and this Submissions Report. Longer term weed management would revert to the existing plan.

The ecological values of the Bypass route have been recognised by the Proponents and the alignment of the Bypass has been chosen to minimise the impacts of the Proposal. This has included realignments to avoid areas of Swamp Orchid habitat, the construction of a launched bridge over Hidden Valley and changes to the route to minimise impacts on Wallum Sedge Frog habitat. It is considered that the benefits of the Proposal are broader than travel time savings and are detailed in the EIS.

The construction timeframe for the Bypass is two years. Construction impacts such as noise and vibration would be managed and maintained in accordance with the relevant law. It is recognised that there is likely to be a level of disturbance in habitats either side of the alignment once the Proposal is operational. This disturbance is described as an edge effect. Edge affected habitat has been calculated and included as part of the compensatory habitat package. While it is recognised that the there would be edge effects as a result of the Proposal there would still be usage of the affected habitat by fauna, but likely not to the same levels as would have been observed prior to the construction of the Proposal.

4.4.3 Threatened and Significant Flora Species

In summary, the respondents to the EIS raised the following issues:

- There is concern over the impact on the Stinking Cryptocarya listed nationally as vulnerable and in Queensland under the *Nature Conservation Act 1992*.
- In preparing a Strategic Revegetation Plan for the Tugun Bypass a project officer should be appointed to coordinate revegetation of the significant rainforest associated species known to be impacted during construction with the aim to mitigate net loss. These species consist of the Long-leaved Tuckeroo, Black Walnut, Fine-leaved Tuckeroo and Stinking Cryptocarya. In addition a Threatened Species (Flora) Management Plan should be prepared and approved before revegetation is undertaken and should include recommendations as provided by the Queensland EPA.
- There is concern over the impact on the Smooth-scrub Turpentine (*Rhodamnia maideniana*), Black Walnut, White Lace Flower (*Archidendron hendersonii*) and the Fine-leaved Tuckeroo, which are all listed in Queensland as rare under the *Nature Conservation Act 1992*.
- There is concern over the potential impacts (and a number of other cumulative impacts) on the number of significant and threatened flora species and their habitat located within the Bypass route.

- There is concern over the impact on the Rough-leaved Queensland Nut (*Macadamia tetraphylla*), listed Nationally as vulnerable. Populations similar to the one present within the Bypass route and surrounds provide important genetic material for future research.
- There is concern over the impact on the regionally significant Match Sticks. Translocation of this species should be undertaken to relocate affected individuals and should occur in accordance with the *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia* (2004).
- There is concern over the impacts on the Scented Acronychia (*Acronychia littoralis*), which is listed as endangered under Commonwealth and State legislation. One individual of this species has been positively identified within the Airport section of the Bypass, however this has not been published. There are a maximum of four individuals remaining on the Gold Coast, and they were also not mentioned in the SIS, other than to say they were not recorded within the study area. A species protection plan should be prepared and implemented regarding Scented Acronychia prior to any impact on this species.
- There is concern over the impact on the only Gold Coast population of the southern NSW plant species, *Trachymene anisocarpa*.
- The area for the Proposal contains a high diversity of rare or threatened plants that would all be affected. A 'no road option' would be the only guarantee that there would be no loss of locally, regionally and Nationally significant species, many of which are of legislative significance.
- Many plants within the Bypass route are vulnerable to extinction and translocation is not a viable option. Translocation of the threatened plants is considered difficult because of their specific growing requirements and there are few similar weed-free environments that exist on the Gold Coast in comparison to the Bypass route.
- There is concern over the impact on the Little Wattle, listed Nationally as vulnerable, and also scheduled under the Queensland *Nature Conservation Act 1992*. Translocation of this species should be undertaken to relocate affected individuals and should occur in accordance with the *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia* (2004).
- There is concern over the impact on the Swamp Orchid, listed nationally as endangered. Additionally, it should be noted that a well-known botanist withdrew his consultancy from the EIA study team when the location of the Swamp Orchids were made public and subsequently one of the orchids was vandalised.
- There are additional threatened flora species which were omitted from the SIS which would be impacted on as a result of the Proposal. These are *Geodorum densiflorum, Hedyotis galioides, Durringtonia paludosa* and the Swamp Orchid.
- In addition to the proposed mitigations for the Swamp Orchid, the protection of habitat by appropriate fencing is also critical to ensure the long-term survival of this species. There is also the opportunity to help with the process of ex-situ conservation currently being undertaken for emergency protection.
- In order to be consistent with other species profiles within the SIS, sections need to define the conservation status, habitat requirements, abundance, regional abundance specific impacts and ameliorative measures for the Swamp Orchid. In addition, while some individual Swamp Orchids were removed for emergency ex-situ conservation purposes, the areas they were removed from are potential habitat, and still needs to be treated as though this species is still present within the area.
- There is concern over the impact on Christmas Bells (*Blandfordia grandiflora*), which is listed as rare under the Queensland's *Nature Conservation Act 1992*.

- There is concern over the impact on the Long-leaved Tuckeroo and Coast Palm Lily, which are both listed as rare under Queensland legislation. The assessment undertaken does not describe that 25% of the Long-leaved Tuckeroo population and the entire Coast Palm Lily population would be destroyed within Hidden Valley.
- There is concern over the impact on the last remaining Queensland population of the leafless shrub Native Currant (*Leptomeria drupacea*).
- There is concern over the impact of the Proposal on one of two known populations of the Drosma Myrtle Heath (*Baeckea diosmifolia*).
- There is concern over the impact on *D. paludosa*, listed as rare under Queensland's *Nature Conservation Act 1992*.
- There is concern over the impact on Durobby (*Syzygium moorei*), listed as vulnerable under Commonwealth and State legislation.
- Although the loss of individuals from plant populations of conservation significance is not considered to be a significant impact for the species as a whole, it is the aim of the legislative provisions to ensure survival and natural development of wildlife, and to identify, reduce or remove relevant threatening processes.
- Prior to clearing of the Proposal footprint, a number of protocols provided by the EPA are required to be undertaken.
- Although the significant taxa identified in Hidden Valley are individually discussed, there is only the briefest mention within the Urban Landscape and Design section. There is no discussion of the ecological significance.
- The proposed use of Chinese Burr in landscaping works poses problems of the long-term management and protection.

Submission Numbers:
16, 19, 27, 38, 40, 41, 43, 44, 46, 47, 51, 52, 57, 62, 66, 69, 70, 71, 72, 73, 74, 79, 86, 88

Response:
The concern over the impacts on Stinking Cryptocarya is noted. It was considered that the Bypass would have a local impact on Stinking Cryptocarya with two plants removed from a population of nine known individuals. The impact to this species has been discussed in detail in Chapter 20 of the SIS.

Outlined in Chapter 7 of Technical Paper 12 and Chapter 32 of the SIS is a list of mitigation measures that would be undertaken. Part of these measures would include the translocation or seed collection and propagation of particular species. The requirements concerning the Long-leaved Tuckeroo, Black Walnut, Fine-leaved Tuckeroo and Stinking Cryptocarya would be incorporated into a Threatened Plant Management Plan which would form part of the Construction and Operation Environmental Management Plans.

Detailed discussion on the impact of the Proposal on Black Walnut and the Fine-leaved Tuckeroo has been undertaken in Chapter 21 and 22 of the SIS. The Proposal would not directly impact upon Smooth-scrub Turpentine and the White Lace Flower and there should be few indirect impacts. None of these plant populations are considered likely to become extinct in the area due the Proposal.

The concern over the potential impacts (and a number of other cumulative impacts) on the number of significant and threatened flora species and their habitat located is noted. Based on investigations undertaken as part of the environmental assessment process it is considered that no individual threatened species, populations or their habitats would become extinct as a result of the Bypass. Management plans and mitigation measures would be put into place to minimise impacts.

The concern over the impact on the Rough-leaved Queensland Nut is noted. However, the nearest individual to the Bypass is approximately 80m away, while the main population is greater than 270m from the Proposal. Therefore, it is considered that the Bypass would not impact upon this species.

The translocation of Match Sticks would be undertaken to relocate affected individuals and would occur in accordance with the *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia* (2004). This has been proposed in Chapter 19 of the SIS which discusses this species in detail.

Scented Acronychia was not identified during surveys of the study area. Historical record indicates this species is or was present within an area of Commonwealth land. Queensland Herbarium records detail one individual was found close to Cobaki Lake and on the edge of Melaleuca forest however, latitude and longitude data recorded do not correlate with the locality description. A review of three reports prepared by Glenn Leiper for Gold Coast Airport Limited did not indicate with any more accuracy the locality of this species. The description provided by the Herbarium record indicates this species is distant to the proposed alignment, especially considering that Scented Acronychia generally occurs in Melaleuca forest and rainforest, both of which occur to the west of the Bypass, in the National Estate area. No impact is therefore considered likely on this species.

Trachymene anisocarpa was not identified during surveys of the study area. However historical record indicates this species is or was present in an area of Swamp Sclerophyll Forest to the east of the proposed tunnel, on Commonwealth land. This area is situated outside the alignment and subsequently, no impact is considered likely on this species from the Bypass.

The concerns that the Proposal would impact on a high diversity of rare or threatened plants is noted. A number of route options were discussed within Chapter 5 of the EIS and one of the evaluation criteria used was the impacts on the natural environment which considered loss, fragmentation and degradation of habitat. The study area does have a high biodiversity of significant flora species as discussed in the SIS and Technical Paper 12. The C4 route alignment has been refined to minimise the impacts on a number of these flora species. The impact on these significant flora species and the mitigation measures which would be implemented to minimise them is provided in the SIS and Technical Paper 12.

Translocation of threatened flora species is achievable and has been undertaken successfully with a number of species on road projects in northern NSW. Weed free environments are not needed for successful translocation, although weed management may be necessary. All translocation requirements for threatened species would be in accordance with the *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia* (2004), and in consultation with the DEC.

The main population of the Little Wattle in the study area would not be impacted by the Bypass. Only a few plants, separate to the main population, in a heavily modified environment would be impacted. Translocation for this species has already been recommended in Chapter 18 of the SIS and would be undertaken in accordance with the *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia* (2004).

The concern over the impact on the Swamp Orchid is noted, however, no individual Swamp Orchids would be directly impacted by the Bypass. Secondary impacts may occur, although these would be minimised through appropriate mitigation measures as discussed in Appendix J and Chapter 6 and 32 of the SIS.

Geodorum densiflorum and the Swamp Orchid was discussed in Appendix J, which was a confidential appendix and it was determined that no significant impact to these species would occur. *Hedyotis galioides* was recorded by Glenn Leiper on Airport land, although the exact location was not provided except for being within remnant vegetation on the western and southern areas of the Airport. A single plant of *D. paludosa* was recorded in NSW during the surveys in Swamp Mahogany Forest. This plant was located 150m to the east of the Bypass and is considered unlikely to be impacted. An eight-part test of significance undertaken for *Durringtonia paludosa* indicates that there would not be a significant impact on this species from the Bypass (refer to Chapter 6 and Appendix F for further detail). The omission from the documentation of *D. paludosa* was an oversight in the EIS.

A detailed profile for the Swamp Orchid, consistent with other species profiles within the SIS, was provided in Appendix J. It is acknowledged that some individual Swamp Orchids were removed for emergency ex-situ conservation purposes. The areas containing previously known populations of Swamp Orchid within the study area were treated within the documents as if the plants were still present. Fencing of the Swamp Orchid population would be undertaken to ensure its long-term survival and discussions would be held with the DEC to determine any opportunity to help in the ex-situ conservation of this species.

The concern over the impact on Christmas Bells is noted, however, the only known location of this species in the area is found greater than 300m from the alignment. This species would not be directly impacted by the Proposal.

The concern over the impact on the Long-leaved Tuckeroo and Coast Palm Lily are acknowledged however, only one Coast Palm Lily out of three would be impacted by the Proposal in Hidden Valley. Detailed descriptions of the impact of the Proposal on Long-leaved Tuckeroo and Coast Palm Lily have been provided in Chapter 17 and 21 of the SIS respectively.

The concern over the impact on the Native Currant and Drosma Myrtle Heath is noted. Native Currant was recorded on Airport land greater than 400m to the east of the Bypass and in Scribbly gum heathland south and north of Boyd Street. None of this vegetation type would be impacted by the Bypass.

The concern over the impact on Durobby is acknowledged, however the closest individual of this species is located 220m from the alignment in Hidden Valley. It is considered highly unlikely that any impact on this species would occur.

It is acknowledged that the aim of the legislative provisions for threatened species is to ensure survival and natural development of wildlife, and to identify, reduce or remove relevant threatening processes. The final alignment and proposed mitigation measures outlined in the EIS and associated documents identified and reduced the impact on the natural environment of the area including that of threatened flora and fauna.

The protocols provided by the Queensland EPA required to be undertaken prior to clearing of the Proposal footprint are noted. These recommendations are provided in the SIS (summarised in Chapter 32) and Technical Paper 12 of the EIS.

The significant taxa identified in Hidden Valley and their ecological significance is discussed in detail in the SIS and Technical Paper 12 of the EIS. It is unlikely that these species would survive along the edges of the road and therefore, they were not discussed within the Urban Landscape and Design section.

The concerns of the proposed use of Chinese Burr in landscaping works are acknowledged. The final species selection would be determined in consultation with relevant statutory authorities during the preparation of the Construction Environmental Management Plan and the detailed design phase of the Proposal.

4.4.4 Threatened and Significant Fauna Species

In summary, the respondents to the EIS raised the following issues:

- The Swordgrass Brown Butterfly should be considered as critically endangered. The Tugun population is one of the last two remaining populations in Queensland and would only survive as long as the preferred food plant for its caterpillars remains. The Bypass would destroy a substantial portion of the food plant and would exacerbate the likelihood of extinction. It is necessary that a further survey for this species and more detailed habitat mapping is undertaken.
- Insufficient invertebrate surveys were undertaken and only a few species were considered. Widespread and targeted seasonal surveys should be undertaken by suitably experienced and qualified persons. Surveys for the Giant Dragonfly and the Swordgrass Brown Butterfly were insufficient to reach the conclusions stated in the SIS.
- No surveys have been undertaken for the vulnerable Australian Fritillary (*Argyreus hyperbius inconstans*). Surveys for this species should be undertaken to ascertain its presence or suitable habitat to determine potential impacts.
- The mitigation measures proposed for the Long-nosed Potoroo are inadequate and unproven. Funds should be provided to finance ongoing research, monitoring and management into the Cobaki Long-nosed Potoroos, including a captive breeding program, in a Queensland EPA facility. Previously cleared and impacted areas in the vicinity of Long-nosed Potoroo habitat should be rehabilitated.
- The SIS only contains information relating to the Cobaki population and it is suggested further information on the West Tweed population should be made available in order to assess the impact of the Bypass and other cumulative impacts on this population. To proceed to destroy this threatened species' habitat should not be contemplated, or undertaken.
- The SIS states on three occasions that the Long-nosed Potoroo may become extinct as a result of cumulative impacts. Without appropriate mitigation measures to minimise cumulative impacts there is potential to force the population to localised extinction.
- For the EIS to be considered plausible the Long-nosed Potoroo population has to increase to a level that offers some resilience to habitat loss and disturbance. Resident Long-nosed Potoroo populations which are surviving in areas surrounding the Bypass route but removed from potential impacts should be monitored.
- The Cobaki Long-nosed Potoroo population should be considered of National importance because it represents one of the few remaining coastal populations. The number of individuals currently known to comprise the population is below that required to ensure anything but short-term viability. Any genuine attempt at managing the population to more sustainable levels would require minimising the potential for impact. It is recommended to realign the Bypass route east to avoid the net loss to habitat.

- Studies have reported that the exiting access track to the Cobaki Lakes development site has split the original Long-nosed Potoroo population in two, with no evidence of individuals crossing the track. Therefore, clearing for a Boyd Street overpass / access to the Cobaki Lakes development would permanently sever the Cobaki population. Recent scientific studies of the viable population indicated that should the Boyd Street interchange or overpass proceed, the population would be destroyed and the loss of their gene pool could see the extinction of the few other remaining Long-nosed Potoroo populations.
- It is considered that the Cobaki Long-nosed Potoroo population is part of a wider population along the Queensland / NSW border and that the Cobaki population would utilise narrow corridors for both breeding and disbursal and cross open ground to access alternative habitat. Conservation in a fragmented landscape requires the adoption of a regional perspective and must be based around the preservation of a mosaic of habitat patches that together would support substantial regional populations.
- There have been errors in the assessment of the viability of the Cobaki Long-nosed Potoroo population. There has been no systematic assessment to prove that the population is isolated. There is evidence to suggest that the Cobaki population is not isolated and therefore may be able to withstand some habitat loss.
- Commitment to installation of sound-proof fencing instead of (or in addition to) predator-exclusion fencing along the western side of the Bypass adjacent to Long-nosed Potoroo habitat is recommended and considered critical in addressing the described impacts on the species.
- Should the proposed mitigation / compensatory measures for the Long-nosed Potoroo not be able to be implemented, further discussions with DEC would be required to progress other suitable measures.
- The proposed frog culverts would also allow the movement of feral dogs, cats and foxes which would become a threat to Long-nosed Potoroo populations.
- The SIS does not include any reference to the threatened species of frogs found in the freshwater wetlands, and the significance and conservation value of these populations.
- The Proposal together with other developments would substantially impact on the threatened Wallum Froglet. The population of this species is regionally significant because it is the last population south of Southport. The Proposal would destroy the core breeding area which would isolate the remaining populations and reduce their size. The proposed frog culverts are unlikely to provide a suitable environment between ponds to maintain a single metapopulation and the local extinction of this species is probable.
- The mitigation measures proposed for the Wallum Froglet are inadequate with many of them being largely experimental. If these measures do not perform, further mitigation measures would be critical.
- For the EIS to be considered plausible the core Wallum Froglet breeding habitats should be protected and connectivity between and remaining breeding populations on either side of the Bypass should be provided. Suitable breeding habitat to translocate frogs from breeding ponds that would be destroyed should also be provided. Assurances that any proposed developments would not further isolate and destroy remaining habitats should be received.

- Identification and protection of the core breeding areas of the Wallum Froglet is critical to evaluate whether appropriate measures have been taken to ameliorate the impacts. Realigning the route eastward and acquiring suitable habitat would minimise the net loss of habitat. Development and implementation of a Wallum Froglet habitat enhancement program aimed at consolidating other known habitat in the Gold Coast lowlands is critical to the Proposal. Conservation of Wallum Frog habitat should be prioritised. On sites that are publicly owned, future land use should be negotiated with the appropriate agency, in particular where a conservation agreement is already in place.
- The Wallum Froglet is very sensitive to a reduction in water quality and therefore it is important to ensure that any activities (liming) do not result in changes to the natural water quality (surface and groundwater) within the receiving environment. As part of any monitoring actions, it is important to ensure that the requirements for Wallum type habitat are maintained.
- Liaison with the DEC to determine the most suitable discharge criteria from sediment basins is required given that the Wallum frog species within the Bypass route are from highly sensitive environmental conditions. A clear understanding of the current environmental conditions for these frog species must be obtained.
- Amelioration methods to ensure the survival of the frog species discussed in Hero, et al. (2001), stressed the importance of the establishment, trial and proven success (as breeding sites) of at least 10 artificial ponds prior to the commencement of any construction activities. This recommendation has not been met and accordingly the future survival of frog populations in the area is seriously jeopardised.
- The mitigation measures proposed for the Wallum Sedge Frog are considered inadequate with many of them being largely experimental. The limited mitigation measures available for this species and the failure to establish artificial ponds to which individuals could be relocated would lead to the local extinction of this species. No construction should be undertaken until constructed ponds have been shown to be suitable and successful.
- The EIS and SIS greatly underestimate the impacts of the Bypass on the Wallum Sedge Frog and often provide unsupported statements with no adequate descriptions on the existing population. The conclusion that there is 56ha of known or potential habitat for this species is misleading and the true amount of suitable habitat is significantly less. The Bypass would not only destroy the core breeding areas but it would isolate the remaining populations on either side of the Bypass.
- The numerous indirect impacts of the Proposal are likely to be highly detrimental to the Wallum Sedge Frog populations and include such impacts as habitat destruction, changes in hydrology, and altered pH. There is a considerable possibility that the population would become locally extinct in the short to medium term as a result of the Bypass.
- The Wallum Sedge Frog is a legislatively protected species under various State and Commonwealth legislation and is listed within the IUCN Red Data Book. Despite this, the Governments and interested stakeholders are continuing with development with little or no acknowledgment towards this species.
- The loss of populations of the Wallum Sedge Frogs must be viewed as significant. The abundance of this species, specifically within the Bypass route and surrounds lacks updated assessment and its habitat is threatened by numerous destructive processes. Further scientific investigation is required to prevent local or total extinction.

- The *Gold Coast Airport Runway Extension Project Draft MDP 2004* states 'all areas in which the Wallum Sedge Frog has been found on Airport land appear to be human made' and the conclusion which is made indicates that the Wallum Sedge Frog readily colonises and / or breeds in artificial areas if Wallum vegetation is nearby. However the trial frog ponds have proven to be a failure, indicating artificial ponds fail to provide the necessary environment. However, the trialling of artificial frog ponds is still considered as an ongoing management strategy. Previous research on this species has shown that they have highly specialised habitat requirements and that populations move as conditions change and they may occupy a series of localities over time. In addition, different ponds may be utilised at different stages of the life cycle.
- The EIS does not include offer any updated information regarding the effectiveness of pond creation and under-road culverts for frogs. It is acknowledged that limited mitigation measures are available for the Wallum Sedge Frog and that compensatory measures need to be re-examined, however this is a vague proposal which offers no reliable protection. A true compensatory package would have included known Wallum Sedge Frog habitat at the start and would be funded by all stakeholders whose projects are likely to negatively impact on the species.
- Any refinement of the mitigation measures for the Wallum Sedge Frog should be undertaken in consultation with the DEC. Prior to undertaking any works, including the development of any artificial ponds, it is critical to obtain a clear idea of the current environmental conditions to enable adequate monitoring of the proposed mitigation measures. It is unclear from the information presented as to whether any enhancement is being undertaken of the current artificial pond. However it is recommended as it provides excellent opportunity to help with the development of any subsequent ponds and also with the potential translocation of any individuals. The placement of dense vegetation along pond edges is also recommended.
- Other mitigation measures proposed for the Wallum Sedge Frog are welcomed, including the proposal to minimise Mosquito Fish from the sediment basins. The final *Predation by the Plague Minnow Threat Abatement Plan* (2003) may be relevant as it sets out the management actions that are necessary to abate the impacts of Mosquito Fish on frog species. Furthermore, the *Information Circular No.6 Hygiene Protocol for the Control or Disease in Frogs* produced by the then NPWS in 2001 should also be used where relevant.
- Although unforested 25 years ago the regenerating Tugun Hill now provides valuable habitat for the Common Planigale.
- The small Common Planigale metapopulation, is likely to become locally extinct should the Bypass be built. While translocation may be an option in terms of ameliorating the impacts, the EIS has failed to consider the broader ecological ramifications from the perspective of landscape scale population dynamics and long-term survival of the population as a whole. This is a significant issue for this species because there is no data in the EIS to support a view that similarly large aggregations occur elsewhere on the site and thus the larger population may also be in jeopardy. Other mitigation measures for the species, for example 90m fauna underpass, are optimistic.
- Consideration for the cumulative impacts on the Common Planigale must be taken into consideration when assessing the long-term survival of the species. Given that there is limited 'known habitat' and a poor understanding of the distribution of this species within the area, any potential impacts on this species is of concern. The ability for the species to move within the landscape is also potentially impacted by the Bypass, particularly given that the use of underpasses has not been documented. It would appear that mitigation measures may not have been developed to address the potential concerns about noise and vibration impacts to the Common Planigale and other conservation significant fauna and further clarification regarding this is required. Additionally, standard fauna exclusion fencing may not prevent Common Planigale access onto the road.

- Has thought been given to the potential that relocated Long-nosed Potoroos and the Common Planigales captured prior to vegetation removal may move back into the area of original capture? Procedures may need to be developed to deal with this potential issue.
- During the exhibition of the SIS it is understood that a Green-thighed Frog individual was identified from the study area. An assessment of the potential impact(s) that the Bypass may have on this species must therefore be undertaken.
- The accidental discovery of the Green-thighed Frog (*Litoria brevipalmata*) along the Bypass route suggests that more survey work should be undertaken in the preparation of a final EIS. The potential impacts of the Bypass on this species are yet to be determined however, the location of this species suggests both its adult and breeding habitat would be directly impacted by the Bypass. There could be the likelihood of extinction of this species at Tugun as result of the Bypass. Additionally threatened species may also be found on the site including the Wallum dependent *Litoria freycineti*.
- The core breeding habitat of the Green-thighed frog should be protected and connectivity between and remaining breeding populations on either side of the Bypass should be provided. Suitable breeding habitat to translocate frogs from breeding ponds that would be destroyed should also be provided. Finally, assurances that any proposed developments would not further isolate and destroy remaining habitats should be received.
- The draft MDP has indicated that the Bypass is unlikely to have any impact on a number of bat species that occur within the Airport land. This contradicts the EIS which indicated that a loss of roosting habitat is highly likely (particularly for the Eastern Long-eared Bat) and therefore an SIS was recommended, including a number of mitigation measures to address these impacts.
- Work undertaken by Dr Rohweder in 2001, indicated that caution should be used over the current status of the roosts for JAMBA and CAMBA bird species and opportunities for creating additional roosting habitat should be considered.
- No information appears to have been presented on the potential impacts that the railway roof tunnel may have on species of conservation significance within the EIS.
- It is recommended in conjunction with the EPA to develop and implement an on-site monitoring program to evaluate the local impact of the construction and operation of the Bypass on regionally significant species.
- No confirmed records of the threatened Glossy Black-Cockatoo (*Calyptorhynchus lathami*), in the Queensland section of the Bypass are cited despite it being previously recorded from the study area.
- The removal of 19.6 hectares of Swamp Sclerophyll Forest is of concern. Some of the tree species associated with this vegetation community are important food sources for a number of legislatively protected fauna species. These include the Grey-headed Flying Fox *(Pteropus poliocephalus*), the Common Blossom Bat *(Synconycteris australis),* and the Yellow-bellied glider (*Petaurus australis*).
- Investigations of the south-eastern slope of the ridgeline in Hidden Valley revealed a number of indicative signs that fauna utilise the Blackbutt forest. Macropod scats, macropod trails and arboreal mammal scratches on tree trunks indicate the presence of Koalas.
- Koala spot assessments were not done in suitable habitat and there is insufficient evidence for concluding that the area no longer supports resident Koalas as Koalas travel and may use these areas as resting places. Spot assessments are not reliable or efficient for Koala surveys using the sampler's timeframe. Line transects and quadrats need to be used.

- A new SIS needs to be undertaken as the Koala has been spotted recently in the Seagulls and Cobaki areas meaning that survey locations were not adequate. The predation scat searches that were undertaken are not satisfactory. In addition, Koala scats were analysed by a Ms Bowen although there is no reference to her qualifications or location.
- The only known habitat within the Bypass route for the Eastern Grass Owl has now been slashed as part of Airport maintenance activities. Justification must be presented on the statement about the 'expansive' area of heath land available for the Eastern Grass Owl in the locality and across the region. While broad habitat may be available, the quality and the factors influencing this habitat cannot be estimated. This is particularly relevant given that this recorded individual was the most recent report in the local area and within 50km of the site.
- The construction of the Hidden Valley Bridge would have significant impacts on both the flora and fauna present in the regenerating remnant vine forest, which forms an important sub-regional corridor. There is no discussion of the ecological significance of the site considering the threatened fauna found include the Bush Hen, Rose Crowned Fruit Dove (*Ptilinopus regina*), Osprey (*Pandion haliaetus*) and possibly the Superb Fruit Dove (*Ptilinopus superbus*) and the Grey-headed Flying Fox.
- There is no guarantee that the Proposal would not lead to the local extinction of a number of endangered fauna species inhabiting the area. The number of other residential developments and future development of the Airport would only contribute to the potential impacts on the rare and threatened fauna species.

Submission Numbers:
19, 21, 25, 27, 33, 34, 36, 38, 40, 41, 43, 44, 47, 51, 52, 54, 57, 59, 61, 62, 63, 66, 69, 70, 71, 72, 73, 74, 79, 80, 82, 86, 88

Responses:
As described in Section 15.4 of the SIS, Volume 1, no known habitat of the Swordgrass Brown Butterfly in the study area is proposed to be removed as a result of the Bypass. *Gahnia* (the preferred food plant) is widely distributed over the study area and only 14.1 hectares out of 105 hectares of potential habitat would be removed. The life cycle of this subspecies is not likely to be disrupted so as to place it at risk of extinction. Further vegetation community assessment and mapping has been completed in the compensatory habitat Blocks A and E and the results of this survey are summarised in Chapter 6 of this Submissions Report and presented in Appendix G.

Targeted surveys for terrestrial invertebrates of conservation significance were undertaken within the study area. Surveys targeted optimum time periods, including additional surveys for the Swordgrass Brown Butterfly to coincide with the flying of the summer-autumn generation. Survey methodology and survey personnel are outlined with Appendix I and J of Technical Paper 12. A discussion on the distribution of species is provided within the Technical Paper 12 and within the SIS.

As discussed in Section 7.4 of the SIS Volume 1, *Argyreus hyperbius* (or more specifically *Argyreus hyperbius* spp. *inconstans)* was not surveyed for. This species inhabits seasonally inundated wetlands which are present in the study area. However, the host plant for the larvae is *Viola betonicifolia* which has not been recorded in the area despite intensive plant surveys. The Laced Fritillary (or Australian Fritillary as it also called) is therefore considered unlikely to occur in the area due to the absence of this plant (Dr Don Sans, CSIRO, pers. comm.). Only one sub-species is known to inhabit Australia.

The significance of the Cobaki Long-nosed Potoroo population within the study area is acknowledged within the EIS. The original C4 alignment has been altered a number of times

to route it away from ecologically sensitive areas. This has included alterations to avoid, amongst other things, the Long-nosed Potoroo habitat as much as possible. However, the EIS outlines that the Cobaki Long-nosed Potoroo population would be at risk from nearby developments, with or without the Proposal. Consequently, a package of mitigation strategies has been proposed to ameliorate potential impacts from the Proposal and cumulative impacts from surrounding developments and is described in Chapter 10 of the EIS Main Volume and Chapter 6 of the SIS Volume 1. Surveys undertaken by Bali et al (2003) within Technical Paper 12 were commissioned to provide information on the status, distribution and habitat use of this population for management. The measures proposed would provide a much improved environment for the Cobaki Long-nosed Potoroo population and significantly increase the likelihood of their long-term survival. The rehabilitation of previously cleared and impacted areas in the vicinity of Long-nosed Potoroo habitat would be undertaken in consultation with DEC and relevant agencies.

A SIS has been prepared covering the Long-nosed Potoroo (Chapter 13, SIS Volume 1) including an addendum for the Cobaki Long-nosed Potoroo endangered population. The prescription of an endangered Potoroo population at Cobaki Lakes and Tweed Heads West actually refers to one population of animals, situated in a small area of Crown Land between the northern shore of Cobaki Broadwater and the NSW-Queensland border. Subsequent descriptions of locality are as described by the Geographical Names Board of NSW 2004.

Impacts on the Cobaki Long-nosed Potoroo population have been targeted with compensatory measures proposed to minimise threats to this species. These measures would be undertaken upon approval.

The fauna monitoring that has been undertaken to date would be used as baseline to determine the impacts of the Tugun Bypass on the Cobaki population of the Long-nosed Potoroo.

Chapter 6, Section 6.9 of the SIS Volume 1, presents a discussion on cumulative impacts in relation to the Cobaki Long-nosed Potoroo population.

An assessment of the potential impacts of the Bypass on the Long-nosed Potoroo and the Cobaki endangered Long-nosed Potoroo population are presented in Chapter 13 of the SIS Volume 1 and Chapter 5 of the SIS Addendum respectively. The assessment also included details on the existing local and regional populations. The SIS and SIS Addendum provided a number of mitigation measures that would be implemented to minimise the potential impacts to the Long-nosed Potoroo as a result if the Bypass, which are discussed in Chapters 32, 33 and 34 of the SIS and Chapter 5 of the SIS Addendum. Discussions with DEC would be undertaken to progress other suitable measures should any impediment arise to the implementation of the mitigation / compensatory measures proposed in the EIS for the Long-nosed Potoroo.

Noise is not a key threatening process under the EPBC Act or the TSC Act. Sound proof fencing had therefore not been considered. In general small macropods habituate to noise and the location of the population next to the flight path of an international airport suggests that the Cobaki Lon-nosed Potoroo population may also habituate to road noise. The installation of noise barriers along the western edge of the Bypass would reduce noise from the Bypass but would do nothing to manage noise from the traffic travelling along Boyd Street.

Fencing is proposed to restrict the movement of predators of the Long-nosed Potoroo. However it is acknowledged that culverts may provide access opportunities. Fox control programs are therefore proposed and would be targeted in specific areas. Details are

provided in the compensatory habitat package summarised in Chapter 6 of this Submissions Report and included in Appendix H. This may include areas around certain culverts.

The results of field based surveys and background database and literature searches for amphibians are described within Appendix C and D of Technical Paper 12. In addition, where amphibian species were coincidently recorded as part of other targeted threatened species surveys and monitoring, they are also described, for example, Common Planigale surveys by Lewis Ecological Surveys, Appendix H, Technical Paper 12 and 2004/2005 summer monitoring for Common Planigales, Appendix I of this Submissions Report. The latter report also describes the location and habitat for the Green-thighed Frog, a threatened species in Queensland and NSW recorded during this survey. Furthermore, sub-consultants Biodiversity Assessment and Management Pty Ltd (BAAM) also provide discussion on threatened amphibian species recorded within the study area and the management measures proposed (refer to Appendix E of this Submissions Report).

The distribution of the Wallum Froglet is summarised in Chapter 14 of the SIS Volume 1 and is known to extend as far south as Wyong on the Central Coast of NSW. Chapter 14 also provides discussion on the potential impact of the Bypass on this species and mitigation strategies to ameliorate these impacts. No experimental mitigation measures for the Wallum Froglet were proposed as were for the Wallum Sedge Frog. The Wallum Froglet population within the study area is estimated to be in excess of 10,000 and only 10% of its habitat would be removed the level of impact on this species was not considered significant.

It is acknowledged that the Wallum Froglet is very sensitive to a reduction in water quality and therefore it is important to ensure that any activities do not result in changes to the natural water quality within the receiving environment. Chapter 8 of the EIS Main Volume explains that liming rates would be based on the results of the testing programs and naturally low pH conditions in the south of the Airport would be maintained.

Generally, the core breeding habitat for the Wallum Froglet has been avoided and connectivity maintained in fragmented areas by the use of purpose designed drainage / frog culverts. Regulation of future development is beyond the capability of the Proponents. Should the Proposal be approved, the mitigation measures for the Wallum Froglet would be detailed in the Flora and Fauna Management Plan, a sub plan of the Construction Environmental Management Plan.

Management measures suggested through submissions to the EIS and SIS, such as the development and implementation of a Wallum Froglet habitat enhancement program aimed at consolidating other known habitat in the Gold Coast lowlands, are considered beyond the scope of this Proposal or are already proposed / undertaken. On-going consultation with government agencies would be coordinated with other measures.

Monitoring of water quality parameters has been identified as a component of the monitoring package summarised in Chapter 18 of the EIS Main Volume and surface and ground water pre and during construction monitoring has been proposed and is outlined within Table 18.1 and Table 18.3. Liaison with government agencies has also been identified as a requirement of the monitoring package as outlined in Section 10.9.1 of the EIS Main Volume. Discharge criteria would be in accordance with the Environmental Protection Licence for the Proposal.

The recommendations proposed within Hero, et al. (2001) have been adopted wherever possible to ensure the survival of the frog species. The design and location of frog ponds is still under review and a recent study by Dr. Glen Ingram Biodiversity Assessment and Management Pty Ltd (BAAM) provided further discussion into the efficacy and potential

locations for frog ponds. This study is summarised in Chapter 6 and the full report is provided in Appendix E of this Submissions Report.

The status of the Wallum Sedge Frog is outlined in the SIS Volume 1, Chapter 29. The mitigation measures for the Wallum Sedge Frog are acknowledged to be experimental and would be subject to monitoring prior to, during and after construction. The monitoring program would be agreed with the government agencies prior to commencement and the results would also be reported directly to them. Mitigation measures incorporate monitoring to measure the effectiveness of ponds, fencing and underpasses. These requirements would be determined in consultation with GCAL, Queensland EPA, DEH and DEC, depending on jurisdiction and detailed in the Operation Environmental Management Plan (refer Table 18.1, EIS Main Volume). Additionally, the continued discussion and the refinement of the mitigation strategies and monitoring methodology for the Wallum Sedge Frog would be undertaken through consultation with the relevant government agencies. The acquisition of known habitat for this species is also being considered as part of the revised compensatory habitat package. In the event that the measures are not successful alternatives would be agreed prior to commencement of the monitoring. A recent study by Dr Glen Ingram (BAAM) provides further information into the status, distribution and efficacy of mitigation strategies for the Wallum Sedge Frog. This study is summarised in Chapter 6 and the full report is provided in Appendix E of this Submissions Report. In summary, mitigation strategies proposed within the EIS have the potential to ameliorate impacts of the Proposal on this species.

A review is presented on the efficacy of the mitigation strategies for the Wallum Sedge frog indicates that those measures proposed within the EIS have the potential to ameliorate impacts of the Proposal on this species.

The issues raised regarding the ability to utilise artificial ponds is discussed within a recent study by BAAM who comment that from the reports available, over four years (2001-2005), the frog has been recorded breeding from six discrete ponds and a drainage line. Five of the ponds and the drainage line all appear to be artificial. The sixth pond is within Wallum woodland in the southeast, which has apparently regenerated after sandmining. Further discussion is provided on suitability of areas and general principles for frog ponds within this report (refer to Appendix E of the Submissions Report)

The *Predation by the Plague Minnow Threat Abatement Plan* (2003) would be integrated into the management of sediment basins and frog ponds where reasonable and feasible.

Studies undertaken as part of this Proposal suggests that the Bypass would not fragment habitats that are not already partially isolated (refer Technical Paper 12, Appendix B). Opportunities may exist to facilitate species movement adjacent to the Bypass through the deployment of fencing, underpass culverts (two culverts are proposed north of Hidden Valley, outlined in Technical Paper 2) and rehabilitation along road verges between Tugun Hill and into Hidden Valley.

Measures are proposed to minimise the barrier effect of the Bypass on the Common Planigale. These include the positioning of culverts at appropriate locations and of suitable design however as suggested, 90m culverts are not proposed. Recent monitoring by Lewis Ecological Surveys (refer to Chapter 6 and Appendix I of this Submissions Report) has also identified a new and significant location for the Common Planigale from an area of Crown Land west of the Bypass footprint and south of the Cobaki Lakes development site which provides some indication that the species is more widespread than previously thought.

Possible noise impacts on the Common Planigale in the vicinity of the tunnel would be buffered both within the tunnel and along the approach ramps due to concrete walls in this area. Noise and vibration would be monitored during construction and would be designated with the Construction Environmental Management Plan. Additionally, the provision of modified fencing to prevent passage of Common Planigale onto the Bypass in key habitat areas would be considered further in the detailed design phase of the Proposal and in consultation with the relevant government agencies.

The potential for relocated Common Planigales and other fauna species, captured prior to vegetation removal, to move back into the area of original capture is noted. This would be considered during the development of fauna and flora sub plans (including translocation strategies) as part of the development of the Construction Environmental Management Plan, Chapter 18, EIS Main Volume.

An assessment of the habitat and impacts of the Bypass on the Green-thighed Frog has been undertaken by BAAM and is summarised in Chapter 6 of this report and the full report is provided in Appendix E of this Submissions Report. Primary habitat for Green-thighed frog is considered to occur in NSW Crown Land situated to the west of the C4 alignment. Regarding *L. freycineti*, little is known about the ecology of this species. In common with the Wallum Froglet and Wallum Sedge Frog, *L. freycineti* is often associated with 'wallum' type habitats. *Litoria freycineti* is not listed under NSW threatened species legislation and is uncommon in NSW. It was recorded in the Tweed coastal lowlands and despite the fact that *L. freycineti* was recorded in the study area by WBM Oceanics (1991), the species has thus far not been recorded during the course of the recent studies despite ideal sampling conditions (Technical Paper 12, Appendix C). Ingram (2005) describes *L. freycineti* as extremely sensitive to change in the phenology of the environment and is eliminated within a few years from these changes.

Potential habitat has been identified for the Eastern Long-eared Bat on Airport land. The impacts of the Bypass within this area are considered as part of the SIS, Volume. The eight part test undertaken for this species indicate a small loss of potential roosting habitat. This impact is unlikely to be significant in terms of the population in the region.

The monitoring proposed in the EIS for the roost site of JAMBA and CAMBA bird species on Pony Club leased land during construction and early operational phases.

Potential impacts on species of conservation significance (as a result of the railway roof tunnel) are detailed specifically within the draft MDP for the Tugun Bypass prepared by Maunsell Australia.

Monitoring strategies to evaluate the local impact of the construction and operation of the Bypass on regionally significant species are outlined within Chapter 18 of the EIS Main Volume. Consultation would occur with government agencies during the development of this program.

Although no confirmed records were identified for the Glossy Black Cockatoo in the Queensland section of the study area, a habitat based approach was taken to determine potential impacts (refer section 4.4.8, of Appendix 1within Appendix A, Technical Paper 12).

The assessment of the potential impacts of the Bypass on Swamp Sclerophyll Forest is discussed within the Chapter 3 of the SIS Addendum. Chapter 6 of the submissions report summarises recent studies into the extent and condition of swamp sclerophyll forest within compensatory habitat Blocks A and E. Residual impacts and offsets for Swamp Sclerophyll Forest are considered within the revised compensatory habitat package.

The distribution of the Koala, arboreal mammals, and macropods within the study area are discussed within Section 10 of the EIS and the associated SIS and Technical Papers. Cross reference between Figure 10.1 (EIS Main Volume) showing vegetation communities within the study area and Figure 3.2 (SIS Volume 1) showing mammal survey sites indicates that spot assessments for Koalas coincided with Koala habitat (including Swamp Mahogany) within the study area. A peer reviewed survey methodology employed during the background studies found that there was a lack of a resident Koala population within the study area. Further information on Koala habitat mapping and survey methodology is provided in Appendix C, Technical Paper 12.

The locality and recording information to confirm the status of the new records for Koalas in the Seagulls and Cobaki areas has not been provided. Koalas are known from the Tweed Shire and recent surveys confirmed the Koala within the compensatory habitat block (refer to Appendix J of this Submissions Report). Although Koala habitat was recorded within the study area for the Proposal, surveys did not confirm a resident Koala population.

Ms. Michiala Bowen is a qualified scientist involved in the field of vertebrate scat and hair analysis trained under the guidance of Anthony Rose and in association with Barbara Triggs. Her expertise was sought by qualified field zoologists as described in Technical Paper 12, Appendix C.

As outlined within Chapter 30 of the SIS Volume 1, the Bypass would fragment potential habitat for the Eastern Grass Owl in the south-eastern corner of the study area, removing 2.4 hectares out of 8.2 hectares. Revegetation of the tunnel area could provide potential habitat for the Eastern Grass Owl in this area although flora species selection and maintenance would be undertaken in consultation with GCAL to maintain OLS requirements in this area.

Ecological values within the Hidden Valley area have been identified in a number of Chapters within the EIS Main Volume. These included Chapter 5, 6, 7 and 10 in the context of changes to the Proposal design to avoid or minimise impacts on a number of significant rare and threatened species in the Hidden Valley area. The conservation significance of the significant rare and threatened species is discussed in further detail within Chapter 10 of the EIS and the SIS. The overall ecological significance of the study area, including Hidden valley, is presented in Chapter 4.4.10 of Technical Paper 12.

A comprehensive package of mitigation strategies and compensatory measures including monitoring strategies has been proposed to ameliorate potential impacts of the Proposal on threatened species. Cumulative impacts have also been considered as part of these compensatory strategies and are discussed within Chapter 6, Section 6.9 of the SIS Volume 1, and Chapter 17 of the EIS Main Volume.

4.4.5 Threatened and Significant Ecological Communities

In summary, the respondents to the EIS raised the following issues:

- There is concern about the destruction of rare and threatened vegetation communities along the Bypass route. These communities should be valued for their historical, cultural and environmental importance.
- The status of the regenerating vine forest in Hidden Valley is considered to be an EEC and therefore no part of it should be destroyed or removed.

- There is concern that the Bypass traverses coastal lowland vegetation communities of Melaleuca forest and coastal heath. Approximately 90% of these coastal forests have been lost, and now coastal heath is listed as a threatened Regional Ecosystem (RE). The coastal heath community should be afforded protection as the Bypass would impact and fragment one of the last substantial remains of this community.
- The latest information on REs within the study area is that 'Tall open forest of *Eucalyptus pilularis*' is now Endangered; 'Tall open forest generally with *E. siderophloia* and *E. propinqua*' is Not Of Concern; 'Complex notophyll vine forest (altitude <600m)' is not of concern; '*E. saligna* or *E. grandis* tall open forest' is Of Concern; and 'Simple notophyll vine forest often with abundant *Archontophoenix cunninghamiana* ('gully vine forest")' is Not Of Concern. This information should be considered within the assessment material.
- The Proposal would impact upon two REs of State significance. Recommended compensatory measures have been taken into consideration regarding impacts on Endangered and Of Concern REs, however a number of recommended measures provided by Queensland EPA should also be undertaken.
- There is concern over the 'clear impact' on the EECs as a result of the Bypass. The loss of some of these communities would be significant and development facilitated by the construction of the Proposal would also contribute to the decline of these communities.
- Chapter 2 of the SIS Addendum states that no threatened or species of conservation significance were recorded within the Swamp Oak Floodplain Forest EEC, however a brief review of the species maps indicates that some species may have been recorded within this area.
- If rehabilitation of Swamp Sclerophyll Forest is required, it should fall under the control of DEC. Concern is also raised about the 16.8 hectares of this community scheduled for rehabilitation on Pony Club land, as plans show that virtually this entire community would be cleared for the Bypass.
- The vegetation originally classified as Blackbutt Woodland / Open Forest has been superseded by the RE 'Mixed Tall Open Forest with *E. siderophloii, E. propinqua* on metamorphics +/- interbedded volcanics'. Although the RE has a 'No Concern at Present' classification, the small size of this patch, its isolation and its importance to species of conservation significance makes it highly significant and therefore should not be impacted upon.
- Clarification of the actual area of Saltmarsh within Pony Club land to be rehabilitated is required.

Submission Numbers:
16, 19, 25, 38, 41, 43, 44, 52, 56, 59, 62, 63, 69, 71, 72, 73, 74, 80, 86, 88

Response:
A full description of each vegetation community present, their distribution within the study area, and their local, regional and state significance is presented in Section 3 and 4 of Technical Paper 12. The significance of these vegetation communities under relevant legislation is summarised into Chapter 10 if the EIS Main Volume. Additionally, five EECs as listed under the TSC Act were considered within the SIS and SIS Addendum. Mitigating and compensatory measures are proposed to ameliorate the impacts on these communities.

Section 16.4.1 of the SIS Volume 1 outlines that the Littoral Rainforest EEC in the study area would include both the littoral rainforest and regenerating vine forest vegetation communities. These communities occupy 14.1 hectares within the study area. The Littoral Rainforest on Commonwealth land represents a mature, relatively undisturbed forest ecosystem, while this community in Hidden Valley is highly disturbed and in the process of

regenerating. An SIS has been prepared for this community and is presented in Chapter 16 the SIS Volume 1.

Mitigation strategies to ameliorate the impacts on the Proposal on Melaleuca forest and coastal heath have been described within the EIS and the SIS Volume 1. Where residual impacts can not be mitigated, a compensatory habitat package has been proposed.

The latest information regarding the REs within the study area would be updated into any future assessment material relating to these REs in Queensland.

The recommended measures provided by the Queensland EPA are part of the mitigation strategies for the Proposal outlined within Chapter 10 and Chapter 18 of the EIS Main Volume.

Species Impact Statements have been prepared for the EECs which would be impacted on by the Proposal. A discussion of the their significance, the impacts of the Bypass and the mitigation measures proposed to minimise impacts are provided within Chapters 16 and 27 of the SIS Volume 1 and Chapters 2, 3 and 4 of the SIS Addendum.

Cross reference between Figure 2.1 of the SIS Addendum and Figures 10.2, 10.5, 10.6 and 10.7 of the EIS main Volume does not indicate any interception between threatened flora or fauna species and the distribution of Swamp Oak Floodplain Forest. This is also consistent for the confidential threatened flora species.

The rehabilitation of the Swamp Sclerophyll Forest EEC as previously proposed would not be undertaken. Additionally, the 16.8 hectares is outside of the proposed footprint on Pony Club leased land.

The re-classification of the vegetation originally classified as Blackbutt Woodland / Open Forest to Mixed Tall Open Forest with *E. siderophloii, E. propinqua* on metamorphics +/- interbedded volcanics would be validated and updated into any future assessment material relating to REs in Queensland. Additionally, regarding impacts on this community type, a full discussion on the route selection process is presented in Chapter 5 of the EIS Main Volume.

Section 6.3 of the SIS proposes to undertake weed management and habitat rehabilitation in the Saltmarsh EEC on the Tweed Heads Pony and Hack Club land. Further consultation with Department of Lands, Tweed Shire Council and the Tweed Pony and Hack Club indicates that weed management within Lot 319 is sufficient. It is therefore proposed that areas of Saltmarsh EEC disturbed (excluding the actual road footprint) as a result of activities associated with the road proposal would be rehabilitated. This would include new access tracks formed to undertake geotechnical activities.

4.4.6 Compensatory Habitat

In summary, the respondents to the EIS raised the following issues:

- The compensatory habitat is inadequate and would not provide for or conserve flora and fauna. Any area identified as compensatory habitat should have at least or better representation of the environmental values, habitat or threatened species than the habitat that would be impacted on.
- There is a reference to the compensatory habitat package in the local area providing preservation of similar vegetation to the Freshwater Wetlands on Coastal Floodplains vegetation community. However, the proposed compensatory habitat does not actually include any such similar vegetation community.

- The SIS refers to the extent of similar vegetation communities in the compensatory habitat, but no mention is made under the TSC Act, that these vegetation communities are already afforded a level of protection.
- If the 'compensatory land package is under consideration' what is the alternative consideration if this package is not implemented? In addition the EIS states 'in NSW compensatory habitat may include…'. This should read 'would include' as 'may' infers that compensatory habitat is not guaranteed.
- It should be noted that when compensating for impacts on SEPP 14 wetlands a ratio of 10:1 is generally used. The consideration of anything less would be unacceptable.
- A detailed survey of the compensatory habitat should be undertaken to the level of the assessments undertaken for the Bypass route. Only then can the compensatory nature of the habitat on sites to the south and west be properly evaluated.
- The compensatory habitat package would need to be updated to reflect the current information on the package. Additionally, further liaison with DEC should be undertaken regarding the compensatory habitat package to ensure that the package most appropriately deals with the potential / known impacts of the Proposal.
- Justification is needed for the use of a 30m strip as being the area of edge effects. A width of 50m (and potentially greater) is the most likely the area effected by edge impacts.
- The proposed compensatory habitat does not reflect the diversity of existing habitat and it is noted that JAMBA and CAMBA sites are not contained in the compensatory habitat package.
- The compensatory habitat area does not contain representative habitats of those Wallum communities or populations of threatened fauna that would be adversely affected by the Bypass. Compensatory habitat for the Wallum frog species and the Long-nosed Potoroo should be acquired.
- The ecologically sensitive and endangered species of flora and fauna would be at an advantage following the implementation of the compensatory habitat package than they are now.
- Opportunities for purchase of like-for-like compensatory habitat are limited due to their limited restricted representation in Queensland.
- Compensatory measures for species of State significance should include integration of elements aimed at providing broader landscape value compensation for regionally significant species.
- Blocks A and E are very different in environmental values than similar lands around the Cobaki Broadwater that were previously requested to be purchased. It is considered that Blocks A and E should be included in the existing Tweed Estuary Nature Reserve.
- Block C proposes to offer compensatory habitat for the Wallum Sedge Frog and is strategically located to act as a buffer from edge effects and future development for the nearby Swamp Orchid colony. However, Block C is small and isolated, would be surrounded by the Bypass and is relatively disturbed by previous landuse activities. Compensatory measures need to be re-examined to include purchasing known Wallum Sedge Frog habitat elsewhere.
- Block E contributes substantially to the compensatory SEPP 14 wetland habitat in and allows for greater connectivity along the Cobaki and Terranora Broadwaters. However, Block E is not particularly diverse with no understorey and remediation of this site would likely to be expensive and unsuitable to provide habitat for biodiversity. In addition, it currently supports approximately 60 goats.

- Block A has been impacted by the presence of goats and it is not clear whether fencing has been erected to protect the reported environmental values of this site. It has undoubted values as Koala habitat and would be a valuable acquisition in order to give greater protection to this species and to consolidate the protection of the Cobaki Broadwater system. However, the landscape is not habitat for any of the more significant fauna species impacted by the Bypass. Some value might exist for bird species but this would logically mean that it is already utilised by bird populations.
- Regarding the value of the compensatory habitat package, clarification is required if fauna linkage between the areas is primarily for avifauna. There is reference to fauna corridors, however there are limitations to providing a continuous linkage between the areas referred to because of the Bypass and other proposed developments.
- It is not clear from the SIS the location of similar vegetation in the area that is proposed as part of a compensatory package to provide for the Eastern Grass Owl.
- Limited information on vegetation communities and the flora and fauna of the compensatory habitat package is provided other than to state it shares ten vegetation communities in common with key habitat to be removed as part of the Proposal. There is also no discussion of the level of protection the compensatory package would receive, what agency would have jurisdiction and how rehabilitation and maintenance would be financed. It is recommended that the compensatory habitat package be expanded to include adequate funding for the necessary costs associated with the establishment and management of an area protected for its environmental values. The compensatory package should also include commitment to the preparation and implementation of a suitable rehabilitation plan.
- The package does not include arrangement with the NSW Government and the Aboriginal claimants to Crown land north of Cobaki Broadwater to secure the conservation management of those Crown lands in perpetuity.
- The package does not include for the permanent protection and appropriate management of buffer between the Proposal and areas of high conservation value in NSW immediately north of where the Bypass crosses the border. It is reasonable to expect that the Proponents purchases and dedicates these lands, and it would have the additional benefit of precluding urban development.
- It is unclear if the soils of the compensatory habitat are compatible with the areas that they are to replace.

Submission Numbers:
14, 16, 19, 25, 36, 43, 44, 47, 51, 52, 59, 62, 63, 66, 68, 69, 71, 72, 73, 74, 75, 79, 88

Response:
A comprehensive compensatory habitat package is proposed.

The need for compensatory habitat has been determined using a number of policies as produced by the NSW State government. The RTA's draft Compensatory Habitat Policy and Guidelines (Version 7) is another initiative in development. That document indicates that, where practicable, compensatory habitat should be at least equal in area to the key habitat lost, close to the affected key habitat and similar to or better than the affected key habitat.

The compensatory habitat package proposed generally accords with these three objectives however 'like for like' compensation in the coastal lowlands of South East Queensland and North East New South Wales is difficult. Assessment of the proposed package indicates significant species of flora and fauna and supporting habitat. The proximity of the proposed compensatory habitat blocks to the study area has ensured that a similar suite of fauna, flora and vegetation communities have been represented. Targeted fauna and flora surveys were commissioned after the exhibition of the EIS to further determine the biodiversity values of

these blocks. Preliminary investigation suggests that the compensatory habitat blocks are providing habitat for a suite of threatened species and providing strategic links in corridor networks around the Cobaki Broadwater.

Threatening processes are listed in the TSC Act and the EPBC Act and the clearing of vegetation for road construction is recognised as a threatening process. In response general reference is made to a compensatory habitat package that 'as a whole' has similar native vegetation. In the instance where the compensatory habitat package contains an area of the actual EEC, specific reference is made. Specific reference is not made with regards to Freshwater Wetlands on Coastal Floodplains. Appendix P of Technical Paper 12 provides further detail on the proposed compensatory habitat package. Further assessment has been undertaken and a summary is provided in Chapter 6 with the full report provided in Appendix G of this Submissions Report.

The level of protection offered through the purchase of land as compensatory habitat is that the land would be managed primarily for conservation outcomes. In addition, the land package for the Proposal combined with the management measures represents a favourable environmental outcome from a local, regional and national perspective. The reasons for these outcomes are explained in detail in Section 10.8 of the EIS Main Volume.

The compensatory habitat package is offered as part of the Proposal. If the Proposal is approved, the compensatory habitat package would be conditioned as part of this approval. Additionally, comprehensive fauna and flora surveys were commissioned by the Proponents for the compensatory habitat blocks. A summary of this work is provided in Chapter 6 with the full reports provided in Appendices G and J of this Submissions Report. It is also proposed to undertake further consultation with government agencies prior to finalising the compensatory habitat package.

Section 1.3 of the Compensatory Habitat report (Appendix P, Technical Paper 13), outlines the DIPNR policy regarding SEPP 14 wetlands. At present, the compensatory habitat package includes 22.1 hectares of SEPP 14 wetlands, which well exceeds the proposed ratio of 10:1.

The approach outlined in the draft Compensatory Habitat Policy and Guidelines (Version 7) has been adopted for the Proposal because it has been subjected to considerable review by the RTA in consultation with DEC, applied to a number of Pacific Highway upgrades' and developed specifically to compensate for impacts associated with linear corridors. The use of 30 metres relates to the provision of compensatory habitat for areas of habitat edge affected by the Proposal. The discussion paper prepared by Bali (2000) was commissioned by the RTA in response to concerns expressed by the then NPWS (now DEC) about mitigating edge effects associated with new roads. Its guidelines are based on ecological principles derived from the literature and tested on several recent Pacific Highway upgrade projects. The report recommends that an additional 30 metre strip be calculated to compensate for edge effects along newly-created corridors.

The concerns regarding JAMBA and CAMBA sites not being represented in the compensatory habitat package are noted. Regarding the 15 bird species identified as having international importance (listed either under JAMBA or CAMBA agreements), these birds are mainly species associated with the aquatic habitats of the Cobaki Broadwater, though several are also woodland-dependent. These habitats are to the west of the Bypass alignment and would be unaffected by the Proposal. A list of the species can be found in Technical Paper 12 of the EIS.

Comprehensive fauna and flora surveys were commissioned by the Proponents for the compensatory habitat blocks. A summary of this work is provided in Chapter 6 with the full reports provided in Appendices G and J of this Submissions Report.

The measures in the compensatory habitat package include predator control and exclusion fencing, in consultation with relevant government agencies.

It is noted that opportunities for purchase of like-for-like compensatory habitat are limited in Queensland. The composition of the compensatory habitat package has taken this into account.

It is not clear what land is being described as previously requested for purchase. The long-term management of blocks A and E is still to be finalised but preservation for conservation use would be assured.

Block C is approximately 3.7 hectares in area and is bordered by a larger parcel of NSW Crown Land to the north and west. It is probable that the ecological value of this area of Crown Land would be retained in the longer term and would further consolidate an area for environmental purposes. This larger area would also retain connectivity with the Airport's Environmental Precinct via the tunnel and SEPP 14 wetlands. Approximately 4.7 hectares of known or potential habitat for the Wallum Sedge Frog may be disturbed by the Bypass. In addition to the compensatory habitat, other amelioration measures are proposed. They include the addition of culverts in areas where barrier effects are indicated and the construction of artificial frog ponds.

The management of the compensatory habitat blocks would be for conservation outcomes. The Proponents are reviewing the long-term management arrangements for the compensatory habitat package in consultation with relevant government agencies. Management strategies would be considered during this process.

Goats are currently utilised for the biological management of weeds and are stocked at the minimum density. Their presence does not detract from the long term suitability of the land for compensatory habitat.

Further environmental assessment of the compensatory habitat has been undertaken and a summary of this is provided in Chapter 6 with the full reports (including a final report on the compensatory habitat package) provided in Appendices G, J and K of this Submissions Report. This involved identifying flora and fauna to species level and recognising specific assemblages. This recent assessment further indicates that the compensatory habitat does support species and assemblages that are impacted by the Proposal. However it is recognised that 'like for like' for compensation would not occur on acceptance of the package. As previously stated this is particularly difficult in the coastal lowlands of South East Queensland and North East NSW.

The proposed compensatory habitat package would increase the area of land conserved for environmental purposes within the local area. Similarly certain 'fauna corridors' would be consolidated and secured in the long-term. At the sub-regional level this is anticipated to provide for the movement of birds, reptiles and mammals and amphibians at the local level.

Section 30 of the SIS indicates that this area holds little value for the Eastern Grass Owl in its current form. Potential impacts of the Bypass are limited to the tunnel area and involve 2.4 hectares of habitat. Re-instatement of this area would occur on completion of construction and it is likely to comprise of a mixture of grasses and shrubs characteristic of

Wallum heathland. Compensatory habitat for the Eastern Grass Owl has therefore not been proposed.

With regards to the buffer area between the Bypass and areas of high conservation value in NSW immediately north of where the Bypass crosses the border, approximately 1.24 hectares of land has been acquired to ameliorate the negative effects of the Proposal.

The majority of soil type of Block A is a red-yellow podsol of medium fertility formed on metasediment (for example, chert or phyllite). There is a patch of red krasnoserm soil capping the highest hill, which is associated with small basalt residual. The low-lying areas of Block A and E have deposits of estuarine mud that support mangroves or swamp forest depending on tidal penetration and soil salinity. Although similar in area to the key habitat impacted by the Bypass, the landforms, vegetation and threatened or significant species of Blocks A and E closely match those impacted only in the northern section of the Bypass route, for example at Hidden Valley. Vegetation types of the coastal sand ecosystem, which predominate on the Bypass such as Scribbly Gum, Mallee Heathland and Wet Heathland for example, are not found on the metamorphic, clayey or muddy substrates of Blocks A and E. The regional geology of Block C comprises river gravels, sand, clay, quaternary alluvial / estuarine sediments. Soils are loose to medium-dense quartz sands characteristic of the southern section of the Bypass alignment. Vegetation includes disturbed, regrowth, and mature paperbark forest.

4.4.7 Wildlife Corridors

In summary, the respondents to the EIS raised the following issues:

- The Proposal is located within a southeast Queensland bioregional wildlife corridor and the Bypass would form a major barrier to the existing function of the corridor by limiting movement of native fauna at both the local and regional levels.
- It is unknown if the 'greenspace' reserve to the west of urban development on Clancy Court and Mirreen Drive would form part of a wildlife corridor and it warrants further investigation. If the reserve is found to be sufficient as a wildlife corridor, an interference problem with native fauna, domesticated animals and humans would exist and therefore fencing is recommended. Once revegetated, the reserve could potentially link under the Bypass in Hidden Valley and could allow some provision for fauna movement.
- Native fauna currently interact between Tugun Heights Conservation Park and the Cobaki Broadwater and the McPherson and Border Ranges. The Tugun Bypass would effectively disconnect the only existing link available through the construction of the Hidden Valley Bridge. The proposed design of the Hidden Valley Bridge would not provide an adequate link for the diversity of the species likely to be utilising the area.
- The existing vegetated link from the Cobaki Broadwater to Currumbin through Reedy Swamp, Hidden Valley and Tugun Hill has not been acknowledged even though it has been identified as a 'major link' in the GCCNCS. More particularly, the value of Hidden Valley to fauna movement has not been fully investigated. It is anticipated that there would be a reduction in vegetated cover under the Hidden Valley bridge which would reduce the effectiveness of the corridor. It is recommended to retain all feasible existing remnant and non-remnant vegetation to provide connectivity.
- Cut and fill batters to the north of Hidden Valley and the large cut batter to the south are likely to result in a barrier for fauna movement between Currumbin Hill and Tugun through to the McPherson Range and Cobaki Broadwater. Research has shown that a slope of 30 degrees and 1m in height presents a barrier to most fauna and fauna that manage to enter the Bypass carriageway would often not be able to escape.

- The GCCNCS states, it is of critical importance that corridors be sustained in the long-term and effectively managed to retain their viability and function. The GCCNCS describes the Bypass route as being located within a 'major linkage'. There is a once in a lifetime opportunity available to be environmentally responsible and to preserve the significance of the 'major linkage' and a tunnel should be considered to allow protection.
- Evidence shows that Tugun Hill is actively being used by fauna and is an important faunal link which would continue to serve this function for a variety of species including rare and threatened fauna. Evidence must be shown that the Bypass would not affect the long-term survival and expansion of significant species in the area. Similarly the Bypass would isolate the Tugun Hill population of the Common Planigale and compromise the metapopulation of the Bush Rat of Hidden Valley. Severing the existing corridor would disrupt if not destroy the movement of these species.

Submission Numbers:
6, 22, 38, 69, 79

Response:
Studies undertaken as part of the Proposal suggests that the Bypass would not fragment habitats that are not already partially isolated (refer Technical Paper 12, Appendix B). The block of Council owned dry open and moist regrowth forest on the southern side of the existing Highway near Stewart Road would suffer increased isolation, with major roads on two sides and urban development on two sides. However, this block of vegetation is already partially isolated by the existing Highway, urban development and disturbed land. The Hidden Valley bridge was designed to help facilitate this movement and especially for less mobile ground fauna species and those with increased vegetative cover requirements.

The suggestions regarding the potential for the 'greenspace' reserve to the west of urban development on Clancy Court and Mirreen Drive to form part of a wildlife corridor are noted and have been further investigated. Assessment indicates that opportunity does exist to maintain a 'fauna corridor' in the area described. Revegetation of areas adjacent to the quarry site and the park is proposed. Chapter 6 of the Submissions Report provides a summary of the environmental assessment.

The design of the Hidden Valley bridge does allow for the retention of a majority of the valley floors' vegetation. Furthermore revegetation of some currently and what would be disturbed areas is proposed. These measures are intended to promote the use of Hidden Valley as a fauna corridor. The height of the bridge above the canopy should allow for adequate drainage and light penetration.

The corridor identified as a 'major link' in the GCCNCS is acknowledged within Section 4.3 of Technical Paper 12. In addition, the value of these areas for biodiversity and corridor value is discussed within Section 4.3 and in Section 5.3 of Technical Paper 12. Corridor condition and integrity is discussed in the context of birds in Section 7.2 of Appendix B, Technical Paper 12. The current Bypass alignment has endeavoured to minimise impacts on corridor values, movement pathways and habitats by aligning as close as practicable with the eastern edge of Hidden Valley where the habitat is already edge affected through past disturbance. Information regarding a detailed analysis of alignment alternatives and their feasibility is provided in Chapter 5 of the EIS Main Volume. The Hidden Valley area is proposed to be bridged to reduce impacts of habitat loss. Any construction disturbance would only occur to obtain access during construction and small areas of clearing required around the bridge pylons. However, in accordance with normal practice, revegetation is proposed to be undertaken as soon as possible after construction is complete including a small area (Park) that is cleared.

Species movements between Currumbin Hill and Tugun Hill are presently limited due to existing road networks and urban development (refer discussion in Appendix B, Technical Paper 12). A haul route south of the Stewart Road interchange to the old quarry site north of Hidden Valley further restricts species movements. The proposed bridge over Hidden Valley would reduce impacts of habitat loss and promote the valley as a fauna corridor.

The construction of a tunnel at Hidden Valley is not feasible due to the underlying geology and excessive cost. Limited advantage, if any would be provided by the construction of a tunnel compared to a bridge.

The EIS acknowledges the biodiversity values within the study area determined through extensive background and field studies during the EIS process. Much is now known on the distribution and habitat for some threatened species. For example, the Long-nosed Potoroo is known only to occur in lowland areas near the Cobaki Lakes development site and primarily on NSW Crown Land (refer Figure 5.1 Technical Paper 12 and Figure 10.7, EIS Main Volume). Similarly, the Common Planigale is now known from a number of sites in the area and recent summer monitoring has recorded new locations for this species west of the Tugun Landfill in NSW. Limited records exist within the Queensland section of the study area with much of this habitat isolated by past development, existing road networks and unsuitable habitat. As discussed previously, a number of strategies are proposed to mitigate impacts on ground fauna movement, habitats, and significant species in the Hidden Valley area including aligning the footprint in previous disturbance zones, employing an incrementally launched bridge structure, exclusion fencing and proposing revegetation of disturbed areas.

4.5 Heritage

4.5.1 Assessment Methodology and Documentation

In summary, the respondents to the EIS raised the following issues:

- The assessment of Aboriginal heritage values is very different to the views being expressed by members of the public.
- Technical Paper 14 and the methodology by which it was undertaken has a number of inconsistencies. It is not a true assessment of the cultural heritage values.
- The suggested approach for the recommended testing for subsurface cultural deposits is insufficient in detail to form the basis of a scope of work.
- A clearer understanding of the true value and significance of the Bypass route to Aboriginal people is possible by reference to historical documents and sources which are not mentioned within Technical Paper 14.
- The conclusions and recommendations of Technical Paper 14 are focused on the physical impact of the proposed construction footprint. The assessment does not provide an assessment of impact on the area's cultural values.
- A bora-ring located between the Airport and Boyd Street was photographed in 1986. If it has been destroyed its details should have been documented in the heritage assessment along with any information known about the site.
- Technical Paper 14 failed to give a professional opinion as to the possibility of finding burials around the house at the Pony Club if controlled subsurface disturbance or test excavations were to be undertaken. The consultants were provided with references, including historical references, through which the location of the burials could be located. Similarly, it would have been useful had photographs of the two scarred trees adjacent to the house at the Pony Club been included in the report so that others would have the opportunity to form an opinion as to the origin of these trees.

- Experience shows that a single Aboriginal burial located during construction can cause major disruptions to work schedules. A thorough procedure of subsurface testing should be carried out well in advance of construction commencing.
- The consultants indicate that burials may be found in a relatively undisturbed section of the study area covered by Technical Paper 14, but fail to give an overview of the possibility of the existence of burials in the more disturbed areas despite there being several examples of Aboriginal burials found in highly disturbed sites throughout the Gold Coast region.
- There are concerns regarding the recommendations in Technical Paper 14. Recommendation 4 states that test pitting and auguring is recommended however it does not state how and to the extent it should be undertaken. Recommendation 5 states that 'if any unexpected non-indigenous cultural heritage items are encountered during the course of construction works, work should cease and the Queensland EPA and / or NSW Heritage Office be contacted, depending on jurisdiction'. Caution should be followed regarding endorsing an assessment that makes such a statement, as items such as fence posts or bottle tops are all by statutory definition cultural heritage items. If this recommendation is followed then construction would have to cease on a regular basis and government agencies contacted before work can commence again.
- Technical Paper 14 states that the likely occurrence of burials overall is rated low and elsewhere as low to moderate. This conclusion regarding burials is at odds with the comment, '...the general opinion of the Traditional Owners was that the potential for grave sites in the general study area was high'. It is incorrect that a major constraint of the assessment is the discovery of Aboriginal burials and that the likely occurrence of burials is low to moderate along the Bypass route.
- The EIS and Technical Paper 14 did not adequately address the Aboriginal cultural heritage legislation relevant for Queensland. The assessment makes no reference to the *Aboriginal Cultural Heritage Act 2003*. The transitional nature of the Proposal may result in the transitional provisions of the *Aboriginal Cultural Heritage Act 2003* applying. Furthermore, despite what the EIS and Technical Paper 14 state, the Queensland EPA no longer have responsibility for sites of Aboriginal cultural significance and have no role in their management.
- Technical Paper 14 is contradictory as it implies it is not possible to identify burials through random subsurface testing, however it does recommend subsurface testing. The assessment has failed to provide any outline as to how and to what extent this should be carried out. The suggested approach to determine the presence of cultural materials is an extremely inadequate attempt to locate subsurface material. Burials may also be located if controlled subsurface testing is carried out in specific locations.
- The Aboriginal community should undertake their own cultural heritage assessment as they are aware of the level of assessment required. It would also lessen the risk that what the Aboriginal community says is interpreted incorrectly and the Aboriginal community are the experts in their own heritage.
- Recent studies in the Gold Coast region are proving that surface inspections fail to identify the genuine potential for cultural heritage artefacts.
- Technical Paper 14 does not make any robust statement as to the cultural heritage value of the Bypass route and is contradictory and open to substantial criticism in terms of methodology and execution by members of the local Aboriginal community.
- Technical Paper 14 does not provide sufficient information for the development of a Cultural Heritage Management Plan (CHMP) and the recommendations made are not supported by either the report itself, or the local Traditional Owners. In addition, the report arguably does not fulfil the requirements of the EP&A Act.

- Technical Paper 14 relied on surface observations only. There has been no comprehensive subsurface assessment. If extensive subsurface testing is not carried out at selected locations prior to construction then the possibility of burial material being located during construction is extremely high. Technical Paper 14 does not indicate whether any attempt was made to improve ground surface visibility or carry out controlled ground disturbance to gain a better understanding of the possibility of subsurface material being located during construction. By not conducting a sufficiently thorough assessment of the area it would result in the inability to make any assertion as to the probability of significant cultural heritage finds during construction.
- There are a number of historical references and documents which contain important information regarding the cultural heritage, including the sensitivity of known sites, within of the Tweed Heads / Gold Coast region but these have not been included within Technical Paper 14.
- The reference to no historic structures or materials being identified along the Bypass route is not correct. Sites such as the remains of old roads, fences, survey markers, and modifications caused by, sand extraction and pastoral activities exist within the Bypass route. If these sites are deemed to have no heritage significance, they are still by statutory definition 'cultural sites'. Technical Paper 14 should have acknowledged the existence of these sites and then demonstrated why these sites do not require protection or preservation.
- Technical Paper 14 does not provide any certainty of process during construction or any reliable comment on the probability of finding any items of significance to the local Aboriginal people during construction. The assessment would not be able to be used in developing a CHMP or for Traditional Owners to support the recommendations.
- Traditional Owners who accompanied the consultants on the survey have raised concerns regarding the areas visited and also the manner in which the survey was conducted.
- Technical Paper 14 does not support the four principles of ESD.
- Regarding the possibility of subsurface cultural material it is suggested that a more efficient and cost effective scope of work for subsurface investigation could include augers as well as test cores. There could also be controlled ground disturbance using mechanical assistance, such as bobcats or excavators as well as several small test excavations.
- There are numerous environmental factors that would indicate a high possibility of burials existing within the Bypass route. The types of sandy ridges on which commercial operators have carried out sand extraction activities are often the same locations where Aborigines have previously placed burials. Numerous members of the local Aboriginal community have raised concern regarding the high possibility of burials existing in the area.
- The guidelines produced as Appendices A and B to the EIS state 'Direct, indirect, short-term and long-term, temporary and irreversible, adverse and beneficial effects should be discussed and quantified where possible'. It states that where mitigation measures are proposed, details of that mitigation including predicted effectiveness of the mitigation measures, any statutory or policy basis, and the cost of the mitigation measures must be included. Such details have not been included in either the EIS or in Technical Paper 14.
- Technical Paper 14 states that a third party consultant would be required to implement the suggestion to test at 50m intervals. There is every chance they would find nothing as the suggestion is not sound in terms of archaeological methodology.

- Technical Paper 14 states that as a result of consultation, background research and survey, Traditional Owners identified no sites of significance outside the National Estate area with the exception of the location of the now destroyed bora ground. This statement is strongly denied, and is contradicted two paragraphs later by 'The Traditional Owners consulted have indicated that the environment and the sites, which occur, are interrelated and therefore they believe the whole area is significant in terms of indigenous issues'. Site information provided during preparation of the assessment was not included in Technical Paper 14 and Traditional Owners claim that no new sites were located during the field surveys.
- Technical Paper 14 does not fairly reflect the values, views or wishes of the Traditional Owners and wider Aboriginal community. The documentation does not recognise any ongoing relationship between the areas' Traditional Owners and their strong spiritual and historical associations and attachment with their country. There is no reference to the fact that Aboriginal descendants have continued to express their cultural traditions within areas of the Bypass route to the present day. The Aboriginal community have no confidence in the alleged consultation process undertaken during the preparation of the assessment.
- Technical Paper 14 gives contradictory information about the probability of disturbing Aboriginal skeletal remains and implies that cultural deposits are primarily of archaeological or scientific interest. No comments or recommendations concerning Aboriginal community expectations and their preferred procedures, when burials are discovered, have been given.
- Technical Paper 14 has selectively referenced reports, resulting in an impression that previous findings and recommendations have been given fair consideration, however the strength of comment and evidence presented in previous reports is not conveyed in the assessment.
- In assessing cultural heritage the authors of Technical Paper 14 appear to have misunderstood the Traditional Owners who have identified and insisted the numerous archaeological sites to the west of the Airport are one place.
- Technical Paper 14 does not recognise any continuing cultural association and present day use of the Bypass route by members of the Aboriginal community.
- Within Technical Paper 14, reference is made to research at the local History Library at Southport and 'revealed that there was no known historical material along the proposed corridor'. This is not surprising as Southport can hardly be regarded as 'local'. The Tweed Heads Historical Society Museum and Research Centre, does however have a significant amount of information, including transcribed interviews with the descendants of the Tugun areas first European settlers.
- Technical Paper 14 does not provide construction methodology or recommendation for salvage of cultural heritage material should the Proposal proceed. Advice from the Aboriginal community was not sought, nor recommendations made, should Aboriginal skeletal remains be located and disturbed.
- A subsequent 'supplementary' cultural heritage survey was undertaken by members of the Aboriginal community. This survey identified a significant number of 'new' cultural sites along the proposed route that are within the Bypass route. Technical Paper 14 appears to be dismissive of the cultural integrity of sites along the route claiming that land reclamation and reshaping has been extensive and much of the surface of the plain along the Bypass route within the Airport boundary is different from its natural state. No clear attempt has been made to either map or identify areas which retain much of their natural state, and therefore, judgments about site integrity within these areas must be regarded as merely speculative.

- The proposal for test excavation of potential archaeological deposits on NSW lands is supported. As the intent of such works would be to determine the presence or absence and nature of archaeological deposits in identified areas, the test excavations conducted in NSW would need to be licensed under the provisions of the *National Parks and Wildlife Act 1974*. Application would need to be made to the DEC for excavation and would need to be accompanied by a methodology for the excavations and clear evidence of the views of the Aboriginal community with regard to the proposed research. It should be noted that the excavations proposed above are distinctly separate from any excavations which may be undertaken for the purpose of geotechnical or other subsurface investigations which do not have as their primary objective the intent to investigate the nature of the related archaeological deposit. The application would be considered and, if approved, a license would be issued with appropriate conditions.
- The addendum to Technical Paper 14 titled 'Inspection of Southern Portion of Route' includes an additional recommendation to test excavate a dune in the NSW southern portion of the route to document the stratigraphy of the dune and the depth of a shell scatter thought not to be Aboriginal in origin. This recommendation is not reflected in the body of the EIS or in the listing of mitigation measures listed in the EIS.
- One known disturbed artefact scatter was stated as occurring within the footprint, however, no further details are given of the site and no further recommendations are made regarding management, further investigation or salvage of this site. Clarification of the above is required.
- Technical Paper 14 places too much emphasis on discovery of artefacts, midden or burial sites in specific places and fails to recognise the holistic concept of the importance of landscape to the Aboriginal community of the region.
- The EIS indicates that prior to construction further activities would be undertaken to determine the presence of other items or sites of cultural heritage which includes subsurface testing in specific areas. Should anything be discovered it is assumed that consultation with the Traditional Owners would be sufficient to determine what happens to this material and its removal elsewhere. This approach is condescending to the Traditional Owners and should have been part of the EIS process from the beginning. How a route can be determined without this knowledge up front is difficult to understand and indicates a determination to proceed with the route regardless of the sensitivity of a significant part of our community.

Submission Numbers:
3, 11, 28, 32, 33, 42, 45, 52, 53, 62, 67, 71, 72, 73, 74, 84

Response:
The method and approach to the Aboriginal cultural heritage assessment included detailed and continuous consultation with relevant groups throughout the study area to determine the Aboriginal heritage values. This consultation process identified a number of issues such as the importance of the area to Traditional Owners, the potential presence of burial sites, the importance of the National Estate area, and the limitations of reliance on surface inspection alone. These issues were recognised and mitigation strategies proposed including the necessity of producing a cultural heritage management plan in consultation with Traditional Owners, protocols for sub surface inspection prior to development, and the importance of ongoing liaison with Traditional Owners as an integral part of future Proposal phases. A preliminary cultural heritage survey has been completed by Eastern Yugambeh Limited in conjunction with the Tweed Byron Local Aboriginal Land Council (Tweed Byron LALC) which aimed to describe the cultural heritage values of the study area, provide information on the site, to involve the Traditional Owner community and to develop strategies for management of cultural heritage values through the design and construction phases of the Proposal. Additionally, a cultural heritage survey was completed by Turnix Pty

Limited and Ngarang-Wal Cultural Heritage Management Group. The survey aimed to familiarise Traditional Owners with the planned route and to make an assessment of the previously assembled cultural evidence. A summary of these reports is provided in Chapter 6 and full reports are included in Appendices C and D respectively.

The connection between resources, location, spiritual, political and social life is complex in the context of development. Consultation has therefore been designed to discuss such matters and to try to identify the impacts of the proposed development on these values. The preliminary cultural heritage survey (refer to Appendix C of the Submissions Report) was prepared to re-examine the concerns raised and to allow a better understanding of the cultural heritage values within the study area.

Section 15.4.8 of the EIS Main Volume discusses the precise technical activities that would be considered and undertaken during pre-construction and construction phases of the Proposal and would be discussed with Traditional Owners. In addition, the preliminary cultural heritage survey report (refer to Appendix C of the Submissions Report) has outlined a number of sub-surface archaeological investigation strategies for zones along the Bypass alignment with potential for cultural heritage significance. The local Traditional Owner community has considered the recommendations within this report and concurs. The key aim of this report is to develop strategies for management of cultural heritage through the design and construction phases of the Proposal.

An Indigenous Historical Study for the Proposal is expected to commence in the near future. The scope of this study is based on recommendations detailed in the preliminary cultural heritage survey report undertaken by Eastern Yugambeh Limited in conjunction with Tweed Byron LALC (refer to Appendix C of the Submissions Report). The results of the study would be used in the preparation of the CHMP for the Proposal.

The preliminary cultural heritage survey addresses concerns regarding the assessment of impact on the area's cultural heritage values to the present Aboriginal community. A summary of this report is provided in Chapter 6 and a full report is included as Appendix C of this Submissions Report.

Examination of an aerial photo from 1986 did not reveal the presence of a Bora ring in the Boyd Street area. However, this bora ring is known to have existed at Boyd Street to the east of the alignment for the Tugun Bypass and was destroyed pre-1990 during construction works in the area (Hall 1990; Steele 1984). The subsequent preliminary cultural heritage survey makes no reference to this bora ring (refer to Appendix C of the Submissions Report).

The cultural heritage assessment could not discount the possibility of burial(s) along the southern section of the alignment (between the southern Airport boundary fence and the Tweed Heads Bypass, refer Chapter 15.4.7 of the EIS). The report recommends that the potential to identify burials during construction be considered with particular importance when writing a Cultural Heritage Management Plan for the Proposal. The EIS also recommends that subsurface testing be undertaken in key areas of archaeological potential identified during the survey according to Section 87 of the *National Parks and Wildlife Act 1974* prior to the start of construction. It was recommended that the Cultural Heritage Management Plan be developed in consultation with Traditional Owners, describing pre-construction protocols to deal with any existing or new material that might be discovered during pre-construction and construction. Regarding the possible scarred trees, the assessment found that the axe marks and shape of the scars that the scars are not of an Aboriginal origin. The subsequent preliminary cultural heritage survey makes no reference to inspecting these possible scarred trees (refer to Appendix C of the Submissions Report).

The EIS notes the concerns of local Aboriginal community regarding the high possibility of burials existing in the area. A risk assessment found that there was a low to moderate chance of finding burials due to the extent of disturbance such as quarrying and sandmining along some sections of the alignment. Consideration has also been given to the methods that would be used during construction. For example, where cutting is planned the ground surface would be highly disturbed, whereas where filling is planned there would be fewer disturbances with clearing and grubbing to create a flat surface to fill. Pre-construction protocols in the form of a CHMP would be developed in consultation with the Traditional Owners to address the management of any existing or new cultural heritage material that might be encountered during pre-construction and construction. Pre-construction testing would also be undertaken in accordance with sites and methodologies identified within Section 15.4.8 of the EIS and within the preliminary cultural heritage survey (refer to Appendix C of the Submissions Report).

Due to the degree of disturbance, which has already occurred along major portions of the Bypass route, it is considered that those disturbed areas would have a low potential for burials to occur. However, the EIS acknowledges that the likelihood of burials cannot be discounted and that subsurface survey would be undertaken pre-construction. Ongoing communication with Traditional Owners would help refine where subsurface investigation is required and would also help develop a CHMP which would include strategies for dealing with cultural heritage material in the event of discovery either pre-construction and during road construction should approval be granted.

The preliminary cultural heritage survey report (refer to Appendix C of the Submissions Report) provides further detail regarding archaeological investigation including key zones for further investigation, and methodology for sub-surface investigation. A Cultural Heritage Management Plan would be developed in consultation with the Traditional Owners and the various regulatory agencies to deal with cultural heritage material, be it indigenous or non-indigenous, that might be discovered during the sub-surface testing or during construction. The basic information for the creation of a Cultural Heritage Management Plan is contained within Technical Paper 14, the Hall report, the Collins report, the preliminary cultural heritage survey, and the Turnix and the Ngarang-Wal report (refer to Appendix D of the Submissions Report).

The initial cultural heritage assessment was conducted and the report written in 2000, several years prior to the passage and subsequent implementation of the current cultural heritage legislation. Queensland EPA no longer has a role in Aboriginal cultural heritage although it was the administering Agency at the time of the study. It is acknowledged that any subsequent cultural heritage undertaking must be in conformance with the *Aboriginal Cultural Heritage Act 2004* as administered by the Queensland Department of Natural Resources and Mines.

The nature of random sub-surface testing is that cultural heritage sites may be overlooked. The difficulty in identifying cultural heritage material through surface inspections is acknowledged by the Proponent. Consequently, the preliminary cultural heritage survey (refer to Appendix C of the Submissions Report) has further refined areas within the alignment most likely to contain cultural heritage material. Areas of archaeological potential will be targeted with a more systematic approach to sub-surface investigation. A more detailed methodology for sub-surface testing in areas of known or potential cultural heritage material is outlined within this report.

Eastern Yugambeh Limited in conjunction with the Tweed Byron LALC have completed and submitted a preliminary cultural heritage survey (refer to Appendix C of the Submissions

Report) for the Proposal. This report was undertaken by employees of Eastern Yugambeh Limited and a number of external consultants who have specific knowledge of links to the affected areas. Traditional Owners and representatives from the Tweed Byron LALC played an essential role in defining and contributing to this process.

The technical study which formed the basis of Technical Paper 14 was also undertaken in consultation with the Traditional Owners. These studies acknowledge the need for further cultural heritage assessment including the development of a Cultural Heritage Management Plan. This plan would be developed in consultation with Traditional Owners and government agencies.

An archaeological assessment has been conducted under the relevant legislation and the results of the assessment and the management recommendations for known and potential sites are included in the Technical Paper 14. Other assessments have also been undertaken and to date, the Proponent has funded four cultural heritage investigations of the transport corridor within which the Tugun Bypass would be aligned. Technical Paper 14 considered provisions for the conservation and management of archaeological sites including the potential for surface and sub-surface sites to be present. Additionally, it recognised the role of Traditional Owners in identifying cultural heritage values and has recommended that consultation on these values be ongoing through the life of the Proposal. Finally, it recommended that a Cultural Heritage Management Plan be developed including further on ground works, investigations and consultation reflecting the changing requirements as the proposed route was finalised. Following on from this position, the recommendations and results of both the Preliminary Cultural Heritage Survey and the additional Indigenous Cultural Heritage Visit would form the basis of the Cultural Heritage Management Plan.
The variability in surface visibility is acknowledged within the cultural heritage assessments. As a consequence, a strategy of reviewing past information, consultation, and field survey aimed to identify key areas of potential cultural heritage material. This strategy was also employed during the preliminary cultural heritage survey (refer to Appendix C of the Submissions Report). Methodology for subsurface testing in these key areas is proposed. Test excavation for cultural heritage material is proposed for pre-construction.

The approach to the cultural heritage assessment within Technical Paper 14, unlike the subsequent preliminary cultural heritage survey undertaken by Eastern Yugambeh Limited, included a review of past literature and communication with Traditional Owners. The EIS explains that ongoing communication with Traditional Owners is an important part of developing a CHMP for the Proposal. If the Proposal is approved and subsequently further information emerges, that information would be considered during the CHMP development phase.

An extremely broad definition of 'historical site' in terms of cultural heritage has been presented. While cultural sites are discussed in the relevant legislation there is no 'statutory definition' as broad as presented within the representation received during EIS exhibition. Additionally, there is a minimum age of 50 years before a feature or site, etc… becomes a relic in terms of the NSW legislation.

Concerns raised by Traditional Owners regarding the areas visited and also the manner in which the initial assessment was conducted is noted. The recently completed preliminary cultural heritage survey (refer to Appendix C of the Submissions Report) by Eastern Yugambeh Limited in conjunction with the Tweed Byron LALC has addressed these concerns.

Technical Paper 14 addresses the precautionary principle through the appreciation of cultural heritage values and sensitivities, and to that end, has proposed to work closely with

the Traditional Owners through the pre-construction and construction phases of the Proposal and in the development of a CHMP. As discussed in the EIS, to address issues of intergenerational equity, the Proponents are committed to ongoing consultation with the Aboriginal community, DEC, the Queensland EPA and the Australian Heritage Commission during the construction phase of the Proposal to ensure that cultural heritage items are not irreparably damaged. The EIS recognises the interrelationship between the assessment of the significance of cultural heritage items and sites, acknowledges the close connection between Aboriginal use and management of environmental resources, and the maintenance of biological diversity. To this end, the Proponents are reviewing a proposal for an Indigenous Historical Study for the Proposal. This study aims to demonstrate the level of community connection to the area.

Where applicable, the development of the guidelines produced as Appendices A and B to the EIS would be integrated into the CHMP developed though consultation between the Proponents, relevant government agencies and the local Traditional Owners.

Sampling is an integral part of archaeological methodology. Given the potential for 'sites' in the study area to be small and scattered across the landscape, it is adopted as a valid means of investigation.

The suggested 'contradiction' is likely to be the product of the definition of a 'site'. While Technical Paper 14 states that no new areas with physical remains were identified, it was acknowledged that the area as a whole holds significance to the Traditional Owners.

The cultural heritage assessment as part of the EIS has attempted to engage all interested indigenous and non-Indigenous groups during the consultation process. The EIS acknowledges that consultation with the Traditional Owners is ongoing and necessary to help develop a CHMP to deal with pre road construction cultural heritage assessment and during road construction should the Proposal be approved.

Concerns regarding the referenced reports within Technical Paper 14 and the strength of comment and evidence presented not being conveyed in the assessment is noted. An attempt has been made to accurately relay the views and interests of all groups consulted during the cultural heritage assessment process.

The Indigenous view of the landscape is distinctly different from the non - Indigenous view. That the Traditional Owners consider the whole area to be of high cultural and social significance is acknowledged. The artefacts and middens whether *in situ*, disturbed or displaced, reflect generations of use by their forebears and all form an integral part of the cultural landscape, which is considered worthy of protection and conservation. The Proponents have recognised this and would continue to consult with the Traditional Owners to develop a CHMP for the Proposal. Additionally, the Proponents recognise the continuing use of the area by the Traditional Owners and are committed to continuing to work with them to develop a CHMP that would enable them to continue to access the area.

The transcribed interviews with the descendants of the Tugun areas first European settlers were not available at the local History Library at Southport. During the assessments of the Proposal life however, other sources of enquiry became obvious, including access to the Tweed Heads Historical Society Museum and Research Centre. Subsequent work on the local documentation has revealed that there are few references to particular sites in the area and their significance. Consultation and field survey has endeavoured to captured this information during both the initial cultural heritage assessment and more recently though the preliminary cultural heritage survey (refer to Appendix C of the Submissions Report).

However, it should be noted that the preliminary cultural heritage survey makes no attempt at providing an assessment of the cultural context of the study area.

The EIS outlines that if cultural heritage material is identified, further open area excavation and salvage may be required. This would be undertaken only after consultation with the appropriate Traditional Owners, the Proponent and relevant government agencies. As described within the EIS, a CHMP is being developed in consultation with the Traditional Owners and government agencies would outline in detail the techniques and strategies to deal with cultural heritage material encountered pre-construction and during construction.

Technical Paper 14 acknowledges that the ability to find cultural heritage material is compromised where significant disturbance such as quarrying and sand mining has occurred. However, finding further cultural heritage material was not discounted during the assessment. The subsequent 'supplementary' cultural heritage survey undertaken by members of the Aboriginal community has identified key cultural heritage areas along the alignment. This survey would further help develop a CHMP for the Proposal.

The Proponents are committed to addressing the requirements of licence approvals including those required under the *National Parks and Wildlife Act 1974*.

The recommendation to test excavate a dune in the NSW southern portion of the route to document the stratigraphy of the dune and the depth of a shell scatter thought not to be Aboriginal in origin would be integrated into the CHMP to be developed in consultation with the Traditional Owners and the government agencies.

Recommendations regarding the management of the known disturbed artefact scatter and others, are provided within the preliminary cultural heritage survey (refer to Appendix C of the Submissions Report).

Technical Paper 14 has attempted to assess the significance of the study area through reviews of existing information, consultation with Traditional Owners, and field surveys. These reviews, consultation and site assessments have helped refine the Bypass alignment to its present location.

Terms of Reference for the next stage of archaeological investigation for the Bypass has been written by the Proponent. The consultant has been chosen and work is planned to begin in the near future. The archaeological work will be carried out in consultation with Traditional Owners including the development of a Cultural Heritage Management Plan in accordance with the requirements of Part 7 of the Queensland *Aboriginal Cultural Heritage Act 2003*, section 87 and 90 approvals under the NSW *National Parks and Wildlife Act 1974*, sub-surface investigations and the development of a cultural heritage assessment report.

4.5.2 Archaeological and Cultural Significance

In summary, the respondents to the EIS raised the following issues:

- There have been a number of recent findings of Aboriginal skeletal remains associated with sandy soils within Gold Coast / Tweed River region. Almost all sand plain and dune coastal midden complexes, such as west of the Airport, would contain Aboriginal skeletal remains.
- It is recommended that 'risk assessment' be used to determine the value of cultural sites and places to the Aboriginal community. Risk assessment would allow the Aboriginal community to publicly assess and compare impacts on cultural heritage values without disclosing confidential cultural information.

- The Bypass would significantly impact on or destroy Aboriginal cultural heritage sites, including Aboriginal burial sites, that are located within and surrounding the Bypass route. These sites should not be disturbed as they are unique and irreplaceable.
- The presence of up to 4% shell content in Test Pit 6 during the geotechnical investigations is evidence of the likelihood that an Aboriginal midden site is present. This needs to be discussed with representatives of the local Aboriginal community.
- Members of the Aboriginal community consider all sites within and surrounding the Bypass route to be of high cultural and social significance. The midden complex, within the western Airport boundary still retains much of its former environmental context and therefore has a strong spiritual connection with direct descendants of Traditional Owners. There are also stone scatters to the southwest of the Airport runway on Pony Club land as well as scarred trees and other midden sites throughout the area from Tugun to the border.
- The educational value for Aboriginal and non-Aboriginal people cannot be overstated. It is requested that the Aboriginal cultural heritage and natural heritage values that are associated with the promotion of the Bypass route are considered in terms of education for all Australians.
- One portion of the midden complex within the western Airport boundary has been listed on the Register of the National Estate (RNE). However this listing is still no guarantee of protection should the Proposal proceed. The site must be on the National Heritage List in order to trigger protective legislation.
- The natural environment holds important meaning for Aboriginal people and their cultural significance is not restricted to built structures. The Aboriginal community regard the environmental values west of the Airport and around Cobaki Broadwater with direct and equal connectivity to cultural and spiritual values of the Murraba Camp. The scientific research, which has highlighted biodiversity values of the area, is supported by Traditional Owners and the wider Aboriginal community.
- The Bypass route traverses sensitive Aboriginal cultural heritage sites that have a spiritual value to Aboriginal people that cannot be replaced by monetary compensation. Should the Proposal proceed the spiritual value is diminished because the sites would be disturbed or destroyed. Fragmentation by the Bypass and other developments associated with the Airport would destroy the spiritual values of the Murraba Camp. This would be a serious loss for Aboriginal people as this complex is the last of its type in the area.
- A descendant of the Traditional Owners who was a well-known community Elder, who maintained their cultural identity and association within the Tugun area, had their ashes placed between two trees, which can still be readily identified in the remaining garden area of the former house close to the Kennedy Drive interchange.
- Descendants of Traditional Owners and members of the Aboriginal community continue to use the Bypass route for gathering traditional foods and expressing cultural traditions, including visiting the burials sites of their ancestors.
- Once cultural heritage sites are destroyed it would not only promote the ignorance that is associated with future development but also destroy sites that are connected both physically and spiritually to the Aboriginal people and the customs / beliefs that have been developed over the last 40,000 years.
- Clearing the Bypass route is likely to result in considerable protest from the Aboriginal community.
- Given the number of adjustments to the Bypass route which have taken place in the years between the preparation of the Technical Papers supporting the EIS and actual EIS preparation, it is important to ensure that any areas not subject to the initial cultural heritage investigations are assessed prior to consideration of approvals.

- It is concerning that the Proposal involves the planned destruction of the Aboriginal community's environmental and spiritual heritage to save travel time and that the vandalism of core Aboriginal identity and culture is considered.
- In 1926, the Aboriginal community attempted to provide some protection for the Murraba tribal lands by dedicating 250 acres for public open space and recreation, however, the majority of these lands have now been lost.
- The presence of significant Aboriginal cultural heritage has been downplayed in favour of development opportunities for the Tugun Bypass. The past decisions, which have failed to protect the bora-ring adjacent to Boyd Street for the sake of an access road, demonstrate that the legislation, which purports to protect Aboriginal heritage can be overridden for 'public interest'. This is an opportunity not only for the Aboriginal people to retain an area of great significance to them, but for the whole community to learn and understand this heritage and promote community and social cohesion.
- Anecdotal evidence has been received that Aboriginal skeletal remains have been located at the tip sites during excavation and have been stored for reburial. The close presence of so many other archaeological sites suggests that this anecdotal evidence may be correct.
- It should be considered that the proposed route for the rail extension corridor which is located 70m away from the Bypass route would also pass through areas of significant cultural heritage.
- An additional three day surface examination assessment for cultural heritage along the proposed Bypass route revealed that there are 30 sites of significance which require further archaeological investigation. This confirms that this area has exceptional richness of Aboriginal heritage to current and future generations and deserves protection.
- Information that has been given verbally by Traditional Owners who have continuous link and usage of this area through their descent from both the Yugambeh and Bundjalung people clearly demonstrates that the area known as Murraba Camp is of great cultural importance.
- Historical documentation has not been accurately represented in the past, particularly for the Tweed Heads / Gold Coast region. It should also be highlighted that much history is held by the Aboriginal oral keepers. Ngarakwal / Githabal traditional custodians have a long history of human rights, land rights and conservation in this region that spans over 50 years. This keeps with the tradition, lore customs and responsibility they have to their totemic homelands. Each aspect of Aboriginal culture required proof of ability before traditional knowledge was revealed.
- The Tweed Shire Council spokesman Max Boyd of the Aboriginal Advisory Committee has announced that Tweed Shire Council withdraws support for the Bypass because there are Aboriginal burials and cultural sites identified on the Bypass route. Furthermore, amalgamated the 'Government Aboriginal Clubs' oppose the Bypass route and Airport runway extension and are working towards the creation of a new cross-border group operating across both NSW and Queensland.
- The sale of Aboriginal lands and areas of significance by Government endorsed LALCs in both NSW and Queensland is of concern. The profit from the sale of Aboriginal lands is lucrative and continues today with several corporations queuing to buy land from these LALCs.
- Aboriginal communities on the Gold Coast are being impacted upon by politicians, councillors, real estates agents and building corporations.

Submission Numbers:
11, 16, 19, 21, 28, 29, 25 27, 28, 31, 32, 33, 34, 35, 40, 41, 42 43, 44, 45, 47, 52, 56, 57, 62, 63, 66, 67, 71, 72, 73, 74, 80, 84, 86, 87

Response:
The identification of the archaeological and heritage values within the study area is recognised and known archaeological sites are reported in the EIS. The likelihood of burials occurring in the study area is also reported in the EIS and it is proposed to undertake subsurface testing prior to the start of any ground clearance. Consultation with the Traditional Owners has continued since the display of the EIS and as a result of submissions made a preliminary cultural heritage survey and an additional cultural heritage survey (refer to Appendices C and D respectively of the Submissions Report) has been undertaken. As stated in the EIS a CHMP would be prepared.

The suggested risk assessment methodology has been included in the methodology for the preliminary cultural heritage survey (refer to Appendix C of the Submissions Report).

The Bypass alignment has been guided by the need to avoid a number of constraints which includes areas with cultural heritage significance. The initial field surveys, undertaken in 2001 with representatives of the Traditional Owners, found three low density stone artefact scatters and a single isolated artefact within the alignment, which was in agreement with the findings of previous surveys. All were in disturbed contexts and were considered to have a low level of scientific or archaeological significance. The areas of high archaeological importance such as the middens contained in the area of the National Estate and the natural setting that surrounds have been avoided.

At the points where the alignment crosses the northern and southern boundaries of the Airport it passes through vegetated areas and would cause some additional local fragmentation of areas of native vegetation. It is acknowledged that the construction of the Bypass immediately adjacent to the midden would have an effect on its setting.

No evidence of burial sites within the alignment was found during the any of the cultural heritage surveys, however their presence has not been discounted The Indigenous view of the landscape is distinctly different from the non - Indigenous view. The Traditional Owners consider that all sites to be of high cultural and social significance. The artefacts and middens whether in situ, disturbed or displaced, reflect generations of use by their forebears and all form an integral part of the cultural landscape, which is considered worthy of protection and conservation. The Proponents have recognised this and would continue to consult with the Traditional Owners to develop a CHMP for the Proposal.

The suggestion of a likely Aboriginal midden site near Test Pit 6 is noted. The Traditional Owners have advised the Proponents of areas where they would like to see subsurface investigations undertaken as part of the development of the CHMP.

The comments relating to the archaeological and cultural values of the area are noted. The importance of the midden complex within the area of the National Estate is recognised and the alignment has avoided impact on the midden and the natural setting that surrounds it. This sensitive area is marked by a fenced inner area. An area of 1200m^2 of the National Estate would be affected. This is within an area that was previously disturbed and would not affect the shell midden complex within the fenced vegetated area. Additionally, section 30 advice from the then Australian Heritage Commission in relation to the effect the proposed Bypass is likely to have on the National Estate area stated that pre-construction and construction protocols developed as part of the project should include stop work provisions should intact midden deposit or other finds that are significant to the Aboriginal community be uncovered. These procedures would be incorporated into the Cultural Heritage Management Plan.

Archaeological remains such as stone scatters to the southwest of the Airport runway on Pony Club land as well as scarred trees and other midden sites throughout the area from Tugun to the border are detailed in the Chapter 15 of the EIS Main Volume and within Technical Paper 14.

At the time of the assessment for Technical Paper 14 the known sites which border the Cobaki Broadwater were excluded from the Bypass footprint. Any nomination of the site complex for the National Heritage list is not a matter arising from the Proposal. It should also be noted that the site complex has not been accepted to date by the Commonwealth Minister for Environment and Heritage as being an area eligible for inclusion on the National Heritage List.

The comments on the significance of the cultural and heritage values of the natural environment, particularly the areas west of the Airport and around Cobaki Broadwater are noted. The importance of the area to the Traditional Owners is recognised by the Proponents and consultation is continuing. As part of this on-going consultation a CHMP would be developed jointly by the Proponents, the Traditional Owners and relevant government agencies.

The potential loss of educational values was not considered in the EIS or in Technical Paper 14. However, the public display of the EIS has allowed the information gathered during the preparation of Technical Paper 14 to be freely available to the communities of Tugun and Bilinga. It is therefore available to be used as an educational resource. The Gold Coast Airport Master Plan identifies the midden complex and areas adjacent to the Cobaki Broadwater as an area of compensatory habitat to offset future Airport developments. The cultural heritage and natural heritage values of the area are therefore still available to be utilised for educational purposes.

During a field visit to this area on 27 November 2000, Jacqueline McDonald spoke of a burial but did not provide the detail that has since emerged. Nevertheless, the possibility of a burial was noted in Technical Paper 14. The house location was visited as part of this site visit but no information about the former residents was provided. The new information has been documented in the recent preliminary cultural heritage survey (refer to Appendix C of the Submissions Report).

The alignment of the Bypass has been chosen to avoid areas of cultural significance. Isolation of areas currently accessed by Traditional Owners has also been avoided. Rightful access to areas outside the road corridor would not be prevented by the Tugun Bypass.

The concerns regarding the destruction of the cultural heritage sites and the subsequent loss of cultural heritage values are noted. Current information shows that three low density stone scatters and a single isolated artefact have been located within the alignment, however, no burial sites have been identified. Subsurface archaeological investigations are planned to be undertaken to further investigate the possibility of burial sites within the alignment. This would be completed in accordance with the directions of the Traditional Owners and appropriate licences.

The Proponents are committed to working with the Traditional Owners to continue to ensure that their concerns are heard and that their directions regarding further works are followed. Additionally, the Proponents have involved Traditional Owners in an additional walk over survey of the Bypass alignment in February, March and August of 2005 and participation in the recent cultural heritage survey. Subsurface archaeological investigations are to be undertaken prior to the beginning of any construction work and would be

undertaken in consultation with Traditional Owners. This would ensure that all areas of the alignment have been subject to cultural heritage investigations.

The comments regarding the impact of the Proposal on the core Aboriginal identity and culture and the protection of the Murraba tribal lands through dedication to public open space and recreation is noted.

Technical Paper 14 has been undertaken in accordance with the requirements and guidelines of the NSW, Queensland and Commonwealth governments. The Traditional Owners have been and continue to be consulted. The comments on utilising the area for the protection, conservation and interpretation of this area for its indigenous cultural heritage are noted. In determining whether the Proposal would proceed, a range of social, environmental and cultural issues would be considered and weighed.

The suggestion that anecdotal evidence has been received that Aboriginal skeletal remains have been located at the tip sites during excavation are noted. The Traditional Owners have advised the Proponents of areas for subsurface investigations to be undertaken as part of the development of the CHMP.

The rail extension would be subject to a separate approvals process which would consider the impacts on cultural heritage values within the rail corridor.

The results of the additional three day surface examination assessment would be used to guide the development of a CHMP for the Proposal, which would be developed by the Proponents in consultation with the Traditional Owners. This would ensure that all impacts on cultural heritage values are assessed, and where possible avoided. Mitigation measures would be put in place if the impacts cannot be avoided.

Concerns raised during submissions regarding Aboriginal history in the Tweed Heads / Gold Coast region, Local Aboriginal Land Councils and unconnected impacts on the local Aboriginal community are noted. However, they are considered to be beyond the scope of the Proposal.

4.5.3 Consultation with Traditional Owners

In summary, the respondents to the EIS raised the following issues:

- The Technical Paper 14 does not mention any public notices, now common practice and acceptable Australia-wide for all range of matters dealing with indigenous and non-indigenous matters of social importance.
- During the consultation process an Aboriginal representative was wrongly listed as representing the Moodung, Moorung Moobar and Nganduwal Language Group. The person was only representing their family who are part of the Nganduwal not all of the Nganduwal.
- The consultation mechanism was by design incapable of reaching the overwhelming majority of Traditional Owners in the area surrounding the Bypass. There is no mention of any consultation that occurred within the Traditional Owner community within Technical Paper 14 and it is not possible to work out whether the local Aboriginal community decided who should be involved, or whether the decision was made by the consultants. With regard to the database of interested individual stakeholders and government agencies, the consultants have failed to outline the manner in which this database was compiled. The quality and controlled access of the database is also questioned. The approach to consultation with the Traditional Owners and the local Aboriginal community failed to provide a workable understanding of the cultural heritage values of the Bypass route.

- The recommendation to develop a Community Involvement and Complaint Response Plan is unreasonable. In order to trigger any sort of Community Involvement and Complaint Response Plan, a Traditional Owner would need to be on site during construction and ahead of any machinery and that person would require the authority to stop machinery.
- The consultants misquoted an Aboriginal representative in their statement in regards to cultural significance of the Bypass route. The Aboriginal representative was never at any stage asked for permission for anything they said to be used in a report. In actual fact the statement that was printed is not a full and complete statement of what was said.
- It is a significant challenge to a cultural heritage consultant to appropriately consult with the community. The consultant who wrote Technical Paper 14 comes from outside the community and may not have the appropriate relationships established throughout the community which would facilitate appropriate consultation.
- The tribal map included in Technical Paper 14 is contentious. The consultants failed to ask the Aboriginal people involved in the assessment if they supported these boundaries.
- A questionable outcome from the consultation with the Aboriginal community can be found from the bottom of page 1-13 of Technical Paper 14 and over, that is, 'the presence of a "dancing ground" was raised'. Technical Paper 14 makes no comment as to the validity of this statement.
- At every opportunity during the cultural heritage assessment concern was raised over the possible Aboriginal burials and the major campsite with its own bora ground which had been destroyed by poor management, however Aboriginal representatives felt at a loss when trying to describe the significance of the site.
- The community focus group meetings are not the desired forum to allow comfortable discussion of important issues regarding cultural heritage.
- An Aboriginal representative in the consultation process was concerned that the wealth of information provided to the consultants was not reflected in the first draft of Technical Paper 14 and the information used was portrayed in a different context which resulted in this information appearing like it was not valued.
- Aboriginal representatives were misquoted by the consultant specifically to information regarding the artefacts supposedly collected near John Flynn Hospital.
- Aboriginal representatives were only verbally advised that the Bypass route alignment had been moved further west. No written advice or maps had been provided to them for consideration.
- If information provided by the Aboriginal representatives is not recorded accurately then mistakes and inaccurate accounts of history and cultural activities may result.
- Some Traditional Owners feel that they have been misquoted and members of at least one family were never approached or contacted, despite the fact that their Grandfather's ashes lie within the Bypass route at West Tweed.
- Technical paper 14 claims to have identified 'Aboriginal Traditional Owners, Native Title Claimants and other indigenous interest groups' to undertake 'relevant cultural heritage field surveys in conjunction with the relevant Traditional Owners to identify and record significant cultural heritage sites'. These claims are disputed by the Aboriginal representatives in the consultation process because they did not get to walk over the entire site with the consulting archaeologist and information provided to the consultants is from some selected informants and not all information provided is included in the assessment.

- The section within Technical Paper 14 titled Aims and Objectives claims 'to develop community confidence in the consultation process and to provide a mechanism whereby the community can provide direct comment on cultural heritage issues'. However a majority of Aboriginal community members feel very strongly that their views are unfairly presented and have no confidence in the alleged consultation process undertaken for the assessment.
- There was failure to consult with the appropriate Traditional Owners and local Aboriginal community regarding the resumption of 1200m^2 of the National Estate, which is located inside the Nganduwal Tribal boundary. The approval process appears to be flawed because no local direct descendants were contacted and as a consequence approval for the resumption has been granted by the Australian Heritage Commission. A formal complaint has been forwarded to the Minister for Environment and Heritage.
- One Aboriginal representative consulted as part of the assessment was Mr. Claude McDermott Snr. The EIS states that since the meeting Claude McDermott has become an Aboriginal Heritage Officer with the NSW NPWS. This is not correct. Claude McDermott, employed by the NSW NPWS, is the son of Claude McDermott Snr who was consulted as part of the consultation process in Tweed Heads.
- There has been a failure to communicate with all of the Traditional Owners because it suited the purposes of the assessment that they do not to know the location of known archaeological sites. Additionally, it is believed that Traditional Owners were pressured in the route selection process.
- There is concern about the operation and management of government endorsed 'Aboriginal Clubs', both nationally and within the local region.
- The Tweed Heads / Gold Coast region was one of the most affected areas with regard to the treatment of Aboriginals during of the colonisation. There has and continues to be concern over the treatment of Aboriginals in this region since this time.

Submission Numbers:
11, 28, 32, 42, 45, 52, 71, 72, 74, 84

Response:
Public notices were one of many tools utilised during the public consultation process which is explained in Technical Paper 1 and Chapter 3 of the EIS Main Volume. During this consultation process, community focus groups, of which Traditional Owners were part, met six times (refer Section 3.6, Technical Paper 1).

The comments regarding the Aboriginal representative being wrongly listed as representing the Moodung, Moorung Moobar and Nganduwal Language Group are noted.

The consultation process and participants is explained in Technical Paper 1 and Chapter 3 of the EIS Main Volume. Consultation with Traditional Owners was augmented by cultural heritage assessments undertaken by sub-consultants who also endeavoured to consult with local Indigenous and non-Indigenous groups in the area. The database of interested individual stakeholders and government agencies is confidential and the Proponents will not release the contents.

A CHMP would form part of the Construction Environmental Management Plan which is the contractors commitment to environmental management of works as defined by the contract and binding law. Within the CHMP, strategies to deal with cultural heritage material recorded either pre-construction or during construction would be formulated in consultation with Traditional Owners.

The comments regarding the Aboriginal representative being misquoted are noted.

The sub-consultants chosen to undertake the cultural heritage assessment have a history of work experience in the region. In addition, there work has been augmented by a recently completed preliminary cultural heritage survey by Eastern Yugambeh Limited in conjunction with the Tweed Byron LALC (refer to Appendix C of this Submissions Report).

The concerns regarding the tribal map included in Technical Paper 14 are noted.

The statement regarding a 'dancing ground' was presented as a result of community consultation. It deals with use of an area which is unlikely to leave physical evidence. The 'dancing ground' is also mentioned in the Hall (1990) and Turnix and Ngarang-Wal report (2005; refer to Appendix D of the Submissions Report).

Technical Paper 14 highlights that the existence of the bora ground is proof to Traditional Owners that the location is of significance, and despite the fact that the physical evidence has been destroyed, that significance remains.

Contact with Aboriginal representatives had been initiated during the early planning phases of the Proposal through the community consultation program and through individual consultation with known interested parties. Cultural heritage interests were further developed during the cultural heritage assessment program through direct contact (phone, meetings and survey) with individuals and communities who were known to have an interest (such as Native Title claimants) and those who had expressed an interest (Traditional Owner groups and individuals). In addition to community forums, Traditional Owners were involved in reconnaissance walks in the study area with heritage consultants.

The views and values of all participants in the cultural heritage assessment process to date have been treated equally and respectfully. A recent preliminary cultural heritage survey (refer to Appendix C of the Submissions Report) undertaken and reported on by the Eastern Yugambeh Limited attempts to allay any concerns such as those suggested in submissions received during the EIS exhibition.

The comments regarding the artefacts collected near John Flynn Hospital are noted.

Further cultural heritage assessment has and continues to be undertaken. Maps of the Bypass have been provided to the consultant and subsequently discussed during consultation with the Traditional Owners.

The Proponents acknowledge the importance of recording information provided by Aboriginal representatives accurately to avoid mistakes and inaccurate accounts of history and cultural activities.

Consultation with the Traditional Owners has continued since the display of the EIS and as a result of submissions made, a recent preliminary cultural heritage survey (refer to Appendix C of the Submissions Report) has been undertaken which addresses cultural heritage issues in a number areas over the entire alignment. Additionally, the Traditional Owners concur with the interim archaeological recommendations within the report.

The comments regarding the resumption of 1200m^2 of the National Estate land are noted.

The error in relation to references to Claude McDermott is acknowledged.

The concern over the operation and management of Local Aboriginal Land Councils is noted.

To address issues of intergenerational equity, the Proponent is committed to ongoing consultation with the Aboriginal community, DEC, Queensland Department of Natural Resources and Mines and the Australian Heritage Commission during the construction phase of the Proposal to ensure that cultural heritage items are not irreparably damaged.

4.5.4 Native Title

In summary the respondents to the EIS raised the following issues:

- Technical Paper 14 fails to mention if contact was made with several community members involved in a Native Title claim over the Bypass route and surrounds that was current during part of the period in which the assessment was undertaken.
- The lack of a current Native Title claim does not necessarily mean there would be no Native Title implications for an area.
- Technical Paper 14 provides a complicated overview of a Land Claim registered on behalf of the Tweed Byron LALC. It is not possible from this overview to determine whether this Land Claim would have any impact upon the Proposal, even though the Bypass route passes through an area of land that is under the Claim. Furthermore, the assessment fails to inform that seven Native Title Claims have previously covered the Bypass route and surrounding area.
- It is a failing of Technical Paper 14 that it has not outlined each parcel of land tenure to be affected by the Bypass. In doing so the consultants would have assessed the potential for Native Title implications.
- Validated Native Title land is the only legislative means available to protect Aboriginal land. It is concerning that the Gold Coast / Eastern Yugambeh Native Title has been withdrawn and a Federal Parliamentary Committee into Native Title and the Aboriginal Torres Straight Islander Land Fund has commenced along with a Federal Parliamentary Committee into Aboriginal Affairs because of suspected corruption by developers exploiting Aboriginal land.

Submission Numbers:
11, 84

Response:
A list of all Aboriginal community contacts is provided in Technical Paper 14 of the EIS.

The comments on Native Title claim issues, even in the absence of a currently registered claim are noted.

It is not the intent of the EIS to provide a history of Native Title claim in the Proposal area All Native Title data presented in Technical Paper 14 was obtained from the Native Title Tribunal.

The practice of identifying each parcel of land tenure to be affected by the Bypass is relatively recent in examining Native Title issues and was not in practice at the time of the assessment undertaken for the EIS. The comments are however noted.

The comments regarding the withdrawing of Native Title Claims and the investigations of Federal Parliamentary Committees are noted although this is a larger issue which is beyond the scope of the Proposal.

4.6 Soils, Water Quality and Hydrology

4.6.1 Assessment Methodology and Documentation

In summary, respondents to the EIS raised the following issues:

- Why were contaminated soils not included as part of the geotechnical assessment and why are the results of the soil and water testing not available?
- The survey of water quality parameters is not listed within the EIS. These are required to draw comparisons to future testing and with the ANZECC guidelines.
- The data for Test Pit 5 is missing in Tables 5.6 and 5.7 of the geotechnical assessment.
- The groundwater analysis in Appendix D of Technical Paper 5 does not show the location descriptions of north bore, south bore or D2 and E2. It is of concern that electrical conductivity results conclude that 492ppm of salinity is quite high for bore water. The EIS did not identify a borehole which was found to be corroded little more than 2 years after it was put in, presumably by acid sulphate soils.
- The level of chloride exceeds the ANZECC trigger levels for toxicants for aquatic food sources. This groundwater should not be assessed for drinking water quality, which hides the real results. No testing for dioxins was undertaken and should have been included.
- Regarding the results of contaminated land investigations, there have been no figures showing the sample points in relation to property boundaries. Within the preliminary environmental site assessment of landfill sites it was noted that a review of aerial photos and certificates of title was undertaken however no details of these were provided. Accordingly the site history component of this assessment has not been addressed. The landfill site that is southwest of the Airport runway which has tested positive for arsenic contamination, has not been mapped to show its location.
- Testing for acid sulphate soils was only undertaken on Airport land and therefore the results are inconclusive as there are acid sulphate soils on Crown Land.
- The mitigation measures proposed in Section 6 of the Technical Paper 6 are considered appropriate. It should also be ensured that any stockpiles of contaminated soil are managed to prevent contaminated run-off leaving containment areas.
- Technical Paper 6 indicates that contaminated soils may be encountered during construction particularly in the vicinity of the quarry area, Tugun Landfill, the Airport landfill site and sand blasting areas. The information provided is insufficient to determine the presence and or extent of impact.
- There is concern with the statement that 'where the groundwater is to be lowered for periods the surface should be rewatered at intervals as required'. Clarification is required on the statement as it was understood that the groundwater would be continuously supplemented with no chance that the groundwater was to be lowered.
- The EIS does not demonstrate that the construction of the proposed tunnel would not have an adverse impact on the existing hydrological regimes.
- There are many unknown impacts of the Bypass particularly the long-term impacts on changes to the watertable in the Cobaki wetlands and the generation of acidic groundwater and associated contamination that would result from construction.
- Nineteen samples from landfills contained asbestos. Levels of total PAH @ 7.2mg/kg were found at landfill A and landfills B and C returned heavy metal levels below Queensland EPA levels of concern.
- Methylphenol and MEK returned levels between 78ug/L to 9450ug/L, which is above investigation levels. The results did not identify the specific monitoring wells that returned the elevated levels.

- The KEC Science Report on water quality in the Lower Tweed Estuary System (1998) advises that it is of some concern that a variety of reports have subjected raw data to the various ANZECC criteria to determine water quality compliance. In most circumstances, comparison of raw data to threshold limits is not an appropriate method of assessment.
- The WBM Oceanics 1991 study was only a desktop study. Is there a more recent physical ecosystem health monitoring study available?
- The EIS fails to provide an adequate report on the health of the Cobaki Broadwater knowing that potential impacts from the Tugun Bypass are likely to impact on the water quality of the already 'stressed' Cobaki Broadwater.
- There is no information in the EIS to indicate how changes in the water quality of the Cobaki Broadwater would be determined. Furthermore, Technical Paper 8 does not recommend any water quality monitoring in the Cobaki Broadwater. Monitoring of these waters is considered important to the health of the Tweed River.
- The EIS fails to identify which studies of water quality in the Cobaki Broadwater were undertaken by Tweed Shire Council.
- There is concern that the EIS states that acid sulphate soils fall into the very high treatment category.
- There is evidence that leachate is migrating from the Gold Coast landfill site towards the Cobaki Broadwater. Groundwater monitoring studies have been undertaken by Gold Coast City Council, however results have not been published due to confidentiality.
- There are a number of contaminated sites identified in the EIS that require remediation including the Tugun Landfill, the Airport landfill site and the sandblasting site. Disturbing these sites could cause serious impacts on the groundwater and soils which would affect the Cobaki Lakes System. Testing in these areas has not included identifying the presence of polynuclear aromatic hydrocarbons, total petrol hydrocarbons, Tributyltin (TBT), and heavy metals. The EIS is inadequate because the treatment that would be required to prevent adverse effects to the human and natural environment is unknown.
- It is a matter of concern that the geological formations on the Hidden Valley floor have not been fully assessed in order to determine whether suitable rock foundation for spread footings exist or if the more intrusive bored piles have to be constructed.
- Within the precincts of the Airport, according to Commonwealth anti-pollutions laws, no fuel or contaminants are allowed to be spilt in the precinct because of the danger of pollution to the water table which is 1m below the surface.
- The location of one contaminated land site being identified metres away from a Tweed waterway is of serious concern and would have significant consequences if there are spills of the contaminate.
- The EIS stated that groundwater must be maintained at appropriate levels to ensure minimal oxidation of potential acid sulphate soils. It is agreed that a suitable solution to this issue is to re-inject groundwater back into the sand aquifer to maintain levels outside the tunnel, at or close to natural conditions.
- The groundwater modelling satisfies the requirements for the interpretation of the groundwater conditions that would occur during construction and post construction of the tunnel.

Submission Numbers:
25, 52, 59, 63, 67, 69, 71, 72, 74, 76, 79, 83

Response:
Information pertaining to contaminated land is provided in Technical Paper 6. Groundwater and soil tests with regard to contaminated land are provided and detailed in Appendices D

and E of Technical Paper 6. Further detail on other soil and groundwater tests is also provided in Technical Papers 4, 5 and 9.

The parameters and results of water quality monitoring are provided in Section 2.5.2 of Technical Paper 12 and are detailed in Appendix K. Additional information on surface water quality is also provided in Technical Paper 8.

Tables 5.6 and 5.7 in Technical Paper 4 contain laboratory test results of California Bearing Ratio and Particle size distribution tests. No soil samples from test pit TP5 were tested for these properties and that is the reason why this test pit is not listed in Tables 5.6 and 5.7.

The laboratory test results in Appendix D identifies bore North as borehole C and bore South as borehole BH9. Approximate location of boreholes BH C, BH 9, D2 and E2 is shown on Figure 2.2 of Technical Paper 5. Specific details including coordinates, surface elevation and number of samples and tests are listed in Table 3.2 of Technical Paper 5.

Appendix D does not indicate that 'electrical conductivity results conclude that 492ppm of salinity is quite high for bore water.' Conductivity results are defined for four sites as 0.073, 0.25, 0.33 and 0.61mS/cm respectively. These values are not considered high, as 'freshwaters' are typically defined as those waters with salinity less than 1000 mg/L (approximately 1.6mS/cm).

It is assumed the comments refer to a monitoring bore placed within NSW Crown Land during early investigation. The location of this bore is not detailed within the EIS as ongoing monitoring of this location was not continued due to difficulties in obtaining access. Bore casing was PVC and resistant to acid attack. Recent visual inspection indicated no corrosion.

The ANZECC guideline for aquatic ecosystems details trigger values for chlorine but not chloride. Sampling and analysis of free chlorine was not undertaken during assessment as potential sources were not indicated. Substitution of indicators and the trigger value assigned is not considered appropriate.

Thresholds for many chemicals are not detailed within the ANZECC guidelines for aquatic ecosystems. In their absence, recognised human health (potable water and recreation) guidelines have been used in the attempt to independently identify a waters quality.

Dioxins and furans are derived predominantly from industrial process such as, incineration, metal smelting, cement kilns, land applied 2-4D and land applied sewage sludge. Historical records indicate that the majority of these activities have not occurred within the study area, with the exception of the nightsoil depot. Investigation in this area was not undertaken as disturbance during construction or operation of the Bypass would not occur.

Figure 4.2 identifies parcels of land by boundary and the locations of the contaminated land assessment. The preliminary environmental site assessment undertaken of landfill sites for the Gold Coast Airport reviewed aerial photography and certificates of title. This information was summarised and used for the next phase of the assessment, that is, to identify likely contaminants and areas of potential contaminant impacts. This was by definition preliminary site assessment and not a full Stage 1 Site History.

No arsenic was reported from the GCAL landfills in either water or soil. Sampling and analysis of dumped material within NSW Crown Land (Lot 319 on DP755740) has been undertaken for arsenic. Tests indicate that the concentration of this chemical does not exceed the relevant NSW (human and environmental health) guidelines.

Two levels of acid sulphate soil investigation were undertaken, a review of desktop mapping and field investigations. A review of mapping indicated that areas of actual acid sulphate soils (AASS) and potential acid sulphate soils (PASS) exist within and adjacent to the proposed transport corridor. This includes an area of NSW Crown Land. Testing for acid sulphate soils was subsequently undertaken at a number of locations along the corridor, including the airport and NSW Crown Land. Field investigation was focused in higher risk areas that may be 'hotspots' or significantly disturbed during construction. Management proposals for all areas of risk are detailed, including further testing prior to construction. Additional geotechnical investigations have been undertaken in response to submissions including further acid sulphate soil assessments. A summary of these investigations is provided in Chapter 6 of this Submissions Report.

Mitigation measures detailed in Section 6 of Technical Paper 6 refer to 'the removal of any contaminated soils' and 'any on-site containment'. In this instance stockpiles are not considered separately and are subject to the mitigation measures referred to in Section 6. This would incorporate appropriate management to prevent sediment laden run off.

A progressive approach has been undertaken with environmental assessment. Previous activities within an area have been considered and are used to determine whether further assessment is required. As a result, sampling and analysis has been undertaken in higher risk areas. Investigation results have been used to determine further management measures, which includes further sampling and analysis in key areas, that is, additional geotechnical investigation undertaken (refer to Chapter 6 of this Submissions Report). The Tugun landfill and sandblasting areas is currently the subject of further assessment and the contractor would be required to manage any contamination issues identified. The additional geotechnical investigation that has been undertaken would also provide greater certainty on the extent of any contamination within the corridor. The contractor would be required to develop environmental management plans or plans to manage contaminated sites to address any areas of concern. This would be completed prior to construction work commencing.

The quarry and borrow areas at the northern end of the route alignment and the sand blasting area at the southern end of the route alignment are not on Gold Coast Airport's land and therefore were not part of their preliminary site assessments.

Regarding the statement that 'where the groundwater is to be lowered for periods the surface should be rewatered at intervals as required', point 1 of Section 27.6 of the SIS is an administrative error. Natural groundwater levels would be maintained either side of the tunnel and approach ramps during construction and operation. During construction this would be achieved by a combination of temporary diaphragm walls and pump assisted extraction and re-injection wells. On completion the temporary diaphragm walls (and wells) would be removed, effectively allowing the movement of groundwater across the roof tunnel. A closed drainage system would further increase capacity through a series of cross tunnel drains. This system has been designed to work on the principle of equilibrium but may be assisted by pressure pumps. Further drains may be constructed if required. Further investigation is currently being undertaken to verify the permeability of the aquifer adjacent to the tunnel. This information would permit the detailed design of all recommended management measures.

Ecosystems within the study area are naturally subject to fluctuating groundwater levels. Many species and communities have subsequently evolved and adapted to these conditions. Wallum heath is recognised as such a community. Management measures are proposed to minimise impacts on groundwater.

Hydrological impacts of the Tugun Bypass have been assessed and detailed in Technical Papers 5, 6 and 9. Significant change to the quality of Cobaki wetlands groundwater is not anticipated. Recognised management measures are also provided.

As stated in Technical Paper 6, Section 4.7.4, 19 samples analysed from the landfills reported the presence of asbestos. It is stated that as part of construction works the material from the exaction would either be replaced in Tugun landfill or moved to an alternate location. Technical Paper 6, Section 6 outlines mitigation measures for the construction and operational phases of the Proposal. These mitigation measures include the preparation of a management plan detailing safe work practices. It is noted that the total PAH concentrations were below the EPA levels of concern, though the concentrations were reported to exceed *Airport (Environmental Protection) Regulations 1997*.

The closest bore to the proposed Tweed Heads Bypass interchange reported a MEK value of 115µg/L and 764µg/L 3- and 4-methylphenol from 379µg/L to 1,070µg/L. The remaining three wells reported MEK values from 78µg/L to 9,450µg/L. The source and scale of this impact is not yet understood. Work undertaken for GCAL has shown that the MEK values have declined to negligible levels since the initial testing.

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality is a recognised 'standard' for water quality assessment and management in Australia. Indicators for assessment and subsequent trigger values accord with this guideline and specifically the framework for aquatic ecosystems. This framework recommends that trigger values for chemical and physical stressors be determined from (in order of preference) the use of biological effects data, local reference data and the tables of default values provided. Default values and historical water quality programs are recognised within the EIS and Technical Paper 8.

The WBM Oceanics 1991 study included several water quality surveys of Cobaki Creek associated with a proposed residential development. The surveys established baseline water quality levels in the receiving water at that time. Results are supplied in Technical Paper 8, Appendix A (Tables A4 – A6.) WBM Oceanics also undertook further field investigations in September 2000 as part of this Proposal.

Historical water quality data is provided in Technical Paper 8 (Section 2.2.2). In addition to this historical data, field investigations were undertaken by WBM Oceanics (28 September 2000) to collect water quality data within the Cobaki Broadwater. The data was then compared with the historical data set. Results are presented in Tables 2.4 and 2.5. An assessment of the existing water quality is provided in Section 2.2.4.

Impact assessment indicates that significant change to the water quality of Cobaki Broadwater would not occur. For this reason Technical Paper 8 does not recommend monitoring of this location. However monitoring (of Cobaki Broadwater) is proposed in Section 8.5.4 and Figure 8.9 of the EIS due to perceived impacts by the wider community. Section 2.2.2 of Technical Paper 8 details a number of water quality studies that have been undertaken within Cobaki Creek and Broadwater. This information and proposed pre-construction monitoring would be used as reference data during construction and operation.

Appendix A of Technical Paper 8 identifies that monitoring of the Cobaki Broadwater was undertaken by Tweed Shire Council from 1989 to 1995. This information is unpublished.

Although soils have been identified as falling into a category of very high treatment regarding acid sulphate soils, suitable and recognised management measures are available and have

been identified in Technical Paper 5, Section 5. This includes assessment and testing, control and management procedures, monitoring, contingency procedures and reporting.

Evidence that leachate is migrating from the Gold Coast landfill site towards the Cobaki Broadwater is noted. Management measures are detailed within Technical Paper 6 to minimise the area of disturbance and groundwater transfer (refer Figure 6.1). Appendix A of Technical Paper 6 details groundwater quality at locations adjacent to and within the Tugun Landfill as tested by Gold Coast City Council. Further groundwater monitoring (within and adjacent to the landfill) has been undertaken (refer to Appendix L of this Submissions Report).

Recognised and proven methods are available for the remediation of contaminated land. The majority of contaminated land identified during impact assessment was uncontrolled and exposed to fluctuating water tables. Remediation of the affected areas would minimise the potential for further or future adverse environmental effects. Sections 4.5, 4.6 and 4.7 of Technical Paper 6 (and Appendix E of the Technical Paper) detail sampling and analysis results for a number of contaminants. This includes testing for PAHs, TPH and heavy metals in those areas at risk of contamination. Further testing of contaminated land been undertaken being undertaken (refer to Chapter 6 of this Submissions Report) and includes testing for TBT within the sandblasting area.

Within Hidden Valley, the differing impact between the construction and use of either spread footings or bored piles is not considered to be significant. Additionally, further geotechnical investigation within Hidden Valley has been undertaken (refer to Chapter 6 of this Submissions Report).

The comments regarding no fuel or contaminant spills within the precincts of the Airport are noted. Release of fuels or oils to any soil or water is controlled under existing dangerous goods storage and handling regulations, while the results of such impacts are regulated by each administering authority.

Regarding the contaminated land site within close proximity to a Tweed waterway, remediation strategies for contaminated lands impacted from the Bypass would be detailed within the Contaminated Land Management Plan to be developed as part of the Construction Environmental management Plan (refer to Section 18 of the EIS).
Comments raised regarding the re-injection of groundwater back into the sand aquifer to maintain levels outside the tunnel, at or close to natural conditions and groundwater modelling are noted.

4.6.2 Construction

In summary, the respondents to the EIS raised the following issues:

- The temporary lowering of groundwater should be avoided and a short time limit placed on earthworks and fill impacting on wetlands. Acid sulphate soils exposed to air would permanently impact on terrestrial and aquatic fauna and result in engineering problems. The lowering of the water table may also contribute to the leaching of acidified water and the mobilisation of heavy metals to the Cobaki Broadwater. This is not acceptable and would lead to contaminated soils with possible arsenic and DDT leaching from the partially remediated soil and from the contaminated landfill.
- It is of concern that samplers of contaminated landfill sites showed signs of illness which resulted in further testing being undertaken with full safety suiting. The health and safety of construction contractors should not be compromised and therefore no construction work for the Proposal should be undertaken in this area.

- Soil and water testing should be undertaken by the DEC before construction commences to determine the presence of heavy metals, arsenic and other contaminates. A plan should be developed that would monitor and evaluate the impacts of the Proposal during construction on the surrounding environment.
- The soil and groundwater assessments of Tugun Landfill showed all samples exceeding ANZECC Guidelines, therefore the surrounding area should not be disturbed to prevent the movement of leachate and contaminated groundwater potentially impacting on the construction site.
- Approximately 240,000m^3 of potentially contaminated soil would be removed from the tunnel area. Liming at a minimal rate of 1% would mean around 5000 tonnes of agricultural lime would be required to treat acid sulphate soils in the initial stages. The treatment of these soils could change the pH over a large area of the Bypass route and surrounds. According to a world-recognised expert on acid sulphate soil management, liming at a rate of 3 per cent is generally carried out in the Tweed farming community. This would necessitate the use of 15,000 tonnes of lime in the initial treatment of the soils that would be excavated from the tunnel area.
- The potential release of acid sulphate contaminated runoff resulting from the disturbance of acid sulphate soils which border the Cobaki Broadwater is high. The migration of acid from the disturbed soils into the Cobaki Lakes is a matter of concern and there are no guarantees that the mitigation measures would be successful over the long-term and once the migration of acid starts there may be no methods to stop it. Due to the sensitivity of this area and the extensive operations necessary to minimise potential areas of contamination such as the flow of acidic groundwater to the Cobaki Broadwater, avoidance is recommended.
- Windblown acid sulphate soils have the potential to adversely impact on waterways. It should be ensured that material stockpiles are managed to prevent the generation of wind-blown material from the containment areas.
- The construction of the Bypass has the potential to impact on groundwater level and flow within the area, including the potential production of acid groundwater. Mitigation is proposed during construction via dewatering and injection to ensure groundwater flows past the tunnel however, it is recommended that a groundwater consultant regularly calculate groundwater flow nets based on groundwater levels to manage this flow.
- The timeline for the closure of the Tugun Landfill site is now being reviewed and is likely to coincide with the completion of the Bypass. The removal of the waste material after the closure of the Tugun Landfill would result in significantly more cost as the waste material would need to be exhumed, transported, compacted and reburied in another landfill site.
- The land contamination impacts from the Tugun Landfill needs to be determined. The alignment of the Tugun Bypass also appears to intersect some of the previous sand mining / dredging activity areas owned by the Gold Coast Airport. These areas would need to be investigated to determine what contamination is present and how it can and would be managed.
- There is concern that as the Tugun Landfill is unlined, it is leaching contaminated waste via groundwater. The placement of a high density polyethylene (HDPE) membrane over the exposed waste would not stop the ongoing leaching of contaminants via groundwater.
- According to a recent survey detailed in the *Tweed Shire Council Cobaki Broadwater Management Plan (Industry) Final Report* (1998), the entry of heavy metal contaminated leachate is occurring from the Tugun Landfill.
- As a result of the high groundwater, the depths of the fill required to maintain stability during construction would affect groundwater flows and pose significant environmental effects.

- The dredging and associated works with the tunnel within the tidal zone would impact on the hydrology of both freshwater and estuarine ecosystems of the Cobaki wetland system.
- Activities carried out during construction that are in proximity to sensitive waters, particularly SEPP 14 Wetland No. 5a, should be appropriately managed to minimise the transportation of sediment and other contaminants off-site.
- The Tugun Bypass crosses over two Gold Coast Airport landfill sites. There is concern of surrounding land contamination and how the 1600m^3 of contaminated material would be disposed of.

Submission Numbers:
25, 33, 46, 52, 53, 61, 62, 67, 69, 71, 72, 73, 74, 84, 88

Response:
The potential impacts of acid sulphate soils are provided in Technical Paper 5 of the EIS. Recognised management measures to prevent adverse effects on biodiversity and engineering structures are also detailed. Lowering of the water table would be temporary and confined to the tunnel and approach ramps. This is to allow the use of concrete as a construction material. Cones of depression would be localised through the use of diaphragm walls and extraction / re-injection wells. Acid sulphate soils within the area of excavation would be treated with lime and re-used where suitable. Excessive acidification of groundwater (and the mobilisation of heavy metals into solution) is not anticipated and quality of the extracted groundwater would be monitored and, if required treatment would be introduced.

Elevated levels of arsenic or DDT were not identified in areas that require groundwater modification. Erosion and sedimentation controls would be implemented, monitored and maintained during construction.

Problematic odours (possibly MEK) were encountered within Gold Coast Airport during supplementary groundwater investigation. Areas of investigation were not located within or immediately adjacent to contaminated landfill sites. Subsequent monitoring of the site 12 months later indicated a significant reduction in odour to near non-detection levels. Construction of the proposed Bypass would not involve the disturbance or exposure of groundwater in these areas. Health risks to construction workers are not anticipated, however precautionary measures are proposed. This includes the development and implementation of a health and safety plan.

Preliminary investigation of the dumped material within NSW Crown Land (Lot 319 on DP755740) has been undertaken. Investigation indicates arsenic and DDT concentrations below recognised human health and environmental guidelines.

The ANZECC guidelines focus on the qualities of water and sediment. Environmental investigation does indicate that the existing quality of some areas exceeds these guidelines. However, few impacts on the construction site are anticipated as a result of moving leachate and contaminated groundwater. Recognised engineering and design solutions are proposed to manage these situations.

Technical Paper 5 considers acid sulphate soils and the potential impacts of 'excessive management'. Section 1.1.4 specifically recognises the need to develop site specific criteria and management strategies to avoid excessive changes in local soil and water chemistry. This would be done in consultation with the relevant State and Commonwealth agencies. Further discussion on management strategies is detailed within Section 5 of Technical Paper 5.

Measures to avoid or minimise the extent of acid sulphate soil disturbance have been integrated within the Proposal. This includes the use of low embankments, minimising the area of excavation and maintaining natural groundwater height. Neutralisation is also proposed. These principles accord with State and Commonwealth guidelines and have been trialled and proven in other infrastructure projects. Monitoring and maintenance of all measures would be undertaken. A management plan is proposed and would be developed in consultation with the relevant agencies. Significant increase in the natural concentration or volume of acid leachate is not anticipated.

Construction of the tunnel, and excavation of acid sulphate soils is proposed to be undertaken early in the construction program. Geotechnical investigation indicates the majority of acid sulphate material comprises sand which would be suitable, upon treatment for embankment material. Due to economic and environmental reasons, removed material would be reused progressively in the adjacent embankments and managed in layers. All materials would be stabilised from the effects of wind and construction vehicles.

The comments on the potential to impact on groundwater level and flow within the area, including the potential production of acid groundwater during construction are noted. This would be dealt with in detailed design phase of the Proposal and as part of the on-going monitoring commitments.

The comment regarding the closure of Tugun Landfill and impacts of waste material are noted. Discussions are being held with Gold Coast City Council regarding this matter.

The contaminated land impacts at the Tugun Landfill (Sections 4.4.2, 5.1.2, 6.1.2) have been assessed in Technical Paper 6. The portion of the Bypass that intersects the sandmining area is discussed in Sections 4.4.4 and 5.1.6. It is concluded in Technical Paper 6 that the mining process had not left a concentration of radioactive sands within the Airport grounds and that previous mining activities on the site did not constitute either an environmental or health risk.

Construction of the Bypass is anticipated to have a minor effect on the volume or migration of contaminated groundwater from the Tugun Landfill. Construction would involve the removal of contaminated material and the installation of a HDPE cover at the landfill interface. This cover would limit recharge volumes and the lateral transfer of groundwater at the area of disturbance.

The entry of heavy metal contaminated leachate into the Cobaki Broadwater occurring from the Tugun Landfill is noted. Measures to manage leachate in this area are proposed and detailed in Section 6 of Technical Paper 6.

The heights (and therefore mass loads) of fill embankments have been minimised and are not anticipated to compress in situ sand materials. With the exception of the tunnel and approach ramps, any barrier effects on natural groundwater flow and volume are unlikely.

Dredging of materials within the tidal zone would not be undertaken as a part of the Proposal.

Technical Paper 8 identifies that in the absence of appropriate mitigation measures the Proposal would have an adverse impact on water quality. It is recognised that appropriate mitigation measures include erosion and sediment controls during construction and stormwater treatment measures and spills containment measures during operation. Activities undertaken in close proximity to the sensitive waterways would be managed in

accordance with the water quality impact mitigation measures detailed in Chapter 4 of Technical Paper 8. Chapter 4 details controls for construction, operation and monitoring programs. All erosion and sediment controls would be designed in accordance with the requirements of *Managing Urban Stormwater – Soils and Construction* (Landcom 2004) and *Soil Erosion and Sediment Control – Engineering Guidelines for Queensland Construction Sites* (Institute of Engineers Queensland 1996) while taking into consideration the nearby receiving waters.

Extensive geotechnical and geophysical investigation (refer Section 4.7 of TP6) was undertaken of the Airport Dump Site (comprising areas A, B and C). Section 8.2.4 of the EIS indicates that further testing of the affected area would occur prior to construction and in accordance with the relevant guidelines for contaminated land. Specific treatment measures would then be determined in consultation with the relevant stakeholders. Possible measures detailed in the EIS include removal and disposal to a licensed landfill, containment and capping. The preparation of a management plan for contaminated land is also proposed and specified in Section 18.2.4 of the EIS.

4.6.3 Operation

In summary, the respondents to the EIS raised the following issues:

- There are many hazards associated with this Proposal regarding the leaching of contaminated soils into the Cobaki Broadwater. Measures should be implemented to filter runoff and a plan should be developed that would monitor and evaluate the impacts of the Proposal during operation.
- The Tugun Bypass would result in impacts on the Cobaki Wetlands / Broadwater and the remaining lake areas by threatening to change the watertable.
- There is concern about mitigation strategies for the tunnel, specifically the ability to equalise water levels and reinstate a natural flow, and the effectiveness of the groundwater modelling. It is unlikely that a monitoring system as described would be installed to ensure drainage systems are working effectively and to identify maintenance when necessary. When a breakdown of the system occurs it could have an irreversible impact.
- It is important to ensure that any likely changes to flooding and drainage as a result of the Proposal do not result in any additional impacts to vegetation communities in the area.
- It is important to develop appropriate mitigation measures to maintain the natural patterns of recharge and not disrupt groundwater levels that are critical for ecosystems. This should include no pollution or causing any changes in groundwater quality. These concerns are also relevant to the construction of the potential railway infrastructure.
- It should be ensured that landscaping activities do not adversely impact on the environment through discharges of sediment into waterways or the generation of particulates in the air. Steep batter slopes have the potential for erosion and the transportation of sediment off the Bypass route. It should be ensured appropriate erosion and sediment controls be maintained until the slopes are fully stabilised.
- Impacts from stormwater runoff have the potential, among other things, to change the pH levels for sensitive frog species and the waters of the Cobaki Broadwater.
- Flood inundation and acidity arising from major disturbance to potential acid sulphate soils have not been accounted for in the EIS. Acidic and polluted stormwater runoff would be very damaging to the water quality of the Cobaki Broadwater and there are many reservations regarding the ongoing management of the acid sulphate soils.

- The deterioration to the water quality of the Cobaki Broadwater and Tweed River Estuary would be ongoing as a result of unknown effects from the Proposal. Any contamination of the Cobaki Broadwater from the Proposal would negatively impact on the Tweed River and the ocean.
- The cofferdam affect from the 3-4m high earth-filled road and rail embankments pose serious environmental impacts, particularly during any heavy rain drainage of stormwater into the Cobaki Broadwater.
- It is of concern that monitoring of environmental impacts from the tunnel, would only occur for 12 months. Some impacts may not be readily visible in this time period and it may be too late for remediation.
- There appears to be an issue with the turbidity of the pumped water which would need to be processed in settling ponds prior to re-injection. It is unclear the length of time that water would remain in the settling ponds and whether this delay would impact on the stability of the groundwater.
- It is of concern that the tunnel is located in the saltwater table. This water is tidal and would be partly blocked by the tunnel causing currents that were not previously there which could cause stronger flows into the Cobaki Broadwater during heavy rains.
- Dewatering and the potential for groundwater quality changes associated with acid sulphate soils is a significant concern. When groundwater is lowered significantly, which maybe outside the parameters used in the modelling predictions, a contingency plan must be in place which would be able to raise the water levels back to a manageable level within a suitable time frame.
- Flood mitigation and management should be assessed in light of the Proposal, as the natural tendencies of the aquatic systems would be altered following construction. It is recommended that this would include comparisons of water quality data, groundwater assessments, flora and fauna impact assessments, macro-invertebrate analyses and hydrological flow assessment.

Submission Numbers:
25, 31, 46, 52, 53, 57, 62, 63, 72, 74, 76, 83, 86, 88

Response:
Known, potential operational impacts of the Bypass, such as those described within the comments from the submissions received, have been identified regarding water quality (both surface and ground) and hydrology. As a result appropriate management measures have been proposed. Particularly, mitigation measures to minimise impacts to the existing watertable levels, the natural patterns of recharge and flow and groundwater quality are proposed in Technical Paper 9. Significant impacts on the Cobaki Broadwater and the groundwater of study area are not anticipated. The assessment concluded that there would be no significant impact on water quality. Specific concerns regarding impacts are discussed below.

Filtering of contaminated leachate is not considered practical, particularly ground water. Contaminated material from within the road footprint would be removed and disposed of at a suitably licensed facility, or contained and capped, thereby limiting the potential for pollution. Additional management measures would be implemented to ensure that exposed faces of the landfill are re-covered with an impermeable barrier. This would include the use of HDPE liners to minimise lateral transfer and groundwater recharge rates.

Strategies to maintain (and monitor) natural groundwater height either side of the tunnel and approach ramps are achievable. Such measures have been trialled and operated in other infrastructure projects with success and would be implemented upon approval.

Construction of the Tugun Bypass would reduce the storage capacity of the Tweed River floodplain slightly. Modelling indicates that the resultant increase in time of inundation, rates of rise and recession and flood height levels of flood events is negligible. Additionally, cross-flow drainage structures are proposed to minimise the potential for a cofferdam effect occurring as a result of the road embankment. The Bypass would also include a system of treatment for surface water run off that would ensure that there is minimal impact on the quality of receiving waters.

Measures to minimise impacts on water chemistry have been proposed with particular emphasis on tributaries of the Cobaki Broadwater and sensitive frog species. Further discussion is provided within Section 1.1.4 Background Trends within Technical Paper 5.

The duration of post construction monitoring of the tunnel is dependant on a number of factors, including the effectiveness of proposed mitigation measures. In most instances, the time frame of twelve months was detailed as a minimum and would depend on the extent of 'site stabilisation' and 'environmental risk'.

Investigation indicates that groundwater in the area proposed for disturbance (tunnel and approach ramps) is acidic. The primary source of this acidity is assumed to be acid sulphate soil, which releases sulphuric acid and ferrous ions upon exposure to oxygen. Further exposure to oxygen can cause ferrous ions to oxidise to the ferric state and precipitate from solution. This precipitant is also referred to as 'iron floc' which in quantity may cause the blockage of pumps. Discussion of turbid groundwater within Technical Paper 9 and Section 8 of the EIS refers primarily to this matter. Closed systems would be used during construction to extract and re-inject groundwater. This process would minimise the risk of oxidising (through the retention of anoxic conditions) ferrous ions in solution and the formation of 'iron floc'. Mechanical filtration may be integrated within the closed system if problems with iron floc are encountered. This would be the primary method to prevent blockage of re-injection screens. Substantial problems with iron floc would involve the use of sedimentation ponds. As hydrogen ions are produced in addition to iron floc, neutralisation may also be required.

4.7 Noise and Vibration

4.7.1 Assessment Methodology and Documentation

In summary, the respondents to the EIS raised the following issues:

- Aircraft activities associated with Gold Coast Airport constitute significant noise events resulting in high noise levels which are unlikely to be affected by noise levels generated by traffic from the Proposal. Consequently, there should be no changes proposed to the mitigation of road noise.
- Section 5.2 of Technical Paper 10 predicts that construction activities are likely to exceed the noise criteria specified in the DEC's Construction Noise Guideline at a number of locations. While the Guideline is not mandatory, it should be approached as closely as possible and where it cannot be reasonably met the best practicable means of reducing noise levels should be implemented.
- From the noise monitoring data provided in the EIS the average LAeq (18 hour) for the seven Queensland locations was 50.7dB. In NSW the average LAeq (15 hour) for the seven locations was 65.6dB. These results show that acceptable NSW noise levels are already exceeded by the Tweed Heads Bypass. Two Bypasses would increase noise levels and would impose marginally acceptable noise intrusion over a greater number of Tweed residents.

- The EIS qualifies that the NSW residential noise levels include façade reflection while the Queensland monitoring includes no façade reflection.
- Noise monitoring at the free field sites of Rose and Ducat Streets, next to the existing Kennedy Drive interchange exceed RTA guidelines substantially.
- The modelling does not account for the fact that the interchange over the Tugun Bypass at the Tweed Heads Bypass would be 6m above ground level. Vehicles using the interchange would need to stop to give way before starting off again which would create more noise.

Submission Numbers:
52, 62, 67

Response:
Comments in relation to aircraft noise and the exceeding of DEC Construction Noise Guidelines are noted.

Since publication of the EIS, implementation of the recommendations of the Northern Pacific Highway Noise Taskforce has commenced in the Tweed Heads area. Many residences currently exposed to existing high levels of road traffic noise from the Tweed Heads Bypass would receive noise amelioration treatments prior to construction of the Tugun Bypass. Where possible, these noise amelioration treatments were included in the prediction of 'future existing' noise levels as published in the EIS. However, noise monitoring was undertaken prior to implementation of the Taskforce recommendations. Therefore the overall noise impact would be less than that indicated by the pre-EIS noise monitoring.

Where façade monitoring could not be conducted at 1m from a building façade, then façade reflection was considered by manual addition of +2.5dBA to monitored noise levels. This method was used, where appropriate, for determination of existing road traffic noise exposure at both NSW and Queensland receivers.

Implementation of the recommendations of the Northern Pacific Highway Noise Taskforce is expected to significantly reduce existing road traffic noise levels along the Tweed Heads Bypass and the Kennedy Drive Interchange.
The road traffic noise modelling undertaken as part of the impact assessment of the EIS (refer to Chapter 14) has included the 3-dimensional location of the noise sources. The model also takes into account the increase in noise due to road gradient. While some countries' noise modelling standards do apply a noise level penalty for the stop-and-go traffic flow through intersections, the CoRTN model does not, since it is based on free-flowing traffic.

4.7.2 Construction

In summary, the respondents to the EIS raised the following issues:

- Section 5.3 of the EIS indicates that the initially proposed sheet piling technique for the tunnel construction would be a major construction noise source as it would be undertaken outside normal construction hours. It is noted that an alternative to sheet piling has been proposed resulting in reduced construction noise levels.
- The potential noise impacts from ERA 22 (Screening materials) locations should be addressed.

- The impact of an additional 150 trucks per day during hauling activities along Boyd Street should be estimated. Noise monitoring is proposed but the impact at receptors and its management has not been quantified or addressed. The baseline ambient noise (existing) due to traffic (including heavy vehicles) along Boyd Street at selected residential / commercial premises should be determined and mitigation measures should be provided where necessary.
- Construction noise issues provide concerns for West Tweed residents.

Submission Numbers:
52, 69, 71, 72

Response:
As indicated in Section 7.4.3 of Technical Paper 2, deep diaphragm walls may be used to facilitate construction of the Airport tunnel. It is probable this method would not require high impact loads and result in lower noise levels during construction. This may be the preferred method for construction as other benefits are also indicated. The final decision will be made in detailed design.

The screening of materials on site is unlikely due to an absence of suitable material. Granular materials would be imported to site. If screening is required within areas of Queensland, the 'Information Sheet – Streamlined development approval for screening materials (ERA 22)' would be followed and the relevant information supplied.

Noise from haul trucks would be limited by regulating the hours of operation. These are specified in Section 4 of Technical Paper 10. All machinery would also accord with the relevant Australian Design Rules and manufacturers specifications. Noise mitigation measures would be implemented as part of the Construction Environmental Management Plan to reduce construction noise impact.

The concern of West Tweed residents regarding construction noise is acknowledged. The measures proposed in Section 14.10 of the EIS would be implemented to limit construction noise as much as possible.

4.7.3 Operation

In summary, the respondents to the EIS raised the following issues:

- Operational noise impacts would be of concern to residents particularly at Hidden Valley, Banora Point and West Tweed.
- The EIS states that asphalt has low noise characteristics in comparison with other road pavement surface types. Open graded asphalt, as the least noise producing asphalt surface, should be implemented where the road is near residential areas or future residential areas such as the Pacific Beach development site.
- While sound mitigation would be installed, it is not possible to build sound barriers around the interchange. The residents of West Tweed suffer 17 hours of aircraft noise daily and further impacts are not acceptable.

Submission Numbers:
3, 27, 38, 54, 62, 67, 71, 72, 74

Response:
Operational noise impacts have been modelled and are provided in Technical Paper 10. Where required, specific surface treatments, noise barriers and or architectural acoustic treatments would be used to mitigate potential noise impacts to acceptable levels. Management measures are indicated in areas of Hidden Valley and West Tweed.

Operational noise impacts at Banora Point are expected to be reduced due to implementation of the recommendations of the Northern Pacific Highway Noise Taskforce prior to construction of the Tugun Bypass.

Final selection of noise mitigation measures would be designed based on technical feasibility, practicality, cost-effectiveness, community consultation and may be a combination of different noise mitigation treatments such as low-noise asphalt, noise barriers and / or other noise control measures. Additionally, the use of noise barriers along the ramps of an interchange has been previously been found to provide effective management of traffic noise.

Traffic modelling indicates a significant reduction in traffic using the existing road after the Bypass is operational. Noise impacts from the new corridor would be mitigated in accordance with QDMR and RTA noise management guidelines in the respective States.

4.8 Air Quality

4.8.1 Assessment Methodology and Documentation

In summary, the respondents to the EIS raised the following issues:

- The indicators for biological integrity, identified as part of *Queensland Environmental Protection (Air) Policy 1997*, would meet the air quality goal in 2007 (95 µg/m3 nitrogen dioxide). There is however no information provided on the maximum 4-hour average ground level concentration of nitrogen dioxide during operation in 2017.
- There was no air quality monitoring undertaken in NSW, the statements in the EIS are 'estimated', as there is no baseline data established. As a result there is no effective monitoring parameter established.

Submission Numbers:
52, 62

Response:
Maximum 1-hour average ground level concentrations for nitrogen dioxide during operation in 2017 are presented in Table 5.3 and Table 5.4 of Technical Paper 11. Estimation of the 4-hour average concentration from these results yields a maximum 4-hour average ground level concentration of nitrogen dioxide of 68µg/m³ at 10m from the road for the proposed Tugun Bypass, which would meet the Queensland EPA (Air) guideline for biological integrity.

Studies into the environmental impacts of the Tugun Bypass have adopted a larger study area approach to ensure that impacts away from the immediate footprint of the Bypass were also considered. Measurements of carbon monoxide were made at two locations near the Gold Coast Highway to provide an indication of existing (baseline) air quality near the road and to validate predicted pollutant levels (refer to Section 1.1, Technical Paper 11). These measurements would represent the existing air quality at similar distances from the road in NSW. As an aid to Interpretation, long-term ambient data from the northern Gold Coast (Helensvale) were also analysed to provide an indication of existing background levels of pollutants in residential areas near the proposed Bypass (refer to Section 2.2, Technical Paper 11). Comparable long-term measurements are not available for the NSW section of the Proposal, thus measurements from Queensland were used to represent existing air quality in NSW.

4.8.2 Construction

In summary, the respondents to the EIS raised the following issues:

- Earthworks associated with construction have the potential to cause emissions of dust. Construction works should adhere to the DEC's objective to minimise adverse effects on the amenity of local residents and sensitive sites, and to limit the effects of emissions on local and regional air quality. In addition to monitoring locations described in Section 9.6.1 of the EIS, it is critical that the sensitive locations such as the Cobaki Broadwater and threatened species habitats are also monitored to ensure dust generated would not impact on these areas.
- The potential impacts on air quality from ERA 22 (Screening materials) locations (within Queensland) should be addressed.
- Air quality issues during construction are of concern for residents of West Tweed and the surrounding environment.

Submission Numbers:
52, 69, 71, 72

Response:
Strategies to minimise air quality impacts during construction would be detailed within the Construction Environmental Management Plan, in accordance with DEC air quality requirements, the aim of which is to ensure the minimisation of dust, smoke, and other particulates. Management measures are proposed in Section 9.6.1 of the EIS. These would extend to monitoring of the Cobaki Broadwater and threatened species habitat.

The screening of materials on site is unlikely due to an absence of suitable material. Granular materials would be imported to site. If screening is required within areas of Queensland, the 'Information Sheet –Streamlined development approval for screening materials (ERA 22)' would be followed and the relevant information supplied.

4.8.3 Operation

In summary, the respondents to the EIS raised the following issues:

- Air pollution from vehicle emissions would increase as a result of the Bypass which would be of a concern for residents, specifically of Banora Point and West Tweed, and the environment.
- Predictions of future concentrations of main air pollutants cannot be achieved before vegetation is removed. After construction of the Bypass and the surrounding vegetation has been cleared, it is not possible to have a decrease in emissions of greenhouse gases and a prediction of a 3.5% decrease by 2017. There are many hazards and risks associated with the Bypass regarding greenhouse gas emissions.
- Vehicle emissions would be spread over three traffic corridors as interstate transport would continue to use the existing Pacific Highway in Tweed Heads and the Gold Coast.

Submission Numbers:
3, 25, 27, 62, 71, 72, 74

Response:
Predictions for future concentrations of the main air quality pollutants, which include vehicle emissions, are expected to remain well below established air quality guidelines at locations 10m from the edge of both the existing route and the Bypass with the latter in operation. Sources of reductions through the operation of the Bypass are primarily through removing traffic congestion and reduced vehicle emissions. The Bypass, by simply providing an alternative route to and from the north, is not expected to generate any significant changes in traffic in the West Tweed and Banora Point area. Traffic modelling undertaken for the EIS

supports this, with very small differences (plus and minus) being shown on sections of Kennedy Drive and the Pacific Highway to the south.

Assuming a worst case of approximately 16,000 tonnes of emissions during the construction phase of the Bypass, and that clearing of 45 hectares of assumed uniformly dense vegetation would release approximately 25,000 tonnes of CO_2, and then total emissions for the Bypass construction would be approximately 41,000 tonnes of CO_2 equivalent. However, it should be noted a saving of 210,000 tonnes of greenhouse emissions would be achieved by 2017 as a result of the construction of the Bypass (explained in further detail in Chapter 6 of Technical Paper 11, and Chapter 9 of EIS Main Volume). This is anticipated as construction of the Bypass would reduce travelling time due to decreased congestion and travelling distance. Subsequently greenhouse gas emissions are expected to decrease per vehicle trip.

The dispersion of vehicle emissions is dependant on a number of factors, including the prevailing weather. Dispersion modelling has been undertaken using a number of weather conditions and is provided in Technical Paper 11. Impacts are indicated to be acceptable, and greatest within 10m of the Bypass alignment.

4.9 Project Design

4.9.1 Route Alignment including Stormwater Infrastructure

In summary, the respondents raised the following issues:

- There is support for the acquisition Crown Land Lot 319, southwest of the Airport boundary. The new alignment could see the road surface below the mean ground level, (to allow free aircraft movement above) and it would not necessitate a tunnel at any time.
- An alternative to building the tunnel under the extended Airport runway must be found. The Tugun Bypass should be able to carry heavy vehicles bearing fuel and other dangerous goods.
- Further information regarding 'a system of filter strips and swales along with the constructed wetlands would treat runoff from the Bypass' is required. Where is the model or design of this system?
- There has been an assumption that the major cutting for the alignment through Hidden Valley / Woodgee Hill is inevitable. However, this has not been described and discussed as a major design feature or structure.
- The design of sediment basin settling volumes should be capable of containing runoff from a 90th percentile 5-day rainfall event where practicable. Justification at the time of submitting an application for an Environment Protection Licence for adopting sediment basins with settling volumes sized to contain runoff less than a 90th percentile 5-day rainfall event should be provided. Consideration must also be given for the protection of the environmental values during the design of these basins.
- There is concern about the constructed wetlands / swales being used as spill containment devices. Should a flood event coincide with a spill event, the tunnel pumps may fail and there is the potential for polluting waters within the Cobaki Broadwater which may also result in a fish kill. It is suggested that inundation of these constructed wetlands should be prevented.
- Constructed wetlands used for stormwater retention and treatment have also become sites of fish kills During summer, hot weather or aquatic vegetation die-off has resulted in dissolved oxygen levels becoming severely depleted resulting in fish kills. Certain spill events can similarly result in a fish kills. Designs and topographic locations must ensure that fish cannot access the constructed wetland.

- Clarification is required about the Bypass being eventually widened to six lanes. If access to the Cobaki Lakes residential development is allowed to the Bypass, then the case for an increase in the Highway to six lanes is advanced.

Submission Numbers:
7, 9, 10, 25, 38, 52, 58, 62, 72, 74

Response:
The route alignment has been selected to minimise impacts on a number of sensitive areas, including Cobaki Broadwater and surrounding wetlands. Relocation of the road corridor south-west to be clear of Airport constraints (including the OLS) would infringe significantly on the Broadwater and wetland areas. This alignment was considered in the route selection process as Option C1 and is described in Chapter 5 of the EIS.

The tunnel is required to achieve an acceptable route with regard to important environmental areas and Airport operations. The tunnel is relatively short (up to 400 metres length of roofed tunnel) and includes a comprehensive range of features and systems for emergency situations. The majority of dangerous goods (including fuel) can therefore be transported along the Bypass via this tunnel with a significant reduction in risk to life over the existing situation.

Further detail would be developed at the detailed design phase and during the preparation of the Construction Environmental Management Plan. Technical Papers 2, 5 and 8 cover the concept design details, as well as processes to follow to determine the final water quality facilities to be designed, built, monitored and maintained. These would be developed in consultation with the relevant government agencies.

The cutting through the ridge behind the John Flynn Hospital is quite deep and wide, but it is relatively short in length (approximately 150m). The alignment has been selected to minimise the impacts through Hidden Valley (immediately to the north) and to limit the size of the cutting (refer to Section 5.2 of Technical Paper 2). The cutting has been assessed for visual impacts in Sections 5.5, 5.11, 5.12, 6.1 and 7 of Technical Paper 13.

The recommendations regarding sediment basin settling volumes are noted and would be considered further at the detailed design stage. The use of the 90th percentile 5-day rainfall event as the design criterion would result in significant increases in the size of sediment basins compared to what is currently proposed with a corresponding increase in Proposal footprint.

Flood events (from local catchments or the Tweed River floodplain) affecting the constructed wetlands would be relatively rare. Coincident road-spill events would be highly unlikely, and the risk of significant contamination of Cobaki Broadwater would therefore be extremely low. However, flood immunity of the constructed wetlands would be considered in detailed design, both in relation to coincident spill containment and the prevention of fish entry, as well as designing to exclude fish passage in low flow conditions. The flood immunity criteria for design would be established in consultation with the relevant government agencies.

The 4-lane Bypass design is compatible with an ultimate 6-lane design. Upgrading to six lanes is not anticipated to be required until at about 2030. An interchange is not proposed to be constructed as part of this Proposal.

4.9.2 Bridges and Batter Slopes

In summary, the respondents to the EIS raised the following issues:

- Of the various bridge options for Hidden Valley, a cable stayed bridge was not considered. This is considered the most environmentally sensitive and most visually interesting bridge and it has not been considered because it has limited benefits at a significantly greater cost.
- There are a number of concerns about the proposed property access bridge. The single lane bridge would be inconsistent with the adjoining access to the property and would be likely to impede on the potential future development of the property. Once the single lane bridge is constructed and the Bypass becomes operational it would be difficult and expensive to construct a wider bridge, due to the height after the excavation and the disruption to traffic.
- A bridge with a minimum width of 9.7m would be required by the Gold Coast City Council for any future development of the properties that the property access bridge is to access.
- The property access bridge superstructure design is not considered to be cost effective for the cantilever of the bridge deck.
- A cost comparison of the single lane versus a two-lane property access bridge has indicated that using the existing design the single lane bridge is the most economical solution, however this type of access reduces the future development potential.
- The batter slopes of the cutting through Hidden Valley / Woodgee Hill are steeper than 1:3 and are unacceptable. A modification to the design includes providing engineering treatments to the cut slopes so to reduce the back slope of the cuts. Modifications could include, concrete panel walls in conjunction with stabilised cut batters. Bored piles, rock bolting and shotcrete are some of the structural methods used to improve the batter stability prior to placing the concrete facing panels.
- The property access bridge is very high above the level of the Bypass which results in issues with the depth that the bridge piles are required to be embedded. The bridge height also poses safety issues, either from falling or objects being thrown down onto traffic below. Inspection and routine maintenance of the bridge structure would also be difficult.
- There is no need for a bridge to provide access to the environmental precinct of the Gold Coast Airport to the west of the alignment. It would be more appropriate to construct a combined low grade single traffic lane underpass also suitable for fauna.
- There is concern about the design and construction of four-span high level bridge 22m above the Bypass that would be required to provide property access to only two private properties opposite the John Flynn Hospital.
- It was decided that the most economic design for the Hidden Valley bridge was a three span bridge with two foundations, although reducing the number of foundations would improve the construction impact. Cost appears to be a major factor here, not conservation of species.

Submission Numbers:
38, 62, 71, 72, 74

Response:
A cable stayed single span bridge option was considered for Hidden Valley, but was not recommended on balance of environmental benefits against significantly greater cost. Additionally, to reduce number of intermediate foundations within the valley floor would require a far more sophisticated and specialised type of bridge, which cannot be justified.

The single lane property access bridge proposed is sufficient to replace the existing property access road. The concerns about possible future bridge widening are recognised. Further

negotiations about bridge width and cost contributions could occur prior to detailed design should the property owner desire. Regarding the superstructure design of the access bridge, Super-T (or teeroff) girders are a feasible option as discussed in Section 6.4 and shown in Figure 6.3 of Technical Paper 2, however this is still subject to detailed design assessment. Other concerns raised during EIS exhibition regarding bridge height, safety and maintenance would also be considered during the detailed design assessment

The concerns regarding the about batter slopes, widths of excavation, and alternative batter options are noted. These issues would be resolved in the detailed design process, in conjunction with the results of the geotechnical investigation undertaken since EIS exhibition (refer to Chapter 6 of this Submissions Report)

Due to flooding issues, Airport access to the west of the Bypass is more practical with an overbridge than an underpass in this low flat area. Access to the western area of the Airport is required for fire fighting and rescue vehicles at all times.

Regarding the concerns of the property access bridge opposite the John Flynn Hospital, no acceptable alternative access to the high bridge connection has been found due to the steep topography of the area. Section 6.4 of Technical Paper 2 provides further detail.

4.9.3 Tunnel

In summary, the respondents to the EIS raised the following issues:

- There is concern about the design of the tunnel particularly regarding the cost of installing necessary pumping equipment to handle salt and fresh water ingress, as well as lighting and future high level power sources for the future rail link.
- The below sea level construction of the tunnel in acid sulphate soils, in area which has a high watertable and the anchoring into the bed rock 150m below the surface has many long-term safety issues and unending expense.
- It is recommended that a tunnel be constructed through Hidden Valley / Woodgee Hill ridgeline. The use of a tunnel would have less detrimental impacts on the surrounding environment and community.
- Is the tunnel under the Airport extension a feasible engineering and environmental solution?
- During periods of heavy rain, flooding would be a major concern with the 300m long open cut ramps at either end of the tunnel. It would take a very efficient pumping system for the tunnel to minimise the risk of flooding.
- The anchoring of the tunnel and approaches pose a major problem because of the potential for hydraulic lift.
- The equalising of the groundwater pressure would be a problem due to the existing incursion of salt water from the Cobaki Broadwater on the eastern side of the tunnel. The EIS admits uncertainty regarding the adequacy of the drainage system proposed to equalise groundwater pressures and flow across the roof of the tunnel. There is also no indication in the EIS how the excess water is to be managed. If the system turns out to be inadequate, this cannot be fixed immediately and could lead to the high risk of contamination of the Cobaki Broadwater.
- There can never be 100% certainty that the steel reinforcement required for the tunnel would have the required amount of concrete side cover for the full 20m depth. This means the reinforced steel could be subject to corrosion over time and limit the tunnel's life. Not only is this a safety issue, but the corrosion could leach into the ground water and impact on flora and fauna.

Submission Numbers:
9, 31, 38, 57, 62, 67, 74, 79

Response:
It is intended that the proposed tunnel be impervious to groundwater and that infiltration be limited. The volume of water to be collected and discharged is anticipated to be small and predominantly fresh. However drainage systems would be designed to resist to corrosion by salt or acid. Such systems are common place and commercially available.

The tunnel design would include drainage and pumping systems to provide at least 1 in 100 year immunity for local rainfall and river flooding At least three independent power sources would be provided. The cost of the tunnel equipment, including pumps has been incorporated into the total project cost. The cost-benefit analysis shows that road user benefits, such as reduced accidents and shorter travel times, outweigh the costs. Refer to Sections 2.4.7, 2.4.10 and 2.6 of Technical Paper 2 for further detail.

The tunnel design and construction methodologies proposed would adequately handle the local groundwater conditions. Anchoring into bedrock is not necessary, buoyancy forces can be adequately handled through a combination of weight and soil friction with the design proposed. Further detail can be found in Sections 2.4.12, 6.6 and 7.4.3 of Technical Paper 2.

The proposed tunnel through Hidden Valley / Woodgee Hill ridgeline is a very expensive alternative to the conventional open cutting proposed in the EIS. As result it was not preferred as the benefit to cost is not justified.

The tunnel under the Airport extension is proposed to be constructed with diaphragm walls along each side. This is a well-proven technique throughout the world. In conjunction with standard care in detailed design and construction, it would result in a very sound and safe engineering product. This type of tunnel construction is also very suitable in terms of environmental controls. The footprint can be minimised, groundwater can be readily managed and all construction works (including any potential contaminants) can be contained within the narrow footprint.

Flooding from the open ramps into the tunnel (in both construction and operational phases) is an acknowledged issue. Consequently a very efficient piping, storage and pumping system is proposed for this tunnel. Further information can be found in Section 2.4.7 and 2.4.10 of Technical Paper 2.

The uplift (or buoyancy) forces of the tunnel immersed well into the groundwater are large, but the weight of the structure plus soil friction forces would be calculated to balance. The concept design of the diaphragm walls and piles may in fact be conservative, with refinements possible at the detailed design stage in conjunction with more detailed geotechnical data.

The migration of groundwater from the Airport towards Cobaki Broadwater is very slow. The transverse drainage system proposed is considered to be adequately robust and maintainable. Monitoring is proposed upstream and downstream of well-points to verify equalisation of groundwater levels. The sandy strata provide good conditions for the collection and recharge wells. During construction there is a one-off displacement of groundwater, which it may be possible to reinject and absorb successfully into the surrounding water-table. In the event that this cannot occur at the required rate during dewatering (due to high water tables in a wet period for example), collection in storage ponds would occur with treatment as required prior to discharge.

Diaphragm wall construction is a well-proven and highly refined system. Adequate concrete cover of the steel reinforcement can be attained. In addition there would be virtually no groundwater movement adjacent to the walls after construction, and hence limited oxygen or acid water present. Corrosion of the steel is therefore unlikely to occur or become a maintenance or safety issue.

4.9.4 Interchanges and Overpasses

In summary, the respondents to the EIS raised the following issues:

- The removal of the Boyd Street interchange has jeopardised the Tweed Shire Arterial Road Network. Tweed Shire Council requests that the necessary planning and environmental approvals be sought for the Boyd Street interchange as part of this EIS process, to facilitate its future construction.
- The existing approvals for the Cobaki Lakes Development were preceded by satisfactory arrangements being established with Gold Coast City Council and QDMR. The Boyd Street interchange would connect the Cobaki Parkway to service the future urban areas of Cobaki Lakes and Bilambil Heights. This arrangement led to a series of legal agreements between the developer of the Cobaki Lakes, Gold Coast City Council and QDMR that ensures road access from the Cobaki Parkway to Boyd Street is entitled. Without the interchange it is uncertain how these legal agreements can be met. The Cobaki Parkway could function with an overpass rather than a full interchange at Boyd Street, however there would be a number of access and traffic impacts.
- The Boyd Street interchange is needed to access the John Flynn Hospital and surrounding businesses and is considered a vital component of the infrastructure for the southern end of the Gold Coast. Without interchange vehicles would continue to use the Gold Coast Highway and side streets to access John Flynn Hospital.
- There is concern that the Tweed Heads Bypass interchange and the proposed Tugun Bypass interchange into Kennedy Drive is the only access servicing a large number of proposed development areas.
- Should the Boyd Street interchange or overpass proceed, recommendations provided by Queensland EPA, regarding measures to reduce the impact on the Boyd Street Long-nosed Potoroo habitat, should also be incorporated.
- Alternative access routes to the Cobaki Lakes Development should be investigated. The existing Boyd Street access should be closed and rehabilitated to address impacts on threatened species.
- Approvals for an overpass or interchange at Boyd Street pose significant environmental difficulties. It is considered they were not included as part of this assessment because it could delay the EIS display.
- Clarification is required about the Lakes Drive Bridge. The Lakes Drive Bridge has been included in the EIS, which would connect South Tweed to Kennedy Drive. Tweed Shire Council and the RTA have both provided conflicting advice regarding this issue.

Submission Numbers:
20, 24, 26, 48, 49, 50, 61, 62, 64, 69, 71, 72, 75, 77, 78, 81, 84, 85

Response:
The primary purpose of the Tugun Bypass is to provide a high speed transport corridor that separates commercial vehicles from local traffic. Construction of an interchange at Boyd Street would encourage local trips from adjacent residential areas and is therefore not proposed. However the Tugun Bypass would be designed to permit a four (4) lane overpass

bridge, thereby maintaining access along Boyd Street. If such a structure were to proceed, it would be subject to separate planning approval.

The comments regarding the existing approvals for the Cobaki Lakes Development are noted. It is assumed however that the legal agreements referred to can be met by construction of an overpass connection to Boyd Street. It should be noted that the agreements reached previously were for an overpass and not an interchange.

The comments about connections from the southern end of the Bypass into development areas around Tweed Heads are noted. Traffic capacities have been confirmed and are considered satisfactory. The Kennedy Drive intersections provide an interface with the adjoining section of Highway to the south, and further upgrading may take place at a future time in conjunction with other infrastructure projects south of Kennedy Drive.

The Boyd Street overpass does not form part of the Tugun Bypass Proposal.

The Boyd Street access to the Cobaki Lakes development site has been approved, and is understood to be the main access. Any question of its possible closure and diversion of traffic back to Piggabeen Road and Kennedy Drive is a matter for Tweed Shire Council.

The Lakes Drive Bridge is shown in Technical Paper 3, reflecting Tweed Shire Council's *Lower Tweed River Transportation Study* (1997). However, that connection has not been included in the traffic modelling, based on advice from Tweed Shire Council that it is unlikely to proceed. It has been confirmed that this is still the case, and the link would be removed from future planning documents.

4.9.5 Utilities and Lighting

In summary, the respondents to the EIS raised the following issues:

- The lighting for the Tugun Bypass is of concern for West Tweed residents and the natural environment.

Submission Numbers:
71, 72

Response:
Route lighting is not proposed as part of the Bypass. Lighting would be limited to interchange ramps and intersections, as well as within the tunnel. Light spill would be limited in the West Tweed area also by Airport regulations which require lighting to be shielded. The tunnel design would therefore minimise the lighting while still providing for vehicle safety.

4.9.6 Visual, Landscape and Urban Design

In summary, the respondents to the EIS raised the following issues:

- There is concern about the described visual quality and landscape character of the area. The EIS states that visual change would be softened over time as the landscape planting included in the Proposal matures. However, the existing landscape is vegetated.
- The Tugun Bypass includes plans for a 21m deep cutting over a maximum width of almost 150m through a ridgeline. The cutting is facing east and would be highly visible with the topography offering little screening. The visual assessment has not included any photomontage or representation of how the cutting would appear when viewed from popular lookouts on the coastline.

- In order to soften and improve the aesthetics of the batters, landscape treatments can be applied to cut batters or planted in front of concrete panel walls. The staging of progressive rehabilitation and other techniques could minimise the visual impact of the excavation.
- Regarding the Bypass through Hidden Valley, slopes in excess of 15-20% are not considered suitable for urban development. Considerable emphasis regarding the need to preserve the natural appearance of the coastal ridgelines and foothills is required which is consistent with the provisions of the Council Planning Schemes. Additionally, Gold Coast City Council planning provisions for the hills in the vicinity of the Gold Coast Airport facilitate generally lower building profiles than those for other parts of the Gold Coast. This should be considered in the design of the Bypass.
- The visual assessment is subjective and has been undertaken from the point of view of existing residents, with little or no consideration of the view from the road or the air. The long-term visual impacts are dismissed because viewers would become more familiar with the landscape where as this would not be the case for visitors.
- Some of the landscaping may not be able to be included due to the restrictions of the road corridor width necessity for a 9m buffer strip. The lack of certainty on this issue is concerning. There should be some commitment that a portion of the Bypass would be landscaped by trees. There is also no commitment about planting on the benches of the cut batter. The width or slope of the terraces, the growing conditions and maintenance are not described.
- The EIS fails to relate what parts of the Proposal are of high or low visible impact and the fauna and human fences are described but the more visually obtrusive sound barriers are not.
- The visual impact of the Tugun Bypass as it cuts through Hidden Valley / Woodgee Hill ridgeline would be emphasised by a property access bridge which would be a locally dominant and highly visible feature to the north and south. Landscaping can do nothing to screen or soften the visual impacts of this structure.
- If the Bypass is to proceed a number of assurances regarding landscaping and urban design should be provided. These would include landscaping and screening benches on cuttings, visually 'light' and semi transparent safety screens on bridges, screening of the property access bridge to cutting transition with bulky shade trees and a commitment to provide tall screening vegetation north of Hidden Valley bridge.
- The section of fill embankment is up to 11m in height as the Bypass emerges from the cutting near Hidden Valley / Woodgee Hill. A future railway tunnel would open through the side of this fill embankment. Both the fill batters and the tunnel opening would be clearly prominent in the landscape.
- In the foothills of Woodgee Hill, the only large development is the John Flynn Hospital, which overlooks the Airport runways. Apart from this building, the coastal hills present a relatively undeveloped contrast to the urban development of the coastal plain. The construction of a tunnel through the Woodgee Hill ridgeline would resolve most of the visual impact issues, by avoiding the wide high cutting and by avoiding the need for the property access bridge.
- The various artistic depictions and photomontage representations do not accurately reflect the extent of the detrimental impact upon the area's visual amenity. It is appropriate to assess visual sensitivity, landscape character units and scenic quality and these should be supplementary information to the issue of prime concern to the impact on the viewshed. One of the critical issues is the view from the Airport to Tugun Heights which would be scarred.
- The analysis of scenic quality uses unquantifiable value statements such as 'of some value', or 'uninteresting'. Standard indicators of scenic quality, including contrast, have not been addressed.

- It is important to ensure that any topsoil used is an appropriate quality for plant growth within the area, to ensure that the chances of successful growth are increased. A copy of the landscaping plans should be provided to DEC during development for comment.
- Regarding the landscaping works, it is important to ensure that any locally endemic seed collected does not become contaminated with other seed from the same species, but which is not locally endemic. In addition, procedures would need to be developed to ensure that seed and volume requirements can be met.
- Much of the visual assessment discusses the view from the road user's point of view and appears to believe that their travel experience would be enhanced. However there is no consideration for the rest of the community who currently enjoyed a view of a heavily forested mountain and soft spacious wetland. The pictures used in the EIS are out of date and do not show this regeneration to uphold the claim that it is a degraded landscape. There are no before or after photos so that the community can clearly see the visual impacts of the cutting, bridges and the road.
- The plantings chosen in landscaping are based on aesthetic appeal. This generally consists of mass planting of one or two types of native vegetation such as Callistemon or Grevillea which is not only monotonous, but fails to provide any habitat benefit. It is stated that coastal heath plants may be used, but it is difficult to see how these would survive in such a disturbed soil profile. Landscaping may well use native species but is unlikely to be endemic and cannot replace the mature eucalypt forest that would be removed.
- The impact of the proposed cutting would be quite dramatic with the loss of vegetation and a visually prominent landscape feature. Similar rock cuttings have been found to consist of highly fractured and weathered material and it is stated that it may be necessary to spray concrete on the cut faces. While this may make the Woodgee Hill cutting safer it certainly would not add to the scenic amenity.

Submission Numbers:
25, 38, 52, 71, 72, 74

Response:
The Landscape Plan for the Proposal would include planting similar to the existing native vegetation that occurs along the Bypass route. Comments on seed collection (type, quantity and protection against contamination with other seed) are noted, and would be included in the brief for seed collection prior to construction. Selected landscaping is also recommended, for shielding and softening views or for retaining open views (as discussed in Section 5.12 of Technical Paper 13).

The visual assessment of the Hidden Valley cutting has been addressed in Sections 5.5, 5.11, 5.12, 6.1 and 7 of Technical Paper 13. In particular, Section 5.11.1 addresses the impact from the distant views (5 to 6km away) from popular coastal lookouts. The Bypass cutting is relatively small compared with the hospital from these viewpoints, and there are more distant ridges and vegetation beyond the first ridge that would make the cutting less visually obtrusive. The ocean and mountain vistas are dominant from these viewpoints, with local features therefore becoming far less noticeable. While there is no perspective from the south in the EIS, an aerial photomontage of the cutting and bridge from the north has been included in Technical Paper 13 as Figure 5.1.

The recommendations concerning landscape treatments being applied the Bypass and the staging of progressive rehabilitation is acknowledged. Landscape treatments are included within Chapters 6 and 7 of Technical Paper 13. Consideration of a number of suggested landscaping treatments received during exhibition of the EIS would be undertaken during the

detailed design and development of the Landscape Plan for the Proposal. The Landscape Plan would also be forwarded to DEC during the detailed design phase for comment.

The Bypass route traverses lower and generally less visible areas within the study area compared to Currumbin Hill and the border ranges. The ridge and foothills behind John Flynn Hospital are of high to moderate scenic quality, but only form skylines from localised areas close-by. Consideration of Gold Coast and Tweed Shire Council planning documents has formed part of the assessment process. Further information is provided in Chapters 2 and 3 of Technical Paper 13.

The visual assessment has included two main aspects:

- Direct visual impact on the existing landscape of the transport corridor; and
- Visual impacts on existing views from the surrounding area.

The type of visual experience that road users would have along the Bypass has also been assessed including the sections where acoustic barriers are proposed (primarily within the northern areas). Although not specifically mentioned, views from aircraft would be covered by the overall approach of assessing and mitigating the visual impact along the Bypass route. Aerial photomontages demonstrate this. Additionally, despite the photos being some years old and that not all views have been displayed. It is considered that the overall assessment is thorough and reasonable.

The visual elements of the property access bridge are discussed in Technical Paper 13. It is considered that visual impacts of the access bridge from more distant views would be similar to the cutting, which is described previously. Similarly, the visual impacts of the fill batters and the future rail tunnel portal adjacent to the John Flynn Hospital would be low and relatively small when viewed from distant lookouts.

The existing 'green backdrop' of Woodgee Hill would not be lost as a result of the Bypass. There are large areas of tall timber and green ridge lines behind this part of the Bypass route and permanent scarring would be considered low. Regarding the construction of a tunnel through the Woodgee Hill ridgeline to resolve the visual impact issues, refer to Section 4.9.3 of this Submissions Report.

The impact on the specific view from the Airport to Tugun Heights is not anticipated to be significant. Other views from the Airport such as to the hinterland ranges would still be dominant and the level of permanent scarring of the cutting is considered low.

The concerns regarding highly fractured and weathered material within the cutting are acknowledged. Detailed geotechnical assessments would be undertaken during the detailed design process to address any potential issues, however sprayed concrete protection is not proposed. Revegetation opportunities would be maximised within the cutting.

4.9.7 Cost

In summary, the respondents to the EIS raised the following issues:

- As a result of the uncertainty of the environment, the construction period for the Tugun Bypass would cost twice as much as estimated.
- The Queensland Government should not pay for a Boyd Street interchange for the Cobaki Lakes Development when housing sales and loans would go to NSW and taxation to the Federal Government.
- A Cost Benefit Ratio (CBR) comparison between the 4-lane Bypass route versus a 6-lane Gold Coast Highway over 15 years would resulting a CBR of 2.5 and the same over 30 years would be 5.9.

- The EIS states that an economic analysis for the cost of the Proposal regarding biodiversity indicated that a net economic benefit would still be achieved even if the unquantified environmental and other adverse impacts attracted a total cost range exceeding $400M in discounted present values in 2003. If this information was extrapolated to reflect the current irreplaceable biodiversity and cultural heritage, this is inter-generational theft of a magnitude beyond comprehension.
- It is highlighted that the costs for construction of the Tugun Bypass is approximately $53.7M/km and is much higher in comparison to the Yelgun to Chinderah Motorway which was approximately $11.7M/km and the Tweed Bypass which was approximately $11.49M/km. Furthermore, Tugun Bypass would be subjected to flooding and increased maintenance costs.
- The estimated cost of a 6-lane capacity Bypass route would be $544M. The Queensland Government underestimated its Pacific Highway upgrade. Its estimate cost was $630M and the final cost ended up being $951M.
- As the need for the Lakes Drive bridge is becoming more necessary to provide for future increased traffic, the $60M cost should be added to the cost of the Tugun Bypass.
- The estimated cost for the tunnel is $110M/km. This is nearly three times the cost of the remaining 5.5km of the remaining Bypass route. As the method of construction is not finalised this cost could escalate.

Submission Numbers:
31, 38, 60, 62, 79, 71, 72, 74

Response:
The impact assessment process has resulted in a detailed understanding of the environment within the study area. As a result of this work, environmental management and mitigation measures have been introduced to the Proposal. These have been included in the cost and it not anticipated that this would result in a doubling of the construction period.

An interchange at Boyd Street does not form of the Tugun Bypass Proposal.

The economic analysis submitted within the submissions to the EIS exhibition has not been examined in detail. An upgrade of the Gold Coast Highway to 6-lanes would not meet a range of Proposal objectives including capacity.

The economic analysis used in the EIS does not attempt to place a monetary value on the environmental and social effects of the Proposal generally. The comments raised regarding the actual values are however acknowledged. Additionally, the environmental costs of the Proposal are, to a degree, recognised in a monetary sense through the expenditure on environmental mitigation as a part of the Proposal.

The cost benefit analysis for the Proposal shows that benefits in the form of improved safety and shorter travel times outweigh the cost. Regarding flood immunity, the Bypass would be provided a similar standard to the other sections of Pacific Highway which is typically 1 in 100 year.

The 6-lane cost (upgrading from the 4-lane Proposal) has not been estimated. However it is not believed to be of the order of cost suggested in submissions, as the 4-lane design enables simple and economical widening to six lanes in the long-term.

Traffic planning for areas to the south of Kennedy Drive including the Lakes Drive bridge is beyond the scope of the Proposal. The Proposal does however have sufficient capacity to accommodate projected traffic growth in these areas.

The comments on tunnel costs are noted. While the method of construction of tunnel would not be confirmed until the detailed design stage, the diaphragm wall method proposed in the EIS is well proven and most likely to be the preferred design.

4.10 Construction

4.10.1 Construction Methods

In summary, the respondents to the EIS raised the following issues:

- There could be unexpected difficulties in excluding groundwater during tunnel excavation which would result in timescales lengthening and building cost escalating.
- The construction methodology for the cut through Hidden Valley is not detailed.
- Two methods for constructing the property access bridge include, constructing the bridge after the cutting is formed or construction of the bridge at existing ground level prior to excavation of the cutting. Both methods have a number of advantages and disadvantages.
- Consideration needs to be given to the proposed construction of the Hidden Valley bridge piers. Similar construction experience has identified the need to undertake a number of additional activities such as trimming of vegetation, need for access tracks and construction pads for vehicles and heavy machinery. The true extent of disturbance on the valley floor and slopes needs to be determined.
- A number of possible methods of construction of the tunnel through the OLS are stated, however it is concerning that no one method has been determined to enable a full evaluation. There appears to be considerable doubt about how this tunnel would be constructed and yet this section of the Bypass is the most hazardous part.

Submission Numbers:
31, 38, 52, 74

Response:
Geotechnical profiles and groundwater pumping tests (extraction and re-injection trials) have been undertaken to further refine the groundwater model. Chapter 6 of the Submissions Report provides a summary of this work, while the full reports are provided in Appendix L. This updated information would feed directly into detailed design methodology and would be used to refine the construction and operational mitigation strategies.

Standard earthworks construction methods are proposed for the cutting adjacent to Hidden Valley, after the property access bridge has been constructed as described in Section 7.4.2 of Technical Paper 2. The construction of the bridge at existing ground level prior to excavation of the cutting is supported, and it is the preferred method proposed in Section 6.4 of Technical Paper 2.

Access tracks would be required to the base of the bridge piers for use during construction of the piers and headstock for the Hidden Valley bridge which is described in Section 7.4.2 of Technical Paper 2. Direct disturbance to vegetation would be limited to clearing for this access, machinery operating pads, and for footing construction. Final dimensions for these would be determined during the detailed design stage. Environmental mitigation and management strategies for these works would be included in the Construction Environmental Management Plan developed in consultation with government agencies.

The proposed tunnel described in Sections 6.6 and 7.4.3 of Technical Paper 2 is a cut and cover tunnel with deep diaphragm walls. Discussion of an alternative was also included, with

various reservations, and preferences for the diaphragm wall method of construction is clearly implied. Recent reviews of tunnel options have confirmed the preference for the diaphragm wall methodology. This is the tunnel methodology proposed for assessment and approval.

4.10.2 Earthworks and Fill Materials

In summary, the respondents to the EIS raised the following issues:

- The location and extent of ERA 22 (Screening materials) activities has not been identified. The ERA 22 locations should be identified and assessed.
- Table 7.1 of the EIS describes cut material from the 'Bypass – south Boyd Street' as 6,500m^3 with 65,000m^3 being unsuitable. Which figure is correct?
- There is concern that the fill required for the road construction would be 850,000m^3 of which 300,000m^3 would be brought in from outside sources. The presence of high groundwater poses significant environmental affects on the depths of earth fill required to maintain stability. Several earthmoving machines have become stuck and nearly lost during past earthworks within the Airport land.

Submission Numbers:
69, 71, 72

Response:
The requirement for ERA 22 (Screening materials) would be determined as part of the detailed design phase of the Proposal including the location of these auxiliary construction facilities. Selection criteria have been proposed for siting of auxiliary construction facilities in Section 7.2.7 of the EIS Main Volume. These criteria consider functionality and operational issues as well as minimising environmental impacts for the chosen locations. Strategies to minimise and mitigate environmental impacts associated with siting and operating construction facilities, and procedures for decommissioning these, would be incorporated into the Construction Environmental Management Plan.

For the section of the alignment described as 'Bypass – south Boyd Street', the estimated required cut is 6,500m^3, while the estimated fill required is 170,000m^3. However, in this area, there could be an additional need for approximately 65,000m^3 of material due to unsuitable material, transportation and compaction.

The need for imported fill is acknowledged as likely, and the quantity of imported fill stated is the current estimate. In the final design and construction, the earthworks balance could improve. If additional materials are required, they would be sourced locally. Geotechnical investigations undertaken since EIS exhibition (refer to Chapter 6 of this Submissions Report) would be used to confirm the extent of soft soils and high water tables, to enable design and construction of stable embankments.

4.10.3 Ancillary Works and Facilities

In summary, the respondents to the EIS raised the following issues:

- Contaminated run-off from concrete batching sites has the potential to adversely affect receiving waters. It is recommended that the detailed design of any concrete batching plant incorporate a segregation of the site into 'clean' and 'dirty' areas. The 'dirty' area is that area of the site in which any runoff may be contaminated by cement material or other chemicals and should be as small as possible and all runoff from this area collected for reuse. The 'clean' area is the remainder of the site and may contribute sediment to any runoff from the site which should be collected and treated prior to discharge. Furthermore, it is critical that facilities such as concrete batching plants, chemical storage facilities and site compounds are located in areas away from watercourses and where they would have minimal impact on the environment including flora, fauna and cultural heritage sites.
- Procedures need to be formed as part of the contract to ensure that the selection of ancillary facility locations is determined in consultation with relevant government agencies.
- All fuels and chemicals are to be stored in appropriately bunded areas to prevent soil, water and groundwater contamination. It should also be ensured that incompatible chemicals are segregated. Bunded areas must be constructed in accordance with the EPA's Technical Bulletin '*Bunding and Spill Management, November 1997*, or to the satisfaction of the DEC. An Emergency Management Plan should be established to deal with chemical spills and should address, but not be limited to, appropriate emergency response training, stocking, maintenance and use of spill kits, storage and disposal of contaminated material and emergency telephone numbers.

Submission Numbers:
52

Response:
The recommendation to design concrete batching plants to incorporate segregation of the site into 'clean' and 'dirty' areas is acknowledged. As discussed in Section 7.11 of Technical Paper 2, batch plant design would depend on the final design elements of the Proposal. Section 7.2.7 of the EIS Main Volume outlines a number of criteria for selecting auxiliary construction facilities including batch plants. The EIS nominates potential sites for batching plants as those that essentially minimise environmental risk, are in previously disturbed areas, and are remote from conservation areas with minimum setbacks from water courses. Furthermore the location of these ancillary facilities would be undertaken in consultation with relevant government agencies.

Once determined, these locations would be outlined within the Construction Environmental Management Plan with approval of final locations and environmental management of these forming part of the overall approval process for the Construction Environmental Management Plan.

All relevant environmental management guidelines and procedures necessary to develop the Construction Environmental Management Plan and supplementary environmental management plans would be sourced and the reference to the EPA's Technical Bulletin '*Bunding and Spill Management, November 1997* is acknowledged. Consultation with the relevant government agencies would ensure that all relevant documents are utilised.

Outlined in Section 18.2.3 of the EIS Main Volume, emergency response procedures for mitigating environmental damage is a requirement of the Construction Environmental Management Plan. Table 18.1 within the EIS summarises mitigation measures and management controls. The issues highlighted regarding the Emergency Management Plan would are broadly addressed within this section and would be included within the Construction Environmental Management Plan.

4.10.4 Timing

In summary, the respondents to the EIS raised the following issues:

- There is concern over the length of time to construct the Bypass and that the works should be completed as soon as possible.

Submission Numbers:
10, 12, 13, 14, 15, 31, 49, 85

Response:
As described in Section 7.2.2 of the EIS Main Volume, an accurate indication of the time frame to construct the Bypass is dependent on the detailed design phase of the Proposal. If approval for the Proposal is obtained it is proposed to commence works shortly after.

4.11 Operations

4.11.1 Existing Highway

In summary, the respondents to the EIS raised the following issues:

- After construction of the Bypass the existing Highway through Tugun should be closed and the two outside roads increased to two lanes in each direction.
- The existing Highway should be upgraded as soon as possible even if the Bypass is constructed as more than 70,000 vehicles use this route per day.
- The Bypass would result in the Tweed Bypass becoming ineffective and would therefore lead to its reclassification as an arterial road.

Submission Numbers:
5, 62, 72

Response:
There are a number of long-term opportunities being considered for southern Gold Coast which have been discussed within planning documents such as the S*outh East Queensland Infrastructure Plan and Program 2005 – 2026*. For example, a consequent reduction in traffic on the Gold Coast Highway due to the Bypass would allow for the corridor space on the Gold Coast Highway to be used for dedicated public transport facilities such as bus lanes or light rail. The Queensland Government has committed funding to further investigate this and a number of other transport infrastructure options within the region as part of the larger South East Queensland Regional Plan to manage growth in the region over the next 20 years.

Upgrading of the existing Highway corridor before the Bypass is constructed is not proposed, in light of the significant reductions which would occur immediately after the Bypass is opened.

The existing Highway corridor (Gold Coast Highway and the northern end of the Tweed Heads Bypass) would still be an effective and important part of the arterial road network.

4.11.2 Maintenance

In summary, the respondents to the EIS raised the following issues:

- The maintenance costs for the tunnel could exceed the $1M estimated in the EIS due to the many environmental concerns. It has been reported that maintenance costs on a similar existing tunnel on General Holmes Drive in Sydney cost in excess of $3M per year.
- The CityLink tunnel in Melbourne has experienced problems with water leaking into the tunnel from the Yarra River. The problem has required the injection of up to 450,000L per day of water into the watertable and the establishment of a water treatment plant. Is there a contingency plan if this should happen on the Bypass? Who would pay ongoing maintenance costs? What effect would a similar situation have on Hinze Dam? The costs and potential risks should be presented to the public so that a more informed decision can be made.
- The costs for maintenance of the tunnel would be provided by NSW. Would Queensland, the Commonwealth or Gold Coast Airport Limited share the operating and maintenance costs?
- Maintenance costs for the Proposal would be much higher than that for an upgraded Gold Coast Highway. While maintenance costs for a six lane Gold Coast Highway are not known, it is believed that maintenance costs would increase insignificantly as little additional electricity, communications, environmental monitoring or any groundwater pumping would be required.
- The cost to NSW of ongoing maintenance for the Proposal's infrastructure requires analysis beyond the scope of the EIS.
- No maintenance figures are given for sedimentation traps, groundwater monitoring, landscaping maintenance, management of compensatory habitat, water quality monitoring and flora and fauna mitigation measures. There is concern that after 10 years, ongoing maintenance costs would then be the responsibility of NSW.
- The maintenance of dealing with acid sulphate soils and a high watertable would result in considerable costs for the life of the Proposal which are estimated at $2-4M per year.

Submission Numbers:
9, 31, 40, 57, 62, 66, 71, 72, 74, 76, 80

Response:
Tunnel maintenance costs depend on the type and length of tunnel, as do operational costs such as lighting and traffic management. A wide range of costs can occur depending which costs are included. Total maintenance and operational costs for this Proposal are expected to be approximately $2M per year as stated in Section 19.2.3 of the EIS. Additionally, as maintenance costs are included in the total Proposal cost, they are considered as part of the cost-benefit analysis and this analysis showed that the benefits resulting from the Proposal outweigh the cost (refer to Section 19.3 of the EIS).

The concerns over groundwater leaking into the tunnel are noted. The tunnel design is well proven for water-charged alluvial ground conditions such as those found at Tugun, and particular care would be taken in determining final design and construction details to avoid serious leakage problems. As a result, it is not anticipated that there would be any regional effects such as impacts on the Hinze Dam.

Cost responsibilities for operating and maintaining the tunnel for the first 10 years after opening would be borne by QDMR at which time the responsibility would pass to the RTA. Maintenance costs of $0.5M per year (refer to Section 19.2.3 of the EIS) are considered reasonable in the context of an overall economic assessment of the Proposal. Similarly, tunnel operating and maintenance costs of $1.5M (refer to Section 19.2.3 of the EIS) are considered to be reasonable. Acid sulphate soil, corrosion and buoyancy problems would be resolved with appropriate design and construction measures.

The section of the Bypass within NSW, plus the area of compensatory habitat, would be managed by appropriate NSW government agencies, in accordance with responsibilities applying to all other sections of the upgraded Pacific Highway. Commonwealth legislation and responsibilities would also apply as required for the Proposal.

4.11.3 Traffic Management

In summary, the respondents to the EIS raised the following issues:

- Operation of the Proposal would not ease traffic congestion. The 'Tugun bottleneck' would be moved 6km south and 70% of traffic would continue to use the existing Highway. The amount of on and off ramps at the Kennedy Drive interchange would further result in traffic congestion.
- Heavy vehicles should be discouraged from using the Tugun Bypass route, especially during daylight hours.
- The Tugun Bypass would restrict the east, north or south movement of traffic from the Cobaki Lakes development. Traffic would travel via Boyd Street and through Tugun.
- The Proposal retains all road freight vehicles through neighbouring suburbs. Requests from the public that heavy vehicles be banned from travelling through Gold Coast City to Brisbane have not been addressed and this would not be improved by the Proposal.

Submission Numbers:
3, 31, 51, 60, 62, 67, 74

Response:
Additional traffic capacity provided by this Proposal would benefit the Tugun area. Adjacent increases in congestion would not occur due to the Bypass, rather it would occur over time due to progressive traffic growth. Specific elements of the Proposal have been designed to accommodate future growth. Adjoining sections of the existing Highway have much higher capacities than the existing Tugun section, and would be subject to separate planning to upgrade further when warranted.

It is not possible to restrict heavy vehicles from using the Bypass nor is it feasible to ban heavy vehicles travelling through the Gold Coast to Brisbane. Both the proposed Bypass and existing Pacific Motorway and Gold Coast Highway form key parts of the National freight and passenger arteries.

During construction of the Tugun Bypass, access to the Cobaki Lakes Development would be possible via Piggabeen Road or Boyd Street. During operation access would be via an overpass bridge at Boyd Street if required and approved.

4.11.4 Hazards and Risks

In summary, the respondents to the EIS raised the following issues:

- The development underway at the Port of Brisbane is likely to increase heavy vehicles travelling south and result in exponential growth in road transport. The size of heavy vehicles would create hazard for road users who would use the Bypass for local journeys.
- The banning of all dangerous goods from the tunnel is understandable but unnecessary, however if it is not policed there is potential that it could result in a future hazard.

- Section 5.4 of the EIS indicates salinity occurring as water levels are within 3m of ground level. Concrete structures would therefore be at risk of deterioration and metal components at risk of corrosion.
- In Technical Paper 6, bore wells E1 and E3 have no data and E2 exceeds all ANZECC guidelines. Any tunnel constructed in this area should be considered unsafe for road users.
- The fragmentation of bushland surrounding the Bypass would lead to impacts on the remaining bushland through increased fire frequency.
- There is concern that the increasing priority of road development is resulting in the continuation of motor vehicle accidents and fatalities.
- The 6-lane Bypass, curved at each end of the tunnel could be the scenario for a serious crash scene. The sudden stopping of a vehicle for any reason would only allow a following vehicle seconds to avoid collision.
- There is concern that the road at the southern end of the Airport is in the 2-4m OLS.

Submission Numbers:
3, 9, 25, 62, 63, 71, 72, 79

Response:
The Integrated Regional Transport Plan for South East Queensland aims to integrate planning for public transport, freight and general vehicular traffic in order to balance future needs. The Bypass would provide the 'missing link' in a motorway standard inter-state highway between Queensland and NSW. It would enable the separation of through and local movement functions, which would improve both the safety and efficiency of traffic movements within the corridor. It would improve the travel time and safety for vehicles travelling through the corridor and would result in the removal of the majority of freight movements from the existing Gold Coast Highway. This would enable the Gold Coast Highway to successfully perform its local access and distribution functions with improved conditions for all road users, including pedestrians and cyclists. It would also improve the overall amenity of the coastal area along the Gold Coast Highway by the shift in through traffic to the Bypass.

The transport of certain classes of dangerous goods (explosives and compressed and liquefied gases) through the tunnel pose the greatest risk of major structural damage and the risk of extended disruptions to both highway and air traffic. It is therefore proposed that vehicles carrying these goods are banned from using the Bypass. Other classes of dangerous goods are proposed to be allowed to travel through the tunnel and remain on the Bypass. The removal of other classes of dangerous goods from the existing Highway through Tugun would result in a substantial reduction in the risk for the community living adjacent to that route. The policing concerns in diverting selected banned dangerous goods from the tunnel are noted.

Structures would be designed to be appropriate to local soil and water conditions to resist corrosion.

Water quality results in bores away from landfill areas show high nutrient levels. Given the depositional history of this environment these results are to be expected. Similarly, the potential groundwater contaminants in the material in the vicinity of the road tunnel include high acidity (low pH levels), elevated nutrient (nitrogen and phosphorus) levels, and elevated iron and zinc levels. Although the soils were not tested for contaminants, the results of the site inspection, land use analysis and groundwater testing concluded that the soils are characteristic for the area and not likely to be contaminated. Naturally occurring acid sulphate soils produce naturally occurring acid groundwater with the potential to carry elevated metal concentrations compared to the ANZECC 2000 default criteria.

There is no data for bore wells E1 and E3. During the preparation of the Submissions Report, additional geotechnical, contaminated land, and groundwater investigations were undertaken in the vicinity of the tunnel to provide additional information to help describe the physical environment in this area and develop appropriate mitigation measures for pre construction, construction and operational phases of the Proposal (refer to Chapter 6 and Appendix L of this Submissions Report). Additional monitoring wells have been constructed in locations upstream and downstream of the tunnel excavation area to report on changes in groundwater levels and to monitor contaminants.

In areas such as the patch of NSW Crown Land supporting the Cobaki Long-nosed Potoroo population, a fire management plan would be developed and would include a mosaic of 'patch' burning to manage habitat.

The Proposal would improve safety for vehicles travelling through the corridor and would result in the removal of the majority of freight movements from the existing Gold Coast Highway, enabling the Gold Coast Highway to perform its local access and distribution functions with improved conditions for all road users, including pedestrians and cyclists.

The tunnel alignment is straight for the majority of its length, with curvature at each end of the open ramp sections. The closed section of tunnel where fire and entrapment are of concern is relatively short in length (up to 400 metres). The design speed is 100 km/h with sight distances in accordance with current design standards. An advanced electronic warning sign would be designed in association with the overall tunnel management system (refer to Section 2.4.5 of Technical Paper 2). Additionally, tunnel levels have been designed to comply with the requirement to be beneath the OLS and would also be underneath the approved runway extension.

4.12 Community Impacts

4.12.1 Social and Amenity

In summary, respondents to the EIS raised the following issues:

- If access to the Tugun Bypass / existing Highway becomes complicated or arduous local residents would be disadvantaged and suffer a loss of amenity.
- There would be a loss of natural amenity and overall aesthetic appeal of the local area during and after construction. Impacts upon the amenity of many residents, including residents of the Tugun area and south Tweed area, together with the John Flynn Hospital and Medical Centre would occur.
- As a result of the traffic congestion at Sextons Hill, residents of Banora Point are suffering from noise and exhaust pollution, which would only increase if a potential warehouse development of Airport land and the Tugun Bypass proceeds.
- As a result of the construction of the Bypass, there could be impacts to the Cobaki Lakes and Terranora Broadwater which would result in swimming being discouraged and tourist boats ceasing operation.
- There are concerns about the loss of previous public space and recreation areas within the Tweed Heads / Banora Point area and the future impacts on Reserve 53690 as a result of the Tugun Bypass. With regards to the Reserve, there is no comparable public passive recreation area of such variety, abundance and interest in flora and fauna available in the Tweed Heads / Banora Point area.
- The Bypass would be in opposition to the Plan of Management Vision for Reserve 53960. The Reserve caters for a range of uses, including the Pony Club, however no

compensation has been proposed to make up for the loss to the community or where activities currently undertaken on the Reserve could be relocated to.

- There is concern that the Tweed Bypass already separates and isolates communities to the west from amenity areas to the east. The Tugun Bypass would compound this issue with NSW residents being faced with more severance of community links and no benefit to any NSW social amenity.
- Over thirty families from the Tweed Heads area would be displaced from their rental accommodation housing as a result of property acquisition by QDMR for the Proposal.
- The addition of bridges and slip roads, above grade pedestrian paths, other concrete structures and lack of at grade pedestrian cycleways are an unacceptable impact on the residents of the Tweed Heads area.
- The lifestyle of the residents of NSW, west Tugun and Currumbin would be severely compromised as a result of the Tugun Bypass. Those that do not have any existing traffic problems would find that the Proposal would generate 24-hour noise and vibration impacts, air pollution, rubbish, night lights and visual pollution caused by the installation of noise barriers. Residents of NSW would be additionally subject to increased noise from interstate heavy vehicles particularly at Sextons Hill.
- The years of delays in remediation of the current traffic situation by improved public transport and an upgrade of the existing Highway has cost the community in economic, social and environmental terms.
- Local and interstate businesses have suffered over many years as a result of the refusal to provide signalised intersections at Tugun and improve their operation.
- No effort has been made to quantify the cost of impairment to the health of residents that would have to live beside the Bypass and tolerate constant noise, vibration and air pollution with no relief. For the residents of west Tugun, Currumbin, West and South Tweed and Banora Point this would be a new health hazard and one which is entirely avoidable.
- The EIS fails to provide any certainty of processes during or after construction and does not assess the economic and social values of the Cobaki wetlands. Degradation of this area would impact on a far reaching area of the Tweed River and surrounding region and would include recreational and commercial fisheries, tourism, health and education.
- There would be no relief to the Tweed residents who would be displaced from their residences or who would lose their businesses or who would suffer from the increased traffic congestion as a result of the Tugun Bypass.

Submission Number:
3, 31, 38, 57, 62, 67, 74, 79, 86

Response:
Access would be maintained during construction of the Tugun Bypass. Additionally, the Proposal would not adversely impact on cyclist or pedestrian movements generally and would improve access for those users between West Tweed Heads and Bilinga by provision of dedicated paths for these movements. It is not anticipated that the Proposal would sever any existing connections used by communities in NSW

Impacts on the natural amenity and aesthetic appeal of the area may occur during construction, however there would be little disruption to the local road network during this period as the construction of the Bypass would not require reconstruction of the Gold Coast Highway. Once the Proposal is operational the landscaping would screen large areas of the road from public view and soften those features that remained exposed.

The development of the Airport land has been considered as a cumulative impact.

The mitigation measures proposed are aimed at retaining current water quality within the Cobaki Broadwater. It is unlikely that the Bypass would be visible from the Cobaki Broadwater due to the intervening vegetation along the waters edge. The interchange may be visible in the distance, but this is not expected to affect the quality of the Cobaki Broadwater.

Environmental and Airport operational matters have constrained alignment options through Reserve No. 59360 (Lot 319). Approximately 5.2 hectares from a total area of 38.1 hectares would be required for the purpose of the Bypass within this Reserve. This is considered consistent with the license and Plan of Management for this area. Access to each residual lot would remain upon construction of the Bypass.

The Plan of Management for the Reserve recognises that part of the property would be required for the Proposal. Discussions with Pony Club Representatives have been commenced to identify mitigation measures for the impacts of the Bypass.

The only residential properties required for the Bypass construction are two blocks of units (totalling 11 units) located in Honeysuckle and Banksia Streets, West Tweed Heads. These units have been owned by QDMR for several years. Unit residents are being kept informed of the Proposal's developments, and at least 60 days notice to vacate would be provided, as required by the NSW *Residential Tenancy Act 1987*.

Traffic noise and air quality in West and South Tweed Heads and Banora Point / Sextons Hill is not expected to be affected by the Tugun Bypass as traffic volumes and conditions in these areas are not predicted to change as a result of the Bypass.

The Proposal provides opportunities for future public transport improvements both along the existing Highway, where bus, cyclist and pedestrian improvements can be made, and alongside the Bypass where a rail extension has been allowed for. The concerns regarding the cost to the community in economic, social and environmental terms as a result of delays is noted.

Traffic modelling predicts a 55 percent reduction in vehicle movements along the Gold Coast Highway when the Bypass is operational. This situation would subsequently permit longer phasing of turn movements at existing intersections along Gold Coast Highway. As a separate project QDMR is also investigating short-term options to help alleviate traffic congestion along the Gold Coast Highway at Tugun. Options currently being considered are phased pedestrian movements across dual carriageways and modifications to existing turn movements.

Assessment of noise, vibration and air pollution has been undertaken for the Bypass and is described in Sections 9 and 14 of the EIS. Management measures are subsequently proposed where potential impacts are indicated and are of significance. This process is believed to have satisfied the guidelines for the preparation of the Tugun Bypass EIS.

The alignment of the Bypass has been designed to avoid the Cobaki Broadwater and surrounding wetlands. Impact assessment indicates that the Bypass would not significantly affect the long-term water quality of the Cobaki Broadwater. However impacts (direct and indirect) on small areas of wetland are indicated. Mitigation and compensation is subsequently proposed in Sections 8 and 10 of the EIS. This process is believed to have satisfied the guidelines for the preparation of the Tugun Bypass EIS.

The only business premises directly affected by the Tweed Heads Bypass are Boyds Garden World and a sandblasting business. The sandblasting business has already been compensated

and agreement has been reached with Boyds Garden World on compensation for land required for the Bypass. As discussed in Technical Paper 3, it is difficult to quantify the number of new trips expected as a result of the Tugun Bypass. However, the number is expected to be very small and there would not be a noticeable increase in traffic for the Tweed Heads area as a result of the Tugun Bypass.

4.12.2 Hazards and Risks

In summary, respondents to the EIS raised the following issue:

- The construction of the tunnel would mean that dangerous and explosive goods would continue to be freighted via the Gold Coast and Pacific Highways and would therefore travel through the commercial and residential areas of Tugun, Bilinga, North Kirra and Banora Point.

Submission Numbers:
7, 9, 10, 62, 74

Response:
Class 1 and 2.1 dangerous goods would still be transported along the existing Highway. The risk assessment for transport of hazardous goods concluded that the overall risk in terms of fatalities per year would be lowest if Class 1 and 2.1 dangerous goods were banned from using the tunnel. Overall risk along the current route would be significantly reduced with provision of the Bypass route which would be used by the majority of carriers of lower class dangerous goods. This risk analysis found that dangerous goods accidents are expected to increase by 50 per cent between 2002 and 2017 if the Bypass is not built.

4.12.3 Local Traffic

In summary, respondents to the EIS raised the following issues:

- If access to the Tugun Bypass / existing Highway becomes complicated or arduous local residents would be disadvantaged when travelling within the region.
- The Bypass would result in the existing traffic problems being shifted from the Tugun area further south into the Tweed area. Traffic congestion would occur at the off road into Kennedy Drive, which would impact on local traffic, because it is far less accommodating than the Gold Coast Highway between Tugun and the start of the Coolangatta / Tweed Heads Bypass.
- The Bypass would do nothing to alleviate the Sextons Hill Black Spot / bottleneck, or to relieve the mounting traffic congestion for Banora Point.
- During the construction of the Bypass there would be further traffic congestion which would spread through the existing road network with gridlock during many peak hours. The present traffic flow in the Tugun area is heavy for a residential suburb particularly on public holidays and weekends and especially on Sunday afternoons.
- Traffic flow generated by the Cobaki-Terranora development should not impact on Tugun as a result of the only access to the Tugun Bypass being via Stewart Road.
- The existing intersection near 500 Coolangatta Road has been made even more dangerous for traffic as it is a comparatively sharp turn after travelling at speeds of 100 - 110km/hr with no traffic lights or intersections.
- Local traffic, specifically traffic from the Cobaki Lakes Development should be considered, knowing that the Tugun Bypass should not be used for local traffic. If access is allowed for local purposes, for example, the Cobaki Lakes Development, the Bypass would be seen as a road designed for residential, industrial and Airport development. Additionally local traffic would reduce the purpose and time efficiency of the Bypass.

Submission Numbers:
3, 13, 31, 37, 40, 50, 60, 62, 68, 71, 72, 79, 85

Response:
The main objective of the Bypass is to separate through traffic and local traffic. It is considered that the local traffic would continue to use the Gold Coast Highway or the Tweed Heads Bypass.

As discussed in Technical Paper 3, it is difficult to quantify the number of new trips expected as a result of the Tugun Bypass. However, the number is expected to be very small and there would not be a noticeable increase in traffic on the Tweed Heads Bypass. The other consideration is the impact that removal of the blockage at Tugun may have on downstream traffic. It is not expected that this would adversely impact on conditions at Kennedy Drive or at Sextons Hill as traffic would arrive at these locations at a more uniform rate than at present where traffic signals group vehicles into 'platoons'. Improvement to traffic flows around Banora Point and Sextons Hill is subject to a separate assessment currently being conducted by the RTA.

There would be little effect on the existing local road network during construction as the Bypass construction does not require the reconstruction of the existing Gold Coast Highway. There would be no impact at the Stewart Road end of the Proposal and minimal impact at the southern end at Kennedy Drive. When reconstruction of the existing roads is required such as on the Tweed Heads Bypass, the Proposal would provide four lanes and geometry for 80km/h to minimise delays and congestion. Congestion on weekends and public holidays in the Tugun residential area would improve with the Bypass in place as it would remove interstate traffic from the local trips.

Access to the Cobaki-Terranora developments is unchanged with the Tugun Bypass constructed. Access before and after would still be via Boyd Street, the Gold Coast Highway and Stewart Road. An interchange at Boyd Street to connect to the Bypass is not part of this Proposal. Additionally, the matters of future development in the Tweed Heads area and impacts on Kennedy Drive as a result of this are the responsibility of Tweed Shire Council.

The existing intersection near Coolangatta road would remain unchanged after the construction of the Bypass. The existing 100km/h speed limit for the Tweed Heads Bypass would also be reduced to about 80km/h. The Bypass is designed as the high speed route with the relevant sight distances and safety curvatures incorporated in the design.

4.12.4 Landuse and Property

In summary, respondents to the EIS raised the following issues:

- The Crown Land in NSW is not vacant and should not be listed as such in the EIS.
- In reference to Figure 4.1 in the SIS Volume 1, the existing industrial landuse on the edge of the wetlands, between open space and recreation is inappropriate. This land was proposed for industrial use dependent on the Proposal and not the existing land use.
- The sales of the lots at the Cobaki Lakes development are likely to decline due to noise pollution from the operation of the Bypass.
- There is concern over the width of the property access bridge. The property owner is entitled access to the same extent as the existing access and should this not be provided, damages for any diminution in the value of the property resulting from any alteration or restriction placed upon the access could be sought. The provision of a

two-way access would be in accordance with the potential for a future re-zoning of the property to be consistent with the Council's Planning Scheme.

- The access bridge would give greater public exposure and reduced privacy to the property it would provide access for.
- The Proposal facilitates the runway extension at the Gold Coast Airport and would remove the buffer zone between residents and the runway extension which would result in the buffer being used for heavy industrial uses. Should the Proposal proceed there would be an industrialisation of approximately 80ha of land including 37.43ha of public space and recreational grounds.
- There is concern that the Proposal would require the relinquishment of public open space leased by the Pony Club. There are no compensatory lands being provided for the loss of recreational area and there is no possibility of the Pony Club being able to relocate within the Tweed Heads area. It would be in the community interest to allow the members of the Pony Club to continue with the stewardship of the Reserve.
- The Proposal would impact on Commonwealth National Estate Lands as a result of moving the alignment further west as previously planned which would also maximise the development area of the Gold Coast Airport's western enterprise precinct.
- Approval has been given by Tweed Shire Council for a 940 unit resort at Cobaki Lakes. The EIS placed on public exhibition breaches the current arrangement between Tweed Shire Council and the proponents of the Cobaki Lakes development. This would result in severe financial loss currently estimated at $230 million. The development approval permits development up to the completion of Stage 3 with traffic accessing the resort from Marana Street, Bilambil Heights. Stages 4 to 9 of the resort project cannot be commenced until the construction of the Cobaki Parkway and its connection to Boyd Street and the Pacific Highway. The Proponent is prepared to pursue whatever course of action required to recover costs should the connection not be built.
- The Gold Coast City Council has financial interest in the Proposal when considering the future disposal or ongoing use of the Gold Coast City Councils refuse site, which could be developed in the future along with other land held by GCAL and Tweed Shire Council. Tweed Shire Council is also interested in disposing of Crown Land Reserve 59360, West Tweed Sewage Treatment Works and ten other private parcels of land within and adjacent to the Proposal site.
- Residents of West Tugun and Currumbin Waters would suffer a reduction in the value of their homes with the construction of the Tugun Bypass. Residents could not have adequately planned for this because of the uncertainty of the proposed route for many years.

Submission Numbers:
25, 31, 38, 54, 62, 64, 71, 72, 74, 79

Response:
The Crown Land in NSW is predominantly vacant with respect to buildings and development. The Tweed Heads Pony and Hack Club have licensed use of Crown Land impacted by the Bypass, but its licence recognises that an area of the reserve may be required for the construction of the Bypass. The Pony Club license over lot 319 excludes the area required for the construction of the Bypass when it is required. No compensatory land is required under the current licence. The Pony Club can continue to operate on the grounds during and after the construction of the Bypass works. About 1.6ha of land are required for the Proposal from around 16ha the Pony Club currently uses.

Section 3.3.4 of Technical Paper 15 describes future land use planning in the Tweed / Gold Coast region. Studies commissioned by Tweed Shire Council have identified land surrounding Gold Coast Airport and Cobaki Broadwater as possible areas for future

industrial purposes. Any subsequent approvals would be the responsibility of Tweed Shire Council and are beyond the scope of this EIS.

The Cobaki Lakes development is located on Boyd Street west of the Bypass alignment. Parts of this development have received development consent, and so DEC and RTA criteria for existing residences are applicable to assessment of traffic noise and mitigation (refer to Section 7.2.2 of Technical Paper 10). Preliminary noise assessment predicts noise levels are within DEC Environmental Criteria for Road Traffic Noise (ECRTN) , however mitigation measures would be provided if ECRTN criteria noise levels are exceeded for developments approved prior to Tugun Bypass approval..

The current access to the two properties on the western side of the alignment is a single lane access track that has been sealed, therefore a single lane bridge only is required to service the existing uses (private residence) of both properties. A two lane bridge would be considered by QDMR only if the current owners demonstrated that a future use required two lanes, and they contributed to the cost. Technical Paper 13 provides an assessment of the visual impact of the Proposal including the property access bridge and includes measures to reduce the adverse impacts.

Heavy industrial uses within the described area of the Gold Coast Airport would be unlikely given that the area represents the southern approach and take-off path for the Airport. It should also be noted that the Bypass neither facilitates nor prevents a future runway extension.

The Proposal would impact (although not significantly) on the edge of an area known to be an indicative place listed on the Register of the National Estate. The Proposal would require about 1200m^2 of disturbed land at the edge. The preferred alignment is a combination of previous options that maximises available developable areas and minimises any direct effects on environmentally sensitive areas.

The development of the resort at Cobaki Lakes is subject to ongoing discussions with Tweed Shire Council and other interested parties.

Gold Coast City Council have agreed to QDMR using part of the landfill for the Bypass. They have also agreed to relocate landfill material from the area required to elsewhere on the landfill. Gold Coast City Council have also offered for QDMR to use the balance of the landfill site during construction for construction compounds and other activities. Gold Coast City Council have indicated they may close the landfill once construction of the Bypass has been completed. The comments regarding Tweed Shire Council and possible land sales are noted but are beyond the scope of this Report.

The Proposal has been the subject of community consultation for several years, including during the environmental impact assessment process for the northern section of the route in late 2002. The value of residential properties would be determined by many factors, with construction of the Bypass possibly being one of those influences. Values may increase after the construction of the Bypass.

4.13 Pedestrian and Cyclist Access

4.13.1 Design

In summary, the respondents to the EIS raised the following issues:

- To improve access to cyclists, pedestrians and the disabled, along the route it is recommended that further consideration be given a number of east-west and north-south accesses in conjunction with improved safety measures and signage.
- A pathway should be developed into the Currumbin Waters area from the junction of the old Pacific Highway and the Tugun Bypass. The development of a pathway would allow people to travel to Palm Beach, and Currumbin High School by bicycle and / or the beach without needing to travel along Currumbin Creek Road.
- There is an existing underpass on the Pacific Highway near Hillcrest Avenue that links Currumbin with Tugun Heights. This underpass is linked to a pathway from Mitchell Avenue and enables bushwalkers to move from the east across the Pacific Highway and into the Tugun Heights Conservation Park. Walkers currently traverse through the Conservation Park and through to the Border Ranges. To prevent a loss of access, the pathway could be extended around the Conservation Park from the Pacific Highway to Tugun Bypass. The pathway then could utilise the proposed overbridge to provide links to other pathways into the Currumbin Waters precinct as well as to the Border Ranges and the Cobaki residential development.
- A pedestrian underpass under the proposed Tugun Bypass at or near Mirreen Drive, Tugun should be included. The tract of land at the end of Mirreen Drive would allow for this track to pass under the Bypass, which would assist in the free movement pedestrians.

Submission Numbers:
2, 6, 22

Response:
The comments regarding the further consideration of east-west and north-south accesses in conjunction with improved safety measures and signage are noted. While a number of recommendations suggested apply to areas remote from the Bypass and are generally outside the scope of this Proposal, the suggestions could be considered by Gold Coast City Council in conjunction with the opening of the Bypass and consequent traffic reductions along the coastal strip.

The requested cycle path connection into the Currumbin Waters area is outside the scope of this Proposal, however the recently constructed underpass enhances opportunities for future connections.

The suggestion to utilise the existing underpass on the Pacific Highway near Hillcrest Avenue that links Currumbin with Tugun Heights is beyond the scope of the Proposal. Additionally, it is considered that this would impact on the fauna movement corridor protected by Gold Coast City Council.

Pedestrian access could be provided from Mirreen Drive under the Bypass bridges over Hidden Valley. A potential shared path (cycle and pedestrian) is shown in this location in Figure 4.8 of Technical Paper 3. However given the high environmental values associated with Hidden Valley it may be preferable to minimise disturbance in this area.

4.13.2 Operation

In summary, the respondents to the EIS raised the following issues:

- Cyclists should be permitted on Tugun Bypass as they would experience benefits similar to that of motorists. The potential dangers of mixing cyclists with 100km/h motor traffic is appreciated, however the 2.5m shoulders throughout the length of the Bypass should not present any safety issues.

- Tugun Bypass would form a barrier to cyclists, pedestrians and the disabled. The crossing points at the Tweed Heads Bypass interchange in the south and Stewart Road interchange in the north would be inadequate at ensuring local accessibility is maintained or enhanced.
- The needs of people who currently trail-walk through the proposed location of the Tugun Bypass should be accommodated. Gold Coast City Council has published texts with a route that traverses the location of the Bypass and appears as an established nature walk. The completion of the Bypass would serve as a major barrier to this walk.
- Tugun Bypass would impact on members of the Pony Club who currently have existing pedestrian and cyclist access to Reserve 59360.

Submission Numbers:
1, 2, 6, 62

Response:
Cyclists are not permitted on motorways in Queensland and there are no opportunities to exit the Bypass in NSW. High standard cycling alternatives are available along the coastal corridor. Connections at the interchanges at each end of the Bypass are proposed that would allow cyclist to continue to access these high standard cycleways (refer Figure 4.8 of Technical Paper 3). The use of some of the Bypass is considered impractical in this context. Further discussion of cycling options is provided in Section 4.4 of Technical Paper 3.

Pedestrian and cycle crossings would be provided across the Bypass at both interchanges mentioned by the respondents. They would be signalised crossings to ensure safety for all users. Figure 4.8 of Technical Paper 3 shows details of the proposed cyclist and pedestrian routes to cross the Bypass.

Nature walks crossing northern parts of the Bypass could remain connected at bridge crossing locations. These can be further detailed at the detailed design stage, in conjunction with Gold Coast City Council. Nature walks in areas adjacent to southern parts of the Bypass would require consultation with GCAL, Tweed Shire Council and other NSW agencies to determine if any routes could be developed and formalised. This consultation by the Proponents would take place during the detailed design phase.

Pedestrian and cycle access for Pony Club members to Reserve 59360 would be improved by service road and interchange provisions. Figure 4.8 of Technical Paper 3 shows these routes.

4.14 Consultation

4.14.1 Consultation Process

In summary, the respondents to the EIS raised the following issues:

- Despite community consultation, the Queensland Government had already resolved the Bypass route and has not been willing or able to consider alternative options. Community views and Proposals are not being considered; rather it is a formality informing the community of what is planned. This attitude is affecting the effectiveness of the consultation process.
- Under the *Public Consultation Policy Standards and Guidelines* (QDMR 1999), all consultation needs to be recorded and made available to stakeholders and individuals are not to be named without their permission.

- The State and Federal response to the Tugun Bypass is inefficient, highlighted by the fact there is another call for public opinion.
- Important information is not available to the public. The decision to reject the Boyd Street Interchange was developed through the consultative process but then eliminated in secrecy. This was either an oversight or deliberate act potentially breaching the rules pertaining to official misconduct, particularly in relation to the abuse of the consultative process.
- There is concern that insufficient time was available for the community to lodge submissions regarding the Proposal. In requesting more time to prepare EIS submissions, the respondents believe they were treated in an unsatisfactory manner by the RTA who failed to respond to their requests for an extension of time or even provide acknowledgment of the request.
- Presenting information in the Submissions Report without public comment contravenes NSW Planning Laws and constitutes a poor public consultation process. More time should have been provided for the community to lodge submissions because of this, and because additional addenda to the EIS were not received until well after the initial advertised date on 10 February 2005.
- Key aspects of the EIS for the Proposal are inadequate and require significant additional work before a final decision on the alignment of the Bypass can be made. Once this information is provided to an adequate standard, the EIS should be placed on further public exhibition for a further period of one month to allow adequate community input on the latest information available. Failing this, the current information with all relevant addendums, should be placed on public exhibition for a further month.
- Citizens have the right of appeal against development projects that have major impacts on the environment and the community in the NSW Environment Court. It is unacceptable that this right is removed for the Tugun Bypass which is considered to be damaging to the natural environment, social amenity and cultural heritage of local Aboriginal people.
- Keeping the community ignorant of the facts has been the strength of those involved in selling out the Tweed. The people of Tweed have been uninformed about increased traffic congestion at West Tweed and there has been no consultation with the community representatives since 2002.
- Public consultation has been distorted by a narrow field of reference and the attitude of a relatively small number of Tugun residents and politicians.

Submission Numbers:
3, 9, 11, 50, 55, 57, 62, 64, 73, 71, 72, 74, 79, 84

Response:
A number of possible route alignments east and west of the Gold Coast Airport were considered during the *Southern Gold Coast – Tweed Corridor Study*. Community views and issues were taken into account during the setting of Proposal objectives, the route selection process, the assessment of impacts and the refining of the engineering concept. Community views on possible route options were also obtained via numerous methods prior to the May 2004 NSW / Queensland government agreement to pursue the C4 option. Issues raised during consultation, such as environmental and technical issues, were used to refine the alignment and identify mitigation strategies.

Chapter 5 of the EIS Main Volume provides an overview of all issues raised during the various consultative processes, whilst the Technical Paper 1 summarises the findings from the various community and stakeholder forums, including the Community Focus Group, the Stage One EIA, the community and business attitude surveys and public meetings.

All submissions received during the public consultation period were summarised and responded to in this Submissions Report to be provided to approval agencies. In relation to stakeholder privacy, public materials issued during the public consultation period contained the following clause, 'All representations would be treated as public documents unless confidentiality is requested. Where the supplier indicates at the time of supply of information that it should be kept confidential, the NSW Roads and Traffic Authority and Queensland Department of Main Roads would attempt to keep it confidential but there may be legislative or legal justification for the release of the information, for example under the NSW *Freedom of Information Act 1989* and/or Queensland *Freedom of Information Act 1992* or subpoena or statutory instrument.'

The consultation referring to another call for public opinion was the display of the EIS (December 2004 – March 2005) and was required in accordance with the Federal and State statutory requirements.

The decision to remove the Boyd Street interchange from the Bypass plan was taken during the development of the Proposal. The decision was communicated in writing to the Tweed Shire Council in 2003 and the revised Proposal was publicly displayed in the EIS and comments sought in December 2004.

It was agreed that the public display period would be based on the statutory timeframe under the *Airports Act 1996* for the MDP assessment process of 90 calendar days. It is the longest of the three display periods (EP&A Act requires 30 calendar days and EPBC Act is 20 working days). Ninety days was therefore considered sufficient time for members of the public to provide submissions on the proposed project.

The display period dates were provided in newspaper advertisements, the executive summary, the fact sheets and posters and other material placed on public display. In addition the Supplementary SIS was displayed concurrently with the other documents for 30 calendar days from 13 February 2005, resulting in an extension of the display period of one month to 15 March 2005.

The RTA has no record of a direct request being made for an extension of the display period.

The additional studies currently underway are occurring, in large part, as a response to submissions received during the public consultation period. A summary of the results of these studies are provided in Chapter 6 of this Submissions Report and the full studies can be found in the Appendices.

It is unclear which aspects of the Proposal 'are inadequate and require significant additional work'. Some additional work is being undertaken, mostly in response to issues raised in submissions. The Submissions Report and EIS are to be provided to approval agencies that would incorporate the results of the current additional environmental and other studies. The planning approvals process does not require display of the Submissions Report for comment.

The concerns raised about appealing against development projects are noted. Mitigation measures to minimise adverse impacts on natural, social and cultural aspects have been proposed.

Details of all impacts on the Tweed area are included within the EIS documentation. This Proposal is not expected to increase traffic congestion in West Tweed. Key NSW stakeholders identified in the Public Consultation and Community Involvement Plan and its

successor include Tweed based elected representatives (local, state and federal), government agencies, property owners and representatives of community, indigenous, environmental and business organisations. The statement regarding consultation with community representatives presumedly relates to the Community Focus Group (CFG), which is a body of invited community and special interest groups established in 2000 to provide input and feedback to the Bypass planning process. The CFG met on six occasions between September 2000 and December 2002. The minutes of the CFG meetings show that members were able to raise and seek information on a number of issues during the initial planning phase (refer to Technical Paper 1, Appendix A - Minutes of Community Focus Group meetings).

Community consultation activities undertaken in the Tweed Shire area since 2002 have included:

- Staffed and static public displays during the Stage 1 EIS consultation (November and December 2002);
- Meetings and briefings with Tweed Shire Council and local Federal and State elected representatives;
- Discussions with property owners and residents of two unit blocks owned by Main Roads in Tweed Heads West; and
- The delivery of project newsletters to 18, 000 homes and businesses in the Tweed Shire in October 2004 and January 2005.

Specific community consultation activities undertaken in the Tweed area to coincide with the release of the EIS and related documents in December 2004 included:

- Static displays at three local libraries, the Tweed Shire Council and the RTA Motor Registry between 13 December 2004 and 15 January 2005;
- Briefings for elected local, state and federal representatives and key stakeholder representatives (including members of the previous Community Focus Group) in January / February 2005; and
- Staffed project displays at the Tweed City Shopping Centre (February 5 and 12 2005) and Tweed Shire Council Civic Centre (February 3 and 10 2005).

The Proposal's Public Consultation and Community Involvement plan, first developed in May 2000, has drawn on a wide audience catchment. Key NSW stakeholders include Tweed based elected representatives (local, state and federal), government agencies, property owners and representatives of community, indigenous, environmental and business organisations. A January 2001 survey on community attitudes to the Bypass included residents from Tweed Heads, Tweed Heads West and Tweed Heads South. A number of Tweed – based organisations had representatives on the Community Focus Group including the Bilambil Heights Progress Association, the Tweed Heads Pony and Hack Club, Caldera Environment Centre, the Tweed Heads Residents and Ratepayers Association, descendents of traditional owners and the Tweed Heads Chamber of Commerce and Industry.

Seven project newsletters have been distributed to households and businesses in the Tweed area since August 2000. The distribution area for these was extended to 18,000 homes and businesses in October 2004. Advertisements were placed in local Tweed media to alert the public to a public information meeting (August 2000); the release of Stage One of the EIA (November 2002); the release of the EIS and related documents (December 2004); and the locations of the static and staffed public displays (January 2005). Several joint Ministerial media releases have been issued to Tweed media to mark important milestones such as the release of the EIS and the start of the public consultation period.

4.15 Cumulative Impacts

4.15.1 Cumulative Impacts

In summary, the respondents to the EIS raised the following issues:

- The potential cumulative impacts of the Bypass, runway extension, railway link and the Airport development would be major. There is concern that the cumulative impacts would lead to the further degradation of the Tweed environment and, as described within the EIS, may lead to the extinction of threatened species within this environment.
- The environmental impacts of the Tugun Bypass cannot be examined in isolation of other proposed developments in the region, including the railway link, the Cobaki Lakes development, GCAL developments, and industrial developments at Tringa Street and adjacent to the Tweed Heads Sewage Treatment Plant. The EIS needs to be an adequate representation of the environmental threats of all the proposed developments and should consider them when discussing cumulative impacts:
- The future Robina to Coolangatta rail extension is proposed on an alignment immediately adjacent to the Tugun Bypass, and this rail alignment also traverses the Tugun Landfill. While the rail extension has been addressed as part of cumulative impacts, the cumulative impacts of the road and rail projects on the Tugun Landfill have not been considered even though both Proposals impact on the Tugun Landfill site.
- Although the EIS reviewed the cumulative impacts stemming from the Bypass, proposed rail corridor, and other activities, no recommendations or Proposals were presented to mitigate them. However, some of the impacts associated with nearby developments have been addressed as part of the compensatory habitat package.
- Cumulative impacts on land within Gold Coast Airport which require action under the 'controlled action process' of EPBC Act include, the railway link, the Bypass, the runway extension to 2858m and the proposed 'Enterprise Park' development.
- It is encouraging to note in the assessments that the impacts of other projects, either simultaneous or facilitated at some future time by construction of the Tugun Bypass are acknowledged.
- Cumulative impacts to matters of National Environmental Significance have not been included.

Submission Numbers:
36, 46, 59, 61, 69, 71, 72, 74, 79, 88

Response:
An assessment of cumulative impacts is presented in Chapter 17 of the EIS Main Volume. The cumulative impact assessment shows that if the Bypass were to proceed without any mitigation measures there would be significant impacts on the environmental values of the study area. A comprehensive package of mitigation measures has been developed to avoid or minimise the impacts and includes a number of commitments to work with surrounding developments to improve the management of conservation issues in the area. This includes the integration of the *Gold Coast Airport Limited Vegetation Management Plan* for the southern end of the obstacle limitation surface with vegetation management measures for the Bypass. The mitigation measures and the compensatory habitat package present an opportunity to secure the ecological values of the area by dedicating a substantial area to conservation. Monitoring of all management measures is proposed and would provide an objective assessment of effectiveness and the status of the natural environment.

The developments described within the submissions are included in the cumulative impact assessment, which is presented in Chapter 17 of the EIS. Those developments that are not

explicitly included in this chapter are not considered likely to occur within the timeframe assessed, in this case before 2017.

On the alignment proposed, construction of the Robina to Coolangatta rail extension would require the acquisition of an area of the Tugun Landfill. The construction techniques and mitigation measures identified for the Bypass would also facilitate rail extension. Mitigation measures are presented in Section 8.2.3 of the EIS.

In an attempt to provide a concise assessment of cumulative impacts, key aspects of each proposed development were discussed. Although important, the containment and/or remediation of landfill waste is not unduly complex and not anticipated to result in significant environmental effects (if appropriately conducted). Cumulative impacts of this matter were considered in the overall assessment, but in combination of the above, not detailed.

In the case of sufficient detail (such as, the Cobaki Lakes residential development, runway extension and rail tunnel), management measures are proposed. An example is the commitment to develop a Vegetation Management Plan with GCAL for the southern end of the OLS. Furthermore the Proponents are only able to make commitments relating to the Bypass and have no control over projects or proposals that are planned by others. Likewise commitments can only be made for land and property that is under control of the State governments. Where possible the Proponents have negotiated with others to achieve positive environmental outcomes for the study area.

The developments listed on land within Gold Coast Airport would require approvals under the EPBC Act and, with the exception of the extension of the runway to 2858m, were included in the assessment of cumulative impacts described in Chapter 17 of the EIS.

The concerns regarding the matters of National Environmental Significance refer to the Cobaki Broadwater and its associated wetlands. Although not currently prescribed, the importance of the Cobaki Broadwater and associated wetlands has been recognised in the EIS and mitigation measures introduced to ensure that run off from the road is treated prior to discharge to the receiving water (refer to Section 8.5.4 of the EIS).

4.16 Environmental Management

4.16.1 Approvals and Licences

In summary, the respondents to the EIS raised the following issues:

- If the transitional provisions of the Queensland *Aboriginal Cultural Heritage Act 2003* apply, any mitigation work undertaken would need to be carried out in compliance with those transitional provisions.
- A permit is not required in order to complete investigation, collection or excavation of Aboriginal cultural heritage, rather the agreement of Aboriginal parties for the area is necessary.
- In NSW all Aboriginal objects and Aboriginal places are protected under the NSW *National Parks and Wildlife Act 1974*. On completion of any test excavations the applicant would be required to submit a report to DEC in accordance with the licence presenting the findings of the investigation. The DEC would then determine whether additional licensing is required to enable the disturbance or destruction of any Aboriginal objects or archaeological deposits identified.
- The EIS and Technical Paper 5 note the low pH of groundwater in areas and that site specific criteria are preferred to DEC requirements regarding discharges. Justification, including historical water and groundwater monitoring data, would be required in

order for the DEC to consider discharge of water to waters and groundwaters that do not meet current DEC requirements.

- Liaison is required with the DEC to determine the most suitable discharge criteria from sediment basins and would need to be undertaken and incorporated into an Environmental Protection Licence.
- It is a requirement of a Section 132C licence issued under the NSW *National Parks and Wildlife Act 1974*, that details of the animals, plants or other organisms captured, observed, collected including species identification, precise locality (description and AMG/MGA coordinates or longitude/latitude) and date of trapping, observation or collection, are to be forwarded in electronic format, preferably Microsoft Excel, to the DEC.
- As required under Section 199 of the NSW *Fisheries Management Act 1994*, the NSW Minister for Primary Industries must be notified of any dredging or reclamation works such as culvert construction and waterway diversions, to be carried out within any waterway in NSW.
- Technical Paper 12 states that the removal of mangroves from the waterway at Site 7 would be kept to a minimum. However the document does not mention the need to obtain a Section 205 Permit to Harm Marine Vegetation from the NSW Department of Primary Industries if the mangroves to be cleared are in NSW.
- Under the Queensland *Nature Conservation Act 1992* a permit would be required for the vegetation clearing and/or movement of any protected wildlife. Section 89 of the Act restricts the taking from the wild of protected wildlife that is rare or threatened. The restrictions and conditions for clearing permits are described in Sections 29, 30 and 56 of the Protected Plants Conservation Plan. Additional restrictions are imposed on endangered species in Sections 12 and 13 of the Plan.
- Regarding contaminated land at the Gold Coast Airport, a number of underground storage tanks containing aviation fuel, diesel and an undescribed fuel have been identified. These notifiable activities have not been listed on the EMR and notification is required under the Queensland *Environmental Protection Act 1994*. Further investigations would need to determine the level of sampling programs required.
- Within the EIS, Table 7.1 states a need for 211,000m^3 of additional fill from sources listed in Table 7.3. ERA 20 (Extracting rock or other material) was identified, though it does not apply to convenient extraction of rock or other material as part of a cut and fill operation associated with Highway construction. Borrow pits however would require such approval and should be identified.
- All of the properties affected by notifiable activities or those affected by hazardous contaminants, including radioactive mineral sands are required to be notified and listed on the EMR. Those properties in the path of the proposed Tugun Bypass which are, or should be listed, on the EMR are required to be investigated and a Contaminated Site Investigation (CSI) Report with a clear recommendation with respect to the EMR be provided. The CSI must be prepared in accordance with the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland. A suitably qualified person is required to sign off as the investigator and report preparer for these CSI. It is recommended that a pre-lodgement meeting be arranged with the Queensland EPA.
- The EIS does not identify ERA 19 (Dredging) and ERA 59 (Asphalt Manufacturing) as ERA approvals that may be required.
- The proposed construction of the underground tunnel would require a Groundwater Licence under the NSW *Water Act 1912* (soon to be replaced by the *Water Management Act 2000*) for the dewatering and re-injection of groundwater. Prior to the issue of a Groundwater License, the proposed total volume in megalitres of groundwater to be extracted is to be determined, as well as the proposed volume of groundwater to be re-injected back into the aquifer. Furthermore, DIPNR Policy is aimed at preventing the degradation of NSW's aquifers where by, each aquifer system

is evaluated for its beneficial use. Potential developers are required to establish that their activity would not contaminate the groundwater or impact on groundwater dependent ecosystems.

- An industrial / dewatering Groundwater License for the excavation of the tunnel would be issued by DIPNR however permanent dewatering is considered to be environmentally unsustainable and as such licensing for dewatering would only be on a temporary basis for the construction purpose.
- All monitoring bores are required to be licensed under the NSW *Water Act 1912*. There is no charge to license the monitoring of bores.

Submission Numbers:
11, 52, 58, 69, 83

Response:
The transitional provisions of the Queensland *Aboriginal Cultural Heritage Act 2003* do not apply to the Tugun Bypass. A CHMP would be developed and endorsed by the Queensland government in accordance with the *Aboriginal Cultural Heritage Act 2003*. The State endorsed CHMP is required for investigations and excavations in Queensland. This cultural heritage management plan will be developed in consultation with the Traditional Owners.

In NSW, the investigation, collection or excavation of Aboriginal cultural heritage is regulated by the *National Parks and Wildlife Act 1974*. Under this act, the disturbance or destruction of Aboriginal objects or places requires approval under Section 87 and 90 respectively. The requirements of any permits or licences would be complied with. (Note: if the Proposal is approved under the provisions of the recently introduced Part 3A of the NSW Environmental Planning and Assessment Act, Section 87 and Section 90 approvals would not be required. However, the commitments included in this Submissions Report and any other requirements of the Department of Environment and Conservation that are reflected in the conditions of approval would still apply.)

Section 1.1.4, Background trends in Technical Paper 5 explains that natural acid tolerant species (the legislatively significant acid frogs) exist in this environment and thus site specific criteria are required in preference to guideline levels. Controls would be aimed at maintaining the natural pH condition for these species and their environments. Queensland EPA have indicated that they would be willing to liaise with the DEC to determine the most appropriate discharge criteria for those basins discharging to frog habitat prior to construction commencement.

The DEC would be consulted during the determination of discharge criteria for sediment basins. Direction would also be sought on the requirement for an Environmental Protection Licence.

It is understood that as a condition of the relevant scientific licence, the licence holder must provide a full report of the actual work carried out under their licence be submitted to the DEC within a specified period depending on the licence period.

The NSW Minister for Primary Industries would be notified prior to any dredging or reclamation works such as culvert construction and waterway diversions, to be carried out within any waterway in NSW.

Application for the removal of mangroves would be submitted to the NSW Department of Primary Industries prior to disturbance. This requirement would be integrated into the Construction Environmental Management Plan.

Application for the relevant permits under the Queensland *Nature Conservation Act 1992* would occur prior to disturbance. This requirement with be detailed within the Construction Environmental Management Plan.

The Airport Environment Strategy outlines the management system that exists to deal with hazardous materials and includes details on inspections, audits and investigations, together with monitoring which includes objectives and targets. Regarding notification under the Queensland *Environmental Protection Act 1994*, the area referred to is Commonwealth Land within the State of NSW. Queensland statutes do not apply.

A pre-lodgement meeting regarding the CSI would be arranged if considered necessary by the Queensland EPA.

The Proposal would not involve any dredging activities relevant under ERA 19. The Proposal would include a full-depth asphalt pavement. A total of up to 20,000 m^3 of asphalt would be required over a 12-month period, and it is most likely that on-site batch plants would be used. Consequently, ERA 59 (Asphalt manufacturing) is relevant to the Proposal and ERA approvals may be required.

Groundwater pumping and extraction tests in the tunnel location are presently underway to provide more accurate information for the detailed design phase of the Proposal. Permits for these activities were sought as part of the Additional Geotechnical Investigation Environmental Management Plan. The objective of the design criteria would be for the groundwater transfer to be a closed system and therefore negating potential impact from water chemistry changes. The respective licence(s) for construction (and operation if required) would be detailed within the Construction Environmental Management Plan.

A dewatering licence would only be required during the tunnel construction phase of the Proposal. Pumped groundwater would be re-injected to confine any drawdown (refer Technical Paper 9, Groundwater). The aims of the ground extraction and injection trials are to design an ongoing sustainable cross flow of ground water to replicate natural conditions.

4.16.2 Environmental Management Plans

In summary, the respondents to the EIS raised the following issues:

- Under the Part 7 of the Queensland *Aboriginal Cultural Heritage Act 2003*, a CHMP is required for the Proposal and the preparation of a CHMP prior to the commencement of earthworks is supported. However, it is essential that the cultural heritage values or potential to find cultural heritage within the Proposal area be determined as it would not be possible to develop the CHMP.
- The respondent requests the formation of the Environmental Review Group (ERG) immediately following approval of the Proposal to allow for the discussion of a number of issues prior to the detailed design stage. The ERG would also be able to assist in the design of appropriate mitigation measures and effective monitoring systems. It is however recommended that the ERG should comprise of the scientific community and researchers only.
- A Soil and Water Management Plan (SWMP) would need to be prepared and implemented and an Erosion and Sediment Control Plan (ESCP) would be required to be included as a component of the SWMP. Both the SWMP and the ESCP should be submitted with an application for an Environment Protection License prior to any works commencing. The respondent acknowledges the commitment to prepare the SWMP and the ESCP in accordance with Landcom's '*Managing Urban Stormwater: Soils & Construction, 4th Edition 2004* (Blue Book), and the RTA's '*Road Design Guide*' and '*Soil Erosion and Sediment Control – Engineering for Queensland*

Construction Sites' (Institution of Engineers Queensland, 1996). Furthermore site-specific ESCPs would need to be prepared as construction proceeds.

- The respondent acknowledges that actual and potential acid sulphate soils may be encountered during construction, including tunnel excavation, and that an acid sulphate soil management plan would be prepared. The mitigation strategies outlined in Technical Paper 5 of the EIS are considered to be appropriate.
- It is recommended that when preparing the Air Quality Management Plan the following be considered:
  - All fixed material transfer points should be enclosed to and fitted with dust control devices to ensure emissions of dust are minimised;
  - Mobile conveyors should be enclosed to minimise the emission of dust; and
  - All material stockpiles should be maintained in a manner that would prevent or minimise the emission of dust.
- It is recommended that when preparing the Construction Noise and Vibration Management Plans the following be considered:
  - Compliance standards;
  - Community consultation;
  - Complaints handling monitoring / system;
  - Site contact person to follow up complaints;
  - Mitigation measures;
  - Design / orientation of the proposed mitigation methods demonstrating best practice; Operational times;
  - Contingency measures where noise complaints are received; and
  - Monitoring methods and program, with monitoring to be undertaken at the nearest affected residential properties.
- A strategy for the translocation of plants, in consultation with the Queensland EPA, should be prepared to be incorporated into the Environmental Management Plan.
- Should off-site disposal of extracted groundwater be required, a Water Quality Management Plan should be developed for disposal outlining water quality parameters to be measured, frequency of sampling and proposed treatment of water outside threshold values and reporting to DIPNR.
- A Groundwater Management Plan would need to be developed for the tunnel excavation to the satisfaction of DIPNR. The plan should include:
  - A detailed record of the water level data from the excavation site;
  - Electronic data loggers should be installed in monitoring bores to record groundwater levels at key sites;
  - Groundwater levels should be used to show the limits of any draw down or temporary mounding caused by the construction of the tunnel (Flow Net diagrams);
  - Major ions should be analysed from all monitoring bores in close proximity to the proposed tunnel excavation site and re-injection area, prior to commencing works and at regular intervals during construction;
  - Trigger level management based on groundwater levels and water quality parameters should be developed to manage the dewatering and re-injection at the site; and
  - It is recommended that groundwater results be interpreted by a qualified groundwater consultant, at frequent set intervals during the construction phase. This should ensure that if remedial action is required, it is undertaken within a timeframe that allows any problem to be rectified and ensures that the beneficial use of the groundwater is not diminished.

Submission Numbers:
11, 25, 52, 69, 83

Response:
Further assessment of cultural heritage within the Bypass alignment has been undertaken. This work has been assisted by Eastern Yugambeh Limited and involved further consultation with a number of Traditional Owners and the Tweed Byron LALC. A report has been developed and summarised within Chapter 6 of this the Submissions Report with the full report provided in Appendix C. Subsequent recommendations include the undertaking of sub-surface survey in a number of locations and an Indigenous Historical Study. Prior to sub-surface survey, it is proposed that a CHMP be developed and approved in principle by the Traditional Owners and Tweed Byron LALC. This plan would also be developed in accordance with the Queensland *Aboriginal Cultural Heritage Act 2003* and the NSW *National Parks and Wildlife Act 1974*. Additionally, an assessment of cultural heritage within the proposed road corridor has been undertaken by Turnix and the Ngarang-Wal Cultural Heritage Management Group. A report was written and is also summarised within Chapter 6 of this the Submissions Report with the full report provided in Appendix D.

A SWMP would be prepared and implemented as part of the Proposal. This plan would include an ESCP and would be included in the Construction Environmental Management Plan.

An Environmental Review Group would be formed in consultation with the DEC and other agencies as relevant.

The requirement for an Environment Protection Licence under the *Protection of the Environment Operations Act 1997* in NSW would be identified within the Construction Environmental Management Plan.

Air quality mitigation strategies are outlined in Chapter 9 of the EIS and summarised into Chapter 18 of the EIS. Dust emission from material stockpiles, and during construction phases of the Proposal are also considered in Chapter 7 (for example, Section 7.3.5 Soil management). Management measures would be specified within the Construction Environmental Management Plan.

The matters recommended for inclusion in the Construction Noise and Vibration Management Plans are noted and would be included during its preparation.

The translocation of flora species would be detailed within the Construction Environmental Management Plan. This would be conducted in accordance with the *Australian Network for Plant Conservation Translocation Guidelines* (2004) and undertaken in consultation with the appropriate government agencies.

The dewatering process for tunnel construction would operate as a closed system involving extraction and re-injection of groundwater. Off-site disposal of groundwater is not anticipated. Monitoring strategies and mitigation measures for groundwater and water quality have been proposed and would be detailed within the Construction Environmental Management Plan.

A Groundwater Management Plan has been proposed as a sub-component of the Construction Environmental Management Plan (refer to Chapter 18, Table 18.1 of the EIS). Details of the surface water quality and groundwater quality monitoring programs including program phase, respective parameters to be measured, trigger values and response activities

are outlined in Table 18.3, Chapter 18 of the EIS. Any approval conditions issues by the DoP or DEH would be incorporated into these programs.

4.17 EIA Content

4.17.1 EIS and SIS Documentation

In summary, the respondents to the EIS raised the following issues:

- The assessment has shown a disregard for the principle of intergenerational equity. If the Proposal were to proceed it would only benefit immediate users at the expense of future generations who would inherit a spoiled and less diverse environment.
- The assessment has shown a disregard for the Precautionary Principle and ESD. The Proposal does not follow the guidelines of ESD or the outlines of the Precautionary Principle and is showing no responsibility to future generations.
- Was the EIS performed on the basis of the 'Beyond BACI Design'? If the assessment was undertaken using purely computer modelling and not performed according to the 'Beyond BACI Design' there is no way to detect or to measure the realistic environmental impact of the Proposal on Cobaki Lake and ultimately the entire Tweed River ecological interconnecting network.
- Approximately 400m of rail corridor would need to be acquired in NSW, however there appears to be conflicting information in the various EIA documents about the approval process for this. It is understood that the Tugun Bypass includes the provision for a future extension of the existing railway line from Robina to a train station proposed at the Gold Coast Airport, however the construction of this railway would be subject to a separate EIA process. Clarification is required on this point.
- The EIS is not a fair or properly produced document, which does not cover pertinent impacts on the environment. The EIS and SIS are selective about what information they provide and are inconsistent with other study documents. The information in the EIS is incomplete and there are inconsistencies with figures, boundaries and defined areas.
- Amendments must be made to the EIS to ensure that an effective and accurate consideration of the 'true value' and impacts from any changes to the local environment surrounding the Bypass route are properly understood and quantified.

Submission Numbers:
25, 36, 46, 52, 53, 67, 79

Response:
The principle of intergenerational equity, the precautionary principle and ESD have been considered throughout the EIS dealing with the assessment of impacts on the physical, biological and socio-economic environment. Chapter 20 of the EIS provides a summary of how the Precautionary Principle was integrated into the assessment process. The implications for sustainable development have been considered at the end of each impact assessment chapter, including the principle of intergenerational equity.

The Beyond BACI Design was not specifically used during environmental impact assessment. Assessment was conducted in accordance with the required guideline and is provided in Appendix A of the EIS. The EIS and SIS have been prepared in accordance with the requirements set out in the EIS guidelines provided by DEH and the requirements issued by the Director-General of the DIPNR.

With the exception of the proposed rail tunnel accommodation works, planning approval for the Robina to Coolangatta rail link would be sought by others.

The environmental impact assessment undertaken has attempted to identify the natural environment within the study area and the potential impacts that may occur. All state and commonwealth laws (at the planning level) have been recognised and due process followed. This process has allowed any member of the public to provide further information on any matter that may have been overlooked or misconstrued. Subsequent documentation is considered to be an objective and transparent record of this work.

The EIS has been prepared in accordance with the requirements issued by the relevant agencies in Queensland, NSW and the Commonwealth. The assessment undertaken follows accepted practise for the assessment of impacts and the EIS, SIS and Technical Papers present the findings of the various studies. Changes to the local environment have been assessed and where possible, quantified. The impacts associated with the Proposal have been avoided or minimised through the introduction of mitigation measures.

4.17.2 MDP Documentation

In summary, the respondents to the EIS raised the following issues:

- All comments made in relation to the EIS and SIS are relevant to the draft MDP, therefore all comments should be considered in their entirety.
- The draft MDP has indicated that it is unlikely to have any impact on a number of bat species that occur within the Airport land. This contradicts the SIS which indicated that a loss of roosting habitat is highly likely and therefore a number of mitigation measures to address these impacts were recommended.
- Due to the recent addition of a number of EECs to the TSC Act, the draft MDP must include an assessment of the potential impacts that the Gold Coast Airport section of the Tugun Bypass is likely to have on these communities.
- The proposed mitigation measures identified within the EIS and SIS are not correctly identified within the draft MDP. Inconsistencies include but may not be limited to:
  - The establishment of artificial frog ponds and the potential enhancement of the existing artificial pond within the area;
  - The location of some sections of the fauna exclusion fencing does not reflect the textual information provided within the EIS and SIS (Figure 19 of the draft MDP); and
  - Appropriately secure fencing to prevent any access to the known Swamp Orchid habitat areas.

Submission Numbers:
52

Response:
All comments made in relation to the EIS and SIS have been considered objectively. However all comments made in relation to the EIS and the SIS may not be relevant to the draft MDP on the basis that the legislative provisions that protect the environment on the Gold Coast Airport section of the Tugun Bypass can and do differ to other sections of the Bypass. Therefore certain matters have been considered spatially and in the context for which the relevant statute requires.

Although a loss of a relatively small amount of roosting habitat is likely, it is considered that bat species, given their mobility and the proposed mitigation, would overcome this effect reasonably quickly and roost in equivalent habitat nearby.

The MDP has been amended to take account of the newly listed EECs and to ensure consistency with the EIS and SIS.

4.18 Outside Scope of Proposal

4.18.1 Outside Scope of Proposal

In summary, the respondents raised the following issues:

- A variety of miscellaneous issues and information not relevant to the Proposal have been raised regarding impacts on the residents at Banora Point from the existing traffic situation, particularly regarding the Sextons Hill Black Spot, and the proposed developments at Terranora with their associated heavy vehicle movements.
- A variety of miscellaneous issues and information not relevant to the Proposal have been raised regarding future GCAL developments and their financial interests.
- A variety of miscellaneous issues and information not relevant to the Proposal have been raised regarding a future rail link between the Gold Coast and Robina, particularly a future link from Casino, Lismore and Byron Bay via Tweed Heads to the Gold Coast and Brisbane.
- A variety of miscellaneous issues and information not relevant to the Proposal have been raised regarding the future use of Government owned land.
- Issues and information not relevant to the Proposal has been raised regarding Polar Bears.
- A variety of miscellaneous issues and information not relevant to the Proposal has been raised regarding past and present Aboriginal customs including impacts from European settlement.

Submission Numbers:
3, 27, 31, 51, 57, 60, 62, 63, 71, 72, 84, 87

Response:
It is considered that the following issues are outside the scope of the Proposal:

- Issues relating to Banora Point, Sextons Hill and Terranora;
- The financial interests of GCAL;
- The future rail links identified;
- The future of government owned land;
- Potential impacts on Polar Bears (the fauna assessment did not identify any potential impacts to Polar Bears).

Past impacts to Aboriginal customs, through European settlement or other influences are in themselves beyond the scope of this Proposal, although they may have influenced consideration of cultural heritage issues in the area affected by the Proposal. Technical Paper 14 discusses Cultural Heritage, including legislation, results of surveys, conclusions and recommendations and comments from Traditional Owners. Additional cultural heritage studies have been undertaken by Traditional Owners and are summarised in Chapter 6 of the Submissions Report and provided in full within the Appendices.

5 Correspondence

Since the exhibition of the EIS and SIS, further consultation in the form of letters, liaison and meetings has been undertaken between the Proponents and Government Agencies and other Authorities, regarding matters that have arisen subsequent to exhibition of the EIS and SIS and as a result of representations received. Below is a summary of the correspondence between the Proponents and Government Agencies and other Authorities.

5.1 Department of Environment and Heritage

As part of a program of ongoing liaison, meetings between DEH and the proponents were conducted on 22 March and 26 July 2005 to discuss the EIS Proposal and the mitigation of impacts. No formal submission to the EIS or SIS was received from DEH.

5.2 Department of Infrastructure, Planning and Natural Resources

A letter and emails from the then DIPNR (Major Infrastructure Assessments section) were provided to the RTA after the exhibition period seeking clarification of issues regarding the EIS on the 18 March and 5 and 19 April 2005 respectively. A copy of those documents and response to the issues raised is included at Appendix M of this Submissions Report. As part of a program of ongoing liaison, subsequent consultation between DIPNR and the Proponents was undertaken to discuss the EIS Proposal and the mitigation of impacts. From this consultation, the key issues of Proposal justification and compensatory habit were identified. Further discussion regarding these issues is provided below in Section 5.2.1 and 5.2.2 respectively.

In addition to the above, the North Coast Region office of the then DIPNR also submitted formal representation number 83, outlining its issues with regard to the EIS Proposal and administrative procedures for dealing with legislative permits. Details from this formal representation are included at Appendix A and information on responses to this representation can be found in Chapter 4 of this Submissions Report.

5.2.1 Proposal Justification

Establishing how the Proposal is justified requires a consideration of the extent to which its beneficial effects balance or outweigh its identified environmental impacts. Elements of the justification for the Proposal can be found in the EIS and the various associated working papers. A detailed discussion of various issues raised by the then DIPNR in relation to justification for the Proposal is provided in Appendix M. This section aims to bring these matters together and present a concise statement of the Proposal justification.

The need for the Proposal is established in Chapter 4 of the EIS. The *Auslink White Paper* recognises that interstate corridors are critical for national, state and regional economic and social development, trade, security and connectivity. In this context the current interstate connection between NSW and Queensland via the Tweed Heads Bypass and the Gold Coast Highway is unsatisfactory for a number of reasons.

The primary concern is the current tension between the need to provide a fast, efficient highway for interstate passenger and freight traffic and the need to maintain appropriate levels of access for an increasing local population. This tension has resulted in high traffic

volumes on the existing route and corresponding travel time delays, growing safety concerns and a reduction in amenity for the area caused by lower levels of accessibility and increases in road traffic noise.

Numerous planning and transport strategy documents have recognised the need to improve the existing interstate connection (these are discussed in detail in Chapter 4 of the EIS) labelling it a 'missing link'. The *Auslink White Paper* specifically identifies the Tugun Bypass as a priority improvement for the National Network and commits $120M towards its construction.

To address the identified need for improvements, corridor and route investigations were undertaken (refer to Chapter 5 of the EIS) and these culminated in the selection of a preferred option which comprises a full bypass of the Gold Coast Highway. The C4 option, as it is known, runs to the west of Tugun and the Gold Coast Airport and includes a tunnel beneath the obstacle limitation surface at the southern end of the runway. It addresses deficiencies of the existing link by providing an alternative corridor which separates heavy vehicles and interstate traffic on one hand, from local traffic on the other. It is this option which became the Proposal and was the subject of the EIS.

The EIS recognised that the Proposal has significantly higher levels of potential impact on the natural environment when compared with options which would wholly or partially utilise the existing Gold Coast Highway corridor. Primary among these are ecological impacts. While the Proposal has been refined to avoid or minimise impact on ecologically sensitive areas such as orchid habitat, Long-nosed Potoroo habitat and Wallum Sedge Frog breeding ponds there are acknowledged residual impacts including those associated with the removal of around 45 hectares of native vegetation communities and the expected edge effects on a further 26 hectares.

These impacts have been addressed through the development of a series of safeguards and mitigation measures (refer to Chapter 7 of the Submissions Report) and a compensatory habitat package (refer to Section 5.2.2 below and Chapters 6 and 7 of the Submissions Report).

Consideration of the Proposal has identified substantial benefits. These include:

- Significantly reduced travel times resulting from the separation of local and interstate traffic;
- Reduced noise levels for communities along the Gold Coast Highway;
- Safety improvements for pedestrians and motorists;
- Air quality improvements; and
- The creation of new opportunities for the enhancement of public transport services.

Additionally, the Proposal would have important regional economic benefits through the enhancement of the existing economic links between northern NSW and south east Queensland. In this regard, there would be an improvement in access between northern New South Wales businesses and key transport infrastructure such as Brisbane Port and Brisbane Airport. Access between distribution centres in south east Queensland to retailers from Grafton north to the border would also be significantly improved.

Further, Brisbane and other south-east Queensland centres are the natural providers of higher order services for people residing in northern New South Wales. Entertainment, specialist medical services, international sporting fixtures and high end shopping opportunities are of equivalent quality and easier to access in Brisbane when compared to those available in Sydney.

The justification of the Proposal is grounded in the demonstrated need for an improved interstate connection and the important social, economic and environmental benefits described above. Route alignment and other measures have been adopted to avoid or minimise impacts. There are recognised environmental impacts remaining but measures have been incorporated to minimise and offset the environmental impacts identified during the course of the assessment process. On balance the Proposal would result in significant benefits for communities both in NSW and Queensland which outweigh the remaining environmental impacts.

5.2.2 Compensatory Habitat

Concerns were raised regarding the reliance on the compensatory habitat package to offset 'residual' impacts of the Proposal. Further clarification regarding the proposed package was also requested with regards to:

- The status of a number of threatened species and communities within the package;
- The size of the package;
- A comparison of impacted habitat with the habitat included in the package;
- The long-term management requirements of the proposed package; and
- The consideration of additional offsets.

In response to the concerns raised by the then DIPNR, the Proponents recognised that the original compensatory habitat package developed in 2001 required further investigation with regards to changes in legislation and policy and the minor design alterations of the Proposal. Following the exhibition of the EIS and SIS, a number of additional studies have been undertaken. These studies involved detailed flora and fauna surveys of the areas proposed in the original package and a review of the original package with the identification of any potential residual impacts that may occur. The report prepared, following the review of the original package, identified inadequacies and provided a number of recommendations with specific consideration to residual impacts. In continuing the improvement of the proposed compensatory habitat package, the Proponents considered the recommendations and options to offset residual impacts that were proposed. A revised compensatory habitat package has now been proposed, which clarifies the issues raised by the then DIPNR as well as other Government Agencies and the public.

Following is a summary of the actions undertaken subsequent to the EIS.

The package as proposed in the EIS/SIS (December 2004) has been modified in response to:

- Changes in the alignment of the project since the package was first developed;
- Listing of new EECs under the TSC Act;
- A number of further studies;
- A review of the package as originally proposed (Ecosense, 2005).

Items removed from the package are:

- Small nest boxes and reinstatement of hollows (survey found that small hollows are abundant)
- Block C (unless all other options discussed below are exhausted)
- Fencing of the Cobaki Lakes development and the Boyd Street extension as part of the Tugun Bypass project. (An integrated management plan is to be developed between QDMR, Tweed Shire Council and Leda Manorstead Pty Ltd and this is proposed to incorporate these measures.)
- Weed management on Pony Club land (as this is already covered in agreements between Lands Department, Tweed Shire Council and Pony Club). Initial rehabilitation work would be undertaken in this area but longer term control would

be subject to the existing agreements rather than being part of the compensatory habitat package.

The major elements of the revised package are:

Land

- Blocks A (64.1 hectares) and E (6.2 hectares) together with a commitment by QDMR to fund development of a management plan and negotiated reasonable costs of initial actions identified in that plan.
- Purchase of Block F (11.0 hectares) adjacent to Cudgen Nature Reserve (subject to owner agreement and flora / fauna survey) OR alternative land based option (options to be identified and assessed in parallel) OR rehabilitation of Block C (3.7 hectares).
- Block P – a one hectare lot of Long-nosed Potoroo habitat in Queensland.

Compensatory Measures

- Hollows: Replacement of large / medium hollows lost in construction with nest/roost boxes. This would occur within or adjacent to the road corridor and Blocks A and E. A potential need for 16 boxes has been indicated.
- Wallum Frog: Construction of 3 frog ponds for acid frogs (Wallum Sedgefrog and Wallum Froglet) to be undertaken in consultation with frog specialists.

The following matters remain to be clarified and finalised. Subject to the actions discussed below, they would be incorporated in the final package.

- A Flora and Fauna Survey of Block F is necessary to determine presence of Common Planigale, Wallum Sedge Frogs and Swamp Sclerophyll Forest. This would occur once agreement is reached with the landowner.
- If no Common Planigale habitat is present on Block F or Block A, then a financial contribution for the management of known Common Planigale habitat in conservation reserves would be negotiated OR additional land would be purchased. The acquisition of additional land would involve option identification and assessment and consultation with DEC prior to its purchase.
- Compensatory measures for the Long-nosed Potoroo would be finalised. Long-nosed Potoroo mitigation and compensation measures would be clearly identified in a Long-nosed Potoroo Management Plan. The plan would focus on predator control, fire management and habitat restoration. The plan would be managed by QDMR, Tweed Shire Council and Leda Manorstead Pty Ltd. Consultation with administrating authorities would be undertaken prior to finalisation of the plan. Costs of measures identified would be apportioned by agreement. The target date for development of the plan would be set at three months post-planning approval.

The revised package has been discussed with the DEC and finalisation would be undertaken in consultation with that Department. Chapter 6 of this Submissions Report provides a summary of the additional studies undertaken regarding the compensatory habitat package, with the full reports being provided in Appendices G, H, J and K.

5.3 Department of Environment and Conservation

The Department of Environment and Conservation submitted formal representation number 52, outlining its issues with regard to the EIS Proposal and administrative procedures for dealing with legislative permits. Details from this formal representation are included at Appendix A and information on responses to this representation can be found in Chapter 4 of this Submissions Report. Additionally, meetings between DEC and the proponents were

conducted on 22 March and 26 July 2005 as part of a program of ongoing liaison to discuss the EIS Proposal and the mitigation of impacts.

5.4 Department of Primary Industries (Fisheries)

The Department of Primary Industries (Fisheries) submitted formal representation number 58, outlining its issues with regard to the EIS Proposal and administrative procedures for dealing with legislative permits. Details from this formal representation are included at Appendix A and information on responses to this representation can be found in Chapter 4 of this Submissions Report. Additionally, meetings between DPI (Fisheries) and the proponents were conducted on 22 March and 26 July 2005 as part of a program of ongoing liaison to discuss the EIS Proposal and the mitigation of impacts.

5.5 Queensland Environmental Protection Agency

The Queensland Environmental Protection Agency (EPA) submitted formal representation number 69, outlining its issues with regard to the EIS Proposal and administrative procedures for dealing with legislative permits. Details from this formal representation are included at Appendix A and information on responses to this representation can be found in Chapter 4 of this Submissions Report. Additionally, meetings between Queensland EPA and the Proponents were conducted on 22 March and 26 July 2005 as part of a program of ongoing liaison to discuss the EIS Proposal and the mitigation of impacts.

5.6 Tweed Shire Council

Tweed Shire Council submitted formal representation number 20, outlining its issues with regard to the EIS Proposal. Details from this formal representation are included at Appendix A and information on responses to this representation can be found in Chapter 4 of this Submissions Report. Additionally, meetings between Tweed Shire Council and the proponents were conducted on 3 June, 5 July and 26 July 2005 as part of a program of ongoing liaison to discuss the EIS Proposal and the mitigation of impacts.

5.7 Gold Coast City Council

Gold Coast City Council submitted formal representation number 61, outlining its issues with regard to the EIS Proposal. Details from this formal representation are included at Appendix A and information on responses to this representation can be found in Chapter 4 of this Submissions Report. Additionally, meetings between Gold Coast City Council and the proponents were conducted on 3 June and 5 July 2005 as part of a program of ongoing liaison to discuss the EIS Proposal and the mitigation of impacts.

6 Additional Investigations

Fifteen additional investigations were undertaken by the Proponents following the public display of the EIS, SIS and MDP. These studies were prepared in response to issues raised in submissions and to provide further information to supplement the EIS, SIS and MDP studies. Information resulting from these studies has permitted further assessment and either confirmed or refined aspects of the Proposal. An overview of each investigation is provided below and the complete reports are provided in the appendices of this Report. Where relevant, additional mitigation measures were recommended as a result of these investigations and these have been included in Table 7.2 of this Submissions Report. These measures would form additional commitments for the Preferred Project.

A number of the studies noted below have contributed to a review of the compensatory habitat package proposed in the EIS. Further detail on that review is provided in Section 5.2.2. of this Submissions Report.

6.1 Eight-part test of significance for Durringtonia paludosa

An eight-part test for *Durringtonia paludosa* was not included in the SIS as this species is not listed under the TSC Act or the EPBC Act. However it is listed as 'rare' in Schedule 4 of Queensland's *Nature Conservation (Wildlife) Regulation 1994*. A single specimen of this species was recorded from the study area during surveys undertaken in 2001, in the Swamp Mahogany Forest on Airport lands about 150m from the Bypass alignment. During the public display a submission was received concerning impacts on *D. paludosa* and as a precautionary approach an eight-part test was prepared.

Durringtonia paludosa grows in coastal swamp forest, often in a closed sedgeland understorey. Potential habitat within the study area was identified as Paperbark Forest, Mixed Swamp Forest and Disturbed Saltmarsh / Sedgeland communities on NSW land and Wet Heathland and Sedgeland on Commonwealth land. Impact assessment indicated that the Bypass could remove 19 hectares (13.7%) from a total potential habitat area of 139 hectares. It is therefore considered unlikely that the loss of a small amount of potential habitat in the study area would disrupt any potential populations of *D. paludosa* or place it at risk of extinction.

Refer to Appendix F for the eight-part test.

6.2 Eight-part test of significance for Randia moorei

An eight-part test for Spiny Gardenia (*Randia moorei*) was not included in the SIS as the species has not been recorded from the study area during present or past surveys, but it has been recorded within 20km of the study area. This species is listed as endangered under Schedule 1 of the TSC Act and Schedule 2 of the Queensland's *Nature Conservation (Wildlife) Regulation 1994*. It is also listed in ROTAP as 3ECi. In addition, it is also listed as endangered under the EPBC Act. During the public display a submission was received concerning Spiny Gardenia and the omission of an eight-part test. As a result an eight-part test has subsequently been prepared.

Spiny Gardenia grows in subtropical, riverine, littoral and dry rainforest north from about Lismore and is known from the Lismore, Byron and Tweed LGAs in NSW and the Gold

Coast City Council in Queensland. Suitable habitat is present for this species in Littoral Rainforest on Commonwealth land and Regenerating Vine Forest in Queensland. Impact assessment concluded that the Bypass could remove approximately 0.6 hectares from a potential habitat area of 11 hectares. Given the small area of disturbance to habitat and the failure to locate this plant during the flora surveys, significant impacts are not anticipated.

Refer to Appendix N for the eight-part test.

6.3 Systematic Survey for Coastal Planigale (Planigale maculata) on Crown Land and Adjacent GCAL Controlled Lands

Lewis Ecological Surveys was commissioned in February 2005 to undertake a survey for the Coastal Planigale (*Planigale maculata*) on lands to the west of the Bypass alignment and also to revisit the original survey sites on Airport land to determine the current status of the known population.

Three planigale were caught during the survey. They comprised two males from an area of Crown Land west of the Bypass alignment and south of the Boyd Street access track. This finding was significant given this species has not been previously detected in this area. One female was also caught at the original survey site on Airport land. The findings of the survey suggest that areas of Coastal Planigale habitat are greater than initial surveys suggested. The information from this survey has been used in the development of the revised compensatory habitat package.

Eighteen other species were recorded during the survey period including the threatened frog species, Wallum Froglet (*Crinia tinnula*) and Green-thighed Frog (*Litoria brevipalmata*) which were the subject of further consideration as discussed below.

Refer to Appendix I for a full report.

6.4 Proposed Tugun Bypass – Review of Wallum Sedge Frog and the Green-thighed Frog

Further assessment of the Wallum Sedge Frog (*Litoria olongburensis*) within the study area was undertaken by BAAM in July 2005. The assessment reviewed the extent and distribution of the Tugun Wallum Sedge Frog population, assessed the suitability of the mitigation measures proposed in the SIS, identified suitable sites for the construction of artificial frog ponds and reviewed the areas of potential habitat for the Green-thighed Frog. It was subsequently suggested that there are two sub-populations of Wallum Sedge Frogs in the study area. All their breeding areas are located on Airport land. The breeding areas have been created either as a result of past sandmining activities or from activities associated with the operation of the Gold Coast Airport. There are also areas of Wallum Sedge Frog habitat outside the Airport land, which offer sites for building further artificial breeding ponds.

The review suggested that frog fencing proposed in the SIS is experimental and recommended that it be subject to experimental trials before being installed. However, it is proposed to introduce the fencing as noted in Section 10.5 of the EIS and to monitor its effectiveness in conjunction with associated ponds and culverts.

Impacts on the Green-thighed Frog were considered to be limited as the Bypass would not remove significant areas of habitat for this species.

Refer to Appendix E for a full report.

6.5 Fauna Survey of Lands Identified for Compensatory Habitat for the Proposed Tugun Bypass Project

As a result of submissions received during the public display and to further the knowledge of the proposed compensatory land (Blocks A and E), targeted fauna surveys of this land were undertaken between 20 and 28 May 2005. The surveys were designed to determine the presence of the Long-nosed Potoroo (*Potorous tridactylus*), Coastal Planigale and the Water Mouse (*Xeromys myoides*) and to obtain a general understanding of fauna diversity.

Fauna surveys identified nine broad habitats across Blocks A and E with 135 vertebrate species recorded (133 on Block A and 56 on Block E). They comprised 21 mammals, 109 birds, 3 frogs and 2 reptiles. Ten of these species are currently listed as vulnerable on Schedule 2 of the TSC Act. They include the Koala (*Phascolarctos cinereus*), Grey-headed Flying Fox (*Pteropus poliocephalus*), Little Bent-wing Bat (*Miniopterus australis*), Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*), Eastern Long-eared Bat (*Nyctophilus bifax*), Large-footed Myotis (*Myotis adversus*), Bush Hen (*Amaurornis olivaceus*), Osprey (*Pandion haliaetus*), Collared Kingfisher (*Todiramphus chloris*) and Mangrove Honeyeater (*Lichenostomus fasciogularis*). The Grey-headed Flying Fox is also listed as vulnerable under the EPBC Act with a further eight species recognised under the EPBC Act's migratory provision.

Most of these species have been recorded elsewhere in the Cobaki Broadwater including on or near the Bypass footprint. The exception to this is the Koala where Block A has long been recognised as containing a remnant population of considerable significance in the Tweed LGA. Other significant features recorded include an important migratory and sedentary wader roost on the northern foreshore of Block A and extensive tree hollow resources located within the mangrove forests which provide potential refuge / breeding habitat for microchiropteran bats. The data provided by the survey is being used in the finalisation of the compensatory habitat package.

Refer to Appendix J for a full report.

6.6 Vegetation Survey of Proposed Compensatory Habitat Blocks A and E, Tweeds Heads West NSW for the Tugun Bypass Project

As a result of submissions received during the public display and to further the knowledge of the proposed compensatory land (Blocks A and E), detailed flora survey of the land was undertaken in July 2005. Subsequent records indicate approximately 84% of the land was covered by native vegetation, while the remainder (16%) was cleared pasture. Five broad vegetation types comprising nine plant associations were present in the Blocks. The broad vegetation types were Lowland Rainforest, Dry to Moist Tall Open Forest, Swamp Sclerophyll Forest, Mangroves and Saltmarsh. Three EECs as prescribed under the TSC Act, the Swamp Oak Flood Plain Forest, Swamp Sclerophyll Forest on Coastal Floodplains and Coastal Saltmarsh were also identified.

A total of 325 vascular plant species were identified (52 exotic) of which 18 were species of conservation significance. The Endangered species were Brush Cassia (*Cassia brewsteri var. markesiana*), Rusty Green-leaved Rose Walnut (*Endiandra muelleri subsp. bracteata*) and Spiny Gardenia. The Vulnerable species were Marblewood (*Acacia bakeri*), Stinking Cryptocarya (*Cryptocarya foetida*) and Fine-leaved Tuckeroo (*Lepiderema pulchella*). In addition 6 nationally rare (ROTAP) and 5 regionally significant species were recorded, including two species possibly recorded for the first time in NSW, *Dianella brevipedunculata* and *Desmodium triflorum*. The data provided by the survey is being used in the finalisation of the compensatory habitat package.

Refer to Appendix G for a full report.

6.7 Stage 1 Assessment of the Adequacy of the Proposed Compensatory Habitat Package for the Tugun Bypass

In 2001, a compensatory habitat package was developed for the Tugun Bypass. Since that time, changes to environmental law, environmental policy and the Proposal had occurred, potentially altering (increasing or decreasing) the need for compensation. It was therefore considered necessary to review the Proposal and any residual impacts that may occur. Ecosense Consulting Pty Ltd was subsequently commissioned to undertake this review and comment on the adequacy of the proposed compensatory habitat package.

The review found that the proposed compensatory habitat package would generally compensate for the area impacted by the Tugun Bypass, however it was biased towards the Bypass alignment's northern extent. Residual impacts were identified and included Swamp Sclerophyll Floodplain Forest EEC, the Wallum Sedge Frog, the Wallum Froglet, the Common Planigale and the Long-nosed Potoroo.

The review considered that the proposed compensatory habitat package needed improvement with respect to replacing important fauna values lost as a result of the Bypass. Blocks A and E support a diversity of highly mobile bats and birds, but lack habitats and resources essential for more specialised and sedentary fauna species. Recent surveys showed that they contain no Wallum habitat, few senescent hollow-bearing trees, one wader roost and no raptor nests. More importantly, the land package did not support habitat for the Wallum Sedge Frog, the Wallum Froglet or the Long-nosed Potoroo. It was considered to be only moderately likely to support Common Planigales.

A number of recommendations were made specific to each residual impact. These included the purchase or securing of additional land areas, particularly those that supported areas of Wallum Heath. These recommendations have been addressed and have contributed to a revised compensatory habitat package.

Refer to Appendix K for a full report.

6.8 Tugun Bypass Stewart Road to Kennedy Drive – Compensatory Habitat

As discussed above in Section 6.7, Ecosense Consulting Pty Ltd concluded that residual impacts on biodiversity may occur if the Tugun Bypass is constructed as currently proposed. A number of recommendations to offset these impacts were documented, including the

purchase or securing of additional land and the undertaking of additional management measures.

In continuing the development of the compensatory habitat package, prior and additional recommendations were considered and options to offset residual impacts were proposed. Options included the acquisition of additional land to offset impacts on the Swamp Sclerophyll Forest on Coastal Floodplains Endangered Ecological Community, the Wallum Froglet and the Wallum Sedge Frog. Additional management measures were also considered for the Long-nosed Potoroo, Wallum Froglet and Wallum Sedge Frog. At the time of reporting, negotiations were still continuing regarding the purchase of one block of land and they are anticipated to be finalised prior to seeking planning approval for the Proposal. A revised compensatory habitat package has been developed.

Refer to Appendix H for a full report.

6.9 Potential for Walking Trail between Tugun Heights Conservation Park and Hidden Valley

A public submission was received concerning access across the northern end of the Bypass. It was suggested that the Bypass would form a major barrier to the east / west movement of bushwalkers and fauna. A review of access was subsequently undertaken by EcoPro in April 2005.

The review found that the Bypass could reduce the width of a fauna corridor which connects Tugun Heights Conservation Park and Hidden Valley. Upon construction this corridor may be reduced to between 10 and 40m in width, approximately half of its existing width. However, it was anticipated that the corridor would continue to function and could be improved by revegetating already cleared areas.

It was also found that the Bypass could modify the access currently used by bushwalkers to cross from Currumbin to either Currumbin Waters or the Border Ranges. Unformed paths within land dedicated for future road (that is, Tugun Bypass) currently provide access and would be severed upon construction of the Proposal. The review recommended the provision of public walking tracks within the road reserve and linking beneath 'Hidden Valley' bridge. The support for and likely commitment to the public walking tracks would be discussed with Gold Coast City Council during the detailed design phase.

Refer to Appendix O for a full report.

6.10 Bird Management Plan

Ecosure was commissioned to prepare a Bird Management Plan to assess if there would be any increased risk of bird strike as a result of the Bypass; to investigate the potential for birds to be attracted to areas of the Gold Coast Airport during and after construction of the Bypass; and to propose the most appropriate means of monitoring and treating the risks posed.

The report identified a number of existing features around the airport that attract birds which include the Cobaki Broadwater, the West Tweed Sewage Works, the Tugun Landfill, the sediment basin constructed for the Pacific Shores development and the now disused Tugun Sewage Works.

The report identified a number of matters related to the Bypass that could attract birds to the area. They included the excavation and management of topsoil, which would expose food organisms in the soil and the inappropriate disposal of workers food or construction of sediment basins. Once operational, roadkill on the Bypass could also attract crows and other scavengers and landscaping could potentially attract nectar feeders and flying-foxes. Management measures were subsequently recommended.

Measures to be adopted include:

- Avoiding the localised ponding of water during construction;
- Locating stockpiles of topsoil far as practical from the runway or covering them;
- Avoiding the use of plant species in landscaping that are highly attractive to birds and flying-fox;
- The timely collection of large roadkills, if they occur; and
- The use of tunnel lights that are less attractive to insects.

Refer to Appendix P for a full report.

6.11 Results of a Preliminary Cultural Heritage Survey of the Proposed Tugun Bypass

A number of submissions were received from the Traditional Owners that raised concerns about the cultural values of the study area that they felt had not been properly addressed in the EIS. As a result of consultation with the Traditional Owners it was agreed that a new walk-over survey would be conducted resulting in a report being produced that would capture the concerns and recommendations of the Traditional Owners. Eastern Yugambeh Ltd were commissioned to undertake the survey which was completed in May 2005. The report recommended that sub-surface surveys be undertaken at a number of points along the Bypass alignment and that a social history survey be undertaken.

To this end, an Indigenous Historical Study is being developed. That study will also contribute to the Cultural Heritage Management Plan. In addition, Terms of Reference for the next stage of archaeological investigation for the Bypass have been prepared, with work planned to begin in the near future. The work would be carried out in consultation with Traditional Owners and would contribute to the Cultural Heritage Management Plan / Assessment Report.

Refer to Appendix C for a full report.

6.12 Tugun Bypass Indigenous Cultural Heritage Visit

On 1 August 2005 representatives from the Ngarang-Wal Cultural Heritage Management Group, along with an environmentalist, a representative of the Gold Coast City Council and an archaeologist undertook a field inspection of the study area. A report was subsequently produced (refer to Appendix D for a full report) and the findings of that report are as follows:

- That the location and extent of the men's dancing ground is required to be correctly ascertained by Traditional Owner custodians and other male Traditional Owners;

- That a desk-top study of the Indigenous resources remaining in the area of the Bypass alignment be undertaken;
- That archaeological investigation is kept to a minimum in view of the possibility that artefact exposures within Airport land are not in situ; and
- That a CHMP / Assessment Report and protocols be prepared covering monitoring during the initial clearing and earthworks by Traditional Owner representatives that follow recommendations as outlined within the report.

The recommendations and results of both the Preliminary Cultural Heritage Survey (discussed above in Section 6.11) and the additional Indigenous Cultural Heritage Visit would be considered in preparing the CHMP / Assessment Report.

6.13 Tugun Bypass – Factual Site Information from Additional Geotechnical, Contaminated land and Groundwater Investigations

Geotechnical, groundwater and contaminated land investigations were undertaken by QDMR and Parsons Brinckerhoff during June and July 2005. This work was undertaken to confirm or further refine design models of and management measures for the Proposal. An additional 40 boreholes 33 test pits and 16 cone penetrometer tests were undertaken in areas that included Hidden Valley, the Tugun Landfill site and within Gold Coast Airport near the proposed tunnel area. A subsequent report has been compiled and Section 6.14 below provides further details regarding groundwater investigations.

6.14 Tugun Bypass Review of Existing and Proposed Groundwater Investigations

A review of groundwater investigations proposed within the EIS has been undertaken to assess their applicability if the installation of slurry walls were used as the construction method for the tunnel. It was confirmed that the requirement to lower the water table is reduced with the installation of slurry walls, which would then be converted to concrete diaphragm walls. It is intended that the construction program would be delivered under an Alliance format and the final construction method for the tunnel would be determined during detailed design. It is therefore possible that a different method of construction would be used for the tunnel. Additional groundwater investigation would be undertaken if alternative construction methods are proposed which would involve further lowering or modification of groundwater. Appropriate management measures would be developed and detailed within the Groundwater Management Plan. The remainder of this section presents a summary of the above mentioned review and is applicable to the slurry wall method of construction.

The initial groundwater investigation program was largely based on technical requirements, although environmental aspects were also considered. Because of the sensitivity of environmental issues at the site, environmental aspects of the program were reassessed to ensure that appropriate safeguards would be in place for the more problematic parts of the program.

Due to site conditions, access and the importance of community expectations of the Proposal, a number of issues relating to the groundwater program have been highlighted. These issues relate mainly to the potential (indirect) environmental impacts of the site test programs (that is, detailed pumping test and injection trials).

The revised groundwater program is based on the following assumptions:

- Dewatering for slurry wall installation would be between 0 and 1m (similar to natural seasonal variation) rather than 2m; and
- Sufficient time would be allowed before completion of detailed design for the preferred, staged approach, rather than risk the undertaking of tests based on less complete data.

The rationale of the groundwater program revision is based on:

- The reduced dewatering requirement means the detailed design of dewatering for slurry wall construction is less critical for preliminary design and may be postponed until detailed design;
- Reduced slurry wall construction dewatering requirements mean less accuracy is acceptable for the eventual design and estimation of costs of that part of dewatering, if it be required at all; and
- The natural variability of the sediments make multiple, less accurate hydraulic tests more relevant for preliminary design of diaphragm wall depth and inter-wall dewatering than few more accurate hydraulic tests in one (pumping) or few (injection) locations.

Wherever possible geotechnical activities with greater environmental risks would be delayed until the Proposal is approved and preferably after ground disturbance and earthmoving equipment is available.

It is anticipated that the groundwater investigations would now comprise:

- A full groundwater characterisation event; and
- Short-term 'slug' hydraulic tests undertaken during monitoring on a small number of bores (between four and six) along the tunnel alignment.

Refer to Appendix L for a full report.

6.15 Boyd Street Overpass Preliminary Overview of Environmental Issues

The EIS stated that approvals for the construction of an overpass at Boyd Street would be sought by others and as a separate project. The EIS also considered the cumulative environmental impacts of a possible future overpass together with those identified from the Tugun Bypass in qualitative terms.

During public display, Tweed Shire Council wrote to the Proponents and expressed concern over the omission of an overpass / interchange at the intersection of Boyd Street and the Tugun Bypass. QDMR has subsequently agreed to progress approval and construction of an overpass jointly with Tweed Shire Council. Some preliminary design work has enabled a more detailed assessment of the impacts of the proposed overpass to be undertaken.

It was generally proposed that the overpass would remain within the road corridor (and footprint) already approved by Tweed Shire Council, however the location of the overpass would be further to the west than the originally approved location and would straddle the Queensland / NSW border. Assessment indicated that there would be no significant environmental impacts resulting from construction of an overpass, but rather it would present an opportunity to implement a number of measures to improve the connectivity of habitat for the Tugun Long-nosed Potoroo population.

The Boyd Street overpass however, is not part of the approval being sought for the Tugun Bypass by the RTA and QDMR.

Refer to Appendix B for a full report.

7 Preferred Project and Statement of Commitments

7.1 Preferred Project

Having considered public submissions for the Tugun Bypass, the RTA and QDMR have decided that the concept design of the Proposal as described in the EIS and without modification, is the Preferred Project. A description of the Preferred Project is provided in Chapter 6 of the Tugun Bypass EIS Main Volume. Changes have however been made to the package of mitigation measures and compensatory habitat. These changes are outlined below in the Section 7.2 and would either be neutral or would minimise the environmental effects of the Proposal.

7.2 Statement of Commitments

The measures detailed in Table 7.1, Table 7.2 and within Section 7.3 together comprise the Statement of Commitments for the Preferred Project. Table 7.1 summarises the measures as published within the EIS, SIS and SIS Addendum while Table 7.2 describes a number of additional measures which have resulted from further discussions with State and Commonwealth approval agencies and the recommendations, where suitable, of the additional investigations described within Chapter 6 of the Submissions Report. Additional measures also include those previously published but subsequently modified. Section 7.3 adopts as commitments, a number of approval conditions transcribed from the Department of Planning Conditions of Approval database.

Management measures previously published but now withdrawn or satisfied are detailed in Table 7.3. Table 7.3 is provided for information purposes only and does not form part of the Statement of Commitments for the Preferred Project.

Table 7.1: Summary of Management Measures made in the EIS, SIS and SIS Addendum

	Pre-construction	During Construction	Post-Construction
Landscape			
	Development a suitable Landscape Plan and specification in accordance with Main Roads /NSW RTA design guidelines and administrating authorities. Determine and develop translocation plan (terrestrial and aquatic) as a component of the Flora and Fauna Management Plan. Co-ordinate endemic seed collection (within footprint) and subsequent propagation prior to construction. Integrate requirements of approvals, licenses and/or permits. Define hydromulching specification including progressive staging. Require mulching of cleared and grubbed native vegetation. Integrate construction requirements into tender documents. Coordinate declared plant audit and eradication program three months prior to construction. A local nursery would be appointed to collect a representative sample of native seeds from the area of the footprint and to propagate them. These species would then be used for landscaping.	Implement, monitor and audit contract requirements. Areas for seedling/planting would be fully prepared, free of weeds, and with existing soil reused as extensively as possible. Soil used for seedling/planting, including both site soil and any imported topsoil, would be tested for quality before use. Any additives recommended to ensure optimal plant growth would be specified and included. It is expected that a slow-release fertiliser and a soil-saturation aid would be used to improve tree growth rates, if appropriate, and that tree guards would be used to protect plants as necessary. Road edges and any other areas disturbed during construction would be revegetated with local native plant species where practical.	Maintain in accordance with contract requirements. A 12 month maintenance program would be undertaken for all landscape works, and would include watering, weeding, pruning, mowing and replacement of any failed plants. If necessary, the program would continue until the landscaping is fully established. Following this initial establishment period, only minor annual maintenance and weed control would be required, this would form part of the 10 year maintenance program under the DCM contract.
Air Quality			
	Develop an Air Quality Management Plan as part of the Construction Environmental Management Plan. Ensure that all temporary facilities are designed to minimise generation of dust, smoke and other particulates.	Construction activities to be undertaken in accordance with the requirements of the Project Environmental Management Plan, the Air Quality Management Plan and any licence conditions relating to air pollution. Mitigation measures to manage air quality during construction would include: • applying water by truck sprays on all exposed areas as required to minimise dust emissions • restricting dust-generating activities, such as topsoil removal, during high winds or during stable conditions with winds blowing toward adjacent residences • siting the construction compounds away from existing dwellings • avoiding spillages and achieving prompt cleanup when required • covering haul vehicles moving outside the construction	Undertake monitoring of air quality as part of the ongoing environmental monitoring program. Air quality monitoring would include carbon monoxide concentrations and visibility levels in the tunnel.

Pre-construction	During Construction	Post-Construction
	site • restricting the speed of construction vehicles, where required • checking particulate emissions from diesel vehicles and undertaking regular maintenance • prohibiting burning or incineration on site • monitoring dust near adjacent dwellings using dust gauges or other suitable ambient monitoring techniques to determine whether controls are being applied appropriately.	
Contaminated Land (including Tugun Landfill, Airport dump sites and sandblasting area)		
A Contaminated Land Management Plan to be developed as part of the Construction Environmental Management Plan. Prior to the start of construction, soil at identified contaminated areas including the Tugun Landfill, Airport dump sites and the sandblasting area would be tested for polynuclear aromatic hydrocarbons, total petroleum hydrocarbons, tributyl-tin (sandblasting area only) and metals. The current landfill management concept plan to be refined with new data and included in the detailed design.	The exposed waste would be capped with clay to a thickness of 0.5 m. The excavated area would be backfilled to the top of the works for drainage purposes. Material used for backfilling would have a low permeability to prevent leachate seeping through to the surface. The work area would be surrounded with an impermeable bund and all surface water/leachate would be collected for treatment or appropriate disposal. All excavated waste would be disposed of to a suitable containment cell or disposed of off site to a suitable facility. Work method statements would be prepared detailing safe work practices for construction workers involved in the excavation and transport of solid waste and the environmental protection measures required. These would be prepared in consultation with the NSW Department of Environment and Conservation, Queensland Environmental Protection Agency and/or Gold Coast Airport Limited depending on jurisdiction.	Monitoring of groundwater conditions would continue during the site stabilisation phase.

	Pre-construction	During Construction	Post-Construction
Flora and fauna			
Clearing of native vegetation	A Flora and Fauna Management Plan would be prepared during the detailed design phase to address vegetation protection issues. Protection measures would include installing temporary fencing to at least beyond the radius of the tree canopy (where possible), and minimising vehicle movements and preventing stockpiling within this vegetation zone. All contractors involved in construction would be thoroughly briefed on the importance and techniques of vegetation protection before any works.	Removal of vegetation would be restricted to the development footprint. Any additional clearing would be subject to future environmental impact assessment approval processes. Where possible, those areas that are already relatively disturbed would be used in preference to clearing nature vegetation. Where an area of native vegetation is required to be cleared and then revegetated post-construction the following measures would be applied: • the boundary would be fenced and the area cleared • seeds and other propagative material would be collected from native species present • where cleared vegetation is to be placed in windrows, these would not be allowed to abut those areas of native vegetation to be retained • topsoil would be stockpiled in long, low piles adjacent to works to maximise the viability of seed stock in the soil. Prior to clearing the footprint, the following protocol would be followed to check for species of conservation significance: • surveys targeting plant species of conservation significance would be undertaken by a qualified botanist • seeds from all threatened plants required to be removed would be collected once approval is obtained to enable potential propagation and re-establishment of threatened species in the area • marking of all threatened species, parawebbing and/or fencing of plants of significance or the footprint near the populations would be undertaken prior to construction to ensure that vehicles and other direct disturbances associated with road construction do not encroach into adjacent habitat containing significant species • a protocol for the removal and possible translocation of plants of conservation significance would be developed in consultation with the Queensland Environmental Protection Agency, NSW Department of Environment and Conservation and/or Commonwealth Department of Environment and Heritage, depending on jurisdiction.	Re-vegetated areas to be monitored until they are fully established.
Relocation of plant species	A strategy for the translocation of plants would be prepared by the NSW RTA in consultation with the Queensland Environmental Protection Agency, NSW Department of Environment and Conservation	All affected plant species of regional or state conservation significance would be translocated to areas of suitable habitat as close to their original location as possible. In the case of Chinese Burr, all plants would be removed	All relocated plant species to be monitored to ensure they are fully established.

	Pre-construction	During Construction	Post-Construction
	and/or Commonwealth Department of Environment and Heritage, depending on jurisdiction and incorporated into the Flora and Fauna Management Plan. Where possible, plants of conservation significance would be incorporated into rehabilitation plans for the road corridor. In particular the Little Wattle and Match Sticks would be considered in areas adjacent to the NSW Crown Land (north of Boyd Street) and Chinese Burr would be spread in the Paperbark Regrowth and Woodland Communities near the Tweed Interchange.	during clearing and transplanted into appropriate habitats nearby and the topsoil containing the seed bank would be spread in adjacent areas. In the case of Little Wattles and Match Sticks, individuals requiring removal would be translocated to suitable nearby habitat.	
Relocation of animals	A relocation plan would be developed as a component of the Flora and Fauna Management Plan. This would include a protocol for the removal and treatment of injured animals. The plan would be developed in consultation with the Queensland Environmental Protection Agency, Commonwealth Department of Environment and Heritage and the NSW Department of Environment and Conservation.	Before the removal of any vegetation begins, measures would be taken to remove as many mammals as possible to safety. These include: • surveys targeting mammals and other species would be undertaken by a qualified ecologist • traps would be set to capture as many individuals as possible. Captured individuals would be relocated to suitable areas of habitat nearby • a fauna rescue framework for clearing has been developed by the NSW RTA in consultation with the NSW Department of Environment and Conservation and would be used as the basis during this project • during pre-clearing surveys bark would be removed from old growth paperbarks after bats have left roost sites (i.e. under the bark) to begin foraging at dusk to prevent individuals from being injured or killed during clearing • once cleared, the footprint would be fenced with animal-proof fencing.	Requirements for post release monitoring to be agreed with the Queensland Environmental Protection Agency, Commonwealth Department of Environment and Heritage and the NSW Department of Environment and Conservation, depending of jurisdiction.
Hollow bearing trees	Protocols for the removal of hollow bearing trees and the relocation of hollows would be developed as a component of the Flora and Fauna Management Plan.	The hollow-bearing portion of the trees be removed after felling and re-instated in adjacent areas. If any hollows are damaged or destroyed during clearing, then appropriately designed nest boxes would be affixed to standing trees in the vicinity. All hollow-bearing trees to be felled would be clearly marked, and their species and approximate dimensions catalogued so that hollows and nest boxes can be affixed to similar standing trees. Reinstated hollows and nest boxes would be placed in intact forest near the preferred alignment. The actual placement would taken into account the density and dispersion of existing hollows, would be examined in	Use of relocated hollows and nest boxes to be monitored until area has stabilised after completion of construction.

	Pre-construction	During Construction	Post-Construction
		detail in the Flora and Fauna Management Plan, and would be discussed with relevant landowners and the NSW Department of Environment and Conservation. Medium-sized hollows would be replaced with nest-boxes designed for Squirrel Gliders and Brush-tailed Phascogales. Nails used to attach nest boxes would not be galvanised or coated and would not contain zinc to avoid poisoning the trees. Metal strapping that allows for tree expansion would be used to attach nest boxes. Boxes would be placed between 4 and 8m above the ground and oriented to minimise penetration by rainfall and sunlight. Boxes would be placed away from main access tracks to minimise the chances of them falling and injuring anyone.	
Wallum Sedge Frogs	Develop a species management plan for the Wallum Sedge Frog as a component of the Flora and Fauna Management Plan.	Artificial frog ponds would be built up with materials taken from the alignment. This would ensure that suitable substrate materials form the base of the ponds. This would also minimise the depth of the excavations below ground level so avoiding saline intrusion from the Cobaki Broadwater. The minimum size of the ponds would be 15-20m in length and 5-8m in width. Ponds would be constructed to a minimum depth of 1.5m with a gradient sloping to 0.3m at the pond edges. A slow release liner, similar to those used in dam construction and sedimentation traps, would be used in the ponds to increase the permanency of surface water (>80% time). Construction works would be undertaken during a dry period (spring) leading up to a pronounced rainfall event (normally summer). Edges of the ponds to be planted with edges and rushes (such as *Restio* species) from the alignment. Vegetation would be removed by a process known as "slabbing'. Slabbing depth would be at least 30 cm to ensure organic layers are collected. The source sites for slabbing would include any existing *Restio* vegetation at the artificial pond sites and where applicable, augmented from areas with dense *Restio* along the proposed alignment. The existing frog pond to the west of the alignment is only sparsely vegetated and would be enhanced by supplementary planting of appropriate vegetation, predominantly rushes such as *Restio* and *Baumea* species. Planting would be done by hand to minimise damage to the pond.	A Wallum Sedge Frog monitoring program to measure effectiveness of ponds, fencing and underpasses would be developed in consultation with GCAL, the Queensland Environmental Protection Agency, Commonwealth Department of Environment and Heritage and the NSW Department of Environment and Conservation, depending on jurisdiction and detailed in the Operation Environmental Management Plan.

	Pre-construction	During Construction	Post-Construction
		Two culverts would be constructed under the bypass to maintain connectivity between areas of Wallum Sedge Frog habitat on either side of the alignment. These culverts would be 1m high and 3m wide, with their length varying between 50 and 60m. The design of the base of the culverts would need to encourage the use of these structures by frogs. One option is to include a central channel in the culvert that would hold water. Frog exclusion fencing would be constructed to keep frogs off the road and direct them into the culverts. This fencing would consist of a solid sheet of durable material measuring approximately 400mm high, with a small overhang at the top.	
Groundwater			
	A Groundwater Management Plan would be developed as a sub component of the Construction Environmental Management Plan. The plan would detail measures to control groundwater drawdown. Further geotechnical bores to be sunk and pump testing to be undertaken to aid detailed design.	Groundwater drawdown would be managed by a series of re-injection spikes along either side of the working area. These would pump groundwater collected from the working area back into the ground so ensuring that the pre-construction levels of groundwater are maintained. The number of spikes can be varied to take account of inflows of groundwater and the pace of construction can be regulated to ensure that it doesn't overwhelm the re-injection system. This system would ensure that groundwater lowering would not extend beyond 5m either side of the construction area. All other water collected in the excavations such as rainfall and seeping groundwater would be pumped to a holding pond. The water would be tested prior to discharge to ensure that its pH is similar to the receiving water.	Cross-tunnel drains would allow free groundwater movement across the tunnel to maintain existing flows and levels. Monitoring of groundwater levels and movement to be undertaken.
Soils and Water			
	A Soil and Water Management Plan, which includes an Erosion and Sediment Control Plan would be developed as part of the Construction Environmental Management Plan, prior to the start of construction. This would include: • adopting best management practices for the control of erosion sediments and pollution during the construction period • ensuring that the construction of the proposal minimises impacts on existing water quality of surrounding catchments. All erosion and sediment controls (including sedimentation basins) would be designed to be consistent with the requirements of *Managing Urban Stormwater – Soils and Construction* (NSW Landcom 2004). They would also be designed to dry	Obtain necessary licenses for the installation of pollution control devices. Prior to construction commencing, diversion drains or diversion channels would be formed around the disturbed area. Clear water would be diverted away from the disturbed areas. Drainage structures such as waterways catch drains and sediment basins would be installed prior to the commencement of bulk earthworks in order to allow existing flows to pass through the construction zone without mixing with flows from the site. The contractor would be required to protect all stockpiles of erodible material against erosion by temporary seeding, together with the provision of other	Routine maintenance of constructed wetlands to be undertaken. This would include: • collecting litter from swales • periodic removal of excess silt • cutting and planting of reeds.

	Pre-construction	During Construction	Post-Construction
	out quickly after rainfall events. Design of constructed wetland treatment systems to be finalised and incorporated into detailed design. Program construction activities to minimise the area of disturbed ground, which is exposed to erosion at any one time.	standard erosion and sediment control measures. Batters would be vegetated as soon as practicable after excavation to mitigate any erosion potential. Erosion control would be necessary on any steep fill embankments and on road excavation that leave a cut surface. These embankments would require treatment to ensure stability. Where seeding/planting is proposed on banks that are steeper than two horizontal to one vertical, prior to landscaping the banks would be stabilised by erosion-control matting and covered with mulch to improve their final appearance.	
Topsoil	Locations for all topsoil stockpiles and procedures required for management would be included as a component of the Construction Environmental Management Plan.	Following appropriate testing, all topsoil suitable for reuse would be removed to temporary locations along the alignment. Any topsoil stripped from the site during construction would be stored in a way that retains maximum soil quality. Measures to achieve this includes, the establishment of vegetative cover for stabilisation during storage, and protection from traffic. Any soil imported to the site would be from an approved source. All stockpiles of potentially erodible material would be protected by temporary seeding, together with standard erosion control measures.	
Water Quality	A water quality monitoring program would be prepared as part of the Soil and Water Management Plan. Safeguards developed to ensure safe storage of fuel and chemicals.	The contractor would develop emergency procedures that would minimise the effects of any spills of hazardous materials. All fuel or chemicals would be stored in a bunded area capable of holding at least 110% of the volume of the materials stored and would be at a level above a 1:10 year flood. Wastewater from on-site amenities to be pumped to sewer. Monitoring of surface water would continue during the construction phase and would maintain the program established during the pre-construction phase. In addition it would have the objectives of identifying if water quality problems are occurring as a result of the construction activities and of demonstrating compliance with legal and other monitoring requirements. In the event that any results are elevated more frequent monitoring would be undertaken and would trigger an investigation into its cause and remedial measures if necessary. Parameters monitored during the construction phase would be considered in the Construction Environmental Management Plan in consultation with regulatory agencies	Water quality monitoring would continue after opening of the bypass. The objectives for this stage of the monitoring program would be to assess and manage impacts on receiving waters as the site stabilises, and to assist in determining when the site has stabilised any criteria imposed as part of the approval conditions are being met. Sampling frequency would be monthly until results show that all or parts of the site have stabilised, at which point the monitoring frequency may be reduced or monitoring discontinued. Parameters monitored during the operational phase would be considered in the operational Environmental Management Plan in consultation with regulatory agencies.

	Pre-construction	During Construction	Post-Construction
Acid Sulfate Soils	An Acid Sulfate Soils Management Plan would be prepared, based on guidelines devised by the Acid Sulfate Soil Management Advisory Committee. This would be a sub-plan within the Construction Environmental Management Plan. The plan would include: • establishing background trends in groundwater chemistry, as site-specific criteria need to be developed, rather than relying on guideline levels. • controlling soil pH by treatment with agricultural lime in bunded areas, and regular testing of pH levels and rates of acid generation • controlling groundwater pH based on regular monitoring to determine the level of treatment necessary • maintaining existing low pH conditions as suitable for 'acid' frogs.	If suitable, materials excavated from the tunnel construction would be used as road embankment materials and would therefore require treatment to control acid generation. Acid neutralisation is considered the most effective treatment option. The treatment process would be as follows: • A site-specific sampling and testing program would be established before construction. The program would follow the guidelines from the Acid Sulfate Soils Management Manual and the Queensland Acid Sulfate Soils Investigation Team. • Liming rates would be based on the results of the testing program. The amount of lime required would be based on the formula kg$CaCO_3$/tonne soil = kg H_2SO_4/tonne soil. In estimating the lime requirement, a factor of safety would be allowed for inefficient mixing of lime. • Stockpiles of lime would be kept on site at all times. The supply would be covered and stored in a bunded area. Similarly, a supply of lime would be kept to treat any acid leachate. • Before placement of excavated materials, the base of the embankment pad would be limed with a precautionary amount of fine agricultural lime at a minimum rate of 2.5 tonnes/ha. • Excavated material would be placed in the embankment area within one day of excavation. • Material would be spread to a maximum thickness and covered with the required amount of lime as determined from the acid sulphate soil analysis. • Soils would be dried out to allow trafficking and mixing. Thorough mixing and aeration is essential and testing trials would be conducted before the layer is compacted. • The final profile of the embankment would be covered with topsoil and vegetated to restrict the ingress of water to minimise the possibility of leachate being generated in the embankment. • Naturally low pH conditions in the south of the airport would be maintained. Toe drains would be constructed along embankments where treated acid sulfate soil materials have been placed. These would collect any run-off or leachate and direct it to a holding pond. Any discharge from the holding pond would be tested for pH before release. If the pH of the pond is lower than the receiving water, the pond would	Incorporation of cross-tunnel drains to allow free groundwater movement across the tunnels to maintain existing flows and levels. Monitoring of placed material during site stabilisation phase to ensure all controls are effective.

	Pre-construction	During Construction	Post-Construction
		be dosed with slaked lime until the pH is brought to acceptable levels. In order to minimise the oxidation of potential acid sulfate soils during construction of the tunnel, groundwater pumped from the excavation would be reinjected into the ground immediately adjacent to the works. This would ensure that the surrounding soils remain saturated and free of oxygen. The pumping system would be sealed to minimise the possibility of oxidation of the groundwater All other water collected in the excavations, such as rainfall and seeping groundwater would be pumped to a holding pond. The water would be tested before discharge to ensure that its pH is similar to the receiving water.	
Cultural Heritage			
	Development, in consultation with Traditional Owners, of a Cultural Heritage Management Plan to deal with any existing or new material that might be discovered during the sub-surface testing or during construction. The Cultural Heritage Management Plan would contain specific procedures for responding to cultural heritage matters. This plan would include: • emergency measures to be adopted in the event of an unexpected find during construction • on-site training for construction and site staff with respect to their cultural heritage responsibilities • the preparation of detailed site plans showing areas which must not be disturbed • required mitigation measures if burial sites are found • specific communication procedures for response to cultural heritage matters. A diesel-powered sand auger could be used to its maximum depth (at least 2m) at intervals of approximately 50m. If cultural materials are identified, further open-area excavation and salvage may be required. This would be undertaken only after consultation with the appropriate Traditional Owners and the relevant state agency.	Measures agreed in the Cultural Heritage Management Plan to be implemented. Activity within the National Estate would be limited to the disturbed eastern edge. There would be no disturbance within the fenced-off, vegetated area of the site. Traditional Owners would be kept fully informed of any further issues that arise from subsequent changes to the proposed alignment. If any unexpected European cultural heritage items are encountered during the course of construction works, works would cease and the Queensland Department of Natural Resources Mines and Energy (Cultural Heritage Coordination Unit) and/or NSW Heritage Office would be contacted, depending on jurisdiction.	

	Pre-construction	During Construction	Post-Construction
Waste Management			
	Specific requirements for waste minimisation and management during construction and operation of the proposed bypass would be set out in the construction and operation environmental management plans. The Construction Environmental Management Plan would specify waste management measures to be followed during the construction period by the contractor as a condition of contract. It would also propose that the contractor be required to reuse material, wherever possible, and incorporate recycling programs as appropriate. The reduction of waste generated by the proposal would involve: • balancing of earthworks, as far as possible, thereby minimising the import of extra fill • ensuring that existing roads adjacent to the proposal would, where possible, remain intact, to reduce the need for additional pavement • encouraging and educating employees to reduce waste wherever possible. In line with NSW RTA *QA Specification G36* – contractors would be required to purchase and use recycled content materials where cost and performance competitive, or at least the environmental equivalent of the non-recycled alternative.	Any waste generated in the project would be contained within the compound boundaries. Waste, which could not be reused or recycled, would be removed at regular intervals to an appropriate location authorised to reuse, recycle or dispose of the waste material. The re-use of waste products during construction would include: • chipping and mulching vegetation cleared for road construction purposes and reusing it as an organic base for revegetation • ensuring that topsoil, stripped before the earthworks phase of the construction period, is free of weeds and then stockpiled • reusing topsoil as part of a landscape strategy, using appropriate management techniques • placing selected vegetation around environmental significant areas • ensuring that any soil unsuitable for use in road embankments is used in mounding for noise mitigation, where practical. The recycling of waste products during construction would include: • Recycling waste created during construction of the proposal would involve; providing on-site rubbish-sorting facilities by the contractor, and recycling wastepaper, metals and glass; collecting and delivering disused or damaged concrete kerbs, medians, asphalt and similar material to crushing and recycling plants. If excess or unsuitable material is to be disposed of off-site, sampling/analysis would be undertaken if materials are suspected to be contaminated. If contaminants are found it would be disposed of to an authorised facility.	
Traffic and Access			
	A Traffic Management Plan will be prepared as part of the Construction Environmental Management Plan. Traffic management measures to be incorporated in the traffic management plan include: • control of access points for construction vehicles to reduce the likelihood of conflicts with other road users, where possible • designing access points with appropriate speed controls to minimise disruption to other road	Traffic management measures, to ensure safe passage of vehicles around the site, would be put in place by the construction contractor. The main access to the John Flynn Hospital and Medical Centre would be maintained and the movement of emergency vehicles not hindered or subjected to delays. Partial road closures and diversions at the proposed Tweed Heads Bypass interchange would be managed by the use of diversions, the two-way service road near	Changes in traffic flows resulting from the implementation of the proposed bypass are expected to require the introduction of management measures in two areas: • along the Gold Coast Highway • in areas where traffic flows are expected to increase to gain access to the bypass. Both these would require further study in

	Pre-construction	During Construction	Post-Construction
	users • providing appropriate signage and safety devices (such as temporary concrete barriers) in accordance with the relevant standards and guidelines • avoiding excessive construction vehicle access during peak travel times • minimising disruption to through traffic to maintain consistent travel times where possible.	Kennedy Drive and limited construction activities at night. Local residents would be kept informed of scheduled road works in their vicinity. All existing pedestrian and cycle routes would be maintained with minor diversion where required.	collaboration with the communities affected. Implementation would be the responsibility of Main Roads and Gold Coast City Council.
Hazard and Risk			
	A Hazard and Risk Management Plan would be prepared detailing safe working practices for construction workers involved in the excavation and transport of the solid waste. The management plan would provide details of protective clothing required, hygiene procedures and any action to be taken should accidental exposure occur.	All health and safety requirements to be implemented by the contractor.	In the event of a spill of hazardous material in the tunnel this would be collected in the sumps. The traffic control centre monitoring the traffic in the tunnel would have a cut off switch, which would disable the pumps in the sumps. The spilt material would then be pumped out of the sumps and disposed of to an appropriate treatment facility.
Construction Facilities			
	In identifying sites for construction compounds and temporary batching facilities the following criteria would be addressed: • central to a substantial portion of the works • located with ready access to the local road network • within the road reserve or in areas where this type of land use is permitted • separated from the nearest residence by at least 200 m, or in a location where it can be demonstrated that no adverse impact would occur at the nearest residence • not located within 100 m of any drain that discharges into the wetland, or mitigation measures that are provided • located in excess of 100 m from a designated wetland • of low conservation significance for flora and fauna • sufficiently large to allow effective operation of the plant • located above an appropriate flood level • on relatively level ground • selected so that the use of construction facilities does not affect land use of adjacent properties.	Each construction compound would be lit at night for security and protection. All work undertaken on temporary sites would be subject to satisfying site-specific environmental criteria, implementing mitigation measures, and meeting local authority requirements. Temporary facilities would be for the exclusive use of the proposed bypass project, and would be removed on completion of the project. Once the facilities are no longer required, the sites would be restored to acceptable conditions, as agreed with the land owner.	

Table 7.2: Summary of Additional or Modified Management Measures

	Pre-construction	During Construction	Post-Construction
Long-nosed Potoroos			
	Develop an integrated plan of management for the Long-nosed Potoroo in consultation with relevant agencies and land owners.	Construction phase measures to be considered during the development of the integrated plan of management would include: • installation of animal proof fencing along the boundary of potoroo habitat and the road proposal • initiation of a fox control program on NSW Crown land • preparation and implementation of a fire management plan for the NSW Crown land taking into account the habitat requirements of the potoroo by prescribing a mosaic of 'patch' burning and the prevention of catastrophic wildfires	Post-construction phase measures to be considered during the development of the integrated plan of management would include: • inclusion in the Operation Environmental Management Plan of a monitoring program to check on the effectiveness of the integrated plan of management and to monitor the status of the population • annual selective burning of understorey vegetation • maintenance of the fox control program • Undertaking of population surveys annually for a period of five years
Wallum Sedge Frog			
	Measures to prevent frog mortality during construction would be determined and specified for implementation during Detailed Design. Such measures may include temporary frog fencing or, if practical the early implementation of sections of permanent frog fence.	Constructed wetlands would be revegetated with native species characteristic of the area. Where possible, wetland vegetation from areas to be disturbed would be used. A total of three, purpose built frog ponds would be constructed as early as practical in association with construction of the Tugun Bypass. 'Below ground ' ponds would be constructed and generally accord with the following specifications: • be generally spoon shaped and constructed to a depth immediately above the organic hard pan layer or to a maximum depth of one (1) metre, which ever is the lesser • approximately 15 to 20m long and 5 to 10m wide • intersect a major ephemeral drainage line • revegetate the pond margins with species consistent with the local habitat requirements for the Wallum Sedge Frog, such as Restio spp.	Monitoring of constructed ponds

	Pre-construction	During Construction	Post-Construction
Common Planigale			
	Underpass structure/s would be designed, implemented and monitored at approximate chainage 5270m. Revegetation at the entrance and exit of each purpose built culvert/pipe would also be undertaken. Additional survey for Common Planigale would be undertaken on Block F. Should no Common Planigale be identified within Block F, surveys would then be undertaken on Block A. Survey methods would reflect previous methods (pit fall traps) and be undertaken during the warmer month of October. Should the presence of Common Planigales not be confirmed on either Block F (subject to purchase) or Block A, then options such as further land or financial contribution to management of known habitat in conservation reserves would be discussed with relevant agencies	Translocation of Common Planigale is proposed prior to clearing and grubbing of habitat. Works to be undertaken in accordance with the approved Threatened Species Management Plan Construction of underpass structures Revegetation of disturbed of habitat adjacent to underpass entry and exit points	
Fauna Habitat			
	During the design of the box culvert proposed for the waterway crossing, consideration would be given to measures which would enhancelight penetration to assist fish passage during the detailed design phase of the Proposal. The fish habitat of this waterway could be classified as class 3 or 4 habitat under the DPI (Fisheries) classification and therefore a culvert would be considered as acceptable for fish passage. Further consultation would be undertaken with the DPI (Fisheries) to determine what is appropriate for the Proposal. Rehabilitation of two cleared areas within the road reserve, north of 'Hidden Valley' would occur to improve a fauna corridor. Damaged or destroyed hollows would be replaced at a ratio of 1:1 and with appropriately designed nest or roost boxes. In the following instances this would include, Medium sized hollows would be replaced with those designed for Squirrel Gliders and Brush-tailed Phascogales, Large hollows would be replaced with nest boxes designed for owls. These would be located on Blocks A and E and in suitable locations along the Tugun Bypass alignment as detailed and approved in the Flora and Fauna Management Sub Plan.		

	Pre-construction	During Construction	Post-Construction
Birds			
	Within and adjacent to Gold Coast Airport, a number of measures are proposed to manage the incidence of bird strike. These include: • avoiding the localised ponding of water during construction • locating stockpiles of topsoil far as practical from the runway or covering them • avoiding the use of plant species in landscaping that are highly attractive to birds and flying-fox • the timely collection of large roadkills, if they occur • the use of tunnel lights that are less attractive to insects Such measures would be detailed within the Contractors Construction Environmental Management Plan		
Flora			
	The translocation of flora would be undertaken following consultation with State and Commonwealth agencies. The *Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia*, 2nd edition, 2004 would be used when developing the flora translocation components of the Construction Environmental Management Plan and Threatened Species Management Plan. Prescribed species likely to be impacted by construction would be translocated to suitable habitat if this is agreed by relevant agencies. Such habitat would be identified for each species prior to construction with preference given to immediately adjacent locations. A suitably qualified botanist/ecologist/scientist would be appointed to coordinate revegetation of the significant rainforest associated species known to be impacted during construction with the aim to mitigate net loss. These species consist of the Long-leaved Tuckeroo, Black Walnut, Fine-leaved Tuckeroo and Stinking Cryptocarya.		

	Pre-construction	During Construction	Post-Construction
Cultural Heritage			
	The intent to develop a Cultural Heritage Management Plan/Cultural Heritage Assessment Report (CHMP/CHAR) would be publicly advertised, Archaeological survey would be undertaken prior to and during construction, as defined within the CHMP/CHAR, Anthropological work would be undertaken and in consultation with all Stakeholders. Sub-surface investigations would be undertaken prior to the start of construction. This is to be undertaken in consultation with the Traditional Owners. The following areas would be tested for sub-surface deposits prior to ground clearance: • the area opposite John Flynn Hospital between chainages 2080 and 2530 [Zone 4 – Eastern Yugambeh Limited/Tweed Byron Local Aboriginal Land Council report] • the area on Commonwealth/airport land between chainages 4250 and 5090 (Zones 8, 9 and 10 - Eastern Yugambeh Limited report) and chainages 4520 and 4750 (Turnix Pty Ltd/Ngarang-Wal report) The potential burial sites for an area from Boyd Street to the southern end of the project (chainages 2530 to 6800 – Zones 5 to 13 in the Eastern Yugambeh Limited report) would be assessed during vegetation clearing activities which would be undertaken prior to commencement of the major construction works. This would be done with presence of the Cultural Heritage Monitors and in accordance with the methodology outlined in the final Cultural Heritage Management Plan/Cultural Heritage Assessment Report.	As detailed in the Cultural Heritage Management Plan / Assessment Report	As detailed in the Cultural Heritage Management Plan/ Assessment Report
Ground Water (tunnel and approach ramps)			
	Hydraulic (slug) tests on a 4-6 bores along the tunnel alignment would be undertaken, 'Baseline' monitoring (groundwater) adjacent to the tunnel and approach ramps would be undertaken 6 months prior to construction, More detailed modelling ('WinFlow', 'PLAXIS' or equivalent) to assess groundwater flow and/ or patterns would be undertaken within the 'void' of		

	Pre-construction	During Construction	Post-Construction
	temporary slurry walls and between the eventual diaphragm walls. Undertake extraction and injection tests if detailed modelling indicates dewatering for slurry wall construction would exceed 0.5 metres or re-injection rates exceed 2.5 L/s per well. Dewatering for slurry wall installation *would be to a maximum depth of 1 metre* (similar to natural seasonal variation).		
Compensatory Habitat			
	The package of compensatory measures described at Appendix H of the Submissions Report would be implemented.		
Noise and Vibration			
	Develop a Noise and Vibration Management Plan as part of the Construction Environmental Management Plan. This plan would demonstrate that best practice environmental management is applied to all aspects of construction activities. Best practice environmental management would be expected to include (as a minimum) the following: • restriction of construction hours • use of plant and equipment designed with inbuilt attenuation • plant and equipment maintained in good working order and compliance with manufacturer's noise ratings for individual plant items • installation of appropriate temporary noise attenuation infrastructure, where necessary, based on advice from acoustic consultants • regular consultation with the community to keep them informed of up-coming works • operational noise mitigation measures to be built, where possible, early in the construction period to provide early benefits in terms of reducing construction noise impacts • development of an induction program on reducing construction noise. All buildings and structures which could potentially be subject to structural damage from excessive ground vibration would be surveyed prior to the start of construction and on completion where this is considered necessary. Identify control types, location and timing for	Develop, implement, monitor and audit Construction Environmental Management Plan (and associated Noise and Vibration Management Plan). Construction relating to surface activities and haulage activities would be limited to NSW Department of Environment and Conservation standard hours of construction (7 am to 6 pm Monday to Friday and 8 am to 12 pm on Saturday, with no work on Sunday or public holidays) or as identified in the Noise and Vibration Management Plan. If any activity needs to be undertaken outside the normal work hours the Department of Environment and Conservation and local residents would be consulted about the timing and duration prior to the work commencing. Additional noise attenuation measure may be required for equipment used during off-peak construction periods, depending on the nature and location of the work. Noise barriers required for the operational phase of the proposal would be constructed, *where possible* at the beginning of the construction process to provide additional noise protection. Standard noise treatments such as the provision of noise barriers, equipment enclosures, the use of silencers and regular equipment maintenance would be used to control noise from construction activities. Use of innovative technologies such as perimeter sawing, use of circular saw or diamond wire, water jet cutting, line drilling and splitting, ripping with excavators and griding would be considered where construction noise and	Maintenance of controls.

	Pre-construction	During Construction	Post-Construction
	implementation. Integrate requirements of approvals, licenses and/or permits. Integrate construction requirements into tender documents.	vibration may be an issue. Monitoring would be conducted during construction activities where there is considered to be potential for complaints regarding vibration which may exceed human disturbance criteria.	
Documentation			
	Design and Construction contract documents would include: • NSW RTA QA Specification G36 (with integration of Queensland and Commonwealth legislative requirements) • one copy of each environmental approval, permit and or licences • integrated requirements for each specific Sub Plan Construction Environmental Management Plan to be developed and certified	Operational Environmental Management Plan to be developed and certified	

7.3 Statement of Commitments from DIPNR Database

The following is a list of the Conditions of Approval from the DIPNR Conditions of Approval database that the RTA and QDMR would commit to in their standard form. Where the Condition of Approval in the database is similar to a commitment made in the EIS, SIS or SIS Addendum, that database condition has been omitted in favour of the more detailed condition included in the environmental impact assessment for the Proposal. References in the following standard conditions to Representations Report should be read as Submissions Report.

1. The Activity must be carried out consistent with:
   (a) the procedures, safeguards and mitigation measures identified in the EIS, as modified by the Representations Report; and
   (b) the measures, controls and commitments for the Activity listed in the amended Tables 7.1 and 7.2 of the Representations Report. The amended tables are included as Appendix A to the Conditions of Approval; and
   (c) these Conditions.

   These Conditions prevail in the event of any inconsistency with the requirements for the Construction and Operation of the Activity arising out of the documents described in (a) and (b) above.

2. These Conditions of Approval do not relieve the Proponent of its obligations under any other Act.

Compliance

General

3. The Proponent must notify in writing the Director-General, Relevant Government Departments and Relevant Councils of the start of the Activity's Construction and Operation. Such notification must be provided at least four weeks before the relevant start date unless otherwise agreed to by the Director-General.

4. It is the responsibility of the Proponent to ensure compliance with all of these Conditions and to implement any measures arising from these Conditions of Approval.

5. The Proponent must bring to the Director-General's attention any matter that may require further assessment by the Director-General.

6. The Proponent must comply with any requirements of the Director-General arising from the Director-General's assessment of:
   (a) any reports, plans or correspondence that are submitted to satisfy these Conditions of Approval; and
   (b) the implementation of any actions or measures contained in such reports, plans or correspondence.

Pre-Construction Compliance Report

8. The Proponent must submit a Pre-Construction Compliance Report to the Director-General at least four weeks before Construction commences (or within any other time agreed to by the Director-General).

   The Pre-Construction Compliance Report must include:
   (a) details of how the Conditions of Approval required to be addressed before Construction were complied with;

(b) the time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates; and
(c) details of any approvals or licences required to be issued by Relevant Government Departments before Construction commences.

Pre-Operation Compliance Report

9. The Proponent must submit a Pre-Operation Compliance Report to the Director-General at least four weeks before Operation commences (or within any other time agreed to by the Director-General).

The Pre-Operation Compliance Report must include:
(a) details of how the Conditions of Approval required to be addressed before Operation were complied with;
(b) the time when each relevant Condition of Approval was complied with, including dates of submission of any required reports and/or approval dates; and
(c) details of any approvals or licences issued by Relevant Government Departments for the Activity's Operation.

Construction Compliance Reports

10. The Proponent must provide the Director-General, Relevant Councils and any other government department nominated by the Director-General with Construction Compliance Reports. The EMR must review the Construction Compliance Reports before they are submitted to the Director-General and bring to the Director-General's attention any shortcomings.

The first Construction Compliance Report must report on the first six months of Construction and be submitted a maximum six weeks after expiry of that period (or at any other time interval agreed to by the Director General). The second, and subsequent, Construction Compliance Reports must be submitted at maximum intervals of six months from the date of submission of the first Construction Compliance Report (or at any other time interval agreed to by the Director General) for the duration of Construction.

The Construction Compliance Reports must include information on:
(a) compliance with the CEMP and the Conditions of Approval;
(b) compliance with any approvals or licences issued by Relevant Government Departments for Construction;
(c) the implementation and effectiveness of environmental controls. The assessment of effectiveness should be based on a comparison of actual impacts against performance criteria identified in the CEMP;
(d) environmental monitoring results, presented as a results summary and analysis;
(e) the number and details of any complaints, including a summary of main areas of complaint, action taken, response given and intended strategies to reduce recurring complaints;
(f) details of any review and amendments to the CEMP resulting from Construction during the reporting period; and
(g) any other matter relating to compliance with the Conditions of Approval or as requested by the Director-General.

The Construction Compliance Reports must be made Publicly Available.

Environmental Management

Construction Environmental Management Plan

13. A Construction Environmental Management Plan (CEMP) must be prepared and implemented in accordance with these Conditions of Approval and all relevant Acts and Regulations. The Proponent must obtain the Director-General's Approval for the CEMP before Construction commences or within any other time agreed to by the Director-General. The CEMP must be reviewed by the EMR before the Proponent seeks the Director-General's approval for the CEMP. The EMR must bring to the Director-General's attention any shortcomings.

    The Proponent must ensure that the mitigation measures identified in the EIS, Representations Report and in these Conditions are incorporated into the CEMP.

    The CEMP must:

    (a) state how the mitigation measures identified in Table 7.7 of the Representations Report will be implemented. The Table 7.7 is attached as Appendix A to these Conditions of Approval;
    (b) include a Construction program, identifying Construction activities and their location and timing;
    (c) cover any relevant environmental elements identified by the Proponent, or its contractor, from their environmental due diligence investigations;
    (d) contain the Construction Sub Plans required by the Conditions of Approval;
    (e) be prepared following consultation with Relevant Government Departments and Relevant Councils;
    (f) be Publicly Available;
    (g) include a community consultation and notification strategy (including local community, Relevant Government Departments, Relevant Councils), and complaints management system;
    (h) include environmental management details such as:
        i. identification of statutory obligations which the Proponent is required to fulfil during Construction, including all approvals and licences;
        ii. an environmental management structure indicating the responsibility, authority and accountability for personnel relevant to the CEMP;
        iii. the role of the EMR and identification of Construction activities requiring EMR attendance;
        iv. details of the Construction personnel induction and training program;
        v. emergency response procedures;
    (i) include implementation details such as:
        i. identification of relevant environmental elements;
        ii. measures to avoid and/or control environmental impacts;
        iii. the tools to be used to implement the CEMP such as plans, schedules and work instructions;
    (j) include monitoring and review details such as:
        i. performance criteria;
        ii. performance monitoring methods;
        iii. auditing and corrective actions procedures;
        iv. CEMP review procedures.

Environmental Management Representative

15. The Proponent must request the Director-General's Approval for the appointment of an Environmental Management Representative (EMR) at least eight weeks before Construction commences (or within any other time agreed to by the Director-General). In its request the Proponent must provide the following information, the:

(a) qualifications and experience of the EMR including demonstration of general compliance with relevant Australian Standards for environmental auditors;
(b) authority and independence (from the Proponent or its contractors) of the EMR including details of the Proponent's internal reporting structure; and
(c) resourcing of the EMR role. The EMR must be available:
    i. for sufficient time to undertake the EMR role. This timing shall be agreed between the Proponent and the EMR and advised to the Director-General in the request for approval;
    ii. at any other time requested by the Director-General;
    iii. during any Construction activities identified in the CEMP to require the EMR's attendance; and
    iv. for the duration of Construction.

16. The Director-General may at any time immediately revoke the approval of an EMR appointment by providing written notice to the Proponent. Interim arrangements for EMR responsibility following the revocation must be agreed in writing between the Director-General and the Proponent.

17. The Director-General may at any time conduct an audit of any actions undertaken by the EMR. The Proponent must:
    (a) facilitate and assist the Director-General in any such audit; and
    (b) include in the conditions of the EMR's appointment the need to facilitate and assist the Director-General in any such audit.

18. The EMR is authorised to :
    (a) consider and advise the Director-General and the Proponent on matters specified in the Conditions of Approval and compliance with such;
    (b) determine whether work falls within the definition of Construction where clarification is requested by the Proponent;
    (c) review the CEMP;
    (d) periodically monitor the Proponent's activities to evaluate compliance with the CEMP. Periodic monitoring must involve site inspections of active work sites at least fortnightly;
    (e) provide a written report to the Proponent of any non-compliance with the CEMP observed or identified by the EMR. Non compliance must be managed as identified in the CEMP;
    (f) issue a recommendation to the Proponent to stop work immediately if in the view of the EMR an unacceptable impact on the environment is occurring or is likely to occur. The stop work recommendation may be limited to specific activities causing an impact if the EMR can easily identify those activities. The EMR may also recommend that the Proponent initiate reasonable actions to avoid or minimise adverse impacts;
    (g) review corrective and preventative actions to monitor the implementation of recommendations made from audits and site inspections;
    (h) certify that minor revisions to the CEMP are consistent with the approved CEMP; and
    (i) provide regular (as agreed with the Director-General) reports to the Director-General on matters relevant to carrying out the EMR role including notifying the Director-General of any stop work recommendations.

    The EMR must immediately advise the Proponent and the Director-General of any incidents relevant to these Conditions resulting from Construction that were not dealt with expediently or adequately by the Proponent.

Communication and Consultation

Advice of Construction Activities

19. Before Construction commences, and then at maximum three monthly intervals, the Proponent must advertise in relevant newspapers the: nature of the works proposed for the next three months; areas in which these works are proposed; Construction hours; and a contact telephone number.

    The Proponent must ensure that the local community and businesses are advised of Construction activities that could cause disruption. Methods to disseminate this information must be identified in the CEMP. Information to be provided must include:
    (a) details of any traffic disruptions and controls;
    (b) construction of temporary detours; and
    (c) work approved to be undertaken outside standard Construction hours, in particular noisy works, before such works are undertaken.

20. The Proponent must establish an Activity internet site before Construction commences and maintain the internet site until Construction ends. This internet site must contain:
    (a) periodic updates of work progress, consultation activities and planned work schedules. The site must indicate the date of the last update and the frequency of the internet site updates;
    (b) a description of relevant approval authorities and their areas of responsibility;
    (c) a list of reports and plans that are Publicly Available under this Approval and details of how these can be accessed;
    (d) contact names and phone numbers of relevant communications staff; and
    (e) the 24 hour toll-free complaints contact telephone number.

    Updates of work progress, Construction activities and planned work schedules must be provided where significant changes in noise or traffic impacts are expected.

Construction Complaints Management System

23. The Proponent must prepare and implement a Construction Complaints Management System before Construction commences and maintain the System for the duration of Construction. The Construction Complaints Management System must be consistent with AS 4269 "Complaints Handling" and include:
    (a) a 24 hour, toll free telephone number listed with a telephone company and advertised;
    (b) a system to receive, record, track and respond to complaints within a specified timeframe. When a complaint cannot be responded to immediately, a follow-up verbal response on what action is proposed must be provided to the complainant within two hours during night-time works and 24 hours at other times;
    (c) a process for the provision of a written response to the complainant within 10 days, if the complaint cannot be resolved by the initial or follow-up verbal response; and
    (d) a mediation system for complaints unable to be resolved.

    Information on all complaints received, including the means by which they were addressed and whether resolution was reached with or without mediation, must be included in the Construction Compliance Reports and must be made available to the Director-General on request.

Flora and Fauna

Construction

24. A Flora and Fauna Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Government Departments and Relevant Councils and include:
    (a) plans showing:
        i. terrestrial vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities were recorded; and areas to be cleared. The plans must also identify vegetation adjoining the Activity where this contains important habitat areas and/or threatened species, populations or ecological communities;
        ii. aquatic vegetation communities; important habitat areas; locations where threatened species, populations or ecological communities were recorded; and areas to be cleared. The plans must also identify vegetation adjoining the Activity where this contains important habitat areas and/or threatened species, populations or ecological communities;
    (b) methods to manage impacts on flora and fauna species (terrestrial and aquatic) and their habitat which may be directly or indirectly affected by the Activity. These must include:
        i. procedures for vegetation clearing, soil management and managing other habitat damage (terrestrial and aquatic) during Construction;
        ii. methods to protect vegetation both retained within, and also adjoining, the Activity from damage during Construction;
        iii. a habitat tree management program including fauna recovery procedures and habitat maintenance (e.g. relocating hollows or installing nesting boxes);
        iv. methods to minimise damage to aquatic habitats;
        v. where possible, and where consistent with DEC or NSW Fisheries requirements, strategies for re-using in rehabilitation works individuals of any threatened plant species that would be otherwise be destroyed by the Activity;
        vi. performance criteria against which to measure the success of the methods
    (c) rehabilitation details including:
        i. identification of locally native species to be used in rehabilitation and landscaping works, including flora species suitable as a food resource for threatened fauna species;
        ii. methods to remediate affected aquatic habitats or fish passages;
        iii. the source of all seed or tube stock to be used in rehabilitation and landscaping works including the identification of seed sources within the Activity. Seed of locally native species within the Activity should be collected before Construction commences to provide seed stock for revegetation;
        iv. methods to re-use topsoil (and where relevant subsoils) and cleared vegetation;
        v. measures for the management and maintenance of all preserved, planted and rehabilitated vegetation (including aquatic vegetation);
    (d) a Weed Management Strategy including:
        i. identification of weeds within the Activity and adjoining areas;
        ii. weed eradication methods and protocols for the use of herbicides;
        iii. methods to treat and re-use weed infested topsoil;
        iv. strategies to control the spread of weeds during Construction;

(e) a program for reporting on the effectiveness of terrestrial and aquatic flora and fauna management measures against the identified performance criteria. Management methods must be reviewed where found to be ineffective.

Heritage

Indigenous Heritage Management

25. An Indigenous Heritage Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with all relevant Aboriginal groups and the DEC and include:
    (a) details of the archaeological investigations to be undertaken and any associated licences or approvals required;
    (b) procedures to be implemented if previously unidentified Aboriginal objects are discovered during Construction. If such objects are discovered all work likely to affect the object(s) must cease immediately and the DEC informed in accordance with the *National Parks and Wildlife Act 1974*; and
    (c) an education program for Construction personnel on their obligations for Aboriginal cultural materials.

Historical Relics

28. If during the course of Construction the Proponent becomes aware of any unexpected historical relic(s), all work likely to affect the relic(s) must cease immediately and the Heritage Council notified in accordance with the *Heritage Act 1977*.

Noise and Vibration

Construction Noise and Vibration Management Sub Plan

29. A Construction Noise and Vibration Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the Relevant Councils and include:
    (a) an education program for Construction personnel about noise minimisation.
    (b) identification of each Construction activity, including Ancillary Facilities, and their associated noise sources;
    (c) identification of all potentially affected Sensitive Receivers;
    (d) the Construction noise objective specified in the Conditions of Approval;
    (e) the Construction vibration criteria specified in the Conditions of Approval;
    (f) determination of appropriate noise and vibration objectives for each identified Sensitive Receiver;
    (g) noise and vibration monitoring, reporting and response procedures;
    (h) assessment of potential noise and vibration from each Construction activity including noise from Construction vehicles and any traffic diversions;
    (i) a description of management methods and procedures and specific noise mitigation treatments that will be implemented to control noise and vibration during Construction;
    (j) justification for any activities outside the Construction hours specified in the Conditions of Approval. This includes identifying areas where Construction noise would not be audible at any Sensitive Receiver;
    (k) procedures for notifying residents of Construction activities that are likely to affect their noise and vibration amenity; and
    (l) contingency plans to be implemented in the event of non-compliances and/or noise complaints.

Construction Noise Management

32. The Proponent must ensure that public address systems used at any Construction site are not used outside the Construction hours detailed in the Conditions of Approval unless otherwise approved through the Construction Noise and Vibration Management Sub Plan. Public address systems must be designed to minimise noise spillage off-site.

35. The Proponent must, where Reasonable and Feasible, erect Operation noise mitigation measures at the start of Construction (or at other times during Construction) to minimise Construction noise impacts.

Physical Issues

Soil and Water Management

Soil and Water Quality Management Sub Plan

42. A Soil and Water Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Government Departments and Relevant Councils. The Sub Plan must:
    (a) where relevant, be consistent with the Department of Housing's guideline "Managing Urban Stormwater - Soils and Construction", the RTA's "Guidelines for the Control of Erosion and Sedimentation in Roadworks" and the DIPNR "Constructed Wetlands Manual";
    (b) identify the Construction activities that could cause soil erosion or discharge sediment or water pollutants from the site;
    (c) describe management methods to minimise soil erosion or discharge of sediment or water pollutants from the site including a strategy to minimise the area of bare surfaces during Construction;
    (d) describe the location and capacity of erosion and sediment control measures;
    (e) identify the timing and conditions under which Construction stage controls will be decommissioned;
    (f) include contingency plans to be implemented for events such as fuel spills; and
    (g) identify how the effectiveness of the sediment and erosion control system will be monitored, reviewed and updated.

Acid Sulfate Soils Management

44. An Acid Sulfate Soil Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with Relevant Government Departments. The Sub Plan must:
    (a) be consistent with the "Acid Sulfate Soils Manual" (Acid Sulfate Soil Management Advisory Committee, 1998) or update;
    (b) include a contingency plan to deal with the unexpected discovery of actual or potential acid sulphate soils; and
    (c) include a water quality monitoring program.

Spoil and Fill Management

47. A Spoil and Fill Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must include:
    (a) the locations of major (defined as a volume greater than 500 cubic metres) spoil stockpiles;
    (b) the source of imported fill material and where it will be stockpiled and used; and
    (c) methods to re-use or dispose excess or unsuitable spoil material including estimated volumes and disposal sites.

48. All material excavated from Construction must be re-used or recycled unless otherwise approved in the Spoil and Fill Management Sub Plan. The Proponent must ensure that the re-use of material generated from Construction is maximised in preference to importing fill.

Air Quality

Dust Management Sub Plan

49. A Dust Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must identify:
    (a) potential sources of dust;
    (b) dust management objectives consistent with DEC guidelines;
    (c) a monitoring program to assess compliance with the identified objectives. Monitoring for dust deposition and particulate concentration must be undertaken according to the DEC Guideline "Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales";
    (d) mitigation measures to be implemented, including measures during weather conditions where high level dust episodes are probable (such as strong winds in dry weather); and
    (e) a progressive rehabilitation strategy for exposed surfaces with the aim of minimising exposed surfaces.

Construction

50. Construction vehicles using public roads must be maintained to prevent any loss of load, whether dust, liquid or soils. Facilities must be provided at exit points of all Construction sites/compounds to minimise tracking mud, dirt or other material onto a public road or footpath. In the event of any spillage, the Proponent must remove the spilled material as soon as practicable within the working day of the spillage.

51. The Proponent must ensure that all plant and equipment used in connection with the Activity are:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

Social and Economic Issues

Property Damage and Access

54. Subject to landowner agreement, property inspections must be conducted on all Structures within:
    (a) 200 metres of blasting;
    (b) 50 metres of Construction activities that generate vibration impacts;
    (c) any other locations identified by the Proponent; and
    (d) any other locations identified by the EMR.

    The property inspections must be undertaken consistent with AS 4349.1 "Inspection of Buildings".

    The owners of all properties on which property inspections are to be conducted must be advised at least two weeks before the inspection of its scope and methodology and of the process for making a property damage claim. A copy of the property inspection report must be given to the owner of each property inspected at least three weeks before Construction that could affect the property commences.

A register of all properties inspected must be maintained by the Proponent indicating whether the owner accepted or refused the property inspection offer. A copy of the register must be provided to the Director-General upon request.

55. Property inspections need not be undertaken if a risk assessment indicates Structures will not be affected. The risk assessment must be undertaken before Construction commences by geotechnical and construction engineering experts with appropriate registration on the National Professional Engineers Register.

Traffic

59. Road dilapidation reports must be prepared for all roads likely to be used by Construction traffic. These reports must be prepared before Construction commences and after Construction is complete. Copies of the reports must be provided to the relevant roads authority. Any damage resulting from Construction, except that resulting from normal wear and tear, must be repaired at the Proponent's cost. Alternatively the Proponent may negotiate an alternative arrangement for road damage with the relevant roads authority.

60. A Construction Traffic Management Sub Plan must be prepared as part of the CEMP. The Sub Plan must be prepared in consultation with the relevant roads authority and include:
    (a) identification of all public roads to be used by Construction traffic, in particular roads proposed to transport large quantities of Construction materials. The expected timing and duration of road usage must be stated;
    (b) management methods to ensure Construction traffic uses identified roads;
    (c) identification of all public roads that may be partially or completely closed during Construction and the expected timing and duration of these closures. Consideration must be given to programming Construction works to minimise road closures during peak hours and/or holiday periods;
    (d) impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons);
    (e) temporary traffic arrangements including property access;
    (f) access to Construction sites including entry and exit locations and measures to prevent Construction vehicles queuing on public roads;
    (g) a response plan for any Construction traffic incident; and
    (h) monitoring, review and amendment mechanisms.

Waste Management and Recycling

64. As part of the Construction and Operation EMPs the Proponent must prepare Waste Management and Re-use Sub Plan(s). The Sub Plans must address the management of wastes during the Construction and Operation stages respectively in accordance with the NSW Government's Waste Reduction and Purchasing Policy. The Sub Plan(s) must identify requirements for:
    (a) the application of the waste minimisation hierarchy principles of avoid/reduce/re-use/recycle/dispose;
    (b) waste handling and storage;
    (c) disposal of wastes. Specific details must be provided for cleared vegetation, contaminated materials, glass, metals and plastics, hydrocarbons (lubricants and fuels) and sanitary wastes; and
    (d) any waste material that is unable to be re-used, re-processed or recycled must be disposed at a facility approved to receive that type of waste.

Utilities and Services

65. The Proponent must identify the utilities and services (hereafter "services") potentially affected by Construction to determine requirements for diversion, protection and/or support. Alterations to services must be determined by negotiation between the Proponent and the service providers. The Proponent in consultation with service providers must ensure that disruption to services resulting from the Activity are minimised and advised to customers.

Specific Conditions: Roads

Bridge and Culvert Design

73. The Proponent must undertake the design and construction of bridges and culverts in consultation with the DEC and NSW Fisheries. The Proponent must ensure the design and construction of bridges and culverts are consistent with NSW Fisheries Guidelines.

Soil and Water Management

Operation

80. All Operation stage controls for stormwater drainage and water pollution must be located, designed, constructed, operated and maintained to meet the requirements of the RTA's "Code of Practice for Water Management – Road Development and Management". These controls must be designed in consultation with Relevant Government Departments and Relevant Councils.

Table 7.3: Summary of Withdrawn or Completed Management Measures

Aspect	Prior management measure withdrawn	Reason for withdrawal
Long-nosed Potoroos	Provision of predator control fencing around the Cobaki Lakes development area once construction commences in order to reduce the incidence of dogs and cats straying from the development preying on native wildlife in adjacent NSW Crown lands, and If necessary, provision of predator control fencing along both sides of the Boyd Street extension, once operational. Fencing around the south-eastern part of the Cobaki Lakes development is likely to be undertaken by Main Roads and maintained by the NSW Department of Lands.	Fencing along the boundary of the Bypass is still proposed as part of the project. Other fencing for Potoroo conservation is subject to further consideration about its benefits and agreements with land owners to be documented within the plan. An integrated plan of management is to be developed for the Cobaki Lakes Population of the Long-nosed Potoroo. Cumulative impacts, management options, timing for implementation and responsibilities will be discussed and detailed within this plan. QDMR would be responsible for development and management of implementation of the Plan.
Vegetation	Weed management on the Pony Club land would be undertaken. Main Roads and the Roads and Traffic Authority would seek permission from the Department of Lands (and Tweed Shire Council as trustee) to undertake additional weed management (for 10 years) of Endangered Ecological Communities as situated within NSW Crown Land (Lot 319). This could include: • 3.3 hectares of Swamp Oak Floodplain Forest Endangered Ecological Community • 16.8 hectares of Swamp Sclerophyll Forest on Coastal Floodplains Endangered Ecological Community; and • 1.9 hectares of Freshwater Wetlands on Coastal Floodplains Endangered Ecological Community	Weed management of Lot 319 is currently undertaken through agreements already in place between the Lands Department, Tweed Shire Council and Tweed Heads Pony Club and is considered sufficient. Rehabilitation within the Saltmarsh area is still proposed as part of the Proposal.
Hollows	Small hollows would be replaced with nest boxes designed for bats, incorporating an overhanging roof and internal baffles and having both internal and external walls lined with flyscreen to improve grip,	Detailed survey of the study area and Blocks A and E indicate an abundance of small hollows and replacement of removed small hollows with nest boxes is not warranted.
Common Planigale	Revegetate a 10-30 metre habitat link along the road edge between Common Planigale habitat in the south to the wet/dry culvert to provide continuous habitat for fauna to the underpass.	Revegetation of areas within the bounds of Gold Coast Airport is no longer considered an option. However, it is still proposed to revegetate at the ends of the wet/dry culvert to connect to existing habitat areas.
Contaminated Land	Further geotechnical and groundwater studies of the Tugun Landfill area to be completed.	Studies completed.
Wallum Sedge Frog	Undertake further studies to finalise location of artificial frog ponds. Include locations and construction method in the detailed design.	Studies completed and detail design continuing.

Aspect	Prior management measure withdrawn	Reason for withdrawal
Compensatory Land	Block C	Block F is proposed to replace Block C. This represents a net gain in overall area (seven hectares) and is perceived to be of greater ecological diversity and quality. Block C has been removed (for compensatory habitat) on the presumption that Block F is suitable and can be acquired. If Block F is not suitable or cannot be acquired then Block C would be included again for compensation for acid frog habitat.

8 Conclusion

This Submissions Report demonstrates that:

- Statutory obligations have been met;
- The EIS, SIS and SIS Addendum have been considered;
- All issues arising from the submissions and additional correspondence since the EIS and SIS exhibition have been considered and written responses to the issues have been provided;
- In responding to these issues and to other correspondence, additional studies have been undertaken which include consideration of likely impacts and the measures which might be used to mitigate these impacts. Additional and modified mitigation measures have been proposed in light of the submissions received and the additional studies;
- Having considered the submissions received, the Proponents are satisfied that the Proposal, as described in the EIS, should proceed with no modifications.

In consideration of the above, the RTA proposes to seek approval of the Minister for Planning under Part 3A of the EP&A Act for the Proposal as described in Chapter 7 of this Submissions Report. Additionally, if the Proposal receives the necessary approvals under NSW legislation, the RTA and QDMR would seek approval of the Commonwealth Minister for the Environment and Heritage under the EPBC Act for the Proposal as described in Chapter 7 of this Submissions Report.

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