Transport
Roads & Maritime
Services

NSW GOVERNMENT

Referrals Gateway
Environment Assessment Branch
GPO Box 787
CANBERRA ACT 2601

File No: SF2016/089025

Dear Sir/Madam

Additional Crossing of the Clarence River at Grafton: Referral of Proposed Action

The NSW Roads & Maritime Services (Roads and Maritime) is planning to build a new bridge across the Clarence River at Grafton NSW. The project known as the 'Additional Crossing of the Clarence River at Grafton' is located in a largely disturbed urban residential landscape and has been assessed and approved under Part 5.1 of the *NSW Environmental Planning and Assessment Act 1979*. An assessment of Matters of National Environmental Significance (MNES) was also undertaken as part of the Environmental Impact Statement (EIS) which concluded no significant impact on MNES matters. The project was approved by the NSW Minister for Planning on 19 December 2014.

As part of the NSW Conditions of Approval, Roads and Maritime undertook flora and fauna surveys for those parts of the project area previously not surveyed, due to accessibility issues. These surveys were required to be completed prior to the commencement of construction. The surveys have now been completed and recorded the presence of the Three Toed Snake Tooth Skink (*Coeranoscincus reticulatus*) which is listed as threatened (vulnerable) species under the *Environment Protection Biodiversity Conservation Act 1999 (EPBC Act)*. This species was previously assessed in the project EIS and was known to occur in the area based on historical records. As a result of the recent surveys an updated and detailed assessment was undertaken to determine the significance of the impact the project would have on this species.

The surveys and associated assessments found the proposal will permanently remove less than 1% of Three Toed Snake Tooth Skink habitat available in the local area. To assist the project manage impacts on the Three Toed Snake Tooth Skink a detailed management plan has been developed which has also undergone external EPA (Biodiversity), Project Environmental Representative and Clarence Valley Council review .

Roads and Maritime has considered likely impacts associated with Three Toed Snake Tooth Skink and other MNES and based on expert advice have concluded

that no significant impact is likely. The referral, accompanying management plan and assessment reports provide a comprehensive analysis of MNES matters.

Roads and Maritime is now referring the proposed action for consideration under the provisions of the *EPBC Act*, noting in our referral enclosed we believe the proposal is not a controlled action and is referred in relation to non-controlled action in a particular manner.

If further information is required or you would like to meet to discuss the proposal please contact, Roads & Maritime Senior Project Manager, Greg Nash on (02) 66401390 or Greg.Nash@rms.nsw.gov.au.

Yours sincerely,

25/5/16

Robert (Bob) Higgins
General Manager, Pacific Highway

Australian Government
Department of the Environment

Referral of proposed action

What is a referral?

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the matters of NES without approval from the Australian Government Environment Minister or the Minister's delegate. (Further references to 'the Minister' in this form include references to the Minister's delegate.) To obtain approval from the Environment Minister, a proposed action should be referred. The purpose of a referral is to obtain a decision on whether your proposed action will need formal assessment and approval under the EPBC Act.

Your referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be undertaken. These decisions are made within 20 business days, provided sufficient information is provided in the referral.

Who can make a referral?

Referrals may be made by or on behalf of a person proposing to take an action, the Commonwealth or a Commonwealth agency, a state or territory government, or agency, provided that the relevant government or agency has administrative responsibilities relating to the action.

When do I need to make a referral?

A referral must be made for actions that are likely to have a significant impact on the following matters protected by Part 3 of the EPBC Act:

World Heritage properties (sections 12 and 15A)

National Heritage places (sections 15B and 15C)

Wetlands of international importance (sections 16 and 17B)

Listed threatened species and communities (sections 18 and 18A)

Listed migratory species (sections 20 and 20A)

Protection of the environment from nuclear actions (sections 21 and 22A)

Commonwealth marine environment (sections 23 and 24A)

Great Barrier Reef Marine Park (sections 24B and 24C)

A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)

The environment, if the action involves Commonwealth land (sections 26 and 27A), including:

- actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land);
- actions taken on Commonwealth land that may have a significant impact on the environment generally;

The environment, if the action is taken by the Commonwealth (section 28)

Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C)

You may still make a referral if you believe your action is not going to have a significant impact, or if you are unsure. This will provide a greater level of certainty that Commonwealth assessment requirements have been met.

To help you decide whether or not your proposed action requires approval (and therefore, if you should make a referral), the following guidance is available from the Department's website:

the Policy Statement titled *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*. Additional sectoral guidelines are also available.

the Policy Statement titled *Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies*.

the Policy Statement titled Significant Impact Guidelines: Coal seam gas and large coal mining developments—Impacts on water resources.

the interactive map tool (enter a location to obtain a report on what matters of NES may occur in that location).

Can I refer part of a larger action?

In certain circumstances, **the Minister may not accept a referral for an action that is a component of a larger action and may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (Section 74A, EPBC Act).** If you wish to make a referral for a staged or component referral, read 'Fact Sheet 6 Staged Developments/Split Referrals' and contact the Referrals Gateway (1800 803 772).

Do I need a permit?

Some activities may also require a permit under other sections of the EPBC Act or another law of the Commonwealth. Information is available on the Department's web site.

Is your action in the Great Barrier Reef Marine Park?

If your action is in the Great Barrier Reef Marine Park it may require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If a permission is required, referral of the action under the EPBC Act is deemed to be an application under the GBRMP Act (see section 37AB, GBRMP Act). This referral will be forwarded to the Great Barrier Reef Marine Park Authority (the Authority) for the Authority to commence its permit processes as required under the Great Barrier Reef Marine Park Regulations 1983. If a permission is not required under the GBRMP Act, no approval under the EPBC Act is required (see section 43, EPBC Act). The Authority can provide advice on relevant permission requirements applying to activities in the Marine Park.

The Authority is responsible for assessing applications for permissions under the GBRMP Act, GBRMP Regulations and Zoning Plan. Where assessment and approval is also required under the EPBC Act, a single integrated assessment for the purposes of both Acts will apply in most cases. Further information on environmental approval requirements applying to actions in the Great Barrier Reef Marine Park is available from http://www.gbrmpa.gov.au/ or by contacting GBRMPA's Environmental Assessment and Management Section on (07) 4750 0700.

The Authority may require a permit application assessment fee to be paid in relation to the assessment of applications for permissions required under the GBRMP Act, even if the permission is made as a referral under the EPBC Act. Further information on this is available from the Authority:

Great Barrier Reef Marine Park Authority

2-68 Flinders Street PO Box 1379
Townsville QLD 4810
AUSTRALIA

Phone: + 61 7 4750 0700
Fax: + 61 7 4772 6093

www.gbrmpa.gov.au

What information do I need to provide?

Completing all parts of this form will ensure that you submit the required information and will also assist the Department to process your referral efficiently. If a section of the referral document is not applicable to your proposal enter N/A.

You can complete your referral by entering your information into this Word file.

Instructions

Instructions are provided in blue text throughout the form.

Attachments/supporting information

The referral form should contain sufficient information to provide an adequate basis for a decision on the likely impacts of the proposed action. You should also provide supporting documentation, such as environmental reports or surveys, as attachments.

Coloured maps, figures or photographs to help explain the project and its location should also be submitted with your referral. Aerial photographs, in particular, can provide a useful perspective and context. Figures should be good quality as they may be scanned and viewed electronically as black and white documents. Maps should be of a scale that clearly shows the location of the proposed action and any environmental aspects of interest.

Please ensure any attachments are below three megabytes (3mb) as they will be published on the Department's website for public comment. To minimise file size, enclose maps and figures as separate files if necessary. If unsure, contact the Referrals Gateway (email address below) for advice. Attachments larger than three megabytes (3mb) may delay processing of your referral.

Note: the Minister may decide not to publish information that the Minister is satisfied is commercial-in-confidence.

How do I pay for my referral?

From 1 October 2014 the Australian Government commenced cost recovery arrangements for environmental assessments and some strategic assessments under the EPBC Act. If an action is referred on or after 1 October 2014, then cost recovery will apply to both the referral and any assessment activities undertaken. Further information regarding cost recovery can be found on the Department's website at: http://www.environment.gov.au/epbc/publications/cost-recovery-cris

Payment of the referral fee can be made using one of the following methods:

- **EFT Payments can be made to:**

  BSB: 092-009
  Bank Account No. 115859
  Amount: $7352
  Account Name: Department of the Environment.
  Bank: Reserve Bank of Australia
  Bank Address: 20-22 London Circuit Canberra ACT 2601
  Description: The reference number provided (see note below)

- **Cheque** - Payable to "Department of the Environment". Include the reference number provided (see note below), and if posted, address:

  The Referrals Gateway
  Environment Assessment Branch
  Department of the Environment
  GPO Box 787
  Canberra ACT 2601

- **Credit Card**

  Please contact the Collector of Public Money (CPM) directly (call (02) 6274 2930 or 6274 20260 and provide the reference number (see note below).

Note: in order to receive a reference number, submit your referral and the Referrals Gateway will email you the reference number.

How do I submit a referral?

Referrals may be submitted by mail or email.

Mail to:

Referrals Gateway
Environment Assessment Branch
Department of Environment
GPO Box 787
CANBERRA ACT 2601

- If submitting via mail, electronic copies of documentation (on CD/DVD or by email) are required.

Email to: epbc.referrals@environment.gov.au

Clearly mark the email as a 'Referral under the EPBC Act'.

Attach the referral as a Microsoft Word file and, if possible, a PDF file.

Follow up with a mailed hardcopy including copies of any attachments or supporting reports.

What happens next?

Following receipt of a valid referral (containing all required information) you will be advised of the next steps in the process, and the referral and attachments will be published on the Department's web site for public comment.

The Department will write to you within 20 business days to advise you of the outcome of your referral and whether or not formal assessment and approval under the EPBC Act is required. There are a number of possible decisions regarding your referral:

The proposed action is NOT LIKELY to have a significant impact and does NOT NEED approval

No further consideration is required under the environmental assessment provisions of the EPBC Act and the action can proceed (subject to any other Commonwealth, state or local government requirements).

The proposed action is NOT LIKELY to have a significant impact IF undertaken in a particular manner

The action can proceed if undertaken in a particular manner (subject to any other Commonwealth, state or local government requirements). The particular manner in which you must carry out the action will be identified as part of the final decision. You must report your compliance with the particular manner to the Department.

The proposed action is LIKELY to have a significant impact and does NEED approval

If the action is likely to have a significant impact a decision will be made that it is a *controlled action*. The particular matters upon which the action may have a significant impact (such as World Heritage values or threatened species) are known as the *controlling provisions*.

The controlled action is subject to a public assessment process before a final decision can be made about whether to approve it. The assessment approach will usually be decided at the same time as the controlled action decision. (Further information about the levels of assessment and basis for deciding the approach are available on the Department's web site.)

The proposed action would have UNACCEPTABLE impacts and CANNOT proceed

The Minister may decide, on the basis of the information in the referral, that a referred action would have clearly unacceptable impacts on a protected matter and cannot proceed.

Compliance audits

If a decision is made to approve a project, the Department may audit it at any time to ensure that it is completed in accordance with the approval decision or the information provided in the referral. If the project changes, such that the likelihood of significant impacts could vary, you should write to the Department to advise of the changes. If your project is in the Great Barrier Reef Marine Park and a decision is made to approve it, the Authority may also audit it. (See "*Is your action in the Great Barrier Reef Marine Park,"* p.2, for more details).

For more information

call the Department of the Environment Community Information Unit on 1800 803 772 or

visit the web site http://www.environment.gov.au/epbc

All the information you need to make a referral, including documents referenced in this form, can be accessed from the above web site.

Referral of proposed action

Project title: Additional Crossing of the Clarence River at Grafton

1 Summary of proposed action

1.1 **Short description**

Roads and Maritime completed an environmental impact statement of the Additional Crossing of the Clarence River at Grafton (the Project EIS) in August 2014. The Submissions Report was issued in October 2014. After consideration of the Project EIS and Submissions Report, the Minister for Planning approved the Additional Crossing of the Clarence River at Grafton Project (the Project) under Section 115ZB of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 19 December 2014 subject to the Minister's Conditions of Approval (MCoA) being met. The project is State Significant Infrastructure (SSI) approved under Part 5.1 of the EP&A Act.

As described in the Project EIS, the project involves:

- Building a road bridge across the Clarence River about 70 metres downstream of the existing road and rail bridge (which is to be retained)
- Upgrading parts of the road network in Grafton and South Grafton to connect the new bridge to the existing road network
- Replacing part of the rail viaduct where it crosses Pound Street in Grafton
- Providing a pedestrian and cycle path and signalised pedestrian crossings.
- Flood mitigation works, raising levees slightly in Grafton and South Grafton.

As outlined in the Project EIS, the project objectives are to:

- Enhance road safety for all road users over the length of the project
- Improve traffic efficiency between and within Grafton and South Grafton
- Support regional and local economic development
- Involve all stakeholders and consider their interests
- Provide value for money
- Minimise impact on the environment.

As outlined in the Project EIS, the project is needed to:

- Provide a practical alternative for road users needing to cross the Clarence River at Grafton. The existing bridge is the only crossing in the Grafton area for people travelling between Grafton and South Grafton. The nearest alternative bridge over the river is in Maclean, about 41 kilometres east of Grafton
- Relieve current and future traffic congestion on the existing bridge over the Clarence River. The bridge is already operating at capacity during peak periods, and forecast traffic growth will worsen congestion problems
- Improve road safety for motorists, pedestrians and cyclists travelling across the river
- Provide a crossing that is designed for the demands of existing and future levels of traffic use and present-day vehicles. The current bridge, which was built in 1932, constrains traffic due to the following design problems:
  - Bottlenecks: There are two lanes of traffic in each direction approaching the bridge, but the traffic must merge into a single lane in each direction on the bridge
  - Kinks: The bridge has pronounced kinks in its horizontal alignment at the northern and southern ends which cannot be negotiated by long, heavy vehicles without crossing the centreline and bringing oncoming traffic to a standstill
- Provide a crossing for large, heavy vehicles. There is a 25/26 metre long B-double trucks ban on the current bridge during peak periods, which restricts efficient freight movement over the Clarence River.

The Project EIS identified Matters of National Environmental Significance (MNES) within the project area, including Three-toed Snake tooth Skink *Saiphos reticulatus* (TTSTS), Grey-headed Flying Fox *Pteropus*

poliocephalus, Silver Perch *Bidyanus bidyanus*, Hairy-joint Grass *Arthraxon hispidus* and Migratory species. Targeted surveys were undertaken for these species, however due to the nature of the project, certain areas were not accessible to undertake surveys (such as privately owned land and occupied residential blocks). Based on the survey information, *Environment Protection and Biodiviersity Conservation 1999* (EPBC Act) assessments of significance were undertaken, the results of which determined that Project would not have a significant impact on any of these MNES.

The Project was approved subject to the MCoAs being met. MCoA B3 states, *"The Proponent shall undertake flora and fauna surveys of those parts of the project area previously not surveyed, due to accessibility issues, prior to the commencement of construction that affects those areas..."* Consequently, Roads and Maritime engaged Lewis Ecological Surveys to implement a biodiversity gap survey and field surveys at the locations that were not surveyed for the Project EIS due to access constraints.

None of the missing lot surveys required under MCOA B 3 surveyed properties are considered to contain examples of native plant community types. This is consistent with previous findings of other ecological surveys in the immediate area (Biosis 2011; 2012; 2014). Given this, clearing calculations will quantify these areas as ornamental gardens and street plantings or something of a similar nature so as to clearly distinguish them from potential native plant community types occurring elsewhere in the Project study area. Similarly, the surveys concluded little likelihood of naturally occurring examples of threatened flora. Surveys were conducted during an ideal time for cryptic species like Hairy Joint Grass (*Arthraxon hispudus*).

Field surveys confirm the continued presence of TTSTS on the northern side of the Clarence River. No additional threatened fauna were identified apart from TTSTS, which were identified at two separate locations. It was considered likely that a population extends throughout the Dovedale area and potentially more broadly through the Grafton township or at least where some form of mulch cover exists on alluvial soils. In many instances these areas are likely to be residential gardens, a previously unrecorded known habitat type for this species (TSSC, 2008). Further surveys were required to provide greater context with respect to local distributional extent and the implications of the Project and its potential impact on this species.

Field surveys were carried out for TTSTS between February and April 2016 at a large number of locations within the proposed construction works boundary and throughout parts of Grafton and South Grafton.

From these surveys, TTSTS were recorded at 17 locations, all on the northern side of the Clarence River. The locations where TTSTS were found are shown in **Attachment 1, Figure 1** and include:

- The proposed construction footprint for the northern bridge abutment
- Along parts of the existing levee in Grafton where levee raising works are proposed
- In urban areas of Grafton, outside of the proposed construction work zone.

The field surveys confirmed that a population of TTSTS is potentially affected by the proposed construction works for the project. This referral has been prepared as a precautionary measure to fully address EPBC Act requirements on this Matter of National Environmental Significance (MNES).

Figures 2 and 3 also shows the bunding location coordinate points for the main bridge works (Construction Works Zone) and the levee works, as detailed in Section 1.2.

1.2 **Latitude and longitude**

Latitude and longitude details are used to accurately map the boundary of the proposed action. If these coordinates are inaccurate or insufficient it may delay the processing of your referral.

Main Construction Zone Area (Figure 2)

Pt	Latitude	Longitude
Project Area		
1	152.9382709	-29.69149105
2	152.9400618	-29.69278789
3	152.9405558	-29.69241736
4	152.941513	-29.69325105
5	152.9429642	-29.6946714
6	152.9434274	-29.69602999

7	152.9437979	-29.69930297
8	152.9451256	-29.70226718
9	152.9468547	-29.70279209
10	152.9463298	-29.70569454
11	152.9486765	-29.70554015
12	152.9489235	-29.7058798
13	152.9464225	-29.70711489
14	152.9423776	-29.70720752
15	152.942007	-29.70850436
16	152.9415439	-29.70850436
17	152.9409263	-29.70770155
18	152.9396604	-29.70794857
19	152.9391354	-29.70751629
20	152.9393825	-29.70711489
21	152.9405867	-29.70711489
22	152.9419453	-29.70689875
23	152.9410498	-29.70628121
24	152.9410498	-29.70603419
25	152.9425319	-29.70658998
26	152.9431804	-29.70535489
27	152.9416983	-29.70470647
28	152.9419453	-29.70408893
29	152.9422232	-29.70421244
30	152.9436435	-29.70124823
31	152.9432112	-29.69985876
32	152.9425937	-29.69988963
33	152.9426246	-29.69961174
34	152.9431186	-29.69942648
35	152.9421305	-29.69643139
36	152.941513	-29.69550508
37	152.9415747	-29.69516543
38	152.9413277	-29.69491841
39	152.9411733	-29.69396122
40	152.9406484	-29.69393034
41	152.9400618	-29.69346719
42	152.9393825	-29.69414648
43	152.9391663	-29.69386859
44	152.9399074	-29.69303491
45	152.9379004	-29.69192333
46	152.9382709	-29.69149105

Levee Boundaries (Figure 3)

Pt	Latitude	Longitude
Levee (Grafton)		
NG 1	152.9219	-29.6814
NG 1	152.9232	-29.6835
NG 1	152.9231	-29.6836

Pt	Latitude	Longitude
Levee (South Grafton)		
SG 1	152.8991	-29.6675
SG 1	152.9028	-29.6741
SG 1	152.9027	-29.6742

NG 1	152.9218	-29.6814	SG 1	152.899	-29.6675
NG 2	152.9248	-29.6856	SG 2	152.9028	-29.6743
NG 2	152.9259	-29.6867	SG 2	152.9073	-29.6816
NG 2	152.9257	-29.6869	SG 2	152.9066	-29.6818
NG 2	152.9245	-29.6857	SG 2	152.9022	-29.6746
NG 3(i)	152.9258	-29.6873	SG 3	152.9089	-29.6897
NG 3(i)	152.9275	-29.69	SG 3	152.911	-29.6911
NG 3(i)	152.9256	-29.6874	SG 3	152.9109	-29.6912
NG 3(i)	152.9276	-29.6899	SG 3	152.9088	-29.6898
NG 3(ii)	152.9276	-29.6899	SG 4	152.9111	-29.6911
NG 3(ii)	152.9302	-29.6923	SG 4	152.9126	-29.6926
NG 3(ii)	152.9299	-29.6925	SG 4	152.9125	-29.6926
NG 3(ii)	152.9274	-29.6901	SG 4	152.9109	-29.6912
NG 3a	152.9333	-29.6942	SG 5	152.9156	-29.6945
NG 3a	152.934	-29.6945	SG 5	152.918	-29.6964
NG 3a	152.9339	-29.6946	SG 5	152.9179	-29.6965
NG 3a	152.9333	-29.6943	SG 5	152.9155	-29.6947
NG 3b	152.9341	-29.6944	SG 6	152.9185	-29.6968
NG 3b	152.9345	-29.6946	SG 6	152.9192	-29.6972
NG 3b	152.9345	-29.6946	SG 6	152.9192	-29.6972
NG 3b	152.9341	-29.6944	SG 6	152.9185	-29.6968
NG 3c	152.935	-29.6945	SG 7	152.9194	-29.6973
NG 3c	152.936	-29.6949	SG 7	152.9202	-29.6977
NG 3c	152.9358	-29.6952	SG 7	152.9202	-29.6977
NG 3c	152.9348	-29.6948	SG 7	152.9194	-29.6973
NG 3d	152.9361	-29.6952	SG 8(i)	152.9204	-29.6977
NG 3d	152.9364	-29.6955	SG 8(i)	152.9222	-29.6987
NG 3d	152.9363	-29.6955	SG 8(i)	152.9221	-29.6988
NG 3d	152.936	-29.6953	SG 8(i)	152.9204	-29.6978
NG 4	152.9381	-29.6958	SG 8(ii)	152.9222	-29.6987
NG 4	152.9404	-29.6959	SG 8(ii)	152.9228	-29.6996
NG 4	152.9404	-29.696	SG 8(ii)	152.9227	-29.6996
NG 4	152.9381	-29.6959	SG 8(ii)	152.9221	-29.6988
NG 5	152.9411	-29.696	SG 9	152.936	-29.7012
NG 5	152.9415	-29.6959	SG 9	152.938	-29.7012
NG 5	152.9415	-29.6959	SG 9	152.938	-29.7014
NG 5	152.9411	-29.696	SG 9	152.936	-29.7013
NG 6	152.9421	-29.6959	SG 10	152.9389	-29.7007
NG 6	152.9428	-29.6958	SG 10	152.9408	-29.7011
NG 6	152.9428	-29.6958	SG 10	152.9407	-29.7013
NG 6	152.9421	-29.6959	SG 10	152.9388	-29.7009

1.3 **Locality and property description**

The project is located at Grafton in the Clarence Valley local government area, on the NSW Mid North Coast, about 610 kilometres north of Sydney (**Attachment 1, Figure 4**). The southern end of the project is located at the junction of Bent Street (the Summerland Way) and the Gwydir Highway in South Grafton and the northern end is located at the junction of Pound Street and Villiers Street in Grafton. The new bridge would be about 70 metres to the east (downstream) of the existing bridge (**Attachment 1, Figure 4**).

Grafton is located on the northern and southern banks of the Clarence River, about 37 kilometres inland from the coast. Grafton is a major regional centre within the Mid North Coast Region and is a focal point for regional road, river and other transport networks. It is also the focus of higher order services to the Clarence Valley subregion such as a major hospital, regional airport, State government offices, sports and entertainment venues, retail shopping centres and livestock selling centre among other services.

1.4	**Size of the development footprint or work area (hectares)**	As outlined in the Project EIS, the project area footprint in total is 49.70 hectares (ha) of which 36.07 ha comprises disturbed vegetation and the remaining hard stand, buildings and infrastructure. With the reduction in levee works from 11.0 km to 5.7 km, the development footprint area has been further reduced.
1.5	**Street address of the site**	Parts of Villiers, Dobie, Pound, Clarence and Greaves Streets in Grafton. Parts of Iolanthe, Through and Spring Streets and the Pacific and Gwydir Highways in South Grafton. Sections of the Clarence River. Other areas in Grafton and South Grafton within the Clarence Valley local government area.

1.6 **Lot description**

LPO / APO	Lot and DP	Land ownership
LPO	**South side levee**	
93	20//DP9270	Private property owner
92	19//DP9270	Private property owner
91	1//DP555614	Private property owner
90	2//DP555614	Private property owner
89	17//DP9270	Private property owner
88	16//DP9270	Private property owner
87	15//DP9270	Private property owner
82	416//DP51385	Private property owner
81	1//DP546675	Private property owner
80	2//DP546675	Private property owner
78	1//DP616956	Private property owner
77	2//DP515705	Private business owner
76	1//DP515705	Private property owner
75.1		Road Reserve (Hay St)
73	2//DP523615	Private property owner
72	1//DP709841	Private property owner
71	1//DP87465	Private property owner
69	2//DP158781	Private property owner
68	3//DP158781	Private property owner
67	4//DP158781	Private property owner
66	8A//DP159766	Private property owner

65	8B//DP159766	Private property owner
64	8C//DP159766	Private property owner
63	4//DP159766	Private property owner
62	2//DP197033	Private property owner
61	1//DP197033	Private property owner
60	2//DP743761	Private property owner
59	2//DP500775	Private property owner
58	3//DP500775	Private property owner
56.1		Road Reserve (James St)
56	3//DP544945	Private property owner
53	4//DP1004386	Private property owner
54	2//DP516879	Private property owner
52	3//DP1004386	Private property owner
31.2		Road Reserve (Skinner St)
31.1	1//DP33660	Clarence Valley Council
31	X//DP33661	Clarence Valley Council
30	A//DP381139	Clarence Valley Council
29	230//DP751385	Clarence Valley Council
28.1	6//DP783029	Clarence Valley Council
28	6//1DP758914	Private property owner
27	8//DP783029	Private property owner
24	7/703754	Private property owner
23	356//DP751385	Private property owner
19	449//DP727424	Private property owner
20	1//DP816112	Clarence Valley Council
18	7//DP726496	Private property owner
16	53//DP1196678	Private property owner
15	52//DP1196678	Private property owner
14	54//DP1196678	Private property owner
13	41//DP880595	Private property owner
12	40//DP880595	Private property owner
11	5//DP979550	Private property owner
10	1//DP995504	Private property owner
8	7A//DP435956	Private property owner
	Northern Levee	
165	2//DP1007024	Private business owner
163	1//DP1007024	Transport for NSW (managed by ARTC)
166	2//DP758470	Transport for NSW (managed by ARTC)
165	142//DP938726	Transport for NSW (managed by ARTC)
164	9//DP758470	Transport for NSW (managed by ARTC)
155		Road Reserve (Fitzroy St)
151	5//DP25861	Private property owner
150	4//DP25861	Private property owner
149		Road Reserve (Victoria St/Alice St)

148	1//DP833552	Private property owner
147	10//DP846839	Private property owner
146	11//DP846839	Private property owner
145	B//DP364448	Private property owner
144	C//DP364448	Private property owner
143	1//DP650134	Private property owner
142.1		Road Reserve (Mary St)
142	7//DP259814	Private property owner
141	8//DP259814	Private property owner
140	19//DP259814	Clarence Valley Council
139	9//DP625257	Private property owner
138	10//DP625257	Clarence Valley Council
133	14//DP259814	Clarence Valley Council
137	10//DP259814	Private property owner
136	SP31999	Private property owner
135	SP30528	Private property owner
134	13//DP259814	Private property owner
132.1	15//DP259814	Private property owner
132	16//DP259814	Private property owner
131	1//DP736979	Private property owner
130.1		Road Reserve (Queen St)
130	11/3//DP758470	Private business owner
129	1//DP366383	Private business owner
128	1//DP115212	Private business owner
120	7001//DP1054597	Crown Lands (Council as Trust Manager)
119	9//DP866434	Private business owner
118	7//DP866434	Private business owner
117	6//DP866434	Private business owner
116	5//DP866434	Private business owner
115	13//DP1177589	Private business owner
114	12//DP1177589	Private business owner
113	21//DP556054	Private business owner
112	1//DP876947	Private property owner
111.1		Road Reserve (Villiers St)
111	2//DP876947	Private business owner
110	3//DP876947	Private business owner
107	17//DP1163618	Clarence Valley Council
106	9//DP1154569	Private business owner
105	1//DP1065647	Private property owner
104	1//DP1127729	Private property owner
103	2//DP840332	Private property owner
102	1//DP840332	Private property owner
98.1	3//DP1138536	Transport for NSW (managed by ARTC)
97	11//DP839860	Clarence Valley Council

APO	Construction Zone Footprint (north of river)	
8	12//DP1048362	RMS (Private property owner)
10	13//DP1048362	RMS (Private property owner)
11	1//DP808306	RMS (Private property owner)
36	100//DP851143	North Coast Institute of TAFE – Grafton campus
30	1//DP783118	RMS (Private property owner)
29	2//DP783118	RMS (Private property owner)
28	3//DP783118	RMS (Private property owner)
27	4//DP783118	RMS (Private property owner)
34	2//DP737953	RMS (Private property owner)
22	1//DP783062	Private property owner
19	2//DP782843	RMS (Private property owner)
18	1//DP713416	RMS (Private property owner)
17	2//DP782843	RMS (Private property owner)
16	1//DP782843	RMS (Private property owner)
15	9//DP12717	RMS (Private property owner)
14	1//DP817474	RMS (Private property owner)
12	10//DP12717	RMS (Private property owner)
13	1//DP781379	RMS (Private property owner)
9	1//DP354989	RMS (Private property owner)
9	1//DP390723	RMS (Private property owner)
1 C	11//DP839860	Clarence Valley Council
	Construction Zone Footprint (South of River)	
7	457//DP823651	RMS (Private property owner)
7	379//DP751385	RMS (Private property owner)
7	380//DP751385	RMS (Private property owner)
6	3//DP1101889	RMS (Private business owner)
6	2//DP1101889	RMS (Private business owner)
1B	2//DP839420	Clarence Valley Council
20	2//DP782846	RMS (Private property owner)
21	1//DP783390	RMS (Private property owner)
5	17//DP858248	RMS (Private property owner)
5	18//DP858248	RMS (Private property owner)
5	385//DP751385	RMS (Private property owner)
5	384//DP751385	RMS (Private property owner)
5	383//DP751385	RMS (Private property owner)
5	382//DP751385	RMS (Private property owner)
5	381//DP751385	RMS (Private property owner)
5	18//DP858248	RMS (Private property owner)
2B	8//DP12717	State Rail (TfNSW)
2A	1//DP549572	State Rail (TfNSW)
2A	2//DP549572	State Rail (TfNSW)

1.7 **Local Government Area and Council contact (if known)**

The Project is not subject to local government planning approval. The Project is in Clarence Valley Council Local Government Area.

1.8 **Time frame**

It is anticipated that construction will commence by the end of 2016. The NSW Government has nominated the end of 2019 as the desired completion date for the project. The actual timing of construction, opening to traffic and completion would depend on the availability of construction funding.

1.9	**Alternatives to proposed action** Were any feasible alternatives to taking the proposed action (including not taking the action) considered but are not proposed?		No
		X	Yes, you must also complete section 2.2
1.10	**Alternative time frames etc** Does the proposed action include alternative time frames, locations or activities?	X	No
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment** Is the action subject to a state or territory environmental impact assessment?		No
		X	Yes, you must also complete Section 2.5
1.12	**Component of larger action** Is the proposed action a component of a larger action?	X	No
			Yes, you must also complete Section 2.7
1.13	**Related actions/proposals** Is the proposed action related to other actions or proposals in the region (if known)?	X	No
			Yes, provide details:
1.14	**Australian Government funding** Has the person proposing to take the action received any Australian Government grant funding to undertake this project?	X	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park** Is the proposed action inside the Great Barrier Reef Marine Park?	X	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

As outlined in the Project EIS, the project involves:

- Construction of a new bridge over the Clarence River about 70 metres downstream of the existing road and rail bridge (which is to be retained)
- Upgrades to parts of the road network in Grafton and South Grafton to connect the new bridge to the existing road network, including:
  - Widening Iolanthe Street to four lanes
  - Widening the Gwydir Highway to four lanes between Bent Street and the Pacific Highway
  - Realigning the existing Pacific Highway to join Iolanthe Street near Through Street
  - Providing a new roundabout at the intersection of the Pacific Highway and Gwydir Highway
  - Providing a new roundabout at the intersection of Through Street and Iolanthe Street
  - Limiting Spring Street and the Old Pacific Highway to left in and left out only where they meet Iolanthe Street
  - Realigning Butters Lane
  - Widening Pound Street to four lanes between Villiers Street and the approach to the new bridge
  - Providing traffic signals at the intersection at Pound Street and Clarence Street
  - Closing Kent Street where it is crossed by the bridge approach road
  - Realigning and lowering Greaves Street beneath the new bridge
  - Realigning Bridge Street to join directly to the southern part of Pound Street (east of the new bridge approach). There would be no direct connection between Pound Street south and the new bridge approach
  - Widening Clarence Street to provide formal car park spaces
  - Minor modifications to the existing Dobie Street and Villiers Street roundabout.
- The existing rail viaduct section across Pound Street would be replaced with a new bridge structure to provide sufficient vertical clearance for the upgrade of Pound Street
- Construction of a pedestrian and cycle path and signalised pedestrian crossings for access to and across the new bridge and throughout Grafton and South Grafton
- Flood mitigation works, which includes raising the height of sections of the existing levee upstream of the existing bridge in Grafton and South Grafton
- Ancillary works such as public utility adjustments, construction compounds and stockpile areas and water management measures.

The Project EIS was prepared based on the project concept design and the key project features are shown in in **Attachment 1, Figure 5**. The project concept design would be subject to further refinement during the detailed design stage.

Project construction elements

Bridge works and alignment

Indicative long sections and cross-sections of the proposed bridge are presented in **Attachment 1, Figure 6, Figure 7, Figure 8 and Figure 9.** Concept design is subject to further refinement during the detailed design stage.

The proposed bridge would be located about 70 metres downstream (east) of the existing bridge. It would be about 553 metres long with an overall deck width of about 17 metres. The bridge would be a concrete box girder bridge consisting of:

- Two traffic lanes (one northbound and one southbound), separated by a raised median
- Road shoulders two metres wide on the outside of each traffic lane
- A pedestrian and cycle path on the western (upstream) side of the bridge
- An approach viaduct, about 58 metres long, on the South Grafton side of the Clarence River
- An approach viaduct, about 29 metres long, on the Grafton side of the Clarence River.

Below-water bridge structures
The bridge foundations would comprise piles bored into bedrock. These would support concrete pile caps, piers and superstructure. The pile caps would be constructed of reinforced concrete partially submerged but visible at all times for navigational safety. All pile caps would have a similar shape to each other for consistency.

Bridge spans, piers and abutments
The proposed concrete box girder section of the bridge would be about 466 metres long across the main river channel. The concrete box girder would consist of five main spans, each about 74 metres long and a back span at both ends, each about 48 metres long.

On both the southern and northern banks of the river, the bridge superstructure would transition from a concrete box girder to a concrete 'super-T' form. The super-T section of the bridge on the southern river bank would consist of two spans, each about 29 metres long, between the southern abutment and a transition pier with the main concrete box girder. The super-T section of bridge on the northern river bank would consist of a single span, about 29 metres long between the northern abutment and a transition pier with the main concrete box girder.

All of the bridge piers would be constructed from reinforced concrete or similar material. The piers in the main river channel would generally align with the piers of the existing bridge.

The two bridge abutments would be constructed of reinforced concrete or similar material. The northern bridge abutment would be located to the north of Greaves Street. The southern bridge abutment would be located close to the existing railway turntable in the Australian Rail Track Corporation (ARTC) land in South Grafton.

Local road network upgrades in Grafton
The proposed road network upgrades in Grafton are presented in Table 1 and **Attachment 1, Figure 10**. These upgrades are needed to connect the new bridge approach roads with the existing road network and support forecast traffic demands on the new bridge. Local road network upgrades will be subject to further refinement during the detailed design stage. Concept design is subject to further refinement during the detailed design stage.

Table 1: Proposed local road network upgrades in Grafton

Location	Description
Main alignment	
Proposed bridge – northern approach	A new road would be constructed between the Pound Street rail viaduct and the northern abutment of the proposed bridge. The new road would consist of two 3.5 m lanes (one in each direction) with a 2 m shoulder, a 1.2 m raised median and a 2.5 m pedestrian and cycle path on the western side. There would be a short section of retaining wall along the eastern side of the proposed bridge approach road opposite the reconfigured intersection of Pound Street and Bridge Street. The retaining wall would be about 51 m long and between 0.3 m and 1.3 m high.
Pound Street	Pound Street would be widened to four lanes (two lanes in each direction) between the rail viaduct and Villiers Street. The section of Pound Street south of the new northern bridge approach road would be separated from the rest of Pound Street. On-street parking would be provided on both sides of Pound Street between Clarence Street and Villiers Street. Driveway accesses along Pound Street between the northern bridge approach road and Villiers Street would be limited to left-in and left-out only.
Main intersections	
Pound Street and Clarence Street intersection	This intersection would be signalised and some movements would be restricted, including: • The right-turn from Pound Street to Clarence Street from both approaches would be prohibited • The Clarence Street eastern approach would be limited to left-in and left-out only • The through movement would be prohibited on the Clarence Street western approach.
Dobie Street and Villiers Street roundabout	Minor refinements would be made to the existing roundabout including extending the concrete apron to make it easier for heavy vehicles to negotiate the roundabout.
Other road network upgrades	
Greaves Street	Greaves Street would be slightly realigned and lowered to pass beneath the proposed bridge.
Kent Street	The northern approach divides Kent Street. Kent Street (west) would be closed at Greaves Street. Kent Street (east) would be closed at the existing intersection with Pound Street.

Location	Description
Bridge Street	Bridge Street would be realigned to tie into the section of Pound Street east of the new bridge approach.
Clarence Street	Clarence Street would be upgraded between Pound Street and the Summerland Way (Craig Street) with additional parking provided on both sides of Clarence Street and centrally between the traffic lanes. The intersection of Pound Street and Clarence Street would be upgraded and signalised.

Local road network upgrades in South Grafton

The proposed road network upgrades in South Grafton are described in Table 2 and **Attachment 1, Figure 11**. These upgrades are needed to connect the bridge approach roads with the existing road network and to support forecast traffic demands at the new bridge. Concept design is subject to further refinement during the detailed design stage.

Table 2: Proposed local road network upgrades in South Grafton

Location	Description
Main alignment	
Proposed bridge southern approach	A new road connection would be constructed between the existing Iolanthe Street and Through Street intersection and the proposed bridge. The new road would consist of two 3.5 m lanes (one in each direction) with a 2 m shoulder, a 1.2 m raised median and a 2.5 m pedestrian and cycle path on the western side. The new connection would separate the northern part of Iolanthe Street and Butters Lane from the rest of Iolanthe Street.
Iolanthe Street	Iolanthe Street would be widened to four lanes (two lanes in each direction) between the Gwydir Highway and the new southern bridge approach road. Driveway accesses along Iolanthe Street would generally be limited to left-in and left-out only. A signalised pedestrian crossing would be provided mid-block between Spring Street and Through Street.
Main intersections	
Through Street and Iolanthe Street intersection	A new roundabout would be constructed next to the existing intersection of Through Street and Iolanthe Street. This would include a connection to the proposed Pacific Highway (north) realignment.
Butters Lane connection	Iolanthe Street/Butters Lane would be realigned to connect to a new T-intersection on the realigned Pacific Highway (north).
Pacific Highway (south), Gwydir Highway and Iolanthe Street Roundabout	A new roundabout would be constructed at the intersection of Pacific Highway (south), Gwydir Highway and Iolanthe Street. The Pacific Highway (south) would be connected with the Pacific Highway (north) along Iolanthe Street between the new roundabouts on Gwydir Highway and Through Street.
Ben Street / Gwydir Highway	The existing Gwydir Highway and Bent Street roundabout would be upgraded to tie in with the widened Gwydir Highway on the eastern side.
Other road network upgrades	
Pacific Highway (north) realignment	The Pacific Highway (north) would be realigned to connect to a new roundabout at the intersection of Iolanthe Street and Through Street
Pacific Highway cul-de-sac	The existing Pacific Highway (north) would be closed with a turning circle installed nearby to Bunnings Warehouse. This section of old Pacific Highway (north) would be maintained to provide access to properties. A left-out only connection to the realigned Pacific Highway would be provided from the existing Pacific Highway (north).
Spring Street	Spring Street would be restricted to left-in left-out only at Iolanthe Street
Gwydir Highway	The Gwydir Highway would be upgraded to four lanes between the Pacific Highway and Bent Street. A signalised pedestrian crossing would be provided mid-block between Bent Street and the Pacific Highway.

Pound Street viaduct replacement
The existing three span concrete arch section of viaduct crossing Pound Street would be replaced to allow adequate space and clearances for the new proposed road alignment. The three arches, two central piers and bridge superstructure would be demolished and replaced with a new single span steel truss bridge about 49 m long. Concept design is subject to further refinement during the detailed design stage. The proposed superstructure would likely include steel trusses, cross beams, a precast concrete deck slab and ballasted track.

The substructure would consist of two new reinforced concrete walls connected to the existing pier at the south end of the bridge and the existing abutment at the north end of the bridge.

The bridge would be supported on two fixed bearings at the northern abutment and on two sliding bearings in the longitudinal direction at the pier. The replacement of the viaduct would be designed based on Australian Standards, in conjunction with Roads and Maritime and ARTC specifications.

Pedestrian and cyclist access and circulation
The project includes a pedestrian and cycle path, which would run on the western (upstream) side of the project, providing a continuous path from the Pacific Highway roundabout with the Gwydir Highway and Iolanthe Street, across the bridge and onto Pound Street in Grafton (**Attachment 1, Figure 12**). Concept design is subject to further refinement during the detailed design stage.

Grafton Section
A pedestrian and cycle path would be provided on the southern side of Pound Street, improving local connectivity by linking Grafton and South Grafton via the new bridge. The path would be about 2.5 metres wide along Pound Street and the bridge approach road and would connect to:

- Existing footpaths on Clarence Street, Villiers Street and Pound Street and Council's future pedestrian and cycle paths as proposed in its *Bike Plan and Pedestrian Access and Mobility Plan* (CVC and QED, 2008)
- A signalised crossing at the intersection of Pound and Clarence streets to allow safe movements in all directions and improve the safety of pedestrians and cyclists
- The Dovedale area via a link to Kent Street. The Dovedale area is the residential area in Grafton north of the Clarence River foreshore and east of the existing railway viaduct.

In addition to the pedestrian and cycle path, the following pedestrian facilities would also be provided in Grafton and constructed consistent with Council standards:

- A 1.5 m wide pedestrian path between Villiers Street and Clarence Street on the northern side to replace the existing path
- A 1.2 m wide pedestrian path on the western side of Clarence Street, linking Pound Street with the existing TAFE driveway entrance
- A 2.5 m wide path connection from the northern bridge approach to the existing bridge, tying in with the existing path at Greaves Street.

South Grafton Section
A pedestrian and cycle path about 2.5 m wide is proposed along the western side of the southern approach road to the bridge. The proposed path in South Grafton would be constructed consistent with Council standards and would connect to:

- The existing bridge's pedestrian and cycle path via a new path parallel to the Clarence River south bank
- The South Grafton bus interchange via a new path crossing the Gwydir Highway
- The future pedestrian and cycle path to Clarenza (proposed by Clarence Valley Council and described in Council's *Bike Plan and Pedestrian Access and Mobility Plan* (CVC and QED, 2008)) via a new path on an existing right-of-way at Bunnings Warehouse and along the Pacific Highway north.

Mid-block signalised pedestrian crossings are proposed to provide safe crossing points for pedestrians and cyclists at the following locations:

- Iolanthe Street between Though Street and Spring Street. This would allow safe east–west movements across Iolanthe Street
- Gwydir Highway between Iolanthe Street and Bent Street. This would allow safe north–south movements across the Gwydir Highway
- If the possible initial upgrades are constructed, a signalised pedestrian crossing would be needed on the Pacific Highway east of Iolanthe Street (note that this crossing would not be needed if the Pacific Highway is realigned to join Iolanthe Street at the Through Street roundabout). This crossing would allow safe north–south movements across the Pacific Highway.

Flood mitigation works
In the Project EIS, about 3.7 km of existing levee in Grafton and seven km of existing levee in South Grafton upstream of the proposed bridge would be raised up by about 0.2 m to maintain the current level of flood immunity within Grafton and South Grafton. Following approval of the Project EIS, more detailed levee survey, updated bathymetric survey, updated flood frequency analysis and levee design refinement was carried out. As a result, the extent of levee works needed to mitigate potential flood impacts have been reduced to approximately 2.0 km in Grafton and 3.7 km in South Grafton. Typically short lengths of levee will be raised by 0.05 m to 0.2 m, with isolated low points raised more. The extent of the proposed flood mitigation works is presented in **Attachment 1, Figure 13**. Concept design is subject to further refinement during the detailed design stage.

The Project would also include flood mitigation works for a number of impacted properties located outside the levee system. Flood mitigation options for these properties would be developed and implemented in consultation with property owners and Clarence Valley Council before the bridge construction works begin. The scale of this work has been reduced from the Project EIS design by requiring greater focus on reducing afflux.

A summary of the proposed changes to the Project EIS as a resulted of the detailed levee survey, bathymetric survey, flood frequency analysis and contractor's design is included as a Flood Mitigation Fact Sheet in **Attachment 2**.

Noise mitigation works
The proposed noise mitigation works consist of a noise barrier and noise architectural treatment at a number of properties. These are described below. Concept design is subject to further refinement during the detailed design stage.

Noise barrier
The noise assessment identified that a noise barrier would be required to mitigate noise impacts from the elevated bridge and approach road on the surrounding neighbourhood. The noise barrier would be located on the eastern side (downstream side) of the northern bridge and approach road and would be about three metres high (measured from the road surface) and about 310 m long. The barrier dimensions and materials would be confirmed during detailed design.

Noise architectural treatment
The noise assessment also identified that architectural treatment would be required for a number of properties which would experience an exceedance of the noise threshold levels. Architectural noise treatments may include (but not limited to) one or a combination of the following:
- Upgraded windows
- Doors and window seals
- Provision of fresh air ventilation/air-conditioning.

Drainage strategy for Grafton
Drainage strategy for Grafton
The existing drainage system in Grafton is a combination of piped networks and open drainage channels. Where the existing road has kerbs, the stormwater runoff is collected via pits and transferred to pipes and open channels, before it is discharged into the Clarence River. Concept design is subject to further refinement during the detailed design stage.

The proposed drainage strategy for the project in Grafton would be to use or modify the existing drainage networks where possible. Where this is not possible, the existing drainage would be removed and replaced with pits that direct the stormwater runoff into grass-lined open channels or swales where possible, which would provide some water quality treatment. Where this is not possible, a pit and pipe network would be implemented. The proposed stormwater drainage would ultimately drain into the Clarence River, consistent with Council's existing stormwater drainage network.

Any grass-lined open channels or swales identified during detailed design would be designed to optimise water quality performance.

There is an existing low point along Pound Street, between Bridge Street and Kent Street. Water is known to pond across Pound Street in this area during local storm events. The proposed stormwater management

system on Pound Street would allow flood-free access to the new bridge in 20-year average recurrence interval event floods and would include:

- A detention basin south of Pound Street. The size of the basin would be determined in detailed design and would be developed to maximise the storage and minimise the pumping needs
- A pump station to extract water from the detention basin and convey it to the Clarence River. The pump station would be enclosed in a pump house located near the foreshore. The pump station size would be confirmed during detailed design
- A series of culverts beneath Pound Street to connect the catchment north of Pound Street with the proposed detention basin.

Drainage strategy for South Grafton

The existing drainage system in South Grafton is a combination of piped networks and open drainage channels, with the stormwater runoff ultimately discharging into the Clarence River. Concept design is subject to further refinement during the detailed design stage.

The proposed drainage strategy would be designed to replicate the existing situation as closely as possible. Where possible, the existing drainage networks would be modified and re-used. Where this is not possible, the existing drainage would be removed and replaced with pits that direct the stormwater runoff into grass and concrete-lined open channels running along the toe of the road embankment, consistent with Council's existing stormwater drainage network (**Attachment 1, Figure 14**).

The stormwater runoff would be directed through a series of grass and concrete-lined open channels and culverts, eventually discharging through a culvert in the flood levee with a flap valve. The stormwater runoff would receive some water quality treatment in the grass-lined channels. From here the water would disperse over the floodplain and ultimately end up in Alipou Creek.

Lighting

As the bridge and bridge approach would be close to residential buildings on the Grafton approach, the lighting produced by the bridge would be designed to avoid any undesirable light spill to the surrounding residential developments in accordance with the principles of *AS4282 Control of the Obtrusive Effects of Outdoor Lighting* (1997). Poles and lighting fixtures would designed in a manner consistent with Council's suburban street lighting on both sides of the Clarence River. Concept design is subject to further refinement during the detailed design stage.

Appropriate lighting would be provided to cater for all users (road users, pedestrians and cyclists) and scenarios (intersections, crossings, pathways). The road lighting would be in accordance with *AS1158.1.1:2005 Vehicular Traffic (Category V3) Lighting*. The pedestrian and cycle path lighting would be provided in accordance with *AS1158.3.1:2005 Pedestrian Area (Category P2)* Lighting. Pedestrian crossing lighting would be designed in accordance with *AS 1158.4:2009 Pedestrian Crossings (Category PX1) Lighting*.

The lighting design would also be influenced by the Crime prevention and the assessment of development applications Guidelines under section 79C of EP&A Act (DUAP, 2001). Lighting design would be further developed during detailed design.

Property acquisition

The acquisition boundary for the proposed project has been developed based on the requirement to have sufficient space for construction and operation of the project. The project would require acquisition of land in Grafton and South Grafton. **Figure 15 in Attachment 1** shows the location of the properties which have been or will be acquired as part of the project.

Utilities

The project requires the connection of utilities, services and other infrastructure associated with the project. This is addressed under MCoA B28, which requires, *"Utilities, services and other infrastructure potentially affected by construction and operation shall be identified prior to construction to determine requirements for access to, diversion, protection, and/or support. Consultation with the relevant owner and/or provider of services that are likely to be affected by the SSI shall be undertaken to make suitable arrangements for access to, diversion, protection, and/or support of the affected infrastructure as required. The cost of any such arrangements shall be borne by the Proponent"*.

Definitions

For the purposes of this referral the following areas are defined:

- The 'project' is the Additional Crossing of the Clarence River at Grafton.
- The 'proposed action' consists of the whole Project, including the construction of the new bridge and associated road upgrades, flood mitigation works, viaduct replacement and house demolition.
- The Construction work zone area comprises the area in which infrastructure associated with the proposed action may be located. Clearing for infrastructure that may be required in this area has been included in the total area of clearing calculated for the proposed action footprint.
- The 'proposed action footprint' is the area within the Construction work zone area where direct impacts would occur, including construction buffer zones. The clearing area is defined in Section 1.6.
- 'Ancillary Area' – the Project EIS identified a potential main ancillary facility site located to the west of Iolanthe Street in South Grafton. The ancillary area will be used for site compounds, concrete batching plants (as required), stockpile areas / storage and pre-cast facilities. It was not possible to reach agreement for this ancillary area. Roads and Maritime have an approved alternative ancillary facility located on cleared land to the east of Iolanthe Street. A lease agreement has been reached with the lot owner, Geoffrey Woods.
- The 'study area' is the proposed action footprint (defined above) and any proximal areas that could potentially be affected by the proposed action including areas of ecological significance outside the corridor, predominantly large areas of Grafton and South Grafton for targeted threatened species surveys.
- The 'region' is a bioregion defined in a national system of bio-regionalisation. For this study this is the NSW North Coast bioregion as defined in the Interim Biogeographic Regionalisation for Australia (Thackway & Cresswell, 1995).

Excluded Activities

The activities identified in Table 3 are excluded from the proposed action being referred.

In general, the activities outlined in the table are exempt from construction under the critical infrastructure project approval. The listed activities would involve nil to limited clearing of highly disturbed native and exotic vegetation / suitable habitat and have been assessed to have a minimal impact on MNES.

A pre-works checklist and assessment would be completed by the Construction Contractor and the project ecologist and provided to Roads and Maritime for signoff before planned works. Specific restrictions and procedures would apply to minimise adverse impacts on ecological values so that only activities that have a minimal impact on MNES are authorised, including referencing the likelihood factors identified in the Three-toed Snake Tooth Skink Management Plan, part of the Flora and Fauna Management Plan (FFMP).

Measures to avoid or reduce impacts, including the Three-toed Snake Tooth Skink Management Plan management actions are discussed further in Section 5 of this referral.

Table 3: Excluded Activities

Action	Activity	Mechanisms used to minimise impacts on MNES
1. Ancillary facilities in the locations identified in Figure 6.4 of the EIS, and Post Approval EAs		
1a	Establishment of site compound and temporary stockpile sites, including access road construction and provision of associated utility services which would have a minimal impact on MNES. This includes the Woods Property ancillary area adjacent to Iolanthe Street.	Approved template or approved Construction Environment Management Plan (CEMP) / Management Plans / Environmental Work Method Statement (EWMS) / Environmental Assessments where required.
1b	Establishment of materials management / stockpile sites, including access road construction and provision of utility services which would have a minimal impact on MNES.	Approved template or approved CEMP / Management Plans/ EWMS / Environmental Assessments where required.

Action	Activity	Mechanisms used to minimise impacts on MNES
2. Ecological and heritage works		
2a	Nest Box / Bat Box installation in accordance with approval documents / EIS.	Approved Flora and Fauna Management Plan (FFMP) / EWMS.
2b	Installation of temporary exclusion fencing around sensitive ecological and heritage areas which would have a minimal impact on MNES.	Approved template or Approved FFMP and Heritage Management Plan (Heritage MP) / EWMS.
2c	Investigations of heritage sites which would have a minimal impact on MNES.	Approved template or Approved CEMP / Heritage MP / EWMS / Heritage Guidelines.
2d	Threatened fauna survey, including TTSTS surveys which would have a minimal impact on MNES.	Approved FFMP / EWMS.
3. Property adjustment works		
3a	Installation of property fencing which would have a minimal impact on MNES.	Approved template or Approved CEMP / Management Plans / EWMS.
3b	Relocation of utilities (including water supply and electrical) to properties which would have a minimal impact on MNES.	Approved template or Approved CEMP / EWMS.
3c	Provision of acoustic treatments to properties.	Approved template or Approved Noise and Vibration Management Plan (NVMP) / EWMS.
4. Survey works		
4a	Survey control, including installation of global positioning system (GPS) repeater stations.	Approved template or Approved CEMP / EWMS.
4b	General project alignment survey.	Approved template or Approved CEMP / EWMS.
4c	Building / road pre-condition surveys.	Approved template or Approved CEMP.
5. Existing road network adjustments		
5a	Minor upgrades to existing local roads and existing Pacific Highway network which would have a minimal impact on MNES.	Approved template or Approved CEMP / Management Plans / EWMS.
5b	Installation of temporary project signage which would have a minimal impact on MNES.	Approved template or Approved CEMP / Management Plans / EWMS.
6. General Project Activities		
6a	Geotechnical investigations, include boreholes and test pits within project area, which would have a minimal impact in MNES.	Approved template or Approved CEMP / EWMS / required Environmental Assessment
6b	Investigation and treatment of contaminated sites which would have a minimal impact on MNES.	Approved Template or Approved Waste and Energy Management Plan / Soil and Water Management Plan (SWMP) / Specific Site Procedures / EWMS.
6c	Relocation of utilities which would have a minimal impact on MNES.	Approved template or Approved CEMP / Required Environmental Assessment and CEMP / Management Plans / EWMS.
6d	Installation of environmental controls, including erosion and sedimentation controls associated with excluded activities which would have a minimal impact on MNES.	Approved template or Approved CEMP / SWMP / Erosion and Sediment Control Plan (ESCP) / EWMS.
6e	Temporary works which would have a minimal impact on MNES.	Approved template or Approved CEMP / Management Plans / EWMS.
7. Upgrade works South Grafton		
7a	Project Works (all construction activities including road works / drainage / landscaping) on the southern side of the Clarence River south of Chainage 310 metres, beside the northern side of Bunnings, which would have a minimal impact on MNES. Between Chainage 310 and Chainage 600 (levee wall) temporary access tracks that are associated with the adjacent ancillary works.	Approved CEMP, FFMP, Heritage MP, Waste and Energy MP, SWMP / progressive Erosion Sediment Control Plans (ESCP)s/ EWMS.
8. Levee works related to flood mitigation		
8a	Installation of levee works, associated materials management / stockpile sites and installation of environmental controls which would have a minimal impact on MNES.	Approved CEMP, FFMP, Heritage MP, Waste and Energy MP, SWMP / progressive ESCPs/ EWMS.

Action	Activity	Mechanisms used to minimise impacts on MNES
8b	Installation of temporary levee works having minimum impact (i.e. placement of sand bags along top of existing levees to provide the additional flood immunity), within areas which would have a minimal impact on MNES. This would not involve machinery, stripping grass or placing fill.	Approved CEMP, FFMP, Heritage MP, Waste and Energy MP, SWMP / progressive ESCPs/ EWMS.

2.2 Alternatives to taking the proposed action

As noted in the Project EIS, the following four alternatives were considered (EIS Section 4.1):

- Do nothing (base case)
- Minimal network improvements
- Traffic demand management
- Additional crossing of the Clarence River.

An extensive range of options were also investigated to identify the preferred location for an additional crossing, as outlined in Section 4.2 of the Project EIS. This is discussed in detail in Section 2.3 of this referral.

Table 4: Alternatives considered as part of the EIS

Alternative	Description
'Do nothing' (base case)	The 'do nothing' (base case) alternative involved retaining the existing Grafton Bridge and local road network in its current configuration. The main benefit of the 'do nothing' (base case) alternative is that no capital expenditure or resources would be required for implementation. Roads and Maritime carried out traffic modelling to predict future traffic demand over the bridge for the 'do nothing' (base case) alternative (GTA, 2010). The study found that with the 'do nothing' (base case) alternative the future average vehicle speed would decrease throughout the Grafton and South Grafton road network during peak periods. The *Route Options Development Report Technical Paper: Traffic assessment* (GTA, 2012) predicts that with the 'do nothing' (base case) alternative traffic volumes that will need to travel across the river will increase. Such an increase will further add to the existing traffic congestion of the bridge during peak periods. The 'do nothing' (base case) alternative would therefore fail to solve the existing traffic congestion across the bridge during peak periods and would not provide the required capacity to respond to the future traffic volumes expected across the river. It would not improve road safety and traffic efficiency and would not support Grafton's economic development. As such, this alternative was not considered further by Roads and Maritime.
Minimal Network Improvements	The minimal network improvements alternative consists of works within the Grafton and South Grafton local road network aimed at addressing local congestion and capacity constraints. These works are documented in the *Route Options Development Report* (Roads and Maritime, 2012) and include: • Upgrading Pound Street to two traffic lanes in each direction between Villiers Street and Prince Street • Upgrading Gwydir Highway to two traffic lanes in each direction between the Pacific Highway and Bent Street • Upgrading of the Villiers Street and Dobie Street roundabout to improve turning movements for heavy vehicles • Upgrading of the Gwydir Highway and Skinner Street roundabout from a single lane roundabout to a two land roundabout. This alternative does not include a new bridge across the Clarence River. The main benefit of this minimal network improvement alternative is that it would have a significantly lower capital cost than building a new bridge. It would also provide a short-term alleviation of the traffic congestion in the Grafton and South Grafton local road network. This alternative was not considered to be viable as it would not cater for increased traffic volumes across the bridge. Traffic modelling documented in the *Route Options Development Report Technical Paper: Traffic assessment* (GTA, 2012) predicted that under a minimal network improvement scenario, traffic congestion associated with the existing bridge and traffic performance on the local road network would continue to deteriorate as traffic demand increases. In particular, by 2049: • The total number of trips across the bridge is forecast to increase by 83 per cent • The total number of vehicle kilometres travelled across the network is forecast to increase by 118 per cent

Alternative	Description
	• The total number of vehicle hours travelled across the network is forecast to increase by 1,000 per cent • The average vehicle speed on the bridge is forecast to decrease to less than three kilometres per hour during the morning peak The model found that the minimal network improvement alternative would alleviate the traffic congestion in the very short-term, but would fail to provide the required traffic capacity to respond to the future traffic growth for trips across the river. As the minimal network improvement alternative would not meet the project transport objectives, it was not considered a viable alternative and was therefore discounted.
Travel demand management	Travel demand management is the application of strategies and policies to reduce travel demand (specifically that of private motor vehicles), or to redistribute this demand in space or in time. The main benefit of travel demand management is its cost effectiveness when compared to building a new bridge. Potential travel demand management measures for this project include: • Walking and cycling • Public transport (buses) • Parking restrictions • Peak spreading (i.e. travelling outside of peak periods or changing business hours). The effectiveness of potential travel demand management measures is generally governed by three broad factors: • The travel demand (e.g. the volume of traffic) to be managed • The existing travel characteristics of the transport network • The types of travel demand management measures available for implementation. Demand management measures would be difficult to implement without major social and behavioural change in Grafton. An analysis undertaken for the Project EIS in 2014 revealed that opportunities to implement travel demand management measures in the Grafton area were limited and likely to have only a marginal effect on managing travel demand during peak periods. Therefore, travel demand management measures would not meet the project objectives, such as meeting the short-term and long-term transport needs within Grafton and South Grafton, improving safety and traffic efficiency between and within Grafton and South Grafton, and supporting regional and local economic development. As such, this was not considered a viable alternative.
Additional Crossing of the Clarence River	This alternative involved retaining the existing Grafton Bridge and construction of an additional crossing over the Clarence River. The existing bridge, built in 1932, is the only crossing of the Clarence River in the Grafton area. Road users travelling between Grafton and South Grafton, including those making both local and through trips, use the existing bridge as there is no practical alternative route. The nearest alternative bridge crossing over the Clarence River is in Maclean, around 41km east of Grafton. The existing Grafton Bridge also forms part of the alternative regional north–south road link when the Pacific Highway is closed due to road traffic incidents or flooding. The *Route Options Development Report* (Roads and Maritime, 2012) identified a number of issues with the existing bridge: • The existing bridge is at capacity during peak periods with low travel speeds experienced by all road users • Kinks in the horizontal alignment of the existing bridge, creating risk of crashes and causing traffic in both lanes to slow contributing to congestion and delays. This has flow on effects causing delays at merge points on approach roads • Restrictions for large, heavy vehicles during peak periods which restricts efficient freight movements • Crash hotspots on the bridge and approach roads • As traffic growth increases there would be substantial deterioration in the performance of the existing bridge. Although this alternative would have environmental, social and economic costs, it is the preferred alternative because it best addresses the issues long term with the existing bridge outlined above. In contrast to the other alternatives, this additional crossing would: • Provide a practical alternative to road users for crossing the Clarence River at Grafton • Improve road safety for motorists, pedestrians and cyclists travelling across the river • Relieve congestion across the river over the existing bridge which currently operates at capacity during peak periods • Provide an additional crossing that is not constrained by narrow lanes, kinks or traffic restrictions to large heavy vehicles • Respond to the forecasted traffic demand across the Clarence River.

The additional crossing over the Clarence River was determined to best meet the project objectives, including enhancing road safety and traffic efficiency between Grafton and South Grafton, supporting local and regional development. In addition, the route option development process met the project objectives by involving all stakeholders and considering their interests. This alternative was therefore selected to move forward to the options selection process and was the subject of the options development, and subsequent Project EIS and approval.

2.3 Alternative locations, time frames or activities that form part of the referred action

Option development process

A large range of options were investigated to identify the preferred location for an additional crossing.
The process followed for the development and assessment of route options and the identification of a preferred option involved:

- Identification of the preliminary route options
- Assessment of the preliminary route options and identification of shortlisted options
- Assessment of the shortlisted options
- Identification and announcement of the preferred option.

The methodology used for the identification of a preferred option was an integrated process which involved engineers, environmental, social, economic and heritage specialists and urban designers working collaboratively. This integrated process was overlaid by extensive consultation with the community and stakeholder groups. The environmental sensitivities and constraints of Grafton and its surrounding areas were taken into account in the process to develop route options and to select the preferred option. Through this process adverse impacts have been avoided or minimised to the greatest extent practicable.

In December 2010, Roads and Maritime announced a revised approach to engage more effectively with the community and stakeholders in identifying a preferred route for an additional crossing. A community update issued in December 2010 identified 13 preliminary route options and invited community comment via a postal survey. Subsequent phone and business surveys were also carried out to understand issues important to the community to be considered when determining a preferred route.

Community and businesses feedback from the postal survey identified a further 28 crossing suggestions, bringing the total to 41. Due to the significant number of crossing locations suggested by the community, Roads and Maritime developed a process to identify a recommended preferred option from the 41 suggestions.

The initial phase of this process was to assess the feasibility of the 41 suggestions.

The assessment involved grouping the suggestions into strategic corridors and assessing each suggestion against key engineering and environmental considerations. It was important that the options taken forward for more investigation satisfied basic requirements and would have no clear and significant environmental impact.

To group the suggestions into corridors, the area covered by the suggestions was divided into five corridors which represented the strategic desire lines across the Clarence River as identified by the project team.

The feasibility assessment was then carried out using the following considerations:

- Engineering and constructability issues
- Land use and land use zoning impacts
- Aboriginal heritage impacts
- Impacts on native plants and animals
- Flooding impacts.

The project team held a workshop on 14 April 2011, to identify feasible options for further consideration. The workshop, consisting of Roads and Maritime staff and Arup representatives, recommended 25 preliminary route options for further engineering and environmental studies to assist in the identification of a preferred location for an additional crossing of the Clarence River. The findings of the feasibility assessment of the 41 preliminary route options are documented in the *Feasibility Assessment Report* (Roads and Maritime, 2011) (Refer **Attachment 1, Figure 16**).

Assessment of Preliminary Route Options
The process for the preliminary route options development phase was to identify a shortlist of options by selecting the best route option(s) within each of the strategic corridors based on technical investigations and community input.

Technical investigations included desktop studies on the existing environment and consideration of landscape and urban character, land use and planning, social and economic, Aboriginal heritage, non-Aboriginal heritage, noise, ecology, flooding and other environmental aspects.

Community feedback was received via community updates, forums, information and feedback sessions, face to face meetings with stakeholder groups, and public display of the *Preliminary Route Options Report – Part 1* (Roads and Maritime, 2011) and *the Preliminary Route Options Report – Parts 1 and 2* (Roads and Maritime, 2011).

Five strategic corridors were identified (**Attachment 1, Figure 16**), and an assessment was carried out to identify the best route option(s) within these five corridors. The assessment examined the options against the key and supporting objectives identified for the project by using key indicators based around the project objectives. These included:

- Road safety audits
- Time travelled for both heavy vehicles and other traffic
- Distance travelled for both heavy vehicles and other traffic
- Level of connectivity between existing and future land uses
- Level of community involvement
- Costs
- Impacts on various land uses (including residential, business and rural)
- Noise and visual amenity
- Impacts on heritage, including Aboriginal and non-Aboriginal
- Impacts on biodiversity
- Hydrology, including flooding impacts.

The outcome of this assessment was the shortlisting of six route options for further investigation. In January 2012, these six route options were announced for further investigation. The assessment and shortlisting process is documented in the *Preliminary Route Options Report – Final* (Roads and Maritime, 2012).

Assessment of the Shortlisted Options
Design refinements and further field and technical investigations were carried out on the six route options. These were documented in the Route Options Development Report (Roads and Maritime, September 2012).

The six route options were subject to consultation and assessment in September, October and November 2012 to identify the preferred location for the additional crossing. The six shortlisted route options are listed below and displayed in **Attachment 1, Figure 17**:

- Option E. About 1 km upstream of the existing bridge - from Cowan Street, South Grafton to Villiers Street, Grafton. The new bridge would have one lane in each direction. The existing bridge would remain one lane in each direction
- Option A. Adjacent to the existing bridge upstream – from Bent Street, South Grafton to Villiers Street, Grafton via Fitzroy Street. The new bridge would have one lane southbound and two lanes northbound. The existing bridge would become one lane southbound
- Option C. Adjacent to the existing bridge downstream – from the junction of the Pacific and Gwydir Highways, South Grafton to Villiers Street, Grafton via Pound Street. The new bridge would have one lane in each direction. The existing bridge would remain one lane in each direction
- Option 11. About 1 km downstream of the existing bridge - from the Pacific Highway near McClares Lane north of South Grafton to Villiers Street, Grafton via Fry Street. The new bridge would have one lane in each direction. The existing bridge would remain one lane in each direction
- Option 14. About 2.5 km downstream of the existing bridge - from the junction of the Pacific Highway and Centenary Drive, north of South Grafton to Turf Street (Summerland Way), Grafton via Kirchner and North streets. The new bridge would have one lane in each direction. The existing bridge would remain one lane in each direction
- Option 15. About 2.5 km downstream of the existing bridge - from the junction of the Pacific Highway and Centenary Drive, north of South Grafton to Summerland Way, Grafton north of North Street via Kirchner

Street. The new bridge would have one lane in each direction. The existing bridge would remain one lane in each direction.

Summary of community feedback following the display of the Route Options Development Report in September 2012

A total of 118 submissions, including two petitions, were received between Monday 10 September and Friday 19 October 2012 in response to the display of the *Route Options Development Report* (Roads and Maritime, September 2012). A total of 64 comments by 18 users were also posted on the online discussion forum.

Submissions covered a wide range of issues of concern to the community and stakeholders, including traffic and transport, socio-economic, environmental, cost, value for money and other concerns. One issue raised in many submissions centred on a key aim of the project, to improve traffic efficiency between Grafton and South Grafton. Respondents were however divided on the core goal of the crossing.

Value management workshop

A value management workshop was held on Tuesday 22 and Wednesday 23 October 2012 with participants from key stakeholders, the community, government agencies and the project team. The purpose of the workshop was to consider the six options from a wide range of perspectives and evaluate the options against agreed and weighted criteria.

The workshop participants agreed that Option E and Option C should go forward for further consideration as they provided the best balance across social, environmental and functional issues.

Recommended preferred option

Following the value management workshop, Roads and Maritime undertook a further review of the options based on:

- The findings of the technical investigations and specialist studies undertaken for the project documented in the *Preliminary Route Options Report – Final* (Roads and Maritime, January 2012) and *Route Options Development Report* (Roads and Maritime, September 2012)
- Feedback received from the community and key stakeholders
- Outcomes of the October 2012 value management workshop.

The review concurred with the outcome of the value management workshop that Options E and C should go forward for further consideration.

Following further assessment of Options E and C, Option C was preferred over Option E as the recommended preferred option because:

- On balance, it presents greater overall value to the community than Option E, in particular addressing long term connectivity, providing for economic growth and supporting Grafton as a regional centre
- It best meets the project objectives
- It provides better transport efficiency improvements over the whole of the road network for both the short and long term, including for road freight movements, as it:
  - Better supports the distribution of traffic flows between the eastern and western sides of South Grafton, especially traffic travelling to and from the south-east as it is located east of the existing bridge and provides better access to the Pacific Highway to the north and south and to Clarenza. Option C also provides good access to Armidale Road
  - Provides a better road hierarchy as it provides a parallel road network with improved redundancy
  - Avoids channelling traffic flows from both crossings into the junction of Fitzroy and Villiers Streets
  - By directing traffic to the intersection of Villiers and Pound Streets, provides a better opportunity for traffic to travel around the edge of the Grafton CBD.
- It performs well in the other areas of the functional assessment criteria
- It provides better outcomes in the socio-economic area, including its ability to better support Grafton as a regional centre, it has less impacts to businesses and fewer noise impacts
- It provides better outcomes than Option E in terms of non-Aboriginal heritage by avoiding impacts on the important and intact heritage precinct around Villiers Street and Victoria Street. It also traverses through a shorter length of heritage conservation area
- It performs comparatively to Option E in terms of capital cost and BCR at this stage of project development.

In April 2013, Option C was confirmed as the preferred option for an additional crossing of the Clarence River at Grafton. Refinements were made to the recommended preferred option after Roads and Maritime's review of the preliminary design, stakeholder consultation and feedback received during the public display of the *Recommended Preferred Option Report.*

Refinements to the preferred option
Roads and Maritime has made a number of design refinements since the preferred option was announced in April 2013. These refinements were made to reduce the extent of the impacts of the project. These refinements include:

- The number of local road and intersection upgrades identified in the preferred option has been reduced so that only the upgrades needed to provide acceptable traffic performance at least to the year 2039 are proposed
- Review of alternate bridge types considering cost, constructability and flood mitigation requirements
- Refinements to the local road network in Grafton
- Refinements to the local road network in South Grafton
- Location of pedestrian and cycle paths in Grafton and South Grafton to improve connectivity
- Refinements to the Pound Street railway viaduct.

The refinements have been incorporated into the concept design, which was assessed in the EIS and is the subject of this Referral.

Alternate bridge type options
The location of the preferred option, being close to the existing bridge, has influenced the design of the proposed new bridge across the Clarence River. The main spans of the proposed bridge would generally match the main spans of the existing bridge with the piers in the river generally aligned between the two bridges. This is needed to maintain navigation channels in the river, for safe river navigation (unaligned piers would create hazards in the river), to minimise potential flood impacts (hydraulic efficiencies of aligned piers).

The bridge type options were assessed considering cost, constructability, visual impacts, impacts on the existing heritage listed bridge and flood mitigation requirements. The concrete box girder bridge was selected as the preferred bridge type for an additional crossing of the Clarence River.

2.4 Context, planning framework and state / local government requirements

Environmental Planning and Assessment Act 1979

After consideration of the Project EIS and Submissions Report, the Minister for Planning approved the Additional Crossing of the Clarence River at Grafton Project under Section 115ZB of the EP&A Act on 19 December 2014 subject to the Minister's Conditions of Approval (MCoA) being met. The project is State Significant Infrastructure (SSI) approved under Part 5.1 of the EP&A Act.

Clause 14 of the *State Environmental Planning Policy (State and Regional Development) 2011* declares the development pursuant to section 115U(2) of the EP&A Act, to be "State significant infrastructure" if:

a) The development on the land concerned is, by the operation of a State environmental planning policy, permissible without development consent under Part 4 of the EP&A Act; and
b) The development is specified in Schedule 3 of the SEPP.

The project falls within the category of development that is permissible without consent pursuant to clause 94 of the *State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP). Clause 94 applies to development for the purpose of a road or road infrastructure facilities and provides that such development, when carried out by or on behalf of a public authority, is permissible without consent. The project is for the purpose of a "road" or "road infrastructure facility" under the Infrastructure SEPP.

Other legislation

NSW Legislation

A number of approvals are not required for a SSI project approved under Part 5.1 of the EP&A Act (section 115ZG). Those approvals relevant to the project are:

- Permits under sections 201, 205 and 219 of the *Fisheries Management Act 1994*
- Approvals under Part 4 and excavation permits under section 139 of the *Heritage Act 1977*
- Aboriginal heritage permits under section 90 of the *National Parks and Wildlife Act 1974*
- Authorisations under the *Native Vegetation Act 2003* to clear native vegetation or State protected land
- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*
- A bush fire safety authority under section 100B of the *Rural Fires Act 1997*
- The concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of that Act.

Approvals under other NSW legislation that may apply to the project include:

- An approval under the *Crown Lands Act 1989* to grant a relevant interest (i.e. licence, permit, easement or right of way) over a Crown Reserve

Other legislation that may apply to the project includes the:

- *Land Acquisition (Just Terms Compensation) Act 1991* – which applies to the acquisition of any land required for the project
- *Crown Lands Act 1989* – which applies to the acquisition of land reserved under this Act
- *Contaminated Land Management Act 1997* – which applies in the event that the project causes or contributes to contamination.
- *Protection of the Environment Operations Act 1997* – which applies to the prevention of pollution, appropriate disposal of waste and the need to notify the Environment Protection Authority (EPA) in the event of any incidents that cause or have the potential to cause material environmental harm. Under section 115ZH of the EP&A Act, certain approvals cannot be refused if necessary to carry out State Significant Infrastructure. This applies to any environmental protection licence required to be obtained for the project under the *Protection of the Environment Operations Act 1997.*

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

Roads and Maritime completed an environmental assessment of the Additional Crossing of the Clarence River at Grafton (the Project EIS) in August 2014. The Project EIS identified a range of environmental, social and planning issues associated with the construction and operation of the Additional Crossing of the Clarence River at Grafton and proposed measures to mitigate or manage those potential impacts. A copy of the full EIS is available at http://www.rms.nsw.gov.au/projects/northern-nsw/grafton-clarence-river-crossing/environmental-impact-statement.html.

The Project EIS was publicly exhibited in August 2014 for a period of 30 days. Following public exhibition, submissions from stakeholders were received and addressed by Roads and Maritime in the Submissions Report which was lodged with the Secretary of the Department of Planning and Environment in October 2014.

After consideration of the Project EIS and Submissions Report, the Minister for Planning approved the Additional Crossing of the Clarence River at Grafton Project under Section 115ZB of the EP&A Act on 19 December 2014 subject to the MCoAs being met. The project is State Significant Infrastructure (SSI) approved under Part 5.1 of the EP&A Act.

The NSW Assessment Contact Officer was Michael Young, (02) 9228 6437.

Consultation

Various consultation activities and tools were implemented under the plan before and during the development of the Project EIS. Through these activities and tools, feedback was been gathered from government agencies, stakeholders and the community in regards to the project. Feedback received was considered during the preparation of this Project EIS and the project's concept design.

Consultation carried out before the Project EIS involved a range of communication activities to seek input, identify issues and help identify the preferred option. Communication activities included:

- A dedicated project website (www.rms.nsw.gov.au/graftonbridge)
- A dedicated project telephone line (1800 633 332)
- A dedicated project email address (graftonbridge@rms.nsw.gov.au)
- 'Community update' newsletters at key stages of the project
- Project update letters from the project manager and project director
- Online interactive maps and traffic modelling videos
- Online discussion forums
- Public forums
- Community and stakeholder briefing sessions
- Radio forums
- Public displays of studies and investigation reports
- Staffed and unstaffed project displays at various locations
- Information sessions
- Telephone surveys and telephone contact with property owners potentially directly affected
- Aboriginal community consultation, including consultation with the Grafton Ngerrie Local Aboriginal Land Council (LALC), following the procedures outlined in the Roads and Maritime document, *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Roads and Maritime, 2011a) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010)
- Invitations to comment on the published reports at key stages of the project. Feedback on the published reports was received at the staffed displays, information sessions, via the project website, mail, the toll-free project information line, email and hand delivery
- Roads and Maritime staff available to talk with the community, directly affected and nearby landowners one-to-one at the Prince Street, Grafton office
- Face-to face-meetings with government agencies and stakeholder groups

Roads and Maritime considered all issues raised by the community and stakeholders during the consultation process. Where possible, these issues were addressed during the route selection process and incorporated into the preferred option. The consultation process and the results of consultation are detailed in the following reports:

- *Preferred Option and Submissions Report* (Roads and Maritime, 2013)
- *Recommended Preferred Option Report: Appendix 1 Route Options Submissions Report* (Roads and Maritime, 2012)
- *Draft Route Options Community Feedback Report* (Roads and Maritime, 2012)
- *Route Options Development Report, Volume 1 – Main Report: Appendix 1 Community feedback January to June 2012* (Roads and Maritime, 2012)
- *Preliminary Route Options Report – Final, Volume 1 – Main Report: Appendix 3 – Community Feedback* (Roads and Maritime, 2012)
- *Postal Survey December 2010 to March 2011 Feedback Report* (Roads and Maritime, 2011)
- *Telephone Survey Report* (Roads and Maritime, 2011)
- *Online Business Survey Report* (Roads and Maritime, 2011).

Community and stakeholder consultation during the preparation of the Project EIS
Consultation for the Project EIS started in September 2013 when the community was informed that the project was being assessed as an SSI project. The SSI application was made publicly available on the Department of Planning and Environment website.

The consultation for the Project EIS built on earlier consultation processes for the project, ensuring key stakeholders and the community were informed and able to provide input to the Project EIS.

The Project EIS consultation process was guided by the Roads and Maritime document, *Community Engagement and Communications: A resource manual for staff* (Roads and Maritime, 2012) and is consistent with the Director-General's environmental assessment requirements for consultation.

Stakeholders consulted
Stakeholders consulted by Roads and Maritime during the preparation of the Project EIS are listed in Table 5. Stakeholders include State government agencies, Aboriginal stakeholders, utility service providers, community groups and affected landowners.

Table 5: Stakeholders consulted during EIS preparation

Stakeholder Group	Stakeholder
Government agencies	• Department of Planning and Environment • Environment Protection Authority • Office of Environment and Heritage including the Heritage Division and Heritage Council of NSW • Trade and Investment (Crown Lands Division) • Department of Primary Industries (Fisheries, Office of Water and Agriculture) • NSW Office of Water • Clarence Valley Council • Roads and Maritime Services (Maritime) • Transport for NSW • Emergency Services (including NSW Police, NSW Fire Brigade, NSW Ambulance, SES) • Australian Rail Track Corporation.
Aboriginal stakeholder	• Grafton Ngerrie Local Aboriginal Land Council
Utility service providers	• Clarence Valley Council (water, sewerage, stormwater) • National Broadband Network • Optus • Telstra • Other providers
Community	• Directly affected landowners and tenants • Adjoining landholders and tenants • North Coast TAFE • Transport and heavy vehicle operators • Local environmental groups • Recreational river user groups • Local businesses of Grafton and South Grafton • Grafton Chamber of Commerce & Industry • South Grafton Progress Association • Tourism operators • River Historical Society • Interest groups and resident groups.

2.6 Public consultation (including with Indigenous stakeholders)
Key consultation activities
Roads and Maritime used a range of consultation methods and activities to engage and inform stakeholders during the preparation of the Project EIS. These methods and activities, and their timing, are presented in Table 6 and described in the sections below.

Table 6: Key consultation activities during preparation of the EIS (2012 – 2013)

Activity / Method	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Community and stakeholder management system	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project website, phone line and email	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Interactive maps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Project manager's update		✓		✓				✓					
Community update		✓		✓									
Community information displays (staffed)					✓								
Community information displays (unstaffed)					✓	✓	✓	✓	✓	✓	✓	✓	✓
Newspaper advertisements and media release				✓									
Stakeholder database email		✓		✓				✓					
Letters to directly affected landowners				✓									
Consultation with registered Aboriginal stakeholder		✓	✓	✓		✓	✓						
Consultation with various community stakeholders	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Community and stakeholder management system
The project has a dedicated community and stakeholder management system which has been used to record and manage communication with the community, stakeholders and government agencies. The system was also used for the ongoing logging, tracking and monitoring of all correspondence, enquiries and complaints related to the project.

Dedicated project website, phone line and email address
The dedicated project website, set up at the beginning of the project, continued to be used during the preparation of the Project EIS. The website provided useful information to the community including project status, project manager's updates, maps, latest news, documents and reports, and project contact details. The website was also used to promote the display of the project's preliminary concept design for the Project EIS.

Online interactive maps
The project's website provided an interactive online map showing the preliminary concept design for the Project EIS that enabled community members to view the project design.

Community update
In September 2013 Roads and Maritime published a community update announcing the preparation of the Project EIS for the project.

In November 2013 Roads and Maritime published a community update providing information on the status of the project and seeking feedback on the preliminary concept design for the Project EIS. The update invited comments to be delivered by post, email, phone or hand by 20 December 2013.

Community information displays
Staffed community information displays were held at the Grafton community information centre (59 Duke Street, Grafton) on Thursday 12 December and Friday 13 December 2013. Staffed displays provided an opportunity for the community to speak with members of the project team, discuss the preliminary concept design for the Project EIS, provide feedback or ask project related questions.

Static (unstaffed) displays of the preliminary concept design for the Project EIS were provided at a range of locations.

A display of the preliminary concept design was also placed in Roads and Maritime's Pacific Highway office at 21 Prince Street, Grafton. Project team members were available during business hours if members of the public wished to discuss the project in detail, or provide feedback.

Newspaper advertisements and media release, stakeholder database email and letter to directly affected landowners
Roads and Maritime informed the community about the preliminary concept design for the Project EIS via newspaper advertisements and a media release published in the Daily Examiner, Clarence Valley Review and Coastal View.

Concurrently, Roads and Maritime sent an email invitation to attend the staffed displays and provide feedback on the preliminary concept design to members of the community registered in the stakeholder database. Personalised letters and copies of the community update were also posted to property owners who would be directly impacted by the preliminary concept design.

Consultation with various community and stakeholders
Other consultation activities with stakeholders included:

- Individual meetings and follow-up correspondence and/or phone calls with directly affected landowners and adjoining landowners
- Meetings with local businesses including businesses along Iolanthe Street, South Grafton; and Pound Street, Grafton
- Meetings with the North Coast TAFE
- Meetings with individual community members who had requested more information specific to the project, such as impacts on amenity, and potential mitigation measures
- A letter drop to businesses in the Iolanthe Street precinct regarding potential changes to access and on-street parking
- A meeting with the local preschool to allow the children to express their ideas regarding the bridge and contribute as members of the community on aspects of the project.

Consultation with Aboriginal stakeholders before and during EIS
Roads and Maritime consulted with the Aboriginal community throughout the development of the project to identify cultural heritage values and the potential impacts of the project. Consultation was in accordance with:

- *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (Department of Environment and Conservation, 2005)
- *RTA Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (RTA, 2008); the procedure was updated in November 2011, and consultation subsequently followed the updated process
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010).

Aboriginal community consultation involved the following steps.

Notification, identification and registration of stakeholders
Roads and Maritime notified, identified and registered relevant stakeholders to be consulted in accordance with the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (RTA, 2008). This step involved:

- Sending letters to relevant agencies and organisations to notify them of the project and determine the relevant knowledge holders within the Grafton and South Grafton area. The letters were sent between 8 and 10 March 2010. A second letter was sent on 22 December 2010
- Publishing public notices (notice given to the public regarding the project) on 1 March 2010. These were reissued on 22 January 2011
- Registering stakeholders. Two responses were received from Aboriginal stakeholders wishing to register for consultation, these were: the Grafton Ngerrie Local Aboriginal Land Council and an individual stakeholder. Following attempted correspondence with the individual stakeholder in December 2010, Roads and Maritime

was advised that the individual stakeholder had recently passed away. As such, the Grafton Ngerrie Local Aboriginal Land Council is the only registered Aboriginal party for the project.

Consultation during route selection

The Grafton Ngerrie Local Aboriginal Land Council was consulted for the route options identification, development, assessment and selection of the preferred option for the project. Consultation occurred between May 2011 and April 2012.

Consultation consisted of Aboriginal focus group meetings to:

- Identify relevant knowledge holders
- Determine the extent of Aboriginal cultural constraints relevant to the project
- Identify impacts and issues pertaining to each option.

Aboriginal consultation activities and outcomes are documented in the *Route Options Development Report Technical Paper: Aboriginal Heritage* (Biosis, 2012).

Feedback on the Draft Aboriginal Cultural Heritage Assessment Report

A draft of the Aboriginal Cultural Heritage Assessment Report was provided to the only registered Aboriginal party for the project (the Grafton Ngerrie Local Aboriginal Land Council) on 22 May 2014 for review and comment, with a period of 28 days given to provide comments. Feedback received from the Local Aboriginal Land Council was as follows:

- The council is keen to see some interpretive signage opportunities around the bridge and noted opportunities for this are already included in *Technical Paper: Aboriginal Cultural Heritage Assessment*
- The council is keen to ensure a pedestrian proof fence is provided during construction to protect the Alipou Creek area and noted this mitigation measure is already included in *Technical Paper: Aboriginal Cultural Heritage Assessment*
- The council wishes to include in *Technical Paper: Aboriginal Cultural Heritage Assessment* opportunities for council site officers being used on site during construction to assist in identifying items of Aboriginal cultural heritage significance. Roads and Maritime acknowledges this request but considers council site officers would not be required during construction as the project area is considered to have low potential for Aboriginal archaeological sites. Nonetheless, in the event that unexpected Aboriginal cultural material or skeletal remains are encountered, Roads and Maritime would implement the *Standard Management Procedure for Unexpected Archaeological Finds* (Roads and Maritime, 2012). This procedure outlines the involvement of Aboriginal registered parties during construction where required.

2.7 A staged development or component of a larger project

The project is not part of a larger project.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

There are no World Heritage Properties within close proximity to the Project.

Nature and extent of likely impact

NA

3.1 (b) National Heritage Places

Description

There are no National Heritage Places within close proximity to the Project.

Nature and extent of likely impact

NA

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

There are no declared Ramsar wetlands within close proximity to the project. The closest Ramsar wetland, Little Llangothlin Nature Reserve is over 100km away.

Nature and extent of likely impact

NA

3.1 (d) Listed threatened species and ecological communities

Description
Information in this section is taken from *Technical Paper: Flora and Fauna Assessment* (August 2014, Biosis), which was produced as part of the Project EIS and subject to previous consideration. Information is also taken from the *Significance Assessment in accordance with the Environmental Protection and Biodiversity Conservation Act (1999) for the Three-toed Snake Tooth Skink (Saiphos reticulatus)* (2016, Lewis, B.D.), which has been completed as part of the Project Approval MCoA requirements, and to inform this referral.

This section focuses on species listed under the EPBC Act. Other significant flora and fauna species are discussed in Section 3.3(a).

Terrestrial and aquatic flora and fauna surveys were designed to identify the extent and quality of native vegetation, fauna habitats and species diversity. Threatened biodiversity with a moderate to high likelihood of occurrence were targeted during field surveys. Detailed information on the field survey effort and methodology is presented in *Technical Paper: Flora and Fauna Assessment* (August 2014, Biosis).

FLORA
A likelihood assessment was undertaken for EPBC listed flora species and threatened ecological communities potentially occurring within 10km of the project area and is reproduced in Table 7.

Table 7: Likelihood assessment of EPBC Act listed flora species and threatened ecological communities occurrence within project area

Scientific Name	Common Name	EPBC Act Listing	Likelihood of Occurrence	Rationale
Acacia ruppii	Rupp's Wattle	Endangered	Low	No potential habitat or associated species identified within the project area. No previous records within the project area.
Allocasuarina defungens	Dwarf Heath Casuarina	Endangered	Low	No previous records within the project area.
Angophora robur	Sandstone Rough-barked Apple	Vulnerable	Low	Soil preferences are not present within the study area although there are six records within the 10km search area, of which the closest is approximately 1km away.
Athraxon hispidus	Hairy Joint-grass	Vulnerable	Medium	Potential habitat within the project area, however no previous records.
Cryptostylis hunteriana	Leafless Tongue Orchid	Vulnerable	Low	No potential habitat and no previous records within the project area.
Cynanchum elegans	White-flowered Wax Plant	Vulnerable	Low	No potential habitat and no previous records within the project area.
Eucalyptus tetrapleura	Square-fruited Ironbark	Vulnerable	Low	Potential habitat is highly restricted due to vegetation clearance and the species has not been recorded during previous assessments.
Marsdenia longiloba	Slender Marsdenia	Vulnerable	Low	No potential habitat within the project area and no records within the 10km locality.
Phaius australis	Southern Swamp Orchid	Endangered	Low	No potential habitat within the project and area and no records within the 10km locality.
Streblus pendulinus	Whalebone Tree	Endangered	Low	No potential habitat within the project and area and no records within the 10km locality.

Scientific Name	Common Name	EPBC Act Listing	Likelihood of Occurrence	Rationale
Triplarina imbricate	Creek Triplarina	Endangered	Low	No potential habitat within the project and area and no records within the 10km locality.
Tylophora woollsii	Cryptic Forest Twiner	Endangered	Low	No potential habitat within the project and area and no records within the 10km locality.
Zieria obcordata		Endangered	Low	No potential habitat within the project and area and no records within the 10km locality.
Threatened Ecological Communities				
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		Critically Endangered	Negligible	No suitably brackish / saline conditions preferred by this community within the project area.
Littoral Rainforest in the New South wales North Coast, Sydney Basin and South East Corner Bioregions		Critically Endangered	Low	The degraded floodplain within the project area does not provide potential habitat for rainforest communities.
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions		Critically Endangered	Low	The degraded floodplain within the project area does not provide potential habitat for rainforest communities.
Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion		Critically Endangered	Low	The degraded floodplain within the project area does not provide potential habitat for rainforest communities.

The habitat assessment carried out for the project indicated that one EPBC Listed threatened flora species, Hairy-joint Grass, *Arthraxon hispidus*, is considered to have a medium likelihood of occurrence. Field surveys carried out for the project have not found evidence of this species within the project boundary.

It should be noted that Frogbit, *Hydrocharis dubia*, was previously listed as vulnerable under the EPBC Act and was the subject of targeted surveys as part of the project's fieldwork. This species was delisted as of 3 December 2013 (Commonwealth of Australia, 2013). Ecological surveys did not identify any Frogbit within the study area and it was not considered further.

FAUNA

A likelihood assessment was undertaken for EPBC listed fauna species potentially occurring within the project area and is reproduced in Table 8.

Table 8: Likelihood assessment of EPBC Act listed fauna species occurrence within project area

Scientific Name	Common Name	EPBC Act Listing	Likelihood of Occurrence	Rationale
Amphibians				
Mixophyes balbus	Stuttering Frog	Vulnerable	Low	No preferred habitat occurs within the project area.
Mixphyes iterates	Giant Barred Frog	Vulnerable	Low	No preferred habitat occurs within the project area.
Birds				
Anthochaera Phrygia	Regent Honeyeater	Endangered	Low	No known breeding habitat. No preferred foraging resources and no historical records occur within the project area.
Botaurus poiciloptilus	Australasian Bittern	Endangered	Low	No records of this species occur within 10km of the project area. Potential habitat occurs within the degraded riparian vegetation along the Clarence River, however this habitat is marginal.
Dasyornis brachypterus	Eastern Bristlebird	Endangered	Low	No preferred habitat occurs within the project area.

Scientific Name	Common Name	EPBC Act Listing	Likelihood of Occurrence	Rationale
Diomedea antipodensis	Antipodean Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Diomedea dabbenena	Tristan albatross	Endangered	Low	No preferred habitat occurs within the project area.
Diomedea epomophora epomophora	Southern Royal Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Diomedea epomophora sanfordi	Northern Royal Albatross	Endangered	Low	No preferred habitat occurs within the project area.
Diomedea exulans antipodeans	Wandering Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Diomedea gibsoni	Gibson's Albatross	Endangered	Low	No preferred habitat occurs within the project area.
Erythrotiriochis radiates	Red Goshawk	Vulnerable	Low	Two records of this species occur within 10km of the project area. The closest record occurs 140m from the project area. No woodland habitat occurs within the project area.
Lathamus discolour	Swift Parrot	Endangered	Low	No preferred foraging resources occur within the project area.
Macronectes giganteus	Southern Giant Petrel	Endangered	Low	No preferred habitat occurs within the project area.
Macronectes halli	Northern Giant Petrel	Vulnerable	Low	No preferred habitat occurs within the project area.
Rostratula australis	Australian Painted Snipe	Endangered	Low	No records of this species occur within 10km of the project area.
Thalassarche cauta cauta	Shy Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Thalassarche eremita	Chatham Albatross	Endangered	Low	No preferred habitat occurs within the project area.
Thalassarche impavida	Campbell Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Thalassarche melanophris	Black-browed Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Thalassarche salvini	Salvin's Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Thalassarche steadi	White-capped Albatross	Vulnerable	Low	No preferred habitat occurs within the project area.
Turnix melanogaster	Black-breasted Button-quail	Vulnerable	Low	No previous records occur within 10km of the project area. Poor quality habitat may occur within the levee area.
Fish				
Bidyanus Bidyanus	Silver Perch	Critically Endangered	Moderate	Suitable habitat is available within the project area. Due to previous occurrence in a connected water body and the potential of long-distance movements, there is moderate potential for the species to occur here.
Epinephelus daemelii	Black Rock-cod	Vulnerable	Low	Pelagic species with no potential habitat within the project area.
Maccullochella ikei	Clarence River Cod	Endangered	Low	Due to previous occurrence in a connected water body and the potential of long-distance movements, there is some potential for the species to occur here, although it is considered to be low.

Scientific Name	Common Name	EPBC Act Listing	Likelihood of Occurrence	Rationale
Nannoperca oxleyana	Oxleyan pygmy perch	Endangered	Low	Endemic to the coastal region of eastern Australia, from northern NSW to south-eastern Queensland (DPI 2010). There is also only limited habitat available within project area.
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Low	No roosting habitat occurs within the project area for this species. No woodland is present within the project area to provide preferred foraging grounds for this species.
Dasyurus maculatus	Spotted-tailed Quoll	Endangered	Low	16 records occur within 10 km of the project area, with records occurring within the project area. No dens sites, caves or rocky outcrops occur within the project area. No wooded habitat present within the project area in which to forage. This species may traverse the agricultural areas when moving between foraging habitats outside of the project area.
Petrogale penicillata	Brush-tailed Rock-wallaby	Vulnerable	Low	No preferred habitat occurs within the project area.
Phascolarctos cinereus	Koala	Vulnerable	Low	The koala has been recorded on 158 occasions within 10km of the project area with the closest record occurring 243m from the project area. One preferred feed tree occurs within the project area, however based on the scarce number of feed trees and habitat, the koala is unlikely to traverse the project area.
Potorous tridactylus tridactylus	Long-nosed Potoroo	Vulnerable	Low	No preferred habitat occurs within the project area.
Pseudomys novaehollandiae	New Holland Mouse	Vulnerable	Low	No preferred habitat occurs within the project area.
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	High	Resident colony Susan Island. Individuals are likely to forage on isolated Moreton Bay fig trees that are located within the project area.
Reptiles				
Caretta caretta	Loggerhead Turtle	Endangered	Low	This is a marine species. There is no suitable habitat in the project area.
Chelonia mydas	Green Turtle	Vulnerable	Low	This is a marine species. There is no suitable habitat in the project area.
Saiphos reticulatus	Three-toed Snake-Tooth Skink	Vulnerable	High – Known	Multiple records of this species occur within 10km with records occurring within the project area.
Dermochelys coriacea	Leathery Turtle	Endangered	Low	This is a marine species. There is no suitable marine habitat in the project area.
Eretmochelys imbricate	Hawskbill Turtle	Vulnerable	Low	This is a marine species. There is no suitable marine habitat in the project area.
Natator depressus	Flatback Turtle	Vulnerable	Low	This is a marine species. There is no suitable marine habitat in the project area.

Silver Perch, Grey-headed Flying Fox are all considered to have moderate to high potential of occurring within the project area, and Three-toed Snake Tooth Skink is known to occur within the project area. An assessment of potential impact significance has been undertaken on these species in the following section.

Nature and extent of likely impact

FLORA

The Project EIS identified Hairy-joint Grass *Arthraxon hispidus* as potentially occurring within the project area. Targeted surveys were undertaken, however no Hairy-joint grass was identified within the project area. Based on the survey information, EPBC Act assessment of significance was undertaken, the results of which determined that Project would not have a significant impact on any of these MNES. This assessment is reproduced in Table 9.

Hairy-joint Grass *(Arthraxon hispidus)* (Vulnerable under the EPBC Act)

Hairy-joint Grass is a creeping grass with branching, erect to semi-erect purplish stems (OEH, 2013). Leaf-blades are 2–6 centimetres long, broad at the base and tapering abruptly to a sharp point. Long white hairs project around the edge of the leaf. The seed-heads are held above the plant on a long fine stalk. The grass was once thought of as annual however it is now thought to be a perennial that tends to die down in winter. Habitat for Hairy-joint Grass is thought to include the edges of rainforest and in wet eucalypt forest, often near creeks or swamps.

Table 9: Significance assessment for Hairy-joint grass

Criteria for a significant impact	Likelihood of Impact
Lead to a long-term decrease in the size of an important population of a species	Within the project area, habitat for Hairy-joint Grass was limited to wet areas, predominantly along the banks of the Clarence River and within wet depressions and ephemeral drainage lines. Areas of potential habitat include an area of Freshwater Wetland on Coastal Floodplains Threatened Ecological Community (FWCF TEC) mapped to the east of the existing bridge alignment, on both the northern and southern river banks. No Hairy-joint Grass was recorded within the project area despite undertaking surveys consistent with DEWHA (2009a) *Matters of National Environmental Significance, Significant Impact Criteria Guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*, however the wet soaks and ephemeral drainage lines may be considered marginal potential habitat for the species. There is no real chance or a possibility that the action would lead to a long-term decrease in the size of an important population of Hairy-joint Grass as the project area is not considered to contain an 'important population' of the species.
Reduce the area of occupancy of an important population	There is no real chance or a possibility that the project would reduce the area of occupancy of an important population of Hairy-joint Grass as the project area is not considered to contain an 'important population' of the species.
Fragment an existing important population into two or more populations	There is no real chance or a possibility that the action would fragment an existing important population into two or more populations of Hairy-joint Grass as the project area is not considered to contain an 'important population' of the species. With regard to fragmentation of habitat for the species, historical disturbance regimes including residential and urban development, grazing and the construction of the levee have contributed to the increase in fragmentation and isolation of habitat for Hairy-joint Grass. Potential habitat within the project area is considered marginal based on the rainforest edge or wet eucalypt forest habitat preferences and it is restricted to the FWCF TEC mapped to the east of the existing bridge alignment. The project is therefore considered unlikely to significantly isolate or fragment habitat for the species.
Adversely affect habitat critical to the survival of a species	To date, no habitat for Hairy-joint Grass is listed on the Register of Critical Habitat. Habitat within the project area was limited to FWCF TEC on the northern and southern bank, to the east of the existing bridge alignment, as well as damp depressions. This habitat was found to be marginal based on the patch size and disturbed nature of the FWCF TEC and is not considered critical to the survival of the species.

Criteria for a significant impact	Likelihood of Impact
Disrupt the breeding cycle of an important population	Little information on the pollination and seed dispersal mechanisms of the species is available however given the scabrid nature of the glume and length of the awn it is anticipated that it is likely to be distributed by wind, water and potentially animals. There is no real chance or a possibility that the action would disrupt the breeding cycle of an important since the project is unlikely to significantly reduce the dispersal mechanisms of the species and the project area is not considered to contain an 'important population' of the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No Hairy-joint Grass was recorded within the project area, however the wet soaks and areas mapped as FWCF TEC do provide marginal potential habitat for the species. The area of marginal potential habitat within the project area is approximately 0.10 ha, however this is considered to be conservative and the actual extent of direct impacts is likely to be far less. Within the likely area of direct impacts (project area), the habitat with greatest potential was identified as the banks of the Clarence River immediately under the proposed alignment. The set back of the piers and ramps for the proposed bridge are anticipated to minimise the direct impacts of the project on habitat for Hairy-joint Grass such as vegetation removal and piling. Indirect impacts of the project would include increased shading under the bridge and potential increased recruitment of exotic grasses. Given the species is shade tolerant, and provided hygiene protocols are adhered to, it is unlikely that the extent of potential habitat for the species would be significantly reduced. The habitat for Hairy-joint Grass is considered to be marginal given the lack of rainforest edge or wet eucalypt forest habitat. Based on this, the potential habitat identified within the project area is considered to be of low regional importance for the species.
Introduce disease that may cause the species to decline	Diseases which may impact Hairy-joint Grass include the introduction of Root Rot Fungus (*Phytophthora cinnamomi*) and other plant pathogens. Although Phytophthora was not identified within the project area, the eastern seaboard of NSW is considered the Area of greatest impact and there is a confirmed site located between Grafton and Tenterfield. Recommendations regarding hygiene protocols would minimise the risk of spread or introduction of Phytophthora within the project area and will be included in the Flora and Fauna Management Plan (FFMP).
Interfere substantially with the recovery of the species	The OEH lists 10 priority actions and five activities to assist this species, including: • Protect habitat from frequent fire. • Avoid slashing or mowing around rainforest edges. • Fence habitat remnants to protect from stock. • Control introduced grasses in areas with known populations. • Protect areas of rainforest, wet eucalypt forest and swamp from clearing and development. The proposed development is not in conflict with these activities.

The significant impact criteria assessment concludes that the project is unlikely to have a significant impact on an important population of Hairy-joint Grass due to the species not being recorded during the site visit and the marginal potential habitat that is present within the project area.

FAUNA

Grey-headed Flying-fox *(Pteropus poliocephalus)* (Vulnerable under the EPBC Act)

The Project EIS identified Grey-headed Flying-fox as potentially occurring within the project area, and was recorded during field surveys foraging within and surrounding the project area (Biosis 2010; 2013). Additionally, a resident camp site (breeding habitat) is known to occur on Susan Island only 1 km west of the project area. An EPBC Act assessment of significance was undertaken, the results of which determined that Project would not have a significant impact on these MNES. This assessment is reproduced in Table 10.

Table 10: Significance assessment for Grey-headed Flying-fox

Criteria for a significant impact	Likelihood of Impact
Lead to a long-term decrease in the size of an important population of a species	The Grey-headed Flying-fox is found in a variety of habitats, including rainforest, mangroves, paperbark swamps, wet and dry sclerophyll forests and cultivated areas (Churchill, 1998). The species is a canopy-feeding frugivore and nectarivore. Their major food source is Myrtaceae blossom (mostly eucalypt) and fruits such as native figs (*Ficus spp.*) and cultivated fruit orchards (Churchill 1998). Bats commute daily to foraging areas, usually within 15 km of the day roost (Strahan, 1995), although some individuals may travel up to 70 km. The species was recorded during field surveys foraging within and surrounding the project area (Biosis 2010; 2013). A resident camp site (breeding habitat) is known to occur on Susan Island only 1 km west of the project area. This large camp has records of between 80-7000 individuals (BioNet 2013). Depending on the season, there may be many tens of thousands of flying-foxes on the island, with numbers in summer sometimes exceeding 100,000 (NSW NPWS, 2009). Given the distribution of records of the species within 10 km, individuals from the Susan Island camp site are considered highly likely to utilise resources within the project area, particularly for foraging on fleshy fruited food trees including *Ficus sp*. It is considered that the construction phase of the project would result in some temporary disturbance to the terrestrial and aquatic environments within the project area. Furthermore, it is considered likely that the works associated with the project could result in subsequent changes in localised abiotic factors in and around the project area. However, the final proposed strategic concept design alignment mostly utilises existing roadways and reserves in northern and southern Grafton, with some sections including previously undisturbed grazing paddocks and river banks. The project would result in the removal of 5 significant feed trees (*Ficus sp*), and therefore it is considered that the availability of potential foraging habitat within the region would be reduced considerably for this species. However, given the high mobility of the Grey-headed Flying-fox (able to travel up to 70 km from a camp site) and the availability of known and potential habitat in the locality (including alternative significant *Ficus sp* trees occurring throughout the city of Grafton), the loss of these trees is considered unlikely to the lead to a long-term decrease in the size of an important population of the species.
Reduce the area of occupancy of an important population	The majority of the project area is covered by urban residential areas and grazed paddocks that contain little native vegetation. Wildlife corridors in the project area are therefore limited. The Grey-headed Flying-fox is highly mobile and capable of negotiating disturbed habitats including the existing Clarence River bridge crossing and surrounding farmland. The small areas of proposed vegetation removal is therefore not considered to fragment or isolate areas of habitat within the project area. The proposed location of the second bridge crossing is approximately parallel to the existing bridge and observations of dusk departure from Susan Island did not observe Flying-foxes moving uniformly across the proposed bridge location area suggesting it is not within a flight corridor for this species. The project involves construction works associated with the Grafton highway upgrade inclusive of the bridge crossing at the Clarence River, in Grafton. There is unlikely to be any possibility of the action reducing the area of occupancy of an important population of this species.
Fragment an existing population into two or more populations	The project is considered likely to increase the distance between patches of vegetation lying north and south of the existing bridge crossing, however, it is considered unlikely that the project would fragment an existing important population of the species into two or more populations as a result, given the species' high mobility and urban nature of the project area.

Criteria for a significant impact	Likelihood of Impact
Adversely affect habitat critical to the survival of the species	The vegetation types which provide habitat for the Grey-headed flying-fox within the project area are continuous and of similar quality in the Locality. The project would remove favourable foraging resources for this species in the form of the removal of 5 mature *Ficus sp* trees and approximately 0.12 ha non-limiting planted vegetation habitat. However, due to the availability of similar quality foraging resources in the surrounding area, there is not considered to be a real chance or a possibility that the action would adversely affect habitat critical to the survival of the Grey-headed Flying-fox as the project area is not considered to contain critical habitat for the species.
Disrupt the breeding cycle of an important population	The project area does not contain breeding or roosting habitat for the Grey-headed Flying-fox. In addition to the resident camp site on Susan Island, a camp is located 1.5 km to the south along Bomaderry Creek, which generally supports between 80-7000 individuals (BioNet, 2013). Given the distribution of records of the species within 10 km, individuals from the Bomaderry Creek camp site are likely to utilise resources within the project area on occasion, however these habitats are not considered to be limiting in the locality. Therefore, there is not considered to be a real chance or a possibility that the action would disrupt the breeding cycle of an important population of Grey-headed Flying-fox as the project area is not considered to contain an 'important population' of the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The majority of the project area is covered by cleared areas and grazed paddocks that contain little native vegetation. Approximately 9.35 ha of non-limiting woodland/forest and planted vegetation habitat would be removed from the project area as a result of the project. The Clarence Valley LGA has 75.1% of native vegetation remaining intact, with an effective habitat area of 6285 ha (Clarence Valley Council SOE, 2012). This equates to only 0.15% of the potential habitat (e.g. eucalypt and riparian forest, rainforest, mangroves and paperbark swamps) available within the Clarence Valley locality. Given the availability of known and potential habitat within the locality, and that no breeding habitat would be impacted, it is considered unlikely that the project would modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	It is likely that invasive species including the red fox (*Vulpes vulpes*), domestic dog (*Canis lupus familiaris*) and cats (*Felis catus*) are already present within the locality; however it is unlikely that these ground-dwelling species are having an effect on Grey-headed Flying-fox's foraging within the project area. Therefore, it is considered that the project would be unlikely to increase their extent or abundance or introduce additional invasive species within the project area that are harmful to Grey-headed Flying-fox
Introduce disease that may cause the species to decline	Australian flying-foxes, including the Grey-headed Flying-fox have been identified as natural reservoirs of three zoonotic diseases being Australian bat lyssavirus, Hendra virus and Menangle virus (DECCW, 2009). Australian bat lyssavirus is a fatal disease that is transmitted to humans through bites or scratches when the saliva of infected bats comes into contact with an open wound (Anon, 1996). There is no evidence that the two paramyxoviruses can be transmitted directly from bats to humans, although each has been transmitted to humans by domestic animals (horses and pigs) (DECCW, 2009). Consequently, it is not considered likely that the project would further introduce disease that may cause the species to decline.
Interfere substantially with the recovery of a species	NSW Government has developed a Draft National Recovery Plan for the Grey-headed Flying-fox (DECCW, 2009). The overall objectives of recovery of Grey-headed Flying-foxes are: • To reduce the impact of threatening processes; to arrest decline throughout their range; • To conserve their functional roles in seed dispersal and pollination of native plants; and, • To improve the comprehensiveness and reliability of information available to guide recovery.

The significant impact criteria assessment concludes that the project has the potential to have a minor adverse impact on the Grey-headed flying-fox due to the removal of five feed trees which could be considered significant, however due to the scope and nature of the project, and availability of additional foraging resources in the surrounding area, it is considered to be an insignificant impact. A number of measures will be included in the Flora and Fauna Management Plan (FFMP) which aim to mitigate the degree of impact to ensure that biodiversity values within the project area are maintained or improved.

Silver Perch *(Bidyanus bidyanus)* (Critically Endangered under the EPBC Act)
No Silver Perch were observed during field surveys conducted throughout the proposed project area (Biosis, 2010). The closest records of the Silver Perch to the project area, includes one record from Angourie South Pool in Yamba (> 20km north-east of Grafton), and two records from the Nymboida River (>20km south-west of Grafton). There are no historical records of this species from the Clarence River (NSW DPI, 2014). An EPBC Significance Assessment was undertaken, the results of which determined that Project would not have a significant impact on these MNES. This assessment is reproduced in Table 11.

Table 11: Significance assessment for Silver Perch

Criteria for a significant impact	Likelihood of Impact
Lead to a long-term decrease in the size of a population	Silver Perch *Bidyanus bidyanus* were once widespread and abundant throughout most of this area, except for cooler high altitude streams. However, they have now declined to low numbers or disappeared from most of their former range. The species prefer fast-flowing, open waters, particularly those containing rapids and races (Allen et al 2002). However, they also inhabit warm, sluggish water with cover provided by large woody debris and reeds. Adults migrate upstream in spring and summer to spawn. Juveniles also sometimes move upstream in response to rising water temperatures and levels (DPI, 2005). No Silver Perch were observed during field surveys conducted throughout the proposed project area (Biosis, 2010). However, it should be noted that the species has been recorded in water bodies connected to the Clarence River, and due to the species ability to make long distance movements, there is considered to be some possibility of occurrence within the Clarence River project area. The only known significant natural population of Silver Perch in NSW occurs in the Murray River, parallel to the NSW/Victorian border (NSW DPI, 2005). Taking this into consideration, it is considered unlikely that the project would lead to a long-term decrease in the size of any important population of the species such that the local population of the species would be placed at risk of extinction.
Reduce the area of occupancy of the species	Silver Perch are found in the Murray-Darling River System (NSW DPI, 2005). Silver Perch are now successfully bred for aquaculture, conservation and to enhance recreational fishing, and large numbers have been stocked into impoundments and smaller numbers into rivers in the Murray-Darling Basin. However, in most cases stocking of Silver Perch has not managed to establish reproducing populations, and they remain threatened in the wild (NSW DPI, 2005). The Murray-Darling contains approximately 13,245 km of waterways that may encompass suitable habitat for this species. However, tremendous pressure has been placed on rivers in the Murray-Darling Basin as a result of river regulation, flood mitigation works, drainage of wetlands, water extraction for consumptive uses, intensive agricultural practices involving the use of fertilisers, pesticides and cultivation, widespread land clearing, the introduction of exotic species (e.g. carp) and rising populations in regional centres (NSW DPI, 2006). Due to the distance of the project area from the natural distribution of the Silver Perch, unsuccessful stocking of viable populations outside of these areas, and lack of records from the locality, it is considered unlikely that the project would reduce the area of occupancy of any important population of the species.
Fragment an existing population into two or more populations	The closest records of the Silver Perch to the project area, includes one record from Angourie South Pool in Yamba (> 20km north-east of Grafton), and two records from the Nymboida River (>20km south-west of Grafton). There are no historical records of this species from the Clarence River (NSW DPI, 2014). Furthermore, given lack of an existing population within the project area, and that the footprint of the proposed works is located within the Clarence River channel where this species has not been historically recorded, on top of the fact that Silver Perch would be more likely to occupy suitable habitat in other creeks within the project area including Carrs Creek, Alipou Creek and Cowan Creek, it is thus considered unlikely that the project would fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of the species	Not applicable. No Critical habitat is listed on the register of Critical Habitat kept by the Chief Executive, OEH or DII within the project area. To date, no critical habitat has been declared for this species.

Criteria for a significant impact	Likelihood of Impact
Disrupt the breeding cycle of an important population	Individuals mature at 3 to 5 years - males at 3 years (~25cm length) earlier than females at 5 years (~29 centimetres length). They spawn in spring and summer after an upstream migration, when large schools often form. The Silver Perch is known to undertake upstream migrations in spring/summer, prior to spawning, and juveniles are known to move in response to slightly elevated water levels and rising water temperatures. This species does not reproduce until the water temperature reaches 23 degrees Celsius (NSW DPI, 2005). Females shed 300,000 or more semi-buoyant eggs that develop into free-feeding stages that drift downstream (Astles et al, 2003). Whilst spawning can occur during non-flood conditions, spawning activity can significantly increase during floods and/or environmental water releases. The proposed bridge upgrade is unlikely to impede fish passage to a greater extent than the existing bridge and the majority of impacts to aquatic fauna are considered to be short term and predominantly during the construction period. Furthermore, no areas of known habitat for the Silver Perch would be disturbed, and therefore there should be no disruption to the breeding cycle of an important population of the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Silver Perch have been found in a wide range of habitats and climates across the Murray-Darling Basin, from the cool, clear, gravel-bed streams of the upper reaches to the lower, slow flowing, turbid rivers of the west and north, and are also known to occur in lakes and reservoirs (NSW DPI, 2005). The proposed Grafton bridge upgrade would require the development of in-stream structures and associated infrastructure crossing the Clarence River as part of the project. The proposed works will cause some intermediate disturbance to the river bed and associated riparian vegetation on the banks of the Clarence River. However due to the lack of records of this species within the locality, some temporary disturbance to the Clarence River within the alignment is not considered likely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	A number of non-native species have been introduced into NSW waterways, both deliberately and accidentally, and at least eleven of these have established self-sustaining populations. Introduced species can impact on native species and freshwater ecosystems through predation (particularly on eggs and larvae); competition for habitat and food resources; habitat degradation; spread of diseases and parasites; and in some cases, hybridisation. The introduced fish species that may have played a part in the decline of Silver Perch include: • Carp *Cyprinus carpio* First released into inland rivers in the 1870s, Carp began to spread rapidly in the early 1970s and are now widespread and abundant in most of the Murray-Darling Basin. They can comprise up to 90% of the fish population in some areas. Carp have destructive feeding habits and are widely blamed for increasing water turbidity and siltation, reducing the amount and diversity of aquatic plants, increasing nutrient levels and the incidence of algal blooms, and causing erosion of streambanks, although it is difficult to separate the impacts of Carp from other causes of habitat degradation (MDBC 2000, Clunie & Koehn 2001a). There is no direct evidence that Carp have caused a decline in any native fish species within the Murray-Darling Basin, and many species – including Silver Perch – had experienced well documented declines before Carp became widespread. It is unlikely that Carp directly prey on Silver Perch, since they mainly consume benthic invertebrates, but they may have affected the species by damaging aquatic habitats and/or competing for resources. • Redfin Perch *Perca fluviatilis* Redfin were introduced into Australia well over a century ago and now occur across much of the Murray-Darling Basin, except warmer waters in parts of northern NSW and Queensland (Weatherley 1963). There is little direct evidence of the effects of Redfin on Silver Perch, and in fact there are some areas where Silver Perch have declined although Redfin are not present (Clunie & Koehn 2001a). Nonetheless, Redfin are known to prey on fish and are likely to consume juveniles, larvae and eggs of Silver Perch as well as other species. Reduced survival of juvenile Silver Perch has been recorded in impoundments containing redfin (Harris et al. unpubl. data cited in Faragher &

Criteria for a significant impact	Likelihood of Impact
	Lintermans 1997). Redfin are also known carriers of epizootic haematopoietic necrosis virus (EHN virus), to which silver perch are susceptible (see below). • Gambusia *Gambusia holbrooki* Gambusia were actively introduced into the wild in Australia, particularly in the early part of the 20th century, to control mosquitos. They can reproduce rapidly and are often abundant in warm and slow flowing waters, especially along the margins near aquatic vegetation (McDowall 1996). Being a small fish, the main impacts of Gambusia are by eating eggs and juveniles and attacking and nipping the fins of larger fish (e.g. Lloyd 1990, McKay et al. 2001). They are unlikely to have contributed significantly to the decline of Silver Perch, although in areas where they are abundant they may pose a threat by preying on eggs, larvae and juveniles. However, given the existing disturbed nature of the project area, and the lack of observations of Silver Perch in the locality, it is considered unlikely that the project would result in invasive species that are harmful to the species becoming established in the species habitat.
Introduce disease that may cause the species to decline	The main pathogenic concern for the Silver Perch is the introduction of exotic diseases by invasive fish species. Of particular concern is the EHN virus which is carried by Redfin Perch, and the Silver Perch is particularly susceptible to. Other diseases that pose a risk to the species include: • Viral Encephalopathy and Retinopathy (VER) • Goldfish Ulcer Disease (GUD) • Asian Fish Tapeworm *Bothriocephalus acheilognathis* • Parasitic copepod Anchorworm *Lernaea cyprinacea* It is unlikely however, that works associated with the proposed development route would result in any of these diseases being introduced to the project area that would in turn cause the species to decline.
Interfere substantially with the recovery of a species	The Recovery Plan specifies those objectives required to prevent the extinction and ensure the recovery of the Silver Perch populations in NSW (NSW DPI, 2005). The proposed development is considered to be generally consistent with the plan and objectives of this program. However, those actions that are considered to be relevant to the project, include: • Ensure that management authorities carry out appropriate planning and impact assessment and make management decisions which minimise impacts on Silver Perch habitats. • Encourage protection and rehabilitation of river reaches known to support important Silver Perch populations. The project is considered to be consistent with the priority actions listed within the recovery plan. Furthermore, given the lack of records of the species from within the locality, and given aquatic mitigation measures are adopted, the project is not considered to have a real chance or possibility of interfering with the recovery of the species.

The significant impact criteria assessment concludes that the project is not likely to significantly impact on the Silver perch. A number of measures will be included in the Flora and Fauna Management Plan (FFMP) which aim to mitigate the degree of impact to ensure that biodiversity values within the project area are maintained or improved.

Three-toed Snake-tooth Skink (Saiphos reticulatus)

Information in this section has been taken from Lewis, B. D (2016). Significance Assessment in accordance with the Environmental Protection and Biodiversity Conservation Act (1999) for the Three-toed Snake Tooth Skink (*Saiphos reticulatus*). Prepared by Lewis Ecological Surveys for the Roads and Maritime, Grafton (**Attachment 5**).

The project works are variable in the way they may impact on this species and its habitat. This is due to the fact that some impacts are of a **permanent** nature (i.e. beneath the completed works footprint) whilst others will be progressively rehabilitated over a 2 year construction period and are considered of an **intermediate** nature. In some cases, particularly the flood mitigation works (i.e. levees), the duration for these works will generally be less than 2 weeks and have been considered **temporary** and more akin to habitat disturbance. How this may impact on the Three-toed Snake-tooth Skink (*Saiphos reticulatus*; hereafter TTSTS) will vary depending on the extent, nature and duration of the works and to more clearly define this, a summary of impacts have been prepared.

Determining Habitat Permeability

The Project study area is located within the industrial and residential urban landscape of Grafton which comprises both permeable (i.e. lawns, parks, gardens) and impermeable (e.g. bitumen roads, concrete footpaths, buildings) surfaces. As impermeable surfaces don't tend to represent habitat for the TTSTS they have been removed from any area calculations to derive the amount of habitat present, and similarly, the amount of habitat potentially being removed as a result of the action. GIS was used to calculate the extent of these unsuitable microhabitats by adding up all of the impermeable surfaces within the construction works footprint and subtracting this from the total construction works area footprint. The resulting figure equating to the area or percentage of permeable habitat which has been calculated for each of the construction works precincts (Table 12).

In those areas adjacent to the construction works footprint, a permeability figure was required as a correction factor to determine on average how much of the residential urban landscape was permeable versus impermeable. This was achieved by dividing the urban area into 140 x 6.25 ha grids (250 x 250 m) and randomly selecting 14 (i.e. 10 per cent) to derive a standard mean figure which could be used as the correction factor. Outlying areas including the Grafton CBD area and the racecourse were excluded from the assessment given they contain high percentages of one, but not the other, thus randomly selected grids within these two areas would skew the number used in the correction factor. The resulting approach identified approximately 59 per cent of Grafton's urban residential area contains permeable surfaces which could be inhabited by the TTSTS. This was used as the correction factor over the mapped population extent of 425 ha to derive a figure of 251 ha of potential TTSTS habitat.

Qualification on TTSTS Likelihood

An assessment has been undertaken to identify likelihood of TTSTS occurring. These areas have been assigned a likelihood rating of unlikely, low, moderate, high or known. The low and unlikely rating have been excluded from any quantification of impact on habitat. The definition of the likelihood ratings was based on the following qualifiers:

- Unlikely: Areas generally more than 100 m from drainage lines and water courses and/or hardstand surfaces such as roads, building, footpaths where no leaf litter build up occurs.
- Low: Permeable lands which generally lacked important micro habitat features such as loose friable soil or a leaf litter/humus layer. In South Grafton, areas may have contained some of these features but were retained in this category given there were no historic records of TTSTS and this was confirmed with the recent field surveys (Bionet 2016; Lewis 2016)
- Moderate: Permeable lands with friable alluvial soils and generally within 100 m of drainage line. In South Grafton, some areas were assigned to this category on the basis that the habitat was highly suitable, although there are no records to confirm TTSTS presence (Bionet 2016; Lewis 2016)
- High: Site contains suitable habitat in form of alluvial soils, leaf litter/humus and within 100 m of drainage line and nearby records which confirm the existence of TTSTS in that area
- Known: TTSTS recorded nearby (<100m) during the course of the field survey

Table 12: TTSTS habitat identified for removal or disturbance based on Roads and Maritime concept design

Works Area	Impact Type	Permeability	Area extent according to likelihood rating (ha)					Total ha Moderate, High, Known
			Unlikely	Low	Moderate	High	Known	
Grafton levee	Temporary	84	0	0	1.90	0.23	0.14	**2.27**
South Grafton levee	Temporary	95	5.71	0.30	0.14	0	0	**0.14**
Bridge and associated roadworks south	Intermediate & Permanent	98	9.29	0.32	0	0	0	**0**
Bridge and associated roadworks – north	Intermediate & Permanent	58	0.58	0	0.39	0.18	0.24	**0.81**
Totals			15.58	0.62	**2.43**	**0.41**	**0.38**	**3.22**

Notes on levee works; Rural – Allowance of a 20 m work zone and Urban – Allowance of a 10 m work zone

Qualification as an Important Population

The TTSTS is currently listed as a vulnerable species pursuant to both the EPBC Act and the TSC Act. Significant impact criteria must be addressed where the vulnerable population qualifies as an 'important population' which is necessary for a species' long-term survival and recovery (DoE 2013). This may include populations specifically identified in recovery plans or qualify as:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity, and/or
- Populations that are near the limit of the species range (DoE 2013).

The Grafton TTSTS population that resides within and beyond parts of the Project study area may be necessary for maintaining genetic diversity, given this geographic locality occurs outside the core distribution of the Border Ranges north to the Brisbane Ranges and DoE survey guidelines encourage the collection of tissue samples (see DEWHA 2011; **Figure 18, Attachment 1**). As a result, the Grafton TTSTS population may be considered an important population. The mapped extent of the population, currently known and confined to Grafton is not at the limit of this species range as records confirm its existence around 200 km to the south at Hat Head and there are some other reported records around Glenreagh and Nana Glen approximately 50 km to the south (**Figure 18, Attachment 1**; OEH 2016; R. Jago pers. comm 31st March 2016). The population has not been identified as a key source population for either breeding or dispersal in any recovery or action plans (Cogger et al. 2000). As a significance assessment had been previously prepared as part of the EIS (see Biosis 2014) it has been subsequently updated to reflect the current findings and knowledge.

Status of the TTSTS in Grafton

The following provides a brief summary on the local ecology of the TTSTS in Grafton and specifically:

- Survey methods and rationale;
- Distribution and Predicted Population Extent;
- Habitat Preferences and Associations; and
- Population Size.

Further information can be found within the TTSTS Management Plan prepared as part of the proposed action (Lewis, 2016), provided in **Attachment 3.**

Survey Methods

Field surveys undertaken between February and April 2016 at all locations within the proposed construction works boundary. This included all of the treatment areas within the levee works construction footprint, excluding a portion of land managed by the Australian Rail Track Corporation (ARTC) in the upstream or western end of the northern levee (**Figure 19, Attachment 1**). These areas were subsequently assigned a moderate likelihood of containing TTSTS, given TTSTS had been recorded in the general area. These areas have been designated as TTSTS habitat for the purposes of this significance assessment.

Field surveys were conducted at 78 locations in the Grafton locality (**Figure 19, Attachment 1**). Generally, surveys were only conducted outside or adjacent to the proposed construction works footprint if TTSTS had been recorded within or in close proximity to the proposed construction works footprint. Some additional outlying areas were also surveyed but are not shown on **Figure 19, Attachment 1**. They include four satellite locations around 3 km to the north at Junction Hill and Alumy Creek Reserve.

Distribution and predicted population extent

TTSTS were recorded at 17 locations with all of these restricted to the northern side of the Clarence River (**Figure 20, Attachment 1**). This included the proposed construction footprint for the northern bridge abutment. There were sufficient numbers of records to suggest all of the North Grafton levee provides habitat, albeit in a disturbed state consistent with a residential urban landscape. No TTSTS were recorded on the southern side of the Clarence River, and only a few areas were deemed as being suitable or having a moderate likelihood of supporting TTSTS; some vegetated areas forming the riparian zone of Cowans Creek where minor levee treatments are planned (**Figure 21, Attachment 1**). The remaining sites were assigned as having a low likelihood, and at distances much beyond 100 m from drainage lines they were assigned an unlikely likelihood of supporting TTSTS.

Following surveys throughout the proposed construction footprint and at another 82 locations scattered throughout Grafton, the 17 recorded locations were overlaid with the four historic records. One of the historic records (i.e. Prince St) appeared as an outlier and upon review of this record it was found to have a 10 km accuracy, meaning that it could have originated anywhere from within 10 km of that location. Following surveys of this area, and combined with the accuracy concerns, it was removed from the dataset as a known or reliable location. After vetting the location data, a close association with drainage lines and flood channels of the Clarence River, Alumy Creek and other drainage lines became evident and this enabled the population to be mapped with a high degree of confidence as skinks were rarely found at distances beyond 100 m from drainage lines (**Figure 20, Attachment 1**). This resulted in a mapped extent of 425 ha restricted to Grafton, however, not all of this could reasonably be considered suitable habitat as the residential urban landscape contains an array of impermeable surfaces including but not necessarily limited to dwellings, bitumen roads and footpaths. To adjust for this, the correction factor (as discussed above) of 0.59 resulted in an adjusted population size or area of habitat refined down to 251 ha which forms the basis for the impact assessment where quantities of habitat are concerned.

Habitat Preferences/Associations

TTSTS were recorded inhabiting non-native ornamental gardens in residential areas and council parks, street tree plantings and, on two occasions, residential yards that have undergone regeneration projects. One as a sub-tropical lowland rainforest, the other a composite representation or sub-tropical coastal floodplain forest (Lewis, 2016). Skinks were consistently recorded where leaf litter covered loose friable soil and were often encountered in association with earthworms and slaters which this species probably forages on. As this species burrows, it would be expected to utilise other areas where surveys were less effective such as gardens with dense ferns and other ground covers and lawn areas with thick thatch cover.

Population Size

The detection rates of TTSTS were highly variable throughout the survey with some sites requiring as few as 5 minutes or 5m^2 of habitat searched to locate an individual, whilst at other locations more than 2000m^2 of habitat required survey before an individual could be located. As the detection rate can be highly influenced by the micro habitat being surveyed, these two figures tend to represent the extremities with which TTSTS were recorded. A cursory estimate of one adult skink per 100m^2 would be expected based on the field survey results.

Table 13 addresses the significant impact criteria for the vulnerable population of the TTSTS.

Table 13: Significance assessment for the TTSTS

Criteria for a significant impact	Likelihood of Impact
Lead to a long-term decrease in the size of an important population of a species	The action is unlikely to lead to a long term decrease in the size of the local TTSTS population. This is due to a number of factors including: • Area of habitat to be permanently removed: The TTSTS population is known from a relatively widespread area of Grafton (i.e. north of the Clarence River), with its distribution quantified at 425ha. After applying the correlation factor of 0.59 (see above), the area of suitable habitat within this area was reduced to 251 ha. The project is of an essentially linear nature with 3.22 ha of moderate or high quality potential habitat or known habitat identified for either disturbance or removal. This equates to 1.28 per cent of TTSTS habitat qualifying as moderate / high or known likelihood (see Table 12 above). It is important to note that only an estimated 0.81 ha (0.40 per cent) of suitable habitat would be impacted to accommodate the bridge and associated roadworks on the northern side, whilst 2.27 ha (0.90 per cent) would be impacted by the levee works on the north Grafton side. Just 0.14 ha of moderate likelihood habitat would be impacted by the works on the south Grafton levee. Consequently, 2.41 ha (0.75 per cent) of the 3.22 ha total will be impacted by temporary works of a short duration, lasting only a few weeks, as the treatment works are of a minor nature (e.g. raising an existing masonry block wall ~50mm). Based on permanent and intermediate impacts, the areal extent of habitat loss at 0.81 ha equates to 0.32 per cent of TTSTS habitat. • Short duration of other areas of habitat being removed: The action proposes to disturb 2.41 ha of TTSTS habitat as opposed to removing it. This is due to works being of a temporary nature, such as increasing existing masonry block walls by less than 100mm, or stripping unsuitable materials from the earth levee mounds and their impermeable layer increased up to 50-250 mm. Works of this nature are expected to be completed within a two week period at any given site, after which the site will be rehabilitated to its pre-existing state. The time taken for this to be returned to suitable TTSTS habitat will be almost immediate as the impacts in these areas are more concerned with direct mortality whilst the works are being undertaken or movement opportunities are reduced as the humus layer and the soils' A horizon is stripped and stockpiled; • The existing site conditions which suggests the species is tolerant to disturbance: Surveys located TTSTS inhabiting leaf litter, building refuse and loose friable soils in ornamental gardens and council parks, street tree plantings in the residential urban landscape of Grafton (Lewis, 2016). On two occasions, TTSTS were recorded in gardens rehabilitated as sub-tropical lowland rainforest (263 Oliver St) and a composite form of sub-tropical floodplain forest (80 Arthur St) established 30 years ago in what was formerly a cleared grazing paddock. On other occasions, TTSTS were found inhabiting leaf litter that had built up on concrete pathways and building foundations. Typically, skinks were found on the soil surface beneath leaf litter ranging in depth from 50 – 300mm and the location data infers the species is capable of sustaining a viable population within the existing residential urban landscape (Lewis, 2016). This is further supported by the fact that TTSTS could be located at all three historic sites which dates back into the 1980's and 1990's whilst the fourth record (i.e. Prince St) proved unreliable due to its 10 km accuracy. Given the fact that TTSTS continue to inhabit the existing disturbed landscape, the rehabilitation times are expected to be almost immediate where works are of a temporary nature. In areas where works will be occurring for longer periods (i.e. construction of the bridge), habitat will be progressively rehabilitated and once construction is completed the revegetated areas will be considered suitable habitat soon after a mulch cover has been established. • A TTSTS Management Plan has been prepared to manage impacts leading up to and during the construction of the action (Lewis, 2016). This includes the use of pre-clearing surveys to reduce any direct mortality during the removal and disturbance of habitat that has been given a moderate, high or known likelihood. Other measures include the identification of relocation sites that are within 100 m of the capture site, occurring outside of the construction works footprint, contain suitable micro habitat consisting of loose friable soil with

Criteria for a significant impact	Likelihood of Impact
	areas of litter, humus or dense vegetative groundcover that provide both cover and foraging resources, and stocking rate considerations with no more than 10 adults and 5 sub adults or hatchlings per 100m^2 of suitable habitat. An effective TTSTS exclusion fence will be designed and installed to reduce the likelihood of skinks moving onto the construction site where works are of a longer duration. At sites where temporary works are planned, TTSTS would be retained and released after the works have been completed. • The management plan also allows for design refinement in the Urban Design and Landscape Plan. This includes a number of design principles that would restore and in some cases improve the overall habitat quality to what currently exists via the following: – Install mulch beds around established isolated planted trees of at least 1 m radius; – Mulch including tea tree mulch, bark chip or coarse woody vegetation processed using a grinder is not deemed suitable; – Integrate planting beds with groundcover species listed in the planting schedule of the urban design and landscaping concept plan; – Mulch beds at least 200 mm depth at their time of installation, and – Refine existing plantings schedule to increase trees with dense canopy traits.
Reduce the area of occupancy of an important population	The area of habitat inhabited by the TTSTS has been estimated at 20,000 km² (7000 km² in NSW and 13,000 km² in Queensland), although this estimate excludes outlying records and areas of disjuncture (DoE SPRAT, 2013). The Grafton TTSTS population is restricted to the northern side of the Clarence River where the population is distributed over an area of 251 ha suitable habitat, after accounting for impermeable (i.e. roads, buildings, concrete footpaths) versus permeable (lawns, gardens, street tree plantings) habitat (Lewis, 2016). The action will not reduce the area of occupancy as TTSTS will still remain over this extent shown presented in **Figure 21, Attachment 1**. The loss of 0.69 ha of habitat within this extent will be offset via the Urban Design and Landscape Plan which seeks to adopt principles that will improve the suitability of plantings as TTSTS habitat as identified above. This approach is supported by the locations where TTSTS have been recorded and consequently considered suitable habitat. For example, street tree plantings, ornamental gardens in private residences and council maintained parks and reserves within and close to drainage lines (see Lewis, 2016).
Fragment an existing population into two or more populations	The action is unlikely to fragment the existing population into two or more populations. This is due to the fact the TTSTS population extends throughout the urban residential landscape of Grafton where there are a variety of impermeable surfaces and structures that would normally be perceived as a barrier to dispersal. The existing road network with its varying widths and configurations of one to four lanes, North Coast Railway, Grafton Central Business District and the existing Grafton Bridge are all obvious examples and occur within the mapped population extent which is supported by both historic (i.e. 1980's) and recent records (2016; see **Figure 21, Attachment 1**). The fact that TTSTS could be found at or close to those locations where historic records date back to the 1980's indicates the population has been able to survive and function in a viable capacity. The Urban Design and Landscape Plan will also provide opportunities to restore and improve habitat connectivity (**Figure 22, Attachment 1**). Note: The Landscape Concept plan is an early draft of landscaping and will be refined and included into the Urban Design and Landscape Plan. This will be undertaken in consultation with RMS, EPA, the project Environmental Representative and DPE. Areas where impermeable surfaces such as roads and dwellings will be replaced with a bridge and vegetated using landscaping principles that align with suitable TTSTS habitat.
Adversely affect habitat critical to the survival of the species	The TTSTS population is known to inhabit ornamental gardens, street tree plantings and parks in Grafton's urban residential landscape (Lewis, 2016). Terrain mapping revealed all of the records were in close proximity to drainage lines and associated riparian areas with alluvial soils (**Figure 21, Attachment 1**). This habitat type, rather than a specific vegetation community, is thought to determine the presence of TTSTS and was the basis for mapping of the population extent at 425 ha before revising this down to 251 ha of permeable habitat. Consequently, it could be perceived that alluvial soils supporting some form of vegetative cover

Criteria for a significant impact	Likelihood of Impact
	within 100 m of drainage lines is important habitat for maintaining the survival of TTSTS in Grafton. The action will permanently remove 0.81 ha of habitat and temporarily disturb a further 2.41 ha of habitat. This loss equates to 0.32 per cent of loss of habitat and disturbance of a further 0.96 per cent with none of these extents occurring in a naturally occurring native plant community type. Such a small incremental loss is not considered adverse in the current context as extensive areas of alluvial soils with some form of vegetative cover will remain and the Urban Design and Landscape Plan makes further contributions which seek to offset any permanent loss of TTSTS habitat using the aforementioned principles.
Disrupt the breeding cycle of an important population	The TTSTS population extends over an area covering 425 ha in the urban residential landscape of Grafton. Within this area, there are many existing activities which could disrupt the breeding cycle of this population, including but not limited to individuals being run over by vehicles, predation by cats, foxes, dogs and chickens, destroyed by residents or general public as they misidentify the animal as a snake, maintenance works of public gardens and street trees and event stochastic events such as flooding. The Project study area is not exempt from these activities and whilst the action will pose a risk of disrupting the breeding cycle, this will be limited to only a small number of individuals within a narrow and predominantly linear area. Such an impact is considered relatively benign, made more so by the management actions outlined in the TTSTS management plan which allow for pre-clearing surveys to capture and relocate individuals, thereby reducing the risk of direct mortality and the Urban Design and Landscape Plan seeks to promote and improve the existing TTSTS habitat using the principles identified in the TTSTS Management Plan.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Most of the Project study area is covered by either urban residential areas with ornamental gardens, cleared mown areas associated with council reserves or grazed paddocks that contain little native vegetation. Consequently, the landscape is considered highly disturbed and degraded. The subterranean habitat consists predominantly of flood alluvium. The action proposes to remove and disturb up to 3.22 ha which equates to 1.28 per cent of suitable habitat after taking into account all areas of habitat that qualify as having a moderate, high or known likelihood (Table 12). Most of this can be categorised as a temporary disturbance as 2.41 ha (0.96 per cent) will receive levee treatment works lasting only 2 weeks within any given area. This combined with management actions outlined in the TTSTS Management Plan (including but not limited to pre-clearing surveys and retention of individuals until the works are complete) will ensure the action is unlikely to cause a decline in the population. Where the action proposes to remove 0.81 ha of habitat (0.32 per cent) to accommodate the bridge and its abutments and associated road upgrades, there are a number of management actions that will similarly ensure the species does not decline. They include the use of pre-clearing surveys, a relocation strategy that releases captured TTSTS into nearby areas of known habitat and the use of an effective exclusion fence to reduce the likelihood of individuals moving back into the construction work zone. Moreover, the TTSTS Management Plan also allows for design refinement in the Urban Design and Landscape Plan for the Action. This includes a number of design principles as identified previously, that would restore, and in some cases improve the overall habitat quality to what currently exists.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species including the Red Fox *(Vulpes vulpes)*, domestic Dog *(Canis lupus familiaris)* and Cat *(Felis catus)* are already present in the Project study area. Domestic fowl also pose a threat to this species and they too are known from the Project study area. Consequently, the action is unlikely to facilitate the increase in either their extent or abundance nor introduce additional invasive species within the Project area that are harmful to the TTSTS.
Introduce disease that may cause the species to decline	No known disease is known to affect the TTSTS, and therefore the project is considered highly unlikely to introduce a disease that may cause the species to decline.
Interfere substantially with the recovery of a species	An Approved Conservation Advice has been developed for TTSTS (TSSC, 2008) and identifies a range of regional and local priority recovery and threat abatement actions. The action conflicts with some of these, namely the removal of TTSTS habitat, however, it is unlikely to interfere substantially with the recovery of the species given only a small area of habitat will be removed (0.69 ha or 0.27 per cent), a

Criteria for a significant impact	Likelihood of Impact
	further 2.41 ha (0.96 per cent) will receive some temporary disturbance. Moreover, a number of management actions identified in the TTSTS management plan will reduce impacts with regard to direct mortality via pre-clearing surveys, relocation procedures, use of exclusion fencing notwithstanding the use of landscaping that will take into account preferred micro habitat attributes for the TTSTS to further offset any habitat loss. The action has brought about a number of positive initiatives consistent with the approved conservation advice. Among them, broader and more systematic surveys have been performed to identify the current status of the TTSTS population in and around Grafton which had not been recorded in almost 30 years, the population extent has been mapped and refined to understand its size and viability, fostered a greater awareness among the community and local government authority where it is known to occur. Additionally, the action will not remove any native plant community types which support known TTSTS habitat.

Conclusion

Targeted surveys for the TTSTS have demonstrated that a population still exists in the urban residential landscape of Grafton. The distillation of records overlaid with terrain mapping and rapid habitat assessments enabled the potential habitat to be mapped over an extent of 425 ha. After accounting for the array of impermeable surfaces deemed unsuitable as habitat for the TTSTS, a correction factor of 0.59 was applied to derive an area of habitat calculated at 251 ha. Field validation surveys at historic sites confirmed all of the historic known locations still supported skinks apart from an outlier location which was later found to be inaccurately plotted with a 10 km accuracy or error margin.

Within the mapped extent, TTSTS were recorded from a range of non-native ornamental gardens, council maintained parks and street tree plantings, but all shared a common association being within 100 m of drainage lines on alluvial soils. This forms the basis of what could be interpreted as habitat required to maintain a population of TTSTS in the Grafton locality.

The Project will permanently remove 0.81 ha of this land (0.32 per cent) and further disturb an area of 2.41 ha (0.96 per cent) but this is considered unlikely to impact on the stability of the population to an extent that could lead to a localised decline in the population. Moreover, a number of safeguards have been proposed in the TTSTS Management Pan to alleviate any potential impacts, including but not limited to the use of pre-clearing surveys by an experienced ecologist, the construction of an effective TTSTS exclusion fence and the refinement of the Urban Design and Landscape Plan to provide plantings more commensurate to the existing habitat values of the TTSTS will ensure little to no net loss of habitat.

Given the action is located in an area best described as a disturbed urban residential landscape and will remove less than 1 per cent of TTSTS habitat that will be managed via the safeguards outlined in the TTSTS Management Plan, it is considered the Project will not have a significant impact on this MNES.

3.1 (e) Listed migratory species

Description

The results of the desktop review of the Commonwealth Protected Matters Search Tool (PMST) identified a range of migratory species listed under the EPBC Act that were predicted to occur within a 10 kilometre radius of the project area (Table 14). Of these migratory species, six are considered to have a high potential and three are considered to have a medium potential to utilise habitats within the project area based on the availability of suitable habitat in the locality. Five species were confirmed during field investigations.

Table 14: Migratory species likelihood of occurrence within project area

Scientific Name	Common Name	Likelihood of Occurrence
Apus Pacificus	Fork-tailed Swift	Low
Acrocephalus stentoreus	Clamorous Reed Warbler	High – confirmed
Ardea ibis	Cattle Egret	High – confirmed
Ardea modesta	Eastern Great Egret	Medium
Calidris acuminate	Sharp-tailed Sandpiper	Low
Chalcophaps indica	Emerald Dove	Low
Chlidonias leucopterus	White-winged Black Tern	Low
Cuculus saturates	Himalayan Cuckoo	Low
Gallinago hardwickii	Latham's Snipe	Medium
Haliaeetus leucogaster	White-bellied Sea-Eagle	High – confirmed
Hirundapus caudacutus	White-throated Needletail	Low
Hydroprogne caspia	Caspian Tern	Medium
Merops ornatus	Rainbow Bee-easter	High – confirmed
Monarcha melanopsis	Black-faced Monarch	Low
Monarcha trivirgatus	Spectacled Monarch	Low
Myuagra cyanoleuca	Satin Flycatcher	Low
Plegadis falcinellus	Glossy Ibis	High
Rhipidura rufifrons	Rufous Fantail	Low
Sterna hirundo	Common Tern	High – Confirmed
Symposiachrus trivigatus	Spectacled Monarch	Low
Tringa stagnatilis	Marsh Sandpiper	Low

Nature and extent of likely impact

A total of 36.07 ha of potentially suitable foraging habitat for these migratory species exist within the project area in a variety of vegetation types; however no breeding habitat exists within the project area for any of these species.

Table 15: Significant impact criteria for migratory species

Criteria for a significant impact	Likelihood of Impact
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	The **Cattle egret** occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It has been recorded on earthen dam walls and ploughed fields. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation (DoE, 2013). The **White-bellied sea eagle** is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, and the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats (DoE, 2013). The **Rainbow bee-eater** occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other

Criteria for a significant impact	Likelihood of Impact
	habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches (DoE, 2013). The **Clamorous reed-warbler** inhabits reed beds and other dense vegetation near water. Flies low over water (Simpson and Day, 1999). The **Common tern** is marine, pelagic and coastal. In Australia, they are recorded in all marine zones, but are commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores (DoE, 2013). It is considered that the construction phase of the project would result in some temporary disturbance to the terrestrial and aquatic environments within the project area. Furthermore, it is considered likely that the works associated with the project would result in subsequent significant changes in localised abiotic factors (i.e. shading, temperature, water flow and inundation etc.) in and around the project area. However, the final proposed strategic concept design alignment mostly utilises existing roadways and reserves in Grafton and South Grafton, with some sections including previously undisturbed grazing paddocks and river banks. As such, due to the nature of the project, it is considered unlikely that the project would have a significant impact on any areas of habitat that would have the ability to seriously disrupt the lifecycle of an ecologically significant proportion of the population of any of these migratory species. It is considered unlikely that there would be a real chance or possibility that the project would substantially modify, destroy or isolate an area of important habitat for any of these migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	The project involves construction works associated with the Grafton Highway upgrade inclusive of the bridge crossing at the Clarence River, in Grafton. There is unlikely to be any possibility of invasive species being introduced to the surrounding terrestrial or marine environment as a result of the proposed works.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The **Cattle egret** population in Australia, New Guinea and New Zealand is estimated to be around 100,000 birds. East coast colonies operate in a well-defined period from October to January, occasionally extending by a month either side. This species breeds colonially and are known to breed in urban areas, which mean that a significant proportion of the population can be present in breeding colonies. The species feeds mostly on grasshoppers during the breeding season. It is, however, known to consume other insects including cicadas, centipedes, spiders, cattle ticks, frogs (including cane toads), lizards (particularly skinks) and small mammals. In Australia the Cattle Egret is a partial migrant; some of the population migrates to New Zealand, while the remainder migrates locally. The birds migrate from breeding colonies in south-east Queensland and north-east NSW to spend winter in either south-east Australia or New Zealand (DoE, 2013). A Cattle egret breeding colony was recorded by Biosis ecologists in Grafton (located between Prince and North Streets, in Grafton). However, it should be noted that the finalised route option bypasses this colony. Given the high degree of tolerance of human presence and activities exhibited by the species, it is considered unlikely that any indirect impacts associated with works occurring in proximity to the colony would be significant. The **White-bellied sea eagle** population is estimated at more than 500 pairs, in Australia. In south-eastern Australia alone is estimated to be 410 – 430 pairs. The species first breeds at approximately six years old. Although the mortality rate is high amongst newly-independent birds, if juveniles survive to breeding age they may live for up to 30 years. The species breeds in solitary and monogamous pairs that mate for life. However, if one member of the pair dies, it is quickly replaced. The species feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal. White-bellied sea eagles are described as a breeding resident throughout much of its range in Australia. Breeding adult birds are generally sedentary, although they forage over large areas and are capable of undertaking long-distance movements (DoE, 2013). The total population size of the **Rainbow bee-eater in Australia** has not been estimated. However, the population size is assumed to be reasonably large based on reporting rates for the species (i.e. the Atlas of Australian Birds has received more than 30,000 records of the Rainbow Bee-eater since 1998. Based on the maximum interval between banding and re-sighting dates for

Criteria for a significant impact	Likelihood of Impact
	individual birds, the Rainbow Bee-eater is capable of living for up to 24 months in the wild. The species breeds in socially monogamous pairs that are sometimes assisted by a varying number of auxiliary birds or 'helpers' that are usually male. The nests are typically concentrated together in loose colonies, although in some instances pairs would nest solitarily. The Rainbow Bee-eater mainly feeds on insects, and would occasionally take other prey items including earthworms, spiders, and tadpoles. The movement patterns of the Rainbow Bee-eater are complex, and are not fully understood. Populations that breed in southern Australia are migratory. After breeding, they move north and remain there for the duration of the Australian winter (DoE, 2013). The population size of the **Clamorous reed-warbler** has not been quantified, however is believed to be stable (Birdlife, 2013). The species breeds from September – December, building a deep cup nest of reedsheaths, woven around reed stems and wouldow strands. The Clamorous reed-warbler eats insects. The species is widespread in eastern Australia, and to a lesser degree in Western Australia, and is also found from New Guinea to south-eastern Africa (Pizzey and Knight, 2006; Birdlife Australia). The **Common tern** has a large global population, estimated to be 1,100,000–4,500,000 individuals. The species is a non-breeding migrant to Australia, where it is widespread and common on the eastern coast south to eastern Victoria, and common on parts of the northern coast, mainly east of Darwin. Common Terns are fairly opportunistic, with a diet predominantly of small fish (greater than or equal to 15 centimetres in length), though also often taking crustaceans or insects, and occasionally squid. The species rarely take other invertebrates. This species is strongly migratory, breeding in the northern hemisphere in the boreal spring-summer and migrating south to wintering areas in the Northern and Southern Hemispheres (DoE, 2013). The construction phase of the project would result in some temporary disturbance to the surrounding terrestrial and aquatic environments within the project area. It is considered likely that the works associated with the project could result in subsequent changes in localised abiotic factors in and around the project area. However, it is considered unlikely that the project would have a significant impact on any areas of habitat that would have the ability to seriously disrupt the lifecycle of an ecologically significant proportion of the population of any of these migratory species. Even so, a number of measures are proposed to mitigate the potential for any substantial changes to important habitat for these species (to be included in the FFMP). Furthermore, given the relatively small footprint, terrestrial nature, and distance of the species habitat from the project, it is considered unlikely that the project would seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the above-listed migratory species.

3.1 (f) Commonwealth marine area

(If the action is in the Commonwealth marine area, complete 3.2(c) instead. This section is for actions taken outside the Commonwealth marine area that may have impacts on that area.)

Description

The Project Area is not located within or adjacent to a Commonwealth Marine Area.

Nature and extent of likely impact

NA

3.1 (g) Commonwealth land

(If the action is on Commonwealth land, complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land.)

Description

The Project is not anticipated to have any impacts on Commonwealth land.

Nature and extent of likely impact

NA

3.1 (h) The Great Barrier Reef Marine Park

Description

The action is not within or in proximity to the Great Barrier Reef Marine Park.

Nature and extent of likely impact

NA

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

The project is not a coal seam gas development or large coal mining development.

Nature and extent of likely impact

NA

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment		

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment		

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))		

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))		

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))		

3.3 Other important features of the environment

3.3 (a) Flora and fauna

The information presented in this section draws on information in the biodiversity report prepared for the Project EIS *(Technical Paper: Flora and Fauna Assessment* (Biosis, 2014)).

FLORA

The majority of the project area, including the flood mitigation works area (levee), is represented by a highly modified landscape in poor condition with little or no native vegetation remaining. These areas have been subject to historic and ongoing urbanisation, grazing and cropping which has led to the isolated and fragmented nature of remnant vegetation.

Flora surveys were undertaken in public, private and Australian Rail Track Corporation (ARTC) owned lands where access was granted. Generally, survey effort was focused on habitats with a greater potential to contain native species, i.e. remnant native vegetation and waterbodies (Clarence River, wetlands, soaks). Less effort was expended on highly modified areas such as cropped pastures, suburban streets and residential housing.

Vegetation Communities

The vegetation communities throughout the study area were broadly categorised into four vegetation communities Table 16. The extent of these communities are shown in **Attachment 1, Figure 23** and **Figure 24**.

Table 16: Vegetation communities occurring in study area

Community	Description
Freshwater Wetlands on the Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (Listed under the *Threatened Species Conservation Act 1995* (TSC Act) as endangered)	This community was recorded within the project area mostly as narrow linear patches along the banks of the Clarence River and up and down stream in disjointed patches. It was also recorded within a number of the floodgate channels along the length of the levee and within some wet depressions adjoining the Clarence River. However, these were located outside the project area. This community was found to be in poor condition with heavy infestation of exotic species due to surrounding land uses.
Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion (Listed under the TSC Act as endangered)	This community is limited to isolated degraded patches of remnant vegetation. The largest patch in the project area is about 1500 m upstream of the existing bridge, on the northern bank of the river. This community was found to be in poor condition due to a history of disturbance, including residential and urban development, grazing and construction of the existing levee.
Native and exotic plantings	This vegetation community comprises a high level of exotic canopy species and native species that are not endemic to the locality. It typically encompasses roadside verges and nature strips where planted jacarandas (*Jacaranda mimosifolia*) and Moreton Bay fig (*Ficus macrophylla*) are thriving
Weeds and exotics	This vegetation community occurs throughout the project area among the native and exotic plantings community. The species composition varies according to land use, with exotic grasses dominant within mown areas and annuals and shrubs dominant through the riparian sections adjoining the Clarence River.

Threatened flora

No threatened flora species were recorded in the project area despite targeted searches during optimal periods.

Endangered populations

The results of the desktop review did not identify any TSC Act listed endangered flora populations for the region. No listed endangered flora populations were recorded or are predicted to occur within 10 kilometres of the project area.

Noxious weeds

Thirteen flora species recorded across the project area are listed as noxious weeds in the Clarence Valley local government area. These weeds are generally located along the banks of the Clarence River and within the paddocks traversed by the levee, Camphor laurel is scattered throughout the project area. One of the weed species listed as noxious, Crack Willow, *Salix fragilis*, is a notifiable weed under Part 3 of the *Noxious Weeds Act 1993.*

Table 17: Weeds recorded within study area (within 10km of project area)

Weed species	Common Name	Noxious Weed Class
Ageratina adenophora	Crofton weed	4
Alternanthera philoxeroides	Alligator weed	2
Cestrum parqui	Green cestrum	3
Cinnamomum camphora	Camphor laurel	4
Cryptostegia grandiflora	Rubber vine	1
Eichhornia crassipes	Water hyacinth	4
Lantana camara	Lantana	4
Leptospermum petersonii	Lemon-scented tea-tree	4
Ligustrum lucidum	Broad-leaved privet	4
Ligstrum sinense	Small-leaved privet	4
Opuntia sctricta	Prickly pear	4
Salix fragilis	Crack willow	5
Sporobolus fertilis	Giant Parramatta Grass	4

Assessment of Impacts on Flora

Impacts on threatened ecological communities and riparian vegetation

Project construction would require the clearing of 0.41 hectares of threatened ecological communities, comprising:

- About 0.31 hectares (3,100m^2) of Subtropical Coastal Floodplain Forest (SCFF)
- About 0.1 hectares (1,000m^2) of Freshwater Wetlands on Coastal Floodplains (FWCF).

FWCF and SCFF comprises the riparian vegetation that would be impacted by the project. Assessments to determine the significance of impacts SCFF and FWCF found that the impacted areas are considered to be of relatively low regional and local importance based on the small patch size, degraded nature of the examples within the project area and their location within a peri-urban area (peri-urban areas are the non-urban areas close to cities and towns).

As outlined in the EIS, the project area (**Figure 1**) footprint in total is 49.70 hectares (ha) of which 36.07 ha comprises vegetation and the remaining hard stand, buildings and infrastructure. The vegetation includes 31.25 ha of weeds and exotics, 4.41 ha of native and exotic plantings and 0.41 ha of poor condition threatened ecological communities. This vegetation is generally in low condition in a cleared and highly modified urban and rural environment. With the reduction in levee works from 11.0 km to 5.7 km, impacts have come down further.

Biodiversity offsets have been considered taking into account the Principles for the use of biodiversity offsets in NSW (DECCW, 2008). Offsets would not be required given that the amount of threatened ecological communities to be cleared is minimal in nature and that the project would not clear native vegetation or threatened species and/or threatened species habitat of very high conservation value. Also, the existing communities are already highly disturbed and in a degraded condition, and thus of low value.

Impacts on threatened flora species

No threatened flora species were recorded within the study area, so it is not anticipated that the project would have any significant impacts on threatened flora species or their habitat. The TSC Act assessment of significance carried out for Hairy-joint Grass concluded that the project would have a minimal impact on this species or its potential habitat in the locality, and that neither a species impact statement nor a referral under the provisions of the EPBC Act are recommended.

Potential spread of noxious weeds

Vegetation removal, construction vehicles, plant and equipment have the potential to spread or introduce noxious weeds to the project area. These risks will be managed in a Construction Environmental Management Plan (CEMP).

FAUNA

Threatened fauna

Nineteen NSW threatened fauna species are known to occur or are considered to have the potential to occur in the study area based on regional records, literature reviews and the presence of suitable habitat. These species are documented in *Technical Paper: Flora and Fauna Assessment.* Of these 19 species, nine threatened fauna species were recorded during field surveys:

- Masked owl, *Tyto novaehollandiae*, TSC Act Vulnerable
- Hoary wattled-bat, *Chalinolobus nigrogriseus*, TSC Act Vulnerable
- Little bent-wing bat, *Miniopterus australis*, TSC Act Vulnerable
- Eastern bent-wing bat, *Miniopterus schreibersii oceansis*, TSC Act Vulnerable
- Eastern freetail-bat, *Mormopterus norfolkensis*, TSC Act Vulnerable
- Southern myotis, *Myotis macropus*, TSC Act Vulnerable
- Grey-headed flying-fox, *Pteropus poliocephalus,* EPBC Act Vulnerable, TSC Act Vulnerable
- Greater-broad nosed bat, *Scoteanax rueppellii*, TSC Act Vulnerable
- Eastern cave bat, *Vespadelus troughtoni*, TSC Act Vulnerable

Fauna movement corridors

The project area is not near any areas classified as regional 'significant vegetated corridors' or 'stepping stone corridors and priority restoration areas' as identified in the Clarence Valley Council Biodiversity Management Strategy (Wright, 2010). The Clarence River represents a corridor for diadromous fish species (fish that migrate from freshwater to saltwater or vice versa, to complete life cycles). Locally occurring freshwater fish are likely to use the Clarence River to migrate to and from spawning sites and exploit resources throughout the system.

Endangered populations

The desktop review of endangered populations listed under the TSC Act identified one endangered fauna population associated with the study area, the Emu population *Dromaius novaehollandia* in the NSW North Coast Bioregion and Port Stephens local government area. Four records of this endangered population occur within 10 kilometres of the project area, with the closest record within one kilometre. However, there are no records of Emu sightings within the project boundary, and they are unlikely to come so far west of their normal range.

Aquatic ecology

Two threatened fish species listed under the FM Act are considered to have a moderate likelihood of occurrence within the study area based on previous records and correspondence with Department of Primary Industries (Fisheries) (NSW DPI, 2013, Butler pers. comm.):

- Purple-spotted Gudgeon, *Mogurnda adspersa*
- Silver Perch, *Bidyanus bidyanus* (this species is also listed as Critically Endangered under the EPBC Act).

Assessment of Impacts on Fauna

Project construction has the potential to impact on threatened species by causing any of the following:

- Death or injury of individuals
- Loss or disturbance of limiting foraging and breeding resources
- Removal of hollow-bearing trees and habitat trees

Based on the precautionary principle construction of the project would include staged clearing of the hollow-bearing and habitat trees, to reduce the risk of fauna mortality associated with their removal.

Seven-part tests under the TSC Act were carried out for threatened fauna species recorded during field surveys and fauna species considered to have a moderate to high likelihood of occurrence in the project area. These concluded that the construction of the project is unlikely to have a significant effect on any of these species.

Impacts on wildlife connectivity and habitat fragmentation
The project area is largely isolated from those optimal habitats and regional corridors occurring within the Clarence Valley local government area. The landscape surrounding the project area has been substantially modified and is now an urban landscape of mainly residential developments, farming lands and associated road infrastructure where habitat is fragmented.

Therefore, the construction of the project would not result in impacts on regional fauna corridors or habitat fragmentation.

Impacts from construction noise, vibration and light
Construction noise, vibration and lighting from ancillary sites and construction zones have the potential to impact native fauna species. However, given the existing levels of noise, vibration and light from Grafton and South Grafton, the increase above existing levels is unlikely to be substantial enough to result in any significant impacts on native fauna species.

Impacts on aquatic ecology
Impacts on aquatic habitat and species
The construction of the project is unlikely to have a significant impact on aquatic habitat and species. This is because:

- Potential construction impacts on aquatic habitat would be temporary and confined to areas occupied by the bridge foundations and abutments
- Erosion and sediment control measures would minimise potential impacts on water quality, which would otherwise have the potential to affect aquatic species and their habitat
- The proposed river-based construction activities or structures are not considered to be barriers to the fish passage along the Clarence River
- FM Act assessments of significance were completed for Purple-spotted Gudgeon and Silver Perch. The assessments concluded that the project would have a minimal impact on these species and their potential habitat and determined that a species impact statement is not necessary for these fish species.

Impacts on listed coastal wetlands
The project is unlikely to impact any listed *State Environmental Planning Policy 14 – Coastal Wetlands* given the distance between the nearest wetland and the project area (several kilometres) and the erosion and sediment control measures proposed during construction.

3.3 (b) Hydrology, including water flows

The information presented in this section draws on information in the flooding report prepared for the Project EIS (*Technical Paper: Flooding and hydrology assessment* (BMT WBM, 2014).

The Clarence River at Grafton flows from west to east within the Study Area. The Clarence River Basin covers an area of approximately 22,700 km^2 and is located in the far north coast of New South Wales. Tidal influences extend to the town of Copmanhurst approximately 30km upstream of Grafton. The River rises near the Queensland border and flows south and northeast for 394 km before empting into the Pacific Ocean at Yamba. Alipou, Cowan's and Carr's Creeks are tributaries of the Clarence River at Grafton and are within the study area. These waterways are influenced by the tidal movements that affect the Clarence River. These three waterways have all been heavily modified by previous agricultural activities, in particular Alipou and Cowan's Creek which are regulated via floodgates.

The Clarence River within the vicinity of the project area and local tributaries are influenced by tidal waters and as such the aquatic ecological community is comprised of a combination of freshwater and estuarine/marine species. The Clarence River within and adjacent to the alignment contains moderately sensitive key fish habitat as it provides riverine brackish wetland habitat and has a stable vegetated substrate. Alipou, Cowan's and Carr's Creeks contain moderately sensitive key fish habitat as they provide a combination of freshwater habitats and brackish wetlands.

The Clarence River has experienced regular floods. The floods typically occur from relatively low rainfall events upstream, lasting for several days or weeks, rather than high intensity rains. Long periods of dry followed by flooding events are normal environmental conditions given the size of the catchment and rainfall for the region.

Existing flood regime

The Clarence River is a major coastal river with lower floodplain areas subject to frequent and extensive flood inundation. The river catchment covers about 20,000 km^2 upstream of Grafton. During times of major flooding, a floodplain of about 500 km^2 downstream of Grafton may also become inundated.

The flooding behaviour of the lower Clarence River is dominated by runoff generated in the large catchment area upstream of Grafton. The upstream catchment typically contributes 80 to 90 per cent of the total volume of floodwater that enters the lower floodplains during main river flood events. Clarence River floods typically occur from low rainfall intensity events that last several days, or even weeks.

Minor tributaries within the lower floodplain of the Clarence River also have the potential to cause flooding issues.

Flood protection in Grafton and South Grafton

Grafton and South Grafton have a long history of flooding. The towns are protected by a ring levee system (refer to **Attachment 1, Figure 25**). Flood protection is also provided by natural high ground and the embankments for the railway and Pacific Highway.

The existing levee system provides flood immunity for around a 20-year average recurrence interval event; that is, there is around five per cent chance that the levee may be overtopped in any given year. Overtopping begins when flood levels are at, or close to, eight metres on the Prince Street gauge (the location of this gauge is shown in **Attachment 1, Figure 25**. After the levee overtops, large areas of Grafton and South Grafton are inundated by floodwater. Because the levee system can withstand a 20-year flood, this is the lowest flood magnitude event considered in this assessment.

Existing Conditions

Peak flood levels for the Prince Street gauge, existing Grafton Bridge, Grafton and South Grafton are provided in Table 18 and Table 19. These tables show that significant overtopping of the levee system occurs during floods above the 20-year average recurrence interval.

Table 18: Existing design peak flood levels

Flood Event	Peak Flood Level (mAHD)			
	Prince St Gauge	Existing Grafton Bridge	Grafton (Intersection of Pound and Prince Streets)	South Grafton (Intersection of Abbott & Vere Streets)
20 year	7.96	7.69	No Flooding	3.87
50 year	8.32	8.02	5.91	4.56
100 year	8.4	8.09	6.88	5.66

Table 19: Existing peak flood depths

Flood Event	Grafton (Intersection of Pound and Prince Streets)	South Grafton (Intersection of Abbott & Vere Streets)
20 year	No Flooding	0.60 m
50 year	0.51 m	1.29 m
100 year	1.48 m	2.39 m

The figure shows flooding is a significant issue as:

- Under a 100-year flood, most of the land inside the levee system would be inundated
- Under the probable maximum flood (that is, the worst-case scenario), the entire township of Grafton would be inundated.

Due to these factors, flooding poses a significant risk to the residents in Grafton and lower lying areas in South Grafton. Inundation of individual properties could potentially result in damage to buildings and belongings. It would also have physical and mental health impacts on residents due to injury, sickness, emotional losses, and fear of future flooding. Local businesses would also be impacted due to a loss of trade and income, and damage to property and goods.

Potential impacts of flooding on the project

Flood events above the 20-year average recurrence interval flood event have the potential to impact construction ancillary sites and construction work zones and to disrupt construction activities. Flooding also has the potential to increase the risk of soil erosion and sedimentation.

With the exception of a small portion of the South Grafton ancillary site and construction work zone, all ancillary sites and construction work zones for the bridge and approaches would be protected by the existing levee system in a 20-year flood event.

In Grafton, there is potential for the construction work zone near the Pound Street rail viaduct to flood when there is a local rainfall event in Grafton and the Clarence River is in flood. There is an existing low point in this area which normally drains to the river during a local rainfall event. When the Clarence River is in flood the raised river level prevents local storm water from draining to the river and water can pond across Pound Street.

Potential impacts of project construction on the flood regime

During the construction of the project, construction activities within the levee system would have a negligible impact on the existing flood regime. Construction activities outside the levee system would also have negligible impact on the exiting flood regime. Activities outside the levee system would include project preliminaries and site establishment activities such as property acquisition and adjustments, detailed surveys, site establishment work, fencing and signage, and installation of environmental controls. These construction activities may occur before the implementation of the proposed flood mitigation work.

Due to the extensive length of the Grafton and South Grafton levees, slight changes in flood level within the Clarence River (even as little as one centimetre) have the potential to alter the volume of water overtopping the levee. The introduction of additional structures on the floodplain and river such as bridge piers, embankments and temporary construction structures (such as the proposed jetty for barge launching) would have a progressive and gradual impact on the existing flood regime upstream of the proposed bridge. However, flood modelling shows no impacts are predicted downstream of the proposed bridge as a result of the project.

Potential impacts of project operation on the flood regime

Without mitigation measures, the project would increase the peak flood levels upstream of the proposed bridge during flood events. There are no predicted impacts downstream of the proposed bridge. The predicted flood

impacts in Grafton and South Grafton resulting from the proposed bridge would be triggered by relatively minor increases in the Clarence River water level.

In view of these potential impacts, the project incorporates flood mitigation measures designed to maintain the current level of flood immunity.

Table 20: Change in peak flood level with the new bridge in place without flood mitigation

Flood Event	Change in peak flood level with the new bridge in place (metres)			
	Prince St Gauge	Existing Grafton Bridge	Grafton (Intersection of Pound and Prince Streets)	South Grafton (Intersection of Abbott & Vere Streets)
20 year	0.03	0.03	No Flooding	0.00
50 year	0.03	0.03	-0.02	0.00
100 year	0.02	0.04	-0.03	0.37

Proposed flood mitigation works

Flood mitigation measures can be classified into three general categories:

- Flood modification: The behaviour of floodwater can be modified by either reducing flood depths and/or velocities or by excluding floodwater from certain areas by using measures such as levees and floodways
- Response modification: A community's response to flooding can be changed or improved through better flood warnings and/or education
- Property modification: The resilience of existing property to flooding can be improved, and appropriate planning controls can be implemented to ensure new property is compatible with the level of flood risk.

Flood risk management typically consists of a suite of measures drawn from all three of these categories.

In Grafton and South Grafton, potential measures to mitigate flood impacts outlined in the EIS could include:

- Dredging the Clarence River to lower the flood level. This option is not considered sustainable and would have uncertain impacts, so was not been assessed further
- Implementing a floodway with associated inlet and outlet control structures to reduce downstream flood levels. No downstream flood impacts are predicted and the option would be prohibitively expensive, therefore this measure was not assessed further
- Augmenting existing levees to contain the increased flood levels
- Creating or enhancing water storage in the floodplain to temporarily detain or slow floodwater and reduce the peak levels. Floodplain storage options around Grafton are likely to be very expensive and of very limited effect against such significant flows, however, they do have potential when considered alongside other measures such as levees
- Raising houses above the predicted flood level (for the 20-year flood).

Defining flood mitigation for the project was an iterative process aimed at identifying the extent of levee upgrades needed to reduce the volume of water that would overtop the levee system to reduce potential impacts from major flood events. Four flood mitigation options were assessed. These options were developed using a combination of the appropriate potential measures listed above and considering the potential flood impacts identified in the flood models for the unmitigated case (used to guide length and height of levee upgrade). *Appendix E Technical Paper: Flooding and hydrology assessment* provides detailed information on the hydraulic modelling carried out for the mitigation options.

As identified in the Project EIS, the preferred option is to raise around 3.7 kilometres of existing levee on the northern bank of the Clarence River, and around seven kilometres on the southern bank, by up to 20 centimetres. This option significantly reduces the flooding impact resulting from the project. There are still some properties that are not protected by the existing levee and would be affected by increased flood levels within the river. As a result it may be necessary to raise any houses that fall within this area.

Following approval of the Project EIS, more detailed levee survey, updated bathymetric survey, updated flood frequency analysis and levee design refinement was carried out. As a result, the extent of levee works needed to mitigate potential flood impacts have been reduced. About 2.0 km of the existing levee in Grafton and 3.7 km of the existing levee in South Grafton is to be raised by 0.05 m to 0.2 m, with isolated low points raised more. It should be noted that the levees are to be raised to target elevations and some sections which are already at or above the target elevation may not need to be adjusted. Flooding issues is being finalised in the Hydrological Mitigation Report (HMR) required under MCoA D23, requiring Secretary approval.

3.3 (c) Soil and Vegetation characteristics

Acid sulfate soils

The 1:25,000 Scale Grafton Acid Sulfate Risk Soil Map (1997) indicates that the project area in Grafton where the road network upgrades would be carried out is located in an area of low probability of acid sulfate soil risk. In South Grafton, the map indicates the proposed road network upgrades are mostly in an area of low probability but does encroach into an area of high probability where the diversion of the existing Pacific Highway would be located and also along the proposed flood mitigation area. The river channel where the bridge would be constructed is also considered to have a high probability of acid sulfate soils as the soils are likely to contain estuarine bottom sediments within the river channel. Areas of high probability of acid sulfate soil risk are shown in **Attachment 1, Figure 26**.

Soil landscape

Grafton soils consist of deep layered alluvium occurring right across the Clarence River floodplain. These silty soils vary in texture with well drained, brownish black sandy loams overlaying acidic dark brown sands at the riverbank, which extend out to more low plasticity, poorly drained clays with some fine sand overlaying heavy plastic clays. Erosion susceptibility within the project area is considered to be relatively low due to the alluvial soil landscape.

Soil characteristics

The ground conditions to the north of the Clarence River comprise Holocene channel levee deposits (fluvial sand, silt and clay) which overlie Holocene in channel bar deposits (fluvial sand, silts, gravels and clay). The Clarence River channel comprises fluvial sand, gravel, silt and clay.

To the south of the Clarence River, Holocene levee deposits are anticipated to overlie Holocene in-channel bar deposits beyond which Holocene floodplain deposits (fluvial sand, silt and clay) overlie Pleistocene deposits (clay, silt, fluvial sand and marine sand).

Geotechnical investigations carried out for the project in 2013 and previous desktop studies found the soil layers described in Table 21 are likely to be encountered in the project area.

Table 21: Materials that are likely to be encountered in the project area

Section	Material Type	Typical thickness (m)
Grafton[1]	Topsoil	0.2 – 0.5
	Fill	1.0 – 3.1
	Holocene alluvium – Soft clay and silt	0.5 – 2.0
	Holocene alluvium – Loose sand	1.0 – 3.5
	Pleistocene alluvium – Loose to medium dense sand	4.0 – 9.0
	Pleistocene alluvium 0 Gravel	6.0 – 12.0
	Grafton Formation – Bedrock	>6.0
South Grafton[1]	Topsoil	0.05 – 0.5
	Fill	0.45 – 3.8
	Holocene alluvium – Soft clay and silt	0.7 – 3.0
	Holocene alluvium – Loose sand	1.0 – 3.3
	Pleistocene alluvium – stiff clay	5.0 – 14.8
	Pleistocene alluvium – Loose to medium dense sand	1.0 – 1.3
	Residual soil – Clay	1.0 – 3.0
	Residual soil - Gravel	0 – 1.0
	Grafton Formation – Bedrock	>6.0
Clarence River[2]	Loose sand and gravel	2.0 – 5.5
	Grafton Formation – Bedrock	>6.0

Source:

1 Geotechnical Site Investigation Interpretive Report (Arup, 2014).

2 Desktop studies documented in the Route Options Development Report (Roads and Maritime, 2012).

Sections of the project are known to have soft soils with soft to stiff consistency, high compressibility and are prone to settlement. Soft soils treatment is proposed as part of the construction method.

3.3 (d) Outstanding natural features
There are no outstanding natural features.

3.3 (e) Remnant native vegetation
The majority of the project area, including the flood mitigation works area (levee), is represented by a highly modified landscape in poor condition with little or no native vegetation remaining. These areas have been subject to historic and ongoing urbanisation, grazing and cropping which has led to the isolated and fragmented nature of remnant vegetation.

The remnant vegetation within the project area consists of the Freshwater Wetlands on Coastal Floodplains (FWCF) threatened ecological community (TEC) and the Subtropical Coastal Floodplain Forest (SCFF) TEC. These TECs have been discussed in the sections above.

As outlined in the Project EIS, the project area (**Attachment 1, Figure 1**) footprint in total is 49.70 hectares (ha) of which 36.07 ha comprises disturbed vegetation and the reaming hard stand, buildings and infrastructure. The vegetation includes 31.25 ha of weeds and exotics, 4.41 ha of native and exotic plantings and 0.41 ha of poor condition threatened ecological communities. This vegetation is generally in low condition in a cleared and highly modified urban and rural environment. With the reduction in levee works from 11.0 km to 5.7 km, impacts have come down further.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)
The topography of the area gently rises on the southern side of the Clarence River to the east, south and west to an elevation of about 70 metres Australian Height Datum. The northern side of the river is mostly flat.

3.3 (g) Current state of the environment
The landscape character of the area that would be traversed by the project is relatively flat and dominated by the Clarence River and its floodplain. Either side of the river are the town centres of Grafton and South Grafton which consist of wide gracious streets laid out on a square grid. Outside of the town centres, there are established and newly developing residential areas, and industrial areas, generally concentrated around the regional road and rail corridors. These urban areas are surrounded by the agricultural areas that comprise the city's rural hinterland.

Erosion susceptibility within the project area is considered to be relatively low due to the alluvial soil landscape.

The TEC vegetation communities in the project area are in poor condition with heavy infestation of exotic species, due to a history of disturbance, including residential and urban development, grazing and construction.

The roadside verges and nature strips contain a high level of exotic canopy species and native species that are not endemic to the locality, such as planted jacarandas *Jacaranda mimosifolia* and Moreton Bay Figs *Ficus macrophylla.* Exotic grasses are dominant within mown areas, and annuals and shrub weed species are dominant through the riparian sections adjoining the Clarence River.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values
The information presented in this section draws on information in the Archaeological report prepared for the EIS: *Appendix G, Technical Paper: Non-Aboriginal Heritage* (Biosis, 2014).

Impacts on terrestrial archaeology
A preliminary archaeological survey was conducted on 8 and 9 October 2013 along the Clarence River bank and streetscapes within Grafton and South Grafton. A second survey was completed on 27 and 28 February 2014. It comprised a visual inspection of the project area to consolidate the results from previous surveys and help in the understanding of the character and condition of existing heritage items.

None of the artefacts (made of steel, iron, wood, ceramic, aluminium or composite material) or features (comprising of post holes and metal and terracotta pipes) found in the two trenches excavated at the construction site of the existing bridge in South Grafton are related to the actual construction of the bridge. Artefacts and features are not considered relics within the meaning of the *Heritage Act 1977* and are related to buildings dating from the 1950s to 1994. Archaeologically significant remains from the existing bridge construction workshops are unlikely to be present along the south bank of the Clarence River. The

archaeological potential for the Grafton Road and Rail Bridge construction workshops is considered to be moderate and its archaeological research potential is considered to be low.

No land has been assessed as having high or moderate research potential within the Grafton and South Grafton construction work zones (Refer **Attachment 1, Figure 27**).

Within the flood mitigation construction work zone in Grafton and South Grafton, as outlined in the Project EIS a number of parcels of land have been assessed as having moderate and high archaeological potential and moderate and high research potential associated with early settlement (Refer **Attachment 1, Figures 28-30**). Work along these areas would involve raising the levee up to 20 centimetres. It is unlikely that this work would require extensive below ground disturbance but, if it is required (for example, if geotechnical investigation results recommend complete replacement of a section of the levee) within areas of moderate to high archaeological potential, a program of archaeological monitoring would be implemented.

Impacts on maritime archaeology

A remote sensing survey of the Clarence River was completed between 17 and 19 December 2013 in an area of about 22 hectares extending from 100 metres upstream (west) of the SS Induna shipwreck (coded as FMW29 in this assessment) to about 400 metres downstream of Alipou Creek. Key anomalies identified by the remote sensing survey were subject to a visual inspection by divers on 29 January 2014.

The maritime surveys and visual inspection found submerged cultural material next to the southern bank of the Clarence River within the project construction work zone. The cultural material consisted of wharf remains and early 20th century tools and fastenings. These remains are commonly found in other New South Wales railway and wharf contexts and have very limited potential to yield information of archaeological significance. These items are not considered relics within the meaning of the *Heritage Act 1977*.

With the exception of the SS Induna (FMW29), none of the features identified through remote sensing and visual inspection are relics or heritage items. The SS Induna shipwreck remains are located beside the southern bank of the Clarence River, about 140 metres upstream from the existing bridge and some 250 metres upstream from the proposed bridge construction work zone, and adjacent to the proposed flood mitigation works construction work zone. As a precautionary measure, a 'no go' area will be implemented around the SS Induna during construction to protect the heritage values associated with the shipwreck remains.

Impacts on Grafton and South Grafton urban conservation areas

The Grafton conservation area (C3) and South Grafton conservation area (C7) are listed on the following registers and schedules:

- Clarence Valley Local Environmental Plan 2011 – Schedule 5
- North Coast Regional Environmental Plan 2008 – Schedule 2
- National Trust of Australia Register (non-statutory)
- Register of the National Estate (non-statutory).

The Grafton and South Grafton conservation areas are examples of a subtropical mid-19th century river port city and pastoral seat. It contains a group of civic and ecclesiastical buildings and many spacious timber houses which display both craftsmanship in detail and the ubiquitous veranda of northern Australia. The magnificent canopies of *Ficus* (fig), Jacaranda and Camphor laurel trees provide shade and colour while serving to link the natural and man-made features of the city. Grafton and South Grafton conservation areas have local heritage significance.

Impacts on Grafton conservation area

The project would have a direct partial impact on a portion of the Grafton conservation area, which would result in:

- Removal of six heritage items, 11 contributory items and the Ficus and Jacaranda trees on Pound Street between Villiers and Kent Street
- Impact on the visual aspects and relationship between Ravensford (CZB10) and Dunvegan (CZB12)
- Alteration of street alignments from the grid established in the mid-19th century.

While the project would result in significant impacts on the aesthetic values of some parts of Grafton, it would have the potential, through the implementation of an interpretation plan, to emphasise and enhance other heritage values such as the Grafton Road and Rail Bridge (CZB36). The interpretation plan would provide

opportunities to enhance understanding and appreciation of the heritage items, values and themes associated with Grafton and could include incorporating formalised heritage walks and tree-planting programs into the landscaping and planning of the project.

The section of the levee to be raised would traverse 27 heritage items of local significance in the Grafton conservation area. Impacts on these items are likely to be direct - partial and consist of removal of gardens and cultural plantings associated with heritage items to enable the works and moderate to minor visual impacts on existing views to and from the setting of the heritage item. There is potential for excavation to impact archaeological resources beneath the levee, specifically those relating to early settlement in Grafton.

Impacts on South Grafton conservation area
The flood mitigation construction work zone would traverse the coastal elements of the South Grafton conservation area and 11 heritage items. Impacts on these items are likely to be direct – partial. If sections of the levee located in areas of high archaeological potential were required to be completely replaced, there is potential for below ground excavation to impact archaeological resources, specifically those relating to early settlement in Grafton.

The levee raising works within the Grafton and South Grafton conservation areas would be completed in a sympathetic manner that, as far as practical, would not diminish the aesthetic values of the conservation areas. As of April 2016, a heritage consultant has been appointed by Roads and Maritime to provide advice on heritage issues, minimising heritage impacts and archival recording.

Impacts on the Grafton Rail and Road Bridge
The Grafton Rail and Road Bridge (CZB36) State heritage listed item would not be directly altered or impacted by the project. The project would have a positive effect on the heritage value of the existing bridge through reducing wear and tear on the bridge's fabric by reducing traffic volumes. The location of the new bridge would provide a new vantage point from which to view the Grafton Rail and Road Bridge. The concept design and design parameters for the new bridge require that it respects and responds to the presence and form of the Grafton Rail and Road Bridge in a complementary manner. In particular:

- The superstructure would be concrete (or similar material), to enable a simple, clean, contemporary character that allows the steel truss of the existing bridge to take visual precedence
- The bridge would be a low profile over the Clarence River to allow the existing bridge to take visual precedence and minimise the loss of views
- The bridge would be as parallel as possible to the existing bridge and have a straight horizontal alignment to echo the alignment of the existing bridge
- The longitudinal grades would be as ‘flat’ as possible to complement the flat alignment of the existing bridge while also meeting drainage requirements
- The piers would be positioned to align as closely as possible with the piers of the existing bridge, especially those in the river.

The proposed bridge would have indirect visual impacts on the existing bridge. In particular, the proposed bridge would permanently change views to the existing bridge from downstream viewpoints within public open space on the riverbank and on the Clarence River; views of portions of the existing bridge from these locations would be also blocked by the proposed bridge. Archival recording would be prepared before the construction of the proposed bridge to document the visual relationships between the Grafton Rail and Road Bridge heritage item and its surrounds.

Impacts on other built heritage
The project would also have impacts on other heritage items. These impacts are categorised as follows:

- Direct impact – total: The project would result in demolition of 10 heritage items of local significance, but no items of State significance would be demolished
- Direct impact – partial: The project would result in acquisition of a small portion of lots occupied by one item of State significance and four items of local significance
- Indirect impact: The project would have impacts from architectural noise treatments at some properties, and from visual impacts from vegetation removal or when existing views to and from a heritage item are affected. Five items of local significance and one item of State significance would be impacted in this way.
- Impact on listed trees: The project would have impacts on trees listed under the Clarence Valley Local Environmental Plan 2011, namely, *Brachychiton*, *Ficus* or Jacaranda trees over three metres high, located in road reserves.

3.3 (i) Indigenous heritage values

Aboriginal occupation in Grafton and South Grafton

At the time of non-Aboriginal arrival in Grafton, the area to the north of the Clarence River was within Bundjalung lands. The Yaegl tribe occupied lands on the coast. The Clarence River and Grafton are within the area previously inhabited by the Gumbainggir people. These people also inhabited the steep terrain of the escarpment zone located south of Grafton, where other sites and evidence of occupation have been found (Witter, 2000).

Non-Aboriginal settlement

The first interaction between the Aboriginal inhabitants of the Grafton region and the incoming European settlers was in 1825 when they encountered an escaped convict, Richard Craig, who later informed the colonial government of the Clarence River and drove the first sheep into the area (McKay, 1938).

Conflict between the Aboriginal population and the incoming settlers followed soon after initial non-Aboriginal settlement.

The land within and surrounding the Grafton and South Grafton area has undergone extensive modification. From the beginning of non-Aboriginal settlement in the 1830s, vegetation was cleared rapidly, followed by pastoral activity and the steady growth of the urban environment.

The northern side of the Clarence River comprises mostly urban streets, residential and commercial development and some parkland. To the south, there are developed urban areas to the west of the existing bridge; open farmland with associated houses and roads dominate the landscape to the east. The alluvial nature of the floodplain soils to the south and the impact of agriculture and urban development have reduced the likelihood of some types of evidence of Aboriginal occupation remaining intact.

Existing native title

A community of Aboriginal people remains in Grafton to this day, many with strong spiritual links to the original inhabitants and important knowledge of their past ways of life.

A search on the National Native Title Tribunal TitleVision online tool was conducted on 18 April 2014. No native title claims were identified within the study area.

Aboriginal cultural places

Representatives of the Grafton Ngerrie LALC identified the Golden Eel site (AHIMS site number 12-6-0326) as a place of important cultural value to the local Aboriginal community.

The Golden Eel site is a creation story associated with the Clarence River and Alipou Creek. The confluence of the Alipou Creek and the Clarence River in South Grafton has been identified as a specific landscape feature with an important relationship to the Golden Eel story. This landscape feature is located outside the project area, but the Grafton Ngerrie LALC has indicated that changing this landscape feature would impact the cultural values of the Golden Eel site.

The specific detail related to the Golden Eel story is culturally restricted information. Access to the Golden Eel site card is also restricted.

The cultural importance of the Golden Eel site has been continually highlighted during consultation with the Grafton Ngerrie LALC. The LALC has indicated that direct impacts on Alipou Creek through landscaping and construction would significantly impact the cultural values of the Golden Eel site and such impacts must be avoided. Accordingly, the project has been designed to avoid direct impacts on this Aboriginal cultural place, as documented below.

Impact avoidance on the Golden Eel site

Meetings with Grafton Ngerrie LALC on 1 July 2011, 10 November 2011 and 30 April 2013 discussed options for avoiding impact on the Golden Eel site by the preferred option for the project. The land council requested that:

- The bridge alignment be shifted to avoid impacting Alipou Creek. Roads and Maritime responded by investigating a bridge route between the existing bridge and Alipou Creek that would avoid direct impacts on Alipou Creek

- The bridge be placed as far west as possible within the preferred project area (former Option C alignment) to minimise any potential visual impacts on Alipou Creek. Roads and Maritime has designed the project to satisfy this request, the Approved Project
- Temporary fencing be erected between the construction area and the creek during construction. A permanent fence has been erected by Roads and Maritime to separate the project area and Alipou Creek to avoid potential impacts during construction to prevent access to the Golden Eel site
- A public interpretation strategy be developed to promote community recognition of, and respect for, the cultural importance of the area to the local Aboriginal community. The LALC suggested that signage containing culturally appropriate information for the area and, potentially, a seating area be considered. These requests will be examined by Roads and Maritime during detailed design of the project.

Aboriginal cultural significance

The Golden Eel dreamtime story holds important cultural values with the local Aboriginal community associated with Aboriginal cosmology, spirituality and connection to place. While no tangible Aboriginal cultural material associated with the Golden Eel dreamtime story is located in the project area, the physical setting and integrity of the Clarence River and Alipou Creek are intrinsically linked to the Golden Eel dreamtime story, particularly the mouth of Alipou Creek downstream from the project site in South Grafton.

Although the landscape of the Grafton area has been heavily modified by urban and industrial land uses and infrastructure, the context of the Clarence River and Alipou Creek and their relationships within the Golden Eel dreamtime story are readily interpretable by contemporary Aboriginal observers. As such, intangible cultural landscape values are associated with the physical landscape to provide a strong sense of place and identity to the local Aboriginal community.

Overall, Grafton and South Grafton are important cultural landscapes that have high cultural values with important visual components (aesthetic values) to the local Aboriginal community. In terms of Aboriginal heritage, while the study area contains low historic and scientific values, due to the high cultural values it is of overall high heritage significance.

Known Aboriginal sites

The results of the surveys and the searches in the Aboriginal Heritage Information Management System (AHIMS) found no Aboriginal sites within the project area. The nearest sites to the project area are more than 200 metres from the project area. There are more known Aboriginal sites in the Grafton and South Grafton area but due to the culturally sensitive and tangible nature of some of these sites and the public nature of this report, only the nearest sites have been documented.

No potential archaeological deposits were found within or close to the project area. The assessment of impact found that there would be no harm or loss of heritage value on known Aboriginal sites provided management measures were implemented.

3.3 (j) Other important or unique values of the environment

Two rural properties in South Grafton identified as containing regionally significant farmland would be partially affected. Regionally significant farmland refers to land designated as 'regionally significant' by the NSW Department of Planning's Farmland Mapping Project (2009). It is defined as "land capable of sustained use for agricultural production with a reasonable level of inputs and which has the potential to contribute substantially to the ongoing productivity and prosperity of a region" (Department of Planning, 2009). The regionally significant farmland affected (about 6.8 hectares) adjoins the South Grafton urban area and represents a small overall percentage of regionally significant farmland.

An excess land strategy would be developed during detailed design and would investigate opportunities to return available regionally significant farmland after the project is completed. This land is close to the urban area and is protected by the existing levee system. There is a broad range of other significant farmland available nearby in this section of the Clarence River valley.

3.3 (k) Tenure of the action area (e.g. freehold, leasehold)

The project EIS identified that the project would require the acquisition of 48 lots (including partial and total acquisition). No property would need to be acquired for the proposed flood mitigation works given the existing levee sits within an easement.

Table 22: Directly affected properties

Land Use	No. of land parcels affected	Extent of impact
Residential	23	Total
Vacant	5	Total
Basmar Hall	1	Total
Park / reserve	1	Total
Subtotal	**30 properties totally affected**	
Residential	1	Partial
Grafton TAFE campus	1	Partial
ARTC (railway) land	4	Partial
Rural	5	Partial
Vacant	3	Partial
Clarence River Visitor Information Centre	1	Partial
Park / reserve	1	Partial
Disused petrol station	2	Partial
Subtotal	**18 properties partially affected**	
Total	**48 properties totally or partially affected**	

Of the lots totally or partially acquired:

- Thirty-seven are privately owned (some owners own more than one lot)
- Six are owned by Clarence Valley Council
- One is owned by TAFE NSW
- Four lots are owned by ARTC.

During the project development for the tendering phase, minor refinements to the project area has realised a reduction in the project footprint and the acquisitions required. A total of 33 lots are now required for the project. RMS has acquired all residential lots and vacant land required except for six outstanding lots:

- TfNSW (leased by ARTC) (two lots) (Transport for New South Wales (TfNSW) will vest this land to RMS under Transport Admin Act)
- Partial acquisition of TAFE (one Lot) (Roads and Maritime waiting for concurrence from TAFE to compulsory acquisition)
- Clarence Valley Council (two lots), Roads and Maritime has concurrence from CVC to Compulsory acquire these lots.

The properties that have been or are being totally acquired include:

- Twenty dwellings in the Dovedale area, Grafton and a dual occupancy development on the corner of Pound Street and Clarence Street, Grafton (one dwelling)
- Basmar Hall, a commercial property in the Dovedale area used for community uses
- One open space reserve on McClymont Place, Grafton owned by Clarence Valley Council
- One vacant lot next to the Pacific Highway owned by Council
- Two vacant lots in the business development zone on Iolanthe Street, South Grafton.

The properties that have been / are being partially acquired include:

- A residence on the corner of Pound Street and Villiers Street
- The Grafton TAFE campus on the southern side of Pound Street
- Two vacant lots owned by TfNSW and leased by ARTC in South Grafton and Grafton
- The Clarence River Visitor Information Centre on Spring Street, South Grafton
- One open space reserve on Charles Street, South Grafton, owned by Council
- Five rural lots in South Grafton

Impacts on Crown land

The project would affect the following parcels of Crown land:

- TAFE land in Grafton (affected by partial land acquisition)
- Clarence Valley Council road reserve foreshore land in Grafton and South Grafton, and the Clarence River Visitor Information Centre in South Grafton (affected by partial land acquisition)
- Clarence Valley Council public reserve located on McClymont Place, Grafton (affected by total land acquisition)
- Roads and Maritime (Maritime) riverbed areas, which would be affected by the bridge foundations
- ARTC land in South Grafton (affected by partial land acquisition).

3.3 (l) Existing land / marine uses of area

Land uses in Grafton

Grafton is located on the northern side of the Clarence River. It is a major regional centre providing a focus for services to the Clarence Valley community. Grafton is the sub-region's major employment centre, and a focus of local government administration. Its higher order services include retail and administrative services, a base hospital, Grafton TAFE campus, a community health centre and high schools.

A large number of Grafton's community and recreation facilities are located near and along the Clarence River or the Summerland Way.

Grafton's main retail and commercial business area is a compact area centred on Prince and Fitzroy streets. Grafton's major shopping centre, Grafton Shopping World, is accessed off Fitzroy and Duke Streets. The north-eastern side of Pound Street, between Clarence and Villiers streets, contains a number of light industrial and service businesses. Near the retail and commercial area is a church and school precinct. Local government and administration activities are located in nearby Victoria Street and have more recently spread to areas around nearby King Street.

The residential area is located outside the main retail and commercial business area. Most residences are detached dwellings.

Land uses on the Clarence River and foreshore

The Clarence River supports a range of commercial and recreational uses including:

- Gravel and sand extraction on the southern channel of the river immediately adjoining the southern edge of Susan Island. The largest vessel working on the river near Grafton is a Boral barge associated with this extractive industry (the barge transits the river downstream from Susan Island four times per day, six days a week)
- Prawn trawling and fishing in the Clarence River estuary near Yamba, downstream of Grafton. The fishery generally operates October to May, and is confined to specific times and areas
- Ferries, which operate downstream of Grafton.
- Major water events such as:
  - The Rowathon between Iluka and Grafton
  - The Head of the River Regatta and the Grafton Rowing Club Regatta
  - The Bridge to Bridge Water Ski Race
  - The Monster Energy Pro Wakeboard Show
  - Yacht and sailing club races
  - Cruising yachts, particularly for the annual Jacaranda Festival in November.
- Regattas held by the Clarence River Sailing Club (located in Salty Seller Reserve, off Fitzroy Street, Grafton). These generally use the reach of the river directly in front of their clubhouse/boat shed. About 28 races are held per year between September and April

- Rowing events managed by the Grafton Rowing Club. The rowing course extends from the clubhouse (located within Memorial Park, off Prince Street, Grafton) for two kilometres upstream, towards the opposite end of Susan Island
- Moorings – there are a number of moorings near the proposed bridge near Girl Guides Park. These are accessed from the Pound Street Jetty.

Riverfront open space near the project includes the Salty Seller Reserve near the sailing club, passive open space either side of the existing bridge, Girl Guides Park and the Pound Street Jetty.

Land uses in South Grafton
South Grafton is located on the southern side of the Clarence River. Its commercial area is focussed on Skinner Street with another shopping centre on Bent Street (the Summerland Way). South Grafton also contains business zones and industrial areas, the airport, railway station and the Clarence River Visitor Information Centre.

Bent Street, from the southern end of the existing bridge to the roundabout at the Gwydir Highway, contains a range of retail businesses, a shopping centre, service industries and light industrial land. Bent Street also has a motel and a bed-and-breakfast and a number of houses. Very few of these businesses, with the exception of the accommodation facilities and service stations, would depend on passing trade.

Land on the eastern side of the railway line, near Spring and Iolanthe Streets, is emerging as a location for large bulky goods premises that are not suited to town centres because of the large floor space requirements or the need for direct vehicle access to load or unload goods.

Land on the western side of Bent Street is predominately residential. Most residences are detached dwellings. Substantial future growth is planned for South Grafton, including new employment and residential development at South Grafton Heights and Clarenza.

Land uses near the levee (proposed flood mitigation works)
The levee is located mostly on private property that is used for a range of purposes including farming, residential dwellings, recreation facilities, a church and associated primary school property, and commercial and industrial uses.

Crown Land
Crown land near the project includes the Grafton Showground, the Clarence River bed and foreshore, and Crown road reserves. Other parcels of Crown land may be crossed by the levee, which would be raised as part of the proposal.

3.3 (m) Any proposed land/marine uses of area
The proposed bridge would pass close to the boat moorings immediately downstream of the existing Grafton Bridge. These moorings would need to be relocated during construction. Roads and Maritime would consult with the owners of the moorings during detailed design and before construction. Moorings would be reopened after completion of the bridge, though some may be relocated away from the proposed bridge.

Construction would also require some restrictions on navigation around the work areas, which would include the placement of barges and sediment control structures, thus restricting speed and navigation similar to roadworks zones. These would potentially affect the use of the river for:
- Rowing, sailing and special events
- The Boral barge, which uses the river for transporting sand and gravel. The bridge has been designed with sufficient draft and separation between supports to enable the barge to continue operating during construction.

Roads and Maritime would consult with these river users to mitigate impacts by providing alternative arrangements as required.

4 Environmental outcomes

This project has been the subject of an EIS, and has been approved with a set of conditions (MCoA), including the preparation and implementation of management plans to manage environmental impacts.

The TTSTS was identified as present during the additional surveys undertaken between February and April 2016, and as such a species-specific Management Plan has been prepared to address this matter, refer Section 5 of this referral for further detail.

Roads and Maritime will implement a stringent framework for the management of environmental impacts. This will be managed through an overarching Construction Environmental Management Plan, which will also include the following sub-plans:

- Flora and Fauna Management Plan
  - Three-toed Snake Tooth Skink Management Plan
  - Bat Management Plan
  - Weed Management Plan
- Urban Design and Landscape Plan
- Soil and Water Quality Management Plan
- Noise and Vibration Management Plan
- Heritage Management Plan
- Waste and Energy Management Plan
- Air Quality Management Plan
- Traffic and Access Management Plan
- Community Information Plan.

5 Measures to avoid or reduce impacts

Three-Toed Snake Tooth Skink Management Plan management actions

The Three-Toed Snake Tooth Skink Management Plan (**Attachment 3**) will be implemented during the construction works. Management actions are proposed to reduce impacts on the TTSTS population during construction. They include:

1. Timing of construction activities to coincide with increased opportunities to capture and relocate TTSTS;
2. Identification of construction activities and TTSTS survey requirements and safeguards;
3. Pre-construction Planning including:
   a) Engaging a suitably qualified and experienced ecologist to implement key components of this management plan;
   b) Design an effective temporary exclusion fence; and
   c) Develop rationale for selecting relocation sites and identifying these on construction drawings and environmentally sensitive area plans.
4. Develop management initiatives for the protection of TTSTS habitat adjacent to the construction works footprint and protection of relocation sites;
5. Outline the requirements for the location and installation of temporary exclusion fencing;
6. Develop a survey prescription to be used by the Project Ecologist for adequately surveying areas prior to and during various construction activities;
7. Outline the data collection requirements for all captured TTSTS;
8. Develop guidelines that provide improved opportunities for habitat augmentation in the existing urban design and landscape concept plan;
9. Unexpected finds procedure; and
10. Framework for allowing this management plan to be progressively updated in light of new findings and information.

Construction Timing

The construction program is divided up into 13 management units summarised in the current dry weather program (see Table 23). Most, but not all of the on ground works will be relevant to TTSTS and importantly most of the on ground initial habitat disturbance and removal will take place during the warmer months of the year when TTSTS are active (i.e. September to May). This provides an increased opportunity for the prescribed surveys discussed elsewhere in this document to be more effective in capturing and relocating TTSTS and thus addressing MCoA D46:

> *(e) (ii) a protocol for the removal and relocation of fauna during clearing, including provision for engagement of a suitably qualified and experienced ecologist to identify locations where they would be present; to oversee clearing activities and facilitate fauna rescue and relocation; and consideration of timing of vegetation clearing during the breeding/nesting periods of threatened species, where feasible and reasonable.*

Table 23: Summary of forecast construction dry weather program and the on-ground relevance to TTSTS

Project Description	Forecast Commencement Date	Forecast Completion Date	On-ground Relevance to TTSTS
Project Award	June 2016	N/A	No
Detail Design (including landscaping, urban design)	June 2016	February 2017	Yes
Construction Environmental Management Plan (CEMP, including FFMP)	June 2016	February 2017	Yes
Flood Mitigation works (levee and house raising)	October 2016	December 2017	Yes
Ancillary site establishment	August 2016	N/A	No
Pre-casting of bridge components	December 2016	N/A	No
Utility Adjustments	October 2016	October 2017	Yes
Roadworks North	January 2017	January 2019	Yes
Roadworks South	January 2017	January 2019	Yes

Bridge construction	January 2017	January 2019	Yes
Rail Viaduct	January 2018	December 2018	Yes
Finishing works	January 2019	June 2019	Yes
Project Completion	N/A	June 2019	No

Construction Activities and sequencing of TTSTS Surveys

Planned construction activities in areas mapped as moderate, high or known TTSTS habitat will require surveys by the Project Ecologist prior to and potentially during the works (**Figure 21, Attachment 1**). The planned construction activities include:

- Clearing and grubbing works
- Excavation in any form of the existing topography to depths of 1 m. Once this layer has been stripped, no further consideration is required
- Installation of controls that require ground disturbance such as the installation of TTSTS exclusion fence
- Geotechnical works that require excavation or accessing known TTSTS habitat in vehicles (i.e. compaction)
- Gravelled or sealed tracks excluded
- The demolition or relocations of dwelling and other existing structures
- Other tasks as deemed necessary by the Project Ecologist.

A summary of the survey requirements is outlined in Table 24 and details relating to survey duration are detailed in the TTSTS Management Plan. The Project Ecologist must perform a series of surveys that are commensurate with the construction tasks planned or being performed at that time, taking into account the habitat suitability and/or the likelihood of TTSTS (**Figure 20 - 21, Attachment 1**). This includes surveys before any planned habitat disturbance or removal (i.e. pre-clearing survey) as well as surveys during the actual disturbance and/or removal (i.e. construction or clearing supervision) until such a time the Project Ecologist believes an adequate level of survey supervision has been performed. For example, the works on the grassed levees should take less time to perform than works levees where established gardens will need to be removed. In areas deemed as having a low or unlikely likelihood to support TTSTS, the Project Ecologist would only perform surveys if directed to by the Environmental Manager or Roads and Maritime following any unexpected finds procedure.

Table 24: Summary of construction activities and the requirements for surveys in areas assessed as moderate, high or known TTSTS habitat

Tasks within area of known or potential TTSTS habitat	Pre-clearing Survey (within 24 hours)	Project Ecologist Supervision of Task (i.e. Construction Supervision)	Hold point / Control
Clear and Grub vegetation	Yes	Yes	Pre-clearing checklist signed before activity commences by Project Ecologist and Environment Manager. A checklist is only valid for that day of works until such a time the Project Ecologist deems the areas as no longer containing TTSTS habitat.
Excavation of ground to 1m (all works)	Yes	Yes	As above
Installation of controls that require ground disturbance in the form of excavation	No	Yes	As above
Geotechnical works (excavation and compaction from vehicles)	Yes	Yes	As above
House and structure demolition	Yes	Yes	As above

Preconstruction Planning in relation to TTSTS

Five pre-construction planning requirements have been identified:

- Engaging a suitably qualified and experienced ecologist;
- Design of an effective temporary exclusion fence;
- Identification of potential relocation sites for TTSTS;
- Progression of the RMS concept design take into account measures to reduce the removal of TTSTS habitat;

- Urban designers planning landscaping to optimise visual, ecological and skink outcomes.

Engaging a Suitably Qualified and Experienced Ecologist

The construction contractor must engage a suitably qualified and experienced ecologist with at least 10 years field experience with reptiles. This experience must include demonstrated first-hand experience with the subject species or some other cryptic threatened reptile, and importantly, the person conducting the onsite duties must possess this experience and not the entity or the company. Contingency for any support role must also possess the same level of experience and must receive endorsement from the Roads and Maritime, and if applicable the Project's Environmental Representative.

Design of an Effective Exclusion Fence for TTSTS

An effective exclusion fence for the TTSTS must prevent both above ground and below ground movements. As this species is not known to readily climb, an above ground height of 500 mm is considered adequate and no vertical return lip is required. Given that individuals have been captured at depths of 100 to 250 mm in litter, humus and loose friable soil, a fence buried to a depth of 500 mm is considered adequate, although in some instances a depth of 250 mm may be used to avoid where there is a demonstrable risk of damaging utilities. Therefore, a 1 m fence constructed with half of it protruding above the ground should be effective at excluding movement of TTSTS onto the construction footprint.

A suitable fence material may comprise geotextile fabric, strong woven polypropylene, metal sheeting or another alternative material if it is endorsed by the Project Ecologist. The material should be sufficient to endure the intended timing of construction works.

The fence is to be decommissioned at the completion of construction activities and no permanent exclusion fencing is planned. This will allow for unhindered skink movements along the riparian foreshore whilst the northern bridge abutment features a retaining wall that will prevent skinks from accessing the roadway.

Identification of Potential TTSTS Relocation Sites

Known TTSTS habitat occurs within the proposed construction works area outlined in the concept design of the Project EIS. Consequently, and in accordance with MCoA D46 (e) (ii) a protocol for the removal and relocation of fauna during clearing relocation sites will need to be identified and based on the current level of information for TTSTS, the following criteria have been developed for identifying a suitable relocation point:

- Within 100 m of the capture site;
- Occurring outside of the construction works footprint;
- Micro habitat consists of loose friable soil with areas of litter, humus or dense vegetative groundcover that provide both cover and foraging resources;
- Exclusion fence has been installed. In instances where an exclusion fence has not been installed but is planned to occur within the next five days, individual TTSTS must be retained and held in captivity using either calico bags or plastic aquaria furnished with leaf litter and soil; and
- No more than 10 adults and 5 sub adults or hatchlings per 100 m^2 of suitable habitat may be relocated to reduce the risk of over stocking.

Working within the parameters above, all relocations are likely to take place within the one population extant and provide for a high rate of relocation success. This is explained in further detail in the TTSTS Management Plan (**Attachment 3**), which provides a draft potential relocation site schedule guided by the results of recent field surveys and should be updated accordingly.

Consideration of TTSTS Habitat During the Design Refinement Process

The progression of the approved RMS concept design will consider and take into account measures to reduce the removal of TTSTS habitat. Such measures may include but are not necessarily limited to the required extents of the levee mitigation works, the locating of ancillary works and infrastructure and further refinement of the Urban Design and Landscape Plan.

Protection of TTSTS Habitat

Affected property owners (APO) 14 and 19 (refer **Attachment 1, Figure 31)** will be protected from pre-construction and construction related works other than what is considered essential

Partial areas of APO 10, APO 11, APO 13, APO 20 and APO 27 (refer **Attachment 1, Figure 31)** should be protected from pre-construction and construction-related works other than what is considered essential, to minimise impacts to TTSTS habitat.

As envisaged in the EIS, temporary works to build the bridge and embankment would also be required, including access tracks, facilities, topsoil stock piles, lay down areas and possibly a small satellite compound in the northern abutment area. All works within the TTSTS Impact Area Boundary will be managed to minimise impacts to the TTSTS habitat. This approach will be in accordance with the MCoA:

B1. The clearing of native vegetation shall be generally in accordance with the areas specified in the documents listed in condition A2, and with the objective of reducing impacts to any endangered ecological communities (EECs), threatened species and their habitat to the greatest extent practicable.

D36. The sites for ancillary facilities that are associated with the construction of the SSI and that have not been identified and assessed in the documents listed in condition A2 shall be located in areas of low ecological significance and require no clearing of native vegetation.

All areas considered to provide known habitat for TTSTS are considered to be of high ecological significance and should be managed accordingly. Consequently, the following management initiatives would be adopted during refinement from the concept design into detailed design and construction:

- Habitat mapping developed using categories of known, high, moderate, low and unlikely to be shown on sensitive area plans and construction drawings. To be updated accordingly
- All nominated relocation sites clearly identified on sensitive area plans and construction drawings to assist in planning of work activities
- Design processes to reduce the loss of TTSTS habitat where reasonable and feasible
- Temporary exclusion fencing installed where non-levee construction footprint interfaces or is within 30 m of either known habitat or assigned as having a moderate or high likelihood
- Signage demarcating “Environmental No Go Zone” or wording to a similar effect to enable on ground identification to construction persons. Signage to be placed at intervals of not less than 1 sign per 25 m of exclusion fence
- Access to those areas controlled by the Environment Manager.

The adoption of these management actions is consistent with the principals of MCoA D46 (e):

… A Construction Flora and Fauna Management Plan to detail how construction impacts on ecology will be minimised and managed … including (i) plans for impacted and adjoining areas showing important flora and fauna habitat areas.

Requirement for the Timing and Installation of Temporary TTSTS Fencing

Timing of Installation

The installation of temporary exclusion fencing for TTSTS can be undertaken in two ways. Firstly, the fence is installed prior to any habitat disturbance or habitat removal works (Option A). This would enable any captured TTSTS to be relocated immediately and avoid retaining individuals until the exclusion fence has been installed. The second, or alternative option (Option B) allows for habitat disturbance and removal to take place without the fence installed, however, the exclusion fence must be installed before any captured TTSTS can be relocated. Both have their merits and notably, both are endorsed by the TTSTS Management Plan.

Location of Temporary TTSTS Exclusion Fencing

For 30 m either side of the relocation point or an area known or assigned as having a moderate or high likelihood of supporting TTSTS and the construction works extend beyond 4 weeks. For construction works of a shorter duration, skinks would be retained in captivity and released upon the completion of those works in any given area to reduce the risk of mortality. The retention of TTSTS in this instance would be in accordance with a NSW Animal Care and Ethics Committee Approval held by the Project Ecologist.

Prescribed Survey Techniques Used by the Project Ecologist

The following survey techniques would be performed by the Project Ecologist during the course of implementing components of this plan:

- Active Search
- Pitfall Surveys
- Funnel traps.

The use and duration (i.e. survey effort) of these techniques has been developed based on the expertise of the author, Department of Environment (formerly DSEWPC) survey guidelines (DSEWPC, 2009) and field survey results from past surveys of the Project study area and surrounds (Lewis 2016). Full details are included in the TTSTS MP (**Attachment 3**).

Captured TTSTS Requirements

Any TTSTS captured during the course of implementing this plan would have the following data collected:

- GPS Coordinates Expressed in GDA 94;
- Date;
- Prevailing Air Temperature;
- Micro habitat at capture site using standardised Office of Environment (OEH) field reporting abbreviations;
- Series of measurements including:
  - Snout-vent length,
  - Tail length, and
  - Total length.
- The collection of genetic material may also be required.

At sites where temporary construction works (i.e. <4 weeks – 28 days) are planned, all captured TTSTS would be retained in captivity until the works have been completed and there is no further risk of direct mortality impacts.

Habitat Augmentation

The urban design and landscaping concept plan presented in the EIS provides a number of opportunities to augment habitat for the TTSTS where dwellings currently exist. In this way, it would be consistent with the following MCoA:

> *B4. The Proponent shall undertake a targeted rehabilitation program post construction to restore riparian habitat to at least the pre-construction condition or better, unless otherwise agreed by DPI (Fisheries) and NOW*
>
> *B5. Vegetation shall be established in or adjacent to disturbed areas and include species which may provide habitat for wildlife following the completion of construction in the vicinity of the disturbed area. Revegetation is to be consistent with the Urban Design and Landscape Plan required under condition D42.*

Within the areas known to provide TTSTS habitat, a number of native and exotic tree plantings are proposed (**Figure 22, Attachment 1**). Some refinement of the concept landscape design with an emphasis on ground or mulch cover would seek to neutralise the overall impact as the hardstand area of the bridge and associated infrastructure is equitable to the footprint of the dwellings identified for removal. Such a refinement would be guided by the following principals as outlined in the TTSTS MP:

- Install mulch beds around established isolated planted trees of at least 1 m radius;
- Mulch including tea tree mulch, bark chip or coarse woody vegetation processed using a grinder is not deemed suitable;
- Integrate planting beds with groundcover species listed in the planting schedule of the urban design and landscaping concept plan;
- Mulch beds at least 200 mm depth at their time of installation, and
- Refine existing plantings schedule to increase trees with dense canopy traits.

Unexpected Finds Procedure

An unexpected finds procedure has been developed to manage instances where TTSTS may be detected during pre-clearing surveys, clearing operations or at any other time throughout construction. This is in response to the recognition that parts of the Project study area are relatively linear (i.e. 10 m wide for levee works) and individuals can move into these areas following the field surveys used to inform this management plan.

In an unexpected finds instance, the management strategies outlined in this plan will be adopted and include:

- Protection of TTSTS habitat including provisions for its protection from ancillary areas and their associated impacts consistent with MCoA B1 and D36;
- Installation of temporary exclusion fencing;
- Additional pre-clearing surveys as deemed appropriate by the Project Ecologist;
- Relocation of individuals using the framework developed in this plan;
- Updating of relocation sites, construction drawings and environmental sensitive area plans; and
- A periodic examination and review of the adequacy of the proposed mitigation measures proposed at that site in consultation with the EPA.

Inspection and Monitoring in Relation to the TTSTS

Inspection, monitoring and surveillance regimes is detailed in the main approved template CEMP document to be finalised by the awarded contractor. The table below summarises important actions relevant to TTSTS management.

Table 25: Environmental Monitoring requirements

Inspection	Objectives	Responsibility	Output	Timing
Site Inspection	Review status of all controls and general environmental performance	Environmental Advisor	Weekly Environmental Checklist	Weekly
Site Inspection	Observe general environmental performance	Environmental Manager / Environmental Advisor	Correct any observed non-conformances as they arise	As required to coincide with inspections
Site surveys	Ensure surveys are being completed prior to and during the disturbance and removal of known and potential TTSTS habitat and relocating individual TTSTS in accordance with this plan	Project Ecologist	Daily pre-clearing checklist and post-clearing report	Daily and at completion of construction activities that seek to disturb and remove known and potential TTSTS habitat.

The specific management measures from the Three-toed Snake Tooth Skink Management Plan are outlined in the Section above, and detailed in **Attachment 3**.

The listed requirements below are the fauna measures detailed under the MCoA's and also the Environmental Management Measures (EMMs) outlined in the Submissions Report. These EMMs in the Submissions Report were updated and refined from the Project EIS. The listed requirements are outlined to assist in outlining the conditions and management measures required on the project.

Table 26: MCoA and Submissions Report Environmental Management Measures regarding impact mitigation measures for the Clarence Crossing project relevant to MNES for the Three-toed Snake Tooth Skink.

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
MCoA						
A10	The Proponent shall be responsible for environmental impacts resulting from the actions of all persons that it invites onto the site, including contractors, sub-contractors and visitors.	✓				
B1	The clearing of native vegetation shall be generally in accordance with the areas specified in the documents listed in condition A2, and with the objective of reducing impacts to any endangered ecological communities (EECs), threatened species and their habitat to the greatest extent practicable.	✓	✓			
B2	Prior to construction, pre-clearing surveys and inspections for EECs and threatened species shall be undertaken. The surveys and inspections, and any subsequent relocation of species, shall be undertaken under the guidance of a suitably qualified ecologist and shall be in accordance with the methodology incorporated into the approved Construction Flora and Fauna Management Plan required under condition D46(e).	✓	✓			
B3	The Proponent shall undertake flora and fauna surveys of those parts of the project area previously not surveyed, due to accessibility issues, prior to the commencement of construction that affects those areas. Should threatened species, communities or habitats be identified, these shall be offset and addressed in the Biodiversity Offset Statement required under condition D1.	✓	✓			
B4	The Proponent shall undertake a targeted rehabilitation program post construction to restore riparian habitat to at least the pre-construction condition or better, unless otherwise agreed by DPI (Fisheries) and NOW.	✓	✓	✓		
B5	Vegetation shall be established in or adjacent to disturbed areas and include species which may provide habitat for wildlife following the completion of construction in the vicinity of the disturbed area Revegetation is to be consistent with the Urban Design and Landscape Plan required under condition D42.	✓	✓	✓		
B6	Scour protection measures shall be implemented prior to and during construction on the banks of the Clarence River in the vicinity of the bridge works to protect the riverbank from erosion and instability during construction and operation.	✓	✓			
B8	Any drainage works that are intended to be operated by Council shall be designed in consultation with Council. Facilities such as back-up generators shall be provided to ensure continued operation of the Pound Street pumping station during electrical power outages.	✓	✓			Design
B9	The SSI shall be constructed and operated to comply with section 120 of the Protection of the Environment Operations Act 1997, which prohibits the pollution of waters.	✓			SWMP	
B10	All water from the SSI shall be appropriately treated prior to discharge, to protect the quality of the receiving waters.	✓			SWMP	
B13	Impacts to Aboriginal heritage shall be minimised to the greatest extent practicable through both detailed design and construction, particularly with regard to encroachment on the Aboriginal dreaming site Golden Eel (AHIMS site number 12-6- 0326). Where impacts	✓			Heritage MP	

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
	are unavoidable, works shall be undertaken in accordance with the strategy outlined in the Construction Heritage Management Plan required under condition D46 (d).					
B20	Identified impacts to heritage sites shall be minimised where feasible and reasonable through both detailed design and construction, particularly with regard to retained locally listed historic properties and the existing Grafton Bridge. Where impacts are unavoidable, works shall be undertaken in accordance with the actions to manage heritage construction impacts required by condition D46 (d) and under the guidance of an appropriately qualified heritage specialist.	✓			Heritage MP	
B23	The measures to protect heritage sites near or adjacent to the SSI during construction shall be detailed in the Construction Heritage Management Plan required under condition D46 (d).	✓			Heritage MP	
B24	In relation to new or modified local road, parking, pedestrian and cycle infrastructure, the SSI shall, where feasible and reasonable, be designed: a) in consultation with the Council; b) to take into consideration existing and future demand, road safety and traffic network impacts; c) to meet relevant design, engineering and safety guidelines, including Austroads Guide to Traffic Engineering Practice; and d) be certified by an appropriately qualified person that has considered the above matters.	✓	✓			Design
B25	The Proponent shall ensure that the SSI is designed to minimise land take impacts to surrounding properties as far as feasible and reasonable, in consultation with the affected landowners.	✓	✓			
B26	The Proponent shall, in consultation with relevant landowners, construct the SSI in a manner that minimises intrusion and disruption to surrounding properties, unless otherwise agreed by the landowner.	✓	✓			
B28	Utilities, services and other infrastructure potentially affected by construction and operation shall be identified prior to construction to determine requirements for access to, diversion, protection, and/or support. Consultation with the relevant owner and/or provider of services that are likely to be affected by the SSI shall be undertaken to make suitable arrangements for access to, diversion, protection, and/or support of the affected infrastructure as required. The cost of any such arrangements shall be borne by the Proponent.	✓				Design
D1	Prior to the commencement of operation of the SSI, the Proponent shall prepare a Biodiversity Offset Statement in consultation with the EPA. The Statement shall: a) confirm the threatened species, communities and their habitat (in hectares) cleared and their condition; and b) provide details of measures to offset impacts of the SSI on native vegetation, including threatened species, communities and their habitats, including the timing, responsibility, management and monitoring, and implementation of the offset measures.	✓	✓	✓		

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
D1	Biodiversity impacts shall be offset in in accordance with the document Principles for the Use of Biodiversity Offsets in NSW (DECCW, 2008). A copy of the statement shall be submitted to the Secretary and EPA.	✓	✓			
D16	Where feasible and reasonable, the Proponent shall provide alternative temporary parking spaces for formal on-street parking spaces removed and/or impacted by the construction of the SSI. The location and number of temporary or relocated parking spaces shall be determined in consultation with Council and affected businesses. The alternative parking spaces shall be provided prior to commencement of construction activities that impact on parking spaces within the SSI footprint.					Design
D19	Soil and water management measures consistent with Managing Urban Stormwater - Soils and Construction Volumes 1 and 2, 4th Edition (Landcom, 2004) shall be employed during the construction of the SSI to minimise soil erosion and the discharge of sediment and other pollutants to land and/or water.	✓			Soil and Water Management Plan (SWMP)	
D20	Works in riparian areas and on riverfront land shall be undertaken in accordance with NOW guidelines for controlled activities on waterfront land, as applicable.	✓	✓		SWMP	
D24	Based on the mitigation measures identified in the Hydrological Mitigation Report, the Proponent shall prepare and implement a final schedule of feasible and reasonable flood mitigation measures proposed at each directly-affected property in consultation with the landowner, and consistent with the flood management objectives described in condition D23(b). The schedule shall be provided to the relevant landowner(s) prior to the implementation/construction of the mitigation works, unless otherwise agreed by the Secretary. A copy of each schedule of flood mitigation measures shall be provided to the Department and Council prior to the implementation/construction of the mitigation measures on the property.	✓				Hydrological Mitigation Report
D25	The Proponent shall undertake engineering and property investigations of the Grafton and South levees prior to detailed design to inform the structural capability of changes to the levees. Any work to augment the structure of the levees shall be carried out in consultation with Council and affected landowners. Note: Should additional assessment of work arising from the engineering and property investigations of the levees be required, the proponent shall undertake a review of the consistency of those works with the SSI approval. Work that is inconsistent with the SSI may require a modification of the approval.		✓			Investigations
D26	The proposed Grafton and South Grafton levee flood mitigation measures shall be implemented prior to construction commencing in the Clarence River, including pier/pile construction and the installation of temporary in-river rock platforms, unless otherwise agreed by the Secretary.	✓				
D28	During detailed design, the Proponent shall undertake a detailed drainage study of the SSI adjacent to the northern and southern approach roads within the levees to ensure there are no adverse impacts to property or existing infrastructure. The study shall be carried out in consultation with Council and include the design of the Pound Street drainage basin and pumping station, and Council's existing drainage and flood relief systems.	✓				Drainage study

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
D36	The sites for ancillary facilities that are associated with the construction of the SSI and that have not been identified and assessed in the documents listed in condition A2 shall: a) be located more than 50 metres from a waterway, including the Clarence River; b) be located within or adjacent to the SSI boundary; c) have ready access to the road network or direct access to the construction corridor; d) be located to minimise the need for heavy vehicles to travel through residential areas; e) be located in areas of low ecological significance and require no clearing of native vegetation; f) be located on relatively level land; g) be separated from the nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant); h) be above the 20 year ARI flood level unless a contingency plan to manage flooding is prepared and implemented; i) not unreasonably affect the land use of adjacent properties; j) provide sufficient area for the storage of material to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours; and k) be located in areas of low heritage conservation significance (including areas identified as being of Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the SSI. The Proponent shall undertake an assessment of the facility against the above criteria in consultation with the relevant public authority(s) and the Council. The site and relevant environmental management measures shall be included in the Construction Environmental Management Plan required under condition D45.	✓	✓			
D39	All ancillary facilities and access points shall be rehabilitated to at least their preconstruction condition or better, unless otherwise agreed by the landowner where relevant.	✓	✓	✓		
D40	Where changes are made to the boundary or use of an ancillary facility, including facilities identified in the documents listed in condition A2, the Proponent shall assess the facility against the criteria set out in condition D36 If the ancillary facility site: a) does not meet the criteria set out under condition D36 the Proponent shall seek the approval of the Environmental Representative in accordance with condition D37; or b) results in impacts to biodiversity, heritage, flooding and noise beyond those approved for the SSI, the Proponent shall seek the approval of the Secretary in accordance with condition D38. The relevant approval shall be obtained prior to the establishment of the ancillary facility.	✓	✓			
D42	The Proponent shall prepare and implement an Urban Design and Landscape Management Plan prior to the commencement of permanent built works and/or landscaping, unless otherwise agreed by the Secretary, to present an integrated landscape and design for the SSI. The Plan shall be prepared in accordance with the Roads and Maritime Services urban design and visual guidelines, and the design principles and revegetation guidelines outlined in the EIS. The Plan shall be prepared by an appropriately qualified expert in consultation	✓	✓	✓		

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
	with EPA, including the Heritage Division, Council and community, and submitted to the Secretary for approval. The Plan shall include, but not necessarily be limited to: a) identification of design principles and standards based on- i. local environmental values, ii. heritage values, iii. urban design context, iv. sustainable design and maintenance, v. community amenity and privacy, vi. relevant design standards and guidelines including "Crime Prevention Through Environmental Design Principles", and vii. the urban design objectives outlined in the EIS Technical Paper Urban Design and Landscape Concept Report; b) details on the location of existing vegetation and proposed landscaping (including use of indigenous and endemic species where possible). Details of species to be replanted/revegetated shall be provided in a Revegetation Strategy, including their appropriateness to the area and habitat for threatened species; c) a description of locations along the corridor directly or indirectly impacted by the construction of the SSI (e.g. temporary ancillary facilities, access tracks, etc.) and details of the strategies to progressively rehabilitate regenerate and/or revegetate the locations with the objective of promoting biodiversity outcomes and visual integration; d) appropriate roadside plantings and landscaping in the vicinity of heritage items and ensure no additional heritage impacts; e) appropriate landscape treatments on flood levees to ensure the structural integrity of the levees is not compromised; f) strategies for progressive landscaping of environmental controls (such as erosion and sedimentation controls, drainage controls); g) responsibilities for maintaining landscaping treatments and areas of regeneration and revegetation; h) location and design treatments for any associated footpaths and cyclist elements, and other features such as seating, fencing, materials and signs; i) a lighting plan lighting (with lighting in accordance with AS/NZS 1158 Lighting for Roads and Public Spaces series as relevant and AS 4282-1997 Control of the Obtrusive Effect of Outdoor Lighting) including lighting designs; j) an assessment of the visual screening effects of existing vegetation and the proposed landscaping and built elements. Where properties have been identified as likely to experience high visual impact as a result of the SSI and high residual impacts are likely to remain, the Proponent shall, in consultation with affected landowners, identify opportunities for providing at-property landscaping to further screen views of the SSI. Where agreed with the landowner, these measures shall be implemented during the construction of the SSI; k) graphics such as sections, perspective views and sketches for key elements of the SSI, including, but not limited to built elements of the SSI;	✓	✓	✓		

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
	l) final design details of the proposed external materials and finishes for the bridge and noise barriers, including schedules and a sample board of materials and colours; m) monitoring and maintenance procedures for the built elements, including performance indicators, responsibilities, timing and duration; and n) evidence of consultation with EPA, Council and community on the proposed urban design and landscape measures prior to finalisation of the Plan. Note: The Urban Design and Landscape Plan shall be consistent with any revegetation and biodiversity offsets established for the SSI under the conditions of this approval.	✓	✓	✓		
D43	Prior to the commencement of construction of the SSI, or as otherwise agreed by the Secretary, the Proponent shall nominate for the approval of the Secretary a suitably qualified and experienced Environmental Representative(s) that is independent of the design and construction personnel. The Proponent shall employ the Environmental Representative(s) for the duration of construction, or as otherwise agreed by the Secretary.	✓				
D45	The Proponent shall prepare and implement a Construction Environmental Management Plan for the SSI, prior to the commencement of construction, or as otherwise agreed by the Secretary. The Plan shall be prepared in consultation with relevant agencies and Council and outline the environmental management practices and procedures that are to be followed during construction. The Plan shall be prepared in accordance with the Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004) and is to include, but not necessarily be limited to, the following: a) a description of activities to be undertaken during construction of the SSI (including staging and scheduling); b) statutory and other obligations that the Proponent is required to fulfil during construction, including approvals, consultations and agreements required from authorities and other stakeholders under key legislation and policies; c) a description of the roles and responsibilities for relevant employees involved in the construction of the SSI, including relevant training and induction provisions for ensuring that employees, including contractors and sub-contractors, are aware of their environmental and compliance obligations under these conditions of approval; d) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase and details of how environmental performance would be managed and monitored to meet acceptable outcomes, including what actions will be taken to address identified potential adverse environmental impacts (including any impacts arising from the staging of the construction of the SSI). In particular, the following environmental performance issues shall be addressed in the Plan: i. measures to minimise hydrology impacts, including measures to stabilise bank structures as required; ii. measures to monitor and manage dust emissions including dust from stockpiles, traffic on unsealed roads and from materials tracking; iii. measures to minimise emissions from construction vehicles, plant and equipment;	✓				

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
	iv. measures to monitor and manage spoil, fill and materials stockpile sites including details of how spoil, fill or material would be handled, stockpiled, reused and disposed in a Stockpile Management Protocol. The Protocol shall include details of the locational criteria that would guide the placement of temporary stockpiles, and management measures that would be implemented to avoid/minimise amenity impacts to surrounding residents and environmental risks (including surrounding water courses); v. measures to monitor and manage waste generated during construction including but not necessarily limited to: general procedures for waste classification, handling, reuse, and disposal; use of secondary waste material in construction wherever feasible and reasonable; procedures or dealing with green waste including timber and mulch from clearing activities; vi. measures for managing asbestos waste including its removal, handling, storage, transport and disposal; vii. measures for reducing demand on water resources (including potential for reuse of treated water from sediment control basins); viii. measures to monitor and manage hazard and risks including emergency management; ix. details of compliance and incident management consistent with the requirements of condition A12; and x. procedures for the periodic review and update of the Construction Environmental Management Plan and Plans required under condition D46, as necessary (including where minor changes can be approved by the Environmental Representative). The Plan shall be submitted for the approval of the Secretary no later than one month prior to the commencement of construction, or as otherwise agreed by the Secretary. Construction work shall not commence until written approval has been received from the Secretary. The approval of a Construction Environmental Management Plan does not relieve the Proponent of any requirement associated with this SSI approval. If there is an inconsistency with an approved Construction Environmental Management Plan and the conditions of this SSI approval, the requirements of this SSI approval shall prevail.	✓				

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
D46	f) a Construction Flood Management Plan to detail how construction impacts on hydrology and flooding from works on the flood levee and within the Clarence River and its floodplain will be minimised and managed and that any significant adverse impacts to people and property are avoided. The Plan shall be prepared in consultation with a suitably qualified and experienced hydrologist, EPA, SES and Council, and shall include, but not necessarily be limited to: i. an assessment of the probabilities and consequences of flood damages and personnel safety over the likely construction period including for possible extensions to this period; ii. details of works and activities, including structures within the Clarence River, which may be impacted by a flood during construction and associated risks; iii. details of measures to ensure work sites and plant and equipment are secure during flooding events and do not become flood debris or impact on property and the environment; iv. management measures and procedures that would be implemented prior to a flooding event, including timeframes for securing work sites and moving plant and equipment, v. consideration of the flood management objectives described in condition D23(b); vi. monitoring of the work sites during flood events; and vii. mechanisms for the monitoring, review and amendment of this plan.	✓			Flood Management Plan	
E7	The Proponent shall maintain the SSI in accordance with the documents listed in condition A2 and any strategy, plan, program or other document required by the conditions of this approval.				Operational management system	
EMMs						
G1	A Construction Environmental Management Plan will be prepared and implemented to ensure appropriate environmental management measures are followed during project delivery. The Construction Environmental Management Plan will provide a framework for environmental management during construction and will: • Outline all environmental management practices and procedures to be followed during construction and demolition works associated with the project • Describe all activities to be undertaken on the site during construction of the project • Detail how the environmental performance of the construction works will be monitored • Detail what corrective actions will be taken to address identified adverse environmental impacts • Describe of the roles and responsibilities for all relevant employees involved in the project • Include relevant sub-plans. The Construction Environmental Management Plan will be developed in accordance with *Guideline for the Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources, 2004).	✓				
TT8	Roads and Maritime will coordinate the placement of the new Pound Street bridge with ARTC to ensure the North Coast Line possession coincides with other works required along					Design

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
	the line. In addition, North Coast Line users (passengers and freight operators) will be notified of impending changes to minimise impacts on them.					
TT14	A construction navigation management plan will be prepared and implemented to set out river procedures and impact reduction measures to be adopted during construction.	✓			Navigation management plan	
TT15	Roads and Maritime will investigate opportunities to provide a comparable level of parking on Clarence Street between Pound Street and the railway viaduct in consultation with local business owners.					Design
Flooding and hydrology						
FH4	Detailed flood modelling will be carried out to further refine the levee raising mitigation measures proposed for the project and to *further* consider the need to raise any houses not protected by the existing levee which would be affected by increased flood levels within the river. As part of this modelling, floor level surveys will be carried out on properties identified as potentially affected by residual impact from the project.					Modelling.
FH5	Property-specific flood risk will be assessed for each property identified as being affected by residual impact from the project, based on the results of the floor level survey. Flood mitigation options will be developed and implemented in consultation with property owners and Clarence Valley Council.	✓				Design
FH6	Flood mitigation works will be staged to ensure no worsening of the existing flood regimes during construction.	✓				
NH3	If required, architectural noise treatments on heritage items will be applied in a sympathetic manner to minimise impact on the significance of the heritage item.	✓			Noise and Vibration Management Plan (NVMP)	
NH4	A construction heritage management plan (CHMP) will be prepared as part of the construction environmental management plan for the project.	✓			Heritage MP	
NH5	Any construction and vegetation clearance within or near the curtilage of heritage items will be sympathetic to minimise the removal of, or impact on, associated heritage values.	✓			Heritage MP	
NH6	Archival recording will be prepared for the following heritage items: CZB10, CZB11, CZB13, CZB16, CZB17, CZB18, CZB19, CZB20 & CZB21, CZB24, CZB25, CZB26, CZB27, CZB28, CZB29, CZB30, CZB31, CZB32, CZB33, CZB34, CZB35, CZB36 and CZB37. Archival recording will also be carried out for portions of Pound Street within the Grafton Conservation Area (C3). The archival records will record the process of development and alterations to heritage values. A program of archival recording will be completed before impacts occur and at the completion of the project. All archival recording will be completed in accordance with the Heritage Branch guidelines *How to Prepare Archival Records for Heritage Items* and *Photographic Recording of Heritage Items Using Film or Digital Capture* (Heritage Office 2001, revised 2004, 2006).	✓			Heritage MP	

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NH7	Following archival recording, the King George V Plaque (CZB19) will be relocated to a safe location and later reinstated on the new section of viaduct at Pound Street.	✓			Heritage MP	
NH8	No-go areas will be established around three heritage items: • CZB07 (Fisher's Drain) • FMW29 (*SS Induna* Shipwreck) • FMW34 (Water Trough, Lane Park) For CZB07 and FMW34, no-go areas will be established at an appropriate distance to protect the heritage values of the heritage items but allow construction to proceed unhindered. For FMW29, *SS Induna*, both terrestrial and maritime temporary exclusion areas will be established during construction to exclude the entry of vehicles or equipment associated with construction. The 'no-go' area perimeter will be placed on the existing property boundary to the south of the *SS Induna.* A maritime exclusion area (to be in accordance with Maritime and navigational requirements) will be placed 15 metres from the shipwreck to remind workboats to not enter this area. No-go areas will be marked on all construction plans and pointed out in induction talks with contractors undertaking work in vicinity to the items.	✓			Heritage MP	
AH1	Detailed design and construction stages will avoid further encroachment towards the Golden Eel dreaming site.	✓			Heritage MP	
SE1	Roads and Maritime will prepare an excess land strategy during detailed design and would investigate opportunities to return available regionally significant farmland, following completion of the project.	✓				
SE5	Roads and Maritime and the construction contractor will minimise impacts, where feasible and reasonable, on existing character trees, including figs and jacarandas. Visual impacts and mitigation measures are outlined in Section 8.8 of the EIS.	✓	✓			
SE7	Roads and Maritime and the construction contractor will continue to liaise with Grafton TAFE Campus and the Gummyaney Aboriginal pre-school to minimise impacts on access and operations.	✓	✓			
SE11	The construction contractor will: • Maintain access to existing bridge pedestrian links • Maintain access for river users, including the Clarence River Sailing Club, and provide appropriate safety and maritime directional and safety signage on structures in the river • Maintain communications with police and emergency services in relation to changed access arrangements and traffic management plans.	✓				Design

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
V1	Detailed design will investigate opportunities to: • Refine car parking arrangements on the southern side of Pound Street • Adjust the kerbline along Pound Street between Clarence Street and Villiers Street. This would enable extra tree planting on both sides of the street and the removal of proposed parallel parking on the southern side. This would improve the visual and pedestrian amenity, reduce the scale of the street and reduce the encroachment of works in TAFE land • Reduce the batter steepness around the water detention basin to avoid the need for fencing • Reduce the construction boundary to reduce impacts on Pound Street and Greaves Street • Refine the drainage detention basin design in Grafton to minimise its visual impact • Incorporate Crime Prevention Through Environmental Design principles into the project where required.	✓				Design
V2	During detailed design, the pier designs will be developed to further reinforce the complementary relationship between the proposed bridge piers and the piers on the existing bridge. In particular, the option of tapering the piers at their long elevation will be considered. In addition, opportunities will be considered to further streamline the appearance of the bridge, including: • Aligning the edges of the piers with the outside faces of the girders • Investigating monolithic construction as an alternative to the current pier design • Ensure the proposed bridge soffit appears as a series of continuous curves with a segmented appearance to be avoided • Incorporate Crime Prevention Through Environmental Design principles into the project where required.					Design
V3	Detailed design will consider: • Flattening the fill embankments to the bridge approach road to better integrate it with the surrounding flat rural landscape • Opportunities to enhance the location's role as the southern arrival point to South Grafton and Grafton • Incorporating safe and efficient bicycle access on the Iolanthe Street / Pacific Highway / Through Street roundabout and the Gwydir Highway / Pacific Highway roundabout to allow a connection to the regional Coastline Cycleway route on the Pacific Highway • Incorporate *Crime Prevention Through Environmental Design principles into the project where required.*					Design

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
V4	Consideration should be given to undertaking an arborist assessment to inform the design development and optimum levee alignment. Where the levee has existing structures (e.g. a building) a specific levee raising design will be required. Where feasible and reasonable, the design will: • Investigate opportunities to avoid changes to the existing structure (e.g. minor realignment of the levee crest) • Keep changes to the existing structure to a minimum • Identify a construction method that will keep the structure operational while construction work is being carried out (subject to safety considerations). Roads and Maritime will consult with the infrastructure owners during detailed design. For heritage listed items, the design will seek to avoid or minimise the need to modify the structure and investigate non-intrusive options to achieve the required levee level. Levee raising materials and finishes will be sympathetic to minimise impact on the significance of the heritage item.	✓	✓			
V5	Detailed design and documentation drawings will define the extent of all construction activity, including temporary work, to protect the area during construction. Construction facilities will be contained within the construction work zone and occupy the minimum area practicable for the intended use. Suitable barriers will be erected to screen views from nearby areas. Work sites will be returned to at least their pre-construction state once work is complete, or progressively reinstated throughout the construction process, where possible. Pollution and dust emissions will be minimised and monitored throughout the construction period (refer to Section 8.12). Footpaths affected by construction activities will be diverted or re-routed. Trees to be retained within construction facilities areas will be identified, protected and maintained. Temporary lighting will be screened or diverted to reduce unnecessary light spill. Material used for temporary land reclamation will be removed once construction is complete.	✓	✓			Design
Biodiversity						
B1	Disturbance and clearing of native vegetation will be minimised, particularly avoiding and minimising vegetation removal wherever possible through the detailed design process. Detailed design will investigate opportunities to retain the two hollow bearing and five habitat trees identified within the project area. A revegetation management sub-plan will be developed as part of the flora and fauna management plan to revegetate with species suitable for the creation of hollows and foraging resources. Strategies to compensate for the loss of hollow bearing/habitat trees will focus on revegetation and rehabilitation activities along riparian and adjoining areas.	✓	✓	✓		Design

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
B2	As part of the flora and fauna management plan, a revegetation management sub-plan will be developed to provide specific details for the re-establishment of native vegetation on areas disturbed by the project construction. This plan will be developed in accordance with *Roads and Maritime Biodiversity Guidelines* (RTA, 2011) and the design principles identified in *Appendix L, Technical Paper: Flora and Fauna Assessment* of the EIS. It will also include details for the regeneration and rehabilitation of areas with a focus on riparian areas within the project area with reference to Guide 3, Guide 6 and Guide 10 of the *Roads and Maritime Biodiversity Guidelines*. The plan will include objectives to incorporate local native species across all revegetation and landscaping efforts along the Clarence River and in the adjoining project area. This will include species consistent with freshwater wetlands on coastal floodplain and sub-tropical coastal floodplain forest threatened ecological communities species composition, which could potentially provide foraging resources and roosting to threatened fauna species, and increase corridors and connectivity throughout the landscape. *This plan will be developed in consultation with OEH.*	✓	✓	✓		
B3	During detailed design, the project design team will comply with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) in relation to requirements for maintaining fish passage via the design and construction of in stream structures.	✓	FFMP			Design
B4	A flora and fauna management plan (FFMP) will be prepared as part of the construction environmental management plan before construction in accordance with *Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects* (Roads and Maritime, 2011). The FFMP will detail how impacts on biodiversity will be minimised and managed during construction and operation and will incorporate specific management measures identified in the EIS. Measures outlined in this table will be addressed within the flora and fauna management plan, including timeframes for implementation and monitoring to be developed post-EIS and project approval.	✓	✓	✓		

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
B5	To minimise the impacts of vegetation clearing and habitat loss the following specific measures will be implemented: • Clearing of vegetation will be carried out in accordance with Guide 1 Pre-clearing Process of Biodiversity Guidelines (RTA, 2011). These guidelines cover the felling of both non-habitat and habitat trees and the rescue and relocation of fauna • The pre-clearing process will be consistent with Guide 2 Exclusion zones of Biodiversity Guidelines (RTA, 2011) and include: pre-clearing surveys by an experienced/qualified ecologist and mapping and delineating the boundaries of threatened flora and/or fauna species, threatened ecological communities and/or suitable habitat (hollow bearing/habitat trees) • Pre-clearance surveys to include surveys for Hairy-joint Grass during flowering period (between summer and autumn) within final impact areas • Pre-clearing surveys to be carried out for the Three-toed Snake-tooth Skink, in suitable areas, not yet surveyed (ancillary sites, especially in North Grafton where houses are to be demolished) before demolition and construction works during late spring and early summer in accordance with the relevant guidelines (DSEWPaC,2011; DEC, 2004 and TSSC, 2008) • Construction traffic will be restricted to defined access tracks and construction works zone areas • The location of exclusion zones will be identified, with temporary fencing or flagging tape to indicate the limits of clearing (in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011)) • All relevant staff will be inducted and informed of the limits of vegetation clearing and the areas of vegetation to be retained.	✓	✓			
B6	• Weeds will be controlled in accordance with RTA (2011a) – Biodiversity Guidelines Guide 6: Weed Management • Declared noxious weeds will be managed in accordance with the requirements of the Noxious Weeds Act 1993 • Weed infested topsoil will be appropriately stockpiled with sediment fencing and as soon as practical, disposed of or treated appropriately to limit potential impacts on nearby areas of native vegetation.	✓	FFMP	✓		
B7	The FFMP will outline a strategy for the implementation of site hygiene protocols and management measures according to Biodiversity Guide 7 – Pathogen Management from Roads and Maritime (2011) to reduce the risk of localised or regional introduction of Myrtle Rust, *Phytophthora cinnamomi* and the amphibian chytrid fungus as a result of the project. Measures for preventing the introduction and/or spread of disease causing agents such as bacteria and fungi will be implemented, as detailed in RTA (2011a) – Biodiversity Guidelines Guide 7: Pathogen management.	✓	FFMP			
B8	Where practical, vegetation removal (especially of the two hollow-bearing and five habitat trees identified) will occur outside the main fauna breeding season (August to February) to avoid potential breeding disturbance to fauna, particularly avifauna (birds and bats).	✓	✓			

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
	Pruning or lopping tree limbs will be conducted in preference to tree removal wherever possible. An appropriate tree removal procedure will be adopted. It will require the presence of a qualified ecologist or wildlife expert experienced in the rescue of fauna as detailed in RMS Biodiversity Guidelines -Guide 4: Clearing of vegetation and removal of bush rock including the staged removal process (2011). Woody debris and habitat trees removed for the project will be managed in accordance with RMS Biodiversity Guidelines - Guide 5: Re-use of woody debris and bush rock (2011). Fauna handling during vegetation removal will be carried out by a licensed fauna ecologist or wildlife carer, as detailed in RMS Biodiversity Guidelines Guide 9: Fauna handling (2011).					
B9	Threatened species guidelines will be developed for threatened flora and fauna likely to occur directly within the project area and which may be impacted during construction, in order to show and educate construction workers of its appearance and outline what should be done if the species is found during construction. Relevant species will include: • Hairy-joint grass • Three-toed Snake-tooth Skink • Grey-headed Flying-fox • Microbats.	✓	✓			
B10	If unexpected threatened fauna or flora species are discovered, works will stop immediately and the *Unexpected Threatened Species Find Procedure* RTA (2011a) as well as the *Biodiversity Guidelines Guide 1: Pre-clearing process* (Roads and Maritime, 2011) will be followed. This procedure will be included in the FFMP developed for the project.	✓	✓			
B11	Nest boxes and bat roost structures will be installed in accordance with the principles outlined in the *Roads and Maritime Guide 8 Nest Boxes* (2011). Details of the number and type of nest boxes will be included in the FFMP prepared for the project, and will include the following details: • The number and type of nest boxes required based on the number, quality and size of the hollows that will be removed • Specifications for nest box dimensions, installation requirements, locations of nest boxes and ongoing monitoring and maintenance • Installation timeframes, including the installation of 70% of nest boxes before the removal of any vegetation • Staged habitat removal, including removal of secondary or less preferential roosting habitat before removal of primary habitat, such as hollow-bearing trees and houses. • Pre-demolition inspection and exclusion measures to prevent continued use of roosts. These will be prepared to address the subject species, specific habitat, roosting habits at each location, and capture and handling procedures (if required).	✓	FFMP			
B12	Direct disturbance of aquatic fauna and riparian zones will be minimised in accordance with *Roads and Maritime Biodiversity Guidelines – Guide 10 Aquatic habitat and riparian zones* (2011).	✓	✓			

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
B13	Erosion and sediment control measures will be implemented and maintained to: • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets • Reduce water velocity and capture sediment on-site • Minimise the amount of material transported from site to surrounding road surfaces • Divert clean water around the site in accordance with *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004). Erosion and sedimentation controls will be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request. Erosion and sediment control measures will not be removed until the works are complete and areas are stabilised. Work areas will be stabilised progressively during the works. A progressive erosion and sediment control plan is to be prepared for the works. The *Guidelines for in stream works on waterfront land* (NSW DPI 2012) will be implemented when constructing and installing piers, bridge footings and undertaking river front landscape works.	✓	✓		SWMP	
B14	Where feasible and reasonable any large woody debris that may be encountered during construction will be relocated.	✓	✓			
SW2	Operational water quality management and protection measures, such as swales, to protect nearby waterways from pollutants from the bridge and approaches will be further refined and investigated in consultation with Clarence Valley Council.					Operational environmental systems
SW3	As part of the construction environmental management plan, a soil and water management plan will be prepared in line with current Roads and Maritime specifications. The plan will include (but not limited to): • A risk assessment of the potential impacts on water quality and hydrological processes • Details of erosion and sediment controls to be implemented, including erosion and sediment control plans developed for the project • Details of inspection frequency for control measures • Monitoring and maintenance of environmental control measures • Environmental work method statements for high risk activities such as dewatering and works within waterways • Procedures to manage stockpiles generated during construction • Tannin leachate management measures • Acid sulfate management measures • Detailed consideration of measures to prevent (where possible) or minimise any water quality impacts • Measures to manage known and unexpected contamination during the construction stage • Consideration of water dissipation due to wick drains.	✓			SWMP	

MCoA or EMM	Requirement	CEMP	FFMP / TTSTS MP	Urban Design & Landscape Plan	Other MP under CEMP	Other
SW7	Work areas will be stabilised progressively during the works.	✓	✓	✓		
SW11	Construction work in proximity to waterways will be undertaken in accordance with best practice and the NSW Office of Water guidelines for controlled activities where feasible and reasonable. Construction water quality management measures to protect nearby waterways from construction activities will be included in the soil and water management plan developed for the project. This plan will include (but not limited to) the following measures: • Appropriate controls to minimise risk of release of dirty water into drainage lines and/or waterways • Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) is to be carried out on a regular basis to identify any potential spills or deficient erosion and sediment controls • Water quality control measures to prevent any materials (e.g. concrete, grout, sediment etc.) entering waterways.	✓			SWMP	
SW12	Before commencement of works within the river, a workshop will be held with relevant government agencies including representatives from EPA, NSW Office of Water, Department of Primary Industries Fisheries, Roads and Maritime and the construction contractor to discuss potential options for temporary working platforms. Any temporary working platforms will be managed in accordance with the principals detailed in Section 6.6.1 of the EIS.	✓				
SW13	Exposed areas will be progressively rehabilitated. Methods will include permanent revegetation, or temporary protection with spray mulching or cover crops.	✓	✓	✓		
Air quality						
GG7	Vegetation clearance will be minimised, where feasible, in accordance with the approved project. Areas to be revegetated will be revegetated in accordance with the project landscape plan.	✓	✓	✓		
UI2	Essential Energy will be consulted during detailed design about the location and timing of a potential easement across the Clarence River.	✓				Design
UI3	Relevant service utility providers or owners will be consulted to verify locations, impacts and any protection, relocation or decommissioning work required.	✓				Design
UI6	Existing services to be potentially impacted by the project will be physically relocated.	✓				Design
UI7	Relevant service utility providers or owners will be consulted before the removal of any decommissioned utility services beneath acquired properties.	✓				Design
WM19	Logs and green waste will be mulched (where not contaminated by weeds) and beneficially reused onsite for rehabilitation and landscaping as a first preference, or offsite in the local area.	✓			Waste and Energy MP	

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

X	No, complete section 6.2
	Yes, complete section 5.3

6.2 Proposed action IS NOT a controlled action.

Consideration of TTSTS
Targeted surveys for the TTSTS have demonstrated that a population still exists in the urban residential landscape of Grafton. The distillation of records overlaid with terrain mapping and rapid habitat assessments enabled the population to be mapped over an extent of 425 ha. After accounting for the array of impermeable surfaces deemed unsuitable as habitat for the TTSTS, a correction factor of 0.59 was applied to derive an area of habitat calculated at 251 ha. Field validation surveys at historic sites confirmed all of the historic known locations still supported skinks apart from an outlier location which was later found to be inaccurately plotted with a 10 km accuracy or error margin.

Within the mapped extent, TTSTS were recorded from a range of non-native ornamental gardens, council maintained parks and street tree plantings, but all shared a common association being within 100 m of drainage lines on alluvial soils.

The Project will permanently remove 0.81 ha of this land (0.32 per cent) and further temporarily disturb an area of 2.41 ha (0.96 per cent) but this is unlikely to impact on the population to an extent that could lead to a localised decline in the population. Moreover, a number of safeguards have been proposed in the TTSTS Management Pan to alleviate any potential impacts including but not limited to:

- the use of pre-clearing surveys by an experienced ecologist,
- the construction of an effective TTSTS exclusion fence and relocation areas and
- the refinement of the Urban Design and Landscape Plan to provide plantings more commensurate to the existing habitat values of the TTSTS will ensure little to no net loss of habitat.

Given the action is located in an area best described as a disturbed urban residential landscape and will remove less than 1 per cent of TTSTS habitat that will be managed via the safeguards outlined in the TTSTS Management Plan, it is considered of insufficient magnitude and therefore unlikely to have a significant impact and is not considered a controlled action.

Consideration of Grey-headed Flying-Fox
The project has the potential to have a minor adverse impact on the Grey-headed flying-fox due to the removal of five feed trees which could be considered significant, however due to the scope and nature of the project, and availability of additional foraging resources in the surrounding area, it is considered to be an insignificant impact. A number of measures will be included in the Flora and Fauna Management Plan (FFMP) which aim to mitigate the degree of impact to ensure that biodiversity values within the project area are maintained or improved.

6.3 Proposed action IS a controlled action

Matters likely to be impacted

	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

7 Environmental record of the responsible party

		Yes	No
7.1	**Does the party taking the action have a satisfactory record of responsible environmental management?**	YES	
	Roads and Maritime is a major infrastructure agency with responsibility for the delivery of a substantial road and bridge development and maintenance programs. Within this context Roads and Maritime has a good environmental record, with few infringements over the last decade, especially considering the scale of activities. Roads and Maritime puts significant resources into environment and conservation measures on its construction and maintenance projects. Roads and Maritime are committed to reducing its impact on the environment through continual environmental performance improvement. The Pacific Highway Upgrading has achieved significant environmental achievements in regards to environmental design innovation, urban design innovation, fauna underpasses and fencing, environmental learnings, erosion and sediment control learnings/ training, learnings from incidents, other learnings and improvements and high standard approaches to undertaking inspection and closeout. There have, however, been occasions where successful proceedings have been brought against Roads and Maritime and penalty infringement notices have been issued. In such instances, Roads and Maritime has instituted measures to ensure that appropriate lessons are communicated to its staff and/or contractors and that any necessary changes are made to management systems and operating procedures. Further detail is provided below. Roads and Maritime engaged qualified experts to undertake environmental assessments for the Additional Crossing of the Clarence River at Grafton to ensure that impacts to the environment are minimised. The construction contractor also has key responsibilities in this area. Environmental management is an important component of tender selection, design, construction and operation. RMS and their Contractors have won a large number of environmental awards for major infrastructure projects.		

7.2 **Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?**

YES

RMS is a major infrastructure agency with responsibility for the delivery of a substantial road and bridge development and maintenance program. Given the scale and complexity of works undertaken, RMS has a very good environmental record and puts significant resources into environment and conservation measures on its construction and maintenance projects. RMS is committed to reducing its impact on the environment through continual environmental performance improvement.

Details of penalty infringement notices that have been issued to Roads and Maritime since 1998 are outlined in the following table.

Date of Penalty Notice	Circumstance
2 February 1998	The NSW Land and Environment Court found that RTA grit blasting operations on the Wallaby Rock Bridge over the Turon River near Bathurst resulted in material containing paint, limestone and copper slag grit entering the river.
3 June 1998	Penalty Notice (P8669550) for inadequate sediment controls at an RTA site on the corner of Stoney Creek Road and King Georges, Beverly Hills.
21 February 2000	Penalty Notice (Z0578326) for the inappropriate cleaning of a bitumen sprayer at a roadside stockpile site near Bowenfels. The infringement was for cleaning the sprayer at a location which created the potential to pollute an onsite drain and possibly other waters.
18 January 2002	Penalty Notice (N7899706) for contravention of a condition of environment protection licence number 10008 for the Pacific Highway Upgrade at Mullumbimby. Sub-contractor employed an incorrect sediment basin pump out procedure.
28 October 2002	Penalty Notice (B5102543) issued to the Mona Vale Road upgrade project for pollution of waters. Sediment laden water escaped the site into stormwater drains during the works.
7 August 2006	Penalty Notices (7616962760 & 7616962751) for failing to supply Dangerous Goods Shipping documents to two drivers of asphalt trucks near Nyngan, western NSW.
8 November 2007	Penalty Notice (7616957069) for unauthorised discharge of water from a construction site to an adjacent water course at Pambula.
11 December 2008	Penalty Notice (7616963164) for clearing of native vegetation (Myall Woodland) adjacent to Mitchell Highway west of Trangie.
29 April 2008	Penalty Notice (7633250250) for pollution of waters as a result of inadequate sediment control measures, Great Western Highway, Marangaroo.
28 September 2010	Penalty Notice (7601508934) for a breach of environment protection licence 13204 for failure to maintain pollution control equipment leading to the discharge of material from the Oxley Highway Upgrade construction works at Port Macquarie.
22 October 2010	Penalty Notice (7601508961) for pollution of waters arising from discharges from the Central Coast Highway Upgrade project.
31 March 2011	3 Penalty Notices (3013382406, 3013382415 & 3013382424) for breaches of Dangerous Goods transport legislation for RFS vehicle on New England Highway.
17 November 2011	Penalty Notice (3068038537) for pollution of waters of Byarong and America Creeks, Wollongong for failure to fully implement the sediment and erosion control measures outlined in the REF for the project.
15 June 2012	Penalty Notice (3085764202) for a breach of environment protection licence 13135 for failure to operate pollution control equipment to prevent the discharge of material from the Central Coast Highway upgrade construction works at Erina Heights.

7.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?**	Yes	
	If yes, provide details of environmental policy and planning framework Roads and Maritime has set the environmental policy direction for the organisation in its Corporate Framework, which seeks to minimise impacts on the natural, cultural and built environment from road use and Roads and Maritime activities. Roads and Maritime commitment to meeting this priority is demonstrated in its environmental policy and the environmental considerations incorporated into its activities. A copy of the 2012 RMS Environmental Policy can be provided should it be required. This policy is currently being updated. To strengthen this commitment and to ensure environmental policy is carried out, Roads and Maritime has implemented an Environmental Management System (EMS). Roads and Maritime EMS and environmental systems provide a framework for environmental management of Roads and Maritime activities and enables Roads and Maritime to manage its obligations more effectively to move beyond compliance with legislative requirements. It provides a basis for improving overall environmental performance by providing tools for effective planning, implementation and review mechanisms. Roads and Maritime are committed to reducing its impact on the environment through continual environmental performance improvement.		

7.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)** • Construction and Operation of the Westconnex new M5 (2015/7520) • Safety Works along Bells Line of Road between Mt Tomah and Kurrajong Heights (2014/7346) • Newcastle Inner City Bypass Rankin to Jesmond NSW (2015/7550) • Pacific Highway Upgrade – Woolgoolga to Ballina (2012/6394) • Pacific Highway Upgrade – Warrell Creek to Nambucca Heads (2013/7101) • Pacific Highway Upgrade – Oxley Highway to Kempsey (2012/6518) • Great Western Highway Upgrade – Mouth Victoria to Lithgow (2013/6804) • Olympic Highway Realignment and Construct Rail-Over Bridge, Wagga Wagga (2013/6956) • Pacific Highway Upgrade – Nambucca Heads to Urunga (2013/6963) • Princes Highway Upgrade (2013/6968) • Federal Highway northbound safety barrier treatments (2013/6855) • Princess Highway Upgrade, South Nowra, Forest Road and Parma Road (2013/6944) • Upgrade of Barton Highway and Mcintosh Circuit Intersection (2013/6961) • Pacific Highway upgrade, Tintenbar to Ewingsdale 2009/5103. • Pacific Highway upgrade, Franklins Road to Eight Mile Lane, Glenugie 2009/5002. • Hume Highway upgrade, 9.5 kilometre dual carriageway bypass of Holbrook 2009/5064. • Hume Highway upgrade, proposed 7 kilometre upgrade Tarcutta bypass 2009/5062. • Hume Highway upgrade, proposed 9 kilometre upgrade Woomargama bypass 2009/5061. • Central Coast Highway upgrade, Ocean View Drive to Matcham Road 2009/4815. • Pacific Highway upgrade, Banora Point upgrade 2008/4047. • Pacific Highway upgrade, Sapphire to Woolgoolga 2007/3910. • Pacific Highway upgrade, Iluka Road to Woodburn Devils Pulpit upgrade 2010/5586	Yes	

8 Information sources and attachments

(For the information provided above)

8.1 References

Literature reviewed for the preparation of this referral has included the following documentation:

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- Appendix D – Technical Paper: Traffic and Transport (Arup, 2014)
- Appendix E – Technical Paper: Flooding and Hydrology Assessment (BMT WBM Pty Ltd, 2014)
- Appendix F – Technical Paper: Noise and Vibration assessment (Arup, 2014)
- Appendix G – Technical Paper: Non-Aboriginal heritage assessment (Biosis, 2014)
- Appendix H – Technical Paper: Aboriginal Heritage Assessment (Biosis, 2014)
- Appendix I – Technical Paper: Socio-economic assessment (BCC Consulting Planners, 2014)
- Appendix J – Technical Paper: Urban design and landscape concept report (including landscape character and visual impact assessment) (Spackman Mossop Michaels (SMM), 2014)
- Appendix K – Technical Paper: Levee works landscape and visual appraisal (Arup, 2014)
- Appendix L – Technical Paper: Flora and fauna assessment (Biosis, 2014)

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8.2 Reliability and date of information

Database searches and literature reviews were undertaken during the various stages of the project, including the route options phase, environmental impact assessment phase, and preparation of this referral.

The field survey methods employed comply with OEH *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities –Working Draft, the Draft Guidelines for Threatened Species Assessment* (Department of Environment and Conservation 2005), Survey guidelines for Australia's threatened fish: Guidelines for detecting fish listed as threatened under the EPBC Act (DSEWPaC, 2011) and the biodiversity assessment guidelines set out in the Roads and Maritime (2013) Biodiversity Assessment Practice Note.

The field surveys methods employed also comply with the guidance provided in DEWHA (2009a) *Matters of National Environmental Significance, Significant Impact Criteria Guidelines 1.1 Environmental Protection and Biodiversity Conservation Act 1999*, and where existing, the relevant species specific EPBC Act policy statements.

Table 27: Summary of flora survey effort per habitat stratification unit undertaken for EIS

Date of Survey / Season	Objectives	Survey Type	Survey effort
August 2010 Winter	General habitat condition assessment, vegetation community association and targeted searches for threatened species and their habitat	Random meander and one plot survey	84 person hours
July 2011 Winter	Mapping of vegetation units across the broader area of Grafton and South Grafton. Completed to provide context for proposed impacts to vegetation.	Foot and vehicle based ground-truthing of vegetation units shown on aerial photography.	30 person hours
February and April 2012 Summer / Autumn	More comprehensive assessment of the six route options including community association and mapping and targeted searches for threatened species and their habitat.	Random meander	96 person hours
October and December 2013 Spring / Summer	Ground truthing of previously mapped vegetation along the final route alignment and comprehensive assessment of the levees on both sides of the Clarence River for threatened species searches and survey techniques.	Random meander	25 hours

Table 28: Summary of fauna survey effort

Fauna group	Technique	Survey effort August 2010	April 2012	October and December 2013	Total effort
Diurnal birds	Diurnal bird counts	2 person hours	2 person hours	2 person hours	6 person hours
Reptiles	Active reptile searches	6 person hours	6 person hours	18 person hours	30 person hours
	Funnel trapping	-	-	4 trap nights	96 trap nights
Frogs	Active amphibian searches	2 person hours	2 person hours	-	4 person hours
Nocturnal birds and mammals	Spotlighting	3 person hours	3 person hours	3 person hours	9 person hours
Microbats	Anabat recording	4 trap nights	-	6 trap nights	10 trap nights
	Echometer recording	-	-	0.5 person hours	0.5 person hours
	Harp trapping	-	-	4 trap nights	4 trap nights
Flying-foxes	Sunset Flying-fox observations	2 person hours	2 person hours	2 person hours	6 person hours
All species	Track, scat and scratch searches	2 person hours	2 person hours	2 person hours	6 person hours
	Opportunistic and incidental observations	48 person hours	32 person hours	32 person hours	112 person hours
Aquatic fauna	Fyke nets	192 net hours	-	-	192 net hours
	Bait traps	288 net hours	-	-	288 net hours
	Habitat assessments	22 person hours	-	-	22 person hours

Additional surveys undertaken in 2016, specifically for the TTSTS

Field surveys undertaken between February and April 2016 at all locations within the proposed construction works boundary. This included all of the treatment areas within the levee works construction footprint, excluding a portion of land managed by the Australian Rail Track Corporation (ARTC) in the upstream or western end of the northern levee (**Figure 19, Attachment 1**).

Field surveys were conducted at 78 locations in the Grafton locality (**Figure 19, Attachment 1**). Generally, surveys were only conducted outside or adjacent to the proposed construction works footprint if TTSTS had been recorded within or in close proximity to the proposed construction works footprint. Some additional outlying areas were also surveyed but are not shown on **Figure 19, Attachment 1**. They include four satellite locations around 3 km to the north at Junction Hill and Alumy Creek Reserve.
These additional surveys were undertaken over February and April to ensure the highest likelihood of encountering TTSTS, which are more active follow periods of rainfall.

Limitations
Field surveys provide a snap-shot of the existing environment at the time of survey, and conditions, including the presence or absence of threatened species, can change with time.

To overcome these limitations, targeted seasonal surveys during optimal survey conditions have been undertaken over a six year period by specialists with specific knowledge and experience of species' distribution, habitat preferences and requirements in the mid-north coast region by ecologists from Biosis and Lewis Ecological Surveys.

Despite the comprehensive field surveys undertaken, it is possible that some threatened fauna species that occur in habitats along or adjoining the alignment (permanently, seasonally or transiently) were not detected during the survey. These species may include: fauna species that depend on seasonal resources such as flowering or fruiting trees or that are mobile and transient in their use of resources. Similarly, no sampling technique can entirely eliminate the possibility that a flora species is present on a site (e.g. species of plant present in the seed bank). For these species, a precautionary approach has been taken and impact assessments have been prepared based on the presence of potential habitat even if a species was not recorded.

8.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	**Attachment 1:** Figure 1: Project Area
	GIS file delineating the boundary of the referral area (section 1)		**Attachment 6: GIS File boundary**
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	**Attachment 1, Figures:**

Figure 1	Project context with identified skink locations
Figure 2	Construction Zone Boundary
Figure 3	Levee Extents
Figure 4	Project Site
Figure 5	Key Features
Figure 6	Bridge details - Long Section
Figure 7	Bridge details - Cross Section
Figure 8	Bridge details - Cross Section 2
Figure 9	Bridge details - Cross Section 3
Figure 10	Road upgrades Grafton
Figure 11	Road upgrades South Grafton
Figure 12	Cycling upgrades
Figure 13	Flood Mitigation
Figure 14	Stormwater Drainage
Figure 15	Property acquisition
Figure 16	Preliminary options
Figure 17	Shortlisted options
Figure 18	TTSTS Extent NSW
Figure 19	TTSTS Survey area
Figure 20	Located TTSTS and predicted extent
Figure 21	Habitat Likelihood
Figure 22	Landscape Concept Plan
Figure 23	Vegetation Communities
Figure 24	Vegetation Communities Broader
Figure 25	Existing Levee System
Figure 26	Acid Sulfate Soils
Figure 27	Archaeological & Research Potential
Figure 28	Built heritage Grafton
Figure 29	Built heritage South Grafton
Figure 30	Built heritage flood mitigation works

If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)	✓	**Attachment 4:** Ministers Condition of Approval
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	✓	Additional Crossing of the Clarence River at Grafton Environmental Impact Statement, August 2014 Prepared by Arup. Parts 1 -3 available online at http://www.rms.nsw.gov.au/projects/northern-nsw/grafton-clarence-river-crossing/environmental-impact-statement.html
	copies of any flora and fauna investigations and surveys (section 3)	✓	• **Attachment 3:** Lewis, B. D (2016). Additional Crossing of the Clarence River at Grafton: Three-toed Snake Tooth Skink *(Saiphos reticulatus)* Construction Management Plan. Prepared by Lewis Ecological Surveys for Roads and Maritime, Grafton. • **Attachment 5:** Lewis, B. D (2016). Significance Assessment in accordance with the Environmental Protection and Biodiversity Conservation Act (1999) for the Three-toed Snake Tooth Skink *(Saiphos reticulatus)*. Prepared by Lewis Ecological Surveys for the Roads and Maritime, Grafton. • Additional Crossing of the Clarence River at Grafton EIS, Appendix L – Technical Paper: Flora and fauna assessment, available online at http://www.rms.nsw.gov.au/projects/northern-nsw/grafton-clarence-river-crossing/environmental-impact-statement.html
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	✓	Additional Crossing of the Clarence River at Grafton EIS Parts 1-3, and Appendices A – L. http://www.rms.nsw.gov.au/projects/northern-nsw/grafton-clarence-river-crossing/environmental-impact-statement.html
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)	✓	Additional Crossing of the Clarence River at Grafton EIS Appendix C – Draft Consultation Strategy Appendix H Part 1-3 – Aboriginal Heritage Assessment available online at http://www.rms.nsw.gov.au/projects/northern-nsw/grafton-clarence-river-crossing/environmental-impact-statement.html

9 Contacts, signatures and declarations

Project title: Additional Crossing of the Clarence River at Grafton

9.1 Person proposing to take action

1. Name and Title: Mr Bob Higgins, General Manager Pacific Highway

2. Organisation: Roads and Maritime Services

3. EPBC Referral Number

4: ACN / ABN 76 236 371 088

5. Postal address 21 Prince Street, Grafton NSW 2460

6. Telephone: 02 6640 1305

7. Email: Bob.HIGGINS@rms.nsw.gov.au

Signature  Date 25/5/16.

9.2 Person preparing the referral information (if different from 8.1)

Individual or organisation who has prepared the information contained in this referral form.

Name Fiona Riley

Title Environmental Consultant

Organisation Arup Pty Ltd

ACN / ABN (if applicable) 18 000 966 165

Postal address PO Box 685, Brisbane, Qld, 4006

Telephone 07 3023 6000

Email Fiona.riley@arup.com

Declaration I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.

Signature  Date 25 May 2016

REFERRAL CHECKLIST

HAVE YOU:

- ☒ Completed all required sections of the referral form?
- ☒ Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- ☒ Provided a map showing the location and approximate boundaries of the project area?
- ☒ Provided a map/plan showing the location of the action in relation to any matters of NES?
- ☒ Provided a digital file (preferably ArcGIS shapefile, refer to guidelines at Attachment A) delineating the boundaries of the referral area?
- ☒ Provided complete contact details and signed the form?
- ☒ Provided copies of any documents referenced in the referral form?
- ☒ Ensured that all attachments are less than three megabytes (3mb)?
- ☒ Sent the referral to the Department (electronic and hard copy preferred)?

Geographic Information System (GIS) data supply guidelines

If the area is less than 5 hectares, provide the location as a point layer. If the area greater than 5 hectares, please provide as a polygon layer. If the proposed action is linear (eg. a road or pipline) please provide a polyline layer.

GIS data needs to be provided to the Department in the following manner:

- Point, Line or Polygon data types: ESRI file geodatabase feature class (preferred) or as an ESRI shapefile (.shp) zipped and attached with appropriate title
- Raster data types: Raw satellite imagery should be supplied in the vendor specific format.
- Projection as GDA94 coordinate system.

Processed products should be provided as follows:

- For data, uncompressed or lossless compressed formats is required - GeoTIFF or Imagine IMG is the first preference, then JPEG2000 lossless and other simple binary+header formats (ERS, ENVI or BIL).
- For natural/false/pseudo colour RGB imagery:
    - If the imagery is already mosaiced and is ready for display then lossy compression is suitable (JPEG2000 lossy/ECW/MrSID). Prefer 10% compression, up to 20% is acceptable.
    - If the imagery requires any sort of processing prior to display (i.e. mosaicing/colour balancing/etc) then an uncompressed or lossless compressed format is required.

Metadata or 'information about data' will be produced for all spatial data and will be compliant with ANZLIC Metadata Profile. (http://www.anzlic.org.au/policies_guidelines#guidelines).

The Department's preferred method is using ANZMet Lite, however the Department's Service Provider may use any compliant system to generate metadata.

All data will be provide under a Creative Commons license (http://creativecommons.org/licenses/by/3.0/au/)