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**Title of Proposal - Bruce Highway Cooroy to Curra (Section D: Woondum to Curra)**

## **Section 1 - Summary of your proposed action**

Provide a summary of your proposed action, including any consultations undertaken.

### **1.1 Project Industry Type**

Transport - Land

### **1.2 Provide a detailed description of the proposed action, including all proposed activities.**

The Department of Transport and Main Roads (TMR) proposes to upgrade and realign 26 km of the Bruce Highway (requiring construction of 30 km of new highway and tie-in works), including a bypass to the east of Gympie, Queensland. This project, titled the Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) project, is the fourth and final section of a 62 km upgrade of the Bruce Highway between Cooroy and Curra. This highway upgrade is one of Queensland's high priority road projects, providing an effective transport link as part of the national highway network and improved safety and flood immunity (Queensland Government, 2012). The Section D: Woondum to Curra project (herein referred to as 'the project') provides for a new four lane divided highway from Woondum to Curra, including a bypass of Gympie, Queensland. The new section of highway will have a posted speed limit of 110 km/hr and directional separation from Woondum to Curra.

The project has been separated into two Contracts. A Southern Contract (Contract 1) will extend for 12 km's from the northern tie in to the Bruce Highway Cooroy to Curra (Section C: Traveston to Woondum) project at Woondum, to approximately 200 m north of Sandy Creek Road. A Northern Contract (Contract 2) of approximately 18 km in length will extend from north of Sandy Creek Road to Curra. The division of this project into Contract 1 and Contract 2 is an administrative requirement to assist in the future management of contractual risks inherent with such a large project. Both contracts are being referred as a single action under the Environment and Biodiversity Conservation Act 1999 (EPBC Act).

The southern extent of the alignment will connect to the northern extent of the Bruce Highway Cooroy to Curra (Section C: Traveston to Woondum) project at Woondum (Ch 134900 m), and the northern extent of the project area will integrate with the existing Bruce Highway north of Curra (Ch 164100 m).

During the Construction phase of the project, a significant amount of bulk earthworks will be required along the entire greenfield corridor. Approximately, 5,500,000 m<sup>3</sup> of cut and 5,200,000 m<sup>3</sup> of fill are required for the project. The earthworks will be required for the road formation and construction of related infrastructure. Bulk earthworks is likely to include reusing and or replacing existing material (with treatment as required) to provide for the required subgrade, general fill and structural fill for the road formation. Cut and fill operations will also be required in some areas to achieve the required road grades. Road formation, embankments, and cuttings



have been designed to provide the relevant flood immunity applicable to this section of the Bruce Highway.

**1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.**

Area	Point	Latitude	Longitude
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	1	-26.261015842897	152.70900940584
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	2	-26.260888071532	152.708937311
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	3	-26.261016618065	152.70822233989
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	4	-26.247352521495	152.70657696706
430 ha area	5	-26.237921971403	152.70192752013



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Area	Point	Latitude	Longitude
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	6	-26.23080043677	152.7018562792
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	7	-26.21937966771	152.70064005981
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	8	-26.210331876842	152.70013966543
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	9	-26.207829172193	152.69835095419
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	10	-26.192939660564	152.6954902185



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Area	Point	Latitude	Longitude
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	11	-26.185430263692	152.69162783752
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	12	-26.170602597513	152.69241404432
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	13	-26.165274967671	152.6891241578
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	14	-26.152948675393	152.67710786141
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and	15	-26.15031606944	152.67567792445



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Area	Point	Latitude	Longitude
associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	16	-26.139657932672	152.67439046412
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	17	-26.134649434174	152.67002682961
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	18	-26.130282615344	152.66566405949
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	19	-26.1263009435	152.65951257552
430 ha area encompassing the highway corridor and associated civil,	20	-26.124245705603	152.65572229462



Area	Point	Latitude	Longitude
drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	21	-26.118273221665	152.64828335031
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	22	-26.11165843919	152.64628091888
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	23	-26.101060745871	152.64041524733
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	24	-26.089755225438	152.63190427856
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	25	-26.077613686814	152.62761274414



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Area	Point	Latitude	Longitude
complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	26	-26.072924024666	152.62353578644
complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	27	-26.067141669859	152.61273570944
complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	28	-26.054676251548	152.59392419891
complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	29	-26.049728888933	152.57783094482
complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local	30	-26.046322829074	152.57289568024



Area	Point	Latitude	Longitude
road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	31	-26.045937260106	152.57332483368
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	32	-26.04915055181	152.57797428061
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	33	-26.054290710058	152.59428211142
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	34	-26.066692179575	152.61316486288
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is	35	-26.072281815275	152.62403617558





Area	Point	Latitude	Longitude
referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	36	-26.077165017822	152.6280410332
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	37	-26.089563284196	152.63247590341
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	38	-26.100740104577	152.64105897225
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	39	-26.111273085354	152.64685254896
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as	40	-26.118016594063	152.64871249852



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Area	Point	Latitude	Longitude
the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	41	-26.119622654568	152.65078617088
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	42	-26.123925132605	152.65607934798
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	43	-26.125722984694	152.6596559113
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	44	-26.12976863629	152.66602111285
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	45	-26.133108319196	152.66938310469



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Area	Point	Latitude	Longitude
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	46	-26.13683239671	152.67303176286
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	47	-26.139465302087	152.67496295335
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	48	-26.150188181218	152.67617831359
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	49	-26.152370848486	152.677537874
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	50	-26.164825854648	152.6894820703
430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	51	-26.170474736232	152.69291529784



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Area	Point	Latitude	Longitude
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	52	-26.185302413976	152.69212822666
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	53	-26.192683977472	152.69591937194
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	54	-26.198202888318	152.69699225555
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	55	-26.207508058056	152.6988522051
encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area	56	-26.210010769609	152.70078339559



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Area	Point	Latitude	Longitude
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	57	-26.216684659336	152.70099797231
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	58	-26.224128136918	152.70157046154
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	59	-26.230736541541	152.70250000936
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	60	-26.237664831784	152.7025721042
highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and	61	-26.247287855405	152.7071485919



Area	Point	Latitude	Longitude
associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'. 430 ha area encompassing the highway corridor and associated civil, drainage and complimentary local road works, and is referred to herein as the 'project area'.	62	-26.261015842897	152.70900940584

**1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).**

The project area has been developed based on the following:

The bottom of embankments (i.e. volume of earthen material that is placed and compacted for the purpose of raising the grade of the roadway above the level of the existing surrounding ground level) plus 25 metres to be cleared of vegetation to provide adequate room for haul routes, light vehicle access, drainage structures, stockpiles and temporary and permanent sediment basins. The top of cuttings (i.e. where soil or rock material from a hill or mountain is cut) plus 15 metres to be cleared of vegetation to provide adequate room for drainage structures and light vehicle access tracks. Where cuttings are required to be installed on a wider slope, or spoil areas required to dispose of material, additional areas within the footprint has been provided. Proposed site office locations as identified in the constructability review. Incorporation of areas of cleared agricultural land owned by TMR adjacent to the construction area for the purposes of site laydown, site offices etc.

It is noted that the project area does not encompass all areas required for the relocation or augmentation of existing public utility and plant and material borrow and spoil areas due to the uncertainty around the locations of these items at present. Mitigation measures and environmental outcomes have been incorporated into the project to address the placement of construction features outside the project area, these are discussed in Section 4. The project area has been refined during the Detailed Design phase to avoid impacts to MNES where possible.

A survey area was established during the Business Case phase of the project for the purposes



of conducting terrestrial flora, terrestrial fauna and aquatic ecology surveys. The survey area is selected to gain an appreciation of ecological values that are present within and immediately adjacent to the project area; for example, fauna species that may transition through the alignment and vegetation communities that may be fragmented by the project area. The survey area was defined by the project area (as of January 2015), plus a buffer of approximately 50 – 100 m around the alignment, with some broader areas on surrounding properties and additional upstream and downstream extents within waterways or within adjacent habitats. As a result of the project area being refined further during the Detailed Design phase, some areas of the project area are outside the survey area. However, these areas include only previously cleared agricultural or grazing land due to their useability for construction related purposes (i.e. site laydown, site offices etc.).

The project area has been developed based on the following:

The bottom of embankments (i.e. volume of earthen material that is placed and compacted for the purpose of raising the grade of the roadway above the level of the existing surrounding ground level) plus 25 metres to be cleared of vegetation to provide adequate room for haul routes, light vehicle access, drainage structures, stockpiles and temporary and permanent sediment basins.

The top of cuttings (i.e. where soil or rock material from a hill or mountain is cut) plus 15 metres to be cleared of vegetation to provide adequate room for drainage structures and light vehicle access tracks.

Where cuttings are required to be installed on a wider slope, or spoil areas required to dispose of material, additional areas within the footprint has been provided.

Proposed site office locations as identified in the constructability review.

Incorporation of areas of cleared agricultural land owned by TMR adjacent to the construction area for the purposes of site laydown, site offices etc.

It is noted that the project area does not encompass all areas required for the relocation or augmentation of existing public utility and plant and material borrow and spoil areas due to the uncertainty around the locations of these items at present. Mitigation measures and environmental outcomes have been incorporated into the project to address the placement of construction features outside the project area, these are discussed in Section 4. The project area has been refined during the Detailed Design phase to avoid impacts to MNES where possible.

A survey area was established during the Business Case phase of the project for the purposes of conducting terrestrial flora, terrestrial fauna and aquatic ecology surveys. The survey area is selected to gain an appreciation of ecological values that are present within and immediately adjacent to the project area; for example, fauna species that may transition through the alignment and vegetation communities that may be fragmented by the project area. The survey area was defined by the project area (as of January 2015), plus a buffer of approximately 50 – 100 m around the alignment, with some broader areas on surrounding properties and additional



upstream and downstream extents within waterways or within adjacent habitats. As a result of the project area being refined further during the Detailed Design phase, some areas of the project area are outside the survey area. However, these areas include only previously cleared agricultural or grazing land due to their useability for construction related purposes (i.e. site laydown, site offices etc.).

The project is located in TMR's Wide Bay Burnett Region, within the Gympie Regional Council (GRC) local government area. Land uses within this local government area are predominantly agriculture and residential; however, commercial and industrial land uses occur along the project alignment intermittently. The project area is located between Woondum Road, Woondum (approximately 10 km south of Gympie) and the township of Curra (approximately 18 km north of Gympie).

### **1.6 What is the size of the development footprint or work area?**

The project area that will contain the final project footprint is approximately 430 ha.

### **1.7 Is the proposed action a street address or lot?**

Street Address

Gazetted Future State-Controlled  
Gympie QLD 4570  
Australia

### **1.8 Primary Jurisdiction.**

Queensland

### **1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?**

No

### **1.10 Is the proposed action subject to local government planning approval?**

No

### **1.11 Provide an estimated start and estimated end date for the proposed action.**

Start date 04/2018

End date 04/2038





## **1.12 Provide details of the context, planning framework and State and/or Local government requirements.**

As a State-controlled road project, the project is exempt from assessment against a local government planning scheme under Schedule 4, Table 5, Item 7 of the Sustainable Planning Regulation 2009.

Planning and environmental approvals will be obtained in accordance with current Commonwealth and Queensland legislation and policy. State environmental permits, approvals and/or processes applicable to the project include the following:

Development permit for operational works for constructing or raising waterway barrier works under the Fisheries Act 1994

Water licence to take or interfere with water under the Water Act 2000

Requirements under the Environmental Offsets Act 2014 and Queensland offsets framework, in particular for State significant biodiversity values

A Clearing Permit and Impact Management Plan for clearing conservation significant flora species under the Nature Conservation Act 1992

Development of a 'high risk' Species Management Program (SMP) under the Nature Conservation Act 1992

General environmental duty to minimise environmental harm under the Environmental Protection Act 1994

Responsibilities to manage contaminated land under the Environmental Protection Act 1994

Cultural heritage management requirements under the Aboriginal Cultural Heritage Act 2003

Revocation of State Forests under the Forestry Act 1959

## **1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.**

Community consultation was undertaken during the Strategic Planning phase between 2004 and 2008 (ARUP, 2008). Meetings, newsletters, community consultative committees, focus groups and a number of public displays were used during this time to provide information to the community and encourage public comment on the proposed alignment for the highway. In July 2008, the Strategic Planning Study Recommended Corridor Report was released and in September of that year it was endorsed by the Australian Government.

Community consultation during the Strategic Planning phase was a key consideration in identifying the recommended highway alignment for the project.



Consultation during the Business Case phase focussed on directly impacted stakeholders and interested community groups such as Mary River Catchment Coordination Committee (MRCCC), Native Title Applicants, Gympie Regional Council, Queensland Rail, Energex, the Department of Natural Resources and Mines, developers with an interest in impacted land parcels and state and federal government environmental regulators. Feedback from the Department of Infrastructure and Regional Development (federal funding partner) was also a key consideration during the development of the Business Case.

Consultation during this phase, enabled TMR to determine the following:

The extent of environmental risks and constraints

Obtain agreement about standards required for local road connections (with consideration of future developments and traffic movements)

Confirm current and future infrastructure requirements and locations with public utility providers and Queensland Rail

Obtain an understanding of potential impacts on properties, business operations and cultural heritage

Identify areas for further investigation as part of the Detailed Design phase of the project

Consultation with key stakeholders during the Business Case enabled detailed identification of risks and opportunities and improved confidence in the recommended option.

TMR officers have met with representatives from the MRCCC during the Detailed Design phase to discuss the Project and potential impacts. The MRCCC has been involved in all sections of the Bruce Highway (Cooroy to Curra) upgrade, including monitoring the water quality of the catchment of Section D and Section C projects during the Detailed Design phases and through the construction stages of Sections A and B.

Consultation with Indigenous stakeholders has commenced as part of the Cultural Heritage Assessment and will continue throughout the future project phases.

Public consultation will continue with key stakeholders (e.g. business and property owners, local environmental groups, government agencies, regional council, emergency services, elected representatives, transport operators, service authorities) throughout the Detailed Design phase, in accordance with TMR's Community Engagement Plan (June 2016). Stakeholder feedback and input will inform the final design, as well as risk management strategies to be adopted for the future construction phase.

**1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.**



Not applicable, the project does not trigger the need for an environmental impact statement under the State Development and Public Works Organisation Act 1971, as the Coordinator General has not declared this project a 'coordinated project'.

The environmental assessment process for the project has followed TMR's internal assessment process described in the Technical Manual: Environmental Processes Manual August 2013 (TMR, 2013).

A description of all ecology studies undertaken for the project to date have been listed in the table below of this referral.

**Year**

**Author**

**Report title**

**Purpose**

2015

BAAM

Baseline Ecological Assessment, Bruce Highway Upgrade Section D: Woondum Road to Curra (BAAM, 2015)

Capture baseline terrestrial ecology information to inform the Review of Environmental Factors

2015

FRC Environmental

Aquatic Ecology Assessment, Bruce Highway Upgrade Section D: Review of Environmental Factors (FRC Environmental, 2015 in Jacobs, 2016)

Capture baseline aquatic ecology information to inform the Review of Environmental Factors

2016

ERM

Terrestrial Fauna Survey Report Bruce Highway (Cooroy to Curra) Project Section D (ERM, 2016)

Targeted terrestrial fauna threatened species surveys to inform Commonwealth and State statutory approvals



2016

BAAM

Detailed Terrestrial Flora Survey Report Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (BAAM, 2016)

Targeted terrestrial flora threatened species surveys to inform Commonwealth and State statutory approvals

2016

GHD

Aquatic Ecology Technical Report Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016a)

Targeted aquatic species surveys to inform Commonwealth and State statutory approvals

2016

GHD

Flora Survey Report for Survey Area Extents Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016b)

Additional targeted terrestrial flora survey to provide greater survey area across the project to support Commonwealth and State statutory approvals

2016

GHD

Targeted Survey for the Greater Glider Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016c)

Targeted greater glider survey due to listing of species as vulnerable under the EPBC Act on 25 May 2016

2016

USC

Koala Surveys (Final) Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) project (USC, 2016)

Targeted koala surveys to provide additional information on koala presence across the project



area to support the EPBC Act Referral

**1.15 Is this action part of a staged development (or a component of a larger project)?**

No

**1.16 Is the proposed action related to other actions or proposals in the region?**

Yes

**1.16.1 Identify the nature/scope and location of the related action (Including under the relevant legislation).**

The Cooroy to Curra program of the Bruce Highway upgrade is being delivered as four separate projects which are independent of each other, refer to Appendix C of the EPBC Act Referral Report. The individual highway upgrade projects have been defined as follows:

Section A: Cooroy Southern Interchange to Sankeys Road (EPBC Act Ref: 2011/6024) (currently under construction at the time of this referral) determined to be a controlled action on 8 August 2011.

Section B: Sankeys Road to Traveston Road (construction complete)

Section C: Traveston to Woondum (EPBC Act Ref: 2014/7394) (currently under construction) determined to be a controlled action on 6 January 2015

Section D: Woondum to Curra (the subject of this EPBC Act referral)

Although this project is one of four sections to be upgraded along the Bruce Highway between Cooroy and Curra, the project is considered as an independent action, as the upgrade of each section of the Bruce Highway is not dependent on the other sections. The overall highway upgrade extends over 62 km and is anticipated to be constructed over a time period of potentially more than 20 years. Each section of the highway upgrade has been established individually so that they can be designed and constructed independently of each other, while maintaining a logical connection to the existing Bruce Highway at rationalised locations. Furthermore, each section has a logical connection, including the Cooroy Southern Interchange, Sankeys Road, Traveston Road, Keefton Road and Curra.

This project should be considered independent of the other sections for the following reasons (which have been determined using the Department's Environment Protection and Biodiversity Conservation Act 1999 Policy Statement, Staged Developments – Split Referrals: Section 74A of the EPBC Act (2013)):

The overall Cooroy to Curra upgrade is being undertaken as four separate work packages, each



with their own individually tailored environmental investigations, designers and Construction Contractors.

Funding for the project is being delivered separately for all four sections of the highway upgrade.

The environmental impacts for each section will be mitigated independently of any other future actions for the Bruce Highway or the previously constructed sections. This includes catchment related impacts, such as impacts to water quality, erosion and sediment control and impacts to aquatic fauna.

Each section of the highway is not dependent on the other sections.

Cumulative environmental impacts from the delivery of each section is not anticipated due to the linear nature of the whole upgrade alignment across the landscape. Therefore, the increased magnitude of environmental impacts, such as habitat connectivity, are not anticipated.

In 2012, the Queensland Government announced a commitment to allocate \$1 billion in State funding over the next ten years to fast-track improvements to the Bruce Highway (Jacobs, 2016). The purpose for this funding was aimed at improving road safety and flood immunity, among other priorities identified in the Bruce Highway Action Plan (Queensland Government, 2012), including capacity. The division of this project into Contract 1 and Contract 2 is an administrative requirement to assist in the future management of contractual risks inherent with such a large project.



## Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The [interactive map tool](#) can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

- [Profiles of relevant species/communities](#) (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;
- [Significant Impact Guidelines 1.1 – Matters of National Environmental Significance](#);
- [Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies](#).

**2.1 Is the proposed action likely to impact on the values of any World Heritage properties?**

No

**2.2 Is the proposed action likely to impact on the values of any National Heritage places?**

No

**2.3 Is the proposed action likely to impact on the ecological character of a Ramsar wetland?**

No

**2.4 Is the proposed action likely to impact on the members of any listed threatened species (except a conservation dependent species) or any threatened ecological community, or their habitat?**

Yes

### 2.4.1 Impact table

Species	Impact
Lowland Rainforest of Subtropical Australia	Description: The EPBC Act Protected Matters



<b>Species</b>	<b>Impact</b>
threatened ecological community	<p>Database (refer to Appendix D) identified the Lowland Rainforest of Subtropical Australia TEC (listed as 'critically endangered') as likely to occur within 5 km of the project. Field surveys undertaken to validate regional ecosystem (RE) mapping were undertaken by BAAM in 2015. The outcomes of these surveys confirmed the presence of RE within the survey area that are associated with the Lowland Rainforest of Subtropical Australia TEC (BAAM, 2015). Further field investigations confirmed that the Lowland Rainforest of Subtropical Australia TEC are present within the survey area along the banks of Six Mile Creek and a small patch south of Keefton Road within Woondum State Forest. These vegetation communities at these two locations conform to the key diagnostic characteristics and the condition threshold stated within the Threatened Species Scientific Committee Guidelines for assessing the conservation status of native species according to the Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000 (DEE, 2016b) (TEC listing advice). A figure has been included in Appendix E which demonstrates the extent of the TEC within the project area. Further details regarding the TEC at both locations, including an assessment of the key diagnostic characteristics and the condition threshold, is provided in the Flora Survey Report for Survey Area Extents (GHD, 2016b) (attached in Appendix F), including a description of the composition, structure and mapping of each TEC patch. Nature and extent of impact: The Lowland Rainforest of Subtropical Australia TEC was confirmed present within the project area and survey area at Six Mile Creek. The extent of the TEC patch within the project area along Six Mile Creek is confined to the riparian vegetation associated with Six Mile Creek. The Lowland Rainforest of Subtropical Australia TEC was also confirmed present immediately adjacent to the project area (within the survey</p>





**Species**

**Impact**

area) within Woondum State Forest. Refer to Appendix E for a figure showing the extent of TEC within the project area. The full significance of impact assessment on the Lowland Rainforest of Subtropical Australia TEC is included in the relevant sections of Appendix K. The project has been assessed as likely to have a significant impact on the Lowland Rainforest of Subtropical Australia TEC due to the likelihood that the project will:

- Reduce the extent of an ecological community
- Fragment or increase fragmentation of an ecological community
- Adversely affect habitat critical to the survival of an ecological community
- Interfere with the recovery of an ecological community

The extent of impact on both confirmed patches of TEC is shown in Appendix E. The total extent of impact on the TEC is 0.82 ha at Six Mile Creek. The extent of direct disturbance of the TEC at Six Mile Creek is required to facilitate the construction of the northbound and southbound bridges at this location. The project area at Six Mile Creek has been designed to allow for the construction of the bridges which includes access for piling pads, embankment works and construction of piers. Table 10 also identifies the extent of indirect impacts on the TEC as a result of remnant vegetation clearing within 50 m of each patch of TEC. The Threatened Species Scientific Committee’s listing advice for the Lowland Rainforest of Subtropical Australia TEC (TSSC, 2011) states that a 50 m buffer zone is required to be placed around the outer edge of the TEC patch to preserve the communities’ habitat. The TEC listing advice also identifies that impacts to vegetation within the 50 m buffer zone may constitute a significant impact (TSSC, 2011). Indirect impact to the TEC may also include: — Importation and/or spread of weeds — Habitat disturbance through introduction and/or degradation through dust, sedimentation, erosion and/or altered hydrology — Reduction in patch size and isolation of two separate patches

Terrestrial fauna species Known to occur -

Description: A detailed assessment of the



**Species**

Turnix melanogaster black-breasted button-quail - Phascolarctos cinereus koala - Petauroides volans greater glider Likely to occur - Pteropus poliocephalus grey-headed flying-fox

**Impact**

likelihood of occurrence of terrestrial fauna species within the project area and survey area was undertaken by ERM in 2016 and reported within the Terrestrial Fauna Survey Report Bruce Highway (Cooroy to Curra) Project Section D (ERM, 2016) (refer to Section 2.1 of Appendix G). The likelihood of occurrence assessment undertaken by ERM built upon the likelihood of occurrence assessment reported in the REF by BAAM in 2015 (BAAM, 2015; Jacobs, 2016) and included a review of current legislative changes under the EPBC Act and outcomes of targeted field surveys undertaken in summer 2016. Following the species' listing of the greater glider (Petauroides Volans) as vulnerable under the EPBC Act on 25 May 2016, an additional targeted survey for the greater glider was undertaken by GHD, with the results documented within the Targeted Survey for the Greater Glider Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016c) (refer to Appendix H). The likelihood of occurrence assessment was based on the following: — Baseline ecological assessments undertaken for the project (BAAM, 2015; Jacobs, 2016) — Previous records reported on the Queensland government's Wildlife Online database, the Atlas of Living Australia and/or Birddata database — Review of mapping products such as Queensland Globe to assess the suitability of habitat across the local region — Outcomes of the targeted field surveys undertaken by ERM in 2016 (ERM, 2016) and GHD in 2016 (GHD, 2016c) The terminology and definitions used in the likelihood of occurrence assessment are described in Table 4 of the attached EPBC Act Referral Report. The species assessed by ERM as having either the 'potential to occur' or being 'unlikely to occur' within the survey area have a lower probability of being impacted by the proposed works, as the species has not been recorded within 10 km of the project (based on desktop assessments) or the project is not within the species distribution. In this regard, the impacts to these species are anticipated to be



**Species**

**Impact**

insignificant and no further assessment of the potential impacts to these species is provided in this referral. Further information regarding the likelihood of occurrence assessment is provided in the Terrestrial Fauna Survey Report Bruce Highway (Cooroy to Curra) Project Section D (ERM, 2016) (refer to Appendix G). Additional information regarding the greater glider is provided in the Targeted Survey for the Greater Glider Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016c) (refer to Appendix H). To gain a more in-depth understanding of koala utilisation of the project area, TMR engaged the University of the Sunshine Coast (USC) to undertake targeted koala surveys using koala scat detection dogs. The survey involved selecting sites for koala surveys using a grid pattern based on a random start point projected inside the survey area. The surveys focused on koala habitat based on vegetation types (as defined in Jacobs, 2016); however, sites were added outside koala habitat to confirm koala utilisation outside previously mapped koala habitat. The USC koala surveys identified that of the 155 sites surveyed, 35 (23%) were found to be positive for koala presence based on the detection of koala scats (refer to Appendix I for a figure showing the survey locations). In addition, USC had eight opportunistic positive sightings for koala presence, including seven scats and one koala sighting (in Woondum State Forest) (refer to Appendix I). USC systematically searched 4,560 individual trees and koala scats were found under a total of 173 trees. The average utilisation rate for all surveys was 3.8% ( $\pm$  9.4%). In positive sites, the number of trees with at least one scat present varied from 1 to 16, with an average of 4.9 trees with scats ( $\pm$  3.9). The utilisation rate per site in this study ranged from 0 % (not utilised) to 53%. The USC data identifies that koala presence was found within previously verified koala habitat, unverified koala habitat, as well as outside of koala habitat; with koalas utilising habitat in five regions located within the survey area (refer to



**Species**

**Impact**

Appendix I). Of the five habitats, the utilisation rate appears to be the highest at Mothar Mountain and within Woondum State Forest (refer to Appendix I). Refer to Appendix J for the USC koala survey report. An MNES Significant Impact Assessment Report (GHD, 2016d) (refer to Appendix K of this referral) has been prepared for the relevant threatened terrestrial fauna species. This report documents all relevant information regarding each species including: — General species descriptions — Survey effort undertaken — Records of MNES — Location and suitability of habitat across the project area — A determination of whether habitat represents habitat critical to the survival of the species — Whether an important population is present — An assessment against the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DoE, 2013) to confirm if the project is anticipated to have a significance impact on each MNES as a result of the project, and — Proposed offset strategies for those species which were determined to have a significant impact. Nature and extent of impact: The black-breasted button-quail, koala and greater glider are ‘known to occur’ within the project area. The grey-headed flying-fox and greater glider have been assessed as ‘likely to occur’ due to previous records within 10 km of the survey area and suitable habitat present. In the absence of mitigation measures, the impacts to threatened fauna species anticipated as a result of the project may include the following: — Direct vegetation clearing and loss of foraging and breeding habitat — Fragmentation of habitats, loss of wildlife movement corridors — Mortality and injury of individuals and disruption of movement during vegetation clearing and construction — Disturbance to fauna during foraging or breeding activities — Indirect impacts through importation and/or spread of weeds — Introduction and/or proliferation of pest fauna — Degradation of habitat through dust, sedimentation and/or erosion — Degradation of aquatic environments through impacts to water



**Species**

**Impact**

quality — Barrier effects due to reduced habitat connectivity and capacity for movement of individuals The significance of impact assessment included in Appendix K identifies that the project is likely to have a significant impact on the black-breasted button-quail and the koala. This assessment outcome for the black-breasted button-quail is attributed to the following two criteria of the significant impact assessment guidelines: — The project will adversely affect habitat critical to the survival of the species — The possibility that the project will modify, destroy, remove, isolate or decrease the availability and quality of habitat that the local population could potentially decline and contribute to the decline of the species The location of habitat critical to the survival of the black-breasted button quail is shown on the figure included as Appendix N and the extent that will be directly impacted by clearing for the project equates to 8.14 ha. The significant impact assessment on the koala found the project is likely to have a significant impact on the species. An assessment of the koala habitat was undertaken in accordance with the koala habitat assessment tool provided by the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE, 2014). Due to the linear nature of the project, the length over which the project occurs and the various vegetation communities and environmental features encountered, the habitat assessment tool has been applied for each of the four different koala habitat types identified. This approach has been taken to accurately identify habitat critical to the survival of the koala. The tool identified that the vegetation within the project area mapped by ERM (2016) as either ‘remnant vegetation with less frequent detection of koala or signs’ and ‘remnant vegetation with more frequent detection of koala or signs’ meets the criteria to be considered ‘habitat critical to survival of koala,’ with a score of 8. Scores greater than 5 are considered to be critical habitat for the species. The assessment of habitat defined as either ‘remnant vegetation with less frequent



Species	Impact
	<p>detection of koala or signs' and 'remnant vegetation with more frequent detection of koala or signs' is summarised as follows: — High level of koala activity recorded in the vicinity: score of 2 (evidence of one or more koalas within the last two years) — High level of suitability of vegetation structure and composition: score of 2 (has forest or woodland with 2 or more known koala food trees) — High level of habitat connectivity: score of 2 (area is part of a contiguous landscape &gt;500 ha) — Moderate level of existing threats: score of 1 (evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence) — Moderate level of recovery value: score of 1 (uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context) Total score: 8 Those areas mapped as either 'generally unsuitable' or 'regrowth' score a lower habitat assessment score as follows: — High level of koala activity recorded in the vicinity: score of 1 (evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years) — High level of suitability of vegetation structure and composition: score of 0 (does not include forest or woodland) — High level of habitat connectivity: score of 0 (neither part of a contiguous landscape &lt;500 ha or &gt;300 ha) — Moderate level of existing threats: score of 1 (evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence) — Moderate level of recovery value: score of 1 (uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context) Total score 3 The project was assessed as likely to have a significant impact on the koala due to the associated impacts on habitat critical to the survival of the species and the possibility of the introduction of invasive species to the species habitat. The location of habitat critical to the survival of the koala is shown on the figure included as Appendix N, and the extent that will</p>





**Species**

**Impact**

be directly impacted by clearing for the project equates to 138.44 ha. The significance of impact assessment identified that the project is anticipated not to have a significant impact on the greater glider and grey-headed flying-fox, as an important population of either species is not present within the project area. Furthermore the habitat present within the project area for the greater glider does not constitute habitat critical to the survival of the species due to the degraded nature of the habitats observed, coupled with the absence of historical records. Habitats within the project area are unlikely to be necessary for the long-term maintenance of the species or for maintaining genetic diversity and long-term evolutionary development of the greater glider, and are therefore not considered to constitute habitat critical to the survival of the species. The Draft Recovery Plan for the Grey-headed flying-fox *Pteropus poliocephalus* (DEE, 2017) states that habitat and associated seasonal resources which are critical to the survival of the species are yet to be mapped. However, the loss of winter forage is considered a primary threat to the species, with the loss of spring forage unlikely to adequately provide resources for the species (DEE, 2017). The project will impact upon vegetation communities which contain *Eucalyptus tereticornis*, *E. crebra*, *E. fibrosa*, *E. pilularis*, *E. robusta*, *E. siderophloia*, *Banksia integrifolia*, *Castanospermum australe*, *Corymbia citriodora citriodora*, *Grevillea robusta* and *Melaleuca quinquenervia*. Vegetation communities containing the aforementioned species are listed on the recovery plan as important winter and spring habitats (DEE, 2017). However, the recovery plan does not attribute an area value to what constitutes habitat critical to the survival of the species. The project will result in the loss of 251.50 ha of suitable foraging habitat which is likely to contain the previously mentioned species. However, it is important to note the relative abundance of suitable foraging habitat which contains both winter and spring forage within the broader region and particularly to the



Species	Impact
	<p>east of Curra State Forest. The habitat within the project area is unlikely to be defined as dispersal habitat given the species' high mobility. Habitat within the project area is also unlikely to be necessary for the long-term maintenance of the species and to maintain genetic diversity and long-term evolutionary development of the species, given the species' high mobility and lack of high numbers of previous records within the project area (ERM, 2016). Reintroduction of the species is unlikely to be undertaken in the project area as the majority of the suitable habitat is present within the actively managed State Forests.</p>
<p>Aquatic fauna species Elusor macrurus Mary River turtle Elseya albagula white-throated snapping turtle Maccullochella mariensis Mary River cod</p>	<p>Description: The major waterways traversed by the project are classified as stream order 4 or greater and are major tributaries of the Mary River, while the remaining waterways that are intersected by the project are considered to be minor (i.e. stream order of 3 or less). A detailed assessment of the likelihood of occurrence of threatened aquatic fauna species within the project area and survey area was undertaken by GHD in 2016 and reported within the Aquatic Ecology Technical Report Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016a) (refer to Section 5 of Appendix M). The following likelihood of occurrence assessment undertaken by GHD in 2016 built upon the likelihood of occurrence assessment reported in the REF in 2016 (FRC 2015 in Jacobs 2016). — Baseline ecological assessments undertaken for the project (Jacobs, 2016) — Outcomes of the aquatic habitat assessments and targeted aquatic fauna field surveys undertaken by GHD in 2016 (FRC 2015 in GHD, 2016a). Further information regarding the likelihood of occurrence assessment is provided in the Aquatic Ecology Technical Report Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016a) (refer to Section 5 of Appendix M). The three major waterways intersected by the project include Six Mile Creek, Deep Creek and Curra Creek. The white-throated snapping turtle is 'known to occur' within Curra Creek, while</p>





Species	Impact
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the Mary River cod is 'known to occur' within Six Mile Creek. The Mary River turtle and white-throated snapping turtle were assessed as 'likely to occur' within the project at Six Mile Creek. Additional information including, the significance of impact assessment for each species assessed as either 'known to occur' or 'likely to occur', has been documented in the MNES Significant Impact Assessment Report (GHD, 2016d) attached as Appendix K. Nature and extent of impact: Two threatened aquatic fauna species are 'known to occur' within the project area, the Mary River cod and the white-throated snapping turtle. The Mary River cod was confirmed present within Six Mile Creek during the 2015 surveys and 2016 electrofishing surveys (FRC Environmental in Jacobs, 2016; GHD, 2016a). Six Mile Creek supports one of only three populations of the Mary River cod, this population is considered to be an important population for maintaining genetic diversity and for the long-term maintenance of the species (GHD, 2016a; GHD, 2016d). Six Mile Creek is also considered habitat critical to the survival of the Mary River cod, as the creek is necessary for critical activities such as foraging and breeding (GHD, 2016d). The Mary River cod has not been previously recorded within Deep Creek or Curra Creek; however, an anecdotal record of the species exists from the confluence of Curra Creek and the Mary River (recorded in 1989, Simpson and Jackson, 1996). Reaches of Deep Creek and Curra Creek that contain deep pools, high abundance of large woody debris, presence of overhanging vegetation and shaded habitat provide potentially suitable habitat conditions for the Mary River cod within the project area (GHD, 2016a). The likelihood of occurrence of the Mary River cod within these waterways, is reduced by the distance and connectivity of these creeks from the three main populations of the species. Notwithstanding, the Mary River cod has the potential to occur in Deep Creek and Curra Creek at low densities (GHD, 2016a). The deep



**Species**

**Impact**

permanent pool habitats within Six Mile Creek, Deep Creek and Curra Creek were identified as providing potentially suitable habitat conditions for the Mary River turtle and the white-throated snapping turtle. However, the Mary River turtle has not been previously recorded within waterways intersected by the project, while only one individual of the white-throated snapping turtle has been previously recorded (GHD, 2016a) from within these waterways. The low abundance of species recorded from the project area and the low suitability of turtle nesting habitat within these waterways, suggests aquatic habitats within the project area are unlikely to represent habitat critical to the survival of either the Mary River turtle or the white-throated snapping turtle. In the absence of mitigation measures, the impacts to threatened aquatic fauna species as a result of the project may include the following: —

- Alteration of aquatic habitat —
- Disturbance to aquatic fauna within foraging habitat —
- Degradation of downstream habitat quality due to changes in water quality —
- Alteration of in-stream hydrological processes due to in-stream structures (e.g. culverts) on minor waterways —
- Noise, vibration and light disturbance —
- Injury and/or mortality during construction —
- Introduction and/or proliferation of pest aquatic fauna —
- Indirect impacts through importation and/or spread of weeds —
- Barrier effects due to reduced habitat connectivity and capacity for movement of individuals

The significance of impact assessment included in Appendix K identified that the project is unlikely to have a significant impact on 'known' and 'likely' threatened aquatic fauna species where management and mitigation measures are incorporated in the design and construction phases of the project. The project has been assessed as not resulting in a significant impact to aquatic species as the project has been assessed as unlikely to result in the criteria nominated in the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DoE, 2013). Specifically, as the



**Species**

**Impact**

project has incorporated bridge structures over Six Mile Creek, Deep Creek and Curra Creek direct impacts will not result in the fragmentation of populations present or reduce the area of occupancy for the species. Furthermore, the implementation of mitigation and management measures will assist in reducing impacts within the project area and downstream of the project. Sediment transport is the primary potential impact to aquatic fauna species due to the potential for habitat degradation. Specific erosion and sediment control measures will assist in reducing the potential for sediment transport, which include:

- Implementation of MRTS52 – Erosion and Sediment Control and associated annexure. These documents are a recent addition to TMR’s contract documentation suite, to enable TMR to have controlling provisions over the construction contract. MRTS52 – Erosion and Sediment Control includes specific requirements, including water quality performance indicators, monitoring, regular auditing (including independent auditors) and reporting.
- Requirement for an appropriately qualified person (in accordance with MRTS52 – Erosion and Sediment Control) to be nominated within Construction Contractors staff including a Certified Professional in Erosion and Sediment Control and demonstrated number of years’ experience in erosion and sediment control.
- Requirement for sediment basins to be designed using appropriate modelling to ensure basins designs are correct for catchment intake and placed in the most appropriate location.
- Inclusion of lessons learnt from previous Cooroy to Curra projects, such as including staging of works to minimise vegetation clearing and provide for the establishment of pioneering works in relation to erosion and sediment control (i.e. establishment of temporary sediment basins and diversion drains prior to major earthworks). Including the use of passive flocculation of sediment basins during construction to provide for an increase in discharge rates while still meeting required



Species	Impact
Macrozamia pauli-guilielmi pineapple zamia	<p>discharge water quality objectives. — Requirement for all temporary erosion and sediment control devices to be designed for a 5 day, 85th percentile storm event, rainfall events within this design requirement will be controlled by the Construction Contractor. Those storm events outside the design event are unable to be controlled by the Construction Contractor due to the intense nature of such storm events. It is likely that sediment laden runoff will exit the project area untreated during these storm events. It is important to note that these events are naturally occurring events and an additional amount of sediment laden runoff will occur from the upstream catchment which includes agricultural land uses, rural residential uses and large areas of bushland.</p> <p>Nature and extent of impact: A total of 48 adults and 167 seedlings of <i>Macrozamia pauli-guilielmi</i> were confirmed present within the project area and will be directly impacted by the project. A further 44 adults and 27 seedlings of <i>Macrozamia pauli-guilielmi</i> are present adjacent to the project area (within the survey area) and are anticipated to be indirectly impacted by the project due to their close proximity to the construction works. Appendix K identifies that remaining habitat where viable populations of <i>Macrozamia pauli-guilielmi</i> are present is likely to be habitat critical to the survival of the species. The National Multi-species Recovery Plan for the Cycads (Queensland Herbarium, 2007) identifies important populations of the species, none of which occur within the project area. The outcomes of the significance of impact assessment included in Appendix K indicates that with the implementation of the Translocation Management Plan developed for the <i>Macrozamia pauli-guilielmi</i>, the project is unlikely to have a significant impact on the species. The translocation of plants under threat is a mitigation measure endorsed in the National Multi-species Recovery Plan for the Cycads (Queensland Herbarium, 2007). Due to the development and proposed implementation of the Translocation Management Plan, a</p>



Species	Impact
	<p>residual impact on <i>M. pauli-guilielmi</i> is anticipated not to occur from the project. A number of adaptive management and contingency measures have been included in the Translocation Management Plan. One of these measures relates to the mortality or loss of adult plants. Where mortality occurs, a program to collect seeds from existing known populations (on a sustainable basis) is to be undertaken. This process will include propagating and planting the seedlings back into existing populations at a ratio of eight seedlings established per adult plant lost, to increase the size of existing populations. This adaptive measure has been developed to reduce a residual impact occurring later in the project. A five year monitoring program is proposed as part of the Translocation Management Monitoring Plan, to assist in assessing the long-term survival of the translocated individuals.</p>

**2.4.2 Do you consider this impact to be significant?**

Yes

**2.5 Is the proposed action likely to impact on the members of any listed migratory species, or their habitat?**

Yes

**2.5.1 Impact table**

Species	Impact
<p>Known to occur Ardea ibis cattle egret Ardea modesta fork-tailed swift Merops ornatus rainbow bee-eater Rhipidura ruficauda rufous fantail Symposiarchus trivirgatus spectacled monarch Likely to occur Apus pacificus eastern great egret Gallinago hardwickii Lantham's snipe Hirundapus caudacutus white-throated needletail Monarcha melanopsis black-faced monarch</p>	<p>Description: A detailed assessment of the likelihood of occurrence of migratory species within the project area was undertaken by ERM in 2016 and reported within the Terrestrial Fauna Survey Report Bruce Highway (Cooroy to Curra) Project Section D (ERM, 2016) (refer to Section 2.1 of Appendix G). The likelihood of occurrence assessment undertaken by ERM in 2016 built upon the likelihood of occurrence</p>



**Species**

**Impact**

assessment reported in the REF by BAAM in 2015 (BAAM, 2015; Jacobs, 2016), and included a review of current legislative changes under the EPBC Act and outcomes of targeted field surveys undertaken in the summer of 2016. The outcomes of ERM's likelihood of occurrence assessment found that five migratory species are 'known to occur' while five additional migratory species are 'likely to occur'. The assessment identified that four listed migratory species were assessed as having the 'potential to occur', within the survey area. Given that these species were assessed as only having a potential to occur within the survey area, due to lack of previous records within 10 km of the project, a significant impact to these species are not anticipated as a result of the project and no further assessment of these species is provided in this referral. Further information regarding the likelihood of occurrence assessment is provided in the Terrestrial Fauna Survey Report Bruce Highway (Cooroy to Curra) Project Section D (refer to Appendix G). Nature and extent of impact: Given the ubiquitous nature of potential habitat and the unlikely occurrence of significant impacts on migratory species (refer to Appendix K), the habitat extent was not quantified. Impacts to migratory species that may occur as a result of the project include the following: — Direct vegetation clearing including loss of foraging and breeding habitat — Fragmentation of habitats — Mortality and injury of individuals and disruption of movement during vegetation clearing and construction — Disturbance to foraging or breeding habitat — Indirect impacts through importation and/or spread of weeds — Introduction and/or proliferation of pest species — Degradation of habitat through dust, sedimentation and/or erosion The MNES Significant Impact Assessment Report (GHD, 2016d), attached as Appendix K, concluded that although migratory species were confirmed present within the project area, the number of birds likely to occur within the project area would not represent a



Species	Impact
	significant proportion of the international or national total population. This assessment was based on the small numbers of individuals observed during the field surveys and relatively small, localised areas of suitable habitat present. The project is not anticipated to have a significant impact on migratory bird species due to the lack of important habitat or breeding habitat within the project area. Additional information regarding the listed migratory species has been documented in the MNES Significant Impact Assessment Report (GHD, 2016d), attached as Appendix K.

**2.5.2 Do you consider this impact to be significant?**

No

**2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?**

No

**2.7 Is the proposed action likely to impact on any part of the environment in the Commonwealth land?**

No

**2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?**

No

**2.9 Will there be any impact on a water resource related to coal / gas / mining?**

No

**2.10 Is the proposed action a nuclear action?**

No

**2.11 Is the proposed action to be taken by the Commonwealth agency?**

No



**2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?**

No

**2.13 Is the proposed action likely to impact on any part of the environment in the Commonwealth marine area?**

No





## Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

### 3.1 Describe the flora and fauna relevant to the project area.

Contract 1 traverses a landscape that has largely been subject to historic clearing, predominantly for agricultural, rural residential and industrial purposes

Contract 2 traverses rural residential properties, commercial properties and a large portion of contiguously vegetated land comprising Curra State Forest.

#### Fauna

The project area was categorised in four broad habitat categories in the REF (Jacobs, 2016) as follows:

Open eucalypt forest (including RE 12.3.3d, RE 12.3.11, RE 12.9-10.4, RE 12.9-10.17b, RE 12.11.3, RE 12.11.5e, RE 12.11.14 and RE 12.11.16)

Vine forest (including RE 12.3.1, regrowth of RE 12.11.10 and a small portion of RE 12.3.11)

Wetlands (including dams, creeks and ephemeral waterways in non-remnant areas and within RE 12.3.1, RE 12.3.3d and RE 12.3.11)

Open pasture (non-remnant)

ERM assessed the project area as being comprised of approximately 60% native habitat types (i.e. Open eucalypt forest, vine forest and wetlands), with the remaining 40% being comprised of cleared areas (i.e. open pasture (non-remnant)) (ERM, 2016). Much of the existing habitat has been subject to disturbance (largely by logging, cattle grazing and regular fire regime) and the conditions varies greatly across the survey area (Jacobs, 2016). Habitat within the majority of Curra State Forest was identified as having been historically subject to logging disturbance and active management. However some areas (where fire regime was not as common) displayed a high dominance of native ground cover, providing habitat of high potential value for ground-dwelling mammals and reptiles (Jacobs, 2016). Those areas of the State Forest subject to regular fire regimes are likely to have reduced the availability of fauna habitat values. Continued logging pressure in these areas has limited the availability of older hollow-bearing trees, which are important for arboreal mammals (Jacobs, 2016).

A detailed baseline terrestrial fauna survey was undertaken as part of the REF in 2015 by BAAM (Jacobs, 2016). A total of 164 fauna species (106 birds, 23 mammals, 22 reptiles and 13



amphibians) were observed within the survey area. A targeted fauna survey undertaken in 2016 by ERM (ERM, 2016) identified a total of 96 fauna species (67 birds, 13 amphibians, eight mammals, six reptiles and two invertebrates). In addition to MNES listed species, ERM recorded the presence of likely breeding places for the following fauna species listed under State legislation: *Adelotus brevis* (tussock frog), *Ninox strenua* (powerful owl) and *Tachyglossus aculeatus* (short-beaked echidna) (ERM, 2016). GHD (2016a) recorded the presence of *Ornithorhynchus anatinus* (platypus), another State listed fauna species.

## Flora

The baseline terrestrial surveys undertaken by BAAM in 2015 (BAAM, 2015) field verified the presence of nine remnant vegetation across the survey area, including 'endangered', 'of concern' and 'least concern' REs under the Queensland Vegetation Management Act 1999, as summarised in the table below. During these baseline surveys a total of 358 flora species were observed by BAAM within the survey area (BAAM 2015 in Jacobs 2016). Of these species 290 (81%) were native and 68 (19%) were exotic.

## RE

### Status

### Description

#### 12.3.1

Endangered

Gallery rainforest (notophyll vine forest) on alluvial plains

#### 12.3.3d

Endangered

Floodplain (other than floodplain wetlands). *Eucalyptus moluccana* woodland. Other frequently occurring species include *Eucalyptus tereticornis*, *E. crebra*, *E. siderophloia* and *Corymbia intermedia*. Occurs on margins of Quaternary alluvial plains usually adjacent sedimentary geologies.

#### 12.3.11

Of concern

*Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near coast

#### 12.9-10.4



Least concern

*Eucalyptus racemosa* subsp. *racemosa* woodland on sedimentary rocks

12.9-10.17

Least concern

*Eucalyptus acmenoides*, *E. major*, *E. siderophloia* +/- *Corymbia citriodora* subsp. *variegata* woodland on sedimentary rocks

12.11.3

Least concern

*Eucalyptus siderophloia*, *E. propinqua* +/- *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* open forest on metamorphics +/- interbedded volcanics

12.11.5e

Least concern

*Corymbia citriodora* subsp. *variegata* woodland usually including *Eucalyptus siderophloia* or *E. crebra* (sub coastal ranges), *E. propinqua* and *E. acmenoides* or *E. carnea*. Occurs on hills and ranges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

12.11.10

Least concern

Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics

12.11.14

Of concern

*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics

12.11.16

Endangered

*Eucalyptus cloeziana* open forest on metamorphics +/- interbedded volcanics



### **3.2 Describe the hydrology relevant to the project area (including water flows).**

The topography of the project area and its surrounds is hilly and undulating, with natural surface levels ranging between 50 – 150 metres AHD. The Mary River, the major river within the Mary River Catchment, is located to the west of the project area and flows in a northerly direction. The project does not intersect the Mary River, but intersects three sub-regional catchments of the Mary River catchment (i.e. Six Mile Creek, Deep Creek and Curra Creek). The project requires a total of 35 waterway crossings over mapped waterways (1012 bridges and 20 culverts). The major waterways traversed by the project (i.e. classified as stream order 4 or greater) include the waterways and associated tributaries shown in the table below. The major waterways are all major tributaries of the Mary River, while the remaining waterways that are intersected by the project are considered to be minor. Stream order is a classification measurement relating to stream complexity. Those waterway classified as stream order 1 are located at the headwaters of a catchment, whereas a stream order of 3 and above usually provide some level of fish habitat value.

The construction of the project requires five minor waterways listed in the table below to be diverted to accommodate construction and operation of the highway: Tannery Creek, Moody Creek (north and south), Banks Creek and Tamaree Creek. Appropriate State statutory approvals will be sought for each waterway diversion.

For further information regarding waterways traversed by the project, refer to the Aquatic Ecology Technical Report Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) (GHD, 2016a) (refer to Appendix M).

### **3.3 Describe the soil and vegetation characteristics relevant to the project area.**

The project is located within the Gympie block of the south-eastern Queensland bioregion. The surface and near-surface geology in the vicinity of the project area comprises quaternary alluvium, tertiary igneous intrusive rocks and Permian to Jurassic sedimentary and low grade metamorphic rocks (Jacobs, 2016). A review of the dominant soils was undertaken by Jacobs in 2016 as part of the REF (Jacobs, 2016). The three dominant soil types, their description and location across the project area are provided in the table below.

Dispersive soils were determined as present (with a degree of certainty) within eight samples collected as part of the preliminary geotechnical investigations undertaken for the project (Jacobs, 2016). Jacobs (2016) concluded that due to the variability of soil structure across the project area, dispersive soils could potentially be encountered at various locations along the length of the alignment. Acid sulfate soils were discounted due to the location of the project being located above 20 m AHD.

Acid rock drainage (ARD) was identified during the Business Case phase of the project as potentially present across the project area (Jacobs, 2016). Geological mapping indicates that Myrtle Creek Sandstones (Geological Unit RJdm), which are known to support pyritic zones, are likely to be present in the general area between Gympie Connection Road and Sandy Creek Road (Ch 145000 m to Ch 146400m) and between Brady's Road and the southern extent of



the Curra Interchange (Ch 156200 m – Ch 162000 m). Design measures, including the requirement for specific construction materials, have been incorporated within contract documentation during the Detailed Design phase to mitigate impacts from ARD during construction and operation.

Soil type

Generalised solid geology

Description

Location

Dermosols

Quaternary alluvium (sands and clayey/silty sands).

Typically, non-reactive Uniform soils with moderate to strongly structured B2 Horizons (subsoils). Soils may also have variable acidic or sodic profiles depending on geomorphology and the influence of landscape factors. These soils are more uniform and are loam to clay in texture.

Contract 1 – Woondum Interchange to Gympie Road Connection

Chromosol

Triassic metasediments (Arenite, Argillite, Phyllite).

Related to the harder meta sedimentary rocks (Kin Kin Beds) which form the higher ground to the west of the project.

Contract 1 - Gympie Connection Road to the North Coast Railway

Tenosol

Weak Permian sediments (sandstone, siltstone and mudstones).

Major soil type where the route crosses the weak sedimentary rocks of the Keefton Formation and Gympie Group.

Contract 1 -Keefton Road to Wood Road

Chromosol

Triassic metasediments (Arenite, Argillite, Phyllite).

Related to the harder meta sedimentary rocks (Kin Kin Beds) which form the higher ground to



the west of the project.

Contract 2 - Wood Road to Bradys Road

Tenosol

Weak Permian sediments (sandstone, siltstone and mudstones).

Major soil type where the route crosses the weak sedimentary rocks of the Keefton Formation and Gympie Group.

Contract 2 - Bradys Road to Ashford Road

Sodosols

Weak Triassic sediment (labile feldspathic sandstone, siltstone and shales).

Derived from feldspathic sandstones of the Myrtle Creek Sandstone.

Contract 2 in the northern part of the project between Ashfords Road to the connection with the existing Bruce Highway (north of Curra)

### **3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.**

The closest outstanding natural feature to the project area is the Mary River. At its closest point, the Mary River is located 200 m from the project area in the southern extent. However, this distance extends to 10 km in the centre of the project area and 4 km in the north.

The project area intersects two State Forests including:

Woondum State Forest (Lot 983 on FTY1488), located between approximate Ch 136800 m and Ch 137290 m

Curra State Forest (Lot 700 on FTY1491), located between approximate Ch 151200 m and Ch 157700 m

Approximately 10 ha of Woondum State Forest will be revoked as part of Contract 1 and approximately 58 ha of Curra State Forest will be revoked as part of Contract 2.

The project does not intersect any additional forest reserves, national parks, regional parks or timber reserves.

### **3.5 Describe the status of native vegetation relevant to the project area.**



The baseline terrestrial surveys undertaken by BAAM in 2015 (BAAM, 2015) field verified the presence of remnant vegetation across the survey area, including 'endangered', 'of concern' and 'least concern' REs under the Queensland Vegetation Management Act 1999. A summary of REs confirmed present within the survey area are provided in the table below.

## RE

### Status

### Description

12.3.1

Endangered

Gallery rainforest (notophyll vine forest) on alluvial plains

12.3.3d

Endangered

Floodplain (other than floodplain wetlands). *Eucalyptus moluccana* woodland. Other frequently occurring species include *Eucalyptus tereticornis*, *E. crebra*, *E. siderophloia* and *Corymbia intermedia*. Occurs on margins of Quaternary alluvial plains usually adjacent sedimentary geologies.

12.3.11

Of concern

*Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near coast

12.9-10.4

Least concern

*Eucalyptus racemosa* subsp. *racemosa* woodland on sedimentary rocks

12.9-10.17

Least concern

*Eucalyptus acmenoides*, *E. major*, *E. siderophloia* +/- *Corymbia citriodora* subsp. *variegata* woodland on sedimentary rocks

12.11.3



Least concern

*Eucalyptus siderophloia*, *E. propinqua* +/- *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* open forest on metamorphics +/- interbedded volcanics

12.11.5e

Least concern

*Corymbia citriodora subsp. variegata* woodland usually including *Eucalyptus siderophloia* or *E. crebra* (sub coastal ranges), *E. propinqua* and *E. acmenoides* or *E. carnea*. Occurs on hills and ranges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

12.11.10

Least concern

Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics

12.11.14

Of concern

*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics

12.11.16

Endangered

*Eucalyptus cloeziana* open forest on metamorphics +/- interbedded volcanics

### **3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.**

The project is located within the Mary River valley with elevated ranges located to the east and west of the project (Jacobs, 2016). Elevation above sea level along the project alignment varies between 50 metres and 150 metres Australian Height Datum (AHD) (Jacobs 2016).

### **3.7 Describe the current condition of the environment relevant to the project area.**

The project area for construction extends through numerous landscapes with a variety of disturbances. The following dots points provide a summary of disturbances noted across the project area during technical studies undertaken for the project:





Declared invasive weeds such as *Lantana camara* (lantana), *Macfadyena unguis-cati* (cats claw creeper) were noted as the two most prevalent weeds (ERM, 2016; GHD, 2016a). Cats claw creeper is most prevalent within the riparian vegetation of Six Mile Creek and Tannery Creek (GHD, 2016a). Both lantana and cats claw creeper are listed as Weeds of National Significance (WoNS) under the Australian Government's database (Australian Government, 2016). Additional WoNS noted in the project area included *Asparagus africanus* (climbing asparagus) and *Asparagus aethiopicus* (asparagus fern).

Feral pig diggings were noted at Curra Creek (ERM, 2016) and Tamaree Creek, domestic (cows, horses and dogs) animals were noted across the project area and evidence of feral rabbits was observed (ERM, 2016). Minor erosion within waterways from cattle crossings was noted across the project area (ERM, 2016).

Wild dogs are known to occur across the Gympie Region and evidence has been noted within the project area (ERM, 2016).

Curra State Forest has been managed through regular fire management and active logging practises.

Cleared areas such as pastures, agricultural or residential land parcels are present across approximately 50% of the project area.

Naturally occurring bank erosion was noted within Six Mile Creek, Deep Creek, Curra Creek (upstream), Corella Creek, Keliher Creek, Tannery Creek, Moody Creek, Tamaree Creek and two unnamed waterways across the project area (GHD, 2016a).

Two aquatic pest species were recorded during the 2015 (Jacobs, 2016) and 2016 (GHD, 2016a) aquatic fauna surveys. *Gambusia holbrooki* (mosquitofish) a noxious species known to occur in the Mary River catchment was recorded at Six Mile Creek, Curra Creek, Deep Creek, Tannery Creek, Moody Creek, Banks Creek, Tamaree Creek and Curra Creek north (Jacobs, 2016; GHD, 2016a). *Xiphophorus maculatus* (platy) was recorded at Six Mile Creek, Curra Creek, Deep Creek, Tannery Creek and Curra Creek north (Jacobs, 2016; GHD, 2016a).

### **3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.**

No Commonwealth Heritage Places were identified in the Protected Matters Search for the project (refer to Appendix D). No places of State or local European heritage are located within the project area.

### **3.9 Describe any Indigenous heritage values relevant to the project area.**

A desktop assessment of the cultural heritage values of the site and surrounding area has been completed. Further site investigative works are currently in progress. No archaeological or cultural heritage sites have previously been recorded within the project area. Despite this, the



desktop assessment has concluded that the project and surrounding area has the potential to contain as yet unrecorded archaeological and cultural heritage sites. It is expected that surface distributions of stone artefacts are the site type most likely to occur within the project area and are likely to be found in creeks and associated flood plains, as well as remnant woodland. Other site types likely to occur include scarred trees and/or carved trees, and earthen arrangements and features, including possibly bora grounds. Representatives of the Kabi Kabi First Nation People have identified two potential bora grounds on a property located off Gympie Connection Road, referred to as Rocky Ridge. There is the potential for sites of cultural heritage to be identified at the Rocky Ridge location and this is currently being assessed in collaboration with the Kabi Kabi First Nation People.

### **3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.**

Real property descriptions of the properties impacted by the project are listed in Appendix B of the EPBC Act Referral Report. The entire project area will be transferred to road reserve prior to construction works commencing.

### **3.11 Describe any existing or any proposed uses relevant to the project area.**

The project area extends for a length of 30 km and intersects a variety of land uses. The existing land uses intersected by the alignment include the following:

Residential – including urban residential, rural residential and dwellings on rural properties. The majority of residential uses are generally located between the North Coast Railway and the southern boundary of the Curra State Forest (Jacobs, 2016).

Commercial – including resource extraction, agricultural and livestock equipment sales and sporting clubs, such as the Mothar Mountain Speedway and Cooloola Kart Club

Existing road infrastructure – including both State-controlled roads and local road networks

State Forests – including Woondum State Forest and Curra State Forest

No major changes to existing land use outside the project area planning is currently known. The project area is mapped on the existing Gympie Regional Council Planning Scheme 2013 as a proposed State Government Road.

Within the project area, land use will be converted from its existing use to road uses.



## Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

### 4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.

The project has incorporated a number of design alterations to avoid or reduce direct and/or indirect impacts to MNES. However, due to the range and broad extent of habitat suitable to MNES likely or known to occur within the project area, the complete avoidance to habitat suitable for MNES is unachievable due to road design constraints and safety considerations. Therefore offsets for residual significant impacts to MNES will be required in accordance with the EPBC Act Environmental Offsets Policy 2012.

The actions which have been incorporated into the project to avoid or reduce impacts to habitat suitable for MNES are summarised within the relevant chapters of the MNES Significant Impact Assessment Report, refer to Appendix K. A brief description of management measures included to mitigate impacts on those MNES where a significant residual impact is anticipated are provided in the table below. A full description of these management measures and their effectiveness for each MNES is provided in the relevant sections of the MNES Significant Impact Assessment Report, refer to Appendix K.

#### **MNES**

#### **Management actions**

##### *Koalas*

Targeted koala surveys completed during the Detailed Design phase

Erection of fauna fencing (koala exclusion fencing) along retained bushland and on either side of nominated fauna connectivity structures, including both fauna underpasses and bridges

Incorporation of 4 fauna connectivity structures and 10 bridge structures (8 over water, 2 over roads). Each fauna connectivity structure has been sized to accommodate for koalas (i.e. 3 m x 3 m) and will incorporate fauna furniture specific for koalas (refer to Plate 1 in the Referral Report)



Incorporation of vegetation clearing limits, pre-clearing surveys, specific vegetation clearing requirements and methodologies within the contract documentation

*Black-breasted button-quail*

Targeted black-breasted button-quail surveys completed during the Detailed Design phase

Erection of fauna fencing along retained bushland and on either side of the nominated fauna connectivity structure

Incorporation of a fauna connectivity structures within Woondum State Forest to maintain habitat connectivity on the eastern and western sides of the project

Incorporation of vegetation clearing limits, pre-clearing surveys, specific vegetation clearing requirements and methodologies within the contract documentation

Revegetation on both the entry and exit of the fauna connectivity structure to encourage use by the black-breasted button-quail

*Macrozamia pauli-guilielmi*

Targeted flora surveys to identify and confirm the extent of occurrence of *M. pauli-guilielmi* completed during the Detailed Design phase

Development and implementation of a peer-reviewed Translocation Management Plan

Post translocation monitoring of *M. pauli-guilielmi* and adaptive management measures

Lowland Rainforest of Subtropical Australia Threatened Ecological Community

A review of design and construction methodologies employed for the Six Mile Creek bridge structure to reduce impacts to the TEC. The review of the design and construction methodologies for bridge construction included:

Altering the bridge spans from 33 m span (Business Case phase) to a main span of 46.4 m in length made continuous using 38 m long super T-girders (Detailed Design phase) to reduce impacts to the waterway and associated riparian vegetation. Individual span widths have been rationalised during the Detailed Design phase due to environmental concerns associated with Six Mile Creek and the TEC. Raising the deck level by 770 mm during the Detailed Design phase to account of critical 1% AEP design storm event and climate change. Increase in spacing between northbound and southbound bridge structures to 1360 mm to allow for increase in natural light. Consideration of specific construction methodologies such as pile structure, timing of construction program, use of a launching truss, use of scaffolding, use of steel casings.

Nomination of specific construction methodologies for the construction of the bridge in the contract documentation to reduce impacts to the area



Nomination of timing requirements for the construction of the bridge structure

Nomination of timing requirements for instream works and bank stability works

Nomination of specific treatments for bank stability works on both banks of Six Mile Creek

Requirement for no temporary crossings to be constructed over Six Mile Creek

Targeted flora surveys to identify the presence of the TEC

Nomination of vegetation clearing limits, establishment on no-go zones within the contract documentation

Ongoing weed control throughout the project duration

Additional general environmental mitigation measures included in the design or contract documentation to mitigate impacts to additional MNES includes the following:

Incorporation of 8 bridge structures (comprising northbound and southbound bridges) over waterways including Six Mile Creek, Deep Creek and Curra Creek (rather than culverts) to allow for the movement of aquatic species upstream and downstream of the project area.

Each bridge proposed over major waterways (i.e. Six Mile Creek, Deep Creek and Curra Creek) have been designed to span the low flow channel, with abutments also located outside the bed and banks of the waterway to avoid impacts to aquatic fauna species during operation of the bridge.

Each bridge proposed over the major waterways has been separated to allow for natural light to filter between the two structures.

Baseline water quality monitoring of major waterways intersected by the project has been undertaken for twelve months to gain an appreciation of baseline flow characteristics and response to rainfall events.

Discharge and receiving water quality performance criteria will be developed and included in the contract documentation, with consideration of available data specific to the local catchment.

Permanent water quality improvement devices (bio-retention systems) have been incorporated into the design at each major waterway crossing (i.e. Six Mile Creek, Deep Creek and Curra Creek) to reduce pollutant loads entering the receiving environment.

Spill containment devices have been incorporated on structures over Six Mile Creek, Deep Creek and Curra Creek to trap oils and fuels from entering these waterways.

Revegetation and landscaping plans have been developed in accordance with TMR's MRTS16 – Landscape and Revegetation Works.



Vegetation clearing limits will be defined under the contract documentation, to minimise the extent of vegetation clearing whilst allowing construction to occur taking into account erosion and sediment control devices. A plan of clearing limits will be prepared by the Construction Contractor and clearing shall not proceed on site until the limits of clearing have been deemed suitable by the Contract Administrator.

The EMP(C) will include a requirement to restrict the use of herbicides and growth retardants to control vegetation, as well as fire retardants and insecticides over and adjacent to dams drainage lines and waterways within the project area, due to the potential indirect impacts on MNES and other threatened fauna.

Additional workspace areas and haul routes will be placed in previously cleared areas, where possible.

Suitable ESC measures will be installed in waterways prior to works commencing.

Undertake instream, bank stability works and works within the bed and banks of Six Mile Creek during dry periods and periods of low flow.

Undertake instream works within Deep Creek and Curra Creek during periods of low flow or the dry season.

Where flow is present, maintain flow of waterways during construction of temporary diversions, temporary waterway crossings or appropriately sized bunds.

Where appropriate, external catchment drainage lines shall be diverted around disturbed areas via cross drains and drainage channels.

No-go zones will be nominated in the contract documentation. These will be clearly set out and marked prior to construction activities commencing. No works are to be undertaken in these areas, nor are these areas to be used as storage of materials/plant.

The contract documentation will require the Construction Contractor to develop a clear staged approach to vegetation clearing prior to the commencement of works. Staged vegetation clearing will also require that the Construction Contractor is initially only permitted to clear for pioneering works (i.e. establishment of fencing and sediment basins). The staging of works will be required to be deemed suitable by the Contract Administrator prior to clearing works commencing.

Environmental induction to all site personnel to outline responsibilities in relation to MNES.

Weed species and pests will be required to be managed in accordance with the contract documentation.

Implement weed management strategies during construction, including weed monitoring and reporting during construction, washdown of vehicles prior to entering the project area, removal of invasive weeds and conducting weed inspection as part of the rehabilitation monitoring and



reporting.

Hygiene declaration forms are to be prepared for all plant/vehicles working within the project area.

Weed management will be required to be undertaken post-construction in accordance with the contract documentation and the Road Maintenance Performance Contract (RMPC) developed for the project.

Terrestrial fauna specialists shall be appointed, prior to construction commencing, and approved by EHP for the handling, capture and release of native fauna (e.g. a licensed spotter catcher issued under the Nature Conservation (Administration) Regulation 2006), for the assessment and/or removal of native fauna.

Prior to vegetation clearing in each zone, the terrestrial fauna specialist will undertake a pre-clearing survey to identify and mark habitat features (i.e. hollow bearing logs, hollow bearing trees, areas of wetland vegetation, banks along waterways with burrows etc.). The terrestrial fauna specialist will also be required to identify the fauna species likely or known to be present within the stage to be cleared based on existing habitat and previous records as identified during the targeted surveys.

Hollow timber, woody debris and bush rock which are suitable for fauna habitat will be relocated to retained habitat areas outside the clearing area adjacent to the project area, where possible.

The terrestrial fauna specialist is required to undertake an immediate pre-clearance survey 24 hours ahead of vegetation clearing in each stage to search habitat features previously marked for fauna and/or breeding activity. A two stage approach to clearing will be implemented where hollow bearing trees have been identified. Non-hollow bearing trees will be cleared before hollow bearing trees to allow fauna an opportunity to move away and allow time to concentrate rescue efforts on the trees that are most likely to be inhabited. Sequential vegetation clearing to be applied onsite. Vegetation clearing is to occur from disturbed areas and clear towards areas of vegetation to be retained. Hollow bearing trees will be felled after a minimum 24 hr delay after clearing of non-habitat trees. The terrestrial fauna specialist will be on site for all clearing works, including clearing of hollow bearing trees. Individual hollows of felled hollow bearing trees will be inspected using a torch or similar by the terrestrial fauna specialist and the relevant fauna contingency actions initiated. Once the trees are deemed clear by the terrestrial fauna specialist further processing can occur.

Where possible, cleared native vegetation should be mulched and reused onsite during establishment of erosion and sediment control, rehabilitation and stabilisation activities. Should the mulch be required to be stockpiled, the material shall be stockpiled in a manner where endemic seeds remain viable and weeds are treated.

All dewatering activities are to be supervised by an aquatic fauna specialist who must have demonstrated experience in the capture and relocation of aquatic MNES. The aquatic fauna specialist must hold all relevant permits including a current General Fisheries Permit, a Rehabilitation Permit and an Animal Ethics Permit.



An aquatic fauna specialist is required to undertake pre-clearance surveys prior to any dewatering activities (including those relating to dams, waterway diversions etc.) to identify whether any burrows are present within the project area.

Where possible, during construction, avoid positioning direct artificial lighting towards retained bushland.

Strategic planting adjacent to targeted fauna connectivity structures will occur to improve and maintain habitat connectivity for MNES, where possible.

Key aspects of the waterway revegetation actions will include stabilisation, replanting, weed control, and restriction of public access and grazing, where applicable.

Permanent revegetation onsite shall occur progressively as soon as practicable once earthworks are complete in accordance with MRTS16 – General Requirements Landscape and Revegetation Works and associated annexure.

#### **4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.**

This referral has been prepared using the documentation completed to date, including targeted surveys for flora species and vegetation communities and terrestrial and aquatic fauna. The project is anticipated to have a significant residual impact on the following MNES:

Black-breasted button quail

Koala

Lowland Rainforest of Subtropical Australia TEC

The project was assessed as unlikely to have a significant impact on the following MNES:

Macrozamia pauli-guilielmi (pineapple zamia)

The grey-headed flying-fox and greater glider

Aquatic fauna including the Mary River turtle, Mary River cod and white-throated snapping-turtle

However, individuals of these species have the potential to occur within the project area and therefore mitigation measures have been included which are relevant to these species.

#### **Proposed environmental outcomes**

The following environmental outcomes are proposed for MNES significantly impacted by the





project and those MNES not anticipated to be significantly impacted, however are either known or likely to occur:

Clearing of no more than 138.44 ha, comprising 42.93 ha within Contract 1 and 95.51 in Contract 2 of habitat critical to the survival of the koala and foraging habitat for the grey-headed flying fox habitat

Clearing of no more than 8.14 ha of black-breasted button quail habitat

Clearing of no more than 45.63 ha of foraging habitat and 21.83 ha denning habitat of the greater glider within Curra State Forest

Compliance with the water quality criteria nominated in the contract documentation (MRTS52 – Erosion and Sediment Control) for receiving water quality within major waterways providing habitat to the Mary River turtle, Mary River cod and white-throated snapping-turtle

No permanent in-stream barriers to the movement of threatened aquatic species within major waterways

Translocation of all known *Macrozamia pauli-guilielmi* (pineapple zamia) identified within the project area to the nominated translocation site outside the project area

Clearing of no more than 0.82 ha of the Lowland Rainforest of Subtropical Australia TEC and 4.67 ha of the Lowland Rainforest of Subtropical Australia TEC 50 m buffer area at Six Mile Creek

Clearing of no more than 0.52 ha of the Lowland Rainforest of Subtropical Australia TEC 50 m buffer area at Woondum State Forest

Environmental outcomes from the project for each of the above MNES will be achieved through the implementation of the mitigation measures listed in Section 4.1 and through the implementation of the following documentation to be prepared for the project:

TMR's current environmental specifications - Main Roads Technical Specification (MRTS) 51 – Environmental Management and associated annexure, and MRTS52 – Erosion and sediment control and associated annexure. These technical standards and annexures will be developed as part of the contract documentation for compliance by the awarded Construction Contractor. These documents outline requirements for environmental management plans and erosion and sediment control plans to be prepared by the Construction Contractor and detail required environmental monitoring, reporting and auditing processes to ensure environmental objectives and compliance throughout the construction of the project.

An Environmental Management Plan (Construction) (EMP(C)) – to incorporate mitigation measures pertaining to fauna, flora and habitat, along with additional measures pertaining to timing of works, waste management, contaminant management, site personnel training, and air and noise management. The EMP(C) will be prepared by the Construction Contractor in accordance with MRTS51 – Environmental Management.



An Erosion and Sediment and Erosion Control Plan (ESCP) – to manage sediment from construction works and minimise impacts on water quality. The ESCP and the proposed measures will be prepared in accordance with MRTS52 – Erosion and Sediment Control.

Species Management Program (high risk) – is required to be developed for all endangered, vulnerable, near threatened or special least concern and colonial breeding fauna species listed under the State’s NC Act, where an active breeding place has been confirmed

A Dewatering Plan will be prepared as part of the SMP high risk to manage all dewatering activities to be undertaken during construction

An EPBC Act Environmental Offsets Proposal for residual significant impacts to MNES, will be prepared in accordance with the Commonwealth’s Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy, October 2012 (DSEWPaC, 2012). The offsets proposal will be developed using the a number of viable offset strategies which have been included in Appendix K of this referral.

Translocation Management Plan prepared for *Macrozamia pauli-guilielmi* (pineapple zamia) identified within the project area. The Translocation Management Plan nominates potential suitable habitat areas for translocated individuals and management measures to maximize survival rates.

Revegetation and landscaping plans to stabilise and rehabilitate areas following construction. These plans form part of the MRTS16 – Landscape and Revegetation Works and associated annexure.

Additional Works Code of Compliance has been developed to enable vegetation clearing to support construction related activities outside the nominated project area, without resulting in significant impacts to MNES. This Code provides clear direction to the Construction Contractor of the required procedures to be undertaken when planning and undertaking vegetation clearing outside the nominated project area, refer to Appendix P.

**Likelihood of achieving proposed environmental outcomes:**

It is considered likely that the proposed environmental outcomes nominated above will be achieved through the implementation of the above documentation and mitigation measures proposed in Section 4.1 of this referral. The proposed environmental outcomes will form part of TMR’s contractual documentation by which the Construction Contractors must abide.



## **Section 5 – Conclusion on the likelihood of significant impacts**

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

### **5.1.1 World Heritage Properties**

No

### **5.1.2 National Heritage Places**

No

### **5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)**

No

### **5.1.4 Listed threatened species or any threatened ecological community**

Listed threatened species and communities - Yes

### **5.1.5 Listed migratory species**

No

### **5.1.6 Commonwealth marine environment**

No

### **5.1.7 Protection of the environment from actions involving Commonwealth land**

No

### **5.1.8 Great Barrier Reef Marine Park**

No

### **5.1.9 A water resource, in relation to coal/gas/mining**

No



### **5.1.10 Protection of the environment from nuclear actions**

No

### **5.1.11 Protection of the environment from Commonwealth actions**

No

### **5.1.12 Commonwealth Heritage places overseas**

No

## **5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.**

A MNES Significant Impact Assessment Report (GHD, 2016d) has been prepared for all MNES known or likely to occur within the project area, which includes a significant impact assessment for each MNES (refer Appendix K). The outcomes of this report conclude that although the project has incorporated a number of avoidance and mitigation measures the project is likely to have a significant impact on the black-breasted button-quail, koala and the lowland sub-tropical rainforest of lowland south-eastern Australia TEC. A significant impact has been avoided for the following MNES: grey-headed flying-fox, greater glider, Mary River cod, Mary River turtle and the white-throated snapping turtle, through either the incorporation of design avoidance or mitigation measures which are known or likely to occur in the project area.

On the basis of this assessment, the project should be controlled through the commitments of environmental outcomes as defined in Section 4.2 of this referral, the avoidance measures and mitigation measures included in Section 4.1 and the offset strategies included as Appendix K of this referral.



## **Section 6 – Environmental record of the person proposing to take the action**

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

### **6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.**

Yes, TMR has implemented a strategic environmental planning, assessment and implementation process for its major projects. To date, TMR has successfully implemented its 'duty of care' to the environment, as per Section 319 of the Queensland Environmental Protection Act 1994. Environmental impact minimisation and mitigation measures are implemented for all projects and these requirements are communicated to relevant parties through a number of processes and documents, including: Environmental Management Plans (Planning, Design, Construction and in some cases Operation), contract documentation (Main Roads Standard Specification MRTS51 - Environmental Management and MRTS52 - Erosion and Sediment Control). All of these documents are also utilised during internal and external environmental audits to ensure documented processes are implemented on the ground. TMR and its contractors are responsible for understanding any non-conformances or improvements and implementing rectification measures as required. In addition, if unforeseen circumstances do arise and unexpected environmental impacts are experienced, TMR and its contractors have, and are willing, to rectify such situations to ensure minimal impact occurs, as well as restoration of the environment in accordance with TMR procedural instructions or direction given by the responsible environmental agency (e.g. Commonwealth DEE or Queensland EHP). In developing mitigation measures and certain design related aspects for the current Section D project, liaison with the environmental representative of the Contract Administration team on the previous Cooroy to Curra projects has been undertaken to build upon previous learnings in regards to environmental management.

### **6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.**

Not relevant.

### **6.3 Will the action be taken in accordance with the corporation's environmental policy and planning framework?**



Yes

**6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.**

TMR has recognised a need for environmental compliance as part of its core business, having established an Environmental Management System.

The TMR's environmental policy and planning framework forms a functional role in the environmental assessment of TMR's projects and business. This framework flows down from the Department's Strategic Plan which requires TMR's business to undertake "environmental management to support environmental conservation" through corporate policies, strategies and documents. The overall strategic environmental outcome is implemented during TMR's business through the Environmental Processes Manual (August 2013). The environmental assessment processes (undertaken in accordance with the Environmental Processes Manual) are then implemented during construction through Main Roads Specification MRTS51 Environmental Management and MRTS52 Erosion and Sediment Control, which forms part of all Main Roads construction tender documentation. The Road Maintenance Performance Contracts also require environmental management to be implemented as part of any maintenance work contractors undertake on TMR's behalf. There are a variety of other environmental policies and documents which TMR has developed to address some of the more specific environmental issues, such as cultural heritage and noise, with all of these specialist policies providing support to the broader environmental assessment process undertaken by TMR.

**6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?**

Yes

**6.4.1 EPBC Act No and/or Name of Proposal.**

TMR have previously referred a variety of actions from across Queensland. Some Wide Bay Burnett Region and South East Queensland Region examples include:

EPBC 2008/4452 Bruce Highway, Cooroy to Curra, Section B

EPBC 2011/6024 Bruce Highway, Cooroy to Curra, Section A

EPBC 2013/6815 for Bruce Highway Realignment – Cabbage Tree Creek and Carman Road

EPBC 2014/7394 Bruce Highway, Cooroy to Curra, Section C

EPBC 2015/7464 Bruce Highway Upgrade Caloundra Road to Sunshine Motorway

EPBC 2015/7558 Bruce Highway Overtaking Lane Adjustment near Bauple-Woolooga Road



Intersection

EPBC 2015/7552 Eton Range Realignment Project, Peak Downs Highway



## Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

### 7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).

Reference Source	Reliability	Uncertainties
<p>Australian Cultural Heritage Management (ACHM) (2015) Desktop Cultural Heritage Assessment Bruce Highway Upgrade: Cooroy to Curra Section D. Prepared for the Department of Transport and Main Roads. Australian Government (2016) Weed in Australia. Available from: <a href="http://www.environment.gov.au/biodiversity/invasive/weeds/index.html">http://www.environment.gov.au/biodiversity/invasive/weeds/index.html</a>. Accessed: August 2016.</p> <p>ARUP (2008) Bruce Highway (Cooroy to Curra) Strategic Planning Study - Recommended Corridor Report. Prepared for the Department of Transport and Main Roads (formally Department of Main Roads). Biodiversity Assessment And Management (BAAM) (2015) Bruce Highway Upgrade Section D: Baseline Ecological Assessment Woondum Road to Curra. Prepared for the Department for Transport and Main Roads. Biodiversity Assessment And Management (BAAM) (2016) Detailed Terrestrial Flora Surveys Bruce Highway Cooroy to Curra (Section D: Woondum to Curra). Prepared for the</p>	<p>Information used in the preparation of this referral is based on a number of reports and studies previously developed to inform compliance with Commonwealth, Queensland and local government approval processes. These studies have been undertaken by professional consultants who are qualified ecologists with practical experience in surveying and monitoring the local environment. Methods followed during field surveys were in accordance with relevant guidelines published by State and Commonwealth departments. References that have been cited in preparation of this referral and supporting documentation (include databases and documents) that have been produced and maintained by State and Commonwealth departments, and as such are considered highly reliable. Other documents included manuscripts in scientific journals that have been subject to peer-review prior to publication, and are therefore also considered reliable</p>	<p>The field survey reports are based on conditions encountered and information reviewed at the date of preparation of the report. The opinions, conclusions and any recommendations in the field survey reports are based on information obtained from specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points. Investigations undertaken in respect of these reports are constrained by the particular site conditions, such as access restrictions and vegetation. As a result, not all relevant site features and conditions may have been identified. Site conditions may change after the date of preparation of these reports.</p>





Reference Source	Reliability	Uncertainties
<p>Department for Transport and Main Roads. Department of the Environment and Energy (DEE) (2016a) Species Profile and Threats (SPRAT) Database species descriptions.</p> <p>Department of the Environment and Energy (DEE) (2016b) Threatened Species Scientific Committee Guidelines for assessing the conservation status of native species according to the Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000. Available from <a href="https://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines">https://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines</a>. Accessed 4 August 2016. Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) (2012) Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy, October 2012. Available from: <a href="http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf">http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf</a>. Accessed: August, 2016. Department of Transport and Main Roads (TMR) (2013) Technical Manual: Environmental Processes Manual August 2013. Available from: <a href="http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Environmental-processes-manual.aspx">http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Environmental-processes-manual.aspx</a>. Accessed July, 2016.</p>	<p>sources of information.</p>	



Reference Source	Reliability	Uncertainties
<p>Department of Transport and Main Roads (TMR) (2010) Fauna Sensitive Road Design Manual Volume 2: Preferred Practises. Available from: <a href="http://www.tmr.qld.gov.au/business-in-dustry/Technical-standards-publications/Fauna-sensitive-road-design-volume-1">http://www.tmr.qld.gov.au/business-in-dustry/Technical-standards-publications/Fauna-sensitive-road-design-volume-1</a>. Dexter, C., Appleby, R., Edgar, J., Scott, J. and Jones, D. (2016) Using complementary remote detection methods for retrofitted eco-passages: a case study for monitoring individual koalas in south-east Queensland. <i>Wildlife Research</i> 43 (5). Environmental Resources Management Australia (ERM, 2016) Bruce Highway (Cooroy to Curra) Project Section D Terrestrial Fauna Survey Report, May 2016. Prepared for the Department of Transport and Main Roads. GHD (2016a) Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) Aquatic Ecology Technical Report. Prepared for the Department of Transport and Main Roads. GHD (2016b) Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) Flora Survey Report for Survey Area Extents. Prepared for the Department of Transport and Main Roads. GHD (2016c) Targeted Survey for the Greater Glider Bruce Highway Cooroy to Curra (Section D: Woondum to Curra). Prepared for the Department of Transport and Main Roads. GHD (2016d) Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) MNES Significant Impact</p>		



Reference Source	Reliability	Uncertainties
<p>Assessment Report. Prepared for the Department of Transport and Main Roads. GHD (2016e) EPBC Act Environmental Offsets Strategy, Bruce Highway Cooroy to Curra (Section D: Woondum to Curra). Prepared for the Department of Transport and Main Roads. Jacobs (2016) Bruce Highway (Cooroy to Curra) Section D: Keefton Road to Curra Review of Environmental Factors (Business Case). Prepared for the Department of Transport and Main Roads. Kapitzke, R. (2010) Culvert Fishway Planning and Design Guidelines, Part C – Fish Migration Barriers and Fish Passage Options for Road Crossings. James Cook University. Available from: <a href="https://www.jcu.edu.au/__data/asset_s/pdf_file/0007/120202/jcuprd1_053871.pdf">https://www.jcu.edu.au/__data/asset_s/pdf_file/0007/120202/jcuprd1_053871.pdf</a>. Accessed: 21 November 2016. Limpus, C. (2008). Freshwater turtles in the Mary River: Review of biological data for turtles in the Mary River, with emphasis on <i>Elusor macrurus</i> and <i>Elseya albagula</i>. Brisbane: Queensland Government. Queensland Government (2012) Bruce Highway Action Plan. Available from: <a href="http://www.tmr.qld.gov.au/About-us/Corporate-information/Publications/Bruce-Highway-Action-Plan.aspx">http://www.tmr.qld.gov.au/About-us/Corporate-information/Publications/Bruce-Highway-Action-Plan.aspx</a>. Accessed: July, 2016. Queensland Herbarium (2007) National Multi-species Recovery Plan for the Cycads. Available from: <a href="http://www.envir">http://www.envir</a></p>		



Reference Source	Reliability	Uncertainties
<p>environment.gov.au/biodiversity/threatened/publications/recovery/national-multi-species-recovery-plan-cycads. Accessed: 04 December 2016. Threatened Species Scientific Committee (TSSC) (2011) Commonwealth Conservation Advice on Lowland Rainforest of Subtropical Australia. Department of Sustainability, Environment, Water, Population and Communities. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: <a href="http://www.environment.gov.au/biodiversity/threatened/communities/pubs/101-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/communities/pubs/101-conservation-advice.pdf</a>. Accessed: 26 August 2016. University of the Sunshine Coast (USC) (2016). Bruce Highway Cooroy to Curra (Section D: Woondum to Curra) project Koala surveys (Final). Prepared for the Queensland Department of Transport and Main Roads.</p>		



## Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

### 8.0 Provide a description of the feasible alternative?

The current alignment of the Bruce Highway through Gympie has considerable safety, flooding and capacity issues, and therefore not undertaking the action was not considered.

This existing route is the primary heavy vehicle freight route connecting South Queensland to North Queensland and due to its current geometric deficiencies and an inability to meet future demands, is required to be signed at 90 km/hr north and south of Gympie. The current alignment of the Bruce Highway intersects Gympie at a signed speed of 60 km/hr with numerous signalised intersections causing congestion issues within the city which in turn impacts the functionality and performance of the highway. Upgrading the existing Bruce Highway through Gympie will not address current congestion, safety and flooding issues currently experienced by users.

TMR and the Australian Government commissioned a four-year Bruce Highway Cooroy to Curra Strategic Planning Study (ARUP, 2008) in 2008 to document the outcome of the overall corridor refinement between Cooroy and Curra. During this study, two alternative options were considered in relation to the Section D project which included the following:

An alternative option was considered for the Gympie Connection Road Interchange, which involved moving the interchange to Tin Can Bay Road, this option was not progressed due to issues associated with flood immunity (ARUP, 2008).

The alignment in the vicinity of the Curra State Forest was revised based on community feedback indicating the proposed corridor alignment impacted too many private (freehold) properties (ARUP, 2008). The proposed project corridor was shifted to the east, reducing the number of private (freehold) properties impacted, while still providing acceptable elevation grades and reasonable earthworks construction (ARUP, 2008).

In summary, minor alterations were made during the Business Case phase of the project to reduce environmental impacts, assist in reducing and balancing earthworks and minimising the requirement to acquire freehold properties. These alternatives are summarised in the table below.

#### Location

#### Description

#### Benefit



## Phase

Interface with Section C project through to Woondum Interchange

The main alignment is approximately 80 m to 100 m further west than the Strategic Planning Study alignment (ARUP, 2008).

Provide beneficial useability.

Business Case

Penny Road interchange

The main alignment is approximately 80 m further west than the Strategic Planning Study alignment (ARUP, 2008) between approximate Ch 138800 m to Ch 141000 m.

The preferred option provides a greater distance between the alignment and the tailings dam associated with the Gympie Eldorado Mining activities on Lot 51 on SP286014.

This change minimised earthworks volumes, changes to local road networks, and additional property impacts. This option also represented the lowest construction cost.

Business Case

Southern portion of Curra State Forest

The main alignment was shifted approximately 65 m to the east to avoid impacts on this section of Tamaree Creek. The original alignment directly impacted Tamaree Creek in this location. This change resulted in the toe of the embankment being located approximately 25 m from the top of the bank.

Reduced impacts to Tamaree Creek, avoidance of the requirement to divert approximately 250 m of Tamaree Creek.

Business Case

Tamaree Creek main diversion

The proposed diversion of Tamaree Creek was originally two separate diversion channels which connected to the existing Queensland Rail (QR) diversion. During a pre-lodgement meeting with State regulatory agencies on 15 September 2015, it was recommended that the option of replacing this section of the waterway with a new diversion channel be investigated.

This recommended change was included in the final Business Case design.

Reduced impacts to Tamaree Creek and aquatic species through one sinuous channel, rather than numerous diversions.



## Business Case

### Curra State Forest

The main alignment was shifted approximately 250 m to the west at approximately Ch 159000 m, and affected the alignment between upper Curra Creek and the Curra Creek overflow.

Reduced impacts on remnant vegetation by approximately 20 ha.

## Business Case

### Embankments on Six Mile Creek floodplain

The embankment included in the Strategic Planning Study alignment (ARUP, 2008) encroached into the Six Mile Creek channel at the meander bend to the south of the North Coast Rail Line. This embankment has been shifted slightly west during the Business Case phase and will be constructed at a steeper grade.

Reduced impacts to Six Mile Creek.

## Business Case

### Six Mile Creek bridge

The design proposed a super T-girder bridge with 38 m spans. Span widths were increased to the maximum allowable span width of 44 m to reduce instream impacts on the waterway.

Construction of a temporary crossing using reinforced concrete pipes and rock or a culvert crossing (as proposed in the Strategic Planning Study (ARUP, 2008)) has been excluded due to environmental impacts, regulatory risks and associated upstream afflux impacts.

Reduced instream impacts to Six Mile Creek.

## Business Case

### Six Mile Creek bridge

Design review of the bridge over Six Mile Creek resulting in the following:

Individual span widths being rationalised  
Raising the deck level by 770 mm to account for the 1% AEP (including climate change) design storm event  
Increased spacing between northbound and southbound bridge structures (to 1360 mm) to allow for increase natural light.  
Consideration of specific construction methodologies such as pile structure, timing of construction program, use of a launching truss, use of scaffolding and use of steel casings.

Reduced impacts to Six Mile Creek and associated riparian vegetation.



## Detailed Design

### Curra Creek north diversion

A diversion of up to 100 m of Curra Creek north was considered due to the sinuous nature of the channel adjacent to the main alignment bridge. This diversion was avoided through careful placement of the bridge piers following a site inspection by the Design Team in August 2015.

Eliminated the requirement to permanently divert Curra Creek.

## Business Case

### Curra Creek bridges

There were four distinct crossings over Curra Creek proposed in the Business Case phase. This has been reduced to 3 crossings during the Detailed Design phase by re-positioning the southbound entry ramp bridge beside the highway bridges.

Reduced the amount of fill around Curra Creek embankment which will reduce the amount of earthworks required around the waterway.

## Detailed Design

### Banks Creek alternative diversion

An alternative diversion design was considered following a recommendation during a pre-lodgement meeting with the Department of Agriculture and Fisheries (DAF) and Department of Natural Resources and Mines (NRM) on 15 September 2015. The alternative design moved the bridge location approximately 100 m to the south and reduced the length of the diversion and associated impacts on this waterway.

An assessment of the potential flooding impacts indicated that this alternative diversion design would introduce unacceptable afflux impacts on properties upstream of the proposed alignment and outside of the land acquisition required for the project.

The original diversion design was retained in the final Business Case design.

Design consideration attempted to reduce impacts to Banks Creek.

## Business Case

### Moody Creek north alternative diversion design

An alternative diversion design was considered following a recommendation during the pre-lodgement meeting. The alternative design moved the proposed diversion location approximately 20 m north to reduce the length of the natural channel impacted by the diversion.





A hydraulic assessment suggested that this change increased flow velocity upstream of the alternative diversion design by making the channel more efficient. This design increased the risk of scour adjacent to the North Coast Rail embankment and was excluded from the final Business Case design.

Design consideration attempted to reduce impacts to Moody Creek.

Business Case

## **8.1 Select the relevant alternatives related to your proposed action.**

### **8.27 Do you have another alternative?**

Yes

#### **8.27.1 Describe the details of the proposed alternative proposal.**

As of April 2017 construction funding is yet to be committed however, construction delivery for the project is anticipated to be undertaken by one of the following methods:

One construction project undertaken by a single Construction Contractor

Two separate contracts (Contract 1 and Contract 2) delivered simultaneously by two separate Construction Contractors

Staged construction, Contract 1 delivered first followed by Contract 2

Although the project area has been defined, additional areas adjacent to the project area may be identified during the construction phase as being impacted to facilitate the construction of the project. The additional areas are proposed to be managed by implementing the provisions contained within the Additional Works Code of Compliance document developed for the project, included in Appendix P. The Additional Works Code of Compliance document outlines the procedures required for managing any clearing of vegetation outside the project area. The aim of the Additional Works Code of Compliance document is twofold:

To provide clarification to the Construction Contractor of the required procedures when undertaking vegetation clearing outside of the project area



To manage the clearing of vegetation outside the project area in a manner consistent with the approved documentation developed for the project, including the EPBC Act Referral



## Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

### 9.0 Is the person proposing to take the action an Organisation or an Individual?

Organisation

#### 9.2 Organisation

##### 9.2.1 Job Title

Project Director

##### 9.2.2 First Name

Don

##### 9.2.3 Last Name

Pitt

##### 9.2.4 E-mail

gympie.office@tmr.qld.gov.au

##### 9.2.5 Postal Address

PO Box 183  
Gympie QLD 4570  
Australia

##### 9.2.6 ABN/ACN

ABN

39407690291 - Department of Transport and Main Roads

##### 9.2.7 Organisation Telephone

5482 0333



**9.2.8 Organisation E-mail**

gympie.office@tmr.qld.gov.au

**9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:**

Not applicable

**Small Business Declaration**

I have read the Department of the Environment and Energy’s guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:..... Date: .....


**9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations**

No

**9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made**

**Person proposing the action - Declaration**

I, Don Pitt, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:.....  ..... Date: 16/5/17 .....

I, \_\_\_\_\_, the person proposing the action, consent to the designation of \_\_\_\_\_ as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:..... Date: .....

**9.3 Is the Proposed Designated Proponent an Organisation or Individual?**



Organisation

## 9.5 Organisation

### 9.5.1 Job Title

Project Director

### 9.5.2 First Name

Don

### 9.5.3 Last Name

Pitt

### 9.5.4 E-mail

gympie.office@tmr.qld.gov.au

### 9.5.5 Postal Address

PO Box 183  
Gympie QLD 4570  
Australia

### 9.5.6 ABN/ACN

ABN

39407690291 - Department of Transport and Main Roads

### 9.5.7 Organisation Telephone

5482 0333

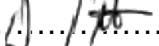
### 9.5.8 Organisation E-mail

gympie.office@tmr.qld.gov.au

## Proposed designated proponent - Declaration

I, Don Pitt, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.



Signature:.....  ..... Date: .....11/5/17.....

**9.6 Is the Referring Party an Organisation or Individual?**

Organisation

**9.8 Organisation**

**9.8.1 Job Title**

Project Director

**9.8.2 First Name**

Don

**9.8.3 Last Name**

Pitt

**9.8.4 E-mail**

gympie.office@tmr.qld.gov.au

**9.8.5 Postal Address**

PO Box 183  
Gympie QLD 4570  
Australia

**9.8.6 ABN/ACN**

ABN

39407690291 - Department of Transport and Main Roads

**9.8.7 Organisation Telephone**

5482 0333

**9.8.8 Organisation E-mail**

gympie.office@tmr.qld.gov.au

**Referring Party - Declaration**



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

Signature:..... Don Pitt ..... Date: ..... 11/5/17 .....



## Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. 41\_29914\_3030\_epbc\_fig01\_a3\_rev0.pdf
2. appendix\_c\_-\_key\_plan.pdf
3. appendix\_d\_-\_pmst\_3gkhqo.pdf
4. appendix\_e\_-\_tec\_map\_r.pdf
5. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_1.pdf
6. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_2a.pdf
7. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_2b.pdf
8. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_3a.pdf
9. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_3b.pdf
10. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_3c.pdf
11. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_4a.pdf
12. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_4b.pdf
13. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_4c.pdf
14. appendix\_f\_-\_flora\_survey\_report\_for\_survey\_extents-part\_5.pdf
15. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2a.pdf
16. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2b.pdf
17. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2c.pdf
18. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2d.pdf
19. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2e.pdf
20. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2f.pdf
21. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_2g.pdf
22. appendix\_g\_technical\_fauna\_report\_final\_unsecured-part\_3.pdf
23. appendix\_g\_technical\_fauna\_report\_final\_unsecured\_part\_1.pdf
24. appendix\_h\_-\_greater\_glider\_survey\_report.pdf
25. appendix\_i\_-\_usc\_koala\_mapping\_r.pdf
26. appendix\_j\_-\_usc\_koala\_survey\_report\_part\_1.pdf
27. appendix\_j\_-\_usc\_koala\_survey\_report\_part\_2.pdf
28. appendix\_k\_-\_mnes\_significant\_impact\_assessment\_report\_rev0\_part\_1.pdf
29. appendix\_k\_-\_mnes\_significant\_impact\_assessment\_report\_rev0\_part\_2.pdf
30. appendix\_k\_-\_mnes\_significant\_impact\_assessment\_report\_rev0\_part\_3.pdf
31. appendix\_k\_-\_mnes\_significant\_impact\_assessment\_report\_rev0\_part\_4.pdf
32. appendix\_l\_-\_detailed\_flora\_surveys\_part\_1.pdf
33. appendix\_l\_-\_detailed\_flora\_surveys\_part\_2.pdf
34. appendix\_m\_-\_ghd\_aquatic\_ecology\_technical\_report-part\_2.pdf
35. appendix\_m\_-\_ghd\_aquatic\_ecology\_technical\_report-part\_3.pdf
36. appendix\_m\_-\_ghd\_aquatic\_ecology\_technical\_report-part\_4.pdf
37. appendix\_m\_-\_ghd\_aquatic\_ecology\_technical\_report-part\_5.pdf
38. appendix\_m\_-\_ghd\_aquatic\_ecology\_technical\_report\_part\_1.pdf
39. appendix\_n\_-\_koala\_bbbq\_map\_reduced.pdf
40. appendix\_o\_-\_land\_tenure\_map.pdf
41. appendix\_p\_-\_additional\_works\_code\_of\_compliance\_final-part\_2.pdf
42. appendix\_p\_-\_additional\_works\_code\_of\_compliance\_final\_part\_1.pdf
43. c2c\_section\_d\_project\_area.zip





44. environmentalprocessesmanual.pdf

45. epbc\_act\_referral\_-\_bruce\_highway\_cooroy\_to\_curra\_section\_d\_no\_appendices.pdf

46. pre-construction\_phase\_flow\_chart.pdf