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Great Northern Highway
Muchea to Wubin

Bindoon Bypass Environmental Review Document and Preliminary Documentation

EPA ASSESSMENT NUMBER 2135 | EPBC 2017/8035 | MAY 2020

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Prepared by	Reviewed by	Reviewed by	Approved by
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Issue summary

Revision	Date	Issue description	Distribution
1	August-2018	Draft	Cross Discipline Review / Technical Review / PAG Review
2	24-08-2018	Draft	Final Internal Review
3	31-08-2018	Draft	Issued to EPA and DAWE for Review
4	08-07-2019	Revised Draft (incorporates findings from 2018 surveys)	PAG review
5	01-10-19	Revised Draft	Issued to EPA and DAWE
6	13-03-20	Final Draft	Issued to DAWE
7	17-05-20	Final	For Publication (printing and electronic/web)

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Glossary

Abbreviation	Description
AASS	actual acid sulfate soil
ADWG	Australian Drinking Water Guidelines
AH Act	*Aboriginal Heritage Act 1972* (WA)
AHIS	Aboriginal Heritage Inquiry System
ALCAM	Australian Level Crossing Assessment Model
ANZECC	Australian and New Zealand Environment and Conservation Council
ARI	average recurrence interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standards
ASJV	Arup Jacobs Joint Venture
ASRIS	Australian Soil Resource Information System
ASS	acid sulfate soil
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
Banksia Woodlands of the Gingin Area PEC	Banksia woodlands of the Gingin area restricted to soils dominated by yellow to orange sands PEC (P3)
Banksia Woodlands TEC	EPBC Act listed Banksia woodlands of the Swan Coastal Plain TEC
BC Act	*Biodiversity Conservation Act 2016* (WA)
BCE	Bamford Consulting Ecologists Pty Ltd
BCR	benefit-cost ratio
BGA	Brad Goode & Associates Pty Ltd
BoM	Bureau of Meteorology
CC	Conservation Category (wetland)
CEMP	Construction Environmental Management Plan
concept design phase	The engineering design work completed up to the submission of this ERD.
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAA	Department of Aboriginal Affairs (WA)—now DPLH
DAFWA	Department of Agriculture and Food (WA)—now DPIRD
DAWE	Department of Agriculture, Water and the Environment (Cwlth)
DBCA	Department of Biodiversity Conservation and Attractions (WA)
DBH	diameter at breast height
DEC	Department of Environment and Conservation (WA)—now split between DWER (regulation) and DBCA (conservation)
detailed design phase	Additional engineering design to be completed at a future date.
Development Envelope	The boundary within which the elements of the Proposal are located. This is represented by closed GIS polygons.

Abbreviation	Description
Development Footprint	The area to be cleared of vegetation.
DMA	Decision Making Authority
DoEE	Department of the Environment and Energy (Cwlth)—now DAWE
DoW	Department of Water (WA)—now DWER
DPaW	Department of Parks and Wildlife (WA)—now DBCA
DPIRD	Department of Primary Industries and Regional Development (WA)
DPLH	Department of Planning, Lands and Heritage (WA)
DRF	Declared Rare Flora under the BC Act
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Cwlth)—now DAWE
DWER	Department of Water and Environmental Regulation (WA)
EBICG	Ellen Brockman Integrated Catchment Group
EC	electrical conductivity
EIA	environmental impact assessment
EMS	environmental management system
EPA	Environmental Protection Authority of Western Australia
EP Act	*Environmental Protection Act 1986* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
ESA	environmentally sensitive area
FCT	floristic community type
FTE	full-time employee
FVC	Focused Vision Consulting Pty Ltd
GDA94	Geocentric Datum of Australia 1994
GDE	groundwater-dependent ecosystem
GHPD	government heritage property disposal
GIS	geographic information system
GNH	Great Northern Highway
GPS	global positioning system
ha	hectare
HISF	heritage information submission form
IBRA	Interim Biogeographic Regionalisation of Australia
IPT	Integrated Project Team (Main Roads and the ASJV)
IS	Infrastructure Sustainability
ISCA	Infrastructure Sustainability Council of Australia
km	kilometre
LGA	local government authority
m	metre

Abbreviation	Description
M2W	Muchea to Wubin
M2W team	Muchea to Wubin Integrated Project Team, comprising Main Roads and industry partners Jacobs and Arup
Main Roads	Main Roads Western Australia
MCA	multi-criteria analysis
MGA94	Map Grid of Australia 1994
MI	municipal inventory
mm	millimetre
MNES	matters of national environmental significance
MoU	memorandum of understanding
MU	multiple use (wetland)
NATA	National Association of Testing Authorities
NNTT	National Native Title Tribunal
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
NTC	Native Title Claim
NVCP	native vegetation clearing permit
NVIS	national vegetation information system
OSOM	over size over mass
PASS	potential acid sulfate soil
PDNH	Perth-Darwin National Highway
PEC	Priority Ecological Community
RAV	restricted access vehicle
RE	resource enhancement (wetland)
RIWI	*Rights in Water and Irrigation Act 1914* (WA)
SLIP	State Land Information Portal
SLK	straight line kilometre
study area	The area comprising the studies completed to support this ERD.
SWALSC	South West Aboriginal Land and Sea Council
TDS	total dissolved solids
TEC	Threatened Ecological Community
TN	total nitrogen
TP	total phosphorous
UFI	unique feature identifier (wetlands)
VSA	vegetation and substrate association
WA	Western Australia
WALGA	Western Australian Local Government Association
WAOL	Western Australian Organism List

Abbreviation	Description
WAPC	Western Australian Planning Commission
WoNS	weeds of national significance

Invitation to make a submission

The Environmental Protection Authority (EPA) invites people to make a submission on the environmental review for this Proposal.

Main Roads Western Australia (Main Roads) proposes to construct and operate a new section of the Great Northern Highway (GNH), the Bindoon Bypass. This will be a new 48 kilometre (km) section of the GNH within the Shires of Chittering and Gingin. The new section of road will bypass the town of Bindoon and consist of a combination of four-lane dual carriageway, four-lane single carriageway and two-lane single carriageway. The Bindoon Bypass will divert from the existing GNH at the Chittering Roadhouse, running to the west of Bindoon and re-joining the GNH north of Calingiri Road.

The Environmental Review Document (ERD) has been prepared in accordance with the EPA's *Procedures Manual (Part IV Divisions 1 and 2).* The ERD is the report by the proponent on their environmental review which describes this Proposal and its likely effects on the environment.

The ERD is available for a public review period of 6 weeks from **25 May 2020**, closing on **6 July 2020**.

Information on the Proposal from the public may assist the EPA to prepare an assessment report in which it will make recommendations on the Proposal to the Minister for Environment.

The Proposal (EPBC 2017/8035) has also been determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and will be assessed via Preliminary Documentation. The controlling provision under Part 3 of the EPBC Act is:

- Listed threatened species and communities (Sections 18 and 18A);

This ERD also meets the requirements of the Preliminary Documentation under the EPBC Act and is published pursuant to Section 98(1)(c) of the EPBC Act.

Why write a submission?

The EPA seeks information that will inform the EPA's consideration of the likely effect of the proposal, if implemented, on the environment. This may include relevant new information that is not in the ERD, such as alternative courses of action or approaches.

In preparing its assessment report for the Minister for Environment, the EPA will consider the information in submissions, the proponent's responses and other relevant information.

Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the *Freedom of Information Act 1992*.

Why not join a group?

It may be worthwhile joining a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on information in the ERD.

When making comments on specific elements in the ERD:

- Clearly state your point of view and give reasons for your conclusions.
- Reference the source of your information, where applicable.
- Suggest alternatives to improve the outcomes on the environment.

What to include in your submission

Include the following in your submission to make it easier for the EPA to consider your submission:

- your contact details – name and address
- date of your submission
- whether you want your contact details to be confidential
- summary of your submission, if your submission is long
- list points so that issues raised are clear, preferably by environmental factor
- refer each point to the page, section and if possible, paragraph of the ERD
- attach any reference material, if applicable. Make sure your information is accurate.

The closing date for public submissions is: **6 July 2020**

The EPA prefers submissions to be made electronically via the EPA's Consultation Hub at **https://consultation.epa.wa.gov.au**.

Alternatively, submissions can be:

- posted to: Chairman, Environmental Protection Authority, Locked Bag 10, Joondalup DC WA 6919

  or

- delivered to: The Environmental Protection Authority, 8 Davidson Terrace, Joondalup.

If you have any questions on how to make a submission, please contact EPA Services at the Department of Water and Environmental Regulation on 6364 7000.

Scoping Checklist

Task No.	Required Work	Chapter and Page No.
Flora and Vegetation		
1	Identify and characterise the flora and vegetation of areas that may be directly or indirectly impacted by the Proposal in accordance with the relevant guidance. Demonstrate how surveys are relevant, representative and demonstrate consistency with current EPA policy and guidance. Include a summary of survey findings in accordance with relevant guidelines.	**Chapter 4.2.3.2**, p. 71 **Chapter 4.2.3.3**, p. 82
2	Identify wetlands and waterways that may be directly or indirectly impacted utilising the relevant database(s).	**Chapter 4.2.3.5**, p. 123 **Chapter 4.4.3.3**, p. 269
3	Undertake targeted survey/s for the Commonwealth listed Endangered/Threatened species *Drakaea elastica* in accordance with the relevant Department of Agriculture, Water and the Envionment (DAWE) survey guidelines. Detail how these guidelines have been followed.	**Chapter 4.2.3.2**, p. 71
4	Identify and describe any flora species and ecological communities recorded during 1 and 3 above that are currently listed under the *Wildlife Conservation Act 1950* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.	**Chapter 4.2.3.2**, p. 71 **Chapter 4.2.3.3**, p. 82 **Chapter 4.2.3.4**, p. 113
5	Determine whether any vegetation identified in 1 above is consistent with the classification of the Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (the TEC). If any vegetation is classified as the TEC, present survey information consistent with the relevant guidelines.	**Chapter 4.2.3.4**, p. 113
6	Identify and describe the vegetation, wetlands, waterways and significant flora species present and likely to be present within the Development Envelope and any areas that may be indirectly impacted by the Proposal beyond the Development Envelope in 1, 2, 3, 4 and 5 above. Include an analysis of the significance of flora, vegetation, wetlands and waterways in local, regional and State contexts as appropriate in accordance with the relevant guidance.	**Chapter 4.2.3.5**, p. 123
7	Provide a map depicting the recorded locations of the significant flora, wetlands, ecological communities and significant vegetation in 6 above in relation to the Development Envelope in accordance with the relevant guidelines.	**Figure 4-3**, p. 74 **Figure 4-4**, p. 85 **Figure 4-8**, p. 119 **Figure 4-23**, p. 273
8	Once the Development Envelope has been finalised, assess the potential direct and indirect impacts of the construction and operational elements of the Proposal on identified environmental values in 6 above. Include a quantitative assessment of levels of impact on significant flora, wetlands, waterways, listed ecological communities and all vegetation associations. Describe and assess the extent of any cumulative impacts within local, regional and State contexts as appropriate.	**Chapter 4.2.4**, p. 135 **Chapter 4.2.5**, p. 141 **Chapter 4.4.4**, p. 272 **Chapter 4.4.5**, p. 274
9	Describe and justify any proposed mitigation to reduce the potential impacts of construction and operation of the Proposal. Include any proposed management and/or monitoring plans that will be implemented pre- and post-construction to demonstrate and ensure that the EPA's objective can be met.	**Chapter 4.2.6**, p. 148

Task No.	Required Work	Chapter and Page No.
10	Identify, describe and quantify the potential residual impacts (direct, indirect and cumulative) that may occur following implementation of the proposed mitigation measures and determine the significance of the residual impacts on the identified environmental values by applying the Residual Impact Significance Model (page 11) and WA Offset template (Appendix 1) in the WA Environmental Offsets Guidelines (2014). Provide spatial data defining the area of any identified significant residual impacts and proposed offsets in relation to the Development Envelope. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines.	**Chapter 4.2.7**, p. 150 **Chapter 7**, p. 430
Terrestrial Fauna		
11	Undertake terrestrial fauna and fauna habitat surveys of the Proposal area in accordance with relevant EPA and Department of Environment and Energy guidelines, including appropriate targeted surveys for significant fauna on land and in aquatic systems. The degree to which these guidelines have been followed should be provided. Adequate reasons for departing from guidelines should be provided where and if relevant.	**Chapter 4.3.2**, p. 152 **Chapter 4.3.3**, p. 153
12	Identify and describe the values and significance of fauna, fauna habitat and habitat connectivity within, and immediately adjacent to, the Development Envelope from II above within local and regional contexts as appropriate.	**Chapter 4.3.3.2**, p. 154 **Chapter 4.3.3.3**, p. 219
13	Identify and describe any fauna species recorded during 11 above that are currently listed under the *Wildlife Conservation Act 1950* and *Environment Protection and Biodiversity Conservation Act 1999*.	**Chapter 4.3.3.4**, p. 221 **Chapter 4.3.3.5**, p. 221
14	Identify any potential fauna movement corridors within, adjacent to or across the Development Envelope including, but not limited to, areas of intact native vegetation and drainage lines, using appropriate methods. Describe the methods undertaken.	**Chapter 4.3.3.3**, p. 219
15	Provide a map depicting the fauna habitats from 12 above in relation to the Development Envelope and document the extent in hectares of each habitat type in the Proposal area, Development Envelope and expected direct and indirect impact footprints.	**Figure 4-12**, p. 157 **Table 4-23**, p. 154
16	Provide a map depicting the known recorded locations of significant species, significant habitats (such as black cockatoo foraging habitats), significant habitat features (such as black cockatoo breeding hollows) and any potential fauna movement corridors identified in 12 and 14 above in relation to the Development Envelope in accordance with relevant guidelines.	**Figure 4-13**, p. 174 **Figure 4-14**, p. 189 **Figure 4-15**, p. 204 **Figure 4-16**, p. 220 **Figure 4-17**, p. 222 **Figure 4-18**, p. 236
17	Once the Development Envelope has been finalised, assess the potential direct and indirect impacts (including mortality and fragmentation) of the construction and operational elements of the Proposal on fauna assemblages, identified significant fauna, fauna habitats and habitat corridors in 12 and 14 above. Describe and assess the extent of any cumulative impacts within local and regional contexts as appropriate.	**Chapter 4.3.4**, p. 229 **Chapter 4.3.5**, p. 231
18	Describe and justify any proposed mitigation to reduce the potential impacts of construction and operation of the Proposal. Provide maps of	**Chapter 4.3.6**, p. 257

Task No.	Required Work	Chapter and Page No.
	and justification for the location and number of any proposed culverts and/or fauna underpasses/overpasses. Include any proposed management and/or monitoring plans that will be implemented pre- and post-construction to demonstrate and ensure that the EPA's objective can be met.	
19	Identify, describe and quantify the potential residual impacts (direct and indirect) that may occur following implementation of the proposed mitigation measures and determine the significance of the residual impacts on the identified environmental values by applying the Residual Impact Significance Model (page 11) and WA Offset template (Appendix 1) in the WA Environmental Offsets Guidelines (2014). Provide spatial data defining the area of any identified significant residual impacts and proposed offsets in relation to the Development Envelope. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines.	**Chapter 4.3.7**, p. 260 **Chapter 7**, p. 430
Hydrological Processes and Inland Waters Environmental Quality		
20	Identify and describe the values and significance of surface and groundwater hydrological and soil (hydrogeological) characteristics within the refined Development Envelope and the immediately adjacent area upstream and downstream of the Development Envelope in accordance with relevant policy and guidance. Identify and describe wetlands within and in proximity upstream and downstream to the refined Development Envelope utilising the relevant database(s). Describe these values in local, regional and State contexts as appropriate. Identify users of the identified values.	**Chapter 4.4.3**, p. 261
21	Describe and assess the potential impacts (direct and indirect) as a result of both construction and operational elements of the Proposal on water quantity (excess and deficit) and quality in relation to the surface and groundwater, waterways and their floodplains and wetlands in 20 above in accordance with the relevant policy and guidance.	**Chapter 4.4.4**, p. 272
22	Once the Development Envelope has been refined, predict the extent, severity and duration of potential impacts to 20 above, including changes to local and regional surface and groundwater flows and levels (excess and deficit), groundwater drawdown, local surface and groundwater quality and impacts to surface and groundwater users as a result of construction and operation in accordance with the relevant policy and guidance.	**Chapter 4.4.5**, p. 274
23	Describe any proposed mitigation to reduce the potential impacts of construction and operation of the Proposal on 20 above. Provide maps of and justification for the location and number of any proposed culverts and stormwater infrastructure. Include any proposed management and/or monitoring plans and strategies (for example the Drainage Strategy for the Perth-Darwin National Highway (Swan Valley section proposal) that will be implemented pre- and post-construction to demonstrate and ensure the EPA's objectives can be met. Include any hydrological and hydrogeological assessments undertaken for dewatering and groundwater use.	**Chapter 4.4.6**, p. 280
24	Identify, describe and quantify the potential residual impacts (direct and indirect) that may occur following implementation of the proposed mitigation measures and determine the significance of the residual impacts on the identified environmental values by applying the	**Chapter 4.4.7**, p. 282

Task No.	Required Work	Chapter and Page No.
	Residual Impact Significance Model (page II) and WA Offset template (Appendix 1) in the WA Environmental Offsets Guidelines (2014). Provide spatial data defining the area of any identified significant residual impacts and proposed offsets in relation to the Development Envelope. Where significant residual impacts remain, propose an appropriate offsets package that is consistent with the WA Environmental Offsets Policy and Guidelines.	
Social Surroundings		
Aboriginal Heritage		
25	Conduct archaeological and ethnographic studies of the area likely to be directly and/or indirectly impacted by the Proposal in order to identify and characterise any Aboriginal heritage sites and their relevance and importance to Aboriginal People and their culture.	**Chapter 4.5.3**, p. 286
26	Describe and assess any potential impacts (direct and indirect) to Aboriginal heritage values in 25 above that may occur as a result of implementation of the Proposal.	**Chapter 4.5.4**, p. 303 **Chapter 4.5.5**, p. 305
27	Describe any proposed mitigation measures to avoid or minimise the identified direct and indirect impacts on Aboriginal heritage in 26 above.	**Chapter 4.5.6**, p. 316
28	Include any proposed management and/or monitoring plans for Aboriginal heritage that will be Implemented pre- and post-construction to demonstrate and ensure the EPA's objectives can be met.	**Chapter 4.5.5**, p. 305 **Chapter 4.5.6**, p. 316
29	Identify and describe the potential residual impacts (direct and indirect) that may occur following implementation of the proposed mitigation measures and determine the significance of the residual impacts on the identified environmental values of Aboriginal heritage with reference to the residual impact model set out in the WA Environmental Offsets Guidelines.	**Chapter 4.5.7**, p. 317
Noise		
30	Undertake noise monitoring along the proposed alignment to determine ambient noise levels in areas of noise sensitive receptors.	**Chapter 4.6.3.1**, p. 318
31	Undertake a screening assessment and if required a detailed noise assessment in accordance with the relevant guidelines to predict future noise levels resulting from the Proposal on sensitive receptors, including recreational values as appropriate.	**Chapter 4.6.4.1**, p. 325 **Chapter 4.6.5.1**, p. 326
32	Identify relevant noise mitigation measures for identified sensitive receptors in 31 above and describe any proposed mitigation to reduce the potential impacts of construction and operation of the Proposal. Provide maps of and justification for the location and number of any proposed mitigation infrastructure.	**Chapter 4.6.6.1**, p. 383
33	Include any proposed management and/or monitoring plans for noise that will be implemented pre- and post-construction to demonstrate and ensure the EPA's objectives can be met.	**Chapter 4.6.6.1**, p. 383
34	Identify and describe the potential residual impacts (direct and indirect) that may occur following implementation of the proposed mitigation measures and determine the significance of the residual impacts of noise on the identified sensitive receptors in 31 above with reference to	**Chapter 4.6.7.1**, p. 386

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	the residual impact model set out in the WA Environmental Offsets Guidelines.	
Visual Amenity, dust and light-spill		
35	Characterise the land use and aesthetic (visual amenity) values along the proposed alignment that have the potential to be impacted by implementation of the Proposal.	**Chapter 4.6.3.2**, p. 321
36	Identify and describe any potential direct and indirect impacts on identified visual amenity values in 35 above as a result of implementation of the Proposal.	**Chapter 4.6.4.2**, p. 325 **Chapter 4.6.5.2**, p. 357
37	Identify and describe any proposed mitigation measures to avoid or minimise the potential impacts to visual amenity values in 35 above along the proposed alignment.	**Chapter 4.6.6.2**, p. 385
38	Characterise current, pre-construction dust and light-spill emissions at sensitive receptors along the proposed alignment that could be impacted by dust and/or light-spill emissions (including headlight glare and intersection lighting) during construction and operation of the Proposal.	**Chapter 4.6.3.2**, p. 321
39	Identify and describe the potential sources and impacts (direct and indirect) of dust and light-spill (including headlight glare or intersection lighting) for the sensitive receptors in 38 above that may arise from construction and operation of the Proposal.	**Chapter 4.6.4.2**, p. 325 **Chapter 4.6.5.2**, p. 357
40	Describe and assess any proposed mitigation measures to avoid or minimise the identified sources of and direct and indirect impacts from dust and light-spill (including headlight glare or intersection lighting) in 38 above.	**Chapter 4.6.6.2**, p. 385
41	Include any proposed management and/or monitoring plans for visual amenity, dust and light-spill that will be implemented pre- and post-construction to demonstrate and ensure the EPA's objectives can be met.	**Chapter 4.6.6.2**, p. 385
42	Identify and describe the potential residual impacts (direct and indirect) that may occur following implementation of the proposed mitigation measures and determine the significance of the residual impacts on the identified sensitive receptors of visual amenity, dust and light-spill with reference to the residual impact model set out in the WA Environmental Offsets Guidelines.	**Chapter 4.6.7.2**, p. 386

Executive Summary

Introduction

The Great Northern Highway (GNH) is a critical freight link between the Perth metropolitan area, and the towns and mining centres of the Midwest and Pilbara regions of Western Australia (WA). The GNH forms part of Highway 1, a network of highways that connect all mainland state capitals. In 2014, Main Roads WA (Main Roads) established the Muchea to Wubin Integrated Project Team (IPT)—comprising Main Roads and industry partners Arup and Jacobs (combining to form Arup Jacobs Joint Venture, ASJV)—to conduct a comprehensive planning review of the full Muchea to Wubin link along the GNH. The focus of the planning review was to improve freight efficiency and safety for both road users and local communities.

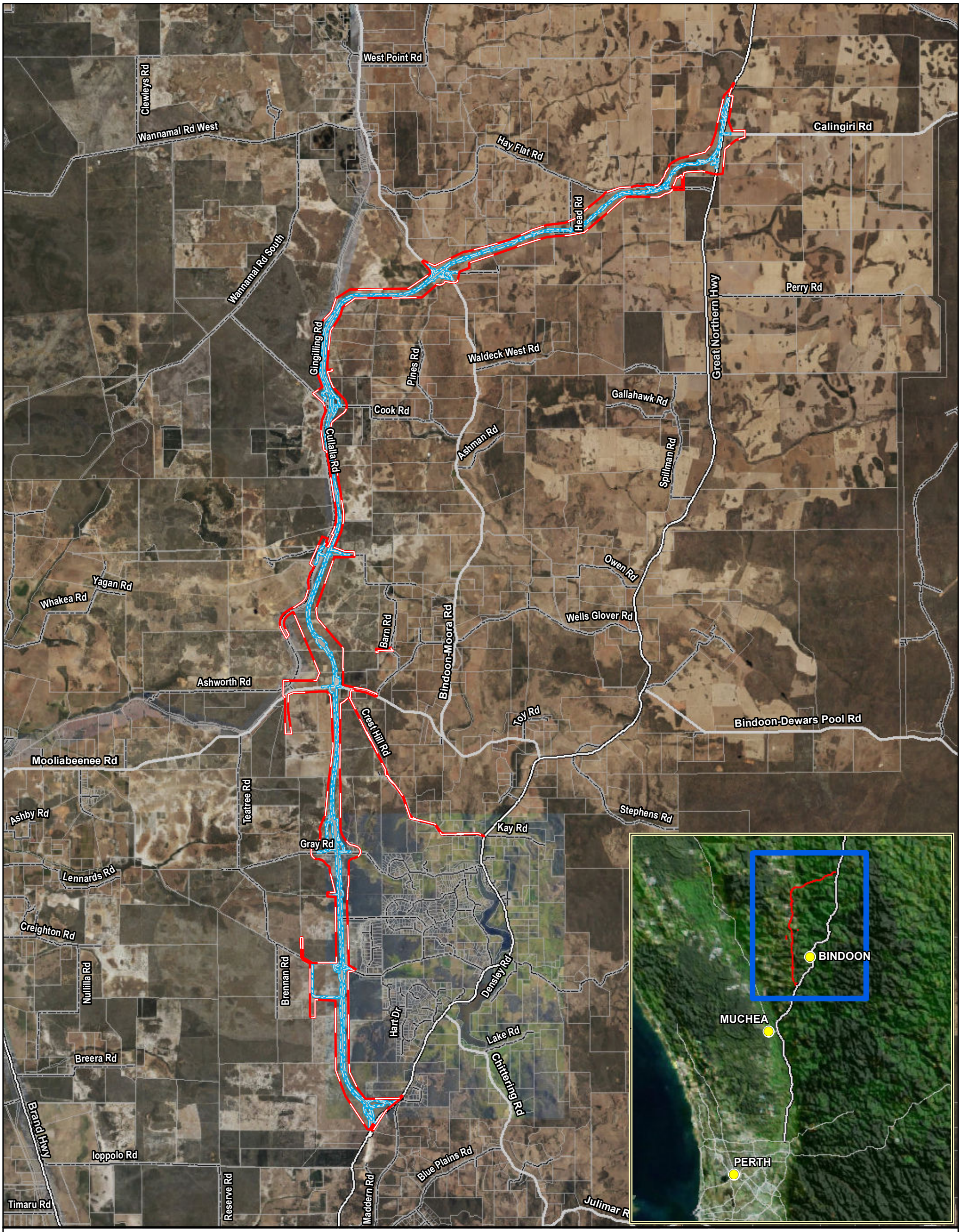
Heavy vehicles currently struggle with the steep grades on the GNH at Bindoon Hill. The impediments to 53.5 m road trains travelling along the current section of the GNH include:

- Bindoon town: major safety concerns regarding conflicts between local traffic, pedestrians, over size and/or over mass vehicles and heavy freight travelling through the Bindoon town centre.
- Bindoon Hill:
  - the steep grades of up to 6.2% over a 2 km length currently result in heavy vehicles travelling slowly at speeds of approximately 20 km/h; the volume of slow-moving traffic would be exacerbated by 53.5 m road trains travelling at 12 km/h or less; this speed differential between vehicle types creates a significant traffic hazard when lighter vehicles are attempting to travel at up to 100 km/h
  - there are a number of substandard horizontal curves and no passing lanes on the downhill sections
  - high temperatures in the summer months can adversely impact the bitumen surface and heavy vehicle performance on the steep sections of the hill.

As part of a planning review, sixteen corridor options were investigated, assessed and refined. Following this review, it was determined that a more efficient route around Bindoon Town and Hill would be required if freight efficiency is to be improved. As a result of the review, a bypass route was selected and endorsed by the Minister for Transport on 12 January 2017, following approval by the WA Planning Commission (WAPC).

Main Roads proposes to construct a bypass around Bindoon town and Bindoon Hill (hereafter referred to as the Bindoon Bypass, or the Proposal), located within the Shire of Chittering approximately 70 km north east of Perth and approximately 13 km north of Muchea. The Bindoon Bypass will divert from the existing GNH at the Chittering Roadhouse, running to the west of Bindoon and re-joining the GNH north of Calingiri Road (Figure ES 1). This will involve the construction of 47 km of new highway.

The Bindoon Bypass will be constructed in stages based on the expected traffic volumes. The initial stage (Interim Stage) will consist of single carriageway (two lanes) with a number of overtaking lanes for both north-bound and south-bound traffic, as well as stopping facilities. The second stage (Ultimate Stage) will build on the work done in the Interim Stage to accommodate higher numbers of road users, and comprises an upgrade to dual carriageway (four lanes) between Chittering Roadhouse and Bindoon-Moora Road. Upgrades to local roads, rail crossings and intersections may also be required, as well as relocation of services, fencing of the road reserve and construction of driveway accesses for landowners. This Environmental Review Document (ERD) has been prepared for assessment of potential impacts associated with both the Interim and Ultimate Stages of the Bindoon Bypass.



Legend

- Development Envelope
- Development Footprint
- Highway
- Major Road
- Minor Road
- Cadastral Boundary

Joint Venture Partners:

Arup Pty Ltd
Level 14 Exchange Tower
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0 1,400 2,800
Metres

Scale at A3 1:120,000

Coordinate System: GDA 1994 MGA Zone 50

Main Roads Western Australia
Client

Project
Great Northern Highway
Bindoon Bypass South
Environmental Review Document

Regional Location and Development Envelope/s

Figure: ES 1

Drawing No	Issue
GNH-CN12-EA-PER-00001 F1-1	1

Task	Drawing Status / Other
EDR	Draft

Date	By	Chkd	Appd
30/05/2019	BG	LB	TJ

MXD Location: \\ausyd0-app023\ArcGISServer\WA_PB50732_GNH\ERD Figures\GNH-CN12-EA-PER-0001-F1-1.mxd

Background and Context

Option Investigations and Studies

Main Roads has investigated options to improve the GNH in the vicinity of Bindoon Town and Bindoon Hill. A wide range of corridors were investigated, including the previously endorsed Perth to Darwin National Highway (PDNH; this endorsement was later removed following strong public opposition), Brand Highway alternatives and hybrid GNH/PDNH corridors. Sixteen corridor options were investigated, assessed and refined between straight line kilometre (SLK) 37.80 and SLK 94.74, with Western Bypass Corridor A (the Bindoon Bypass) endorsed by the Minister for Transport on 12 January 2017, following approval by the WA Planning Commission (WAPC). Greater detail on the corridor selection process is provided in **Chapter 2.4**.

Main Roads commissioned the following studies and investigations to inform the ERD, in line with the requirements of the Environmental Scoping Document (ESD—**0**) prepared by the Environmental Protection Authority of WA (EPA) for the Proposal:

- flora and vegetation surveys
- dieback assessment and mapping
- fauna surveys including targeted Black Cockatoo assessments
- groundwater review and assessment
- surface water quality assessment
- noise modelling and assessment
- landscape character and visual impact assessment
- light-spill and headlight glare assessment
- Aboriginal heritage surveys (archaeological and ethnographic)
- non-indigenous heritage survey.

The results of these studies and investigations have been used to undertake an impact assessment, described in detail in **Chapter 4**.

Stakeholder Consultation

Extended community consultation for the Bindoon Bypass has been undertaken since 2016, to provide input into the Bindoon Bypass corridor selection process, and to inform development of the preferred corridor. Consultation supporting this submission occurred with various Government agencies and other key stakeholders, as described in **Chapter 3**.

Part IV and EPBC Act Referrals

The Bindoon Bypass was referred to the EPA under section 38 of the WA *Environmental Protection Act 1986* (EP Act) on 1 September 2017. The referral was advertised by the EPA for a seven-day public comment period from 15 September 2017 to 21 September 2017. Two comments on the referral were received by the EPA during this period. On 2 October 2017, the Chairman of the EPA determined the Proposal required further assessment at the level of public environmental review.

Main Roads also referred the Bindoon Bypass to the Commonwealth Department of the Environment and Energy (DoEE—now the Department of Agriculture, Water and the Environment [DAWE]) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 1 September 2017. The DAWE considered the Proposal and determined it to be a Controlled Action on 29 January 2018 (EPBC 2017/8035). A request for additional information in the form of Preliminary Documentation was received

by Main Roads on 7 May 2018 (**Appendix B**). At that time, the DAWE confirmed that the information required could be presented in this ERD, with a single document meeting the needs of both the EPA and the DAWE. As the ESD was approved by the EPA prior to the Controlled Action decision, the Proposal cannot be assessed under the accredited process provisions of section 87 of the EPBC Act; however, the DAWE informed Main Roads that they intend to coordinate the assessment process with the EPA where possible, and that the information required for the DAWE assessment may still be provided in this ERD.

As a result of baseline environmental surveys and stakeholder consultation undertaken after September 2017, alternative alignments were identified at six locations along the proposed Bindoon Bypass. These revisions generally received greater landowner support than the initial alignment, and in some cases arose directly from landowner requests. The revisions also resulted in reduced environmental impacts overall. However, these changes also caused the alignment to deviate outside the referred Development Envelope. Main Roads has adopted these alignment changes to take forward into land acquisition and detailed design. A section 43A request to change the Proposal during assessment was submitted to the EPA on 09 July 2018 and is provided in **Appendix C**.

Proposal Objectives

The Proposal objectives are to:

- Improve road safety in line with the State “Towards Zero” policy: safety will be improved by diverting regional traffic, including heavy freight vehicles, out of Bindoon town onto a fit-for-purpose highway.
- Increase freight efficiency: bypassing Bindoon, implementing a constant 110km/h speed limit, and utilising maximum vertical grades of 3% will improve freight efficiency on the highway, while still allowing important freight movements in and out of Bindoon.
- Improve network reliability: bypassing Bindoon will improve network reliability by allowing more consistent travel times between the Chittering Roadhouse and New Norcia.
- Enhance travel wellbeing: the intersection strategy proposed enhances travel wellbeing by providing more direct access to a higher-quality primary distributor road than is currently the case. Provision of suitable roadside stopping places, signage and landscaping treatments will further support this objective.
- Contribute to sustainable and viable communities: provision of the bypass and its proposed intersections will reduce congestion and freight traffic in Bindoon town, while ensuring that the communities in the vicinity of the Bindoon Bypass remain connected and viable.
- Enhance the environment: developing detailed mitigation and management measures during the planning and development of the Proposal will maximise opportunities for environmental enhancement along the proposed corridor.

The proposed Bindoon Bypass will contribute to the wider Muchea to Wubin Upgrade Project achieving its objectives, and will provide the community with a safer, more efficient GNH.

Overview of the Proposal

The Proposal begins approximately 17 km north of Muchea and finishes approximately 28 km north of Bindoon. Towns and centres in the region include Bindoon, Gingin, Muchea, Wannamal and New Norcia. The major land use is agriculture and grazing with some horticulture. There are no major industrial facilities or mining operations within the region. The proposed Bindoon Bypass is predominantly located within the Shire of Chittering, with a minor road placed within the Shire of Gingin (**Figure 1-1**). Approximately 36 km of new dual carriageway, and 11 km of new single carriageway, will be constructed along an alignment between Chittering Roadhouse and the northern tie-in point, located approximately 1.25 km north of Calingiri Road. The concept design alignment is shown in **Figure 2-6**.

The ESD describes the environmental impact of the works associated with construction and operation of the Proposal via the following five Key Environmental Factors:

- Flora and Vegetation
- Terrestrial Fauna
- Hydrological Processes
- Inland Waters Environmental Quality
- Social Surroundings.

Following publication of the ESD, the EPA undertook a review of the environmental factors and objectives. This review resulted in Hydrological Processes and Inland Waters Environmental Quality being combined into a single environmental factor, Inland Waters. This ERD has been prepared to reflect the environmental factors as published on the EPA website as of August 2018.

Table ES1 and **Table ES2** provide the key characteristics of the proposal.

Table ES1: Summary of the Proposal

Proposal Title	Great Northern Highway – Bindoon Bypass.
Proponent Name	Main Roads Western Australia.
Short Description	The Proposal is to construct and operate a new 47 km section of the Great Northern Highway (GNH) within the Shires of Chittering and Gingin. The Proposal bypasses the town of Bindoon located approximately 70 km north east of Perth, WA. The Proposal consists of a combination of four-lane dual carriageway, four-lane single carriageway, two-lane single carriageway and a bridge across the Brockman River. The Proposal diverts from the existing GNH at the Chittering Roadhouse, runs west of Bindoon, joining the proposed Bindoon North section north of Calingiri Road.

Table ES2: Location and Proposed Extent of Physical and Operational Elements

Element	Location	Proposed Extent
Road construction and associated infrastructure	**Figure 1-1**	Clearing and disturbance of no more than 503 ha of native vegetation, trees over pasture and cleared land. This consists of 120 ha of native vegetation, of which 107.9 ha is in good or better condition, 374 ha of trees over pasture and nine hectares of cleared land. Within this 503 ha, clearing of no more than: • 204.8 ha of Carnaby's Black Cockatoo foraging habitat (of Moderate value or higher) including trees with hollows suitable for Black Cockatoos • 168.0 ha of Forest Red-tailed Black Cockatoo foraging habitat (of Moderate value or higher) including trees with hollows suitable for Black Cockatoos • 10 trees with hollows previously used by Black Cockatoos for nesting will be cleared • 2.5 ha of vegetation associations corresponding to the Nooning vegetation complex which is below 30% of its pre-European extent

		• 0.4 ha of Good or better condition native vegetation in a total disturbance footprint of 2.7 ha within the boundaries of Conservation Category (CC) wetlands • 60 ha of Commonwealth EPBC ACT listed Banksia Woodlands of the Swan Coastal Plain, Threatened Ecological Community, The Development Envelope is 2,552.5 ha.

Summary of Potential Impacts, Proposed Mitigation and Outcomes

A summary of potential impacts, mitigation and predicted outcomes is provided in **Table ES3**.

An impact mitigation hierarchy of avoid, minimise, rehabilitate or offset (**Chapter 4.2.6**) has been implemented throughout the concept design phase of the Proposal, and will continue to be implemented during detailed design and construction.

Table ES3: Summary of Potential Impacts, Proposed Mitigation and Outcomes

Flora and Vegetation	
EPA Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained
Policy and guidance	EPA policy and guidance: • Statement of environmental principles, factors and objectives (EPA 2016a) • Environmental factor guideline - flora and vegetation (EPA 2016b) • Technical guidance: flora and vegetation surveys for environmental impact assessment (EPA 2016c) Other policy and guidance: • Survey guidelines for Australia's threatened orchids: guidelines for detecting orchids listed as 'Threatened' under the EPBC Act (Department of the Environment 2013) • Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (Department of the Environment 2014) • Approved conservation advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain Ecological Community (Threatened Species Scientific Community 2016) • Geomorphic wetlands of the Swan Coastal Plain dataset (DBCA 2016) • WA environmental offsets policy (Government of WA 2011) • WA environmental offsets guidelines (Government of WA 2014a) • WA environmental offsets template (Government of WA 2014b).

Potential impacts	The following impacts are anticipated as a result of implementation of the Proposal:
	• permanent loss of 119.1 ha of native vegetation, of which 107.9 ha is in good or better condition, within the Development Footprint including:
	  ▸ 61.7 ha that is in Very Good to Excellent condition
	  ▸ 2.5 ha of vegetation corresponding to the Nooning complex
	  ▸ 0.4 ha of vegetation in Good or better condition associated with CC wetlands.
	  ▸ permanent loss of 60 ha of the EPBC Act listed Banksia Woodlands TEC
	  ▸ permanent loss of 13.5 ha of riparian and non CC wetland vegetation in good or better condition
	• permanent loss of 42 individuals of the P2 species *Drosera sewelliae*, four individuals of the P2 species *Leucopogon squarrosus* subsp. *trigynus*, two individuals of the P3 species *Verticordia rutilastra*, one individual of the P4 species *Anigozanthos humilis* subsp. *chrysanthus* and 108 individuals of the P4 species *Verticordia paludosa*
	• fragmentation of native vegetation, TEC and/or conservation significant flora populations.
	The following indirect impacts may arise as a result of implementation of the Proposal:
	• degradation of native vegetation associations and the TEC due to altered ground and surface water hydrology
	• degradation of native vegetation associations and the TEC due to introduction and/or spread of weeds or *Phytophthora* dieback

Mitigation	**Avoid:** • Impacts to native vegetation and conservation significant flora have been avoided and minimised during the concept design phase, by preferentially locating the Development Footprint within previously cleared paddocks to avoid conservation significant flora and vegetation. • The Development Footprint was modified to avoid an historic record of *Drakaea elastica* identified from the DBCA database. **Minimise:** • During the detailed design phase: ▸ Clearing of native vegetation will be further reduced through engineering solutions, including but not limited to:

	- additional steepening of batters - installation of barriers in areas of high conservation value (e.g. through the EPBC Act listed Banksia Woodland TEC) to reduce clear zone requirements - reduction of median widths or design of medians to reduce the clearing required between carriageways. ▸ Drainage will be designed to avoid the movement of soils and/or water potentially carrying *Phytophthora* dieback into areas mapped as dieback-free. • The area to be cleared will be surveyed and accurately marked in the field, with pegs/flagging. • Drainage for the road will be designed to avoid movement of water from areas identified as dieback-infested to dieback-free areas. • A dieback and weed hygiene management plan will be developed for construction of the Proposal. • Priority flora species not within the Development Footprint will be clearly marked as no-go zones, and access to these areas restricted. A 20 m buffer will be applied to Priority flora locations where practicable. Where this cannot be achieved, the no-go zone will start at the edge of the Development footprint. The 20 m buffer will be maintained on all other sides at these locations. • Areas of the EPBC Act listed Banksia Woodland TEC and vegetation association BmKgHg outside of the Development Footprint, will be clearly marked as no-go zones and access to these areas restricted. • Educational and induction/training material about all relevant significant flora and ecological communities will be provided to contractors working on the Proposal, to reduce the risk of accidental clearing. **Rehabilitate:** • Revegetation will commence in the autumn following completion of construction works within designated revegetation areas and corridors to maintain ecological linkages. • Annual surveys of revegetation areas will be undertaken to assess revegetation success and weed presence/cover.
Outcomes	**Residual Impact:** The Proposal will result in clearing of no more than 119.1 ha of native vegetation, of which 107.9 ha is in good or better condition, including: • 60 ha of EPBC Act listed Banksia Woodland TEC • 61.7 ha that is in Very Good to Excellent condition • 2.5 ha of vegetation corresponding to the Nooning complex • 0.4 ha of vegetation in Good or better condition associated with CC wetlands. • 13.5 ha of riparian and wetland vegetation in Good or better condition • 42 individuals of the P2 species *Drosera sewelliae*, four individuals of the P2 species *Leucopogon squarrosus* subsp. *trigynus*, two individuals of the P3 species *Verticordia rutilastra*, one individual of the P4 species *Anigozanthos humilis* subsp. *chrysanthus* and 108 individuals of the P4 species *Verticordia paludosa* **Offset:** Main Roads is proposing to offset the potential significant residual impacts to: • Banksia Woodlands TEC • vegetation associated with CC wetlands that is in Good or better condition • vegetation associations corresponding to the Nooning vegetation complex (which is below 30% of their pre-European extent).
Terrestrial Fauna	
EPA Objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Policy and guidance	EPA policy and guidance: • Statement of environmental principles, factors and objectives (EPA 2016a) • Environmental factor guideline - terrestrial fauna (EPA 2016d) • Technical guidance: sampling methods for terrestrial vertebrate fauna (EPA 2016e)

	• Technical guidance: sampling of short range endemic invertebrate fauna (EPA 2016f) • Technical guidance: terrestrial fauna surveys (EPA 2016g). Other policy and guidance: • Survey guidelines for Australia's threatened bats: guidelines for detecting bats listed as threatened under the EPBC Act (Department of the Environment, Water, Heritage and the Arts—now DAWE—2010) • Survey guidelines for Australia's threatened mammals: guidelines for detecting mammals listed as threatened under the EPBC Act (Department of Sustainability, Environment, Water, Population and Communities—DSEWPaC, now DAWE—2011a) • Survey guidelines for Australia's threatened reptiles: guidelines for detecting reptiles listed as threatened under the EPBC Act (DSEWPaC 2011b) • Chuditch (*Dasyurus geoffroii*) recovery plan (Department of Environment and Conservation—now DBCA—2012) • Carnaby's Cockatoo (*Calyptorhynchus latirostris*) recovery plan (Department of Parks and Wildlife—now DBCA—2013) • Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) recovery plan (Chapman 2008) • EPBC Act environmental offsets policy (DSEWPaC 2012b) • WA environmental offsets policy (Government of WA 2011) • WA environmental offsets guidelines (Government of WA 2014a) • WA environmental offsets template (Government of WA 2014b).
Potential impacts	The following direct and indirect impacts to fauna are anticipated as a result of the Proposal: • permanent loss of 137.1 ha of fauna habitat. • permanent loss of 130.3 ha of habitat for the Brush Wallaby • permanent loss of 54.4 ha of habitat for the Chuditch • permanent loss of 69.2 ha of habitat for the Brush-tailed Phascogale • permanent loss of 6.8 ha of habitat for the Water-rat • permanent loss of 204.8 ha of foraging habitat identified as having Moderate or higher value for Carnaby's Black Cockatoo and 79.3 ha of potential breeding habitat. • permanent loss of 168 ha of foraging habitat with a Moderate or higher value for the Forest Red-tailed Black Cockatoo and 68.5 ha of potential breeding habitat • fragmentation of habitat and loss of connectivity • habitat degradation due to altered ground and surface water hydrology • habitat degradation due to introduction or spread of weed or dieback • fauna mortality from vehicle strikes. • ten trees containing hollows showing evidence of previous use by Black Cockatoos • 117 trees with suitable (but not currently or previously used) hollows.
Mitigation	**Avoid:** • Impacts to hollows showing evidence of use by Black Cockatoos have been avoided and minimised where practicable, through alignment changes and engineering solutions such as steepening of batters. These changes have resulted in 15 trees with hollows used by Black Cockatoos being avoided. • Impacts to terrestrial fauna and their habitats has been avoided and minimised during the concept design phase, by preferentially locating the Development Footprint within previously cleared paddock. • Where impacts to fauna habitat are unavoidable, the extent of clearing has been minimised as far as practicable by the employment of road safety barriers, steepening batters of cut and fill areas and adjusting road levels to minimise the depth/height of cut and fill areas. **Minimise:**

	To further minimise and mitigate potential impacts to terrestrial fauna, the following management measures, actions and controls are proposed:
	• During the detailed design phase:
	  ▸ Clearing of native vegetation will be further reduced through the use of engineering solutions including but not limited to:
	  - additional steepening of batters
	  - installation of barriers in areas of high conservation value (e.g. where Black Cockatoo hollows are close to the road) to reduce clear zone requirements
	  - reduction of median widths or design of medians to reduce the clearing required between carriageways.
	  ▸ Road design in the vicinity of habitat trees 5806, 4142, 2999 and 9081 will be reviewed to determine if the design and/or alignment can be modified in order to retain these trees.
	  ▸ Drainage will be designed to avoid:
	  - ponding of water near the roadside to avoid attraction of fauna including Black Cockatoos
	  - the movement of soils and/or water potentially carrying *Phytophthora* dieback into areas mapped as dieback-free.
	  ▸ Fauna underpasses will be included in the detailed design and will be designed to allow movement of fauna including Grey Kangaroos, Brush Wallabies, Chuditch and Water-rat (in watercourse areas).
	• The areas to be cleared will be accurately marked in the field with pegs/flagging.
	• Trapping and relocation of fauna will occur in areas of fauna habitat prior to clearing occurring. Preferentially, fauna will be encouraged to disperse on their own accord.
	• Fauna spotters will be engaged during clearing of fauna habitat to supervise the dispersal and/or relocation of remnant fauna.
	• Excavations and trenches will be fenced to exclude fauna, or temporary fauna escape ramps will be installed and excavations inspected daily before 9 am for trapped fauna.
	• Trees with hollows previously used by, or suitable for, Black Cockatoos within the Development Envelope but not within the Development Footprint will be clearly marked as no-go zones, and access to these areas restricted.
	• If clearing of Black Cockatoo habitat is to occur during the breeding season, all potential nesting trees identified by BCE (2017, 2018) within the area to be cleared will be inspected by a suitably qualified person, to determine if any hollows are currently being used by Black Cockatoos.
	• If any hollows within the Development Footprint are identified as being in use by Black Cockatoos, the hollow-bearing tree and a 10 m-diameter buffer around the tree will be marked as a no-go area. Clearing of the tree will not be undertaken until a suitably qualified person has verified that the hollow is no longer being used.
	• No plant species which provides habitat for Black Cockatoos will be planted within 10 m of the edge of the road seal.
	• During construction, speed limits will be reduced (for example, to 40 km/h) to reduce the risk of fauna strikes.
	• All fauna injured during the construction period will be taken to an authorised veterinarian or wildlife carer.
	• Fauna warning signs will be installed in areas where native vegetation occurs next to the roadside.
	• Educational and induction material about the significant flora and ecological communities will be provided to contractors working on the construction, to reduce the risk of accidental clearing.
	Rehabilitate:
	• Species mixes used in revegetation will aim to provide the following ecological services:
	  ▸ provide foraging and potential breeding habitat for Black Cockatoos.
	  ▸ support fauna movement within the road reserve and between patches of existing native vegetation outside of the Development Envelope.
	• Revegetation will commence in autumn, following completion of construction works within designated revegetation areas and corridors to reinstate ecological linkages.
	• Revegetation will include placement of hollow logs and brush, to provide fauna habitat and protection from feral predators while vegetation establishes. To further mitigate impacts, Main Roads will offset the clearing of hollows previously used by Black Cockatoos through the installation of artificial nesting hollows.

Outcomes	**Residual Impact:**

	• 137.1 ha of natural fauna habitats (i.e. those not classified as paddock) will be cleared, including 130.3 ha of habitat for the Brush Wallaby, 54.4 ha of habitat for the Chuditch, 69.2 ha of habitat for the Brush-tailed Phascogale and 6.8 ha of habitat for the Water-rat. • 204.8 ha of foraging habitat identified as having Moderate or higher value for Carnaby's Black Cockatoo and 79.3 ha of breeding habitat will be cleared. • 168 ha of foraging habitat with a Moderate or higher value for the Forest Red-tailed Black Cockatoo and 69.2 ha of breeding habitat will be cleared. • No more than 10 trees with hollows previously used by Black Cockatoos and 76 hollows suitable for Black Cockatoos as identified in BCE (2018) will be cleared. **Offset:** Main Roads is proposing to offset the potential significant residual impacts to: • hollows previously used by Black Cockatoos (Carnaby's Black Cockatoo and the Forest Red-tailed Black Cockatoo) • Carnaby's Black Cockatoo foraging and potential breeding habitat (including trees with hollows suitable for Black Cockatoos) • Forest Red-tailed Black Cockatoo foraging and potential breeding habitat (including trees with hollows suitable for Black Cockatoos)
Inland Waters	
EPA Objective	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Policy and guidance	EPA policy and guidance: • Statement of environmental principles, factors and objectives (EPA 2016a) • Environmental factor guideline – inland waters (EPA 2018b). Other policy and guidance: • Geomorphic wetlands of the Swan Coastal Plain dataset (DBCA 2016) • Hydrogeological reporting associated with a groundwater well licence (DoW 2009) • Stormwater management manual for WA (DoW 2004) • State planning policy 2.9: water resources (WAPC 2006) • Guidelines for treatment of stormwater runoff from the road infrastructure (Austroads 2003) • Roads near sensitive water resources (DoW 2006a) • Australian and New Zealand guidelines for fresh and marine water quality (ANZECC & ARMCANZ 2000) • WA environmental offsets policy (Government of WA 2011) • WA environmental offsets guidelines (Government of WA 2014a) • WA environmental offsets template (Government of WA 2014b).

Potential impacts	**Groundwater**
	The following groundwater impacts may occur through implementation of the Proposal:
	• changes to groundwater levels, flow, connectivity and groundwater storage, particularly due to the influence of road cuttings, fill areas and subsurface compaction
	• temporary changes to groundwater quality from:
	  ▸ accidental spills and leaks from construction plant, machinery and equipment
	  ▸ dewatering and/or excavation exposing potential acid sulfate soils (PASS)
	  ▸ drainage maintenance issues and polluted surface water runoff entering groundwater systems
	  ▸ water usage practices on site
	  ▸ excavation across aquifer boundaries leading to cross contamination of aquifers
	• impacts to groundwater users.

	Surface Water and Wetlands The following impacts to surface waters and wetlands may occur through implementation of the Proposal: • changes in surface water runoff volumes due to increased impervious areas • changes in water quality during construction due to disturbance of PASS, transportation of sediments from exposed soils, discharge of groundwater abstracted during construction activities (e.g. from bridge construction or excavation for cuttings) and accidental spills of construction related chemicals • changes in surface water flow paths/hydrological regimes due to construction of road embankments or other permanent structures • changes in water quality during road operation from surface runoff, transporting pollutants discharged to the road surface (e.g. fuel, litter, heavy metals from brake pads) • disturbance to conservation category (CC) wetlands.
Mitigation	**Avoid:** • In order to avoid construction water abstraction impacts to the EPBC Act listed Banksia Woodlands TEC and all other groundwater-dependent ecosystems (GDEs), bores will be located such that the potential drawdown below identified occurrences of the TEC is less than 0.5 m, in accordance with ecological water requirements criteria set out by the DWER (DoW 2006b). **Minimise:** • The detailed design phase will assess the viability of alignment adjustments and design criteria, such as steepening of cut/fill batter slopes, to minimise the area of CC wetlands impacted. • Permanent earthworks will not extend below the natural groundwater level. • The detailed design phase for the Tea Tree Road intersection will aim to contain road design and construction activities within the current southern boundary of the road reserve to minimise impacts to the CC wetland at this location. • Where practicable construction of the Brockman River crossing will be scheduled for the drier months of the year (October-April), in order to maximise the depth to groundwater and reduce dewatering requirements. • Dewatering impact mitigation measures (including acid sulfate soil—ASS—and salinity management) will be developed as part of the construction environmental management plan (CEMP) and implemented in support of any application for dewatering works. A groundwater operating strategy will be developed and implemented as necessary to support the supply of construction water. • Detailed ASS investigations will be undertaken for the Brockman River crossing during the detailed design phase, to confirm the presence/absence of PASS and identify construction management requirements. • Should actual ASS or PASS be encountered during the investigation, the ASS management plan prepared in consultation with the DWER will include impact mitigation measures consistent with the *Treatment and management of soil and water in acid sulfate soil landscapes* (DER 2015b). • Drainage design standards, through the Proposal's drainage strategy, will be implemented during detailed design. The objective of the drainage strategy is to maintain drainage across the site to as close to the pre-development condition as practicable. This will be achieved in accordance with the DWER's principles of water resource management, as detailed in the *Stormwater management manual for Western Australia* (DoW 2004) and the *Decision process for stormwater management in Western Australia* (DWER 2017). • Site-specific erosion and sediment control measures will be developed as part of the CEMP, to minimise environmental impacts of stormwater runoff during construction activities. It may include use of silt fences and sediment traps to prevent soil export to waterways and wetlands, particularly during wet seasons; this will be determined during detailed design. • All fuels and chemicals will be stored in secure, impervious, bunded areas at least 50 m from drainage lines, in the construction compound. Individual substances will be stored in accordance with the relevant material safety data sheet specifications. • All relevant construction plant will be equipped with spill kits, and a spill response procedure will be established for the Proposal. • A refuelling procedure will be established and implemented for refuelling within the construction compound. • Additional groundwater salinity testing will be undertaken prior to construction to establish the pre-construction salinity regime. • Water quality monitoring will be undertaken at the Brockman River crossing and the Teatree Road watercourse to establish a pre-impact baseline.

	• A section 17 permit under the WA *Rights in Water and Irrigation Act 1914* (RIWI Act—also known as a bed-and-banks permit) will be applied for, seeking approval for river bed and banks works associated with construction of the Brockman River bridge. This application and permit will also address the mitigation of potential direct impacts to wetlands from road construction. • Water quality monitoring will be conducted at strategic locations prior to construction, throughout the construction period and for a period after project completion. The purpose of the monitoring regime will be to assess whether the mitigation and management strategies described herein are effective relative to existing surface water quality. • The proposed new Brockman River bridge will not exacerbate flooding, as it will be designed to accommodate backwater from a 1 in 100-year ARI event to no more than 100 mm higher than current water levels. • Swales, and an emergency response procedure, will be implemented during the road operations phase to mitigate water pollution from the road surface. • A groundwater operating strategy will be developed for abstraction of groundwater for construction purposes and approval sought under the RIWI Act. **Rehabilitate:** • The banks of watercourses disturbed by construction will be stabilised and revegetated.
Outcomes	**Residual Impact:** • Localised, temporary drawdown of groundwater levels due to construction dewatering and water abstraction may occur. Groundwater levels are expected to return to pre-impact levels following construction. • Although impacts to surface water are unlikely to be significant, a range of mitigation measures will be in place to reduce impacts to as low as reasonably practicable. Implementation of these mitigation measures will result in the following minor residual impacts to surface water and wetlands: ▸ minor localised alteration to surface water flows during construction phase ▸ minor increase in runoff volume and contaminant concentrations in streams due to drainage of road runoff during operation phase ▸ minor direct loss of wetland habitat due to placement of road and bridge structures in wetland areas ▸ localised increase in flood depth and width in the floodplain of Brockman River upstream of the bridge and culvert system. • Disturbance of no more than 2.7 ha within the mapped boundaries of CC wetlands, of which 0.4 ha is covered by native vegetation in Good or better condition and the remainder is cleared or vegetation in a degraded condition. **Offset:** Main Roads is proposing to offset the potential significant residual impacts to: • vegetation associated with CC Wetlands that is in Good or better condition.
Social Surroundings – Heritage	
EPA Objective	To protect social surroundings from significant harm.
Policy and guidance	EPA policy and guidance: • Statement of environmental principles, factors and objectives (EPA 2016a) • Environmental factor guideline - social surroundings (EPA 2016j) • Guidance for the assessment of environmental factors in accordance with the EP Act: assessment of Aboriginal heritage (EPA 2004c). Other policy and guidance: • WA environmental offsets policy (Government of WA 2011) • WA environmental offsets guidelines (Government of WA 2014a) • WA environmental offsets template (Government of WA 2014b).
Potential impacts	The following impacts may occur as a result of implementation of the Proposal: • physical damage or loss of Aboriginal heritage sites, and subsequent impacts to mythological, cultural and heritage values • loss of access to and use of Aboriginal heritage sites for Traditional Owners

	• permanent loss of heritage sites due to clearing for construction • fragmentation of existing heritage sites. **Aboriginal Heritage** Four Aboriginal Heritage sites intersect the Development Envelope: • Gingin Brook Waggyl registered site (Site ID 20008) • Lennard Brook (Place ID 20650) • Udumung Brook Artefact 1 (Place ID 3528) • Burroloo Well (Place ID 3528) (no impact is expected as archaeological surveys indicate the site is not located at the coordinates on file for this location). Other potential impacts: • One newly identified site comprising artefacts of Aboriginal origin (named Spring Valley Artefact Scatter) is located within the Development Footprint, and is likely to be directly impacted by the Proposal; however, the significance of impact will depend on whether this site is recognised under the AH Act. • The Development Footprint includes approximately 2.31 ha of the Lennard Brook and 41.41 ha of the Gingin Brook Waggyl sites. The waterways by which these sites are defined are ephemeral, so exposure of surface water in these watercourses will be minimal and intermittent. • Restriction to hunting and other traditional practices within known heritage sites/places as a result of the Proposal is expected to be low, as the identified sites are located on private freehold properties. • Targeted archaeological surveys found no archaeological objects in the Aboriginal sites or places. Impacts to these sites/places, and their biological and physical features, resulting from the Proposal are therefore not considered significant. **Non-Indigenous Heritage** There are a number of existing structures located in the Development Footprint that cannot be avoided and will be directly impacted as a result of construction of the new road. None of these are likely to be assessed by the Heritage Council's Register Committee as meeting the threshold for entry in the State Register of Heritage Places (Archae-aus 2018). Notwithstanding this, any impacts to these places will require consultation by Main Roads with the WA Department of Planning, Lands and Heritage (DPLH), to ascertain whether submissions under the government heritage property disposal (GHPD) process are required.
Mitigation	**Avoid:** • Of the twelve Aboriginal heritage sites (registered and other 'heritage places') that exist within the Development Envelope, nine of these have been avoided by the Proposal throughout the concept design phase. • Three of the five newly identified existing structures that may exhibit non-indigenous heritage value, and 15 of the 16 registered municipal inventory (MI) places, have been avoided by the Proposal. • The Development Envelope intersects the boundary of the registered MI place Cullala Siding (Place ID 14194); however, the existing structures within this place will not be impacted by the Proposal. • Construction of the Brockman River bridge will avoid direct impacts to the key physical, biological and mythological aspects of this watercourse. **Minimise:** • The detailed design phase will assess the viability of alignment adjustments to minimise or avoid impacts to Aboriginal heritage sites and places, in particular the Spring Valley Artefact Scatter. Where this is not reasonably practicable, Main Roads will seek consent under section 18 of the WA *Aboriginal Heritage Act 1972* (AH Act) to disturb this site. Artefacts will be recovered and relocated in consultation with archaeologists and/or the Yued people. • The Brockman River bridge, and any culverts required along the alignment, will be designed and constructed to: ▸ prevent scour damage on the downstream side. ▸ include erosion protection or control measures on adjacent banks as required. ▸ avoid damming of flows and minimise the retention time of water on the upstream side, through design of culverts and bridge structures such that the change in water level for significant rainfall/flood events is no more than 100 mm on current conditions. ▸ maintain existing flow paths, quantities and velocities.

	• All employees and contractors will be informed about the cultural heritage values of the Proposal and the presence and location of known Aboriginal archaeological sites, which areas are or may be considered Aboriginal sites under section 5(a) of the AH Act, and their obligations under section 15 of the AH Act (to report the discovery of any Aboriginal cultural material, which may be uncovered in the course of their work or any other activities). • Prior to nearby ground development, all known sites not to be impacted by the Proposal will be clearly delineated as no-go zones using physical markers and/or fencing. • Monitoring by archaeologists, and/or appropriately trained members of the Yued community, will take place during clearing activites in areas that have high potential for sites with some sub-surface archaeological integrity. • In the event of potential heritage artefacts or skeletal material being discovered during construction activities, work will stop in the immediate vicinity of the find and an investigation undertaken to determine its origin and significance, including recovery of materials if required. In the case of skeletal material being uncovered, the WA Police will be notified. No disturbance to the site will be permitted until the investigation has been completed, or approval to do so has been granted by the relevant decision-making authority. • Main Roads will continue consultation with the Yued Working Party and provide further information on potential impacts to Aboriginal heritage sites, places and values as required. Impacts to non-indigenous heritage places within and adjacent to the Development Footprint have been, and will continue to be, minimised through the following management actions and design principles: • The detailed design phase will assess the viability of alignment adjustments to minimise or avoid impacts to heritage sites and places; in particular, Harris Well 2 and the Spring Valley site. • Consultation with the State Heritage Office on newly recorded places of potential heritage value will be undertaken, to determine if these places required assessment via the GHPD process. • The GHPD process will be complied with by preparing a letter to the State Heritage Office, advising of impacts to those listed and newly identified heritage places. • Ongoing consultation will take place with the Shires of Chittering and Gingin regarding the heritage values within and adjacent to the Development Footprint. • Non-indigenous heritage places in proximity to the Development Footprint and within the Development Envelope will be identified as No-Go zones (for example, Harris Well 2), clearly demarcated on the ground prior to construction works commencing, and communicated to personnel via inductions and toolbox awareness sessions. • All employees and contractors will be informed about the presence and location of non-indigenous heritage places identified within and adjacent to the Development Envelope, and their responsibilities in relation to these.
Outcomes	**Residual Impact:** • No long term impacts to ethnographic sites is anticipated following construction. A request for AH Act section 18 consent for disturbance to registered Aboriginal heritage sites or places will be submitted during the detailed design phase of the Proposal. • No disturbance to any Aboriginal heritage sites or places outside of that approved under section 18 of the AH Act will occur. • The demolition/clearing of newly identified non-Indigenous heritage places and places on the MI is not likely to adversely affect any historical or cultural associations. **Offset:** No offsets are required or proposed for this factor.
Social Surroundings – Amenity	
EPA Objective	To protect social surroundings from significant harm.
Policy and guidance	The following EPA policy and guidance have been considered during the preparation of this ERD and the supporting technical studies: • Statement of environmental principles, factors and objectives (EPA 2016a) • Environmental factor guideline - social surroundings (EPA 2016j). Other policy and guidance considered during the preparation of this ERD and the supporting technical studies includes: • State planning policy 5.4: road and rail transport noise and freight considerations in land use planning (WAPC 2009) • Implementation guidelines for State planning policy 5.4 (Department of Planning & WAPC 2014) • Australia/New Zealand Standard 1158 (2005): lighting for roads and public spaces • Visual landscape planning in WA; a manual for evaluation, assessment, siting and design (WAPC & Department for Planning and Infrastructure 2007)

	• Guidelines for landscape and visual impact assessment (Landscape Institute & IEMA 2013) • WA environmental offsets policy (Government of WA 2011) • WA environmental offsets guidelines (Government of WA 2014a) • WA environmental offsets template (Government of WA 2014b).
Potential impacts	The following impacts may occur as a result of implementation of the Proposal: • increase in noise levels and vibration for sensitive receptors in a rural setting • increase in dust emissions during construction • reduced local amenity due to increase in road traffic, change in rural vista due to cuts or embankments, glare from headlights, presence of street lighting and proximity of national highway • noise impact modelling identified that: ▸ the daytime noise target stipulated in State planning policy 5.4 will be exceeded at 11 residences, with 10 also exceeding the night-time noise target ▸ the daytime noise limit stipulated in State planning policy 5.4 will be exceeded at Lot 1 (no. 428) Gingilling Road, Mooliabeenee • visual impacts at 12 of 24 viewpoints were assessed as Moderate or High • light spill impacts to residences (whether of unverified, unliveable or occupied status) were assessed as Negligible or Low • dust impacts are only likely to occur during the construction phase and will be minor, short term and temporary—particularly in relation to other dust generating activities that regularly occur in the study area (i.e. cropping).
Mitigation	**Avoid:** To avoid impacts to amenity, the Proposal has sought to reduce clearing of native vegetation, which acts to screen the road from nearby residences. The design has also implemented a maximum grade of 3.5%, which reduces the amount of breaking and/or engine revving as a result of travel up/down hill. **Minimise:** ***Noise*** • Noise generated during construction of the Bindoon Bypass will be managed in accordance with the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations). Noise Regulations require that the following management occurs during construction: ▸ the construction work is carried out in accordance with control of environmental noise practices set out in section 4 of Australian Standard (AS) 2436-2010 *Guide to noise and vibration control on construction, maintenance and demolition sites* ▸ the equipment used on the premises will be the quietest reasonably available ▸ if Main Roads is required to prepare a noise management plan in respect of the construction site: - the noise management plan will be prepared and given in accordance with the requirement, and approved by the local government - the construction work will be carried out in accordance with the noise management plan, excluding any ancillary measure ▸ if out-of-hours works are required, a noise management plan will be developed and approved by the local government (in accordance with the local government's delegated authority from the DWER): - plan will be submitted to the local government not later than 7 days before proposed works commence - all nearby sensitive receivers will be consulted on the noise management plan prior to its submission to local government - all nearby noise sensitive receivers will be notified in writing at least 24 hours prior to the works commencing. • Noise mitigation measures employed by Main Roads in rural settings generally includes: ▸ preparation and implementation of a noise management plan as required under State planning policy 5.4 ▸ selecting a low-noise pavement for sections of the alignment

	▸ noise monitoring at residences experiencing high noise emissions to confirm if State planning policy 5.4 targets or limits are exceeded ▸ modifications to noise sensitive premises and improvements (such as double glazing, installation of air conditioning units) to reduce noise inside residences where required under State planning policy 5.4. ***Visual amenity*** • Landowners will be consulted to identify suitable types of planting/landscaping (for example, trees and tall shrubs, rather than low shrubs and groundcovers), and to investigate opportunities for early planting of screening vegetation prior to commencement of construction. • The detailed design phase will assess the viability of alignment adjustments and design criteria such as steepening of cut/fill batter slopes, median width, or provision of barriers to minimise the amount of existing native vegetation to be cleared. ***Light spill and headlight glare*** To reduce light spill from intersection lighting, the following mitigation measures will be incorporated into the design: • review of best practice lighting during detailed design to confirm high-pressure sodium light remains appropriate • luminaire photometry selection which provides sufficient illumination of the road surface with minimal light spill beyond the road • zero-degree tilt for luminaires for minimal light spill • use of aeroscreen (flat glass) luminaires wherever possible for minimal glare and light spill • lighting will be installed at intersections only: no lighting will be installed along the remainder of the alignment. • Where required to reduce impacts to residences from headlights of vehicles travelling on the Bindoon Bypass, planting will be undertaken around the outside of curves, including intersections, near those residences that may be impacted. ***Dust*** To reduce dust during construction, the following mitigation measures will be implemented: • development of a construction dust management plan in accordance with DEC (2011) *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities.* • wetting of cleared areas as required (water trucks or similar will be available during construction) • should visible dust plumes be observed, works will be reduced or stopped until either conditions become less favourable for dust lift-off or additional measures (wetting of cleared areas) are undertaken to reduce dust lift-off • reduced vehicle speed limits (e.g. 40km/hr) on site to reduce the potential for dust to be generated by vehicle movements • use of dust suppressants and soil stabilisation treatments (e.g. Dustex, gluon, hydro-mulch, mulch) to stabilse areas left exposed for more than two weeks without construction activities occurring. **Rehabilitate:** • progressive revegetation of cleared areas to reduce the amount of time these remain bare and susceptible to wind erosion • revegetation of the road reserve to reflect the existing vegetation patterns and structure • retention of *Xanthorrhoea* spp. outside the Development Footprint • planting along the road reserve with a focus on covering exposed earthworks • planting with linear canopy planting and intermittent planting to mirror existing open wooded landscape • planting along road corridor with gaps that mirror the existing open woodland • intermittent planting of shrubs along the road reserve away from viewpoints to achieve vegetation consistent with the surrounding area.

Outcomes	**Residual Impact:** • The traffic noise assessment conducted by the GNH IPT in 2018 (GNH IPT 2018b) found that up to 11 noise sensitive receivers have potential to experience noise levels above State planning policy 5.4 targets, and one sensitive receiver with potential to experience noise levels above the limits. • The existing rural character of the area will be compromised by the presence of the highway, and this will be experienced at a range of magnitudes from various viewpoints. The mitigation measures proposed will reduce impacts to visual amenity, with the reduction becoming more pronounced over time as vegetation matures and establishes. Planting along the road reserve will mirror existing landscape character along the Development Envelope, and therefore it is expected that visual impacts will not be significant. • The proposed intersection lighting for the Proposal is not anticipated to result in light spill impacts to residences. As such, light spill impacts are negligible. • The operation of the road will not generate dust due to it being sealed. During construction, a range of mitigation measures will be available to be employed by site construction teams. Dust levels are therefore not expected to increase beyond those levels already generated by surrounding agricultural land uses. **Offset:** No offsets are required or proposed for this factor

1. Introduction

The Great Northern Highway (GNH) is a critical freight link between the Perth metropolitan area and the towns and mining centres of the Midwest and Pilbara regions of Western Australia (WA), forming part of Highway 1, a network of highways that connect all mainland state capitals. In 2014, Main Roads Western Australia (Main Roads) established the Muchea to Wubin Integrated Project Team (IPT), comprising Main Roads and industry partners Arup and Jacobs (combining to form Arup Jacobs Joint Venture, ASJV) to conduct a comprehensive planning review of the full Muchea to Wubin link along the GNH. The focus of the planning review was to improve freight efficiency and safety for both road users and local communities.

The GNH currently runs through the increasingly populated regions of the Swan Valley, Bullsbrook and Bindoon. This population growth is increasing road congestion, which in turn is reducing social amenity and road service quality, and negatively impacting freight efficiency and road safety. Through the Swan Valley and Bullsbrook, GNH is being bypassed by the Perth-Darwin National Highway - Swan Valley Bypass project (also known as Northlink WA). This will provide a free-flowing freight link between Muchea and Perth's northern suburbs.

One of the outcomes of the planning review of GNH between Muchea and Wubin was to allow 53.5 m road trains along this section of GNH. Currently 53.5 m road trains are required to stop and "break down" at Wubin due to the steepness of parts of GNH and the lack of a road train assembly area south of Wubin. Northlink WA is currently building a road train assembly area at Muchea which will be completed in 2019.

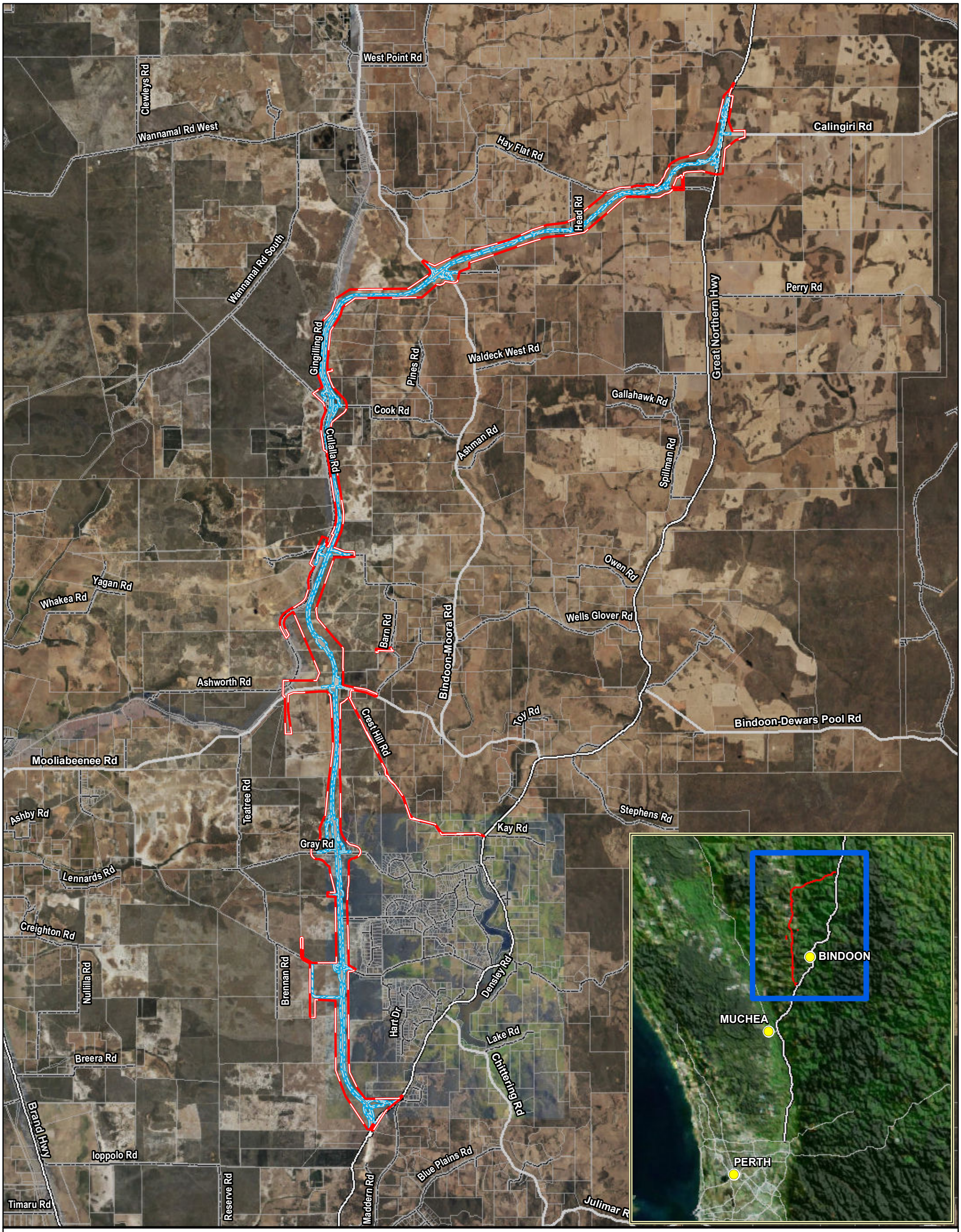
Heavy vehicles currently struggle with the steep grades on the GNH at Bindoon Hill. It has been identified that a more efficient route through or around Bindoon Hill is required if freight efficiency is to be improved. Identified impediments to 53.5 m road trains travelling along this section of GNH include:

- Bindoon town: major safety concerns regarding conflicts between local traffic, pedestrians, over size and/or over mass vehicles (OSOMs) and heavy freight travelling through the Bindoon town centre
- Bindoon Hill:
  - the steep grades of up to 6.2% over a 2 km length currently result in heavy vehicles travelling slowly at speeds of approximately 20 km/h; the volume of slow-moving traffic would be exacerbated by 53.5 m road trains travelling at 12 km/h or less; this speed differential between vehicle types creates a significant traffic hazard when lighter vehicles are attempting to travel at up to 100 km/h
  - there are a number of substandard horizontal curves and no passing lanes on the downhill sections
  - high temperatures in the summer months can adversely impact the bitumen surface and heavy vehicle performance on the steep sections of the hill.

As part of a planning review, sixteen corridor options were investigated, assessed and refined. Following this review, it was determined that a more efficient route around Bindoon Town and Hill would be required if freight efficiency is to be improved. As a result of the review, a bypass route was selected and endorsed by the Minister for Transport on 12 January 2017, following approval by the WA Planning Commission (WAPC).

Main Roads proposes to construct a bypass around Bindoon town and Bindoon Hill (hereafter referred to as the Bindoon Bypass, or the Proposal), located within the Shire of Chittering approximately 70 km north east of Perth and approximately 13 km north of Muchea, Western Australia (**Figure 1-1**). The Bindoon Bypass will divert from the existing GNH at the Chittering Roadhouse, running to the west of Bindoon and re-joining the GNH north of Calingiri Road. This will involve the construction of 47 km of new highway. The Bindoon Bypass will be constructed in stages based on the expected traffic volumes. The initial stage (Interim Stage) will consist of single carriageway (two lanes) with a number of overtaking lanes for both north-bound and south-bound traffic as well as stopping facilities. The second stage (Ultimate Stage) will build on the work done in the Interim Stage to accommodate higher numbers of road users, comprising an upgrade to dual carriageway (four lanes) between Chittering Roadhouse and Bindoon-Moora Road. Upgrades to local roads, rail crossings and intersections may also be required, as well as relocation of services, fencing of the road reserve and

construction of driveway accesses for landowners. This ERD has been prepared for assessment of potential impacts associated with both the Interim and Ultimate Stages of the Bindoon Bypass. To this end, a combined Development Footprint has been used in order to quantify and assess potential impacts.



Legend

- Development Envelope
- Development Footprint
- Highway
- Major Road
- Minor Road
- Cadastral Boundary

Joint Venture Partners:

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0 1,400 2,800
Metres

Scale at A3 1:120,000

Coordinate System: GDA 1994 MGA Zone 50

Main Roads Western Australia
Client

Project
Great Northern Highway
Bindoon Bypass South
Environmental Review Document

Proposal Location

Figure: 1-1

Drawing No	Issue
GNH-CN12-EA-PER-00001 F1-1	1

Task	Drawing Status / Other
EDR	Draft

Date	By	Chkd	Appd
30/05/2019	BG	LB	TJ

MXD Location: \\ausyd0-app023\ArcGISServer\WA_PB50732_GNH\ERD Figures\GNH-CN12-EA-PER-0001-F1-1.mxd

1.1 Purpose and Scope of the ERD

The purpose of this Environmental Review Document (ERD) is to present an environmental review of the Proposal. This review includes a detailed description of the Proposal components in **Chapter 2**, and the predicted environmental impacts and proposed mitigation and management measures for the Key Environmental Factors identified in the Environmental Scoping Document (ESD—approved on 4 December 2017) in **Chapter 4**. This ERD also assesses the potential impacts of the Proposal on Matters of National Environmental Significance (MNES) in **Chapter 6**, as required by the *Request for additional information – preliminary documentation* received from the Commonwealth Department of Agriculture, Water and the Environment (DAWE) on 2 May 2018, in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This document has been prepared in accordance with the following guidance:

- WA Environmental Protection Authority (EPA) Instruction on how to prepare an Environmental Review Document (EPA 2018a)
- EPA-endorsed ESD (0)
- Request for additional information – preliminary documentation (**Appendix B**).

The ERD contains the following information:

- details of the Proponent (Chapter 1)
- detailed description of the Proposal and its key characteristics (**Chapter 2**)
- stakeholder engagement (Chapter 3)
- receiving environment (Chapter 4)
- assessment of the impacts of the Proposal on the Key Environmental Factors and measures to avoid, minimise, manage or mitigate impacts (**Chapter 4**)
- other environmental factors or matters (**Chapter 5**)
- residual impacts and any offset requirements (Chapter 7)
- assessment of the impacts of the Proposal on the relevant MNES and measures to avoid, minimise, manage or mitigate impacts (**Chapter 6**)
- discussion on the interconnectedness of the Key Environmental Factors and predicted impacts and assessment of the predicted outcomes in relation to the environmental principles and objects (**Chapter 7**).

Copies of the technical studies and investigations undertaken to inform the environmental impact assessment (EIA), and referred to in this ERD, are provided in the appendices to this document. For hardcopy versions of this ERD, the appendices are provided on electronic media attached to the inside back cover of this document.

The following terms are used throughout the ERD:

- **study area**: The boundary within which field studies and investigations were undertaken. This is a nominal 500 m corridor.
- **Development Envelope**: The boundary within which the elements of the Proposal are located. This is smaller than the study area.
- **Development Footprint**: The area that will be directly disturbed by the proposal (e.g. cleared of native vegetation). The Development Footprint is entirely within the Development Envelope.

1.2 Proponent

The Proponent for the Proposal is Main Roads Western Australia. Details for the Proponent are as follows:

Commissioner of Main Roads
Main Roads Western Australia
PO Box 6202
East Perth WA 6002

ABN: 50 860 676 021

The key contacts for this Proposal are:

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1.3 Environmental Impact Assessment Process

The Bindoon Bypass was referred to the EPA under section 38 of the WA *Environmental Protection Act 1986* (EP Act) on 1 September 2017. The referral was advertised by the EPA for a seven-day public comment period from 15 September 2017 to 21 September 2017. Two comments on the referral were received by the EPA during this period.

On 2 October 2017, the Chairman of the EPA determined the Proposal required further assessment at the level of public environmental review. The public review period was set at six weeks and the ESD for the environmental review would be prepared by the EPA.

The ESD for the Proposal identified the following five Key Environmental Factors:

- Flora and Vegetation
- Terrestrial Fauna
- Hydrological Processes
- Inland Waters Environmental Quality
- Social Surroundings.

The ESD set out the studies and investigation required to inform the ERD, and the information that must be included in the ERD. Main Roads has commissioned the following studies and investigations to inform the ERD, in line with the requirements of the ESD:

- flora and vegetation surveys
- dieback assessment and mapping
- fauna surveys including targeted Black Cockatoo assessments
- groundwater review and assessment
- surface water quality assessment

- noise modelling and assessment
- landscape character and visual impact assessment;
- light-spill and headlight glare assessment
- Aboriginal heritage surveys (archaeological and ethnographic)
- non-indigenous heritage survey.

The results of these studies and investigations have been fed into the impact assessment undertaken in **Chapter 4**.

The assessment timeline for the Proposal was set out in the ESD and is provided in **Table 1-1**. A revised timeframe is also provided.

Table 1-1: Assessment Timeline

Key Assessment Milestone	Duration	Completion Date from ESD	Revised Completion Date[1]
EPA approves ESD		04/12/2017	
Main Roads submits first draft ERD		31/08/2018	
EPA provides comment on first draft ERD	6 weeks from receipt of ERD	12/10/2018	
Main Roads submits revised draft ERD	4 weeks from receipt of comments	09/11/2018	1/10/2019
EPA authorises release of ERD for public review	2 weeks from EPA approval of ERD	23/11/2018	15/10/2019
Main Roads releases ERD for public review	3 weeks from EPA authorisation	17/12/2018	5/11/2019
Close of public review period	6 weeks[2]	10/02/2019	17/12/2019
EPA provides summary of submissions	3 weeks from close of public review	01/03/2019	7/01/2020
Main Roads provides response to submissions	5 weeks from receipt of submissions	05/04/2019	11/02/2020
EPA reviews the response to submissions	4 weeks from receipt of response to submissions	03/05/2019	10/03/2020
EPA prepares draft assessment report and completes assessment	6 weeks from EPA accepting response to submissions	14/06/2019	21/04/2020
EPA finalises assessment report and provides to Minister	6 weeks from completion of assessment	27/07/2019	2/06/2020

[1] *Dates subject to change*

[2] *plus 2 weeks if over Christmas / New Year period*

1.4 Other Approvals and Regulation

Other than the Minister for Environment, the EPA and the DAWE, the key decision making authorities (DMAs) relevant to the Proposal are:

- Minister for Environment / Department of Biodiversity, Conservation and Attractions (DBCA)
- Minister for Water / Department of Water and Environmental Regulation (DWER)
- Minister for Lands / Department of Planning, Lands and Heritage (DPLH)
- Minister for Aboriginal Affairs / DPLH.

Following approval of the Proposal under both the EP Act and EPBC Act, the additional approvals detailed in **Table 1-2** may be required. These requirements will be determined during detailed design, and in consultation with the relevant regulator/Department.

Table 1-2: Other Approvals

Proposal Activities	Land Tenure/Access	Type of Approval	Legislation regulating the activity
Construction of Brockman River crossing and other creek crossings	Road reserve	Section 11 permit (Bed and Banks)	*Rights in Water and Irrigation Act 1914* (RIWI Act)
Dewatering for bridge construction	Road reserve	5C license to take water (dewatering exemption may apply)	RIWI Act
Abstraction for construction water	Access agreements will be negotiated for all land not owned or managed by Main Roads.	5C license to take water 26D license to construct or alter a well	RIWI Act
Construction within the boundaries of a registered Aboriginal heritage site.	Road reserve	Section 18 permit	*Aboriginal Heritage Act 1972* (AH Act)
Construction within the boundaries of heritage places or places more than 60 years' old	Road reserve Rail reserve (access agreement with the Public Transport Authority (PTA) and/or ARC Infrastructure will be in place)	Government Heritage Property Disposal (GHPD)	GHPD Process Policy