Title of Proposal - Bindoon Bypass - Northern Section

Section 1 - Summary of your proposed action

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

1.1 Project Industry Type

Transport - Land

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

The Proposed Action involves the upgrade of existing portions of Great Northern Highway (GNH) and construction of a new section of the GNH in the Bindoon region (Figure 1). This Proposed Action is referred to as the Bindoon Bypass – Northern Section and has a development footprint of approximately 176 hectares (ha). The objective of the Proposed Action is to improve the safety and efficiency of all passenger and freight vehicles, including the potential future use of the GNH by 53.5 metre (m) road trains. Bindoon Bypass – Northern Section will depart from the existing GNH near Calingiri West Road and follow the existing GNH north to approximately 1.6 kilometres (km) south of New Norcia. This upgrade of the highway is discrete and separate to the Bindoon Bypass – Southern Section (which is also referred to as the Bindoon Bypass). Its implementation is not dependent upon approval of the Bindoon Bypass – Southern Section.

Key components of the Project include:

- Construction of approximately 14.7 km of new carriageway;
- Widening and an overtaking lane extension of approximately 3.4 km of existing road;
- New southbound truck stop;
- New stock underpass;
- Upgrade and installation of new culverts;
- Intersections, driveway construction and access roads; and
- Construction support areas such as:
- laydown; and
- water storage areas.

The following benefits are expected from the Proposal:

- Travel time benefits – a reduction in the travel time per vehicle due to improved service levels within the GNH corridor.
- Vehicle operating cost (VOC) savings – a reduction in fuel and ‘wear and tear’ costs due to improved service levels on the GNH corridor (Austroads Project Evaluation Data, 2012).
- Safety benefits – a reduction in the number of crashes due to an improved GNH corridor alignment. WARES was used to estimate this benefit.
- Road maintenance cost savings – a reduction in the cost of maintaining the GNH corridor due to an enhanced road geometry that reduces the ‘wear and tear costs’ from vehicles travelling through the corridor.

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

Area	Point	Latitude	Longitude
Bindoon Bypass Northern Section 1	1	-31.145625942025	116.18476971947
Bindoon Bypass Northern Section 1	2	-31.145552483331	116.18472680412
Bindoon Bypass Northern Section 1	3	-31.145589212685	116.18481263481
Bindoon Bypass Northern Section 1	4	-31.139602140102	116.18665799461
Bindoon Bypass Northern Section 1	5	-31.135965635427	116.18940457664
Bindoon Bypass Northern Section 1	6	-31.131153480576	116.19129285179
Bindoon Bypass Northern Section 1	7	-31.126414555181	116.19232282005
Bindoon Bypass Northern Section 1	8	-31.100364608459	116.19648560844
Bindoon Bypass Northern Section 1	9	-31.092243206191	116.19794473015
Bindoon Bypass Northern Section 1	10	-31.079196061464	116.20326623283
Bindoon Bypass Northern Section 1	11	-31.076623173627	116.20369538628
Bindoon Bypass Northern Section 1	12	-31.076145343933	116.20627030693
Bindoon Bypass Northern Section 1	13	-31.079343081522	116.2061415609
Bindoon Bypass Northern Section 1	14	-31.092941453576	116.20073422752
Bindoon Bypass Northern Section 1	15	-31.10598671096	116.19858846031
Bindoon Bypass Northern Section 1	16	-31.131190215507	116.19442567192
Bindoon Bypass Northern Section 1	17	-31.137508412016	116.19210824333
Bindoon Bypass Northern Section 1	18	-31.145993234641	116.18657216392
Bindoon Bypass Northern Section 1	19	-31.145625942025	116.18476971947
Bindoon Bypass Northern Section 2	1	-30.976594213717	116.20905980431
Bindoon Bypass Northern Section 2	2	-30.978213164849	116.21403798424

Area	Point	Latitude	Longitude
Bindoon Bypass Northern Section 2	3	-30.992488181371	116.20785817467
Bindoon Bypass Northern Section 2	4	-31.020296252598	116.21472462974
Bindoon Bypass Northern Section 2	5	-31.033241157862	116.21077641807
Bindoon Bypass Northern Section 2	6	-31.040742513609	116.21008977257
Bindoon Bypass Northern Section 2	7	-31.045596017105	116.20871648155
Bindoon Bypass Northern Section 2	8	-31.056478731309	116.20940312706
Bindoon Bypass Northern Section 2	9	-31.068830574254	116.20562657677
Bindoon Bypass Northern Section 2	10	-31.068683537938	116.20116338097
Bindoon Bypass Northern Section 2	11	-31.056772841447	116.20562657677
Bindoon Bypass Northern Section 2	12	-31.043095758329	116.203909963
Bindoon Bypass Northern Section 2	13	-31.021620244118	116.20974644981
Bindoon Bypass Northern Section 2	14	-30.990575158768	116.20202168785
Bindoon Bypass Northern Section 2	15	-30.976741392228	116.20923146568
Bindoon Bypass Northern Section 2	16	-30.976594213717	116.20905980431

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

The Proposed Action is located within the Shires of Victoria Plains and Chittering in the State of Western Australia. The southern end of the Proposal is located approximately 28 km north of the town of Bindoon and the northern end is approximately 1.6 km south of the town of New Norcia.

The Proposed Action will occur within an area that is a mixture of the existing GNH road reserve and privately-owned properties. The Proposed Action will occur within a predominantly agricultural landscape with fragmented patches of remnant native vegetation.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

The development footprint is approximately 176 ha, which encompasses approximately 28 ha of native vegetation to be cleared.

1.7 Is the proposed action a street address or lot?

Lot

1.7.2 Describe the lot number and title. See Appendix B

1.8 Primary Jurisdiction.

Western Australia

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

Yes

1.9.1 Please provide details.

The Proposed Action has received funding from both the Western Australian and Commonwealth governments. The Commonwealth funding comprises 80% of the total project funding requirements.

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

No

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

Start date 06/2020

End date 06/2040

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

A detailed description of the planning context and options assessment for the Proposed Action is provided in Section 8.2. In summary thereof, planning included a multi-criteria analysis of online and offline options to determine the preferred option for the Bindoon Bypass – Northern Section upgrade.

The final concept alignment design was developed following several optioneering exercises and iterations of the proposed alignment to avoid and minimise environment and heritage impacts, as well as meet the key Project objectives for improving the safety and efficiency of the

highway.

During the analysis several heritage areas and environmental factors were identified that constrained the required geometric design improvements needed for the online option. Detailed flora and fauna surveys identified and mapped Carnaby's Cockatoo breeding and foraging habitat. Threatened flora and fauna species were also observed within the initial proposed alignment, including the Seven Mile Well Nature Reserve. As a result, the Online option was considered unsuitable, given that the safety and efficiency of the road could not be improved by way of geometric alignment and application of suitable clear zone without significantly affecting the environmental and heritage constraints identified within the project area. The installation of barriers to protect vehicles from roadside hazards, and protect Carnaby's Cockatoo trees was not considered a suitable option because:

- major sub-standard geometry flaws of the road could not be fixed, meaning that there was little benefit (improved safety) for substantial cost of installing barriers and making the minor upgrades to the highway;

- ongoing costs for maintenance of the barriers has the potential to be very high due to the close proximity to the edge of traffic lane; and

- it is not aligned with the overall intent of the GNH – Muchea to Wubin project (improved safety, improved efficiency, etc.).

A review was undertaken of the offline option to determine impacts to environmental and social values within the Project area. While the offline options north and south of Seven Mile Well Nature Reserve were met with approval (and progressed further in the current Proposed Action), the offline sections detailed in the report around the Seven Mile Well Nature Reserve were not progressed due to the desire to maintain the upgraded highway and works that Access Alliance had previously conducted in 2008. The resulting design as submitted in this Proposed Action is a combination of online and offline options to maximise the key projects requirements while minimising the environmental and heritage impacts.

The Proposed Action will require the following State approvals and permits:

- WA *Environmental Protection Act 1986* (EP Act), Part V Environmental Regulation Division 2, Clearing of Native Vegetation

- A native vegetation clearing permit (NVCP) is required under the EP Act prior to clearing native vegetation. Granting and administration of clearing permits is regulated under the *Environmental Protection Act (Clearing of Native Vegetation) Regulations 2004*. An application for a clearing permit will be submitted to the Department of Water and Environmental Regulation (DWER).

- Consent obtained under Section 18 of the WA *Aboriginal Heritage Act 1972* (AH Act) for works that impact the Registered Aboriginal Heritage site Moore River East (Place ID 20749)

- Referral to the State Heritage Office as part of the Government Heritage Property Disposal

Process (GHPDP).

- Administration of State Land and transfer of private land under the WA *Land Administration Act 1997*.

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

Stakeholder consultation has been an integral consideration in the development of the Proposal. The overarching objectives of the stakeholder engagement program are:

- to inform stakeholders about the Proposal and its impacts to the environment and describe the outcomes of consultation in project design; and

- to establish relationships with key stakeholders that enable ongoing dialogue through implementation and regulatory phases of the Proposal.

Stakeholder and community engagement is continuing with landowners, communities of interest, local government authorities and State Government agencies. From the commencement of planning studies associated with the Proposed Action, consultation has been undertaken with various parties including:

- Shire of Chittering;

- Shire of Victoria Plains;

- Environmental Protection Authority (EPA);

- Department of the Environment and Energy (DoEE);

- Department of Water and Environmental Regulation (DWER) and Environmental Protection Authority (EPA) Services Unit;

- Department of Biodiversity Conservation and Attractions;

- Department of Planning, Lands and Heritage

- Department of Transport;

- Local community;

- Landowners, tenants and lease holders;

- Heavy Vehicle Liaison Group;

- Local Businesses;

- Chittering Tourist Association;

- Wheatbelt Development Commission;

- Bindoon Bypass Reference Group;

- Agricultural Lime Cartage Association; and

- Traditional Owners (TOs) of the Yued Noongar dialect group.

A number of methods have been used to communicate with stakeholders including:

- community consultation sessions;

- Heavy Vehicle Liaison Group sessions;

- project overview brochures and newsletters;

- newspaper advertising;

- media briefings/ releases;

- direct mail/ email;

- Collabmaps (online spatial comments tool);

- direct contact with key stakeholders (face-to-face meetings);

- public displays (static displays of enlarged maps – accompanied by newsletters);

- Ministerial Briefing Notes; and

- website information (https://project.mainroads.wa.gov.au/home/regional/northeast/gnh/Pages/default.aspx).

Issues and concerns raised were largely around the potential loss of productive farmland, and the possibility of property severance (which has been avoided).

Further consultation will take place as the Proposed Action progresses.

Several consultations were also undertaken with the Yued Noongar community, including both archaeological and ethnographic consultations and site visits with nine Yued WC1997/071 Native Title Claim group representatives. The Proposal was discussed in detail with the representatives and several areas of significance were explained and reviewed on site. Two sites of ethnographic significance—Site ID 20008 Gingin Brook Waggyl and Site ID 20749 Moore

River Waugal—have been identified as being potentially impacted by the proposed works. With support from the TOs, these works were submitted for approval under section 18 of the AH Act and approved on 30 October 2017 (WA Department of Planning, Lands and Heritage reference 69-04210).

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

An Environmental Impact Assessment (EIA) was undertaken for the area of the Proposed Action (GNH Integrated Project Team, 2018). The EIA assessed the Proposed Action against publicly available environment and heritage information, together with the results of ecological surveys undertaken specifically for the Proposed Action. The EIA determined that the Proposed Action, which is the focus of this referral, may impact on listed threatened species and ecological communities, such as Carnaby's Cockatoo.

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

No

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

Yes

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

The Bindoon Bypass – Northern Section will tie in to the Bindoon Bypass – Southern Section construction package at the southern end and the New Norcia Bypass in the north. The Bindoon Bypass – Southern Section package is the subject of separate approval applications.

Section 2 - Matters of National Environmental Significance

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

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

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?

No

2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?

No

2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?

No

2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

Yes

2.4.1 Impact table

Species	Impact
Carnaby's Cockatoo (Calyptorhynchus latirostris) [Endangered] foraging habitat and potential nesting trees	Minor residual impacts likely. The Proposed Action involves clearing of up to 20 ha of foraging habitat. With reference to the EPBC

Species	Impact
	Act 1999: referral guidelines for three threatened black cockatoo species (DSEWPaC 2012) the following information is provided: (1) The design and planning of the Proposal has resulted in the Proposal avoiding all known Black Cockatoo nesting hollows, with only one tree containing a potentially suitable hollow being impacted. This tree has not been used for breeding. (2) Although the Proposal covers an area of approximately 176 ha and more than 17 km, 508 suitable diameter at breast height (DBH) trees will be impacted. (3) The Proposed Action will result in the clearing of only 15.5 ha of low value foraging habitat, and 4.5 ha of quality foraging habitat. (4) Carnaby's Cockatoo is unlikely to use any of the trees being cleared as a night roost. (5) As the Proposal Area is largely in cleared paddocks, only intersecting roadside vegetation when joining the current alignment of GNH, it is not expected to create a gap in habitat of more than 1km. <<Lead to a long-term decrease in the size of a population:>> the reduction in foraging and breeding habitat is unlikely to contribute to a long-term decrease in the population. Assessment of the potential impacts on Black Cockatoo habitat using vegetation complexes within a 12 km radius indicated that the vegetation complexes that provide the highest-quality foraging habitat were in general well-represented outside the Proposal Area. The availability of foraging and breeding habitat within 12 km of the Proposed Action is very high, comprising 'Eucalyptus Woodlands' and 'Other Shrublands' (Beard, 1981; Shepherd et al, 2002). There is approximately 20,692 ha of remnant vegetation (Beard, 1981; Shepherd et al, 2002) within 12 km of the Proposal Area. The majority of this is likely to be potential breeding habitat and/or foraging habitat. The clearing of approximately 20 ha of potential habitat represents less than a 0.1 % reduction in potential foraging and breeding habitat for Black Cockatoo species within the local area. <<Reduce the area of occupancy of the species:>> the Proposal is located within the mapped distribution of this species (DSEWPaC, 2012; DoEE, 2017), with its presence confirmed

Species	Impact
	in the field. The species is known to occur throughout the greater South-West region and Southern Jarrah Forest bioregion. Given the habitat within the broader area it is unlikely to significantly reduce the area of occupancy of the species. <<Fragment an existing population into two or more populations:>> Unlikely: the revised draft referral guideline for the three Black Cockatoo species (DoEE, 2017) identifies the species as mobile and highly dispersed and indicates that definition of distinct and/or important populations is not considered appropriate for these species. The Proposed Action is within an area where habitat is highly fragmented. The gap created by the Proposed Action will be approximately 200m wide and is unlikely to fragment an existing population into two or more populations. <<Adversely affect habitat critical to the survival of a species:>> the species was observed within the Survey Area with foraging and potential breeding habitat present (although no known nesting hollows are present). The Proposal will also implement mitigation measures to reduce indirect impacts that may reduce the quality of adjacent / retained habitat. The clearing of approximately 20 ha of potential habitat represents a <0.1 % reduction in potential foraging and breeding habitat for the Black Cockatoo species within the local area (suitable remnant vegetation based on mapped vegetation complexes within a 12km radius). The reduction in habitat is therefore not considered to affect habitat critical to the survival of the species. <<Disrupt the breeding cycle of a population:>> no known Black Cockatoo hollows were recorded within the Proposal Area. Implementing the Proposal will result in the loss of one tree that contain a potentially suitable nest hollow with no evidence of use, and a further 507 suitable DBH trees. No evidence of breeding was observed within the Proposal Area during the field survey (Phoenix, 2019). The removal of potential breeding trees and foraging habitat may result in some disruption to the species breeding cycle; however, when considered in the context of habitat availability within the local area

Species	Impact
	(based on suitable remnant vegetation within a 12km radius), the potential loss of 20 ha, which represents a <0.2 % reduction in potential foraging and breeding habitat for Carnaby's Cockatoo within the local area, is not considered significant. <<Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline:>> the Proposal may potentially result in loss of up to 20 ha of suitable Carnaby's Cockatoo habitat, with one tree considered to contain a potentially suitable hollow. The clearing of approximately 20 ha of potential habitat represents a <0.1 % reduction in potential foraging and breeding habitat for Carnaby's Cockatoo within the local area (suitable remnant vegetation within a 12km radius). The reduction in foraging and potential breeding habitat for Carnaby's Cockatoo may result in a minor residual impact associated with the Proposal. <<Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat:>> the Proposed Action is unlikely to result in the introduction of new species to the area. However, competition currently exists for nest hollows with European honeybees and other bird species. The loss of one potentially suitable hollow may marginally increase the competition for remaining hollows in the immediate area by a variety of species. <<Introduce disease that may cause the species to decline:>> the Proposal is unlikely to introduce a disease (e.g. beak and feather disease virus) that may cause the species to decline. There are no known diseases that may be introduced to the area that may cause the Carnaby's Cockatoo population to decline and it is unlikely that any disease already exists in the Proposal Area that may be spread by the activities of the Proposal (as there has been no indication of any such disease). <<Interfere with the recovery of the species:>> the Recovery Plans (DBCA, 2013 and DEC, 2008) provide measures for the species recovery. These include identifying, protecting and managing important habitat. The Proposed Action is likely

Species	Impact
	to result in minor residual impacts to habitat including potential breeding and foraging habitat, this loss is unlikely to interfere with the recovery of the species in the local area.

2.4.2 Do you consider this impact to be significant?

No

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

No

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

No

2.7 Is the proposed action to be taken on or near Commonwealth land?

No

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

No

2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

2.10 Is the proposed action a nuclear action?

No

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

No

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

No

2.13 Is the proposed action likely to have ANY direct or indirect impact on any part of the environment in the Commonwealth marine area?

No

Section 3 - Description of the project area

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

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

Flora

Flora and vegetation surveys were conducted over seven seasonal periods between Spring 2014 and Autumn 2018 (Phoenix, 2018).

The surveys identified 296 flora taxa from 154 genera and 55 families across the survey area. Fifteen conservation significant flora species comprising of 398 individual plants were also recorded in the survey area. No range extensions were identified. No flora protected under the EPBC Act were identified in the area proposed to be cleared.

Fauna

Initial fauna habitat and black cockatoo tree assessments were undertaken concurrently with the flora and vegetation surveys. Subsequent black cockatoo habitat assessments were undertaken with Tony Kirkby, a recognised subject matter expert on black cockatoos, to inspect the recorded potential breeding trees for signs of use. The following assessment was conducted for black cockatoo species in the survey area:

- survey of potential breeding trees, roosting sites and feeding sites for Carnaby's Cockatoo; and

- mapping of breeding and foraging habitat for Carnaby's Cockatoo.

The full survey report is provided as Appendix A. The surveys were conducted in accordance with following relevant State and Commonwealth guidelines including:

- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a) – for surveys conducted in 2017 and 2018;

- EPA Guidance Statement 51: Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia (EPA 2004) and Technical Guide: Flora and vegetation surveys for environmental impact assessment (DPaW and EPA 2015) – for surveys conducted in 2016 and earlier;

- Environmental Factor Guideline - Terrestrial Fauna (Environmental Protection Authority [EPA], 2016);

- Technical Guidance - Terrestrial fauna surveys (EPA 2004a); and

- Technical guide: Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA & DEC 2010).

Fauna surveys were conducted between October 2014 and March 2018. The desktop study of the survey area (Phoenix 2018) identified 8 conservation significant fauna species which may be present in, or have potential relevance to, the survey area. Of these, seven are listed under the EPBC Act and one is listed as migratory. The majority of the listed species are birds.

One conservation significant species, Carnaby's Cockatoo (*Calyptorhynchus latirostris*), was recorded as occurring within the survey area through direct observation and secondary evidence. Surveys undertaken by Phoenix (2018) recorded a total of 97.7 ha of quality foraging habitat and 309.7 ha of breeding habitat for Carnaby's Cockatoo present within the survey area (Figure 2). Surveys were conducted in accordance with EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and Forest Red-tailed Black Cockatoo (DSEWPaC, 2012).

Habitat for Carnaby's Cockatoo is separated into breeding habitat, foraging habitat and night roosting habitat. Breeding habitat is generally located in woodlands or forest but can also be present as isolated trees. Nesting occurs in appropriate hollows in salmon gums, wandoo, tuart, jarrah, flooded gum, york gum, powderbark, karri and marri. Roosting habitat is generally associated with riparian areas with a range of species being used, including flat-topped yate, salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts and pines. Foraging occurs in proteaceous shrublands and woodlands, kwongan heathland and eucalypt woodlands and forest that contain foraging species (DSEWPaC, 2012).

A total of 4,146 trees were recorded within the survey area as potential Carnaby's Cockatoo breeding trees (DBH greater than 500 mm, or greater than 300 mm for salmon gum and wandoo trees), with *Eucalyptus wandoo* being the dominant tree species present. Of these, 83 trees were considered by Tony Kirby (2018) to contain hollows suitable for breeding, including 44 which showed signs of use. The Proposal Area includes 687 suitable DBH trees.

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

The Proposed Action lies within the Brockman River sub-catchment within the Swan Avon (Main Avon) Catchment area, and the Moore River East Branch sub-catchment within the Moore River Catchment area. A number of streams cross, or are in proximity to, the Proposed Action including Moore River east major watercourse and Yarawindah Brook minor watercourse. A search of ArcGIS shapefiles indicates no wetlands (RAMSAR, Wheatbelt Wetlands dataset, etc.) are located within the vicinity of the Proposed Action.

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

The Proposed Action lies within the Avon Wheatbelt bioregion and Jarrah Forest bioregion as

defined by the Interim Biogeographic Regionalisation for Australia (IBRA). The most northerly portion of the Proposed Action is in the Katanning subregion of the Avon Wheatbelt bioregion and is comprised of an erosional surface of gently undulating rises to low hills with abrupt breakaways and continuous stream channels (Beecham 2001). Soils support woodlands of Wandoo, York Gum and Salmon Gum with Jam and *Casuarina* spp. The remainder of the survey area is located within the Northern Jarrah Forest subregion of the Jarrah Forest bioregion, which incorporates an area east of the Darling Scarp and is comprised of Jarrah?Marri forest and Marri woodlands. Sand sheets support local populations of *Banksia* low woodlands and heath. The following Soil Landscape Systems occur within the Proposed Action (Purdie et al, 2004):

- Glentrome System: stripped, weathered plateau with undulating low hills and rises; loamy earths, loam, loamy gravel and some clay and rock; weathered granite and migmatite

- Julimar System: Moderately dissected areas with gravelly slopes and ridges and minor rock outcrop on the eastern side of the Darling Plateau over weathered granite and granitic gneiss. loamy gravel, shallow duplexes and pale deep sand common.

- Ranfurly System: level to gently undulating plain being a relict flood plain, partially rejuvenated; loamy earths and clay, some duplex; from alluvium;

- Udamong System: Northern Darling Range near New Norcia. Partially stripped lateritic plateau with undulating low hills to gently undulating rises. Loamy gravel, minor pale sand and clay; deep weathered granitic gneiss, gneiss and schist;

- Wannamal System: Alluvial plain and fans, brown and red loamy earths, yellow brown sandy duplexes, loamy duplexes; and

- Yarawindah System: dissected lateritic plateau with rolling to undulating low hills and undulating rises; loamy gravel, loamy earth, loamy duplex, some rock; weathered schist and some gneiss.

Phoenix conducted targeted surveys to determine the extent of Eucalypt Woodlands of the Western Australian Wheatbelt Threatened Ecological Community (Eucalypt Woodlands TEC) between 20 October and 14 November 2017, and 6-7 March 2018. The surveys were conducted in accordance with relevant State and Commonwealth guidelines including:

- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (Environmental Protection Authority (EPA), 2016a);

- Environmental Factor Guideline - Flora and Vegetation (EPA, 2016b); and

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approved Conservation Advice - Eucalypt Woodlands of the Western Australian Wheatbelt.

Preliminary (desktop based) mapping of the extent of the Eucalypt Woodlands TEC was undertaken following the Spring 2015 surveys. This assessment was checked and ground?truthed in the field using a key and customised data collection template derived from conservation advice for TEC (Threatened Species Scientific Committee, 2015). Additional areas that had not previously been surveyed were assessed in the field. The full survey report is provided with this referral.

The DoEE draft conservation advice estimates the total current extent of this community at 18,007,898 ha. Of this approximately 76,000 ha is protected in formal conservation reserves and another 219,000 ha in ‘off-reserve’ conservation land.

A total of 99 sites were assessed against the Conservation Advice for Eucalypt Woodland TEC characteristics throughout the survey area. Whilst several of the sites and patches met the diagnostic characteristics, none were determined to meet all criteria for classification as Eucalypt Woodland TEC. It has therefore been determined that the Eucalypt Woodland TEC does not occur within the survey area.

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

There are no outstanding natural features in the Proposed Action.

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

Approximately 74% of the survey area comprises agricultural areas, existing roads and townships, while the remaining 26% comprises Low paperbark forest, Medium Marri forest and Acacia/Casuarina shrublands (Phoenix 2018). Eleven vegetation associations (Figure 3) have been mapped within the survey area as follows:

- 4: Medium woodland; Marri and Wandoo;

- 7: Medium woodland; York gum (Eucalyptus loxophleba) and Wandoo;

- 36: Shrublands; thicket, Acacia-Casuarina alliance species;

- 352: Medium woodland; York Gum

- 946: Medium woodland; Wandoo;

- 950: Medium woodland; Casuarina obesa;

- 973: Low forest; paperbark (Melaleuca rhaphiophylla)

- 999: Medium woodland; Marri;

- 1034: Medium woodland; Marri, Wandoo and Powderbark;

- 1132: Medium forest; Marri; and

- 1182: Medium woodland; Eucalyptus rudis and Melaleuca rhaphiophylla.

Phoenix (2018) found that the condition of the vegetation within the survey area ranged from Completely Degraded to Excellent with 77% of the area mapped as Completely Degraded (represented primarily by existing road, cleared areas and pasture/agricultural areas). The condition of the native vegetation varies widely: 9.1% recorded as Degraded, 6.8% as Good, 3.3% as Very Good and 0.2% as Excellent.

The vegetation types recorded by Phoenix in the survey area were correlated to the Shepherd et al (2002) vegetation associations and used to assess current State-wide extent against pre-European extent (Government of Western Australia, 2018). Six vegetation types are considered Vulnerable with less than 30% of their pre-European extent remaining; these were vegetation association 4, 7, 352, 946, 999 and 1182.

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

The topography of the Proposed Action is generally flat with undulating, gentle slopes. The land surface varies from 190 m Australian Height Datum (m AHD) to 315 m AHD.

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

The Proposed Action is a mixture of areas of mostly cleared paddock and some native vegetation. Approximately 79% of the Proposal Area is made up of existing road and cleared paddock, while most native vegetation remnants are considered low fauna value due to the presence of weeds and feral animals, including livestock. Better quality habitat was observed in some locations within the Proposed Action, most of which were located in privately-owned areas.

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

There are no Commonwealth Heritage Places or places listed on the WA State heritage register within the Proposed Action.

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

A search of the Department of Planning, Land and Heritage Aboriginal Heritage Inquiry System identified the following Aboriginal Heritage sites that are intersected by or adjacent to the Proposed Action (Figure 4):

- Moore River Waugal Site (Place ID: 20749) located to the east of the existing GNH; and

- Gingin Brook Waggyl Site (Place ID: 20008).

The river that defines the Moore River Waugal Site runs adjacent to the existing GNH for approximately 200 metres at one location. While the road surface upgrade works will not impact on the river, the embankment and erosion armouring works are likely to encroach on the high-water mark zone of the river. As such, consent under Section 18 of the Aboriginal Heritage Act 1972 will be sought for potential disturbance to this site.

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

The Proposed Action is a combination of freehold privately-owned land, road reserved managed by Main Roads, local road reserves managed by the Shire of Chittering and Shire of Victoria Plains, and Crown reserves managed by a number of entities.

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

Existing land uses in the Proposed Action are agriculture and transportation (road). No additional land uses are proposed for the Proposed Action.

Section 4 - Measures to avoid or reduce impacts

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

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

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

Impact Avoidance through Design

Information from biological surveys has influenced the design of the Proposed Action. Where practicable, the road design and alignment will avoid areas of high environmental significance such as Black Cockatoo foraging and breeding habitat. It is not feasible to avoid all environmentally significant areas due to other project constraints such as links to existing and proposed roads, road geometry, and the locations of locally-significant heritage sites, existing houses and other structures.

Design options included:

- Online – works to be completed in the same alignment to the existing route of the Great Northern Highway, and

- Offline – works to be completed in an alignment which does not match the existing route of the Great Northern highway.

Several alignment design variations were examined in the development of the final design, including: a full online upgrade option; staged online upgrades option; and offline options. The final design is a combination of online and offline options.

The final concept alignment design was developed following several optioneering exercises and iterations of the proposed alignment to avoid and minimise environment and heritage impacts, as well as meet the key Project objectives for improving the safety and efficiency of the highway.

In October 2017, a multi-criteria analysis was undertaken to determine the most suitable design for the Bindoon Bypass – Northern Section upgrade. The multi-criteria analysis involved the creation of a constraints map to show environmental, social, geological, hydrological, existing/proposed planning developments to determine the likely impacts of each option. Several heritage areas and environmental constraints in relation to the road alignment were

identified. These included Carnaby's Cockatoo breeding and foraging habitat, Threatened flora and fauna species and habitat and conservation estate, namely Seven Mile Well Nature Reserve.

Assessment of the online options determined that the safety and efficiency of the road could not be improved by way of geometric alignment and application of suitable clear zone without significantly affecting environmental and heritage values. The installation of barriers to protect vehicles from roadside hazards and protect a single potential Carnaby's Cockatoo breeding tree was not considered a suitable option due to major road geometry flaws. There was limited benefit in improved safety for the substantial cost of installing barriers and making minor upgrades to the highway, hence this option was also not aligned with key Project objectives (improved safety, improved efficiency, etc.). As a result, the full online upgrade option was unsuitable, given that safety and efficiency of the road could not be improved by way of geometric alignment and application of suitable clear zones without significantly affecting the environmental constraints identified. In particular, this option would have resulted in the clearing of 21 known nesting trees for Carnaby's Cockatoo and was considered unacceptable.

Offline options were also assessed as part of the design analysis. A combination of online and offline areas was assessed and ultimately progressed as the preferred option (this Proposed Action), as negative impacts to environmental and heritage areas would be greatly reduced (see below). By moving the alignment to the east of the existing carriageway, Main Roads was able to improve the vertical and horizontal geometry, include wider shoulders, introduce a suitable clear zone, and improve the overall safety and efficiency of the road without having significant impacts to the environmental and heritage areas of concern. Approximately 15.7 km of the 17.8 km length of this stage (88%) is proposed to be within cleared farmland.

Comparison of impacts to Carnaby's Cockatoo habitat for each design option:

- Known nesting trees:
    - Survey area: 44 trees
    - Online option (not proceeding): 21 trees
    - Proposal: 0 trees
- Trees with suitable hollows:
    - Survey area: 83 trees
    - Online option (not proceeding): 18 trees
    - Proposal: 1 tree
- High-quality foraging habitat:
    - Survey area: 97.7 ha
    - Online option (not proceeding): 16.4 ha

- Proposal: 4.5 ha

- Low-quality foraging habitat:

  - Survey area: 309.7 ha

  - Online option (not proceeding): 19.1 ha

  - Proposal: 15.5 ha

Impact Reduction through Environmental Management

The following measures are proposed to reduce or avoid impacts to Carnaby's Cockatoos:

- The tree known to contain a hollow that was considered to be potentially suitable for use by Carnaby's Cockatoo will be physically inspected by a suitably qualified person for nesting activity, eggs or fledglings within seven days prior to being felled, if clearing is occurring during cockatoo breeding season. The tree will not be felled until all nesting activity has ceased and/or young birds have fledged.

- The area to be cleared will be accurately pegged/marked on the ground.

- Laydown and other ancillary areas will be located outside of areas of native vegetation (e.g. in paddock areas).

- Weed and hygiene control measures will be in place during construction. These will include verifying all plant and machinery as clean prior to arrival at site and segregating stripped topsoil according to its weed and disease status.

- During construction, vehicle speed on site will be limited to reduce the risk of vehicle-fauna collisions.

- Management measures for the Declared Pest Asparagus asparagoides will be included in the Principal's Environmental Management Plan.

- Main Roads will implement standard dust control measures, which will be included in the Principal's Environmental Management Plan

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

The Proposed Action involves the clearing of one tree with a potentially suitable hollow for breeding (which has not been used for breeding), 15.5 ha of low value foraging habitat, and 4.5 ha of quality foraging habitat.

The Carnaby's Cockatoo Recovery Plan (DPaW, 2013) outlines the Important Bird Areas

designated specifically for Carnaby's Cockatoo in Calingiri, which supports up to 20 breeding pairs which nest in woodland remnants and isolated paddock trees and feed in native shrublands. Calingiri is located approximately 20 km to the east of the Proposal.

The Recovery Plan for Carnaby's Cockatoo (Parks and Wildlife, 2013) and the recovery action items outlined in Section 14 are addressed below:

Action 1: Protect and Manage Important Habitat

According to the Carnaby's Cockatoo Recovery Plan (DPaW, 2013) habitat critical to the survival of Carnaby's Cockatoo includes three types of habitat. These are addressed individually below:

"The eucalypt woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding",

"Woodland sites known to have supported breeding in the past and which could be used in the future, provided adequate nearby food and/or water resources are available or are re-established"

The proposed offline alignment has successfully avoided all known nesting trees and all other trees with hollows suitable for use by the species. The vegetation proposed to be cleared includes only one tree with a hollow potentially suitable for use by Carnaby's Cockatoos, although this hollow does not show evidence of previous use. Therefore, trees still present in the Proposed Action have not supported breeding in the past.

"In the non-breeding season, the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources."

The availability of foraging and breeding habitat within 12 km of the Proposed Action is very high, comprising 'Eucalyptus Woodlands' and 'Other Shrublands' (Beard, 1981; Shepherd et al, 2002). There is approximately 20,692 ha of remnant vegetation (Beard, 1981; Shepherd et al, 2002) within 12 km of the Project (Figure 5). A high proportion of this will more than likely be potential breeding habitat and/or foraging habitat. Proportionally, clearing of 20 ha of Black Cockatoo habitat is not considered significant to the recovery and survival of this species; however, given that this foraging habitat likely supports future breeding trees it is likely to be considered critical habitat for the species.

The area proposed to be cleared includes approximately 20 ha of Carnaby's Cockatoo foraging habitat. Of this, only approximately 4.5 ha is high quality habitat, and approximately 15.5 ha is low value foraging habitat. The locations of known nesting trees and trees with hollows suitable

for Carnaby's Cockatoo have been taken into consideration during the design phase of the project. As a result, clearing of only one potential nesting tree will be required for the entire action. As such, this clearing is unlikely to result in a significant impact to Carnaby's Cockatoo.

Action 2: Undertake Regular Monitoring

The Proposed Action is not inconsistent with this action item.

Action 3: Conduct Research to Inform Management

The Proposed Action is not inconsistent with this action item.

Action 4: Manage Other Impacts

The installation of wildlife crossing signs in locations where there is a high abundance of known nesting trees or extensive areas of foraging habitat has been considered in order to reduce the incidence of vehicle-bird collisions.

Any injured birds found during construction activities (within the construction area) will be taken to the nearest local wildlife carer as appropriate.

Action 5: Engage with the Broader Community

There is potential to engage with local community groups, schools, landcare groups and the like as part of the construction phase the project. These opportunities shall be further considered as the project is progressed.

Action 6: Undertake Information and Communication Activities

There is potential to engage with local community groups, schools, landcare groups and the like as part of the construction phase the project. These opportunities shall be further considered as the project is progressed.

While no specific threat abatement plans have been identified for Carnaby's Cockatoo, the "Threat Abatement Plan for Disease in Natural Ecosystems Caused by *Phytophthora cinnamomi*" is relevant for this species. Although several of the key Eucalypts used by Carnaby's Cockatoo for breeding are considered resistant to dieback disease (TSSC, 2015), many foraging species are susceptible.

A dieback survey conducted in 2016 by TerraTree indicated that the majority of the Bindoon Bypass – Northern Section assessment area is categorised as Excluded, as it is predominantly cleared agricultural land with sparse remnant native vegetation that is in Degraded or Completely Degraded condition. There is a Protectable Uninfested (dieback-free) area located at the southern extent of the Bindoon Bypass – Northern Section assessment area. Another Uninfested area in Bindoon Bypass – Northern Section is Unprotectable due to its size being less than 4 ha.

The proposed environmental outcomes for Carnaby's Cockatoos are:

- no net loss of known nesting hollows for Carnaby's Cockatoos;

- minimise loss of Carnaby's Cockatoo foraging habitat;

- no mortality of Carnaby's Cockatoos as a result of clearing activities associated with the Proposed Action; and

- minimise the risk of introduction or spread of weeds or disease that may impact on habitat for Carnaby's Cockatoos

Section 5 – Conclusion on the likelihood of significant impacts

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

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

5.1.1 World Heritage Properties

No

5.1.2 National Heritage Places

No

5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

5.1.4 Listed threatened species or any threatened ecological community

No

5.1.5 Listed migratory species

No

5.1.6 Commonwealth marine environment

No

5.1.7 Protection of the environment from actions involving Commonwealth land

No

5.1.8 Great Barrier Reef Marine Park

No

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

No

5.1.10 Protection of the environment from nuclear actions

No

5.1.11 Protection of the environment from Commonwealth actions

No

5.1.12 Commonwealth Heritage places overseas

No

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

The Proposed Action is not considered to be a controlled action as it will have a minor residual impact on Carnaby's Cockatoo. This is based on the following:

- Although the Proposal Area covers approximately 176 ha, the planning and design of the Proposal has managed to avoid all known black cockatoo nesting trees. The Proposed Action will only impact one tree with a potentially suitable hollow, with this hollow showing no signs of being used for breeding. More than 80 trees with potentially suitable hollows were recorded within the survey area for the Proposal.

- A total of 508 suitable DBH trees were recorded within the Proposal Area, with more than 4100 suitable DBH trees being recorded within the Proposal's survey area. Clearing for the Proposal will result in less than 15 % of the trees within the survey area for the Proposal being impacted.

- Although the Proposal Area stretches more than 17 km, the planning and design of the Proposal has managed to only require the clearing of 15.5 ha of low value foraging habitat and 4.5 ha of quality foraging habitat. More than 300 ha of low value foraging habitat and almost 100 ha of quality foraging habitat was recorded within the Proposal's survey area. The clearing of approximately 20 ha of Carnaby's Cockatoo habitat represents less than a 0.1 % reduction in potential foraging and breeding habitat for the Black Cockatoo species within the local area (reduction considered conservative, based on vegetation associations present within 12 km of the Proposal Area).

- None of the trees to be cleared are expected to be used by Carnaby's Cockatoo as night roosts.

- As the Proposal Area is largely in cleared paddocks, only intersecting roadside vegetation when joining the current alignment of GNH, it is not expected to create a gap in habitat of more than 1 km.

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

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

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

Main Roads is a State agency with a demonstrable record of responsible environmental management and environmental management systems. Main Roads recognises the importance of the natural environmental and social values and the broader benefits that these values provide to the community.

Main Roads is committed to protecting the natural environmental and social values in all of their activities. All work undertaken by Main Roads is completed in accordance with their Environmental Policy and Environmental Management System (EMS) that is implemented, maintained, continually improved and compliant with ISO 14001:2015. Main Roads EMS holds Certificate No. MRWQ51–CCE02 which complies with the requirements of ISO 14001:2015 environmental management systems comprising ‘Activities, products and services associated with delivering Road Management (planning, building and maintaining) on Western Australia’s State Road Network’. The EMS was certified in 8 January 2008 and expiring on 8 June 2019.

Main Roads has a demonstrated history of responsible environmental management associated with the construction of new and upgraded road infrastructure projects in Western Australia. Examples of these projects include:

- New Norcia Bypass, Great Northern Highway Upgrade;

- Miling Straight, Great Northern Highway Upgrade

- Bindi Bindi to Lyons East Road, Great Northern Highway Upgrade;

- Batty Bog Road to Walebing, Great Northern Highway Upgrade;

- Gateway WA - Perth Airport and Freight Access;

- Bunbury Port Access Road; and

- New Perth to Bunbury Highway.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b)

if a permit has been applied for in relation to the action – the person making the application.

Not applicable.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

Yes

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

Main Roads' Environmental Management System (EMS) is independently certified and covers all their processes and activities that have the potential to impact on the environment. The EMS enables compliance with Main Roads' environment and heritage compliance obligations, providing the framework for driving environmental requirements throughout leadership, planning, support, operation, performance evaluation and improvement actions. The Proposed Action, therefore, will be undertaken, monitored and measured in accordance with the Main Roads' EMS.

Main Roads' Environmental Policy commits to protecting and enhancing the natural environmental and social values in all Main Roads' activities.

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

Yes

6.4.1 EPBC Act No and/or Name of Proposal.

Main Roads has referred over 70 Proposals under the EPBC Act since January 2013. The 10 most recent referrals are:

- 2018/8367: Mitchell Freeway Extension and Wanneroo Rd upgrade;

- 2018/8316: Roe Hwy and Kalamunda Rd interchange upgrade;

- 2018/8346: Indian Ocean Drive widening and upgrade;

- 2018/8315: High Street upgrade, Fremantle;

- 2018/8279: South Coast Road Widening, Albany, WA;

- 2018/8284: Armadale Road to North Lake Road Bridge development, Jandakot, WA;

- 2017/8035: Great Northern Highway – Bindoon Bypass, WA;

- 2017/7972: Armadale Road Duplication - Tapper to Anstey Road;

- 2017/7934: Road Widening Kojonup South SLK 254.9 to SLK 259.8; and

- 2017/7907: Albany Highway Crossman Intersection Improvements

Section 7 – Information sources

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

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

Reference Source	Reliability	Uncertainties
Beard, JS, 1981. Swan 1:1000000 vegetation series: explanatory notes to sheet 7: the vegetation of the Swan area. University of Western Australia, Nedlands, WA.	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
Beecham, B, 2001. Avon Wheatbelt 2 (AW2 – Re-juvenated Drainage Subregion), in: May, J.E., McKenzie, N.L. (Eds.), A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management, Perth	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
DoEE, 2016. Interim Biogeographic Regionalisation for Australia, Version 7; Australian Government Department of the Environment and Energy, Canberra, October 2016	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
Government of Western	The information sources used	There are no uncertainties in

Reference Source	Reliability	Uncertainties
Australia, 2018. 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions, Perth	to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	the information source.
Mattiske, EM and Havel JJ, 1998. Vegetation Mapping in the South West of Western Australia and Regional Forest Agreement vegetation complexes. Map sheets for Pemberton, Collie, Pinjarra, Busselton, Margaret River, Mt Barker, and Perth, Western Australia. Scale 1:250,000. Department of Conservation and Land Management, Perth	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
Phoenix Environmental Sciences, 2019. Flora and Fauna Assessment for Calingiri Survey area Survey – Great Northern Highway, Muchea to Wubin Upgrades, Stage 2 Project	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
Purdie, BR, Tille, PJ, and Schoknecht, NR, 2004. Soil-landscape mapping in south-Western Australia: an overview of methodology and outputs. Department of Agriculture and Food, Western Australia, Perth. Report 280	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
Shepherd, DP, Beeston, GR,	The information sources used	There are no uncertainties in

Reference Source	Reliability	Uncertainties
Hopkins, AJ, 2002. Native vegetation in Western Australia: extent, type and status (No. 249). Department of Agriculture and Food, Western Australia	to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	the information source.
Threatened Species Scientific Committee, 2015. Approved conservation advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt (incl. Appendix A – species list). Department of the Environment, Canberra, ACT.	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.
Williams, K, Mitchell, D, 2001. Jarrah Forest 1 (JF1 - Northern Jarrah Forest Subregion), in: May, J.E., McKenzie, N.L. (Eds.), A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management, Perth	The information sources used to inform this referral are both recent and reliable. Database searches and field surveys were undertaken in 2016. Field surveys followed regulatory requirements set out in published guidance material. Additional information was sourced from technical publications from recognised experts in the field of study.	There are no uncertainties in the information source.

Section 8 – Proposed alternatives

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

8.0 Provide a description of the feasible alternative?

Crash history along the Bindoon Bypass – Northern Section of the GNH between 2012 and 2016 recorded five fatalities, seven hospitalisations, four medical treatment incidents, 21 incidents of major property damage, and five incidents of minor property damage. In light of this crash history and with the proposed use of 53.5 m road trains to travel between Muchea and Wubin, it was identified that the current geometry and standard of road condition along the GNH between Hay Flat Road and New Norcia was likely to negatively impact driver safety, and constrain the safe and efficient movement of all vehicles.

Without upgrading the road, safety concerns would prevent use of 53.5 m road trains and crash susceptibility would persist. Both the social imperative to improve road safety and the economic imperative to provide better freight to the State’s north mean that the option to not take the action is not practicable.

In October 2017, a multi-criteria analysis was undertaken to determine the preferred option for the Bindoon Bypass – Northern Section upgrade. The multi-criteria analysis assessed design options which were:

- Online – works to be completed in the same alignment to the existing route of the Great Northern Highway, and

- Offline – works to be completed in an alignment which does not match the existing route of the Great Northern highway.

A number of options were examined in the development of the final design including a full online upgrade option; staged online upgrades option; and offline options. The final design is a combination of online and offline options.

The multi-criteria analysis considered the following elements:

- Threatened Fauna (particularly Carnaby’s Cockatoo)

- Threatened Fauna Habitat

- Protected Areas (reserves, environmentally sensitive areas, conservation covenants)

- Native Vegetation

- Threatened Ecological Communities

- Threatened and Priority Flora

- Watercourses and wetlands

- Road geometry (vertical and horizontal)

- Cross section widths

- Clear zones

- Safety considerations

- Road furniture – signs and lines

- Drainage and culverts

- Constructability and traffic management

- Retiring good road

- Overtaking opportunities and lanes

The final concept alignment design was developed following several optioneering exercises and iterations of the proposed alignment to avoid and minimise environment and heritage impacts, as well as meet the key Project objectives for improving the safety and efficiency of the highway.

During the analysis several heritage areas and environmental factors were identified that constrained the required geometric design improvements needed for the Online option. Detailed flora and fauna surveys identified and mapped Carnaby's Cockatoo breeding and foraging habitat. Threatened flora and fauna species were also observed within the initial proposed alignment, including the Seven Mile Well Nature Reserve. As a result, the Online option was considered unsuitable, given that the safety and efficiency of the road could not be improved by way of geometric alignment and application of suitable clear zone without significantly affecting the environmental and heritage constraints identified within the project area. The installation of barriers to protect vehicles from roadside hazards, and protect Carnaby's Cockatoo trees was not considered a suitable option because:

- major sub-standard geometry flaws of the road could not be fixed, meaning that there was little benefit (improved safety) for substantial cost of installing barriers and making the minor upgrades to the highway;

- ongoing costs for maintenance of the barriers has the potential to be very high due to the close proximity to the edge of traffic lane; and

- it is not aligned with the overall intent of the Great Northern Highway – Muchea to Wubin project (improved safety, improved efficiency, etc.).

A review was undertaken of the Offline option to determine impacts to environmental and social values within the Proposed Action. While the offline options north and south of Seven Mile Well Nature Reserve were met with approval (and progressed further in the current Proposed Action), the offline sections detailed in the report around the Seven Mile Well Nature Reserve were not progressed due to the desire to maintain the upgraded highway and works that Access Alliance had previously conducted in 2008. The resulting design is a combination of online and offline options to maximise the key projects requirements while minimising the environmental and heritage impacts

8.1 Select the relevant alternatives related to your proposed action.

Locations

8.3 What is the extent and location of your proposed alternative action?

Area	Point	Latitude	Longitude
Fully online option	1	-31.143802156314	116.18551218461
Fully online option	2	-31.140422932484	116.18671381425
Fully online option	3	-31.13660279532	116.18997538041
Fully online option	4	-31.127933451769	116.19272196244
Fully online option	5	-31.100597793836	116.19735681962
Fully online option	6	-31.090749150167	116.19890177201
Fully online option	7	-31.078106111282	116.2042232747
Fully online option	8	-31.073695353217	116.2042232747
Fully online option	9	-31.067961061817	116.20233499955
Fully online option	10	-31.062373470933	116.20542490434
Fully online option	11	-31.058256088662	116.20679819535
Fully online option	12	-31.049285460302	116.20593988847
Fully online option	13	-31.042078933245	116.20628321122
Fully online option	14	-31.03987274446	116.20782816361
Fully online option	15	-31.034724771812	116.20834314774
Fully online option	16	-31.031488760836	116.20799982499
Fully online option	17	-31.020456078885	116.21246302079
Fully online option	18	-30.99250090031	116.20473825883
Fully online option	19	-30.983082573663	116.20834314774
Fully online option	20	-30.97807870947	116.20971643876
Fully online option	21	-30.978520237453	116.21057474564

Area	Point	Latitude	Longitude
Fully online option	22	-30.99250090031	116.20628321122
Fully online option	23	-31.020750300319	116.21332132768
Fully online option	24	-31.031782948195	116.20937311601
Fully online option	25	-31.034724771812	116.20937311601
Fully online option	26	-31.040461066468	116.20851480912
Fully online option	27	-31.042814318145	116.20748484086
Fully online option	28	-31.050020789527	116.20696985673
Fully online option	29	-31.058109035999	116.20765650224
Fully online option	30	-31.062520517004	116.2064548726
Fully online option	31	-31.06810809925	116.20319330644
Fully online option	32	-31.073548324424	116.20525324296
Fully online option	33	-31.078400154544	116.20559656571
Fully online option	34	-31.091043154314	116.20010340165
Fully online option	35	-31.127345670986	116.19443857621
Fully online option	36	-31.137337449033	116.19134867143
Fully online option	37	-31.140863707639	116.18774378251
Fully online option	38	-31.144095996173	116.18688547562
Fully online option	39	-31.143802156314	116.18551218461

8.4 Provide a brief physical description of the property on which the alternative proposed action will take place and the project location (e.g. Proximity to major towns, or for off-shore projects, shortest distance to mainland.

Both the Online and Offline options are located in the Shire of Victoria Plains and Shire of Chittering in the State of Western Australia between Calingiri Road and New Norcia. The Online option followed the current GNH alignment, with the Offline option following the current alignment in some parts, but also passing over land where there are currently no roads.

8.5 What is the size of the development footprint or work area of the alternative?

Online option: 31 ha native vegetation; Proposed alignment: 28 ha native vegetation

8.6 Is the alternative proposal a street address or lot?

Lot

8.6.2 Describe the lot number associated with the alternative proposal.

Primarily the Great Northern Highway road reserve, with some local road reserves managed by the two Shires, Crown reserve and possibly privately-owned properties.

8.7 Is there a different local government area and council contact for the alternative?

No

8.8 Provide details of the context, planning framework and State/Local Government requirements.

This information is the same as for the Proposed Action.

8.9 Describe any public consultation that has been, is being or will be undertaken (including with Indigenous stakeholders).

Consultation for the alternatives was undertaken in conjunction with the Proposed Action. The information provided in Section 1.13 provides the consultation undertaken to date for the alternatives as well as the Proposed Action.

8.10 Describe any environmental impact assessments that have been, is being or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project for the alternative.

Not applicable.

8.11 Is the alternative activity part of a staged development or a component of a larger project?

No

8.12 Nominate any matters of National Environmental Significance that are likely to be impacted by this alternative proposal by ticking the relevant checkboxes.

Listed threatened species or any threatened ecological community

8.12.1 Please provide further information on potential impacts of matters of environmental significance that you have nominated above.

The alternative online option would have impacted MNES to a much greater extent than the selected option proposed in this referral. Potential impacts to matters of national environmental significance as a result of the alternative online option in relation to the proposed option are summarised as:

- Clearing of 16.42 ha (an additional 11.97 ha) of quality Carnaby’s Cockatoo foraging habitat;

- Clearing of 19.10 ha (an additional 3.60 ha) of low value Carnaby’s Cockatoo foraging habitat;

- Loss of 21 (an additional 21) Carnaby’s Cockatoo hollows showing signs of use; and

- Loss of 18 (an additional 17) Carnaby's Cockatoo hollows suitable for breeding but with no signs of use

8.13 Describe any impacts on the flora and fauna relevant to the alternative proposal.

In addition to the impacts described in the previous section (8.12.1), the full online option for the Great Northern Highway resulted in a higher level of impact on all environmental factors:

- Clearing of 45.71 ha (an additional 14.17 ha) of native vegetation; and

- Clearing of 2 *Conospermum densiflorum* subsp. *unicephalatum* (Threatened) individuals.

8.14 Describe the hydrology relevant to the alternative proposal (including water flows).

The hydrology of the alternative alignments is similar to that described for the Proposed Action in Section 3.2. The online alignment and the current Proposal run either over the same route or in close parallel to one another.

8.15 Describe the soil and vegetation characteristics relevant to the alternative proposal.

The soil and vegetation characteristics are similar to those described for the Proposed Action in Section 3.3; however, the online option results in clearing of an additional 14.17 ha of native vegetation. While some associations are impacted slightly more in the proposed alignment, multiple vegetation associations are impacted at a significantly higher level in the alternative online option:

- 1034: Medium woodland; Marri, Wandoo and Powderbark – 3.25 ha (an additional 1.40 ha)

- 1132: Medium forest; Marri – 0.48 ha (an additional 0.44 ha)

- 1182: Medium woodland; *Eucalyptus rudis* and *Melaleuca rhaphiophylla* – 1.73 ha (reduced by 0.24 ha)

- 352: Medium woodland; York Gum – 7.20 ha (an additional 3.73 ha)

- 4: Medium woodland; Marri & Wandoo – 11.83 ha (an additional 8.58 ha)

- 7: Medium woodland; York Gum (*Eucalyptus loxophleba*) and Wandoo – 2.20 ha (reduced by 3.00 ha)

- 946: Medium woodland; Wandoo – 13.01 ha (an additional 5.78 ha)

- 950: Medium woodland; *Casuarina obesa* – 2.66 ha (reduced by 0.11 ha)

- 973: Low forest; paperbark (*Melaleuca rhaphiophylla*) – 0.28 ha (reduced by 0.68 ha)

- 999: Medium woodland; Marri – 3.01 ha (an additional 2.05 ha

8.16 Describe any outstanding natural features and/or unique values relevant to the alternative proposal.

There are no outstanding natural features or unique values of the areas for the alternative actions in addition to those already outlined in Section 3.4.

8.17 Describe the remnant native vegetation relevant to the alternative proposal.

The condition of the vegetation is expected to be similar to that mapped for the Proposed Action, given the proximity of the alternatives to the Proposed Action. However, the online option would impact an additional 14.17 ha of native vegetation: the alternative impacts roadside vegetation whereas the proposed design runs mostly over cleared pasture.

8.18 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the alternative proposal.

The gradient of the alternatives is similar to that of the Proposed Action.

8.19 Describe the current state of the environment relevant to the alternative proposal.

No specific assessment of the current state of the environment for the alternatives has been undertaken. Given the proximity of the alternatives to the Proposed Action, it is expected that this will be very similar to the current state of the environment for the Proposed Action.

8.20 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the alternative proposal.

Both the online option and the current Proposal would impact the site known as the Maher Unmarked Graves is not currently registered but is of interest, having been raised by a local landowner, was located by Archae-aus immediately adjacent to the east of the existing road reserve at SLK 103.7. The Maher Graves would be impacted by excavation of cut/fill activities at SLK 103.7. Consultation is currently underway with the Shire of Victoria Plains and the State Heritage Office regarding management of this site.

8.21 Describe any Indigenous heritage values relevant to the alternative proposal.

Both the online option and the current Proposal would require ground disturbance within the boundaries of the Moore River Waugal site (Site ID 20749) and the Gingin Brook Waggyl Site (Site ID 20008). These sites are registered as ethnographic sites as a result of having mythological value. These sites may be impacted by construction activities including clearing,

earthworks, and road construction.

8.22 Describe any other important or unique values relevant to the alternative proposal.

The Online option would remain on the existing GNH alignment, clearing the majority of roadside vegetation along the route.

8.23 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the alternative proposal.

The area of the alternative actions is a combination of freehold privately-owned land, road reserves managed by Main Roads, local road reserves managed by the Shire of Chittering, and Crown reserves managed by a number of entities. The online option is aligned with the existing GNH Road Reserve.

8.24 Describe the existing uses of the area relevant to the alternative proposal.

The existing land uses of the alternatives are mixed agriculture and transportation.

8.25 Identify any proposed uses of the area relevant to the alternative proposal.

No additional uses are proposed for the alternatives.

8.26 What are the proposed measures for any alternative action to avoid or reduce impact?

As the alternative will not be progressed, no measures beyond those for the Proposed Action which could also be applied to the alternatives have been identified.

8.27 Do you have another alternative?

No

Section 9 – Contacts, signatures and declarations

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

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

Organisation

9.2 Organisation

9.2.1 Job Title

Project Director

9.2.2 First Name

Norm

9.2.3 Last Name

Fox

9.2.4 E-mail

norman.fox@mainroads.wa.gov.au

9.2.5 Postal Address

PO Box 6202
East Perth WA 6892
Australia

9.2.6 ABN/ACN

ABN

50860676021 - MAIN ROADS

9.2.7 Organisation Telephone

0418 958 828

9.2.8 Organisation E-mail

norman.fox@mainroads.wa.gov.au

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

Not applicable

Small Business Declaration

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

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

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

No

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

Person proposing the action - Declaration

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

Signature: N Fox Date: 26/6/19

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

Signature: N Fox Date: 26/6/19

9.3 Is the Proposed Designated Proponent an Organisation or Individual?

Organisation

9.5 Organisation

9.5.1 Job Title

Project Director

9.5.2 First Name

Norm

9.5.3 Last Name

Fox

9.5.4 E-mail

norman.fox@mainroads.wa.gov.au

9.5.5 Postal Address

PO Box 6202
East Perth WA 6892
Australia

9.5.6 ABN/ACN

ABN

50860676021 - MAIN ROADS

9.5.7 Organisation Telephone

0418 958 828

9.5.8 Organisation E-mail

norman.fox@mainroads.wa.gov.au

Proposed designated proponent - Declaration

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

Signature: N Fox Date: 26/6/19

9.6 Is the Referring Party an Organisation or Individual?

Individual

9.7 Individual

9.7.1 Job Title

Environment, Sustainability and Heritage Manager

9.7.2 First Name

Jonathan

9.7.3 Last Name

Davies

9.7.4 E-mail

Jonathan.Davies@jacobs.com

Referring Party - Declaration

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

Signature:..... Date: 26/06/2019

Appendix A - Attachments

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

1. Bindoon Bypass - Northern Section EPBC Referral Appendix A (Part 1).pdf
2. Bindoon Bypass - Northern Section EPBC Referral Appendix A (Part 2).pdf
3. Bindoon Bypass - Northern Section EPBC Referral Appendix A (Part 3).pdf
4. Bindoon Bypass - Northern Section EPBC Referral Appendix C.pdf
5. BindoonBypassNorthernSection_DisturbanceFootprint.zip
6. BindoonBypassNorthernSection_ReferralArea.zip
7. Figure 1 - Location of the Proposed Action.pdf
8. Figure 2 - Black Cockatoo Habitat.pdf
9. Figure 3 - Vegetation Associations.pdf
10. Figure 4 - Heritage Values.pdf
11. Figure 5 - Carnaby's Cockatoo Habitat within 12 km.pdf