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mainroads WESTERN AUSTRALIA

NorthLinkWA
Perth-Darwin National Highway

Final Public Environment Report

Perth–Darwin National Highway (Swan Valley Section)

FEBRUARY 2016 | PART A: DRAFT PUBLIC ENVIRONMENT REPORT

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Public Environmental Review

Perth-Darwin National Highway (Swan Valley Section)

SEPTEMBER 2015 | VOLUME I: MAIN TEXT

This document is a Public Environmental Review under the *Environmental Protection Act 1986* (WA) and a draft Public Environment Report under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

EXECUTIVE SUMMARY

Introduction

Main Roads Western Australia (MRWA) proposes to construct a new section of the Perth–Darwin National Highway (hereafter referred to as 'the proposal') between Malaga and Muchea, Western Australia. The proposal is 38 km of new dual carriageway highway to the west of the Swan Valley and will connect the intersection of Tonkin Highway and Reid Highway in the south with Great Northern Highway and Brand Highway in the north.

The proposal is the culmination of decades of planning for the southern terminus of the Perth–Darwin National Highway (PDNH), a key 4,000 km road transport route linking Perth with northern Western Australia and the Northern Territory.

This document is a Public Environmental Review (PER) required under Western Australian environmental legislation and a Public Environment Report required under Commonwealth environmental legislation. It will be used by Western Australian and Commonwealth agencies as the basis for environmental assessment of the proposal.

Background and Context

The current PDNH alignment follows Great Northern Highway through the Swan Valley between Roe Highway and Muchea. However, urban growth and increased tourism between Midland and Bindoon has generated additional traffic on roads in and around the Swan Valley, including on Great Northern Highway. Traffic congestion, increased travel times and reduced amenity have resulted in the need to investigate a more contemporary solution that is able to cater for projected future traffic volumes while minimising impacts to residents, businesses and tourism in the Swan Valley.

While future urban growth will result in more development in the Swan Valley, opportunities for upgrade works along this section of Great Northern Highway are limited. With the freight task predicted to double by 2050, a fit for purpose road built to national highway standard is required.

The objectives of the proposal are to:

- Improve freight capacity, efficiency and productivity.
- Reduce urban congestion now and into the future.
- Improve road safety through the 'Towards Zero' initiative.
- Maximise sustainability through economic, social and environmental responsibility.
- Improve amenity for the community, tourists and road users.
- Create value through affordable infrastructure.

Overview of the Proposal

MRWA is, therefore, proposing to construct a new section of the PDNH (Figure ES1). Beginning at the intersection of Tonkin Highway and Reid Highway, the highway will travel north on a new alignment through Whiteman Park towards Gnangara Road before heading northeast through parts of the Gnangara State Forest to Ellenbrook. Skirting the western fringes of Ellenbrook, the highway will continue north

passing west of Bullsbrook before again turning northeast to cross Muchea Road South and the Midland–Geraldton railway line. The highway will connect to Great Northern Highway and Brand Highway on the eastern side of the Muchea town site.

The highway will be accessible from grade-separated interchanges at the following roads:

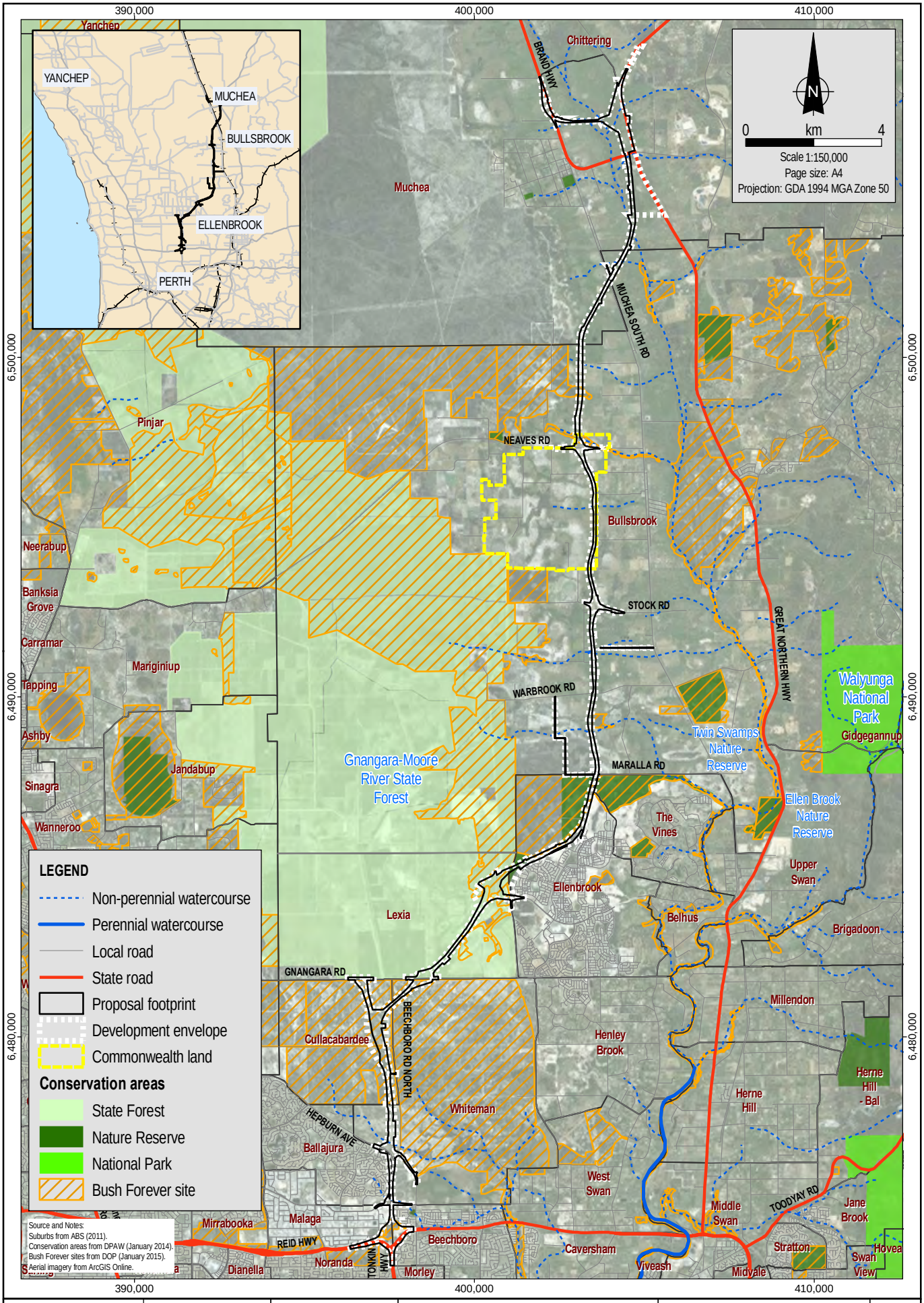
- Tonkin Highway and Reid Highway in Malaga.
- Hepburn Avenue in Malaga.
- Gnangara Road in Lexia.
- The Promenade in Ellenbrook.
- Stock Road in Bullsbrook.
- Neaves Road in Bullsbrook.
- Great Northern Highway and Brand Highway in Muchea.

The proposal's design also incorporates an interchange with a future road heading northwest from Whiteman Park, known as the East Wanneroo North–South Route. The East Wanneroo North–South Route north of Gnangara Road is currently in early planning stages and is not part of this proposal. Grade separations will be achieved using a combination of cuttings, embankments, bridges and flyovers as required.

Pedestrian and cyclist traffic will be accommodated through the provision of a Principal Shared Path alongside the new PDNH alignment between Ellenbrook and Malaga. The Principal Shared Path will be accessible from planned interchanges as well as local streets near the alignment to increase useability.

Construction of the proposal is to start in 2016–2017. While this document describes the ultimate planning design concept for the proposal, construction is likely to proceed in a staged approach. Proposal staging has not yet been decided, though it will be influenced by a number of factors including government priorities, funding availability, urban growth and traffic demand. The staging is not expected to change the overall environmental impacts described in this document.

The key characteristics of the proposal are summarised in Table ES-1.



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Main Roads WA

Public Environmental Review
Perth–Darwin National Highway

Proposal overview

Figure No:
ES1

Table ES-1 Key proposal characteristics

Element	Description
Proponent name	Main Roads Western Australia
Proposal title	Perth–Darwin National Highway
Short description	This proposal is to construct a new 38 km long section of the Perth–Darwin National Highway between Malaga and Muchea, Western Australia. It will consist of a dual carriageway highway and will connect the intersection of Tonkin Highway and Reid Highway in the south with Great Northern Highway and Brand Highway in the north.
Development envelope	Approximately 975 hectares (ha).
Proposal footprint	Disturbance for construction purposes to be no more than 746 ha.
Noise walls	• Noise walls constructed to a height of between 2.4 metre (m) and 5 m dependent on agreement with landholders. • Noise walls on residential boundaries to be no less than 2.4 m in height. • Noise walls on non-residential boundaries to be no less than 1.8 m in height.
Area of native vegetation cleared	• No more than 205 ha.
Area of conservation category wetland cleared or indirectly impacted	• No more than 16.0 ha.

Community Engagement and Stakeholder Consultation

MRWA is committed to utilising the knowledge, views and expertise of the community and stakeholders to guide sustainable outcomes in its decision making process as demonstrated by its Community Engagement Policy (MRWA, 2008). The key principles of this policy are respect, transparency, diversity, accountability, early engagement and leadership.

In accordance with this policy, a considerable amount of community and stakeholder engagement has been undertaken during the development of this proposal, both during historical alignment definition studies and as part of the current community and stakeholder engagement process. This has ensured that there is an agreed understanding of the local issues in relation to the proposal and that these issues have informed the proposal's design, subject to the proposal's constraints.

Stakeholder consultation and engagement has been facilitated through:

- Community 'drop-in' sessions held at various locations along the corridor as follows:
  - Morley Galleria.
  - Altone Park Shopping Centre.
  - Ballajura Library.
  - Ellenbrook Library.
  - Ellenbrook Shopping Centre.
  - Bullsbrook IGA.
  - Muchea IGA.

- Three Community Reference Groups.
- Environmental Reference Group.
- Freight and Road User Group.
- Drainage Reference Group.
- Safe Systems Working Group.
- Project Enabling Group involving and informing key government stakeholders.
- Community, business and special group meetings and briefings.
- Government agency briefing and project development sessions.
- A number of Project Newsletters.
- A 1800 Information Line.
- A project website (www.northlinkwa.com.au).
- A project email address.

A number of stakeholder issues have been raised throughout the proposal's development, including issues relating to the feasibility of various route alignments and the social, economic and environmental concerns associated with these. A Community and Stakeholder Register has been developed to capture all issues, complaints and queries raised.

The community and stakeholder engagement program has increased awareness of the proposal and enabled stakeholders to have the opportunity to inform and influence the proposal's design and management. MRWA is committed to ongoing engagement throughout the proposal's development to ensure that a sustainable outcome is achieved that minimises environmental and social impacts.

Strategic Assessment of the Proposal

The Strategic Assessment of the Perth and Peel Regions (SAPPR) is currently being undertaken under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). At a state level the SAPPR is being led by the Department of Premier and Cabinet, which is working closely with a number of state government agencies. The SAPPR will assess the impact of future development proposed under current state land use planning on Matters of National Environmental Significance (MNES) within the Perth and Peel regions in order to provide effective long-term management of key environmental issues and greater certainty to industry on those areas that can be developed.

The assessment of this proposal's environmental impacts is not being conducted as part of the SAPPR process. The timing of the SAPPR was not consistent with the timeframes required for the project to be ready for construction. However, the SAPPR does take this proposal into account given the implications of this proposal on future land use planning.

Further information on the SAPPR is available at www.dpc.wa.gov.au.

Potential Environmental Impacts and Management

As determined by the Environmental Protection Authority (EPA, 2014a), the preliminary key environmental factors for the proposal are:

- Flora and Vegetation.

- Terrestrial Fauna.
- Hydrological Processes and Inland Waters Environmental Quality.
- Amenity – Noise and Vibration.
- Rehabilitation and Decommissioning.
- Offsets.

Tables ES-2, ES-3, ES-4, ES-5 and ES-6 summarise the key existing environmental values, potential impacts, environmental commitments, key management strategies to achieve these commitments and residual impacts for each of the preliminary key environmental factors.

To ensure that impacts are minimised and that the relevant EPA objectives can be met, MRWA has committed to achieving a number of environmental outcomes. While various management measures are proposed in this PER to achieve these desired outcomes, alternative management strategies may arise with further design, investigations and proposal planning. MRWA is committed to achieving environmental outcomes through the implementation of appropriate management measures that are relevant to specific conditions on-site, and which may vary from those described in this document. This approach is consistent with the Environmental Assessment Guideline for Recommending Environmental Conditions (EPA, 2013a).

Following the minimisation of impacts though avoidance, mitigation and management measures, there are residual impacts that require offsetting. The strategies for offsetting the residual impacts address environmental values relevant to the State as assessed by the EPA and Matters of National Environmental Significance as determined by the Commonwealth.

In addition to the preliminary key environmental factors, the following environmental aspects were also required to be considered:

- Heritage:
  - Aboriginal.
  - European.
- Amenity – including Dick Perry Reserve and Whiteman Park.

In addition to consideration of amenity impacts to Dick Perry Reserve and Whiteman Park, impacts of the proposal on conservation areas were also considered in this section.

Tables ES-7 and ES-8 and ES-9 summarise the existing values, potential impacts, proposal commitments, the key management strategies to achieve these commitments and residual impacts for Aboriginal heritage, European heritage and amenity.

Matters protected by the EPBC Act, both environmental values on Commonwealth land and impacts to MNES (i.e. threatened and migratory species), have been considered separately. Table ES-10 summarises the existing environment, potential impacts, environmental commitments, key management strategies to achieve these commitments, and residual impacts for matters protected under the EPBC Act.

Following the implementation of mitigation measures and proposed offsets, MRWA expects that the proposal will meet the EPA's objectives for each of the preliminary key environmental factors: flora and vegetation, terrestrial fauna, hydrological processes and inland waters environmental quality, amenity and rehabilitation.

Table ES-2 Flora and vegetation

EPA objective	Key environmental values[1]	Potential impacts	Management	Residual impacts	Proposed offset
To maintain representation, diversity, viability and ecological function at the species, population and community level.	Major flora and vegetation values within and in close proximity (flora study area) to the proposal footprint: • 485 native taxa represent a high diversity of flora on the Swan Coastal Plain (SCP). • 205.0 ha native vegetation (in degraded to pristine condition). • Two Threatened and eight Priority listed flora. • 13 significant flora of the Perth Metropolitan region. • 60 vegetation associations and five mapping units. • Four Threatened Ecological Communities (TECs) (Mound Springs SCP, Claypans of the SCP, SCP02 and SCP20a). • Five Priority Ecological Communities (PECs) (SCP21c, SCP22, SCP23b, SCP24 and Banksia Woodlands SCP). • Ecological linkages (Gaston Road, Bullsbrook; Raphael Road, Bullsbrook; Maralla Road Nature Reserve; Rocla mining lease area; Cullacabardee; Reid Highway). • Approximately 361.5 ha of Groundwater Dependent Ecosystems (GDEs) (i.e. geomorphic wetlands supporting intact native vegetation). • 14 Bush Forever sites.	• Construction phase impacts: – Permanent loss of native vegetation. – Permanent loss of GDEs. – Permanent loss of native vegetation within Bush Forever sites. – Permanent loss of TECs and PECs. – Permanent loss of Threatened and Priority listed flora. – Spread of introduced weeds. – Spread of *Phytophthora* Dieback. – Fragmentation of native vegetation. • Operation phase impacts: – Spread of introduced weeds. – Spread of *Phytophthora* Dieback. – Vegetation degradation from uncontrolled access to remnant vegetation. – Increase in fires.	**Avoidance:** Mound Springs SCP TEC at Gaston Road; Claypans of the Swan Coastal Plain TEC adjacent to the existing Great Northern Highway; *Caladenia huegelii*, *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida* threatened flora locations; *Cyathochaeta teretifolia* (P3), *Ornduffia submersa* (P4) and *Stylidium striatum* (P4) priority flora locations; and Bush Forever Site 13, including conservation category wetland UFI 8926. **Environmental commitments:** • A maximum of 205.0 ha of native vegetation will be cleared. • A maximum of 128.5 ha of Bush Forever sites will be cleared. • A maximum of 49.6 ha of GDEs will be cleared. • A maximum of 4.4 ha of State listed TECs (SCP02 and SCP20a) will be cleared. • A maximum of 145.5 ha of State listed PECs (SCP21c, SCP22, SCP23b, SCP24 and Banksia Woodlands SCP) will be cleared. Key management strategies that can be applied to achieve these commitments: • Progressive clearing and revegetation will occur through the construction phase of the proposal. • An EMP will be developed and implemented prior to construction and will include measures for mitigating and managing the risk of fire, the introduction and/or spread of weeds and/or dieback and litter The EMP will also include management and monitoring of Threatened and Priority flora, TECs and PECs, including vegetated buffers. • A detailed infrastructure plan will be developed for each stage of the development prior to construction to ensure that the proposal is designed within the approved development envelope and identifies areas of native vegetation to be retained. • Educational and induction material about the significant flora and ecological communities will be provided to contractors working on the proposal to reduce the risk of clearing outside of the proposal footprint. • No movement of plant (construction) or vehicles outside of the designated clearing line during construction.	• Loss of 205.0 ha of native vegetation in degraded or better condition. • Loss of 49.6 ha of native vegetation consistent with GDEs. • Loss of 128.5 ha within Bush Forever sites. • Loss of 4.4 ha of two State TECs. • Loss of 145.5 ha of five State PECs. • Loss of 39.2 ha and 2.0 ha of critical habitat for *Caladenia huegelii* and *Grevillea curviloba* subsp. *incurva*, respectively. • High loss (known individuals) of two Priority taxa: – *Millotia tenuifolia* var. *laevis*: 18.8% on known individuals. – *Meeboldina decipiens* subsp. *decipiens* ms: 50% of known individuals. Three fragmented ecological linkage networks (Gaston Road Bullsbrook, Raphael Road Bullsbrook and Reid Highway) will be further fragmented. Three large, fairly contiguous ecological linkage networks (Maralla Road Nature Reserve, Rocla mining lease area and Cullacabardee) will be fragmented.	• Providing 673.5 ha of Black Cockatoo habitat as part of Offset Proposal 1. This offset area will be ceded to the Conservation Commission, with the intention that it will be added to conservation estate and managed in the long-term by Department of Parks and Wildlife. • Providing 78 ha of TEC SCP20a as part of Offset Proposal 1. This offset area will be ceded to the Conservation Commission, with the intention that it will be added to conservation estate and managed in the long-term by Department of Parks and Wildlife. • Providing 0.2 ha of TEC SCP02 as part of Offset Proposal 3. This will only be required where TEC SCP02 is confirmed to be present within the proposal footprint.

Table ES-3 Terrestrial fauna

EPA objective	Key environmental values[1]	Potential impacts	Management	Residual impacts	Proposed offset
To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Major fauna and habitat values within and in close proximity (fauna study area) to the proposal footprint: • 159.3 ha of natural fauna habitats (Banksia Woodland, Eucalypt/Corymbia Woodland, Dampland and Wetland). • A total of 97 fauna were recorded, including one fish, six amphibians, 19 reptiles, 62 birds and nine mammals. • Four species of conservation significant fauna were recorded: – Carnaby's Cockatoo (*Calyptorhynchus latirostiris*) (EN, S1). – Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (VU, S1). – Australian Bustard (*Ardeotis australis*) (P4). – Southern Brown Bandicoot (P5) (*Isoodon obesulus fusciventer*). • Seven species of conservation significance are considered likely to occur: – Great Egret (*Ardea alba*) (M, S3). – Cattle Egret (*Ardea ibis*) (M, S3). – Rainbow Bee-eater (*Merops ornatus*) (M, S3). – Western Carpet Python (*Morelia spilota imbricata*) (S4). – Jewelled Sandplain Ctenotus (*Ctenotus gemmula*) (P3). – Black-striped Snake (*Neelaps calonotos*) (P3). – Western Brush Wallaby (*Macropus irma*) (P4). • Ecological linkages important for fauna (Maralla Road Nature Reserve; Cullacabardee Nature Reserve and Reid Highway).	• Construction phase impacts: – Habitat loss due to vegetation clearing. – Habitat fragmentation due to vegetation clearing. – Disturbance to waterbirds (including migratory species) from impacts to wetlands. – Fauna mortalities primarily due to clearing activities. – Feral predation of displaced fauna by Red Foxes and Cats. – Accidental fire during construction activities. – Light and noise as a result of machinery and construction activities. • Operation phase impacts: – Habitat fragmentation. – Severing of ecological connectivity. – Fauna mortalities from fauna/vehicle interactions. – Feral predation by Red Foxes and Cats. – Habitat degradation, edge effects, weeds, dieback, rubbish and vehicle tracks. – Increased risk of bushfires due to greater human access to areas of vegetation. – Light and noise as a result of vehicles along the PDNH. – Altered surface and groundwater hydrology resulting in habitat degradation.	**Avoidance:** Western Swamp Tortoise critical habitat at Twin Swamps Nature Reserve, an area containing a high concentration of Black Cockatoo potential breeding trees and Mound Springs SCP TEC at Gaston Road. **Environmental commitments:** • A maximum of 201.8 ha of Carnaby's Cockatoo foraging habitat, 120.1 ha of Forest Red-tailed Black Cockatoo foraging habitat, and 120.1 ha of breeding habitat (inclusive of 737 potential breeding trees) and 58.6 ha of roosting habitat for both species will be removed. • A maximum of 159.3 ha of natural fauna habitat will be removed. • Ecological connectivity will be maintained across the proposal. • The occurrence of fauna mortality, associated with vegetation clearing and vehicle interaction will be minimised during construction and operation. Key management strategies that can be applied to achieve these commitments: • A total of 21 underpasses and two bridges are planned to be constructed in key locations along the proposal. Their effectiveness will be assessed via a monitoring program. • Boundary fencing or flagging will be used to delineate extent of clearing during construction. • An environmental management plan will be implemented to limit the risk of fire, spread of weeds, rubbish and vehicle tracks caused during construction. • Furniture and revegetation will be used in fauna underpasses to reduce risk of predation. • There will be multiple fauna underpasses in close proximity to reduce the risk of predation. • A trapping and translocation program will be conducted for ground dwelling fauna in areas of native vegetation prior to clearing. • Fauna spotters will be present during the clearing to help translocate any fauna and minimise any mortalities. • All fauna injured during the construction period will be taken to an authorised veterinarian or wildlife carer. • Limit the use of Banksia and other Black Cockatoo foraging resources as part of revegetation activities within 10 m of the road. • Fauna fencing and fauna escape ramps will be installed in areas of ecological significance.	• Loss of 159.3 ha of natural fauna habitat • Loss of Black Cockatoo habitat: – 201.8 ha of Carnaby's Cockatoo and 120.1 ha of Forest Red-tailed Black Cockatoo foraging habitat. – 58.6 ha of roosting habitat for both species. – 120.1 ha of potential breeding habitat (including 737 potential breeding trees) for both species. • Loss of conservation significant habitat: – 15.5 ha Great Egret habitat. – 271.2 ha Cattle Egret habitat. – 367.5 ha Rainbow Bee-eater habitat. – 81.7 ha Jewelled Sandplain Ctenotus habitat. – 124.8 ha Black Striped-snake, Western Carpet Python and Western Brush Wallaby habitat. – 19.0 ha Southern Brown Bandicoot habitat. • Fragmentation to fauna habitats. However, fauna underpasses allow the maintenance of ecological connectivity. • Some increase in the degradation of habitats from the spread of weeds and dieback, rubbish dumping, vehicle tracks and some edge effects.	Providing 673.5 ha of Black Cockatoo habitat as part of Offset Proposal 1. This offset area will be ceded to the Conservation Commission, with the intention that it will be added to conservation estate and managed in the long-term by Department of Parks and Wildlife.

Table ES-4 Hydrological processes and inland waters environmental quality

EPA objective	Key environmental values[1]	Potential impacts	Management	Residual impacts	Proposed offset
• To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected. • To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	Major surface water features within and in close proximity to the proposal footprint: • Ellen Brook. • Five Environmental Protection Policy (EPP) lakes (439, 440, 441, 450 and 453). • Fifty-two geomorphic wetlands, including 20 conservation category wetlands (CCWs), 11 resource enhancement wetlands (REW) and 21 multiple use wetlands (MUW). • Seven occurrences of Mound Springs SCP TEC. • Claypans of the SCP TEC. • 12.5 km of the proposal footprint occurs within the Gnangara Underground Water Pollution Control Area, including 12 km within the Priority 1 area and 0.5 km within the Priority 3 area. • Eight Wellhead Protection Zones (WHPZ) occur within the proposal footprint. Other key values considered include Twin Swamps and Ellen Brook nature reserves (2.6 km and 5 km from the proposal footprint respectively).	Construction phase impacts: • Altered surface water runoff volumes from vegetation clearing. • Altered surface water flow from earthworks and crossing/impounding of waterways and wetlands. • Temporary changes to local groundwater levels as a result of drawdown of local aquifers during construction. • Altered groundwater flow paths associated with subsurface compaction. • Altered water quality, associated with: – Liberation of sediments during ground disturbing activities. – Disturbance to potential acid sulfate soils. – Accidental spills and releases. Operation phase impacts: • Altered surface water runoff volumes from road surface. • Changes to local groundwater levels associated with infiltration basins. • Altered water quality associated with road runoff and accidental spills and releases.	**Avoidance:** Mound Springs SCP TEC at Gaston Road, one CCW (UFI 8914) and three REWs (UFI 8916, UFI 8915 and UFI 8541). The interchange at Warbrook Road was relocated to Stock Road to avoid any potential impacts on Twin Swamps Nature Reserve and an additional 2.8 ha of CCW and 4.5 ha of REW within the development envelope has been avoided. **Environmental commitments:** • A maximum of 14.8 ha of CCW and 14.0 ha of REW will be removed. • No adverse change in the condition of remaining wetlands, Ellen Brook, Mound Springs SCP TEC and Claypans of the SCP TEC. • No adverse impact on groundwater quality or availability of the Gnangara Mound. Key management strategies to achieve these commitments: • An EMP will be developed and implemented prior to construction and will include measures for mitigating and managing hydrological impacts particularly in regard to the generation, storage, handling and release of pollutants, including an emergency spill response procedure. • A drainage management and monitoring plan will be developed and implemented, including a groundwater monitoring procedure, to ensure impacts to Gnangara Mound are being appropriately managed. • Following final design and identification of appropriate water abstraction locations (where not in accordance with an existing bore/licence) an investigation into water abstraction requirements will be undertaken to understand the extent and scale of associated impacts on groundwater. • A wetland management and monitoring plan will be developed and implemented, including a groundwater monitoring to ensure that impacts to wetlands (including Ellen Brook) are being appropriately managed. • A detailed infrastructure plan will be prepared for each stage of the development prior to construction to ensure that the proposal is designed and constructed in accordance with the drainage strategy. • Any dewatering, sourcing of construction water and interference of beds and banks will be undertaken in accordance with approved licences under the *Rights in Water and Irrigation Act 1914*.	Construction: • Complete loss of one CCW (0.9 ha) and partial loss of an additional six CCWs (13.9 ha). • Partial loss of four REWs (14.0 ha). • Partial loss of EPP Lake 450 (0.04 ha). • Loss of ecosystem function in a portion of one CCW isolated by the proposal (1.2 ha). • Minor localised alteration to ephemeral surface water flows. • Temporary and localised lowering of groundwater levels. Operation: • Localised and temporary increase in groundwater levels at infiltration basins, following rainfall.	Providing 32 ha of CCW as part of Offset Proposal 2.

Table ES-5 Amenity (noise and vibration)

EPA objective	Key environmental values	Potential impacts	Management	Residual impacts
To ensure that impacts from noise and vibration are reduced as low as reasonably practicable.	Noise monitoring was conducted at eight sites between Bayswater and Muchea. • Existing daytime noise levels were highest at the Stock Road West site in Bullsbrook (54.2 dB $LA_{eq\ (Day)}$) and lowest at the Cootha Court site in Ballajura. • At night, the noisiest site monitored was Mitra Loop in Beechboro (52.8 dB $LA_{eq\ (Night)}$) and the quietest at sites in Cootha Court in Beechboro and Strachan Road in Bullsbrook (43.2 dB $A_{eq\ (Night)}$). • It is assumed for this proposal that daytime traffic noise levels will be more than 5 dB above the night time traffic noise levels.	• Sleep disturbance. • Hearing impairment. • Community annoyance. • Reduced amenity. • Reduced learning capacity. • Changed behaviour in the use of public areas. • Hearing protection requirement. • Vibration, leading to structural damage (only expected during construction).	**Environmental commitments:** • Construction noise will comply with the prescribed standards for noise emissions under the Environmental Protection (Noise) Regulations 1997. • Operational noise will not exceed the noise limit of 60 dB LA_{eq} as prescribed in State Planning Policy 5.4 between Reid Highway and Ellenbrook. Key management strategies that can be applied to achieve these commitments: • A CNVMP will be developed for any out of hour's works, prior to construction, to ensure all works are carried out in accordance with AS 2436:2010 - Guide to Noise and Vibration control on Construction, Demolition and Maintenance sites , and will include the following mitigation/management measures: – Using equipment with low noise levels and maintaining noise control devices on equipment. – Using broadband reversing alarms on construction equipment. – Ensure construction vibration does not exceed 5 mm/s. – Providing a 24-hour noise complaint hotline during construction. – Obtaining necessary approval to work outside of normal working hours, if required. – Providing public notification where receptors may be impacted by construction noise and/or vibration, particularly when works will occur outside normal working hours. – Minimising the amount of night-time traffic and construction adjacent to residential areas. – Conducting a dilapidation survey prior to construction. – Undertaking noise and vibration monitoring during construction in response to complaints or at potentially affected locations. • Using the quietest practical road surface. • Constructing noise walls to a maximum height of 5 m adjacent to noise sensitive premises between Reid Highway and Ellenbrook and of a material with a surface density exceeding 15 kg/m^2. • Should the construction of noise walls not result in achieving the noise target of 55 dB LAeq at noise sensitive receptors between Hepburn Avenue and Ellenbrook, efforts will be made to achieve the noise limit of 60 dB LAeq. • Constructing screening walls of a maximum height of 2.4 m at noise sensitive premises north of Ellenbrook. • Where the limit can't be achieved north of Ellenbrook, facade treatments will be applied to reduce indoor noise. The level of treatment provided will be determined on a case-by-case basis in consultation with affected property owners.	Noise and vibration impacts will temporarily occur during the construction phase of the proposal. With the implementation of mitigation and management measures the effects are expected to be manageable and within the requirements of the Environmental Protection (Noise) Regulations 1997. For brownfields areas between Reid Highway and Hepburn Avenue the proposal will achieve the noise limits of 60 dB LA_{eq} prescribed in State Planning Policy 5.4. For greenfields areas between Hepburn Avenue and Ellenbrook the proposal will achieve the noise target of 55 dB LA_{eq} at noise sensitive receptors where practicable, while achieving the noise limit of 60 dBLA_{eq} at remaining noise sensitive receptors where 55 dB LA_{eq} cannot be achieved. Mitigation measures will not achieve the 55 dB LA_{eq} target for eight rural residential properties north of Ellenbrook. Façade treatment will be provided to achieve indoor noise targets, but will not necessarily reduce external noise.

Table ES-6 Rehabilitation and decommissioning

EPA objective	Key environmental values	Potential impacts	Management	Residual impacts
To ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner.	• The revegetation strategy considers the existing landscapes of the proposal footprint. • Provide a landscape consistent with the vegetation types and classes of the proposal footprint. • Provide an urban experience for road users, creating a 'journey' through the road corridor. • Provide a road corridor development with high quality urban design and aesthetic structures. • Provide a soft landscaped road alignment in keeping with the varied site context of the corridor. • Provide landscape and urban design treatments that are sustainable and maintainable. • Provide landscape and urban design treatments that provide amenity for adjoining landholders and provide management of the roadways visual impacts.	Failure to rehabilitate or poor site rehabilitation can have a number of impacts on the environment including: • Reduction in the quality and quantity of habitats. • Reduction in ecosystem functions. • Impacts to adjacent natural vegetation and in the economic value of sites. • Contaminated water from road runoff into swales.	**Environmental commitments:** • All areas of temporary disturbance will be revegetated by the re-establishment of a cover of vegetation suited to the location. • Rehabilitation of the road verge will improve the amenity of the site, the stability of unpaved surfaces and promote ecological sustainability. Key management strategies to achieve these commitments: • An EMP will be developed and implemented during construction, which includes a detailed revegetation plan, outlining a clear timeframe for mitigation and management measures, monitoring actions and completion criteria. • Retain topsoil and vegetation removed (topsoil materials must be contaminant and weed free). • Dieback hygiene procedures will be implemented. • Weed hygiene procedures will be implemented. • Unsuitable topsoil and cleared vegetation will be treated or disposed of during the clearing works. • Landscaping will be undertaken in accordance with the landscaping types and extent present in the proposal footprint (rural zone, transition zone and urban zone). • Local provenance native species that represent the floristic formations of the proposal footprint will be selected for revegetation. • Rehabilitation will be scheduled progressively where practicable. Timing of activities will, however, be dependent on optimal seasons. • Ongoing maintenance will form part of the regional Maintenance Program and will be the responsibility of the Asset Manager.	• Achievement of roadside stability and minimised on-going maintenance. • Enhancement of the ecological function of vegetation immediately adjacent to the proposal footprint and assistance in conservation of local biodiversity value.

Table ES-7 Other environmental factors – Aboriginal heritage

EPA objective	Key environmental values	Potential impacts	Management	Residual impacts
To ensure that historical and cultural associations, and natural heritage, are not adversely affected.[1]	Archaeological and ethnographic heritage within the proposal footprint: Registered sites: • Bennett Brook in Toto (ID 3692). • Temporary camp (ID 20058). • NOR/02 Lightning Swamp (ID 21393). • Chandala Brook (ID 21620). Lodged Sites • Ellen Brook, Upper Swan (ID 3525). Newly identified sites in close proximity to the proposal footprint: • NorthLink 14-01. • NorthLink 14-02.	Disturbance to Aboriginal heritage sites. • Registered sites: – Bennett Brook in Toto (ID 3692). – Temporary camp (ID 20058). – NOR/02 Lightning Swamp (ID 21393). – Chandala Brook (ID 21620).	**Environmental commitments:** • No disturbance to any Aboriginal heritage site outside of that approved under Section 18 of the AH Act. • Minimise impacts to unknown Aboriginal heritage sites. Key management strategies to achieve these commitments: • Should any ground disturbance be proposed for Registered (archaeological) sites: – MRWA will seek formal, written advice from the Department of Aboriginal Affairs (DAA) as to whether Ministerial consent is required under Section 18 of the *Aboriginal Heritage Act 1972* (AH Act) for the proposed works. – Consultation with the South-West Aboriginal Land and Sea Council (SWALSC) and other relevant Aboriginal people will take place. – An application will be made under Section 18 of the AH Act to use the ground on which the sites are located, where necessary. • Prior to nearby ground disturbance, sites NorthLink 14-01 and NorthLink 14-02 will be clearly delineated using physical markers and/or fencing and existing induction programmes/materials altered to alert staff in the area about the restrictions in entering or working near these heritage areas. • Monitoring by archaeologists and/or appropriately trained members of the Noongar community will take place in areas that have high potential for sites with some archaeological integrity. • MRWA will continue to consult with SWALSC and other relevant Aboriginal people on the documentation and management of Aboriginal sites.	• Disturbance and clearance of Aboriginal Heritage values in proposal footprint.

1. Aboriginal heritage was not identified in the Environmental Scoping Document (ESD) by the EPA as a preliminary key environmental factor. However, heritage was identified as one of two other environmental factors that require consideration in the PER. In addition, MRWA recognises the significance of Aboriginal heritage and a survey was commissioned in this regard.

Table ES-8 Other environmental factors – European heritage

EPA objective	Key environmental values	Potential impacts	Management	Residual impacts
To ensure that historical and cultural associations, and natural heritage, are not adversely affected.[1]	Two Management Category No.5 places on the Shire of Chittering's Heritage List were identified within the proposal footprint: • Muchela – No. 30 Brand Highway, Muchea. • Drainage/Irrigation Channel - association with early drainage practices in the Muchea district. One Place registered in the National Estate List of Classified Places (the National Trust): • Ellenbrook Estate Area. One place not listed on any statutory lists, but potentially subject to the Government Heritage Property Disposal Process: • Forestry Department's Divisional Headquarters and Fire Lookout.	Disturbance to European heritage values in the proposal footprint associated with: • Muchela – No. 30 Brand Highway, Muchea. • Drainage/Irrigation Channel, Muchea South Road, Muchea. • Ellenbrook Estate Area. • Forestry Department's Divisional Headquarters and Fire Lookout.	**Environmental commitments:** • No disturbance to any European heritage site outside of the proposal. Key management strategies to achieve these commitments: • A site visit will be undertaken to enable external photographs to be taken of the Ellenbrook Estate Area, Muchela, Drainage/Irrigation Channel that may be subject to the Government Heritage Property Disposal Process (GHPDP). The site visit should enable an understanding of the nature and extent of original/historic fabric remaining on site. • Comply with the GHPDP by preparing a letter to the State Heritage Office advising of further clearance of the Ellenbrook Estate Area, Muchela, the Drainage/Irrigation Channel and the Forestry Department's Divisional Headquarters and Fire Lookout site. • The Shire of Chittering will be advised that the proposal is occurring and that it will directly impact on two locally listed heritage places - Muchela and the Drainage/Irrigation Channel. Clarification is required on the status of these places on the Shire's Heritage List and what process is required to enable the further clearance of this site. • The European Heritage values identified adjacent to the study area will be clearly marked on future mapping for the proposal to ensure that all construction personnel are aware of their location and the need for care during construction or with any future boundary changes. • The City of Swan, Shire of Chittering and City of Bayswater will be informed that the proposal is occurring and that it is occurring in close proximity to locally listed heritage places.	• Disturbance and clearance of European Heritage values in proposal footprint.

1. European heritage was not identified in the ESD by the EPA as a preliminary key environmental factor and no specific objectives were set for this. However, heritage was identified as one of two other environmental factors that require consideration in the PER. In addition, MRWA recognises the significance of European heritage.

Table ES-9 Other environmental factors – amenity (Dick Perry Reserve, Whiteman Park and conservation areas)

EPA objective	Key environmental values	Potential impacts	Management	Residual impacts
To ensure that impacts to amenity are reduced to as low as practicable.[1]	• Proposed Dick Perry Reserve (Concept Plan for Gnangara Park). • Whiteman Park (reserved for parks and recreation). • Conservation areas: – Class A Nature Reserve 46919. – Class A Nature Reserve 46920. – Gnangara–Moore River State Forest No. 65. – Nine Bush Forever sites: 97, 100, 192, 198, 300, 304, 307, 399 and 480.	• Reduction in the size of Dick Perry Reserve and its potential to be utilised as recreational open space by the community. • Loss of native vegetation, habitat fragmentation and potential fauna mortalities through Whiteman Park associated with clearing activities and vehicle movements during construction and operation. • Loss of conservation areas.	• Construction of the proposal is likely to require changes to the Master Plan to accommodate the relocation or redesign of planned infrastructure. • Management measures to address the continued use and viability of the reserve have been addressed through the design of the proposal and include: – Re-establishment of a barrier fence along the western side of the proposal to ensure access to the reserve is controlled. Gates for access for fire management activities will be established at regular intervals as agreed with DPAW. – Link walk trails with PSP at the interchanges on Gnangara Road and at Ellenbrook to ensure continuity of the trails. • Implementation of mitigation measures relevant to the specific environmental values (i.e. flora and vegetation, fauna and habitats, and wetlands) detailed in Tables ES-2, ES-3 and ES-4, including: – Implementation of a vehicle underpass south at crossing of Baal Street. Additionally, an access road parallel to the alignment will be constructed in this vicinity to provide access to the Cullacabardee community. – Implementation of fauna underpasses on or adjacent to Whiteman Park to facilitate fauna movement and maintain ecological connectivity. – Management measures to address habitat fragmentation have been incorporated in the UPDC of the proposal. These are discussed in more detail in Section 9.5.1. – The use of fauna spotters and a translocation program to reduce risk of fauna mortalities. • Minimise the State Forest and Nature Reserve excision area and impact to Bush Forever sites as much as practical.	• Reduced amenity of the proposed Dick Perry Reserve and its utilisation as open space. • Minor and localised impacts on fauna populations. • Fragmentation of fauna habitats will increase due to the proposal. However, the inclusion of fauna underpasses allows the maintenance of ecological connectivity to the greatest practicable extent. • Excision of 114 ha of conservation estate (including 8 ha of Class A Nature Reserve and 106 ha of State Forest). • Loss of 128.5 ha of intact native vegetation in Bush Forever sites.

1. Amenity was not identified in the ESD by the EPA as a preliminary key environmental factor.

Table ES-10 Matters protected under the EPBC Act

Key environmental values	Potential impacts	Management	Residual impacts	Proposed offset
Matters of National Environmental Significance under the EPBC Act: • Two species of conservation significant fauna were recorded: – Carnaby's Cockatoo *Calyptorhynchus latirostiris*) (EN, S1). – Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (VU, S1). • Six species of conservation significance are considered likely to occur: – *Caladenia huegelii* (EN). – *Darwinia foetida* (CR, EN). – *Grevillea curviloba* subsp. *incurva* (EN). – Great Egret (*Ardea alba*) (M, S3). – Cattle Egret (*Ardea ibis*) (M, S3). – Rainbow Bee-eater (*Merops ornatus*) (M, S3). • Two TECs (Claypans of the SCP and Mound Springs SCP) were recorded. Environmental impacts to Commonwealth land: • No conservation significant flora was recorded or is expected to occur. • 1.9 ha of Wetland habitat classified as potential breeding habitat for Black Cockatoos. • 26 potential breeding trees. • No critical habitat exists on the Commonwealth Land for conservation significant fauna other than the Black Cockatoos. • Two CCWs (0.42 ha) are present.	Matters of National Environmental Significance under the EPBC Act: • Permanent loss of TEC. • Local loss of Threatened flora. • For Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo: – Loss of breeding, foraging and roosting habitat. – Increased occurrence of vehicle collisions. – Habitat degradation. • Habitat degradation and loss for Great Egret, Cattle Egret and Rainbow Bee-eater. Environmental impacts to Commonwealth land: • Clearing of Conservation Category Wetlands. • Loss of fauna habitat and Black Cockatoo habitat.	**Avoidance:** Mound Springs SCP TEC at Gaston Road, Claypans of the SCP TEC adjacent to the existing Great Northern Highway, *Caladenia huegelii*, *Grevillea curviloba* subsp. *incurva* and *Darwinia foetida* threatened flora locations, Western Swamp Tortoise critical habitat at Twin Swamps Nature Reserve and an area containing a high concentration of Black Cockatoo potential breeding trees. **Environmental commitments:** • A maximum of 201.8 ha of Carnaby's Cockatoo foraging habitat, 120.1 ha of Forest Red-tailed Black Cockatoo foraging habitat, 120.1 ha of breeding habitat, 58.6 ha of roosting habitat and 737 potential breeding trees will be removed. • No impact to TECs, Threatened flora and Western Swamp Tortoise critical habitat. Key management strategies that can be applied to achieve these commitments for Matters of National Environmental Significance under the EPBC Act: • A management and monitoring program will be included within the EMP to ensure that the condition and structural integrity of the vegetated buffer for *Caladenia huegelii* is maintained. • Additional targeted surveys will be completed prior to the construction phase to further define the population size and the extent of the known location. The targeted survey will also identify if any additional plants are located within the proposal footprint. • Impacts to the loss of Black Cockatoo habitat will be offset. Key management strategies that can be applied to achieve these commitments for environmental impacts to Commonwealth land include: • Implement an environmental management plan to limit spread of weeds, dieback, rubbish and vehicle tracks. • Installation of drainage culverts to maintain hydrological flow. • Reduction of design footprint. • A wetland management and monitoring plan will be prepared and implemented.	Matters of National Environmental Significance under the EPBC Act: • Loss of 39.2 ha and 2.04 ha of Critical habitat for *Caladenia huegelii* and *Grevillea curviloba* subsp. *incurva*, respectively. • No impact to Mound Springs SCP and Claypans of the SCP TECs. • No impact upon the Western Swamp Tortoise or its critical habitat at Twin Swamps Nature Reserve and Ellen Brook Nature Reserve. • For Black Cockatoos: – The loss of 201.8 ha of Carnaby's Cockatoo foraging habitat, 120.1 ha of Forest Red-tailed Black Cockatoo foraging habitat, 58.6 ha roosting habitat, 120.1 ha breeding habitat and 737 suitable trees (including Commonwealth land). – Increased occurrence of vehicle collision. – Habitat degradation. Commonwealth lands: • No significant flora or vegetation exists on the Commonwealth land within the proposal footprint. • Excision of 46.4 ha of Commonwealth land. • Rural land use will be maintained for disposed land with restrictive covenants. • Loss of 1.9 ha of Wetland habitat (0.42 ha of CCW), classified as potential breeding habitat for Black Cockatoos[1]. • Loss of 26 potential breeding trees[1].	Providing 673.5 ha of Black Cockatoo habitat as part of Offset Proposal 1. This offset area will be ceded to the Conservation Commission, with the intention that it will be added to conservation estate and managed in the long-term by Department of Parks and Wildlife. Providing an offset for impacts to critical habitat for *Caladenia huegelii.*

1. Fauna values outside of Commonwealth land are addressed separately in Table ES-3.

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Document Control

Revision	Date	Description	Prepared	Reviewed	Approved
A	06/02/2015	Draft to NorthLink WA (Coffey v1)	Coffey	N. Hattingh	D. True
B	28/02/2015	Draft to Main Roads WA (Coffey v2)	Coffey	N. Hattingh	D. True
C	25/03/2015	Final draft to Main Roads WA (Coffey v3)	Coffey	N. Hattingh	D. True
0	31/03/2015	First submission to Office of the Environmental Protection Authority (Coffey v4)	Coffey	N. Hattingh	D. True
1	03/07/2015	Revised draft to Main Roads WA (Coffey v5)	Coffey	D. True	D. True
2	15/07/2015	Second submission to Office of the Environmental Protection Authority (Coffey v6)	Coffey	D. True	D. True
3	07/08/2015	Third submission to Office of the Environmental Protection Authority (Coffey v7)	Coffey	D. True	D. True
4	04/09/2015	Final for public review (Coffey v8)	Coffey	D. True	D. True

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1 INTRODUCTION

Main Roads Western Australia (MRWA) proposes to construct a new section of the Perth–Darwin National Highway (hereafter referred to as 'the proposal') between Malaga and Muchea, Western Australia. The proposal is 38 km of new dual carriageway highway to the west of the Swan Valley and will connect the intersection of Tonkin Highway and Reid Highway in the south with Great Northern Highway and Brand Highway in the north.

The proposal is the culmination of decades of planning for the southern terminus of the Perth–Darwin National Highway (PDNH), a key 4,000 km road transport route linking Perth with northern Western Australia and the Northern Territory.

This document is a Public Environmental Review (PER) required under the Western Australian *Environmental Protection Act 1986* (EP Act) and a Public Environment Report required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It will be used by the Office of the Environmental Protection Authority (OEPA) and the Department of the Environment (DOTE) as the basis for conducting an environmental impact assessment of the proposal.

1.1 Proponent

The proponent for the proposal is MRWA and formal contact details are shown in Table 1.1.

Table 1.1 Proponent identification

Property	Details	
Proponent	Commissioner of Main Roads Main Roads Western Australia PO Box 6202 East Perth WA 6002	
Key contacts	Rob Arnott Project Director Main Roads Western Australia PO Box 6202 East Perth WA 6002 rob.arnott@mainroads.wa.gov.au	Denise True Environment and Heritage Manager NorthLink WA PO Box 4223 Victoria Park WA 6979 denise.true@northlinkwa.com.au

1.2 Background and Context

The PDNH is a key interstate road for the transport of people and goods between Perth and Darwin. Within Western Australia (WA), the route is important for transport between the southwest and the north of the State.

The current route of the PDNH starts at the intersection of Great Northern Highway with Roe Highway and Reid Highway in Midland. It follows Great Northern Highway in a northerly direction through the Swan Valley, passing through the townships of Upper Swan and Bullsbrook. At the intersection with Brand Highway in Muchea, the PDNH continues along Great Northern Highway to the northeast.

Great Northern Highway is a two-lane road built to rural highway standard. However, urban growth and increased tourism between Midland and Bindoon has generated additional traffic on roads in and around the Swan Valley, including on Great Northern Highway. Traffic congestion, increased travel times and reduced amenity have resulted in the need to investigate a more contemporary solution that is able to cater for projected future traffic volumes while minimising impacts to residents, businesses and tourism in the Swan Valley.

While future urban growth will result in more development in the Swan Valley, opportunities for upgrade works along this section of Great Northern Highway are limited. With the freight volumes predicted to double by 2050, a fit for purpose road built to national highway standard is required. The objectives for such a road are to:

- Improve freight capacity, efficiency and productivity.
- Reduce urban congestion now and into the future.
- Improve road safety through the 'Towards Zero' initiative.
- Maximise sustainability through economic, social and environmental responsibility.
- Improve amenity for the community, tourists and road users.

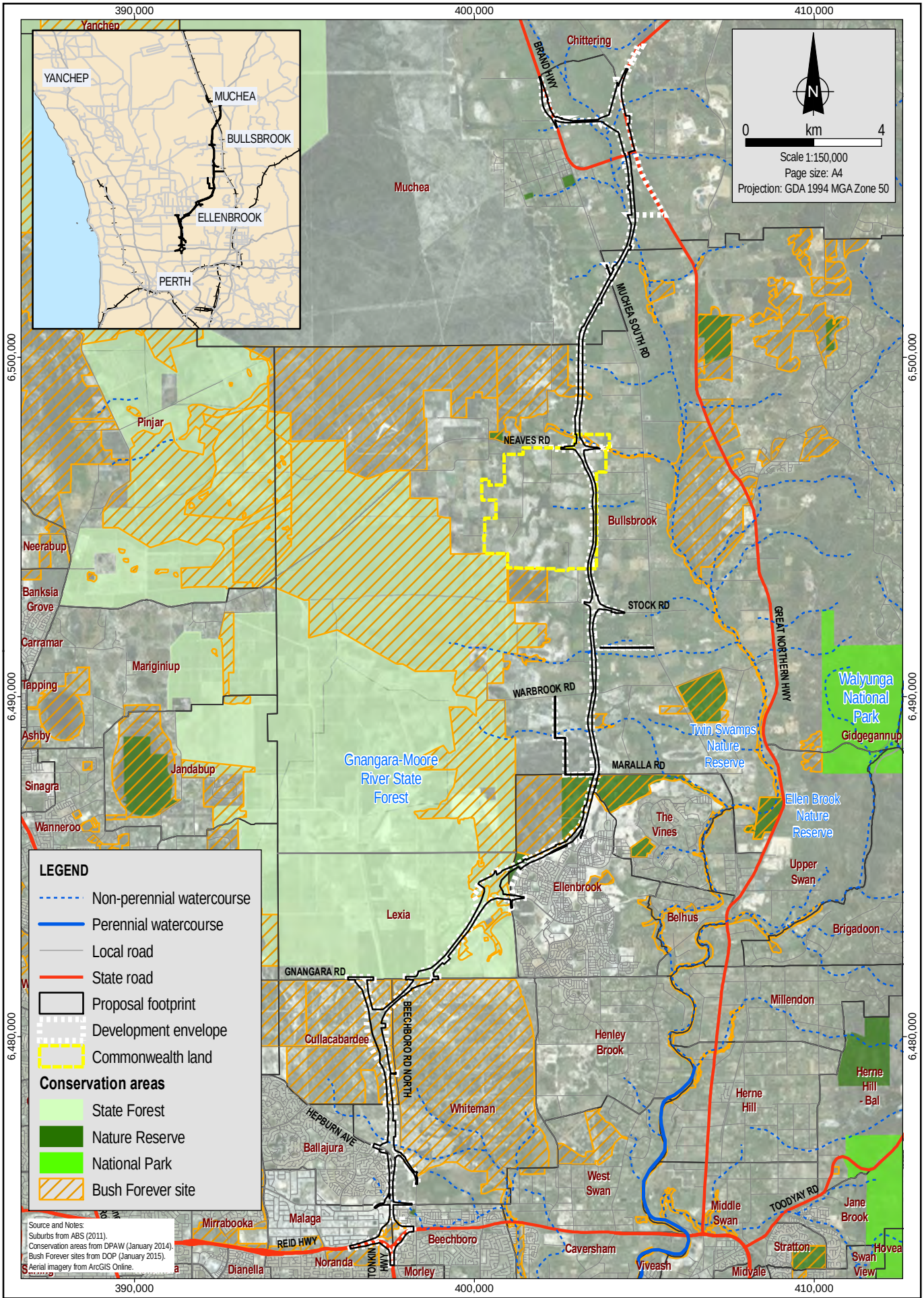
1.3 The Proposal

MRWA is proposing to construct a new section of the PDNH (Figure 1.1). Beginning at the intersection of Tonkin Highway and Reid Highway, the highway will travel north on a new alignment through Whiteman Park towards Gnangara Road before heading northeast through parts of the Gnangara State Forest to Ellenbrook. Skirting the western fringes of Ellenbrook, the highway will continue north passing west of Bullsbrook before again turning northeast to cross Muchea Road South and the Midland–Geraldton railway line. The highway will connect to Great Northern Highway and Brand Highway on the eastern side of the Muchea town site.

The highway will be accessible from grade-separated interchanges at the following roads:

- Tonkin Highway and Reid Highway in Malaga.
- Hepburn Avenue in Malaga.
- Gnangara Road in Lexia.
- The Promenade in Ellenbrook.
- Stock Road in Bullsbrook.
- Neaves Road in Bullsbrook.
- Great Northern Highway and Brand Highway in Muchea.

In addition to these planned interchanges, allowance has been made in the design to incorporate an interchange with a future road heading northwest from Whiteman Park, known as the East Wanneroo North–South Route (EWNSR). The EWNSR north of Gnangara Road is currently in early planning stages and is not part of this proposal. Grade separations will be achieved using a combination of cuttings, embankments, bridges and flyovers as required.



NorthLinkWA	coffey	Date: 18.06.2015 MXD: 4483AA_03_GIS007_2 File Name: 4483AA_03_F001.1_GIS	Main Roads WA Public Environmental Review Perth–Darwin National Highway	Proposal overview	Figure No: 1.1

Pedestrian and cyclist traffic will be accommodated through the provision of a Principal Shared Path (PSP) alongside the new PDNH alignment between Ellenbrook and Malaga. The PSP will be accessible from planned interchanges as well as local streets near the alignment to increase useability.

Construction of the proposal is to start in 2016–17. While this document describes the ultimate planning design concept (UPDC) for the proposal, construction is likely to proceed in a staged approach. Staging of construction has not yet been finalised, though it will be influenced by a number of factors including government priorities, funding availability, urban growth and traffic demand. The staging is not expected to change the spatial extent or significance of the overall environmental impacts described in this document.

1.4 Key Proposal Characteristics

The key characteristics of the proposal are summarised in Table 1.2.

Table 1.2 Key proposal characteristics

Element	Description
Proponent name	Main Roads Western Australia
Proposal title	Perth–Darwin National Highway (Swan Valley Section)
Short description	This proposal is to construct a new 38 km long section of the Perth–Darwin National Highway between Malaga and Muchea, Western Australia. It will consist of a dual carriageway highway and will connect the intersection of Tonkin Highway and Reid Highway in the south with Great Northern Highway and Brand Highway in the north.
Development envelope	975 ha.
Proposal footprint	Disturbance for construction purposes to be no more than 746 ha.
Noise walls	• Noise walls constructed to a height of between 2.4 m and 5 m dependent on agreement with landholders. • Noise walls on residential boundaries to be no less than 2.4 m in height. • Noise walls on non-residential boundaries to be no less than 1.8 m in height.
Area of native vegetation cleared	No more than 205 ha.
Area of conservation category wetland cleared or indirectly impacted	No more than 16.0 ha.

Note: MRWA is seeking approval to construct and operate the proposal within the development envelope. The impact assessment in this PER is based on the proposal footprint, which is the area required to be disturbed based on the proposal's current design. The proposal footprint is wholly contained within the development envelope. The proposal footprint and development envelope are discussed further in Chapter 4.

1.5 Purpose of this Document

The EP Act requires proposals that may have a significant effect on the environment to be referred to the Environmental Protection Authority (EPA). The proposal was referred to the EPA in 2013 and the EPA subsequently decided that the proposal would be formally assessed. The EPA set a PER level of assessment, the highest level of assessment available under the EP Act.

The EPBC Act requires that all actions that will or may have a significant impact on a matter protected under the Act must be referred to the Minister for the Environment via the DOTE. An action must also be

referred if it will have an impact on Commonwealth land. This proposal was referred under the EPBC Act due to likely impacts to threatened flora and fauna species and because it intersects Commonwealth land. DOTE determined that the proposal is a 'controlled action', setting a Public Environment Report level of assessment.

The EPA and the DOTE have agreed to a joint assessment that requires MRWA to produce a single PER (this document) that satisfies the requirements of both assessment processes. The assessment is unable to be formally conducted under the bilateral agreement for joint assessments between WA and the Commonwealth, though the assessment will be coordinated. Broadly, the purpose of this PER is to:

- Describe the features of and activities associated with the proposal, including the development of the proposal.
- Describe the existing natural and social environment in the area where the proposal is located.
- Detail the impacts that the proposal may have on key environmental factors.
- Describe the management and mitigation measures that will be put in place to reduce the impacts of the proposal on the environment.
- Predict the environmental outcomes of the proposal.
- Invite public comment on the environmental impacts of the proposal.

This PER is divided into chapters as follows:

- Chapter 1 (this chapter) introduces the proposal and sets out the basis for this document.
- Chapter 2 provides background to the proposal.
- Chapter 3 provides details on alternative options to the proposal, and how the current proposal has been developed and refined over time.
- Chapter 4 contains a detailed description of the proposal.
- Chapter 5 describes the regulatory context – the legislation, regulations, guidelines, policies that may apply to the proposal.
- Chapter 6 describes the community and stakeholder engagement activities undertaken as part of proposal.
- Chapter 7 discusses the environmental impact assessment framework applied in the development of this PER.
- Chapter 8 focuses on terrestrial flora and vegetation and describes the existing environment, potential impacts of the proposal on this factor, management and mitigation measures and residual impacts.
- Chapter 9 focuses on fauna and describes the existing environment, potential impacts of the proposal on this factor, management and mitigation measures and residual impacts.
- Chapter 10 discusses hydrological processes and inland waters environmental quality and describes the existing environment, potential impacts of the proposal on this factor, management and mitigation measures and residual impacts.
- Chapter 11 describes potential impacts on amenity (specifically noise and vibration), management and mitigation measures and residual impacts.
- Chapter 12 describes rehabilitation and landscaping.

- Chapter 13 discusses Aboriginal heritage and describes the existing environment, potential impacts of the proposal on this factor, management and mitigation measures and residual impacts.
- Chapter 14 discusses European heritage and describes the existing environment, potential impacts of the proposal on this factor, management and mitigation measures and residual impacts.
- Chapter 15 discusses the impact on the amenity associated with Dick Perry Reserve and Whiteman Park and conservation areas.
- Chapter 16 describes potential impacts to matters protected under the EPBC Act.
- Chapter 17 describes the proposed offsets for the proposal.
- Chapter 18 concludes the main content of this document.
- Chapter 19 contains a list of definitions, acronyms and abbreviations used in the document.
- Chapter 20 contains a bibliography of all reference material cited throughout the document.

A number of individuals and organisations contributed to the development of this PER. Details are provided in Appendix A.

1.6 Assessment Process

Assessment of this PER will be conducted in accordance with:

- Part IV of the EP Act.
- The *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012*.
- Parts 8 and 9 of the EPBC Act.

The assessment process has been set out in the proposal's Environmental Scoping Document (ESD) (EPA, 2014a) (Appendix B) and the client service charter agreed by the OEPA, DOTE and MRWA (DOTE, 2014a).

The nominal assessment timeline is shown in Table 1.3.

Table 1.3 Assessment timeline

Step	Nominal timing[1]
EPA approves ESD	1 April 2014
MRWA submits first adequate draft of PER	30 March 2015
OEPA provides comment on first draft PER	8 May 2015
MRWA submits adequate revised draft PER	13 July 2015
OEPA reviews revised draft PER	27 July 2015
EPA authorises release of PER for public review	31 August 2015
MRWA releases approved PER for 4-week public review	7 September 2015
Public review period ends	6 October 2015
OEPA provides summary of public submissions	3 weeks
MRWA provides responses to public submissions	6 weeks
OEPA reviews MRWA responses to public submissions	4 weeks
OEPA assesses proposal on behalf of EPA	7 weeks
OEPA prepares and finalises EPA report on proposal	5 weeks
Minister for the Environment decides whether to approve proposal	After receiving EPA report

1. Dates are subject to change.

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2 PROPOSAL BACKGROUND AND JUSTIFICATION

2.1 Proposal Background

The PDNH is an important link in the State and national road network. It will enhance transport efficiencies between the Perth metropolitan area, northwest WA and the Northern Territory (MRWA, 2012a). The national highway currently follows the Great Northern Highway alignment and Roe Highway in Midland. The current road is built to rural highway standard. Urban growth in the northeast of the Perth metropolitan area, along with growth in the resources sector is anticipated to intensify traffic congestion, reducing amenity and serviceability of the existing highway route. To provide an acceptable long-term road network there is a need to plan for a new national highway route (WAPC, 2012).

The planning for the PDNH commenced in the 1980s. Since 1991, numerous studies have been undertaken by MRWA on behalf of the WA Government in relation to the development of a highway standard road from Perth's metropolitan area to regional areas in the north. The development of this road will provide appropriate road infrastructure to support increased traffic between Perth and regional areas and reduce the impacts of vehicle movements on the local residential population, while it will increase productivity and freight efficiency (MRWA, 2013a).

There has been extensive stakeholder consultation regarding a preferred route and alignment options. The focus of these preferred route alignment options has been to consider key constraints, including environmental and social aspects, and to avoid and minimise impacts where possible.

2.2 Proposal Objectives

The overall proposal objectives are to:

- **Improve freight capacity, efficiency and productivity.** Efficiency can be improved by increasing the average speed of freight along the new route. This will increase reliability by having more consistent travel times. By improving freight movements, and particularly the types of cargoes to support emerging oil and gas projects in WA, the region's competitiveness to undertake such projects in Australia will be increased. Connecting areas of supply and demand ensures the flow of goods into these areas and builds upon the region's global competitive advantage into the future (MRWA, 2013a).
- **Reduce urban congestion now and into the future.** It is estimated that traffic congestion in Perth could cost $2.2 billion per year by 2020 (MRWA, 2013a). Reducing travel time, fuel consumption and general traffic congestion will support economic development and the productive capacity of the freight network. In addition, improving the general traffic congestion in the Swan Valley area will promote better residential and tourist opportunities and communities.
- **Improve road safety in line with the State "Towards Zero" policy.** The primary safety issue is Great Northern Highway's role as a major freight route that is within the Swan Valley tourist area and an urban environment with increasing residential development (MRWA, 2013a). Traffic safety can be improved by diverting regional traffic, including heavy freight vehicles, onto a fit for purpose highway.
- **Maximise sustainability through economic, social and environmental responsibility.** Developing detailed mitigation and management measures during the planning and development of the proposal will ensure that opportunities for environmental, social and economic enhancement within

and outside of the proposal corridor are maximised. By providing efficient freight infrastructure to the economic regions of northwest Australia, the proposal supports economic development. The northwest region accounts for approximately 30% of the nation's exports and is predicted to rise to 45 to 55% by 2025 (Department of State Development, 2012 cited in MRWA, 2013a).

- **Improve amenity for the community, tourists and road users.** Improving the general traffic congestion, in particular in the Swan Valley area, will promote better residential and tourist opportunities. Reducing impacts such as noise and pollution associated with freight vehicles will have benefits for residents and tourists. Improvement of amenities will enhance journeys and give provision for roadside facilities.
- **Create value through affordable infrastructure.** This proposal represents a significant investment and it is critical that primary benefits for road safety, freight capacity and urban congestion are realised in an affordable and socially and environmentally responsible way.

2.3 Proposal Justification

Due to the increase in demand for mineral resources, such as iron ore, and the exploration and development of oil and gas, the population and industry in the northwest of Australia has grown significantly. This increase in mining and construction activity has put a strain on existing road infrastructure (MRWA, 2013a).

As a result of urban growth, agriculture and other developments in the northeast corridor of the Perth metropolitan area, traffic congestion is expected to increase, especially around the Bullsbrook and Upper Swan town sites. This will reduce social amenity and the serviceability of the existing highway route (GHD, 2013a). As upgrading opportunities are limited along the current highway route, the development of a new route is required.

As a solution to the problem it has been proposed to construct new sections of road and to bypass the Swan Valley area. To make sure the highway is fit for purpose, it is necessary to construct a new road from the intersection of Reid Highway and Tonkin Highway to Muchea, as well as upgrade road connections and interchanges within the existing road network (MRWA, 2013a).

2.4 Policies and Strategies

The National Land Freight Strategy was formally approved and released by the Standing Council on Transport and Infrastructure (SCOTI) in September 2013. The Strategy is a partnership between the Commonwealth, State, Territory and local governments and industry to provide a streamlined, combined and multimodal transport system which is capable of moving freight around Australia efficiently (SCOTI, 2012). The PDNH is a key road link and forms part of the National Land Freight Network.

Directions 2031, the State's strategic planning document for the Perth and Peel regions, was released by the Department of Planning (DOP) on behalf of the WA Planning Commission (WAPC). The focus of this strategy is land use and key infrastructure. The PDNH contributes to Directions 2031, particularly in relation to creating a more compact city that maximises the efficiencies of road infrastructure, while mitigating and reducing road congestion (WAPC, 2010 cited in MRWA, 2013a).

2.5 Other Actions Taken or Approved in the Region Affected by the Proposal

2.5.1 Tonkin Highway Grade Separations Project (TGS)

Tonkin Highway will be upgraded between Collier Road and Reid Highway through a series of grade-separated intersections and widening of the highway. Grade separations will occur at Collier Road, Morley Drive and Benara Road. TGS connects directly to the southern extent of the proposal and consists of the following key elements:

- Upgrading Tonkin Highway between Collier Road (north of Guilford Road) and Benara Road (south of Reid Highway) to six lanes (three in each direction).
- Construction of a single-point grade separated interchange at Collier Road including associated realignment of Collier Road and modifications to local road accesses.
- Construction of a grade separated roundabout interchange at Morley Drive including associated local road modifications.
- Grade separation of Benara Road to accommodate a flyover at Tonkin Highway.

TGS is currently under environmental assessment by DOTE and DER. Construction is expected to commence in early 2016.

2.5.2 Reid Highway/Malaga Drive Interchange

The existing at-grade intersection of Reid Highway and Malaga Drive is being upgraded to a grade separated interchange. Construction commenced in May 2015 and will be completed in 2016. This interchange is immediately west of the Reid Highway/Tonkin Highway interchange of this proposal.

2.5.3 East Wanneroo North–South Route

An EWNSR (to be referred to as the Whiteman to Yanchep Highway in future) is planned to connect to the PDNH immediately south of Gnangara Road and will extend to Yanchep in the north, with the alignment north of Neaves Road still to be selected.

2.5.4 Muchea Employment Node

The Muchea employment node is located at the intersection of the Brand Highway and Great Northern Highway, and is an area of 1,113 ha set aside for service-based uses such as transport, livestock, fabrication, warehousing, wholesaling and general commercial use. The node is located approximately 2 km east of the Muchea town centre in the Shire of Chittering.

New development in the employment node will provide a concentration of employment opportunities for people living in and around the Shire of Chittering. Great Northern Highway and Muchea East Road divide the structure plan area into precincts.

The node was recognised as having potential as an industrial area that could take advantage of long-term transport opportunities offered by the proposed PDNH.

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3 ROUTE SELECTION DEVELOPMENT

3.1 PDNH Termination Studies

Various studies have been undertaken since 1991 to identify the route alignment for the PDNH. Several environmental assessments were undertaken as part of these studies and considered during the selection of preferred alignments.

The PDNH Termination Study – Stage 1 Report (by Travers Morgan Pty Ltd, Feilman Planning Consultants, Cossil and Webley in 1991) (MRWA, 2012b) examined a number of route options between Reid Highway and Muchea. Five route options were considered: one along the existing Great Northern Highway, two options to the west of Great Northern Highway and two options to the east of Great Northern Highway. From these, two preferred options were short listed, namely the route along the existing Great Northern Highway and a route to the east of it (MRWA, 2012b).

A northward extension of Tonkin Highway to the west of Whiteman Park and connecting to the western routes was also considered as part of the 1991 study. However, this extension was not short listed at the time as the western routes were not expected to attract sufficient traffic and construction costs were deemed to be prohibitive due to its location over the Gnangara Mound. In addition, the routes to the west would likely restrict access to Whiteman Park.

Public comment and opinion, however, was that a route further west of the Swan Valley should be investigated and the extension of Tonkin Highway from Reid Highway to Muchea was again considered in 1992. As part of this investigation, three route options were considered north of Gnangara Road (Figure 3.1):

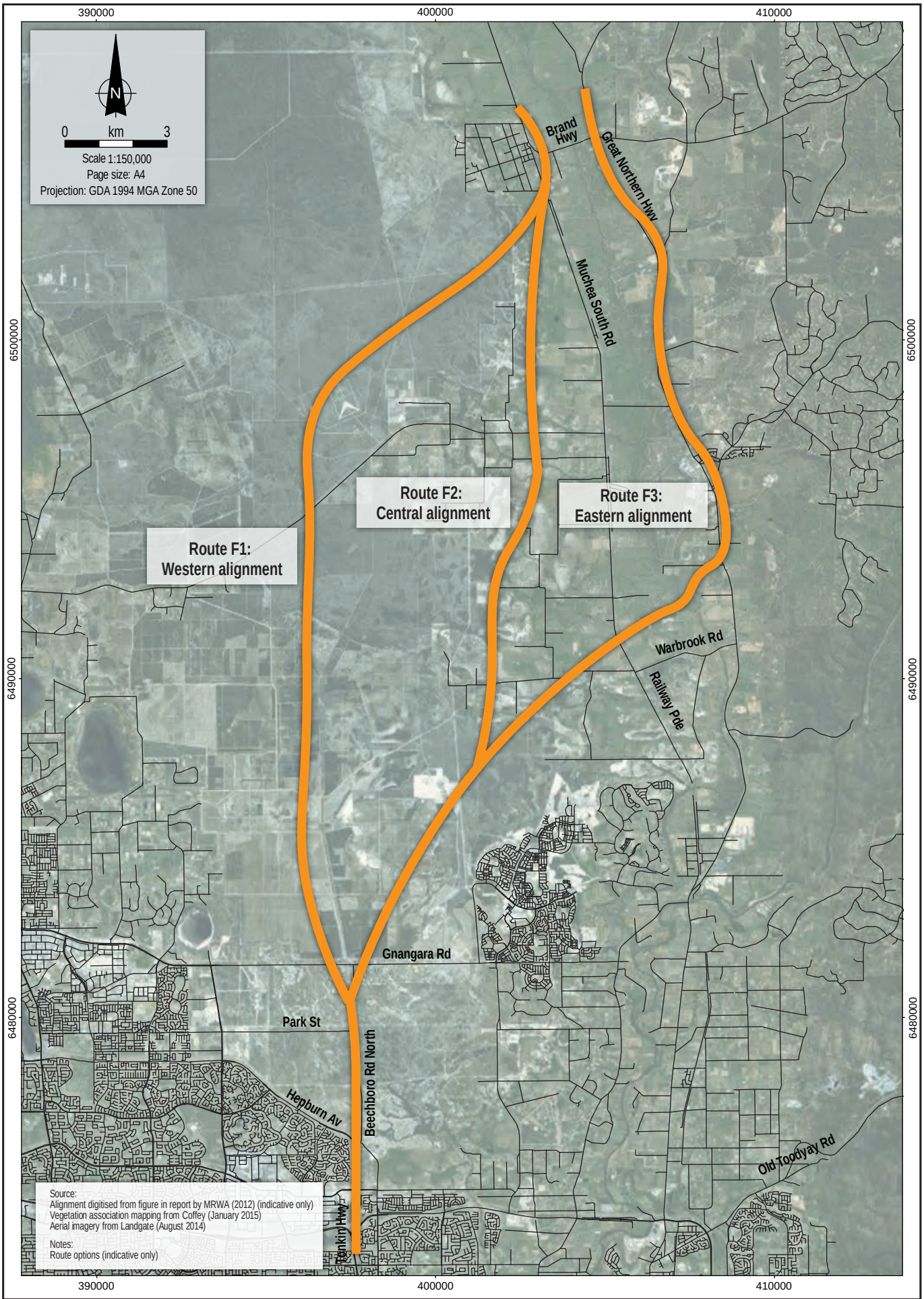
- Route F1 – A western alignment extending north from Tonkin Highway and turning east to join Brand Highway immediately south of Muchea.
- Route F2 – A central alignment that runs northeast from Gnangara Road, turning north to the west of Bullsbrook and joining Brand Highway at the same location as the western alignment.
- Route F3 – An eastern alignment that follows the central alignment from Gnangara Road but continues northeast, crossing the Midland–Geraldton railway and connecting to the existing Great Northern Highway at Bullsbrook.

A number of constraints were identified during the 1992 study, including the Dampier to Bunbury Natural Gas Pipeline, power line infrastructure, Gnangara Geophysical Observatory, Gnangara Priority 1 groundwater resource, Aboriginal heritage sites and Bush Forever sites, vegetation and surface drainage.

All three routes in the 1992 study were considered to be preferable to those previously considered, with the eastern alignment deemed to have the least impact on the above constraints. Route F2 relates closely to the general alignment of the current proposal.

In 1994, the PDNH Termination Study – Stage 2 Final Report by BSD Consultants Pty Ltd (MRWA, 2012b) was completed. Four base options were identified:

- An extension of Tonkin Highway from Reid Highway to Brand Highway in the vicinity of Muchea.
- An extension of Tonkin Highway from Reid Highway across to Great Northern Highway south of Bullsbrook, then following Great Northern Highway to Muchea.



coffey	Date: 18.06.2015 MXT: 4483AA_03_GIS033_2 File Name: 4483AA_03_F03.01_GIS_GL_2	Main Roads WA Public Environmental Review Perth–Darwin National Highway	NorthLinkWA	Route options considered north of Gnangara Road	Figure No: 3.1

- An extension of Lord Street from Reid Highway across to Great Northern Highway south of Bullsbrook, then following the existing Great Northern Highway to Muchea.
- An upgrade of the existing Great Northern Highway.

Seven possible route options were developed from the base options. An alignment along Lord Street and Drumpellier Drive, between Reid Highway and Maralla Road in Ellenbrook, was selected as the preferred route and was included in the Metropolitan Region Scheme (MRS) (MRWA, 2012b). This portion of the alignment is indicated in red in Option A on Figure 3.4. This decision was subsequently reviewed and amended (discussed later in Section 3.3).

3.2 PDNH – Maralla Road to Muchea

3.2.1 Alignment Selection

In December 2000 an Alignment Selection Study Report by Sinclair Knight Merz (SKM) investigated several options to enable a 500 m highway corridor to be selected between Maralla Road and a point north of Muchea (SKM, 2000). Six options were considered (Figure 3.2) with two options (Option B and Option C) shortlisted for further evaluation using a multi-criteria assessment process. The alignment options considered included:

- Option A – Far Outer Option.
- Option B – Outer Bullsbrook.
- Option C – Inner Bullsbrook.
- Option D – Inner/Outer Bullsbrook.
- Option E – Railway Parade.
- Option F – RAAF Pearce.

As discussed by SKM (2000), criteria used in the process included engineering considerations (topographical, ground conditions, utilities), flora and fauna, conservation estate, wetlands, Bush Forever sites, groundwater environmental management areas and economic aspects.

Option A, the most western route, traversed the Gnangara–Moore River State Forest before crossing the railway line just to the south of Muchea before turning northwest and rejoining Great Northern Highway south of Muchea East Road. The route was located partly over the Gnangara Mound water catchment area and impacted on significant areas of remnant vegetation, particularly Bush Forever Site 97, north of Neaves Road. This option was longer compared to the others and the additional travel distance did not satisfy the objective of minimising travel times and costs.

Option B was located approximately two kilometres to the east of Option A and extended along the outer edge of the palusplain in the drier parts of the Bassendean Sands area. This option was considered to be relatively short with lower construction costs as it avoided the waterlogged palusplain area. However, the route would affect a large number of properties and bridges that required construction at an angle and would have a higher cost and greater environmental impact.

Option C crossed a section of land managed by the Department of Defence (DOD) (known at the time as 3TU) and extended north to just south of Neaves Road and then turned northeast to join the existing Great Northern Highway north of Bullsbrook. As this option was located within the palusplain area, it would require high volumes of imported fill with higher associated construction costs. Furthermore, it would require management of traffic noise to avoid impacting on residential areas and would impact on wetlands in the area north of Maralla Road.

Option D was located along the western side of the railway line between Cunningham Road and Rutland Road, from where it turned northwest to join Option B just east of the State Forest. The route provided a relatively direct alignment for freight traffic for the northern part of the corridor, but had reasonably high costs of construction as a result of being located on the palusplain. As per Option B, construction costs associated with bridge crossings would be costly and have a greater environmental impact.

The route for Option E was similar to that of Option D, but extended along Railway Parade until approximately 3 km south of Muchea, before turning northeast to join Great Northern Highway. The route was relatively short, but impacted a large number of properties. In addition, it was considered to have adverse noise and social impacts, with a 200 m noise buffer recommended at the time. Construction of the route was determined to be costly, requiring grade separations to accommodate the existing highway and raising the level of Railway Parade to avoid seasonal waterlogging on the palusplain.

Option F was located approximately 500 m to the east of Railway Parade, between RAAF Pearce and West Bullsbrook. The route allowed for a relatively short and direct alignment, and expansion of West Bullsbrook in a westerly direction. It required construction in the waterlogged palusplain with associated high costs, as well as higher costs of construction of railway crossings at an angle. At the time, buffers for noise levels in West Bullsbrook could not be met and the route may have impacted RAAF Pearce operations.

Option B and Option C were shortlisted for further assessment through a multi criteria assessment process. Option B was preferred from a transport and engineering perspective. Neither option presented a clear advantage from an environmental perspective. Option C was preferred from an urban design perspective as it demonstrated greater flexibility to accommodate future land use planning. It further provided better integration with broader land use structure planning and was selected as the preferred option.

3.2.2 Alignment Definition

The Government of Western Australia endorsed the preferred 500 m wide corridor between Maralla Road and Muchea in January 2002. An alignment definition study was commenced in December 2003 to develop a planning design concept and a more precise road reservation based on Option C between Maralla Road and Calingiri Road at Muchea. The study included detailed environmental and heritage investigations and consultation with key stakeholders, landowners and the community (MRWA, 2012a).

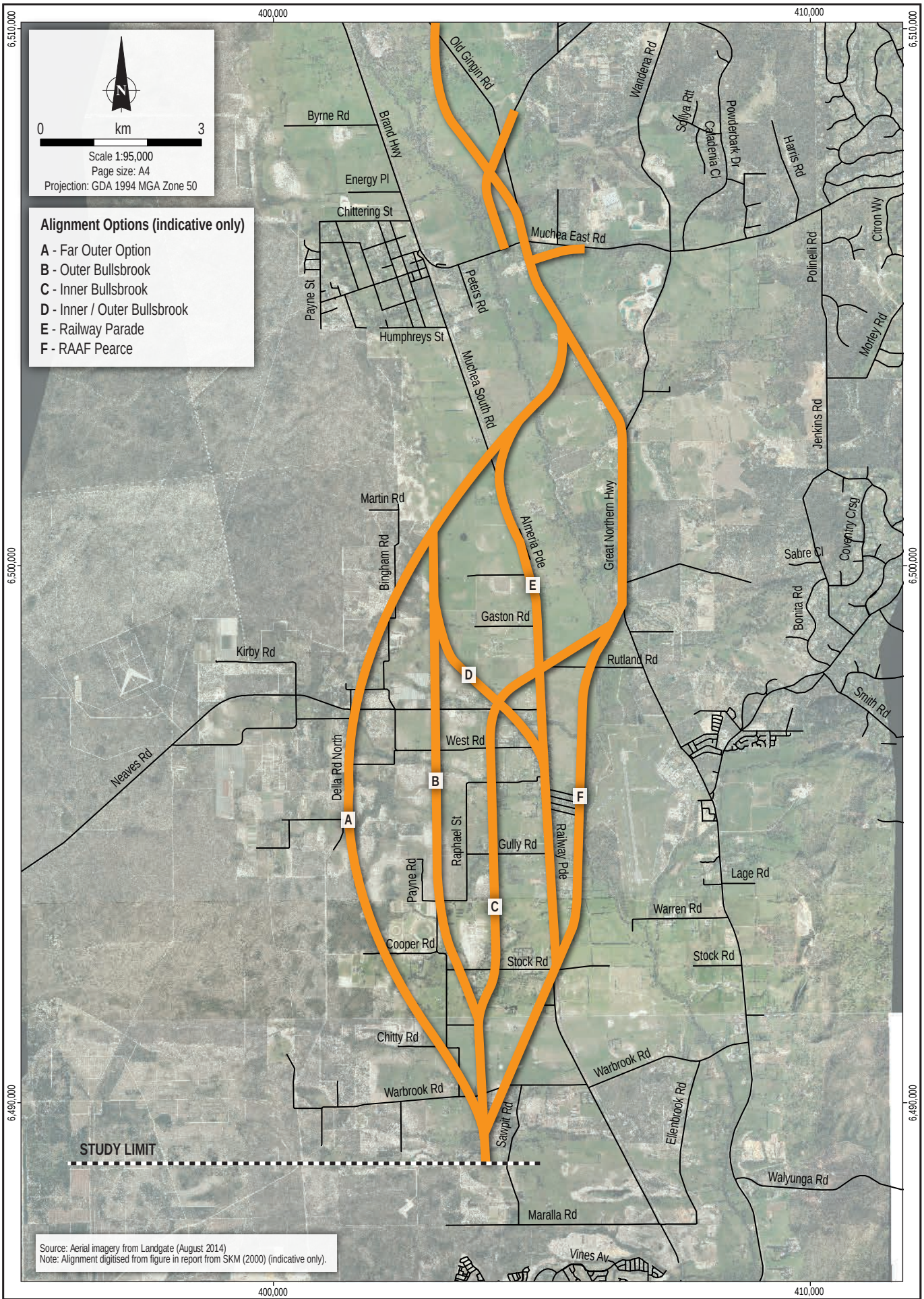
As part of the alignment definition study, an assessment of potential physical constraints on the alignment was undertaken and included topography, development, major infrastructure, DOD facilities, watercourses, wetlands, rare flora, indigenous and non-indigenous heritage sites (GHD, 2010).

In defining the alignment, impacts on the following were avoided where possible or minimised:

- Wetlands, Bush Forever sites, rare flora and trees.
- Indigenous and non-indigenous heritage sites.
- Property severance, access and water supply.

A preferred concept and reservation for the section between Maralla Road and Muchea was developed. This provided for a four-lane highway standard road within a nominal 100 m wide road reservation with potential interchanges at Warbrook Road, Neaves Road and Muchea. Provision was made for a rapid transit public transport route in the central median, drainage basins and a cycle/pedestrian facility.

Based on investigations as part of the alignment definition study, the concept alignment for the PDNH was revised to include the following key modifications:



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- The DOD, which controls land owned by the Commonwealth Government south of Neaves Road, requested that an alignment further to the east be considered to minimise impact to its property. In response, an alignment along the eastern boundary of DOD land was developed that abuts Raphael Road, a shift of approximately 600 m east of the original alignment (GHD, 2013a).
- A minor westward shift of the alignment at the southern section of the DOD land to minimise impacts on an environmentally sensitive conservation category wetland at Raphael Road (WAPC, 2012) (Figure 3.3).
- Relocation of the proposed interchange at Warbrook Road to Stock Road following consultation with the City of Swan and the Department of Environment and Conservation (DEC). The DEC had at the time, indicated a preference for the interchange to be located at Stock Road to avoid any potential impacts on Twin Swamps Nature Reserve, which is covered by the Environmental Protection (Western Swamp Tortoise Habitat) Policy (GHD, 2013a).
- An eastward shift of the alignment at Gaston Road and north of Neaves Road to avoid hydrological impacts to the Mound Springs Swan Coastal Plain (SCP) Threatened Ecological Community (TEC) in the vicinity of Bingham and Gaston Roads. This shift to the east provided a 100 m buffer between the TEC and the highway reserve and would ensure that the TEC remained upstream of the PDNH (GHD, 2010).
- Realignment and reconfiguration of the interchange of the PDNH alignment, Brand Highway and Great Northern Highway at Muchea to optimise access to Muchea (WAPC, 2012).

The preferred concept and reservation (see Figure 3.3) was incorporated in the MRS by the WAPC in 2012.

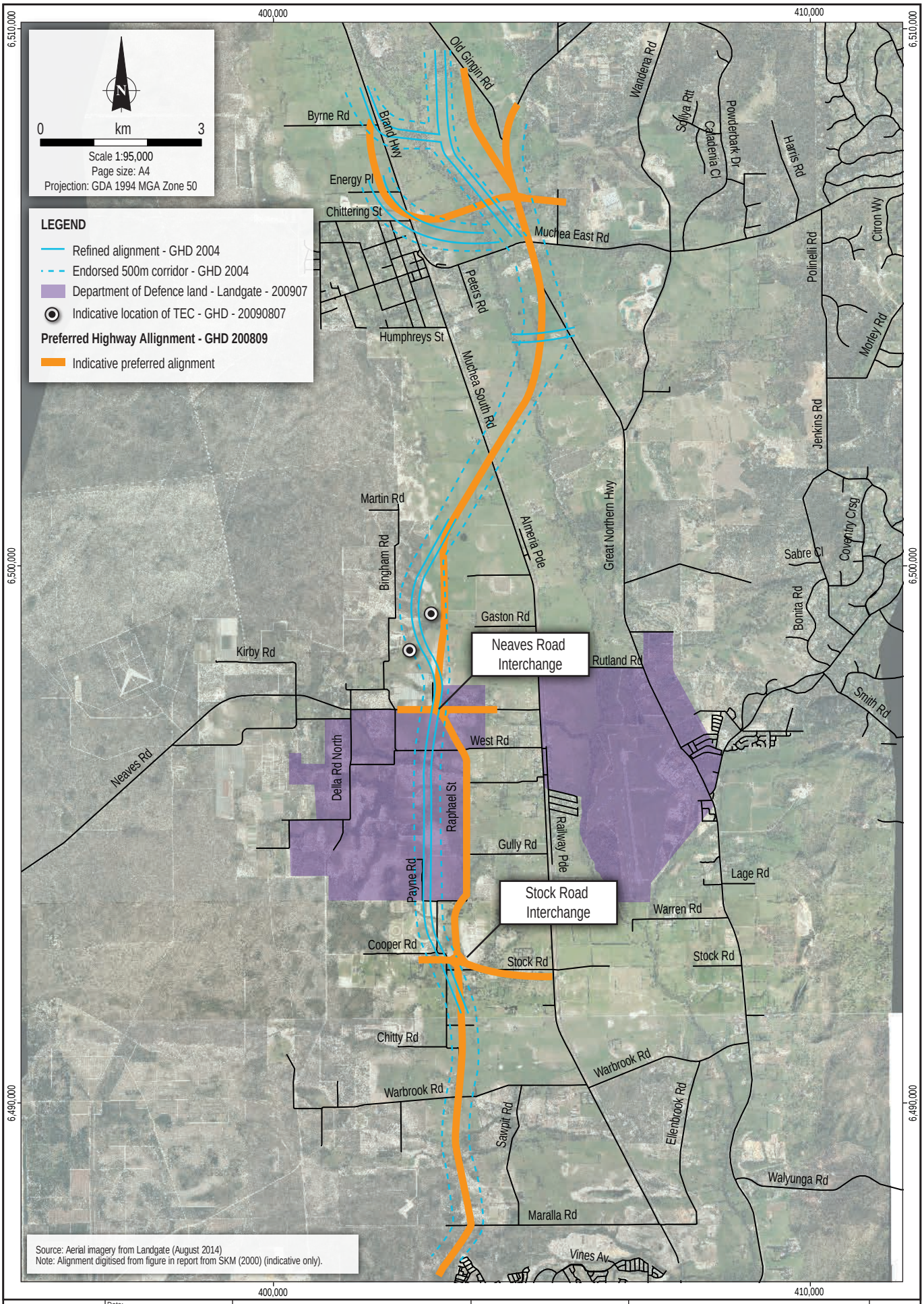
3.3 PDNH – Reid Highway to Maralla Road

A strategic road network review was conducted by MRWA in 2012 (MRWA, 2012b) to confirm the route alignment and network configuration for the PDNH between Reid Highway and Maralla Road. The review considered environmental, social, heritage and land use constraints as well as strategic planning considerations for the area.

One key aspect considered was a separate regional road proposed to run along the western edge of the Gnangara Priority 1 Underground Water Pollution Control Area (UWPCA). This proposal, known as the EWNSR, provided an opportunity to consider a more direct connection of the PDNH to Tonkin Highway.

Three network options for this section of the PDNH were therefore considered (see Figure 3.4):

- Option A, which included the approved alignment (as endorsed by the WAPC) for the EWNSR proposal and the PDNH alignment along Drumpellier Drive and Lord Street. North of Gnangara Road the existing Drumpellier Drive was proposed to be replaced by the PDNH. Under the proposed option, PDNH would replace sections of Lord Street between Reid Highway and Gnangara Road and the existing Lord Street would become a discontinuous local road.
- Option B, which included the route alignment for the EWNSR and a western PDNH alignment running southwest to northeast on the western edge of Ellenbrook. The PDNH alignment would connect to the EWNSR south of Gnangara Road and then link with Tonkin Highway. Drumpellier Drive and Lord Street were included as four-lane local arterial roads to provide north–south connectivity to Reid Highway. Lord Street would continue south of Reid Highway as a two-lane road.
- Option B1, which was a modification of Option B, where Drumpellier Drive and Lord Street are two-lane local roads rather than four-lane local arterials.



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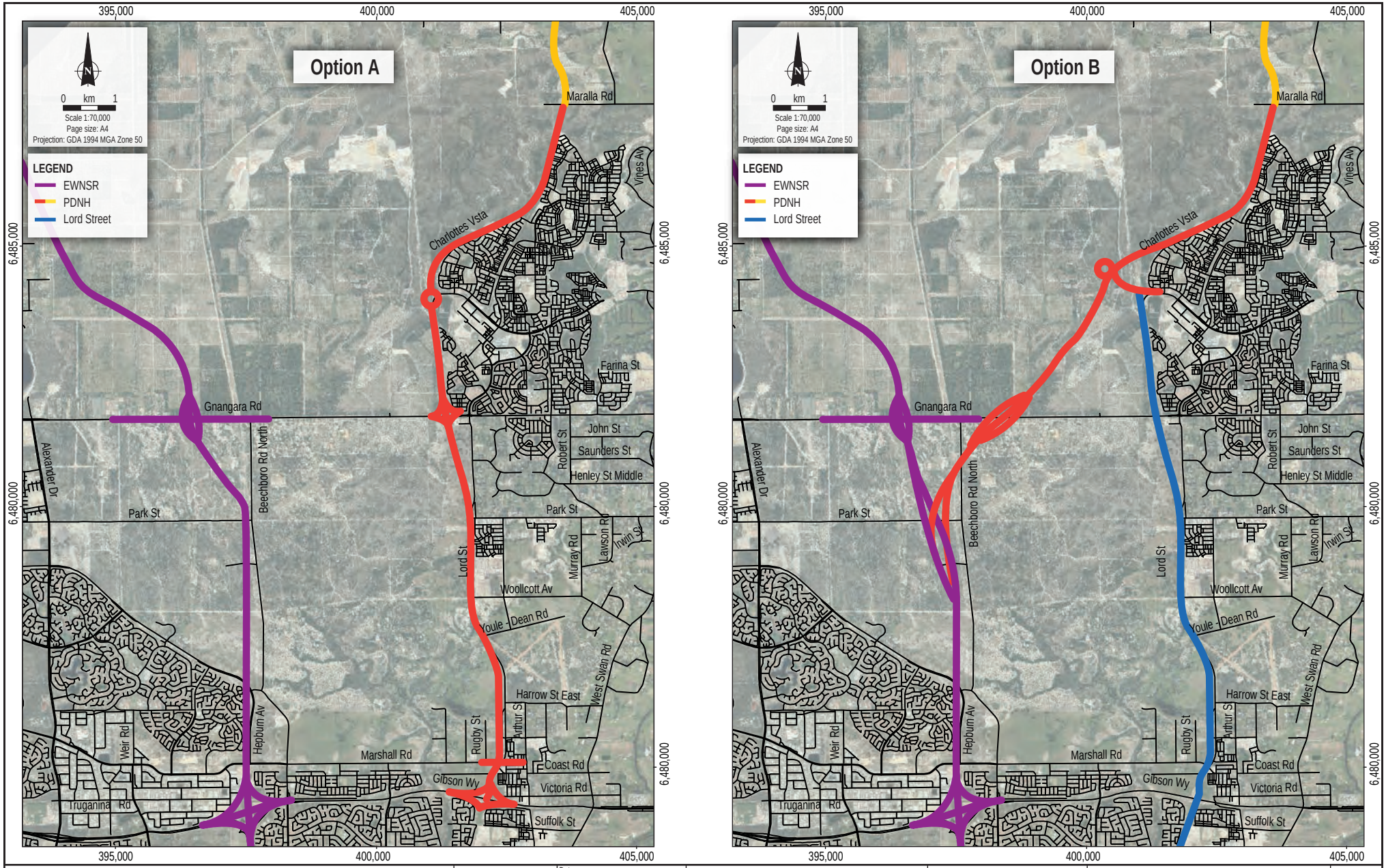
Alignment options in the vicinity of Raphael Road wetlands

Figure No: 3.3



Source: Imagery from Google Earth.
Note: Alignment digitised from figure in report from MRWA (2012b) (indicative only).

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Indicative alignment options considered from Reid Highway to Maralla Road

Illustration No: **3.4**

An environmental constraints assessment undertaken on the three options identified the following issues to be considered:

- Options B and B1 will require approximately 8 km of additional highway across the Gnangara Priority 1 Underground Water Pollution Control Area.
- Options B and B1 would increase the potential impact on a Conservation Category Wetland in Cullacabardee that is already impacted by the EWNSR, while Option A would impact on a large area of Multiple Use Wetlands south of Gnangara Road.
- Option A would impact on fewer Bush Forever sites between Reid Highway and Ellenbrook.
- All of the network options impact on a TEC north of the suburb of Ellenbrook.
- Options B and B1 would impact on the eastern portion of the Gnangara State Forest.

Modelling undertaken on these options indicated that there was a strong demand for a more direct link between the PDNH and Tonkin Highway and that Option B would provide significant transport benefits including:

- Providing a more functional transport network.
- Functioning as a more effective transport link with approximately 84% of freight traffic travelling on the PDNH north of Ellenbrook using the proposed link to Tonkin Highway.
- Improved integration with key highway infrastructure, linking to important industrial areas in Kewdale/Welshpool area.
- Having less social impact on existing and future residential areas.
- Requiring less capital expenditure.
- Achieving the lowest operating cost (MRWA, 2013a).

3.4 MRS Referral Boundary

The road reservation included in the MRS was based on the various definition studies discussed above and consisted of a corridor approximately 100 m wide and 40 km long, covering an area of approximately 963 ha.

This boundary formed the basis of the environmental referral submitted to the EPA in October 2013. Following the referral, proposal definition has led to sections of the alignment extending outside this reservation. The current development envelope therefore varies from the boundary nominated in the referral, encompassing the existing MRS road reservation as well as future proposed amendments to the MRS to allow for the construction of this proposal.

3.5 No Build Option

The option of not proceeding considers the consequences if the proposal is not constructed. The key consequences include:

- Lack of key transport infrastructure to support energy and resource projects in the northwest of WA to remain competitive in the global marketplace. The Australian National Land Freight Network was developed to maximise Australia's international competitiveness and consists of a network of freight corridors to the major seaports, airports and freight generating regions. The northwest of WA is the

largest single freight generating region in Australia, contributing approximately six per cent to Australia's total GDP (NLWA, 2015a).

- Separation of freight and local traffic will enhance the whole road network's safety and social amenity, which is consistent with State and metropolitan priorities and planning directions. Not proceeding with the proposal will preclude these safety and amenity benefits.
- Increasing already unacceptable congestion levels and crash statistics in the region as a result of expected traffic growth in both freight and passenger vehicles.